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Kiel Institute of World Economics
Duesternbrooker Weg 120
24105 Kiel (Germany)

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The "Employment Intensity" of Growth in Europe

by

Jörg Döpke

January 2001

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The Employment Intensity of Growth in Europe*

Abstract:

The paper elaborates on the employment intensity of growth. Previous evidence regarding this question is surveyed. Empirical results concerning Europe and selected other industrial countries reveal that the cyclical link between unemployment and growth is still stable in the nineties. However, the relation strongly depends on the variable chosen to represent the labor market situation. Test on an asymmetric relation leads to ambitious results. Cross-country and panel evidence suggest that the employment intensity of growth is influenced by the country's wage setting process, the share of the service sector, and labor market flexibility. A clear-cut importance of exchange rate volatility cannot be found. Some conclusions with regard to economic policy are drawn.

Keywords: Unemployment, Employment, Okun's law, European monetary union

JEL-classification: E2, C2

Corresponding address:
Dr. Jörg Döpke
Kiel Institute of World Economics
24100 Kiel, Germany
Telephone: +49-431-8814-261
Fax: +49-431-8814-525
E-mail: J.Doepke@ifw.uni-kiel.de

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1 Introduction

The EU White Book on growth, competitiveness and employment (European Commission 1994) and the more recent EU employment guidelines aim at improving the employment situation within the European Union. The strategy of the White Book was twofold: on the one hand the prospects for growth were a major target, on the other hand attempts to promote the employment intensity of growth were on the agenda. Five years after, this paper will discuss to what extent the White Book strategies have been a success or failure. Moreover, the central question to be discussed in this paper is what economic policy can do to achieve more employment out of a given growth rate. In the public opinion opposite concerns dominate the discussion. It is often stated that the link between employment and growth is disturbed. In particular, the political discussion fears that society has entered an area of "jobless growth" (e.g. Gerstenberger 1999). This is in remarkable contrast to the conventional wisdom in the scientific community. For example, Blinder (1997) counts the relation between unemployment and growth to the principles of macroeconomics "we should all believe". Despite this, he argues that a simple linear relation between the percentage change of output and the absolute change in the unemployment rate is "atheoretical, if not indeed antitheoretical" (Blinder 1997:241).

To shed light on the important question whether the empirical regularity between unemployment or employment and output growth is still valid, the paper presents a discussion of the stylized facts of the relationship between employment and growth. In a first step recent empirical evidence on this question is reviewed. In a second step, updated empirical results for the European countries are compared to the results for other industrial countries. Moreover, it is tested whether the relationship is different for the individual European countries. To summarize the findings, so-called Okun coefficients for the countries under investigation are estimated. It is analyzed whether these coefficients are stable over time or have changed recently. Additionally, it will be discussed whether the stylized facts change when alternative definitions of "employment" (persons, hours) are utilized in the empirical analyses.

After the main stylized facts of the employment-growth nexus will have been figured out, the crucial question is how economic policy can influence these links in favor of a more job-intensive growth. To discuss this question, several possible determinants of the employment intensity of growth like real wages, the share of services relative to total output, labor market institutions, and exchange rate volatility are discussed and compared in a cross-country analysis.

It is of particular relevance whether or not economic policy can and should try to increase the employment intensity of growth. Therefore, in the final section some conclusions with regard to economic policy will be drawn.

2 The European Commission's White Book "Five Years After"

Five years ago the European Commission (EU) provided a White Book (European Commission 1994) on competitiveness, growth, and employment. The paper was devoted to outline a strategy to improve the insufficient labor market situation. Table 2.1 reveals that a look at the quantitative outcome of the economic development of the last five years leads to the conclusion that the strategy was only a partial success. Though employment has increased, the number of newly created jobs was not large enough to match the challenging aims of the White Book.

Table 2.1 —The EU White Book — five years after

Variable	White Book Projection	Actual Outcome
Increase in Employment (number of persons)	+15 mill.	+5 mill.
Growth of Employment in the European Union	1.5 to 2 % p.a.	0.7 %
Growth of Real GDP in the European Union in p.c.	3 to 3.5 % p.a.	2.3 %
Employment Intensity of Growth in percentage points	–2.5 to –3	–1.7

Sources: White Book (1994), European Commission's Spring Forecast 2000 (2000a) and own calculations.

Roughly one third of the necessary rise in the number of persons employed was actually achieved. As can also be seen from the following row of the table, this is to a good deal due to a lack of growth. The upswing following the recession of 1992/93 was somewhat weaker than expected. The growth of real output was by about 1 to 1.5 percentage points lower than the strategy has assumed. However, this difference cannot explain the weakness of the employment increase. Additionally, it has to be taken into account that the so-called employment intensity of growth was substantially lower than presumed. Table 2.1 calculates these number as the White Book has done, i.e. the employment intensity is the difference between the increase in real production and the change in employment in percentage points. Thus, the number indicates the increase of labor productivity. It was clear-cut higher than expected in the White Book. Moreover, the White Book has even quantified the growth rate of GDP necessary to keep employment at least constant. It is stated that the growth rate observed at that time (1994) by about 2 p.c. would be just enough to keep employment constant. If one takes this statement as given even the slight improvement of employment must be taken as a surprise. Hence, it is a natural and

relevant question whether the link between employment and growth is still valid and correctly quantified. Moreover, it has to be addressed what policy measures can be undertaken to improve the employment intensity.

3 Previous Empirical Evidence on Employment and Growth

This section is devoted to an overview on recent empirical evidence on the relation between growth and employment with a special focus on Europe. Most of the literature is concerned with a discussion of so-called Okun coefficients in various directions. In his seminal paper Okun (1970) defines a coefficient which gives the rate of change of real output for a given change in the unemployment rate. The focus of this contribution was on an estimation of potential GDP. As a consequence, unemployment was seen as the exogenous and real GDP as the dependent variable. Within this paper the causality is mostly assumed to be in the opposite direction, i.e. changes in output may explain the variation of employment or unemployment.

Lee (2000) estimates Okun equations for all OECD countries. He stresses that the relation is not stable over time, but concludes that the impact of growth on employment is still valid. Moreover, he argues that the coefficient is considerably different across the countries under investigation. Different estimation techniques — in particular different trend extraction methods — also lead to conflicting views of the Okun relation. However, though discussing the merits of several technical methods to calculate the output elasticity of employment or unemployment he offers no explanation for the differences across countries.

Padalino and Vivarelle (1997) discuss the Okun coefficient for the G-7 countries. They find that the Okun relation is still valid for these countries. They report that the correlation of GDP growth to the change of hours worked in manufacturing is closer than to other measures of employment or unemployment. Moreover, according to these findings, the growth-employment link in manufacturing is much closer than the respective relation estimated for the total economy. They conclude that the link between employment and growth has not weakened over time.

Baker and Schmitt (1999) estimate Okun coefficients for a panel of OECD countries. They point out that the employment intensity of growth today is higher than, for example, in the sixties. They stress the importance of foreign growth as a determinant of domestic employment. Moreover, they contrast the interpretation of unemployment given by Okun's law as a macroeconomic explanation to the viewpoint that microeconomic factors are the main source of at least European unemployment. They claim that the relatively good empirical performance of Okun

equations is a strong hint that macroeconomic forces play a greater role in the development of unemployment than it is generally believed.

Schalk and Untiedt (2000) provide a discussion of the link between employment and growth with a special focus on the German situation. They estimate Okun equations and conclude that Okun's law is a valid approximation. Moreover, they perform test on parameter constancy and report structural breaks in the estimated relationship related to the two oil price shocks in 1974 and 1981. However, according to their results the link between unemployment and growth has even become closer than before. The unemployment threshold calculated from these study has declined by two percentage points since the early seventies. To provide evidence on the dynamic interactions between unemployment and growth the authors have also estimated a vector auto regressive model (VAR) including the unemployment rate, real GDP, nominal wages and the inflation rate. Their impulse response analysis reveals that a shock to either real GDP growth or to inflation has significant effects on the unemployment rate 15 quarters. After this time span no significant response can be observed. Schalk and Untied (2000) discuss a possible asymmetry of Okun's law and report that the Okun coefficient is higher in absolute terms in recession as compared to expansion phases of the business cycle. They also use Okun's law to estimate potential GDP and conclude that these estimations do not differ very much as compared to the numbers calculated by the German council of economic advisers. Taking all their evidence together the authors argue that the link between unemployment and growth is still close enough to rely policy advice on this relation. Therefore, they emphasize the role of aggregate demand as a major source of unemployment changes.

Erber (1994) estimates Okun equations for a number of OECD countries. He finds a significant negative correlation between unemployment and growth. He confronts this finding with another famous empirical regularity called Verdoon's law. According to this rule changes of labor productivity depend positively on changes in real output.

Solow (2000) argues that a good deal of the European unemployment is due to lack of demand. Using the Okun relation and some simple calculations he quantifies the recent output gap for Germany in the neighborhood of –6 p.c. Prachowny (1993) considers the theoretical foundation of Okun's law. He derives the usual Okun relationship starting from a production function using several restrictive assumptions. His empirical evidence for the United States supports the view that the Okun equation is a useful proxy in macroeconomics. Buscher et al. (2000) present several estimates of the Okun relations using German, Dutch American and British data. Employing a wide range of empirical techniques they argue that the cyclical link between the labor and the goods markets has not become weaker. Rather, they argue

that the interaction between the two developments has become even closer in recent times. Moreover, they refer to a similar study by Löbbe (1998) to show that the employment threshold varies across the sub-sectors of the economy.

Bräuninger and Pannenberg (2000) analyze the link between unemployment and productivity in a growth model. They also present some empirical evidence — using a panel of OECD country data — supporting the view that unemployment lowers productivity in the long run. Flaig and Rottman (2000) criticize the Okun coefficient literature for neglecting the influence of relative prices. They argue that the employment intensity of growth is strongly related to real labor cost and, hence, estimating a simple Okun equation is not appropriate since it would be not correctly specified. Fabiani and Mestre (2000) estimate non-accelerating rates of unemployment (NAIRU's) for the Euro-area and derive output gaps from these estimates.

Buscher and Müller (1999) as well as Stirböck and Buscher (2000) argue that the Okun relationship in Germany is affected by exchange rate volatility. In particular, they argue that higher exchange rate volatility will cause a lower employment intensity of growth. Revenga and Bentolila (1995) discuss the reasons for a different employment intensity of growth across countries. They use a panel estimation method to evaluate the Okun coefficients in a group of OCED countries and add dummy variables to capture different labor market institutions. In a similar approach, Nickell (1999) explains differences in the level of unemployment rates by variables capturing the main labor market institutions. Hubert (1997) presents empirical evidence that Okun’s coefficient partly depends on the flexibility of the national labor market. The latter is measured by the judgment provided in the OECD jobs study (OECD 1994).

All in all, the results of the various studies suggest that the link between unemployment and growth is still a useful macroeconomic rule of thumb. There is little evidence, however, how the link can be influenced and exploited by economic policy.

4 Growth and Employment: Some Stylized Facts for European Countries

4.1 The Okun Coefficient

In Okun’s (1970) seminal paper, the relation between the unemployment rate and the change of real GDP takes the form:

$$(4.1.1) \quad \Delta U_t = -\frac{1}{k}\Delta \ln GDP_t$$

with k as the so-called Okun coefficient. Okun found for the US a value of k=3. Since then a large number of empirical studies has estimated Okun's coefficient for industrial countries. From equation (4.1.1) it is possible to calculate an "unemployment threshold", i.e. the growth rate of real GDP that is necessary to reduce unemployment.

Table 4.1.1 — Okun Equation in First Differences for Selected OECD Countries, Sample 1971–1999

Country	$\hat{a}$	$\hat{b}$	R^2	d_w	k	$-\frac{a}{b}$
Austria	0.44	–0.10	0.31	1.81	9.75	4.27
	(6.34)***	(–7.36)***				
Belgium	0.73	–0.15	0.10	0.69	6.65	4.88
	(2.13)**	(–1.82)*				
Denmark	0.94	–0.36	0.41	0.90	2.74	2.56
	(4.33)***	(–7.48)***				
Finland	1.55	–0.45	0.65	1.22	2.21	3.44
	(4.55)***	(–5.00)***				
France	0.82	–0.21	0.31	1.25	4.75	3.89
	(6.35)***	(–3.85)***				
Germany[a]	0.78	–0.19	0.43	1.12	5.17	4.01
	(4.00)***	(–3.80)***				
Greece	0.64	–0.15	0.31	1.49	6.78	4.30
	(2.31)**	(–2.54)**				
Ireland	1.85	–0.06	0.54	1.89	2.59	4.49
	(5.45)***	(–6.36)***				
Italy	0.39	–0.06	0.04	1.21	17.40	6.75
	(2.13)**	(–1.45)				
Netherlands	1.07	–0.38	0.33	0.88	2.65	2.85
	(2.58)**	(–2.63**)				
Portugal	0.29	–0.12	0.12	0.85	8.60	2.50
	(1.22)	(–1.90)*				
Spain	1.96	–0.52	0.43	0.72	1.93	3.79
	(3.99)***	(–2.85)***				
Sweden	0.77	–0.34	0.57	0.98	2.96	2.29
	(2.67)**	(–3.22)***				
United Kingdom	0.99	–0.39	0.47	1.10	2.55	2.53
	(3.88)***	(–4.11)***				
United States	1.25	–0.42	0.75	1.92	2.40	3.00
	(9.56)***	(–11.99)***				
Switzerland	0.20	–0.06	0.09	1.05	15.66	3.15
	(1.18)	(–1.90)*				
Japan	0.30	–0.05	0.34	1.54	19.00	5.76
	(4.42)***	(–2.79)***				
Norway	0.62	–0.17	0.26	1.27	5.93	3.69
	(2.14)**	(2.58)**				

In brackets: *t*-values calculated with robust standard errors using the method of Newey and West (1987). — *** (**,*) denotes significance at the 1 (5, 10) percent level. — a) West Germany until 1991.

In a first step the relation is estimated country by country to reproduce the results found previously. The estimated relationship is:

(4.1.2) $\Delta U_t = a + b\Delta \ln GDP_t + u_t$

Figure 1a — GDP Growth and Employment Growth for Selected OECD Countries 1970 to 1999

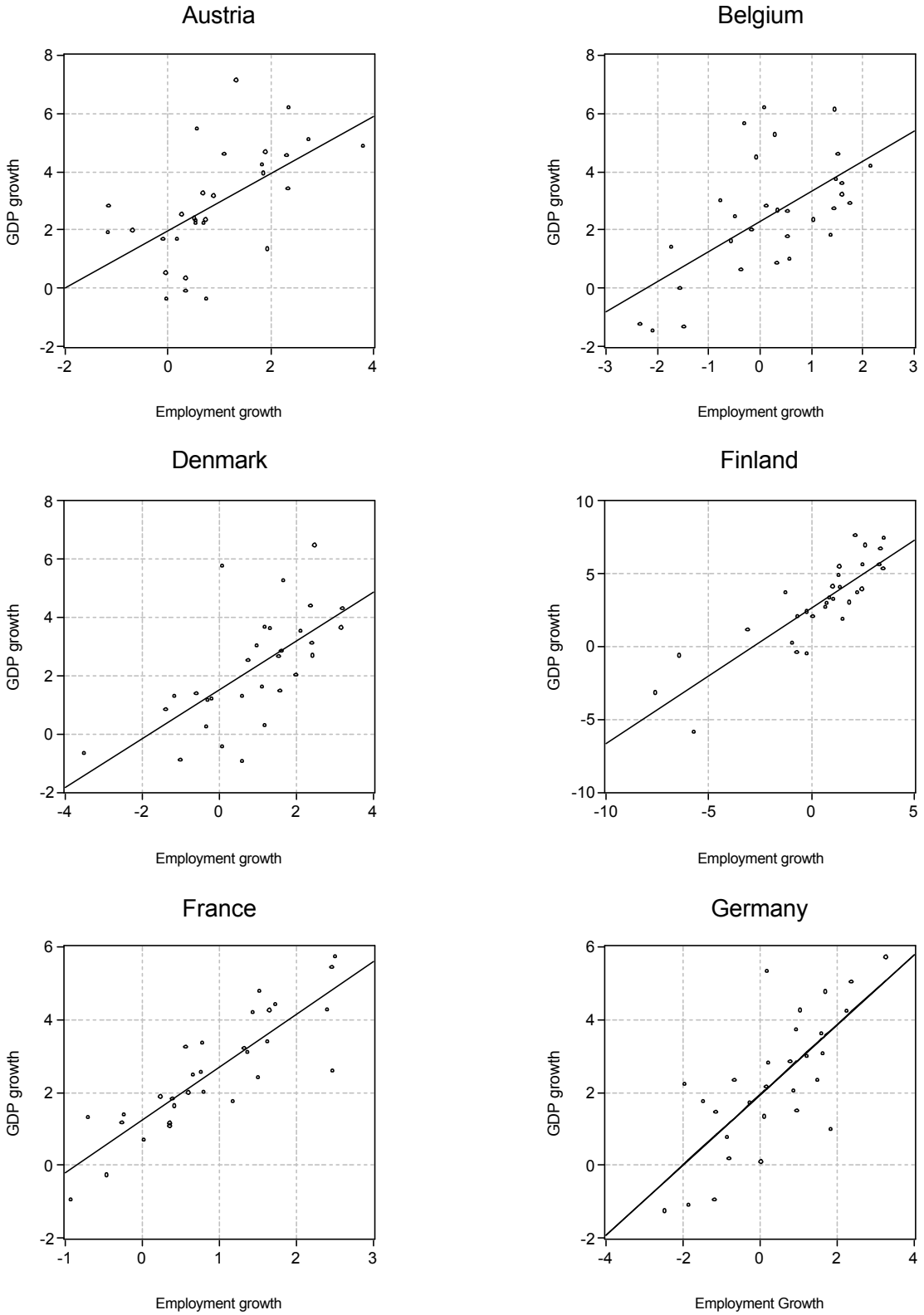


Figure 1b — GDP Growth and Employment Growth for Selected OECD Countries 1970 to 1999

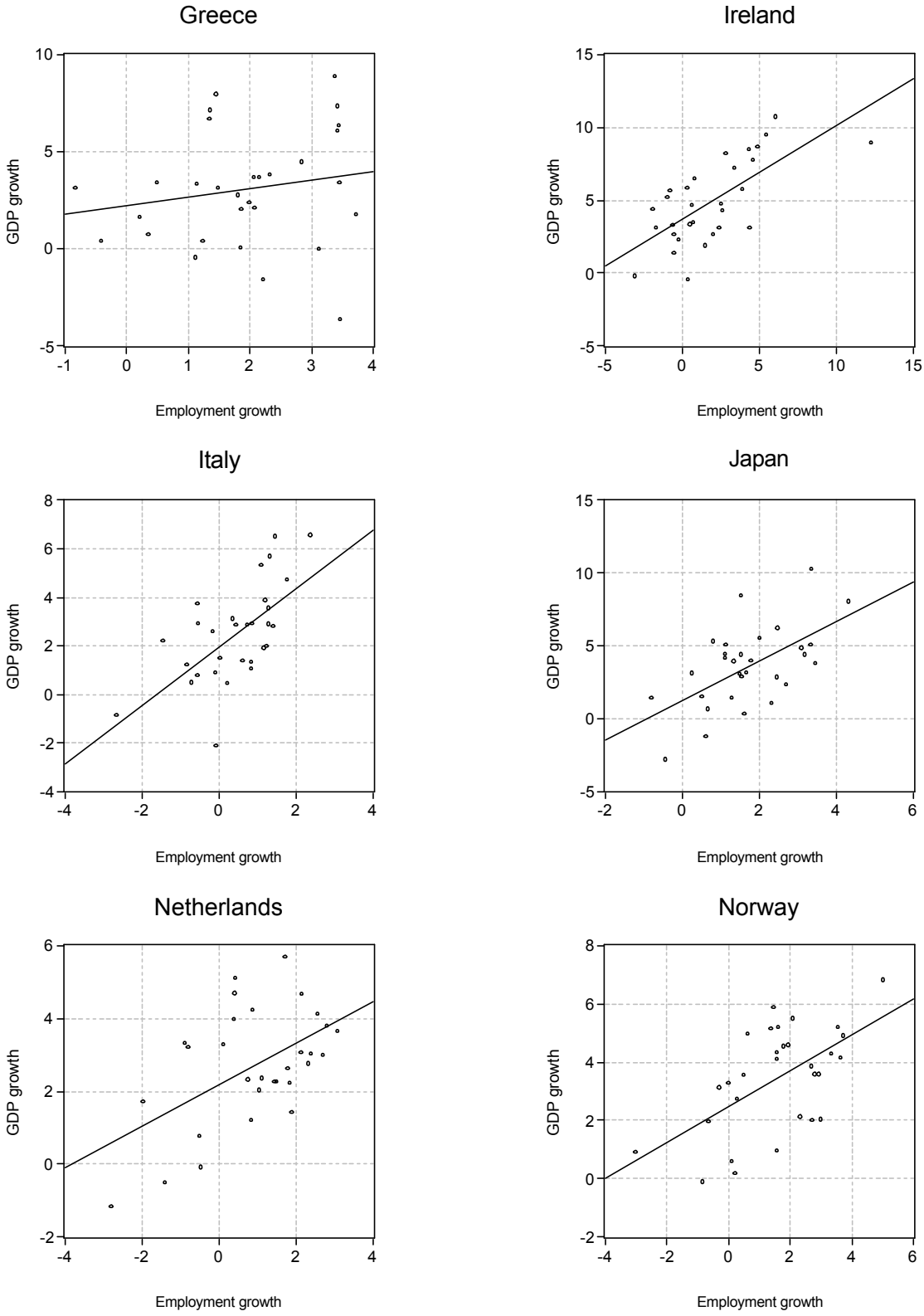
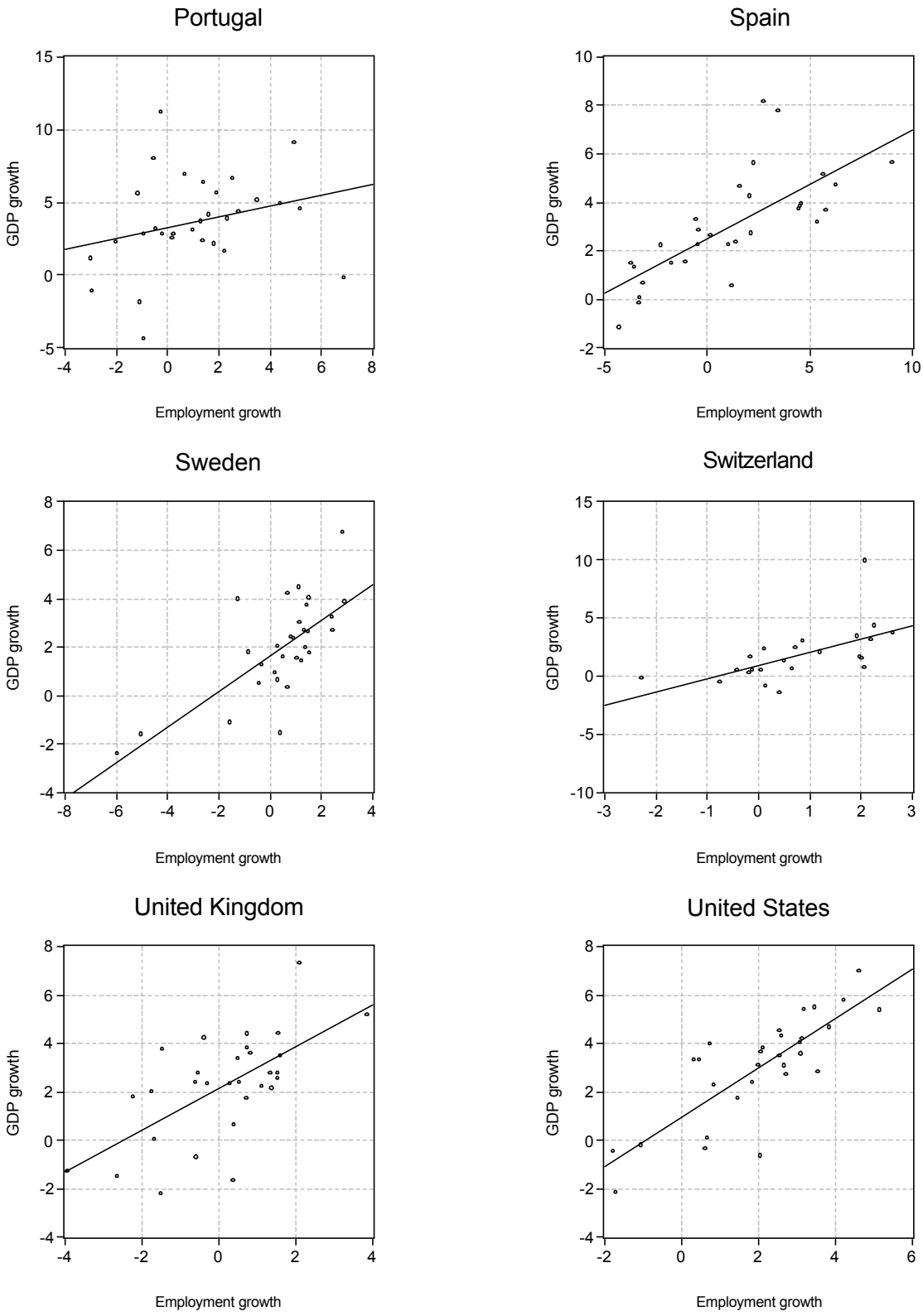


Figure 1c — GDP Growth and Employment Growth for Selected OECD Countries 1970 to 1999



with *t* as the time index. Annual data ranging from 1970 to 1999 are used. As the institutional arrangements are quite different across the member states the unemploy-

ment threshold $-\frac{a}{b}$ might vary across the countries. Since this equation has no dynamics at all and does certainly not contain all relevant variables robust standard errors — in particular, the method of Newey and West (1987) — have been calculated. The results of these exercises are given in table 4.11.

The result indicates that the simple Okun relationship is still a useful proxy for most of the countries under investigation. The coefficients are significant with the expected signs and for some countries the fit of the equation is remarkably high. However, there are some exceptions from this rule and generally the remaining autocorrelation indicates that the equation is not correctly specified. The unemployment threshold is relatively high for most of the countries. Moreover, the numbers differ remarkably across the countries.

Following Lee (2000), we have also estimated the relation in forms of trend deviations (equation 4.1.3). As a measure for the trend of both real GDP and the unemployment rate (each denoted with a *) we use a Hodrick-Prescott (1997) filter. However, rather than following the original advice by Hodrick and Prescott and setting the smoothing parameter to 100, we apply a parameter of 10 to both time series. This setting is in line with the recommendations of Baxter and King (1995) who argue that this smoothing is more or less the same as setting the parameter to 1600 for quarterly data. This, in turn, implies that fluctuations between 2 and approximately 5 years are considered to be cyclical whereas all other frequencies are interpreted as either noise or trend (Baxter and King 1995). Of course, the choice of the appropriate trend extraction method is somewhat arbitrary. Lee (2000) presents results using a Beverige-Nelson decomposition, a band pass filter, and an unobserved component model. He points out that the results differ if one uses different measures for the trend component of the time series. However, the HP filter might serve as a first approximation in this context. In particular the following equation has been estimated:

$$(4.1.3) \quad (U - U^*)_t = a + b\,(GDP - GDP^*)_t + u_t$$

where the asterisk denotes the trend component of the time series under investigation and all other symbols are the same as above. Generally, the fit of all equations improves as compared to the difference model.[1] One may take that as a hint for the cyclical nature of the Okun relationship. The figures 1a to 1c also underpin that the

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[1] Because of the use of trend deviations the constant is found to be not significantly different from zero for all countries. As a consequence, it is not possible to calculate a threshold variable comparable to the one used in the first difference model.

cyclical components of unemployment and output correlate well for all countries under investigation.

Figure 2a — Trend Deviations of the Unemployment Rate (inverse scale) and the Outputgap for Selected OECD Countries 1970 to 1999

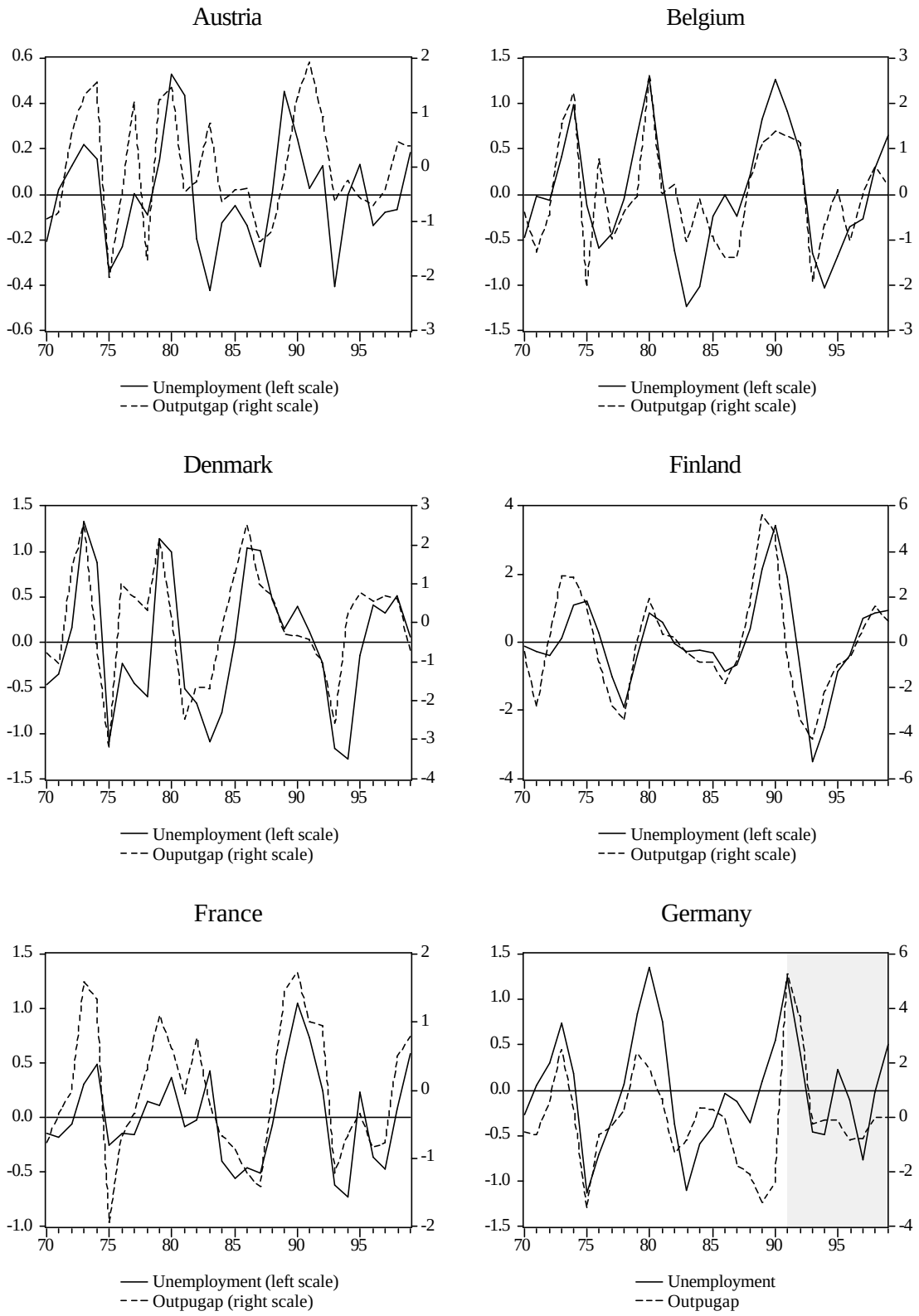


Figure 2b — Trend Deviations of the Unemployment Rate (inverse scale) and the Outputgap for Selected OECD Countries 1970 to 1999

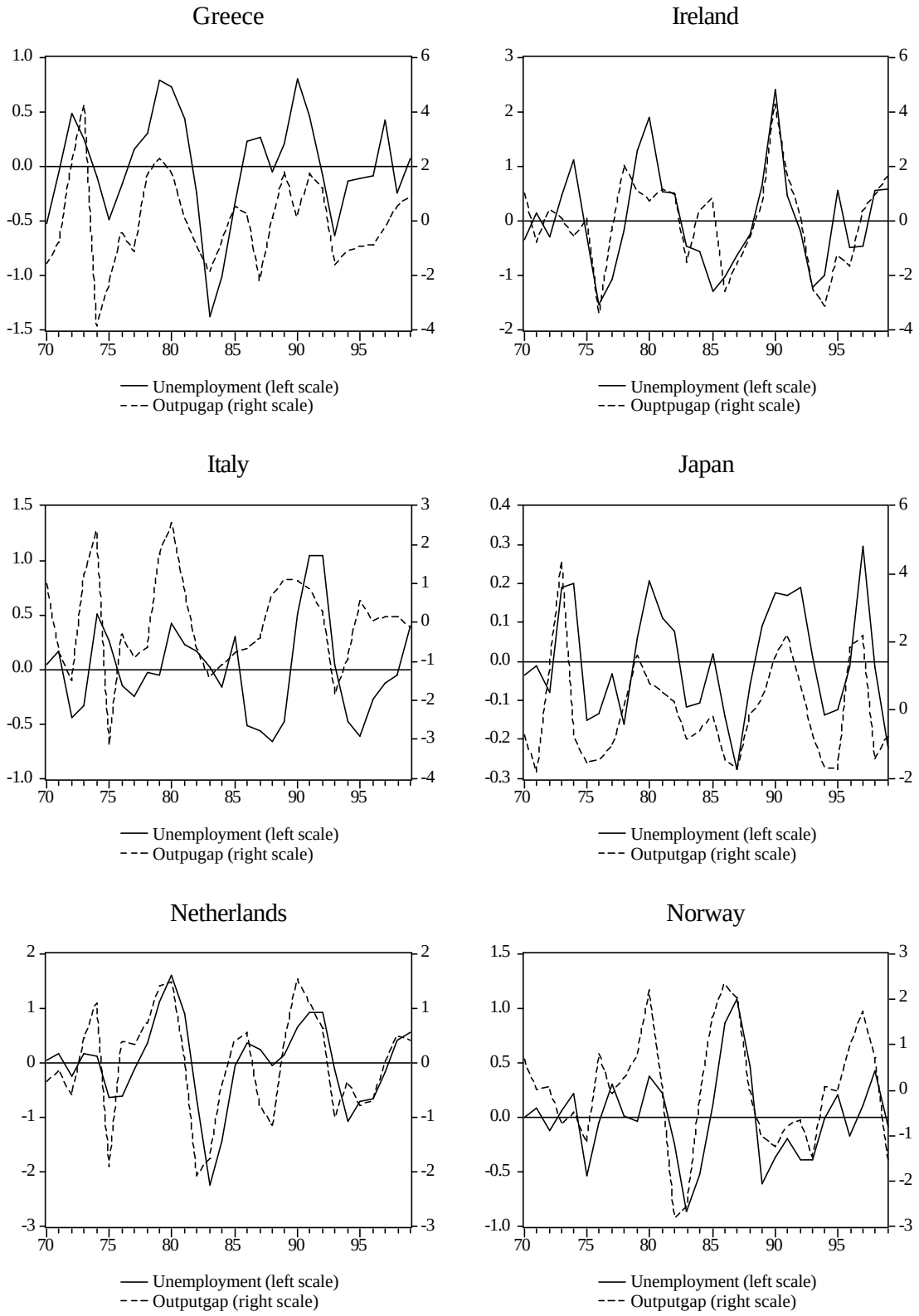


Figure 2c — Trend Deviations of the Unemployment Rate (inverse scale) and the Outputgap for Selected OECD Countries 1970 to 1999

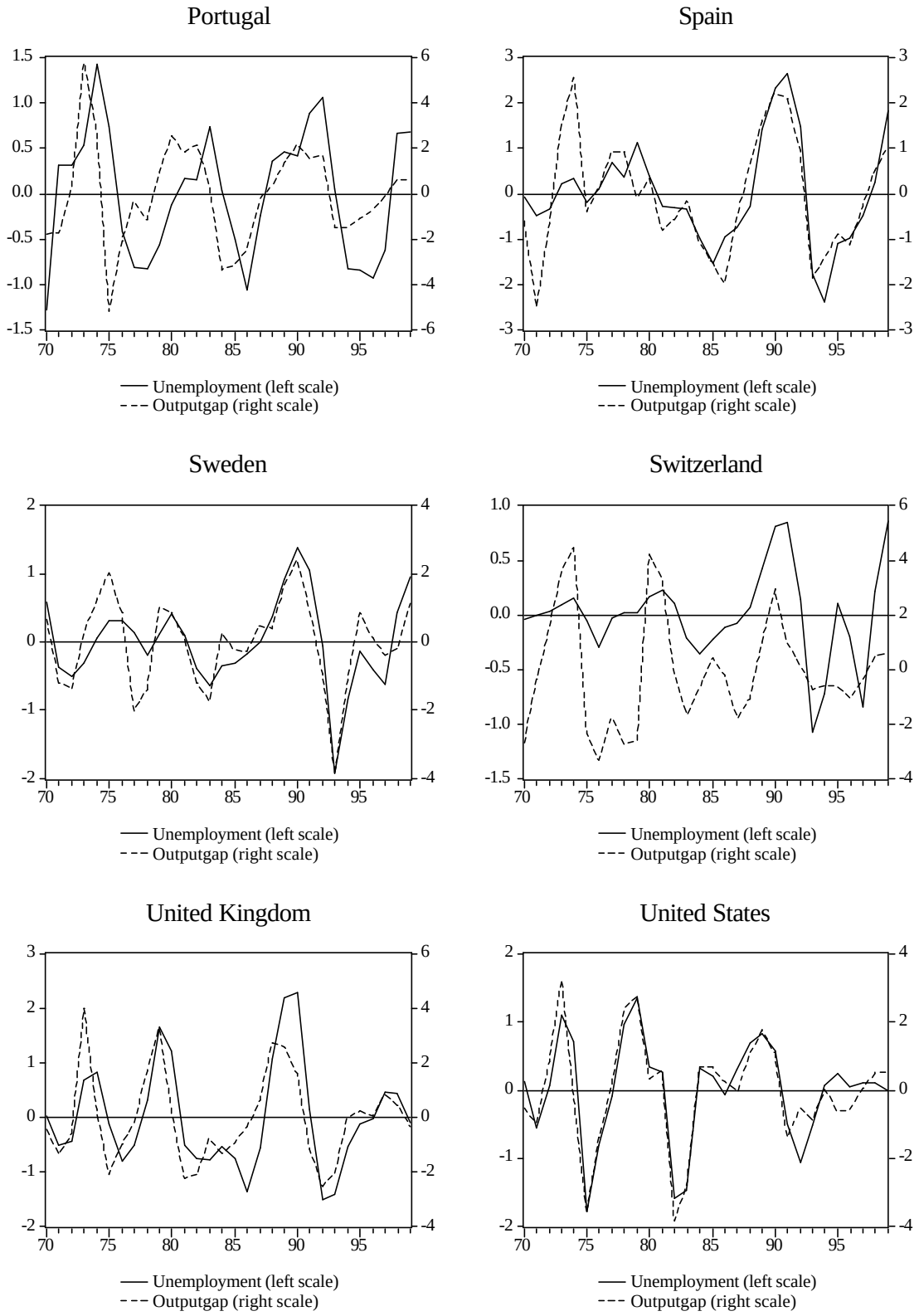


Table 4.1.2 — Okun Equation in Trend Deviations for Selected OECD Countries, Sample 1970-1999

Country	$\hat{a}$	$\hat{b}$	R^2	d_w	k
Austria	–0.00	–6.14	0.35	1.25	0.16
	(–0.52)	(–3.34)***			
Belgium	–0.58	–6.00	0.42	1.56	0.17
	(–0.41)	(–5.41)*			
Denmark	–1.43	–8.50	0.33	0.96	0.12
	(–0.41)	(–2.78)***			
Finland	–4.46	–8.71	0.71	1.03	0.11
	(–1.49)	(–9.78)***			
France	–0.30	–5.19	0.73	1.92	0.19
	(0.60)	(–9.63)***			
Germany[a]	–1.08	–6.05	0.27	1.07	0.17
	(–0.33)	(–2.08)**			
Greece	–1.73	–4.87	0.45	1.63	0.21
	(–0.90)	(–3.64)***			
Ireland	–0.93	–3.21	0.43	1.60	0.31
	(–0.64)	(–5.80)***			
Italy	.0.27	–1.09	0.06	1.30	0.91
	(–0.26)	(–2.05)*			
Netherlands	–1.88	–10.21	0.53	1.21	0.10
	(–0.93)	(–6.15)***			
Portugal	–1.79	–2.59	0.21	1.12	0.39
	(–0.73)	(–2.86)***			
Spain	–0.75	–5.66	0.77	1.60	0.18
	(–0.85)	(–12.46)***			
Sweden	–3.98	–11.38	0.56	0.85	0.09
	(–1.14)	(–3.39)***			
United Kingdom	–1.95	–7.42	0.61	1.14	0.13
	(–1.01)	(–12.27)***			
United States	–0.99	–6.17	0.82	1.64	0.16
	(–1.38)	(–17.20)***			
Switzerland[b]	–11.15	–17.46	0.61	0.99	0.09
	(–1.63)	(–4.83)***			
Japan	–0.45	–2.95	0.46	2.15	0.34
	(–0.64)	(–6.62)***			
Norway	–1.81	–8.29	0.48	1.72	0.12
	(–1.11)	(4.35)***			

In brackets: Robust *t*-values calculated using the method of Newey and West (1987). — *** (**,*) denotes significance at the 1 (5,10) percent level. d_w denotes the Durbin-Watson coefficient— a) West Germany until 1991. b) — Sample 1975 to 1999.

However, the mechanistic nature of the filter used to calculate the trend component of the series makes it difficult to draw conclusions regarding the nature of unemployment. As pointed out by Solow (2000), the method used implies that normal capacity utilization has to be reached by about every three to five years. Persistent underutilization is ruled out by assumption.

However, though the equations based on trend deviations show a remarkably good fit in some cases, the remaining autocorrelation remains a serious problem.

Moreover, nothing is said so far on the crucial question whether or not the relationship has changed over time.

4.2 Is the Relation Stable over Time?

There are several reasons why the link between employment and growth might change over time. The rate of technical progress might speed up or slow down, the institutional settings regarding the labor market might change, or wage policies can be more or less aggressive. Hence, it is necessary to analyze whether or not the link between employment and growth has been stable over time. This is of particular relevance since the EU has explicitly announced to focus on a higher employment intensity of growth (European Commission 1994).

Table 4.2.1 — Test on Parameter Stability of the Okun Equations, Sample 1970-1999

Country	Difference Model, CUSUM	Differnce Model, CUSUMQ	Gap Model, CUSUM	Gap Model, CUSUMQ
Austria	y	y	y	y
Belgium	y	y	y	y
Denmark	y	y	y	y
Finland	y	n	y	n
France	y	n	y	y
Germany[a]	y	y	y	y
Greece	n	y	y	y
Ireland	y	y	y	n
Italy	y	y	y	n
Netherlands	y	y	y	y
Portugal	n	n	y	y
Spain	y	n	y	n
Sweden	y	n	y	n
United Kingdom	y	y	y	y
United States	n	y	y	y
Switzerland[b]	y	n	y	n
Japan	y	y	y	y
Norway	y	y	y	y

y denotes : no structural break at the 5 % level. — *n* denotes hypothesis of parameter instability cannot be rejected.

To take into account the possibility that the relation obtained in the previous section is not stable over time as argued by Lee (2000) we apply the usual test battery on the equations. CUSUM and CUSUMQ statistic test the null hypothesis of no structural break in the relationship against the hypothesis of a structural break of unknown date. Generally, the null hypothesis of no structural break cannot be rejected. Hence, for most of the countries the link between unemployment and growth is still valid. These findings are in line with the results of Buscher et al.

(2000) who argue that the link might even have become closer. However, Lee (2000) reports some evidence for structural breaks.

Figure 3a — Time Varying Unemployment Thresholds for Industrial Countries 1980-1999

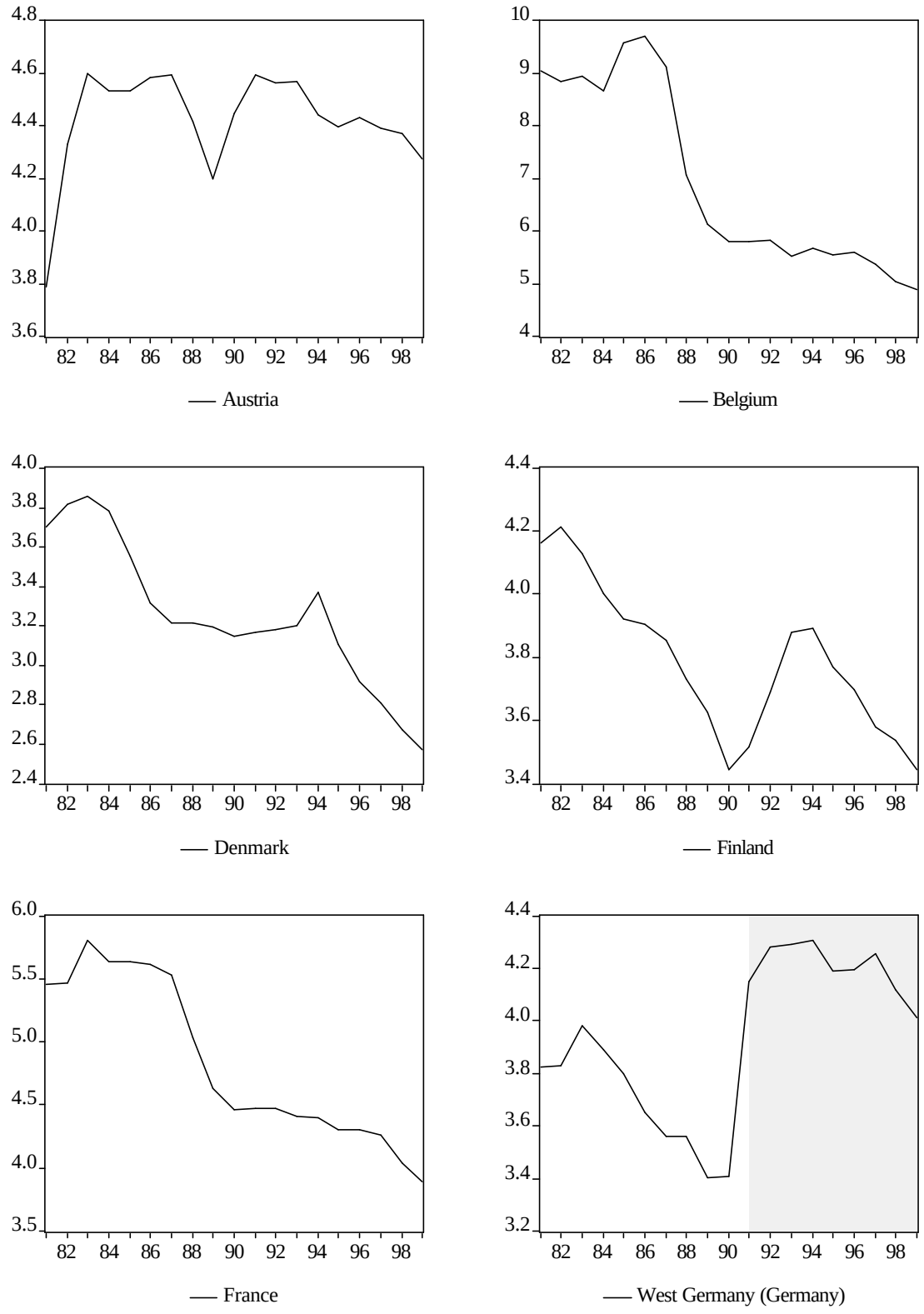


Figure 3b — Time Varying Unemployment Thresholds for Industrial Countries 1980-1999

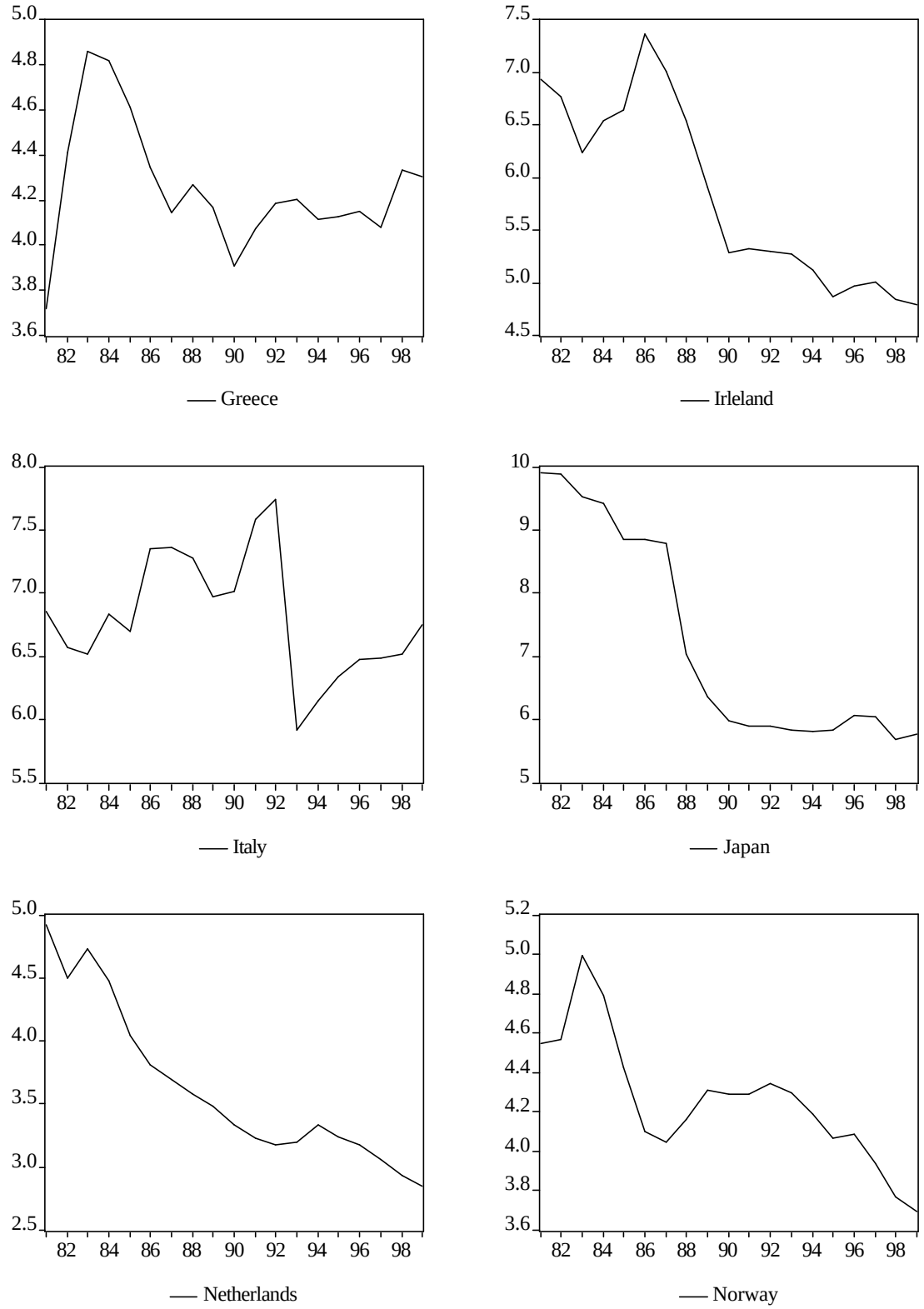
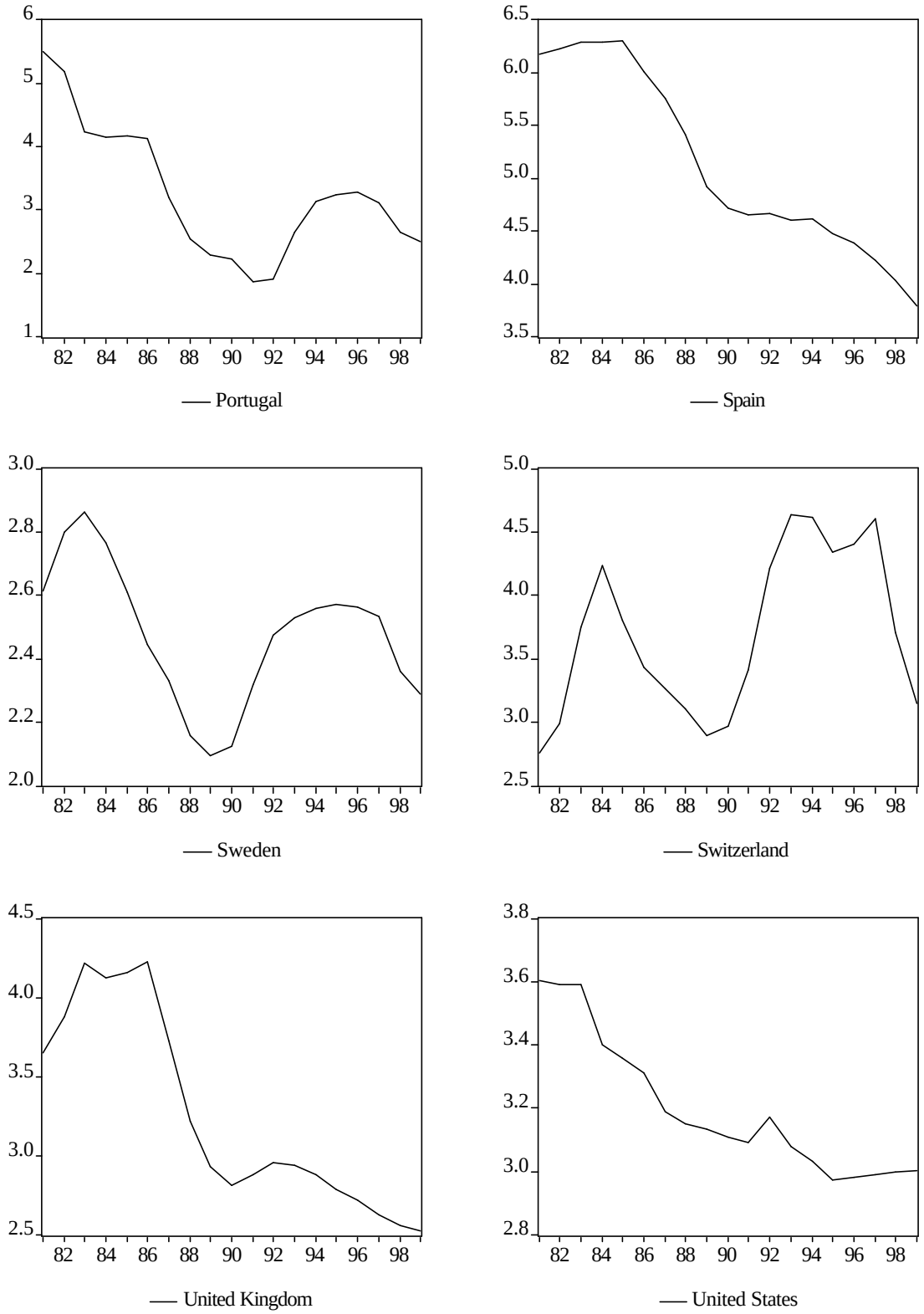


Figure 3c — Time Varying Unemployment Thresholds for Industrial Countries 1980-1999



In addition, a simple recursive estimation procedure is employed. Figures 3a to 3c depict the unemployment threshold estimated recursively for 1980 to 1999. After estimating the relation on the basis of the years 1970 to 1980 the following years are added to the sample underlying the equation. Generally, the unemployment threshold declines for most of the countries. This is in contrast to widespread beliefs in the public opinion. However, it is in line with some recent evidence supporting the view of a declining NAIRU in most of the OECD member states (OECD 2000). One might interpret this as a possible hint for at least some successful labor market reforms during the late eighties and the nineties. Moreover, the ongoing sectoral change has shifted more production into sub-sectors of the economy suspected to be more employment intensive.

4.3 Is the Employment-Growth Relationship Asymmetric?

There is a broad stream in the literature elaborating on the question whether the business cycle is asymmetric (cf. e.g. Sichel 1993). In particular, labor market variables are often seen as an example for asymmetric behavior during the cycle. If the relation between the labor market conditions and the situations in the goods market appears to be asymmetric itself, this might be of potential relevance for macroeconomic policy. For example, Erber (1994) argues that such a situation might urge policy makers "to avoid everything which would reduce output growth" (Erber 1994: 37). He takes this a possible supporting argument for activist stabilization policy.

This motivates efforts to analyze whether the Okun relationship might be different during expansion and recessions (Lee 2000: 348, Zwick 1999). In this section we follow the approach advocated by Lee (2000) and estimate the equation:

$$(4.3.1) \quad \Delta U_t = a + (b_1 I_t^+ \Delta \ln GDP_t + b_2 I_t^- \Delta \ln GDP_t) + u_t$$

where I denotes the Heavyside function such that

$$I_t^+ = \begin{cases} 1 & if \quad \Delta \ln GDP_t \geq 0 \\ 0 & if \quad \Delta \ln GDP_t < 0 \end{cases}$$

$$I_t^- = \begin{cases} 0 & if \quad \Delta \ln GDP_t \geq 0 \\ 1 & if \quad \Delta \ln GDP_t < 0 \end{cases}$$

The table 4.3.1 reports the results of this estimation as well as a test for asymmetry. The findings turn out to be rather ambiguous. There are several countries for which the null hypothesis of no asymmetry has to be rejected. However, there is no clear-cut pattern across the countries under investigation. In most cases the coefficient

associated with a positive rate of growth of real GDP is of a absolutely higher value than the parameter associated with a decline in real production. Unfortunately, this outcome differs remarkably since there are some countries for which the opposite does hold and a large number of equations in which no significant dummy can be obtained.

Table 4.3.1 — Tests on an Asymmetric Response of Employment to Growth in Selected OECD Countries 1971-1999

Country	$\hat{a}$	$\hat{b}_1$	$\hat{b}_2$	c^2	R^2	d_w
Austria	0.46	0.14	–0.11	0.41	0.31	1.82
	(5.67)***	(0.38)	(–6.90)***			
Belgium	0.06	–1.40	0.04	12.07***	0.32	0.90
	(0.14)	(–4.41)***	(0.35)			
Denmark	0.54	–1.64	–0.25	9.49***	0.48	0.97
	(2.11)**	(–3.96)***	(–3.84)			
Finland	1.40	–0.54	–0.41	0.28	0.65	1.21
	(2.62)**	(–4.23)***	(–2.87)***			
France	0.71	–0.74	–0.18	3.94*	0.33	1.32
	(4.16)***	(–3.15)***	(–2.85)***			
Germany[a]	0.54	–1.01	–0.14	23.79***	0.55	1.60
	(3.17)***	(–5.84)***	(–4.06)***			
Greece	0.87	0.19	–0.20	4.99*	0.41	1.56
	(2.70)**	(1.61)	(–3.07)***			
Ireland	2.18	2.89	–0.44	5.11*	0.57	1.86
	(5.48)***	(2.01)*	(–6.47)***			
Italy	0.33	–0.18	–0.04	0.28	0.05	1.19
	(1.41)	(–0.67)	(0.78)			
Netherlands	0.57	–1.94	0.23	11.00***	0.42	1.16
	(1.64)	(–4.70)***	(–1.89)*			
Portugal	0.03	–0.35	–0.06	2.64	0.16	0.86
	(0.08)	(–4.09)***	(–0.62)			
Spain	1.63	–2.43	–0.44	9.78***	0.49	0.71
	(2.96)***	(–4.98)***	(–2.45)**			
Sweden	0.33	–0.87	–0.19	5.92**	0.67	1.30
	(2.19)**	(–3.16)***	(–3.18)***			
United	1.01	–0.37	0.40	0.01	0.48	1.10
Kingdom	(3.01)***	(–1.34)	(–4.12)***			
United States	1.26	–0.41	–0.42	0.00	0.75	1.92
	(6.53)***	(–3.70)***	(–9.07)***			
Switzerland	0.25	–0.03	–0.08	0.38	0.10	1.06
	(1.06)	(–0.71)	(–1.42)			
Japan	0.276	–0.11	–0.04	1.43	0.36	1.57
	(4.07)***	(–2.20)**	(–2.51)**			
Norway	0.52	–5.50	–0.14	3.77*	0.29	1.42
	(1.72)*	(–2.04)*	(–2.22)**			

In brackets: Robust *t*-values calculated using the method of Newey and West (1987). — *** (**,*) denotes significance at the 1 (5, 10) percent level. — a) West Germany until 1991.

Moreover, the tests presented here are at odds with the results obtained by Lee (2000) and Erber (1994) for some prominent cases. In particular Erber (1994) reports asymmetric relations for all countries under investigation except for the U.S.A. Given

the differences to our results the finding seems to be not very robust. Hence, asymmetry of the relation seems not to be a solid empirical ground for policy advice.

4.4 Alternative Variables Representing the Labor Market Situation

The relation between (un-)employment and growth is likely to be highly dependent on the labor market variable under investigation. To understand this notion consider the following tautological relation (Prachowny 1993):

$$(4.4.1) \quad Y = \frac{Y}{H} \cdot \frac{H}{E} \cdot \frac{E}{L} \cdot \frac{L}{N} \cdot N = y \cdot h \cdot e \cdot l \cdot N$$

where H represents the hours worked in the economy, L the labor force, E the number of employed persons, and N the total population of the economy. $y = Y / H$ is labor productivity measured as output per hour. $h = H / E$ are the hours worked per person employed. $E / L = e$ is the employment rate, and $l = L / N$ the labor force participation rate. Each of these variables may have an equilibrium value. Potential GDP (Y^*) can then be written as:

$$(4.4.2) \quad Y^* = y^* \cdot h^* \cdot e^* \cdot l^* \cdot N$$

Rearranging this equation and using the approximation $\ln(\frac{Y}{Y^*}) \approx -\left[\frac{Y^* - Y}{Y^*}\right]$ leads to the equation:

$$(4.4.3) \quad \frac{Y^* - Y}{Y} = \frac{y^* - y}{y} + \frac{h^* - h}{h} + \frac{e^* - e}{e} + \frac{l^* - l}{l}$$

From this it can be seen that the simple Okun relation discussed above holds only under a set of rather restrictive assumptions. Namely the other variables should have a constant gap as compared to their equilibrium values. Hence, in this section the Okun relation is estimated for alternative measures for the performance of the labor market. In particular, the following time series are considered:

– the unemployment rate as defined by the OECD/ILO convention

– the change of total employment

– the change of dependent employment

– the change of the employment rate defined as the ratio of total employment to total population in working age.

– the change of the hours worked.

For all variables — unless they are not available for the selected countries — table 4.4.1 compares the respective threshold variables with respect to alternative labor market variables. As a general picture, the table reveals that the threshold with respect to an increase of either persons or hours is lower than the growth rate necessary to reduce the official unemployment rate. In case of higher growth a part of the increase in employment comes from the so-called hidden unemployment, that is, from person not actually registered as unemployed.

Table 4.4.1 — Thresholds Calculated for Alternative Labor Market Variables 1970–1999

Country	Change of Standardized Unemployment Rate	Change of Total Employment	Change of Dependent Employment	Change of Employment Rate	Change of Hours Worked
Austria	4.27	0.73	0.21	3.47	na
Belgium	4.88	1.70	1.92	3.27	na
Denmark	2.58	1.11	0.53	2.32	na
Finland	3.44	2.47	2.50	2.32	?
France	3.89	1.36	0.79	3.68	2.30
Germany[a]	4.01	1.93	1.83	3.05	2.37
Greece	4.30	14.97	–23.19	1.21	na
Ireland	4.80	2.90	2.30	5.27	na
Italy	6.75	1.56	1.21	3.83	2.95
Netherlands	2.85	–0.23	–1.55	2.67	3.20
Portugal	2.50	18.22	0.85	1.12	na
Spain	3.79	2.39	–2.02	4.14	2.81
Sweden	2.29	1.55	1.34	1.83	1.57
United Kingdom	2.52	1.56	1.97	2.18	2.34
United States	8.18	–0.49	–0.17	1.71	0.52
Switzerland	3.15	–0.02	–0.62	1.12	na
Japan	5.76	–1.34	–3.03	1.35	1.23
Norway	3.69	0.91	0.58	2.64	2.44

In some countries the threshold with regard to persons employed and hours actually worked also differ. In part, this might reflect a policy of reducing working hours. Either the latter can be reduced by general agreements of by measures supporting part-time work.

4.5 Long-Run Properties of the Employment-Output Relationship

So far, nothing has been said about the time series properties of the data under investigation. However, real GDP and — at least for European countries — the unemployment rate are likely to be integrated of order 1. In economic terms this implies that the series does not return to its pre-shock level after an exogenous shock

has occurred. If both time series are indeed I(1), it is possible to estimate Okun's coefficient via cointegration techniques.

The first difference model as well as the trend deviation model do not take into account that there might be a long-run cointegration relationship between the level variables. Hence, one should estimate a long-run Okun coefficient by cointegration techniques. Basically, in this paper the approach used by Weber (1995) is applied. He estimates an equation including the logarithm of real GDP, a time trend and a dummy variable to capture possible structural breaks in the relationship to model the unemployment rate. In this paper, the long-run relation is estimated using the approach

$$\log(E_t)=a+b_1\log(GDP_t)+b_2t+e_t \qquad (4.5.1)$$

with E denoting employment measured in persons. In this context, the coefficient b_1 gives the long-run employment elasticity with respect to output. b_2 can be interpreted as an exogenous rate of technological change.

It would be possible to use the unemployment rate in equation 4.5.1. However, it is unclear whether or not the rate is I(1). While this might be the case for most of the European countries it is probably not a correct description of US data. Empirical results presented in the appendix suggest that the log of employment (measured in persons) and the log of real GDP are indeed I(1) for the countries under investigation.[2] A time trend is included in (4.5.1) to capture the influence of technical progress.

To test for a possible cointegration relation two residual based statistics have been used. The fist one applies a augmented Dickey-Fuller test to the residuals of equation (4.5.1) to test the null hypothesis of "no cointegration". The second one uses the residuals of the DOLS estimation for a KPSS test (see Hassler 2000, Shin 1994). In this case the null hypothesis is cointegration. The results presented in the table reveal that according to the ADF test there is hardly any cointegration between the variables. However, the additional used KPSS test on cointegration shows that — given the opposite null hypothesis of "cointegration" — the idea of a long-run relation cannot be rejected. The coefficients, however, are not often in line with economic theory. In some cases the influence of real GDP is unexpected low, in some cases the deterministic trend has an unexpected sign. To sum up, the estimated equations are not satisfactory. Later on, it will be discussed whether an additional variable might improve the outcome.

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2 The results are available upon request from the author.

Table 4.5.1 — Cointegration-Equations for Okun's Coefficient for Selected OECD Countries, Sample 1970–1999

Country	$\hat{a}$	$\hat{b}_1$	$\hat{b}_2$	R^2	ADF	KPSS
Austria	–0.12	1.09	–0.018	0.96	–2.85	0.16**
	(–0.02)	(2.93)	(–2.13)		(0)	
Belgium	0.19	0.96	–0.019	0.38	1.23	0.17**
	(0.04)	(2.94)	(–2.91)		(0)	
Denmark	5.25	0.70	–0.006	0.90	–1.40	0.16**
	(0.46)	(0.81)	(–0.35)		(0)	
Finland	–4.41	1.49	–0.036	0.89	–2.58	0.08
	(–6.12)	(26.25)	(–25.87)		(0)	
France	13.28	0.22	0.001	0.97	–1.02	0.13**
	(3.29)	(0.83)	(0.33)		(0)	
Germany[a]	–8.89	1.79	–0.028	0.96	–3.78	0.07
	(–4.08)	(11.78)	(–7.21)		(0)	
Greece	4.45	0.58	0.004	0.99	–3.45	0.09
	(3.48)	(7.59)	(2.91)		(0)	
Ireland	–0.09	1.43	–0.046	0.97	–3.02	0.06
	(–0.09)	(13.96)	(–11.73)		(0)	
Italy	2.42	0.68	–0.014	0.91	–2.57	0.09
	(1.00)	(5.53)	(–4.79)		(0)	
Netherlands	1.88	1.04	–0.015	0.92	–3.50	0.07
	(1.40)	(9.95)	(–6.36)		(0)	
Portugal	17.58	–0.19	0.021	0.85	–1.64	0.13**
	(0.78)	(-0.13)	(0.47)		(0)	
Spain	–31.99	2.74	–0.059	0.74	–3.31	0.16**
	(–3.29)	(4.92)	(–4.14)		(0)	
Sweden	–17.99	2.38	–0.037	0.62	–1.27	0.15**
	(–1.99)	(3.66)	(–3.45)		(0)	
United Kingdom	6.53	0.81	–0.017	0.48	–1.21	0.14**
	(1.05)	(1.65)	(–1.67)		(0)	
United States	6.75	0.75	–0.016	0.99	–2.05	0.16**
	(1.15)	(1.94)	(–0.14)		(0)	
Switzerland	1.41	1.09	–0.010	0.95	–2.43	0.09
	(0.57)	(5.36)	(–2.71)		(0)	
Japan	10.84	0.34	0.005	0.99	–1.53	0.14**
	(2.80)	(1.68)	(0.69)		(0)	
Norway	0.85	1.04	–0.021	0.98	–2.17	0.06
	(0.59)	(9.18)	(–6.00)			

Note: In brackets are *t*-values corrected for the long-run variance. The lag-length of the ADF test was selected by a LM Test on white noise. The critical value for the rejection of the null "no cointegration is taken from Engle and Yooh (1987). The critical value for the rejection of the null "cointegration" of the KPSS test is taken from Hassler (2000: 41) and is computed from Shin (1994).

However, some methodological problems have to be addressed here. The sample is relatively small and there is a possible simultaneity bias in the relationship. To take into account both problems, the dynamic OLS estimator advocated by Stock and Watson (1993) has been used to estimate the long-run relation. Taking the estimates as given, in a next step an error correction equation is estimated. It takes the form (Pehkonnen (1998)):

$$(4.5.2) \quad \Delta \ln E_t = l_0 + l_1 \Delta \ln E_{t-1} + l_3 \Delta \ln GDP_t + l_3 \ln E_{t-1}\, l_4 \ln GDP_{t-1} + l_5 t + e_t$$

This equation combines the short-run impacts on employment as given in the difference model to explain employment outlined in previous sections with the long-run impacts derived from the cointegration relation. The first three coefficients measure the short-run dynamics and the last three coefficients are the long run estimates from the DOLS procedure above.

Table 4.5.2— Error Correction Estimates for Selected OECD Countries, Sample 1970–1999

Country	l_1	l_1	l_1	R^2	*dw*
Austria	–0.00	0.40	0.15	0.48	1.80
	(–0.02)	(2.53)	(1.34)		
Belgium	0.00	0.61	–0.07	0.28	1.72
	(0.46)	(2.28)	(–0.49)		
Denmark	–0.00	0.04	0.39	0.25	2.06
	(–0.20)	(0.14)	(1.86)		
Finland	–0.02	–0.08	0.90	0.71	1.16
	(–3.45)	(–0.39)	(3.95)		
France	0.00	0.14	0.17	0.50	1.70
	(0.56)	(0.39)	(0.60)		
Germany[a]	–0.02	–0.50	1.45	0.23	2.15
	(–0.79)	(–1.23)	(1.69)		
Greece	0.01	0.60	0.09	0.57	1.96
	(1.52)	(4.13)	(1.37)		
Ireland	–0.01	0.83	0.25	0.63	1.56
	(–0.62)	(3.65)	(1.24)		
Italy	–0.00	0.37	0.08	0.23	2.15
	(–0.20)	(1.53)	(1.77)		
Netherlands	–0.00	0.51	0.33	0.63	1.33
	(–0.87)	(3.18)	(2.24)		
Portugal	0.01	0.53	–0.00	0.20	2.01
	(0.84)	(2.68)	(–0.00)		
Spain	0.01	0.85	–0.17	0.53	1.19
	(0.56)	(3.58)	(–0.42)		
Sweden	–0.01	0.35	0.49	0.48	1.33
	(1.49)	(1.69)	(2.21)		
United Kingdom	–0.01	0.21	0.40	0.45	1.65
	(–2.08)	(1.01)	(2.71)		
United States	–0.01	0.83	0.25	0.63	1.56
	(–0.62)	(3.65)	(1.24)		
Switzerland	0.01	0.47	0.19	0.52	1.35
	(0.43)	(2.39)	(1.83)		
Japan	0.01	0.20	0.20	0.23	0.94
	(1.53)	(0.98)	(1.97)		
Norway	–0.01	0.43	0.50	0.67	1.80
	(–1.73)	(2.67)	(3.09)		

Note: *t*-values in brackets. Long-run estimates are those of the DOLS procedure above.

Though for some countries the results may be seen as reasonable, in some other prominent cases the results are not in line with economic prejudice. For example, the coefficient represent the influence of the change of real GDP, that is the short-run output elasticity of employment is negative for Finland and Spain. Moreover, the so-

called employment persistence is also negative in some countries. All in all, the results of the error correction estimates do not support the

4.6 Does the Employment Intensity Vary over Countries?

A major concern of economic policy is to improve the employment intensity of growth. Hence, empirical evidence on the sources of cross-country differences on the Okun relationship would be particularly welcome. However, this kind of analysis requires significant differences between the countries under investigation. To shed light on this issue, the Okun relation is re-estimated in a system of seemingly unrelated regression. After this has been done, Wald tests are employed to test whether certain groups of countries have a common Okun coefficient. The results presented in table 4.6.1 are clear-cut in the sense that the idea of an equal coefficient must be rejected. The result does hold for the group of all OECD countries under investigation as well as for the group of all members of the European Union and for the group of all participants of the European Monetary Union.

Table 4.6.1 — Test on an Equal Employment Intensity of Growth Across the Countries under Investigation 1970-1999

Null Hypothesis	Wald Test (c^2)	Decision
Coefficient equal in all 18 OECD Countries	511.42	Hypothesis rejected
Coefficient equal in all 14 EU Countries	213.84	Hypothesis rejected
Coefficient equal in all 10 EMU OECD Countries	137.56	Hypothesis rejected
Nullhypothesis: Coefficient is equal to the on estimated for the U.S		
Austria	97.13	Hypothesis rejected
Belgium	53.01	Hypothesis rejected
Denmark	2.07	Hypothesis not rejected
Finland	0.08	Hypothesis not rejected
France	34.63	Hypothesis rejected
Germany[a]	60.80	Hypothesis rejected
Greece	44.53	Hypothesis rejected
Ireland	4.29	Hypothesis not rejected
Italy	56.94	Hypothesis rejected
Netherlands	12.01	Hypothesis rejected
Portugal	34.76	Hypothesis rejected
Spain	0.16	Hypothesis not rejected
Sweden	10.77	Hypothesis rejected
United Kingdom	0.65	Hypothesis not rejected
United States	na	na
Switzerland	136.58	Hypothesis rejected
Japan	158.64	Hypothesis rejected
Norway	56.70	Hypothesis rejected

Additionally, it is tested whether the coefficient for the US equals the respective number for the country under investigation. With only a few exceptions the idea has to rejected. Hence, one may conclude that there are substantial differences across countries with regard to the link between employment and growth.

4.7 Summary

The results presented in the previous section suggest that there is still a close link between (un-)employment and growth. In contrast to widespread beliefs, the employment intensity of growth has been even larger in the nineties than it had been before. Threshold variables — i.e. the growth rate to increase employment or to decrease unemployment — depend strongly on the labor market variable chosen. As a general picture, the link appears to be asymmetric, i.e. the impact of growth on employment differs with regard to the stance of the business cycle. Moreover, the employment elasticity with respect to growth of real production differs significantly across the countries under investigation. Hence, the next section will address the question what the causes for these differences are.

5 What Causes the Employment Intensity of Growth in Europe?

The aim of this section is to exploit the information contained in the cross-section as well as the time series dimension of the dates under investigation to learn about possible determinants of the so-called employment intensity of growth. In doing so, one is forced to choose one of the competing measures for the employment growth nexus discussed in the previous section. The dependent variables in the cross-section analysis are the "unemployment threshold" derived from the Okun equation, and the trend of labor productivity growth. However, since some of the variables to be discussed in the following are observations referring to a certain point of time only data from the last ten years have been used for estimation.

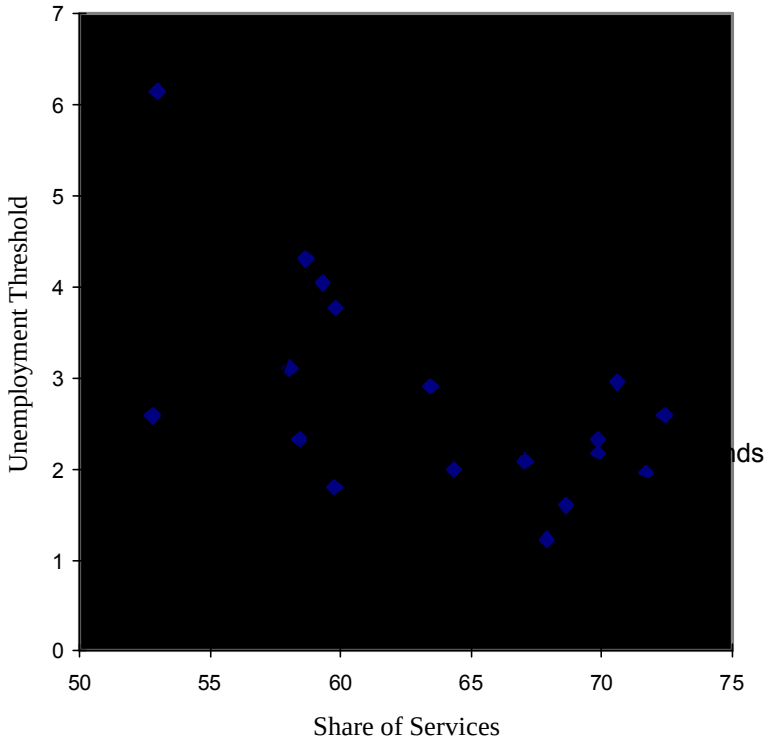
5.1 The Share of the Services Sector

Generally, the average labor productivity is lower in the services sector than in the industrial sector of an economy. Hence, it is often presumed that the share of services in real GDP might exhibit an influence on the employment intensity of growth. Previous findings support this assumption. Palino and Vivarelli (1997) argue that while in manufacturing the output elasticity of employment is generally negative for

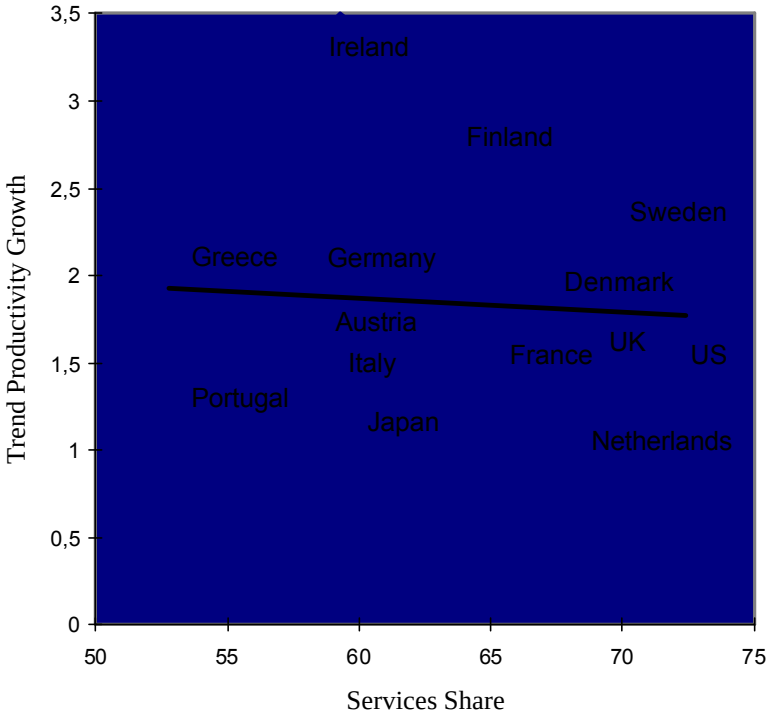
the G-7 countries, it is even positive for the services sector. Gordon (1997) analyses the cross-country differences in labor productivity growth (and, therefore, the employment intensity of growth) using a panel approach. He reports, that that sectoral dummies are in several cases significant. In particular, productivity growth is slower in construction than in other sectors of the economy. He finds similar evidence for services sectors. A higher employment intensity of growth due to a prominent role of services sectors is also supported by the results of Buscher et al. (2000) and Löbbe (1998).

To capture the impact of the sectoral composition of the economy on the employment intensity of growth within the data under investigation in this paper the figure 5.1.1 plots the (dependent) employment threshold as given in the previous sections of this paper estimated for the period from 1989 to 1999 as a function of the ratio of employees in the service sector to total dependent employment.

Figure 5.1.1 — Share of Service Sector in Total Employment, Employment Thresholds, and Trend Productivity Growth in the Nineties



(a) Unemployment Threshold



(b) Trend Productivity Growth

The figure reveals that a more prominent role for services corresponds to a higher employment intensity of growth. Hence, a structural change in favor of the services sector might help to fight unemployment. However, the plotted regression tells nothing on the measures necessary to manage such structural change. For example, it might be helpful to alter several labor market institutions like minimum wages to promote a higher services growth. Moreover, the argument does only hold for a given overall growth rate.

5.2 Real Labor Costs

A more fundamental critique of the simple Okun equations discussed above is that they neglect important explanatory variables. For example, Prachowny (1993) has considered the theoretical foundations of Okun's law. He argues that the Okun relationship should be seen as a special case of a production function. This function includes as arguments the unemployment rate, the capacity utilization rate, hours per worker, and the labor force. Hence, a simple Okun relationship does only occur if other variables than the unemployment rate are equal to their equilibrium values or, alternatively, if they do not influence the cyclical component of output. In practical terms, this proposition will yield a significant specification bias in traditional equations. A similar point has been made by Flaig and Rottmann (2000). They emphasize

that relative factor costs are neglected by the Okun regularity. Taking into account the factor costs alters the view on the unemployment thresholds. Rather than being a natural constant the threshold depends on the relative factor prices, the capital accumulation, and the pace of technical change (Flaig and Rottmann 2000:5) Thus, an employment threshold will hold only for a given relation of relative prices for inputs. Gerstenberger (1999) argues in the same direction. He compares the long-run employment paths of the EU and the US and points out that the main difference between the areas is a higher capital output ratio of the growth path in Europe. According to the author, the underlying reasons for this finding is the faster increase of real wage costs during the period under investigation. The European Commission (1996) makes the same proposition. The report emphasizes that the long-run difference between the US and the EU experience with respect to the labor market performance cannot — or only to a very small extent — be attributed to diverging rates of real GP growth. Rather, the increase of real wages was much smaller in the US than within the European Union.

To capture the influence of real wage cost this variable has been included into the long run relation between employment and real GDP discussed above:

$$\log(E_t)=a_0+a_1\log(GDP_t)+a_2\log(W_t)+a_3t+e_t \qquad (5.2.1)$$

In this long-run equation a_1 is an estimate for the output elasticity of employment, a_2 provides an estimation of the elasticity with respect to real labor cost and the last coefficient measures the influence of technical progress. Within this model there is no employment threshold per se. Rather, the growth of real output necessary to keep employment constant in the long-run depends on the wage increase and the time trend, i.e. a proxy for technological change. Given a neutral wage increase the threshold is given by the coefficient a_3.

Table 5.2.1 gives the result of a cointegration analysis of equation 5.2.1. Again the DOLS estimator by Stock and Watson is used. It turns out that there is significant negative real wage elasticity for most of the countries under investigation. Though the hypothesis of cointegration is not confirmed by the ADF test, the opposite does hold for the KPSS test. Hence, one can define an employment threshold only for a given wage increase. If the rise of real wage costs exceeds the implied rate of technological progress GDP has to grow faster even to keep employment constant.

Table 5.2.1 — Cointegration Equations for Okun's Coefficient Including Real Wage Costs for Selected OECD Countries, Sample 1970–1999

Country	$\hat{a}$	$\hat{a}_1$	$\hat{a}$	$\hat{a}_3$	R^2	ADF	KPSS
Austria	–4.98	1.53	–0.022	–0.29	0.96	–3.08	0.06
	(–3.15)	(13.03)	(–8.48)	(–6.18)		(0)	
Belgium	0.87	0.93	–0.017	–0.08	0.78	–3.15	0.10*
	(0.35)	(5.17)	(–5.55)	(–1.15)		(0)	
Denmark	5.14	1.06	0.002	–1.07	0.91	–1.68	0.09*
	(2.08)	(5.79)	(0.65)	(–5.79)		(0)	
Finland	–3.35	1.46	–0.033	–0.14	0.89	2.85	0.08
	(–25.18)	(107.1)	(–48.4)	(–3.47)		(0)	
France	9.95	0.40	–0.002	0.11	0.98	–1.14	0.07
	(10.35)	(5.62)	(–1.64)	(2.21)		(0)	
Germany[a]	0.44	1.37	–0.013	–0.75	0.99	–3.43	0.09*
	(1.12)	(61.62)	(–18.47)	(–33.37)		(0)	
Greece	9.92	0.23	0.011	0.082	0.99	–3.41	0.09*
	(12.19)	(4.19)	(11.01)	(2.96)		(0)	
Ireland	3.10	1.41	–0.032	–0.72	0.97	–3.05	0.09*
	(9.46)	(47.08)	(–21.79)	(–12.58)		(0)	
Italy	–4.29	1.03	–0.019	–0.146	0.92	–2.28	0.07
	(–3.65)	(14.47)	(–18.53)	(–1.95)		(0)	
Netherlands	3.85	1.18	–0.011	–0.85	0.97	–3.36	0.07
	(2.92)	(10.77)	(–4.29)	(–3.81)		(0)	
Portugal	–11.36	1.92	–0.038	–0.81	0.93	–2.00	0.05
	(–7.61)	(19.13)	(–12.87)	(–32.14)		(0)	
Spain	–12.12	1.76	–0.027	–0.66	0.95	–1.86	0.14**
	(–2.60)	(7.91)	(–3.85)	(–3.62)		(0)	
Sweden	–14.16	2.12	–0.031	–0.04	0.67	–1.68	0.08
	(–9.68)	(23.25)	(–15.03)	(–0.61)		(0)	
United Kingdom	–0.29	1.61	–0.021	–0.84	0.48	–1.25	0.10*
	(–0.40)	(24.90)	(–13.94)	(–9.79)		(0)	
United States	3.15	2.47	–0.019	–4.99	0.99	–2.52	0.15**
	(0.58)	(2.22)	(–1.33)	(–1.63)		(0)	
Switzerland	8.79	1.38	0.010	–2.2	0.96	–2.96	0.08
	(4.72)	(28.32)	(2.45)	(–4.71)			
Japan	6.10	0.69	0.011	–0.43	0.99	–1.59	0.08
	(6.72)	(12.72)	(0.62)	(–3.80)		(0)	
Norway	–5.39	1.44	–0.038	0.26	0.98	–2.18	0.09*
	(–5.47)	(22.27)	(–13.95)	(4.62)			

Note: In brackets are *t*-values corrected for the long-run variance according to the DOLS-procedure. The lag-length of the ADF test was selected by a LM Test on no autocorrelation. The critical value for the rejection of the null "no cointegration" is taken from Engle and Yooh (1987). The critical values for the rejection of the null "cointegration" of the KPSS test is taken from Hassler (2000: 41) and are computed from Shin (1994).

5.3 Labor market flexibility and Labor Market Institutions

A possible explanation for the varying employment intensity of growth across countries is that labor market institutions are different (Siebert 1997). Several empirical studies have stressed this point (cf. e.g. OECD 1994). Some authors also claim that labor market institutions have an impact on the Okun relationship. For example, Hubert (1997) uses the overall judgment of the OECD jobs study on the flexibility of

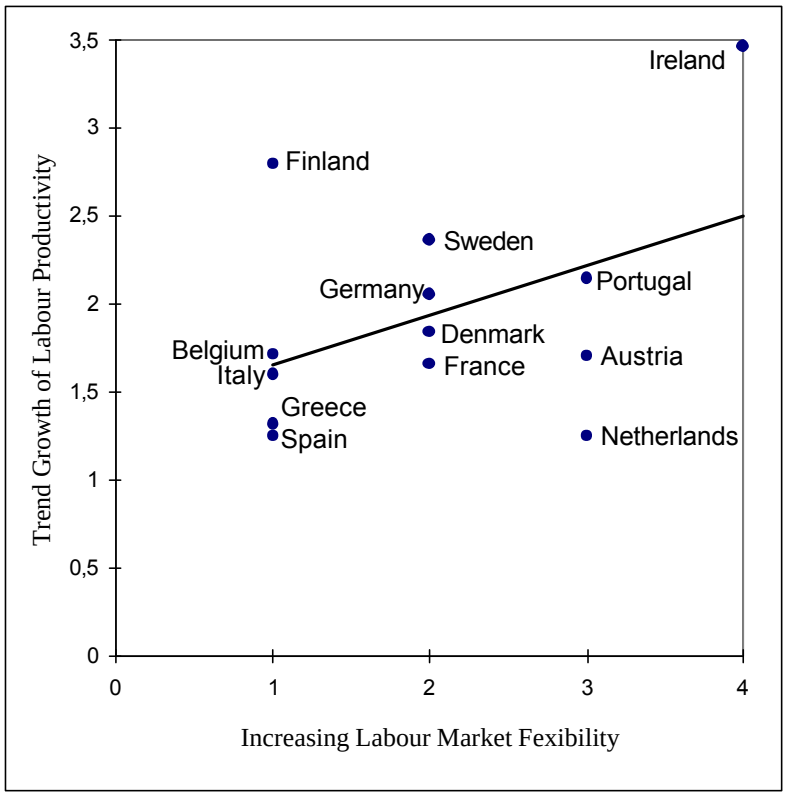
the labor market to evaluate whether or not a more flexible setting of institutions implies a larger response of employment to fluctuations in real production. His empirical findings suggest that the link between the markets for goods and for labor is closer in countries with fewer regulations on labor standards as compared to countries with a lot of restrictions. Revenga and Bentolina (1995) also report that some structural and institutional features affect the output elasticity of employment. In particular, the share of agriculture in output, the level of firing costs, the degree of inter-union and inter-firm coordination, and the percentage of employees in large firms correlate with this elasticity. With regard to firing cost their results are in partial contrast to Bertola (1990) who argues theoretically and empirically that higher job security does not bias the labor demand toward lower average employment. Nickell and Layard (1999) use a set of variables capturing labor market institutions to model the differences of unemployment rates and of labor productivity across countries. They report a negative impact of the total tax rate, and of the benefit duration. A positive sign is estimated for the degree of employment protection, the replacement ration, and the owner occupation rate. However, though the results are weakly significant the authors conclude that the relation of the labor market institutions are much more associated with unemployment or — to a lesser extend — to labor input (Nickell and Layard 1999: 3055).

To get a first impression for the European countries under investigation, figure 5.2.1 depicts the employment threshold as estimated in part 2.1 and a measure of labor market flexibility. Labor market flexibility is a quite complex concept. Several labor market institutions can be used to measure flexibility. The figures reveal that, in general, the higher the overall labor market flexibility the lower is the unemployment threshold. In other words: a more flexible labor market leads to a more employment insensitive growth. However, the results are far from being robust.

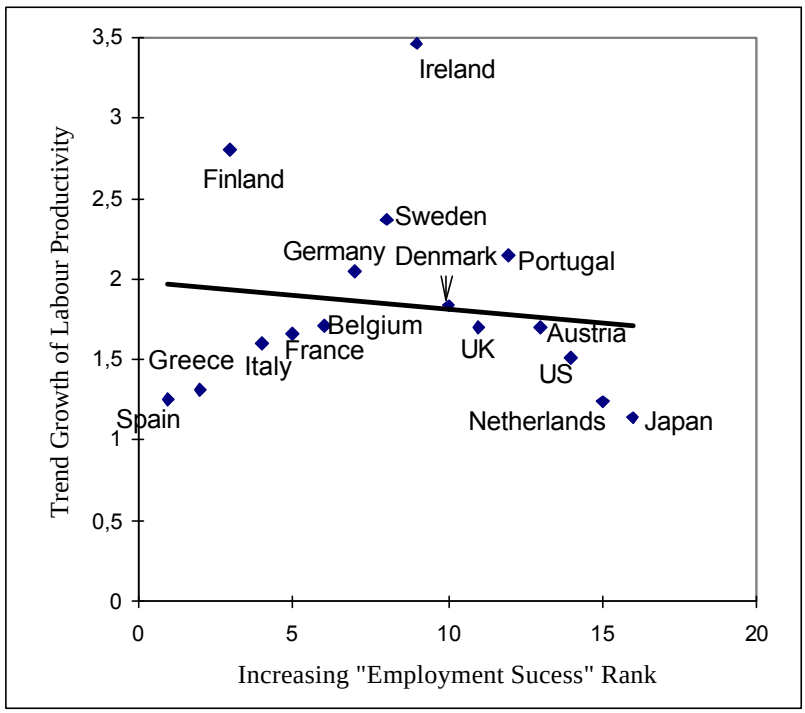
At a first glance, we refer to the "overall impression on labor market flexibility" given by Dohse et al. (1998, table 12, p. 88). To check the robustness of the results the OECD (1994) figures of the labor standards are also used.

Neither do the results appear if instead of the unemployment threshold the trend growth of labor productivity is used as the variable to be explained. Nor do the outcome regarding to the OECD index of labor standards underpin the previous conclusion.

Figure 5.2.1 —"Labor Market Flexibility", Unemployment Thresholds, and Trend Productivity Growth in the European Union in the Nineties



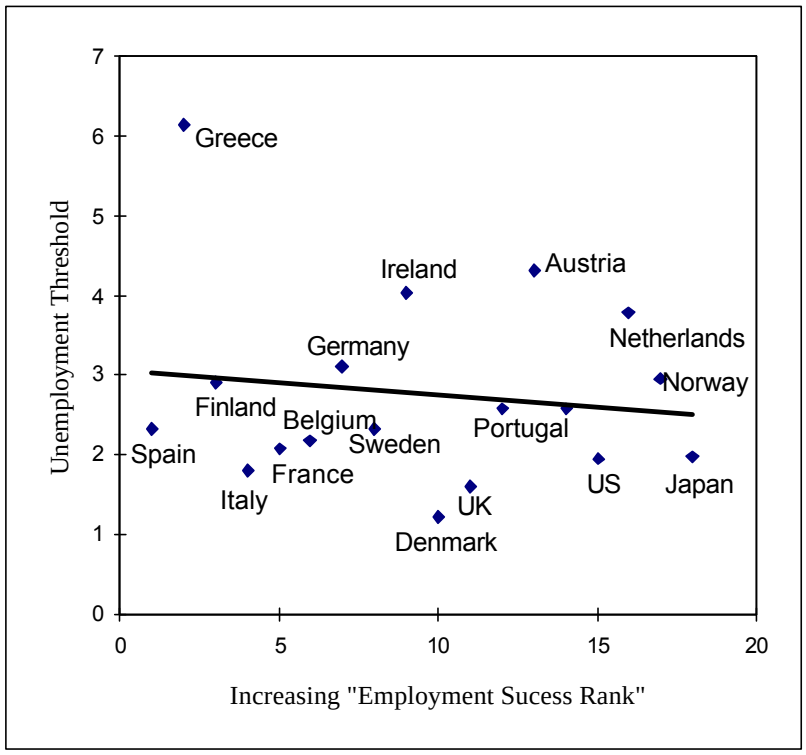
(a) Labor Productivity Growth



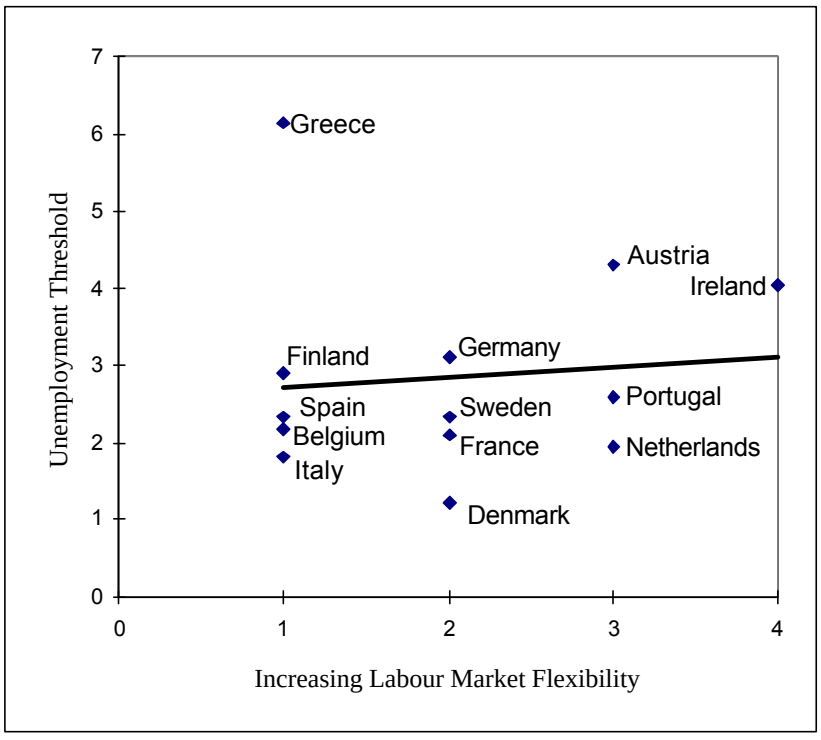
(b) Unemployment Threshold

Note: The "overall" labor market flexibility is taken from Dohse et al. (1998), p. 88, table 12. 1 denotes "inflexible labor market", 2 denotes "relatively inflexible labor market", 3 "relatively flexible labor market", 4: "flexible labor market".

Figure 5.2.2 — "Labor Market Success Rank", Trend Labor Productivity Growth, and Unemployment Thresholds in Nineties



(a) Trend Labor Productivity Growth



(b) Unemployment Threshold

Note: On the vertical axis is the employment threshold. The employment policy rank is taken from van Suntum and Kröger (2000). A large number indicates a "good" labor market performance, o low rank a "bad" one.

Moreover, though the result of a lower unemployment threshold due to more flexible labor markets might meet widespread economic prejudices several methodological shortcomings must be kept in mind. For example, the flexibility measure is an observation at a certain point of time and the employment threshold is estimated for a time period including one decade. Over and above, a simple correlation of both measures does not control for any other possible exogenous variable. Over and above, it is an open question whether the result is robust against changes in the arbitrary measure of "labor market flexibility". To check for the robustness of the result in the following it will be elaborated whether the similar results can be found for different measures of the employment intensity of growth and for alternative rankings of labor market institutions. With respect to the latter we first make use of the "international employment ranking" provided by van Suntum and Kröger (2000).

The figure depicts that the correlation between the employment threshold and the ranking is much lower than the one calculated with the measure constructed by Dohse et al. (1999 a, b). However, van Suntum and Kröger (2000) provide a rather flexible ranking. Countries can gain or lose several ranks within two years. Hence, their measure is even more than the previous ranking related to a certain actual point of time. Moreover, in ranking the employment success they include the actual outcome in their judgment. Hence, the exogenous variable is not fully independent from the endogenous variable.

5.4 Exchange Rate Volatility

Several recent papers have argued that exchange rate volatility might influence domestic employment. Buscher and Müller (1999) and Stirböck and Buscher (2000) have argued that the Okun relationship in Germany is affected by the intensity of exchange rate movements. The underlying argument is that exchange rate fluctuations cause both transaction costs and uncertainty. Both factors will — according to the authors — dampen exports and, therefore, production and employment. Fixing the exchange rate will, in turn, improve the employment situation and reduce unemployment. However, when considering this argument one has to keep in mind that exchange rates have an economic function. In particular, they might serve as a shock absorber (Siebert 1999). Thus, in the presence of asymmetric shocks in a monetary union the reduced volatility might easily be accompanied by reduced employment in a particular country. Hence, the question whether exchange rate volatility dampens the domestic employment prospects remains an empirical one. Buscher and Müller (2000) estimate dynamic versions of Okun's law and add several volatility measures to the equations. Their evidence, however, is ambiguous. In some time periods and

for some volatility measures there seems to be a significant negative impact of exchange rate volatility on employment. However, the results are far from being robust.

Belke and Gros (1999) consider the possibility that the introduction of the Euro might have stimulated employment within Europe. They argue, that the risk of implementing the Euro was small since there has been only a minor impact of external shocks on domestic employment. Hence, the loss of the exchange rate as a shock absorber is unlikely to have large effects on the labor market prospects. Following the approach advocated by Stirböck and Buscher (2000) the estimated equation in this context is:

(5.4.1) $$\Delta U_t = a + b\Delta \ln GDP_t + g s_t + e_t$$

where the s_t is a measure of exchange rate volatility. In this paper, we use the standard deviation of the real external value of the respective currency within the year as a measure of exchange rate risk.

Table 5.4.1 gives the results of the estimation. There are only a few countries for which a significant unemployment increasing effect of exchange rate volatility can be observed. Moreover, in most of these cases the coefficient is significant only at a 10 percent level. The estimations have also been done — but not reported — for the gap-model of the Okun relationship. It turns out, that within this specification only for Greece and Norway a significant influence can be established. All in all, these results are less optimistic about the unemployment dampening effects of reducing exchange rate fluctuation than — for example — the ones in Stirböck and Buscher (2000).

Table 5.4.1 — Okun's Law and Exchange Rate Volatility for Selected OECD Countries 1970 to 1999

Country	$\hat{a}$	$\hat{b}$	$\hat{g}$	R^2	d_w
Austria	0.68	–0.10	–0.87	0.35	1.55
	(3.07)***	(–6.56)***	(–1.47)		
Belgium	0.19	–0.12	1.56	0.14	0.87
	(0.38)	(–1.31)	(1.34)		
Denmark	0.05	–0.38	2.34	0.53	1.50
	(0.14)	(–7.46)***	(3.02)***		
Finland	0.12	–0.36	2.61	0.81	1.22
	(0.30)	(–5.94)***	(3.51)***		
France	0.65	–0.21	0.42	0.32	1.40
	(3.68)***	(–3.71)***	(1.04)		
Germany[a]	0.61	–0.20	0.45	0.44	1.24
	(2.34)**	(–3.85)***	(1.28)		
Greece	0.22	–0.15	0.56	0.41	1.33
	(1.25)	(–2.95)***	(2.30)**		
Ireland	1.72	–0.38	0.22	0.54	1.87
	(3.20)***	(–5.76)***	(0.25)		
Italy	0.26	–0.07	0.35	0.09	1.26
	(1.22)	(–2.16)**	(1.66)		
Netherlands	1.46	–0.38	–1.08	0.35	0.89
	(2.24)**	(–2.55**)	(–1.10)		
Portugal	–0.51	–0.11	1.22	0.36	1.22
	(–1.16)	(–1.66)	(2.31)*		
Spain	1.34	–0.51	1.00	0.47	0.93
	(1.94)	(–2.99)***	(1.21)		
Sweden	0.60	-0.32	0.27	0.57	1.03
	(2.28)	(–3.10)	(1.11)		
United Kingdom	–0.12	–0.45	1.69	0.62	1.43
	(–0.33)	(–5.80)***	(3.72)***		
United States	1.60	–0.43	–0.57	0.77	2.22
	(6.03)***	(–10.67)***	(–1.75)*		
Switzerland	0.27	–0.06	–0.12	0.09	1.03
	(1.55)	(–1.88)*	(-0.47)		
Japan	0.39	–0.06	–0.07	0.35	1.57
	(5.71)***	(–3.19)***	(–1.05)		
Norway	0.88	–0.18	–0.61	0.29	1.36
	(2.05)**	(–2.62)**	(–1.13)		

In brackets: *t*-values. They calculated using robust standard errors according to Newey and West (1987). — *** (**, *) denotes significance at the 1 (5, 10) percent level. — a) West Germany until 1991.

5.5 Cross-Country Evidence

To give some insights into the factors underlying the employment intensity of growth in the nineties, some cross country regressions have been performed. The point of departure is the equation:

(5.5.1) $$Threshold_i = a_0 + a_1 Wage_i + a_2 Service_i + a_3 Dummies_i + e_i$$

The approach summarizes some of the possible influences on the threshold considered above. The variable "Wage" represents the average increase of the real labor cost during the nineties, "Service" is the share of the services sectors relative to total employment and the set of dummies gives the overall flexibility of the labor markets. The dummies are taken from Dohse et al. (1999). Only in cases, for which these authors do not provide a judgment, the classification of van Suntum and Kröger (2000) used instead.

Table 5.5.1 — Different Employment Thresholds in Selected OECD Countries — Cross-Country Estimates 1990–1999

Constant	Wage	Service	Dummies	R^2
9.93 (2.77)	–0.03 (–0.06)			0.00
9.99 (2.60)	0.25 (0.56)	–0.14 (–2.33)		0.31
13.20 (5.72)	0.34 (1.29)	–0.18 (–5.68)	–2.21 (–4.14)	0.81

Note: The numbers in brackets are robust *t*-values computed according to the method of Withe (1978). The dummy is 1 for a country having a flexible labor market according to Dohse et al., and 0 else.

The estimation results given in table 5.5.1 reveal that all variables have the expected sign, i.e. an increase in real wage cost leads to a higher employment threshold whereas a greater relative importance of the services sector and a more "flexible" labor market tend to lower the growth rate needed to promote employment. Unfortunately, the results occur to be not very robust. A alternative measure of the threshold variable or minor changes in the set of exogenous variables lead to unsatisfactory results. Hence, estimations based on more observations are in order. This will be done in the next section.

5.6 Evidence from Panel Data

To further elaborate on the interaction between the employment intensity of growth and its possible determinants, we use both the time series and cross section information involved in the data set. As a first approximation, we estimate a fixed effects model of the original Okun equation and add several additional variables (X) to the relation.

(5.6.1) $$\Delta U_{t,i} = a_i + b\Delta GDP_{t,i} + gX_{t,i} + e_{t,i}$$

where "*X*" stands for exchange rate volatility, the change real labor costs, the share of the services sector, and dummies representing the "flexibility" of the labor market, respectively. The coefficient representing the influence of real GDP growth is assumed to be equal over all countries under investigation. However, since the institutional arrangements are quite different across the member states the unemployment threshold $-\frac{a}{b}$ might easily vary across the countries. This is captured by using a fixed effect model, i.e. using country-specific constants.

Table 5.6.1 — Different Employment Threshold across Selected OECD Countries — Panel Estimates 1990–1999

Dependent Variable: Change of Unemployment Rate

Specification	Estimation Results
Change of Real GDP	$\underset{(-11.76)}{-0.39}\,\Delta \ln GDP_{t,i} + \hat{e}_{t,i}$
Change of Real GDP, Exchange Rate Volatility	$\underset{(-10.75)}{-0.35}\,\Delta \ln GDP_{t,i} + \underset{(4.21)}{1.23}\,s_{t,i} + \hat{e}_{t,i}$
Change of Real GDP, Change of Real Labor Costs	$\underset{(-11.68)}{-0.39}\,\Delta \ln GDP_{t,i} - \underset{(-0.43)}{0.01}\,s_{t,i} + \hat{e}_{t,i}$

The results of the estimations are given in table 5.6.1. They are in partial conflict with the results of the cross-country regressions. None of the "flexibility "dummies turns out to be significant. The main problem with regard to this variable is that the flexibility dummies refer to a certain point in time rather than being a time series itself. Hence, a study of the impact of changes of flexibility over time, i.e. the changes of institutions, are beyond the scope of the analysis. The volatility variable is — also in contrast to the cross-country regression — significant. The main reason for this finding seems to be that in the panel estimation the variable to explain is the change of the unemployment rate rather than the employment intensity of growth.

6 Conclusions

The relatively poor employment performance in Europe is partly due to low employment intensity of growth. Though the results presented in this paper suggest that the link between the increase of overall production and the rise of employment is still close they also prove that countries more successful in fighting unemployment like, for example, the United States show a generally lower unemployment threshold.

The stable link between employment and growth has implications for economic policy. On one hand, this finding is a challenge for the hypothesis that insufficient growth is the main determinant of European unemployment. Though the US economy has been growing faster than the economies of the European Union within the last recent years, this does not hold for sample of, say two or three decades. The bulk of the large European unemployment, however, has emerged over a relatively long time period. On the other hand the result makes clear that there is indeed no evidence supporting the fear of a jobless growth. In fact, "the idea of 'jobless growth' in Europe is not only misplaced but also turns the facts upside down" (Paqué 1998: 22).

With respect to possible reasons for different employment elasticities or threshold we have found a significant impact of wage policy and institutional settings on the labor market. An employment threshold should therefore not be taken as a natural constant. Rather it can be influenced by policy measures. The most prominent measure seems to be wage policy. Moreover, institutions and macroeconomic sources for unemployment are not independent from each other. Even economists arguing for demand side stimulus on employment for Europe do not pretend that institutions have no impact on the labor market performance (cf. e.g. Solow 2000). Hence, one direction for a revised White Book Strategy probably lies in a closer look on the interaction between macroeconomic relations and country specific labor market institutions.

However, increasing the employment intensity of growth is — of course — not a political aim per se. Reducing labor productivity would reduce the real per capita income and, thus, economic welfare. To figure out the "natural" rate of labor productivity growth as compared to the excess increase driven, for example, from to high wage increases is empirically a very difficult task. Moreover, the empirical results presented here and elsewhere on the possible causes of the employment threshold or the employment intensity of growth are by no means more accurate as competing evidence directly modeling employment or unemployment. Hence, economic policy should consider aiming directly on increasing employment rather than using the concept of employment intensity as intermediate goal. Over and above, labor productivity is known as a clear-cut procyclical macroeconomic variable. It is a difficult task to figure out trend and cycle of the time series. Thus, it is very hard to identify whether a certain increase of labor productivity is merely a normal cyclical phenomenon or a sign for a decreasing employment intensity of growth.

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8 Data Appendix

Unless otherwise stated, all data are taken from the CD

OCED Statistical Compendium 2000.

The average hours worked are taken from the OECD working hours database. Total hours worked are calculated by multiplying the average hours worked with total employment or dependent employment in persons, respectively.