



OECD Economics Department Working Papers No. 130

Unemployment and Labour  
Force Participation: Trends  
and Cycles

**Jørgen Elmeskov,  
Karl Pichelmann**

<https://dx.doi.org/10.1787/066012764781>

**GENERAL DISTRIBUTION  
OCDE/GD (93)95**

**ECONOMICS DEPARTMENT  
WORKING PAPERS**

**No. 130**

**UNEMPLOYMENT AND LABOUR  
FORCE PARTICIPATION -  
TRENDS AND CYCLES**

**by**

**Jørgen Elmeskov and Karl Pichelmann**



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1993



GENERAL DISTRIBUTION

OCDE/GD(93)95

ECONOMICS DEPARTMENT

WORKING PAPERS

No. 130

UNEMPLOYMENT AND LABOUR FORCE PARTICIPATION -- TRENDS AND CYCLES

by

Jørgen Elmeskov and Karl Pichelmann

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1993

006831

FOR TECHNICAL REASONS, GRAPHS, TABLES & FACSIMILES ARE NOT AVAILABLE ON OLIS

## UNEMPLOYMENT AND LABOUR FORCE PARTICIPATION -- TRENDS AND CYCLES

This paper deals with trends and cycles of unemployment and labour-force participation. Empirical evidence on both trends and cyclical movements in unemployment and participation is presented. Some of the mechanisms behind the observed developments are also analysed, examining how well they fit into different theoretical frameworks. The implications for the assessment of labour market slack of the observed interplay between unemployment and participation are discussed. The paper ends by presenting some unexplained puzzles concerning the interplay between trends and cycles of unemployment and participation.

\* \* \*

Cette étude est consacrée à l'analyse de l'évolution du chômage et des taux d'activité, distinguant entre variations conjoncturelles et évolution tendancielle. Des données empiriques sur ces deux types de variations y sont présentées. Certains des mécanismes sous-jacents aux évolutions constatées sont aussi analysés, ainsi que la manière dont ils peuvent s'inscrire dans différents cadres théoriques. L'étude examine comment les interactions observées entre chômage et taux d'activité permettent d'interpréter le sous-emploi des ressources sur le marché du travail. Certains aspects difficiles à comprendre en ce qui concerne les interactions entre évolution conjoncturelle et tendancielle du chômage et des taux d'activité sont mentionnés à la fin de l'étude.

## Contents

1.	Introduction .....	5
2.	Explaining unemployment trends: the role of labour-force participation .....	6
3.	Explaining unemployment cyclicalilty .....	11
3.1	A decomposition of unemployment cyclicalilty .....	13
3.2	Interpreting the link between employment and labour force .....	22
3.3	Summing up: decomposing unemployment cyclicalilty .....	34
4.	Is unemployment a good measure of slack? .....	34
5.	Some tentative conclusions and remaining questions .....	39
	Annex I: Gross flows on the labour market .....	46
	References .....	52



## UNEMPLOYMENT AND LABOUR FORCE PARTICIPATION -- TRENDS AND CYCLES

Jørgen Elmeskov and Karl Pichelmann (1)

### 1. Introduction

Economists and statisticians have found it difficult to determine unambiguously which of the three principal labour market states a person belongs to: employed, unemployed or non-participating in the labour force. Definitions and classifications differ across countries, and they are apt to change over time within countries, too. Furthermore, gross flows between the various labour market states -- usually large compared to corresponding net flows and changes in stock figures -- respond significantly to cyclical conditions in the labour market. As a result, the question of whether unemployment, as currently defined and measured, is an appropriate indicator for assessing labour market slack has been a subject of continuous debate.

Several factors hinder a clear partition of labour force participants into those employed and those unemployed. For example, people working part-time or in seasonal, temporary, or irregular jobs may be seeking full-time work. In particular, in some countries workers may find themselves being rationed on the hours component of their employment relation, working short-shifts in a cyclical downturn, while in other countries workers awaiting recalls from their employers temporarily swell the ranks of the unemployed. In general, the strong pro-cyclical movement of productivity observed in many countries is indicative of some degree of labour hoarding being a systematic feature of depressed labour markets. Furthermore, in countries where labour market policies play a major role, training schemes and direct job-creation may keep a significant number of people off the unemployment register (2).

A key issue in the measurement of unemployment is the fuzzy dividing line between unemployment and non-participation in the labour force, and the important role it plays in accounting for the differing unemployment experience across countries. It has been asserted that low (increases in) unemployment in some countries may simply reflect the channelling of excess supply in the labour market into non-activity rather than into open unemployment. A key notion in this context is that of discouraged workers who have stopped to search actively for work because of a (perceived) lack of jobs. The observation that labour force participation seems to be quite sensitive to overall conditions in the market gives rise to the hypothesis of a causal link running from unemployment to participation. The strength of this interaction is likely to vary across countries depending inter alia on the demographic composition of the work-force, coverage and generosity of alternative income support systems and a variety of other incentives affecting the decision to join or leave the labour force.



In this note the interaction of unemployment and labour force participation is discussed and some implications for the reliability of unemployment as a measure of labour market slack are discussed. Descriptive evidence on the link between unemployment and participation is presented in Section 2. In Section 3 possible causes of the varying degree of cyclicity in unemployment are explored by looking at the link between employment and labour force participation across OECD countries. The appropriateness of unemployment as a measure of labour market slack is discussed in Section 4. The note closes with some tentative conclusions and a few remaining puzzles concerning the interaction between trend and cycle unemployment and participation rates.

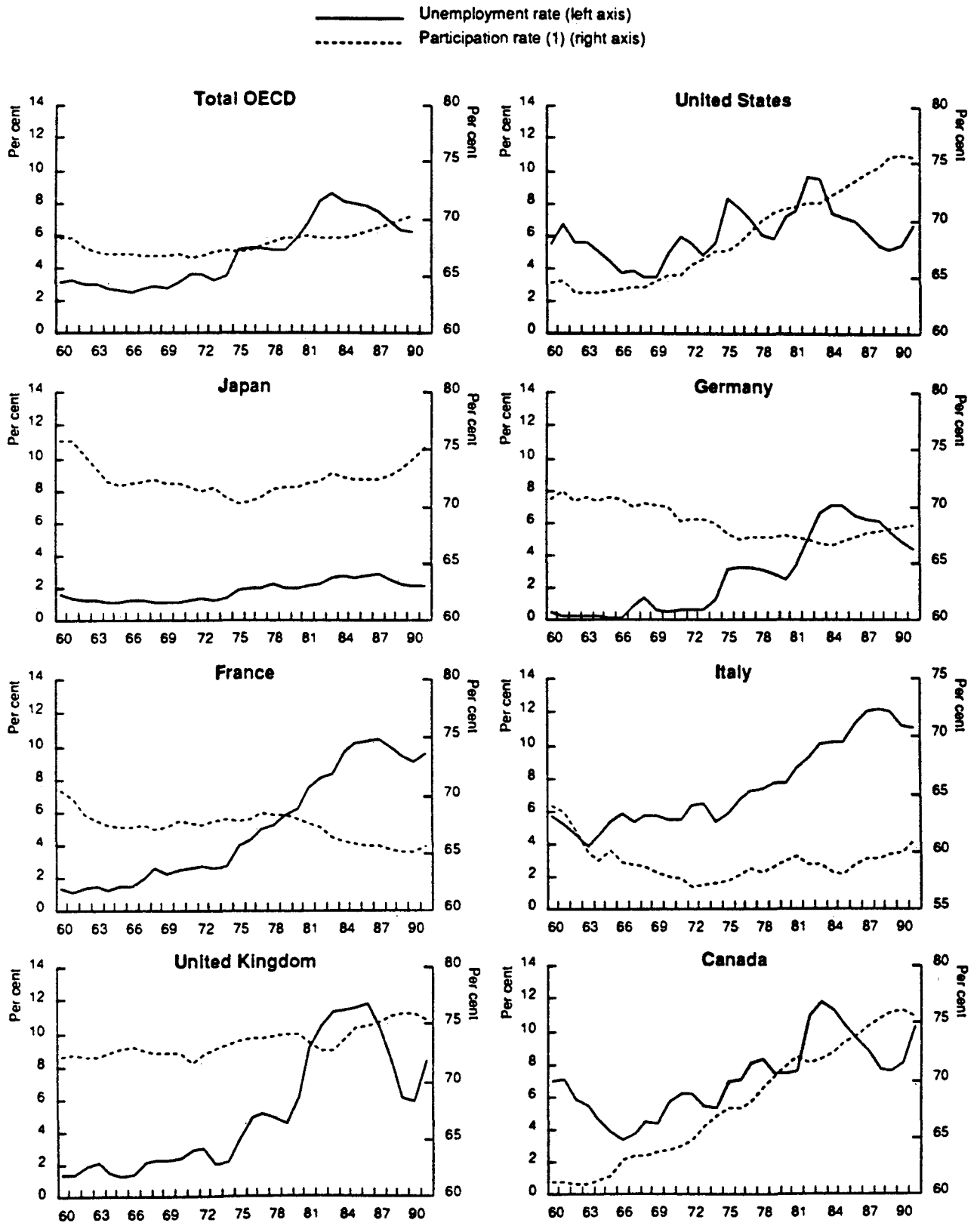
## 2. Explaining unemployment trends: the role of labour-force participation

For the OECD region as a whole, labour force participation rates fell somewhat through the 1960s but since around 1970 they have risen steadily (Figure 1). The fall in the 1960s may be interpreted as mainly a result of increasing school attendance and rapidly rising real incomes leading to increased demand for leisure, including effects of an increase in the coverage as well as in the generosity of tax financed public pension schemes. The subsequent trend rise in the aggregate participation rate can be fully accounted for by the increase in female participation, which more than offset the stagnation or further reduction of the male participation rates. While predominantly reflecting a gradual shift in attitudes, cultural and social norms, these developments have, in many countries, coincided with increased availability of publicly-financed day care institutions, taking over selective parts of the traditional family roles of women. Reform of the tax systems, especially the shift from the family to the individual as the basic income tax unit, may also have contributed.

The long-term trends in aggregate participation rates over the last two decades have been different across geographical areas. Participation rates were broadly stable during the first half of the 1960s but rose steadily thereafter in North America, Australia and most Nordic countries. Japan and many continental European countries experienced a prolonged period of falling participation early on. In some of these countries the participation rate reached a trough in the mid-1970s, but in others, such as France and the Netherlands, it kept falling. Male participation rates have been on a declining trend over the past twenty years in virtually all European countries as well as in Australia, but have remained stable in North America and in Japan. Female participation rates, on the other hand, have been rising in the entire OECD area, so that there has been a steady narrowing of the gap between gender-specific participation rates. Indeed, for the OECD as a whole, the difference between male and female participation rates is now only about half the size it used to be some twenty years ago.

The data presented in Figure 1 are also suggestive of some impact of unemployment on participation rates. For the OECD as whole, periods of sharply rising unemployment tended to be associated with a stagnation in the aggregate participation rate. This observation does not only hold over time, but also across countries, as confirmed by the evidence presented in Figure 2. Increases in participation rates were, on average, significantly smaller in

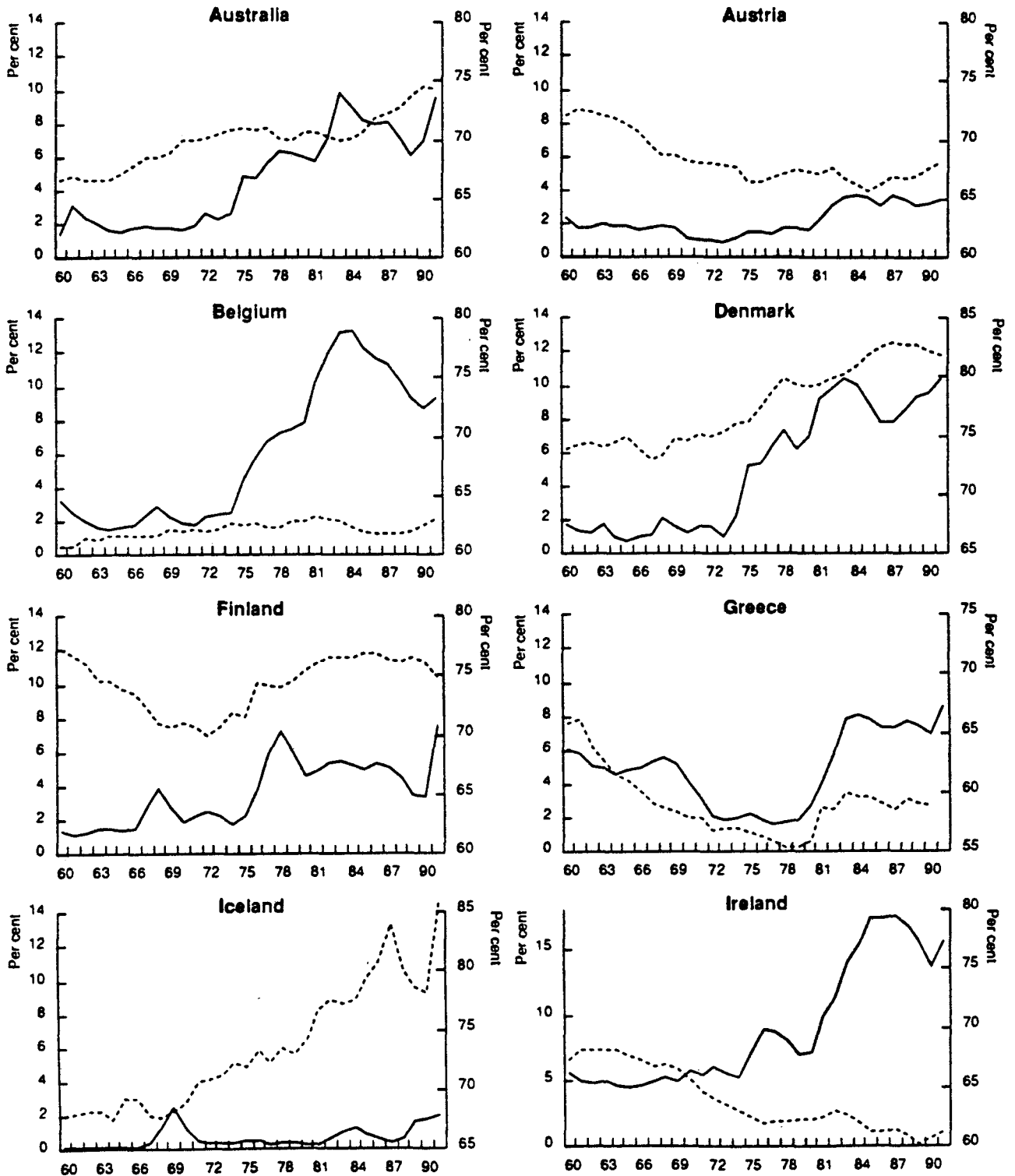
**Figure 1. Unemployment and labour force participation rates**



1. Labour force as a share of population between 15-64 years of age.

Figure 1 (continued)

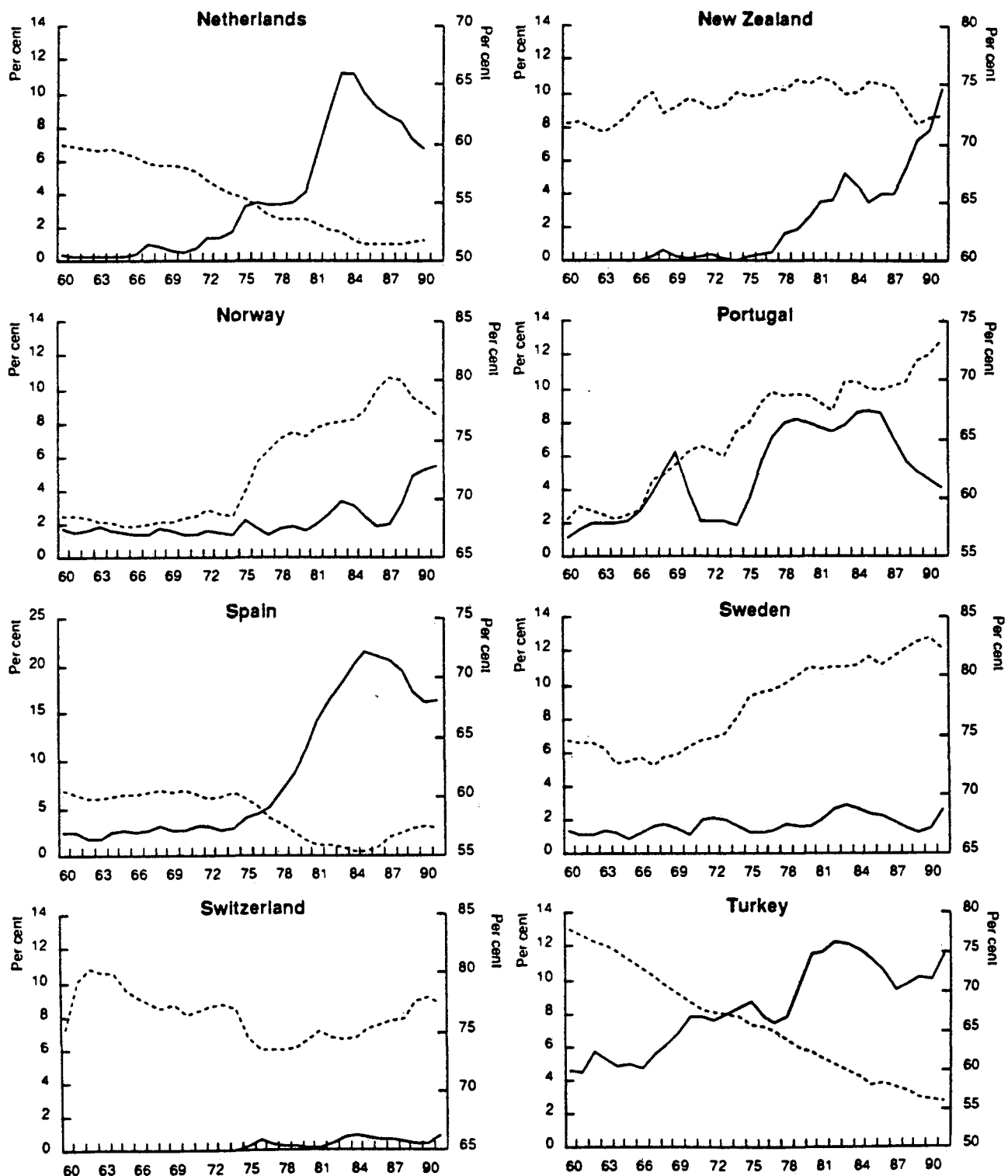
— Unemployment rate (left axis)  
 - - - Participation rate (1) (right axis)



1. Labour force as a share of population between 15-64 years of age.

Figure 1 (continued)

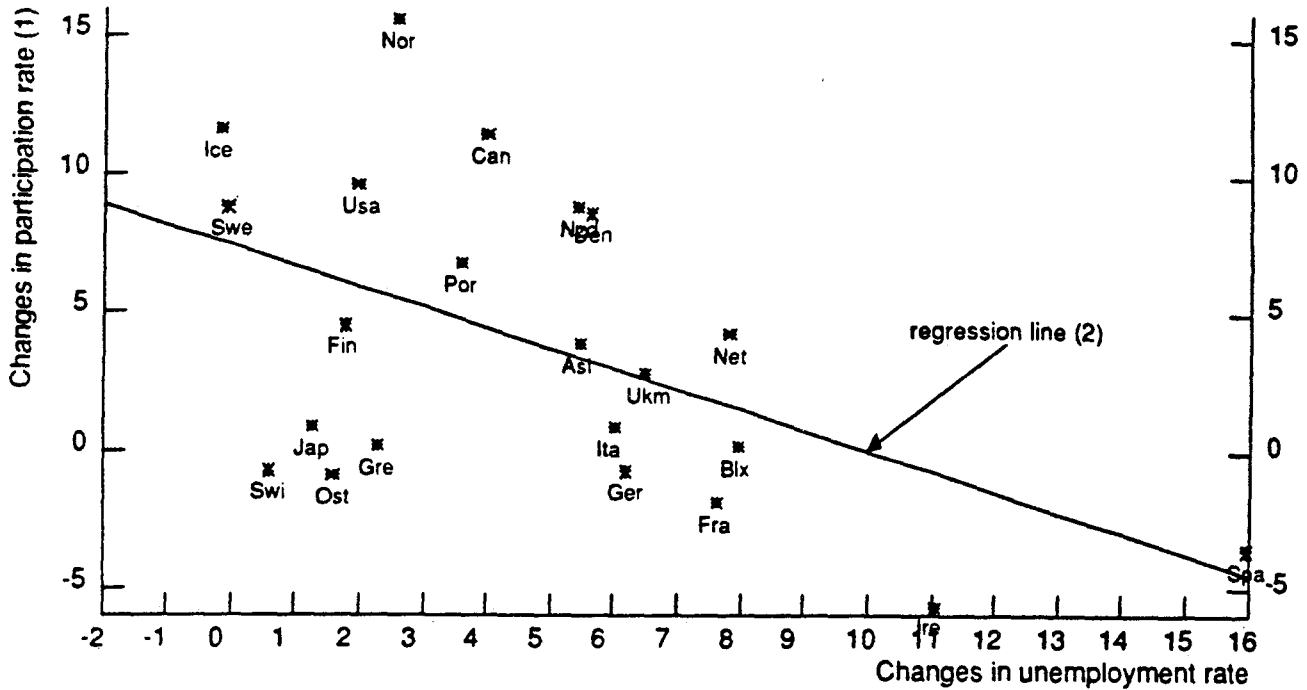
— Unemployment rate (left axis)  
 - - - Participation rate (1) (right axis)



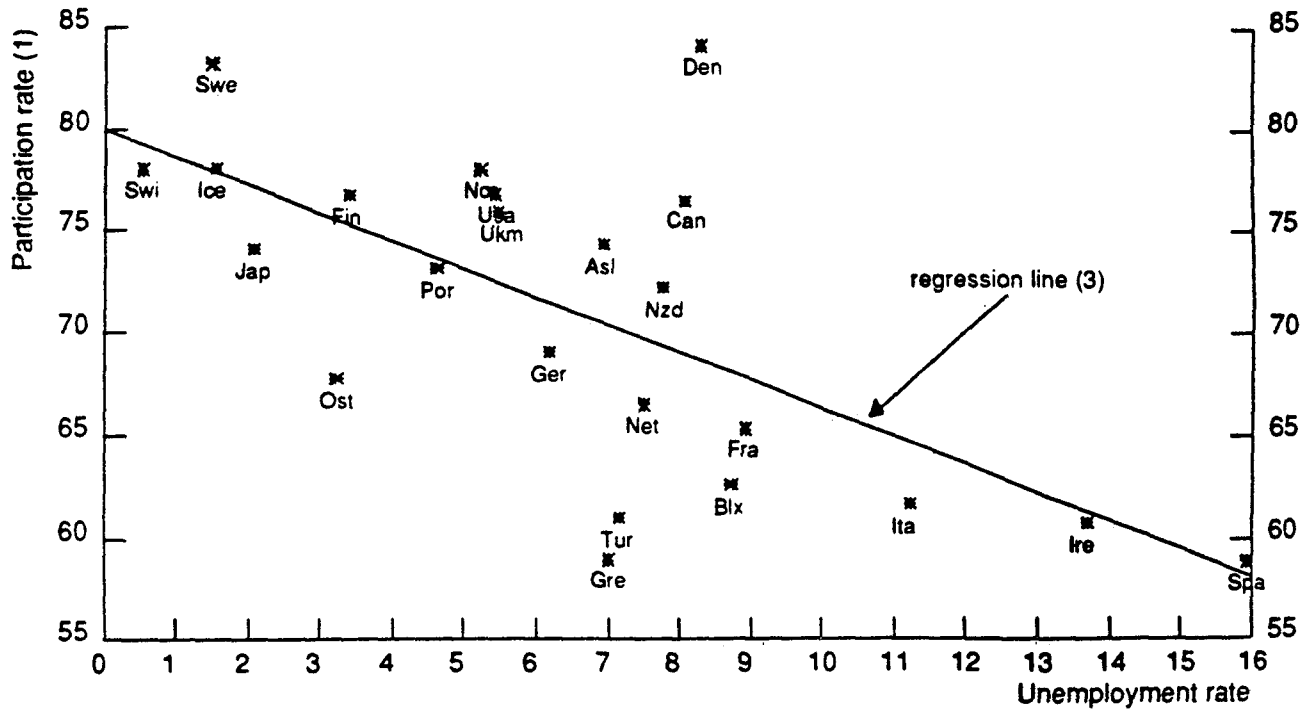
1. Labour force as a share of population between 15-64 years of age.

**Figure 2. Unemployment and participation rates, cross-country trends and levels**

**A. Changes between average 1966-70 and average 1986-90 (percentage points)**



**B. Levels 1990 (per cent)**



1 Labour force as a share of total population 15-64 years

2 The line is based on the estimated equation  
 changes in participation rate = 7.40 - 0.74 \* changes in unemployment rate  $R^2=0.23$   
 t-values (4.40) (-2.70)

3 The line is based on the estimated equation:  
 participation rate = 80.0 - 1.36 \* unemployment rate  $R^2=0.41$   
 t-values (31.5) (-4.03)

countries with large increases in unemployment over the past twenty years (Panel A); and high unemployment rates are associated with significantly lower rates of participation across countries (Panel B).

The data presented in Figure 2 point towards a negative long-run relation -- both in levels and in changes -- between unemployment and labour-force participation, suggesting that with rising open unemployment its "hidden component" may increase as well (3). Thus, there seems to be little evidence that countries with low (increases of) open unemployment have achieved this outcome at the expense of relatively lower levels of participation, and cross-country differences in labour market slack, open as well as hidden, may actually be even larger than indicated by official unemployment figures.

For some countries more direct evidence exists in the form of data on the number of "discouraged workers", a sub-category of the inactive population which conceptually is close to unemployment (4). However, definitions differ across countries, making comparison difficult, and available time-series are in most cases relatively short. Over time, nevertheless, the number of discouraged workers has been positively correlated with measured unemployment in most countries, with the notable exception of Japan, supporting the evidence presented above. This was the result of a study of discouraged workers in seven OECD countries which, on the other hand, also indicated that in the mid-1980s countries with lower measured rates of unemployment had a higher ratio of discouraged to unemployed workers, with this ratio ranging from a low of 5 to 8 per cent in Canada, 14 per cent in Australia and the United States, 90 per cent in Norway, to over 100 per cent in Japan (OECD, 1987). Thus, including discouraged workers in the unemployment count would tend to narrow the differences across countries, in contrast to the evidence presented above. In interpreting this finding it should, however, be borne in mind that non-participation is a much broader concept than discouraged workers (5).

In summary, the long-run relation between unemployment and labour-force participation appears to be negative: countries with low unemployment/population ratios have high participation rates, with Sweden and Japan as the most notable examples; at the other end of the spectrum, high unemployment coincides with low participation in Spain and Ireland (6). In general, therefore, cross-country evidence does not support the notion of a long-run trade-off between levels of unemployment and non-participation (7).

### 3. Explaining unemployment cyclicity

The extent to which the unemployment rate fluctuates over the business cycle differs significantly across OECD countries. Based on one measure of such fluctuations, the standard deviation of first differences in the average annual unemployment rate, it appears that the variability of the unemployment rate is high in North America, the United Kingdom, Finland, Ireland and Spain while it is low in Japan, Austria, Switzerland and some of the Nordic countries (Table 1, last column). In general, very similar cross-country rankings are obtained when more sophisticated procedures to assess the magnitude of cyclical variations in unemployment are applied (8).

Table 1. The cyclicity of unemployment

	Variability of output (1)		Employment responsiveness (2)	Elasticity of hours worked with respect to output (3)		Responsiveness of labour force to employment (4)		Responsiveness of real consumption wages (5)		Variability of unemployment rate (1)
	1970-91	1970-91		1970-91	1970-91	1970-91	1970-91	1970-91		
United States	1.02	0.64	0.19	0.30	-0.46	1.12				
Japan	0.94	0.19	0.17	0.81	-3.29	0.20				
Germany	0.84	0.45	0.23	0.44	-1.64	0.73				
France	0.68	0.38	0.09	0.17	-0.93	0.50				
Italy	0.93	0.15	0.39	0.46	-0.47	0.57				
United Kingdom	1.02	0.68	0.22	0.27	-0.78	1.27				
Canada	1.11	0.62	0.10	0.35	-0.58	1.12				
Australia	0.87	0.79	0.26	0.45	0.70	1.09				
Austria	0.86	0.33	0.23	0.91	-2.59	0.39				
Belgium	0.92	0.49	0.73	0.06	-0.12	0.96				
Denmark	0.87	0.59	..	0.30	0.02	1.01				
Finland	1.35	0.37	0.64	0.27	-1.39	1.24				
Greece	1.37	-0.05	0.12	1.01	..	0.87				
Iceland	1.53	0.28	..	0.89	..	0.42				
Ireland	1.00	0.54	0.15	0.20	-0.47	1.30				
Netherlands	0.80	0.63	..	0.18	-0.73	1.05				
New Zealand	1.79	0.24	..	0.62	-0.64	0.82				
Norway	0.85	0.59	0.07	0.74	-1.22	0.58				
Portugal	1.49	-0.19	..	0.98	-0.29	1.08				
Spain	0.96	0.85	0.90	0.25	-0.65	1.32				
Sweden	0.77	0.50	0.66	0.56	-3.92	0.42				
Switzerland	1.13	0.65	..	0.91	-3.24	0.20				
Turkey	1.18	0.38	..	0.22	..	0.80				

1. Standard deviation of first difference (in log and multiplied by 100, for output).

2. The estimated coefficient  $b$  in the regression  $\langle \text{employment deviation from trend} \rangle = a + b \langle \text{output deviation from trend} \rangle$ , where the trends have been established using the Hodrick-Prescott filter, imposing identical smoothing factors for employment and output in each country.

3. The estimated coefficient to output growth in a regression of changes in weekly/monthly hours of work in manufacturing or industry (and in a few cases the whole economy), including also a constant, a time trend and lagged working hours on the right-hand side of the equation.

4. The estimated coefficient  $b$  in the regression  $\langle \text{labour force deviation from trend} \rangle = a + b \langle \text{employment deviation from trend} \rangle$ , where the trends have been established using the Hodrick-Prescott filter, imposing identical smoothing factors for employment and output in each country.

5. The estimated coefficient  $b$  in the regression  $\langle \text{real wage deviation from trend} \rangle = a + b \langle \text{unemployment deviation from trend} \rangle$ , where the trends have been established using the Hodrick-Prescott filter, imposing identical smoothing factors for employment and output in each country.

Source: OECD Secretariat.

### 3.1 A decomposition of unemployment cyclicality

Several different factors operate simultaneously to affect the magnitude of unemployment variability over the business cycle. Indeed, variations of unemployment are the net result of bilateral and bi-directional flows between all of the three labour-market states: employment, unemployment or outside the labour force. Unfortunately, there is little data coverage of these flows for most countries, so the following analysis relies on observations of the state variables. The available evidence on gross flows is surveyed in Annex I.

In a mechanical sense, cyclical fluctuations in output may lead -- to varying degrees across countries -- to variations in employment which, in turn, may trigger different responses of the labour force and, ultimately, unemployment. And, to start with, the volatility of production differs across countries.

An indication of the extent of cyclical fluctuations in output across OECD countries over the period 1970-1991 is given in Table 1, column 1. According to the measure presented in the table, some countries, such as France, the Netherlands and Sweden, have experienced less cyclical fluctuations in output than others, such as Finland, Greece, Iceland, New Zealand and Portugal. Obviously, these differences may be attributed to a host of different factors like the degree of exposure to autonomous supply or demand shocks, the sectoral composition of output, or the importance of automatic stabilisers to mention just a few.

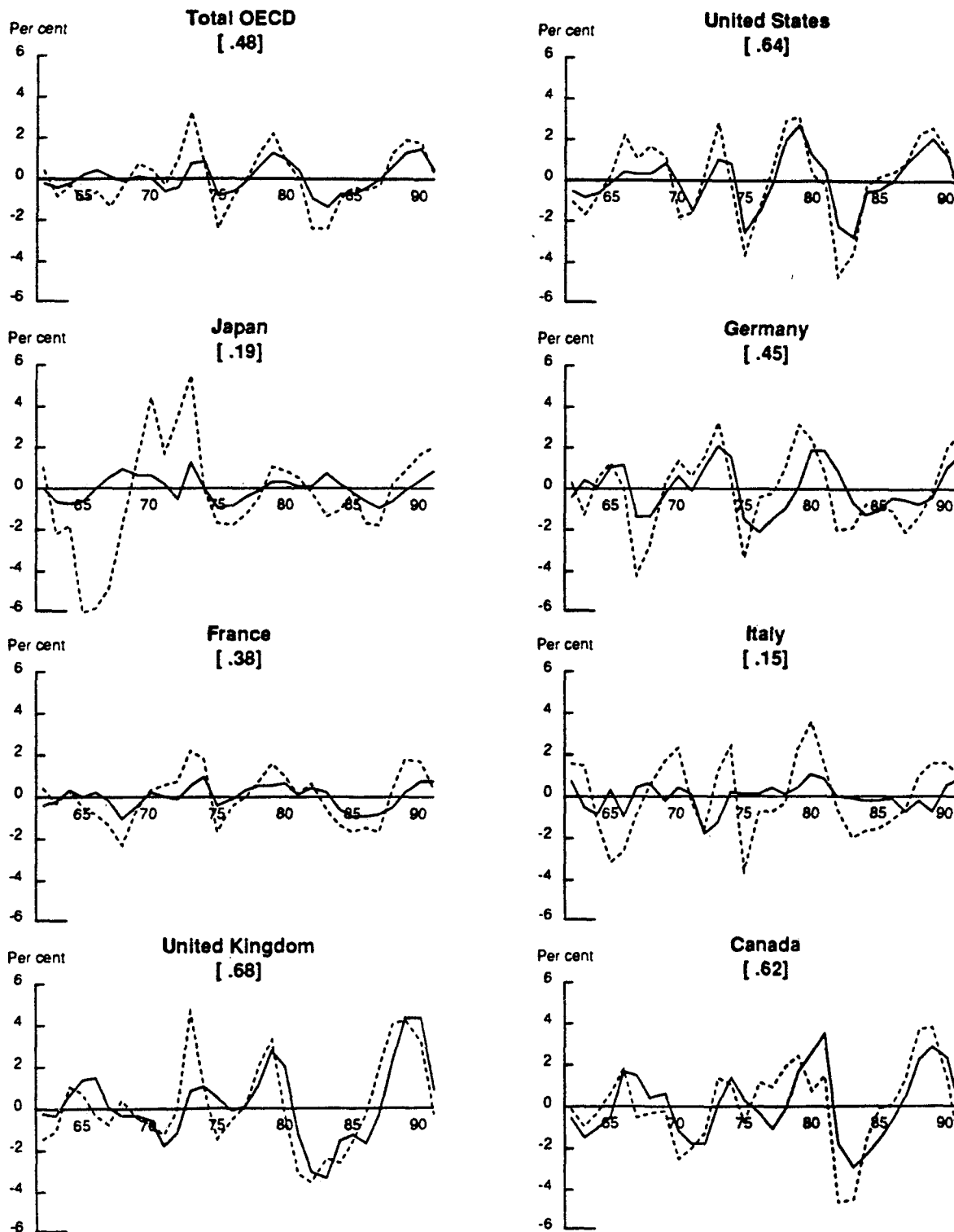
There are also noticeable cross-country differences in the employment response to cyclical variations in output. The evidence presented in Table 1, column 2, and in Figure 3 indicates that employment fluctuations show strong covariation with output variations in North America, the United Kingdom, Australia, the Netherlands, Spain and Switzerland, while in countries like Japan and Italy there are almost entirely offsetting pro-cyclical productivity movements. There are various explanations for the pro-cyclical behaviour of productivity. A traditional one is labour hoarding: as a result of adjustment costs, firms will be reluctant to lay off workers in a downturn and will first tend to reduce the number of hours worked (9). One of the institutional factors influencing the flexibility of employment is employment protection legislation (10), and the choice between adjustment of hours or employment levels is also likely to be influenced by the specific incentives in unemployment benefit systems for the use of temporary layoffs as opposed to part-time and/or short-time working (11). The evidence presented in Table 1, column 3 indicates that working-hours seem to be particularly pro-cyclical in Belgium, Finland, Spain and Sweden, while the elasticity of hours worked with respect to output is estimated to be very low in countries like France, Canada and Norway.

The strength of the overall employment response to business cycle conditions may also partly depend on variations in self-employment. In general, the past decade has seen a reversal of the long-term trend away from self-employment, with self-employment growing faster than overall, non-agricultural employment in the majority of OECD countries. One possible reason for the rise in the proportion of self-employed in overall employment may be less favourable labour-market conditions providing a "push factor" to an increase in self-employment. In addition, many countries have introduced



**Figure 3. Trend deviations of output and employment**

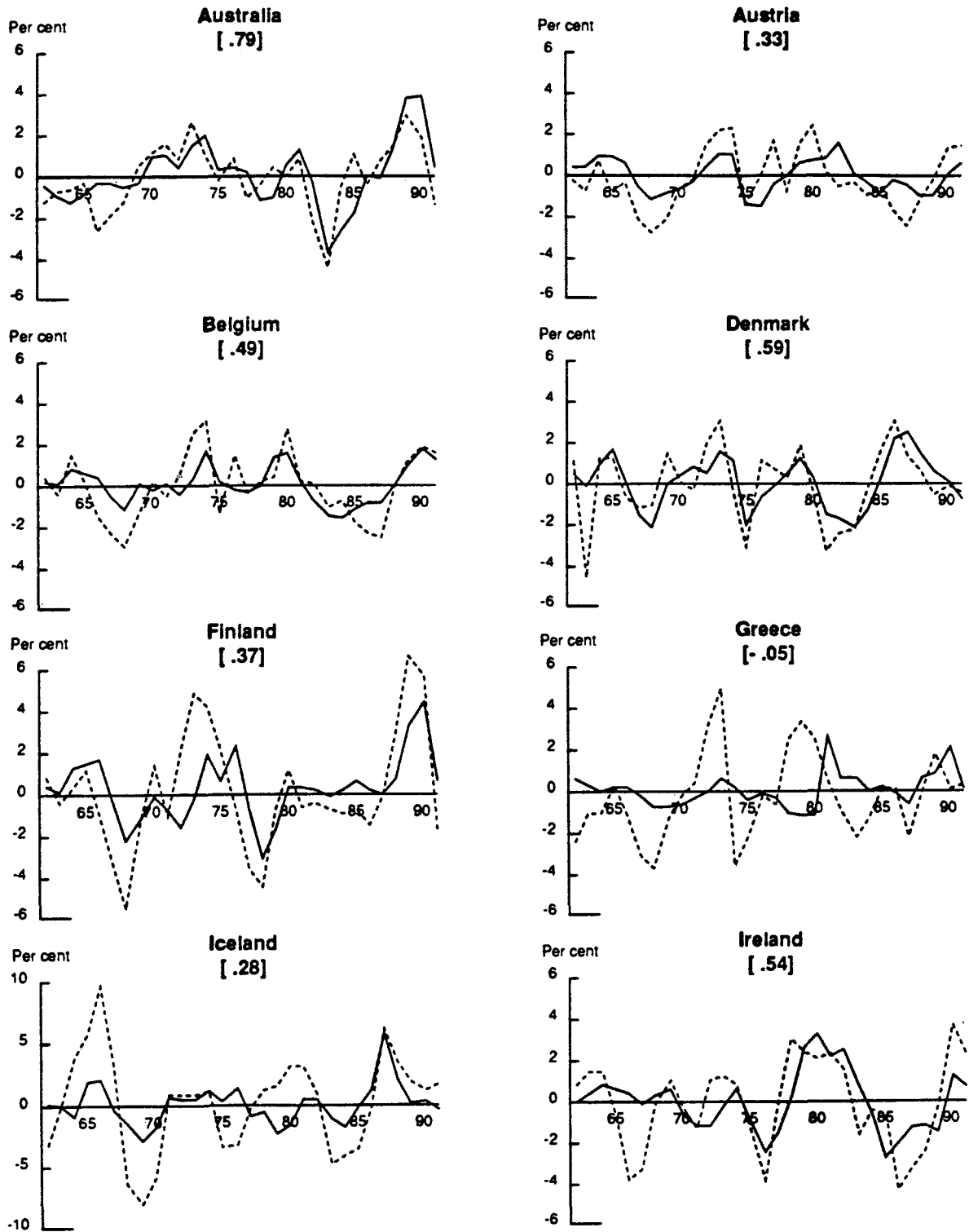
— Employment (1)  
 - - - Real GDP (1)  
 [ ] Employment responsiveness (2)



1. The curves show the relative difference between actual and trend figures for employment and real GDP  
 The trend figures are calculated using a Hodrick-Prescott filter
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of employment with respect to trend deviations of real GDP based on regressions using annual data over the period 1970-91.

Figure 3 (continued)

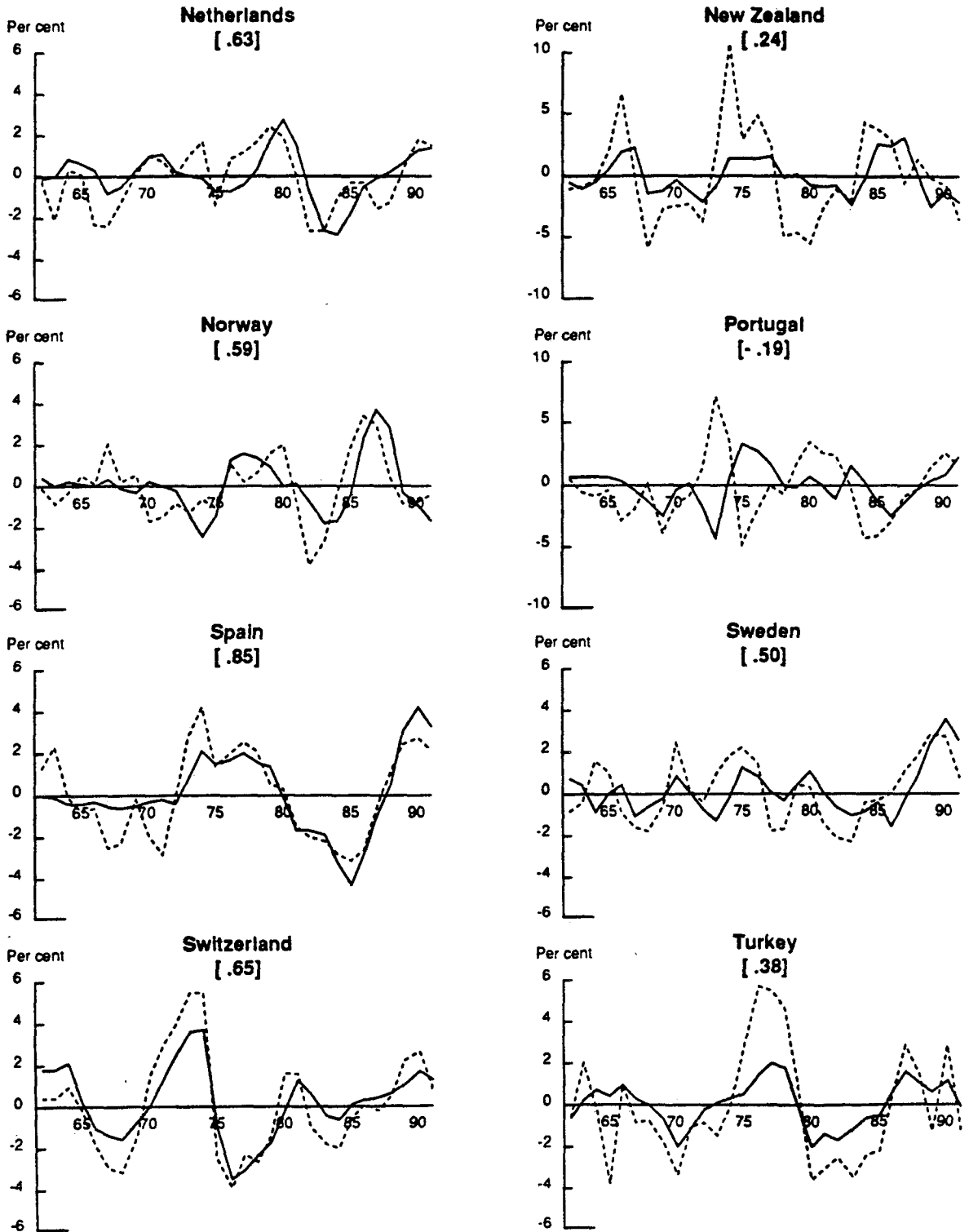
— Employment (1)  
 - - - Real GDP (1)  
 [ ] Employment responsiveness (2)



1. The curves show the relative difference between actual and trend figures for employment and real GDP. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of employment with respect to trend deviations of real GDP based on regressions using annual data over the period 1970-91.

Figure 3 (continued)

— Employment (1)  
 - - - Real GDP (1)  
 [ ] Employment responsiveness (2)



- 1 The curves show the relative difference between actual and trend figures for employment and real GDP  
 The trend figures are calculated using a Hodrick-Prescott filter
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of employment with respect to trend deviations of real GDP based on regressions using annual data over the period 1970-91

schemes to help unemployed people to set up their own business. However, the evidence reviewed in OECD (1992) provides only weak support, if any, for a positive relationship between changes in unemployment and in self-employment over the past two decades. Nevertheless, as self-employment exhibits less cyclical volatility than wage and salary employment (12), a relative increase in self-employment will tend to reduce the cyclical variability in overall employment.

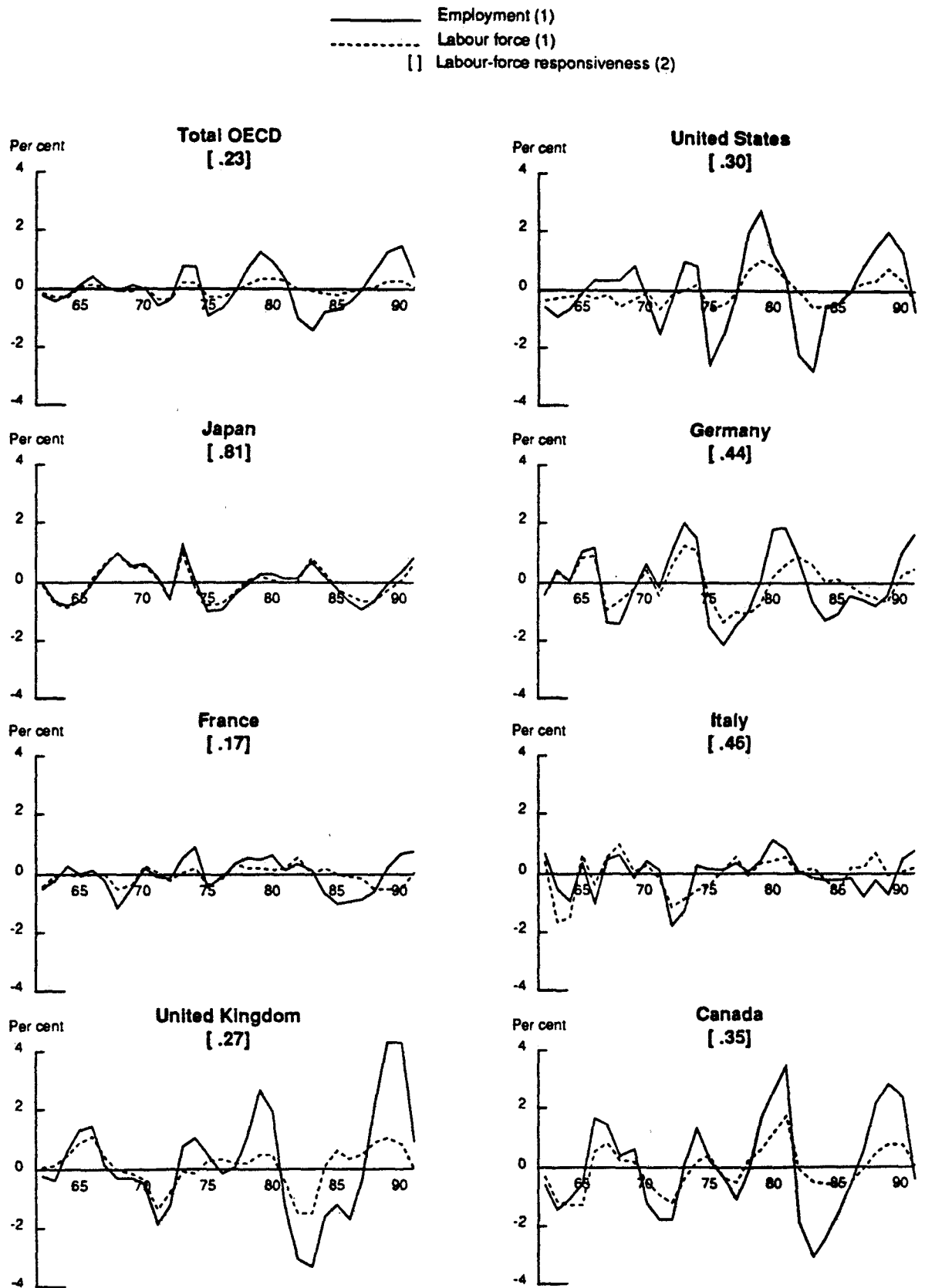
Several procedures can be applied to gauge the sensitivity of the labour force to cyclical conditions. One empirical indicator is based on the estimated elasticity of trend deviations of the labour force with respect to trend deviations of employment, as illustrated in Figure 4. This measure of labour force "responsiveness" provides a quantitative estimate of the extent to which the effect of cyclical employment fluctuations on unemployment is cushioned by pro-cyclical variations in the labour force. The empirical evidence on the strength of labour force "responsiveness" presented in Table 1, column 4, indicates that the cyclical nature of the labour force differs widely across countries. In countries such as Japan, Austria, Iceland, Portugal and Switzerland employment deviations from trend are almost entirely matched by cyclical fluctuations in the labour force (13). France, Belgium, Ireland and the Netherlands are located at the other end of this spectrum with virtually no short-run labour force response to cyclical swings in employment.

These results confirm, by and large, the empirical evidence on cycles in labour force participation in seven major OECD countries as presented in OECD (1986). Estimating average cyclical amplitudes of total participation rates and of civilian employment over the three major recessions before the mid-1980s, the ratio of these two figures turned out to be highest for Japan and France, lowest for the United Kingdom and the United States, with Canada, Germany and Australia in an intermediate position. Thus, with the notable exception of France, rankings with respect to labour force cyclical nature are almost identical despite a different methodology and different coverage over time (14).

The cross-country variation in the degree of labour force "responsiveness" to employment conditions is also revealed by estimating the elasticity of participation rates with respect to the employment share in the working-age population from structural participation rate equations. The results of an analysis along these lines are presented in Table 2. In all countries, with the exception of Germany and France, total participation rates are significantly affected by employment rates; the estimated elasticities are particularly high in Italy and Japan, but are in the range of 0.4 to 0.6 in most other countries (15).

The elasticity of participation rates with respect to overall employment conditions, as proxied by the total employment share in the working-age population, differs considerably between main demographic groups (Table 2). In almost all countries, the elasticity of participation rates with respect to employment opportunities is higher for females as compared to males (16). Also, participation rates of both the younger and older age groups appear to be generally more elastic than that of prime-age adults. However, once out of the labour force, older workers tend to quit the labour market more permanently than other workers (17).

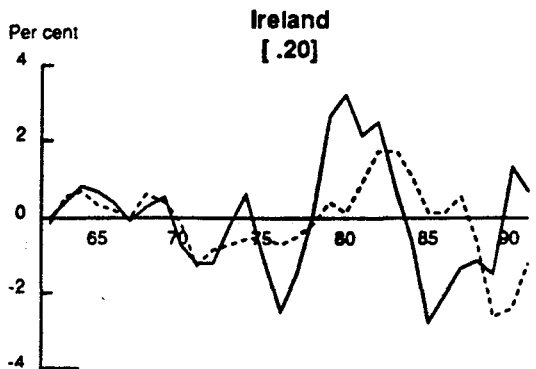
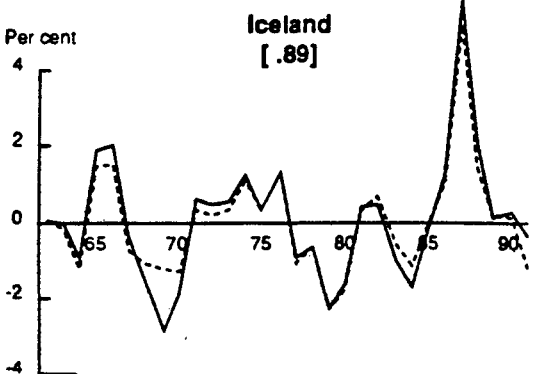
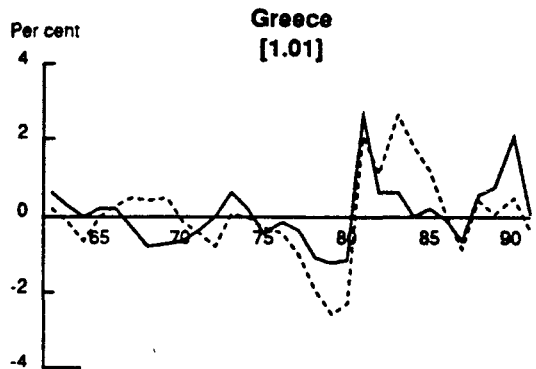
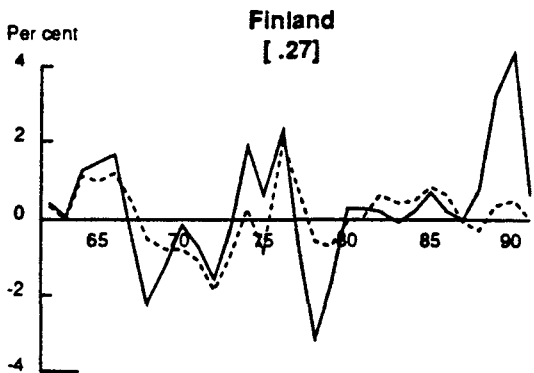
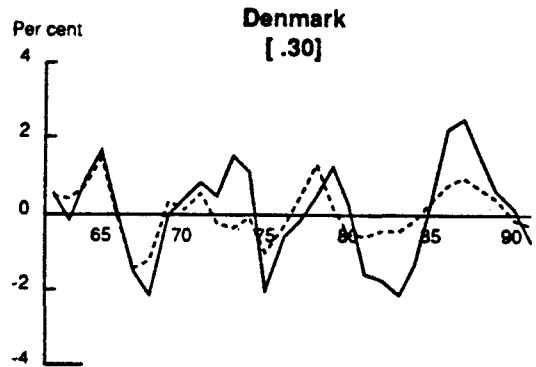
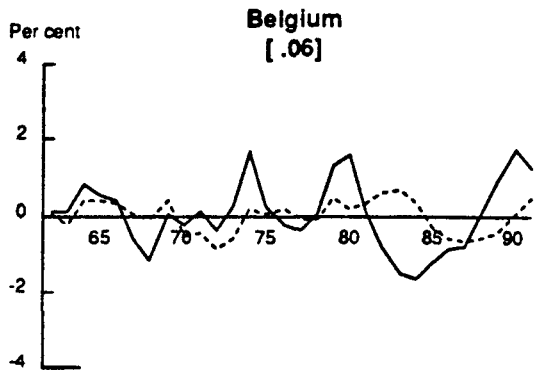
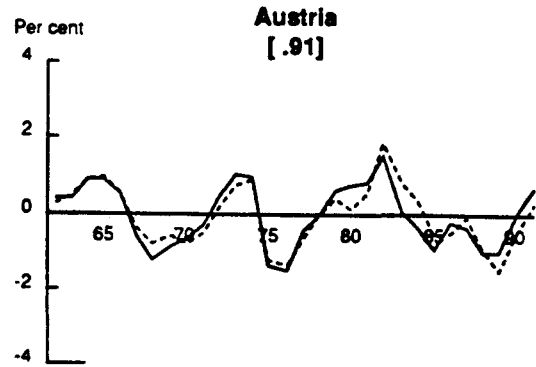
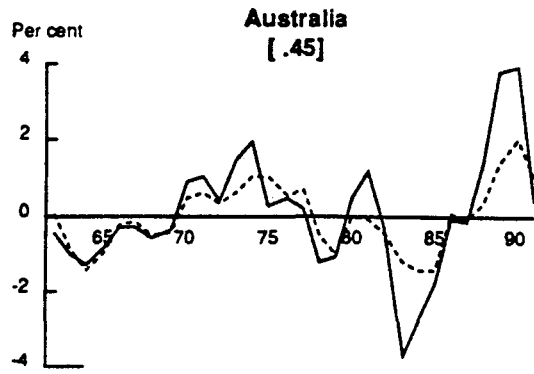
**Figure 4. Trend deviations of employment and labour force**



1. The curves show the relative difference between actual and trend figures for employment and labour force. The trend figures are calculated using a Hodrick-Prescott filter
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the labour force with respect to trend deviations of employment based on regressions using annual data over the period 1970-91

Figure 4 (continued)

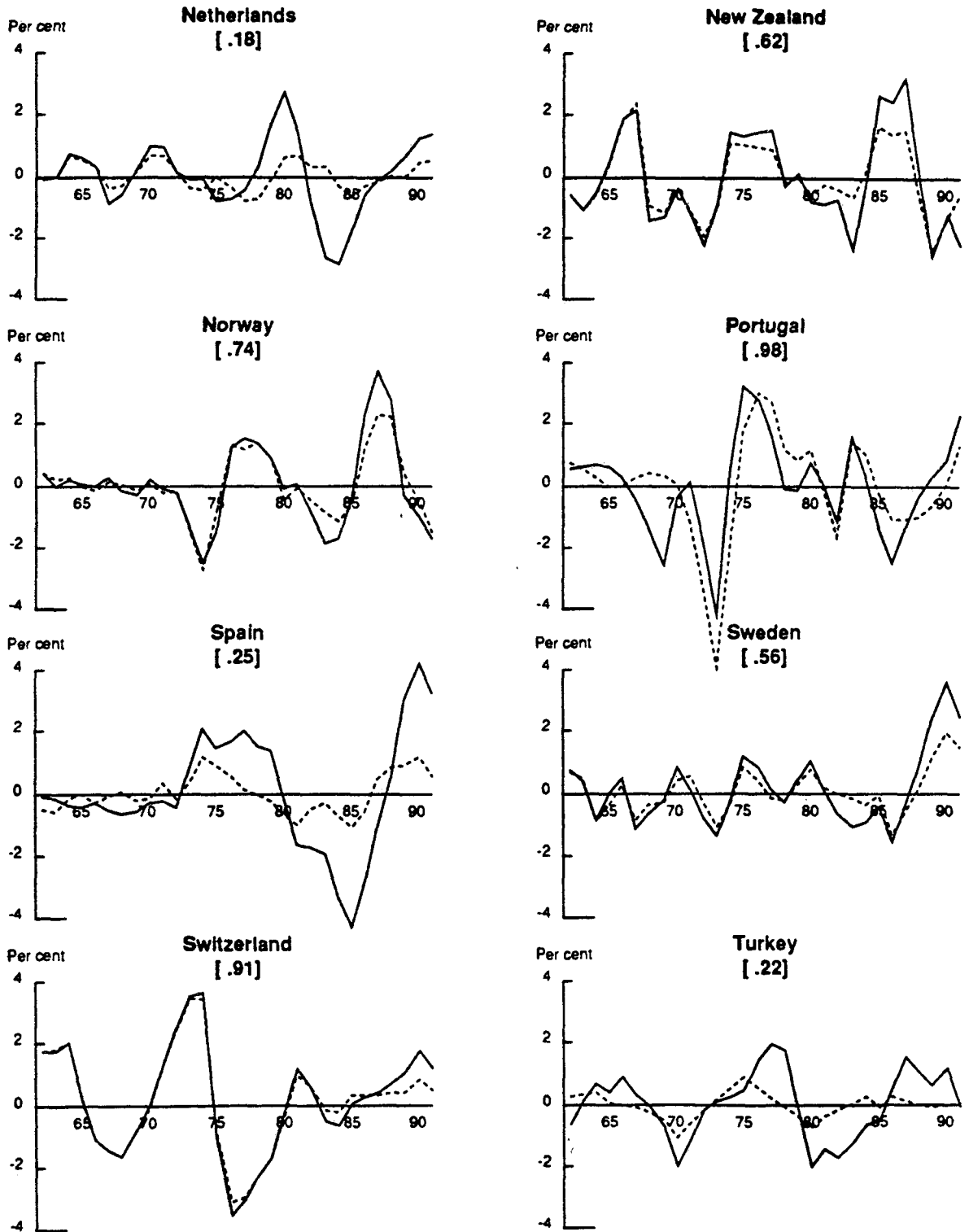
— Employment (1)  
 - - - Labour force (1)  
 [ ] Labour-force responsiveness (2)



1. The curves show the relative difference between actual and trend figures for employment and labour force. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the labour force with respect to trend deviations of employment based on regressions using annual data over the period 1970-91.

Figure 4 (continued)

— Employment (1)  
 - - - Labour force (1)  
 [ ] Labour-force responsiveness (2)



1. The curves show the relative difference between actual and trend figures for employment and labour force. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the labour force with respect to trend deviations of employment based on regressions using annual data over the period 1970-91.

**Table 2. The influence of employment shares on participation rates**

	Elasticities of participation rates with respect to the overall employment share in working-age population (1)					
	Total	Male	Female	15-24	25-54	55+
United States	0.4	0.2	1.1	1.6	2.3	2.2
Japan	0.8	0.7	1.5	8.6	0.1	0.9
Germany	..	..	..	..	..	..
France	..	..	..	..	..	..
Italy	1.3	0.7	3.4	3.7	1.0	1.8
United Kingdom	0.6	0.4	0.7	0.7	0.3	1.4
Canada	0.6	0.3	..	0.9	..	..
Australia	0.5	0.2	0.9	..	0.5	1.6
Finland	0.4	0.3	0.5	..	..	2.7
Netherlands	0.4	0.2	0.7	0.8	0.3	3.6
Norway	0.4	..	1.3	..	..	..
Portugal	0.4	..	0.6	..	..	..
Spain	0.2	..	..	..	0.2	..
Sweden	0.6	0.5	0.8	2.7	0.4	..

.. Insignificant.

1. Results are based on the estimation of:

$$\text{Log PR} = a_0 + a_1 \log \text{PR}(-1) + a_2 \log \text{RDI} + a_3 \log \text{ES} + \text{time trends},$$

where PR = participation rate; logistic transformation  
RDI = real disposable income per head  
ES = overall employment share in working-age population.

The estimated elasticities are evaluated at the average value of the participation rates over the estimation period.



The higher sensitivity of female labour market participation to overall employment conditions matches with the observation that women usually comprise the majority, and often a large one, of discouraged workers. However, a straightforward interpretation of the above results in terms of discouragement effects driving people out of the market who are ready to re-enter in a cyclical upturn may be misleading in several respects (18):

- The cyclical inflow into the status of labour market "discouragement" does not seem to be particularly concentrated among people with recent work experience.
- Discouraged workers, as defined in labour force surveys, appear to be no more likely to enter the labour force than other members of the inactive population who say they would want a job but cite non-economic reasons for non-searching.
- A significant part of discouraged workers has not been in the labour force for many years, pointing toward discouragement being not only a cyclical but also a longer-term phenomenon and raising doubts about the readiness of discouraged workers to re-enter the labour force when economic prospects improve.

### 3.2 Interpreting the link between employment and labour force

It is not, *a priori*, clear that the behavioural interpretation given above to the positive covariation between levels of employment and labour force is the correct one. In principle, the positive covariation could result from other types of behaviour, inverting the causal link between employment and the labour force. Empirical causality tests are not of much assistance in judging this issue (Table 3). For many countries, even those with a very close covariation between employment and labour force, these tests do not give significant results independently of whether total or business sector employment is used in the testing. In many cases, this seems to reflect adjustment speeds that are much higher than what the data frequencies applied can capture, i.e. a large part of transitions taking place more or less directly between non-participation and employment. For the remaining countries, the observed pattern is far from uniform: for five or six countries, dependent on the employment concept used, employment appears to lead the labour force, whereas the reverse appears to be the case in five countries, with some overlap between the two groupings.

The lack of clear, uniform evidence from causality tests is not surprising. Theoretical arguments can be made for causality running in both directions. Thus, in a simple bargaining framework, with downward-sloping labour demand, and upward sloping wage-setting and labour supply schedules in real wage/labour space, a shift in the labour supply curve accompanied by a parallel move (of equal magnitude) of the wage-setting schedule would lead to a change in the quantity of labour demanded and *vice versa* for a shift in the demand curve (19). This framework suggests a way of testing which causal link has been the dominant over the historical period: a positive shock to labour supply should lead to a fall in real wages simultaneously with an increase of employment, while a positive shock to labour demand should lead to both higher real wages and employment.

**Table 3. Tests of causality between labour force and employment**

F-statistics based on:  $D\log LF = a + L \cdot B(L) \cdot D\log LF + L \cdot C(L) \cdot D\log EM + \text{time trends}$   
 and:  $D\log EM = a + L \cdot E(L) \cdot D\log EM + L \cdot F(L) \cdot D\log LF + \text{time trends}$

Country	Estimation period	EM = total employment		EM = business sector employment	
		C = 0	F = 0	C = 0	F = 0
<b>Major countries, half-yearly data (1)</b>					
United States	1962S1-1991S2	4.94***	1.99	3.81**	0.72
Japan	1962S1-1991S2	0.07	0.09	0.02	0.01
Germany	1962S1-1991S2	3.14**	3.00**	2.62*	2.42*
France	1962S1-1991S2	1.94	0.62	1.50	2.06
Italy	1962S1-1991S2	0.18	1.38	0.89	1.81
United Kingdom	1962S1-1991S2	1.22	2.17	0.69	2.22*
Canada	1962S1-1991S2	1.81	1.16	1.17	0.39
<b>Smaller countries, annual data (2)</b>					
Australia	1965-91	2.86*	0.25	3.44*	0.34
Austria	1965-91	1.73	1.52	2.73*	2.15
Belgium	1965-87	1.95	1.97	1.41	5.38**
Denmark	1965-91	0.43	0.62	0.45	0.16
Finland	1965-91	1.14	2.92*	2.38	0.42
Greece	1965-91	2.51	0.28	1.83	0.44
Iceland	1965-91	1.01	1.21	0.29	0.20
Ireland	1965-91	0.63	0.89	0.55	0.89
Netherlands	1965-91	1.84	3.10*	4.92**	0.78
New Zealand	1965-91	0.24	0.04	0.44	0.43
Norway	1965-91	2.19	0.52	0.32	0.53
Portugal	1965-91	0.23	0.14	0.09	0.30
Spain	1965-91	7.21***	2.63*	4.00**	0.52
Sweden	1965-91	3.27*	4.90**	1.25	6.47***
Switzerland	1965-91	0.24	0.43	0.23	0.39
Turkey	1965-91	1.44	1.68	1.45	3.29*

1. Order of L-polynomials = 2.
2. Order of L-polynomials = 1.

Levels of significance:

- \* Rejected at the 10 per cent level.
- \*\* Rejected at the 5 per cent level.
- \*\*\* Rejected at the 1 per cent level.

The picture of covariation between cyclical employment and cyclical real wage movements is relatively clear (Figure 5) (20). In almost all countries, Australia being the only exception, the covariation is positive, though sometimes only weakly so (21). This weakness in some countries may seem surprising, since the data refer to annual real wages and employment in persons. Thus, to the extent fluctuations of aggregate production are reflected in hours worked, and, indeed, the empirical evidence in Table 1 suggests a positive covariation between output and working hours for all countries, the estimated response of real wages to employment would be expected to be stronger on an annual basis than on an hourly basis. However, a caveat concerning potential aggregation bias is worth noting. Based on longitudinal micro data for the United States, much stronger pro-cyclicality of real wages has been found than between aggregated series based on the same data (Solon, Barsky and Parker, 1992). Employment seems to be relatively more cyclical for groups at the lower end of the pay scale, and as these groups experience more-than-proportional employment increases during an upturn, the aggregate average wage is being dragged down and *vice versa* in a downturn.

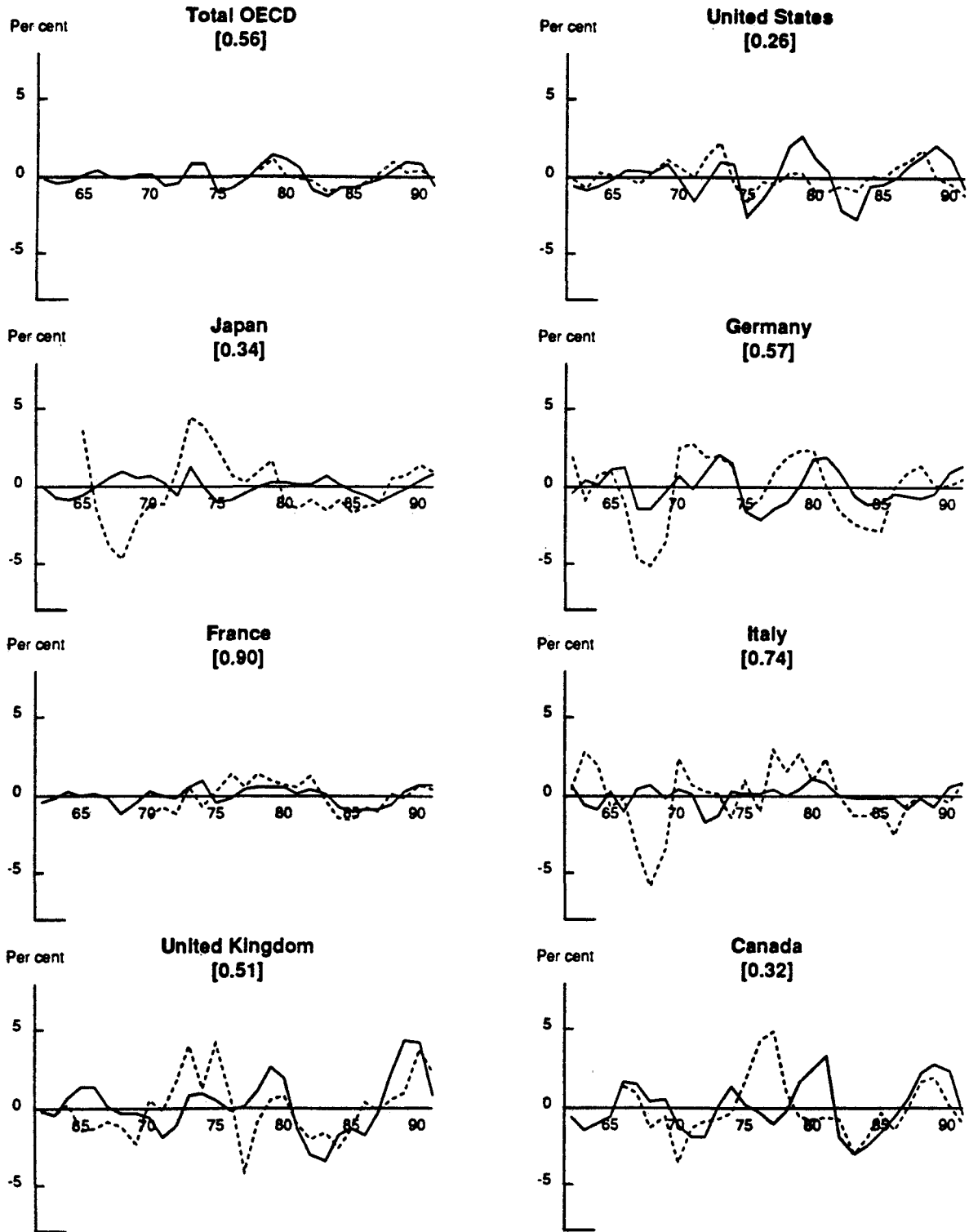
Another piece of evidence suggesting that the main causal link runs from labour demand to labour supply, is the negative covariation between, on the one hand, unemployment and, on the other hand, real wages and employment (Figure 6). In a bargaining framework, a positive shock to labour supply might in the short run increase unemployment but the real wage should unambiguously fall and employment unambiguously increase. A negative demand shock would also raise unemployment and reduce the real wage, but employment would fall. Again, as in Figure 5, the movement of real wages is pro-cyclical for most countries and employment and unemployment are clearly negatively related.

The observations contained in Figures 5 and 6 could conceivably also be consistent with a different theoretical framework. An important tenet of Real Business Cycle (RBC) theory is that markets clear continuously and that cyclical variations mostly reflect changes in production technology. Positive technology shocks increase real wages, thus changing the return from work relative to leisure, thereby boosting labour supply and, given instantaneous market clearing, employment. This is consistent with the pro-cyclicality of productivity, which sits oddly with the standard framework used above (Figure 7) (22). It is, however, less easy to explain why, within an RBC framework, employment and unemployment would be negatively related as shown for most countries in Figure 6. Given the set-up of unemployment benefit systems in most countries, productivity shocks are not likely to have a very large impact on the return to work relative to unemployment benefits and, therefore, it may seem difficult to explain why, in countries where the coverage of benefit systems is relatively broad, so many people should be induced to leave unemployment in favour of employment in order to reap this return.

On the basis of the above discussion, the observed link between employment and labour force may be interpreted as predominantly a causal link from the former to the latter. It should, however, be kept in mind that this mechanism is not the only one in operation and that in some countries the reverse causal link may play an important role as well.

**Figure 5. Cyclicity of real wages and employment**

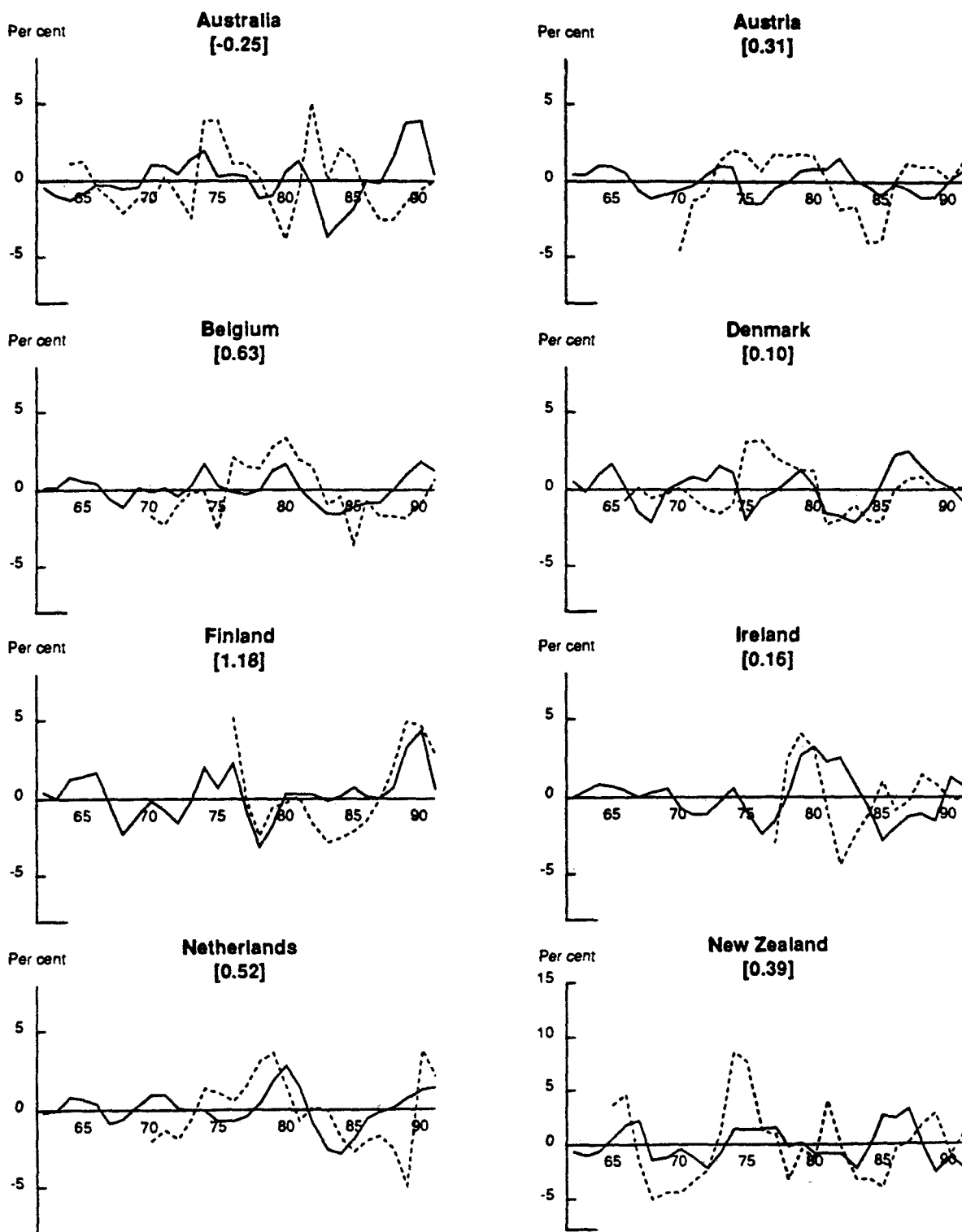
— Employment (1)  
 - - - Real consumption wage (1)  
 [ ] Wage responsiveness to employment (2)



1. The curves show the relative difference between actual and trend figures for employment and real consumption wage. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the real wage with respect to trend deviations of employment based on regressions using annual data over the period 1970-91.

Figure 5 (continued)

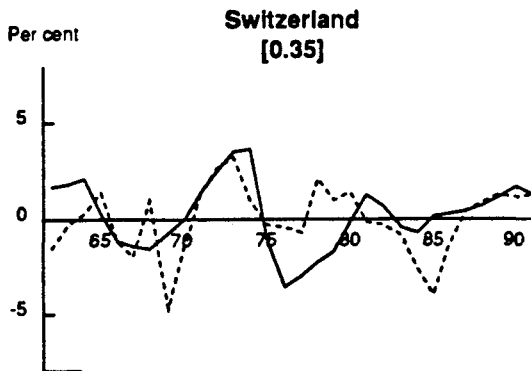
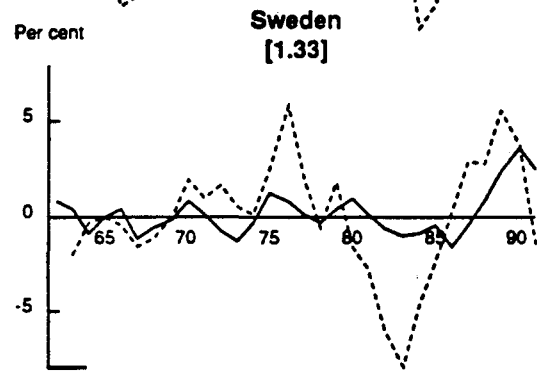
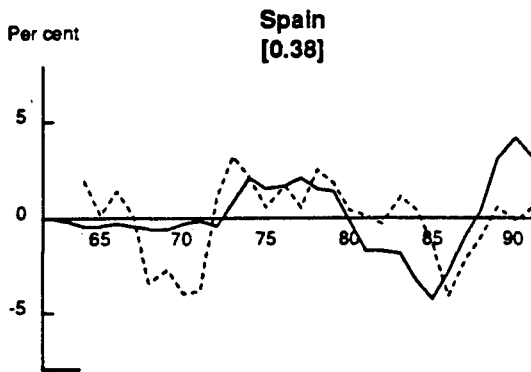
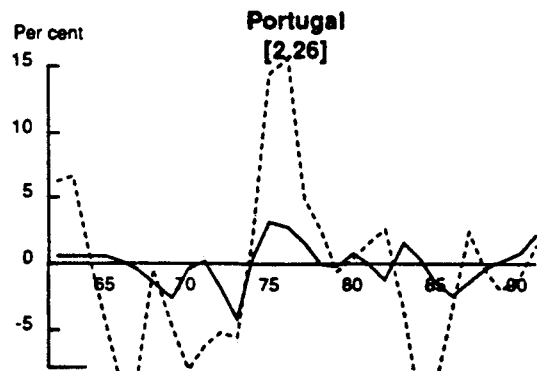
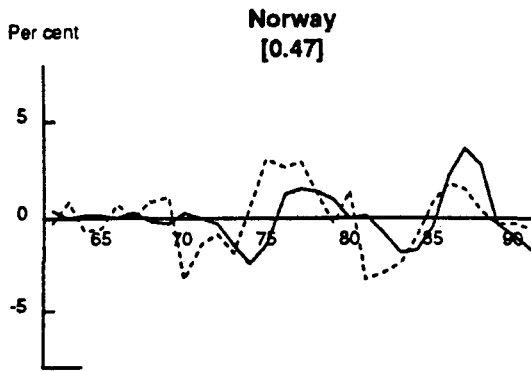
— Employment (1)  
 - - - Real consumption wage (1)  
 [ ] Wage responsiveness to employment (2)



1. The curves show the relative difference between actual and trend figures for employment and real consumption wage. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the real wage with respect to trend deviations of employment based on regressions using annual data over the period 1970-91.

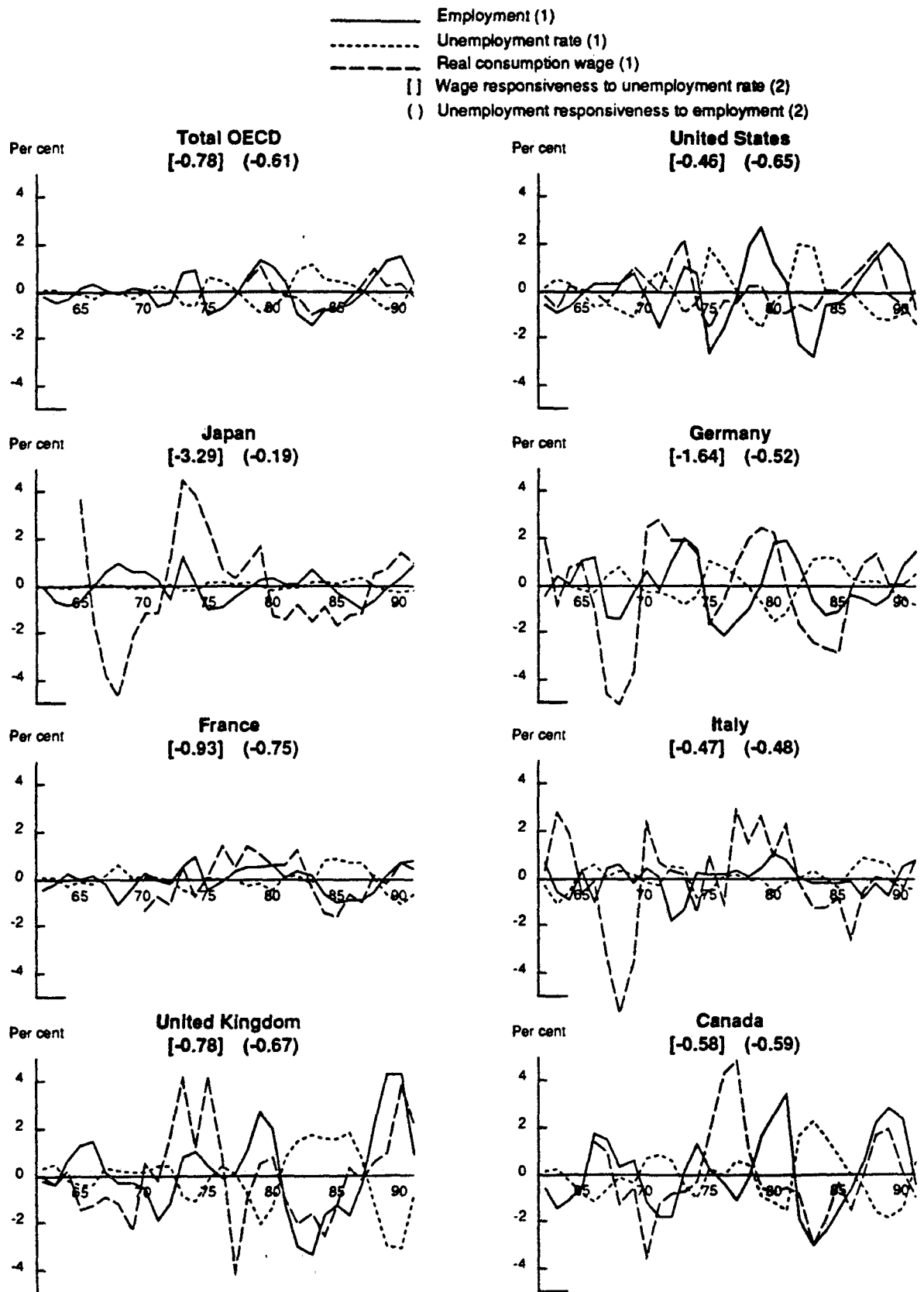
**Figure 5 (continued)**

— Employment (1)  
 - - - Real consumption wage (1)  
 [ ] Wage responsiveness to employment (2)



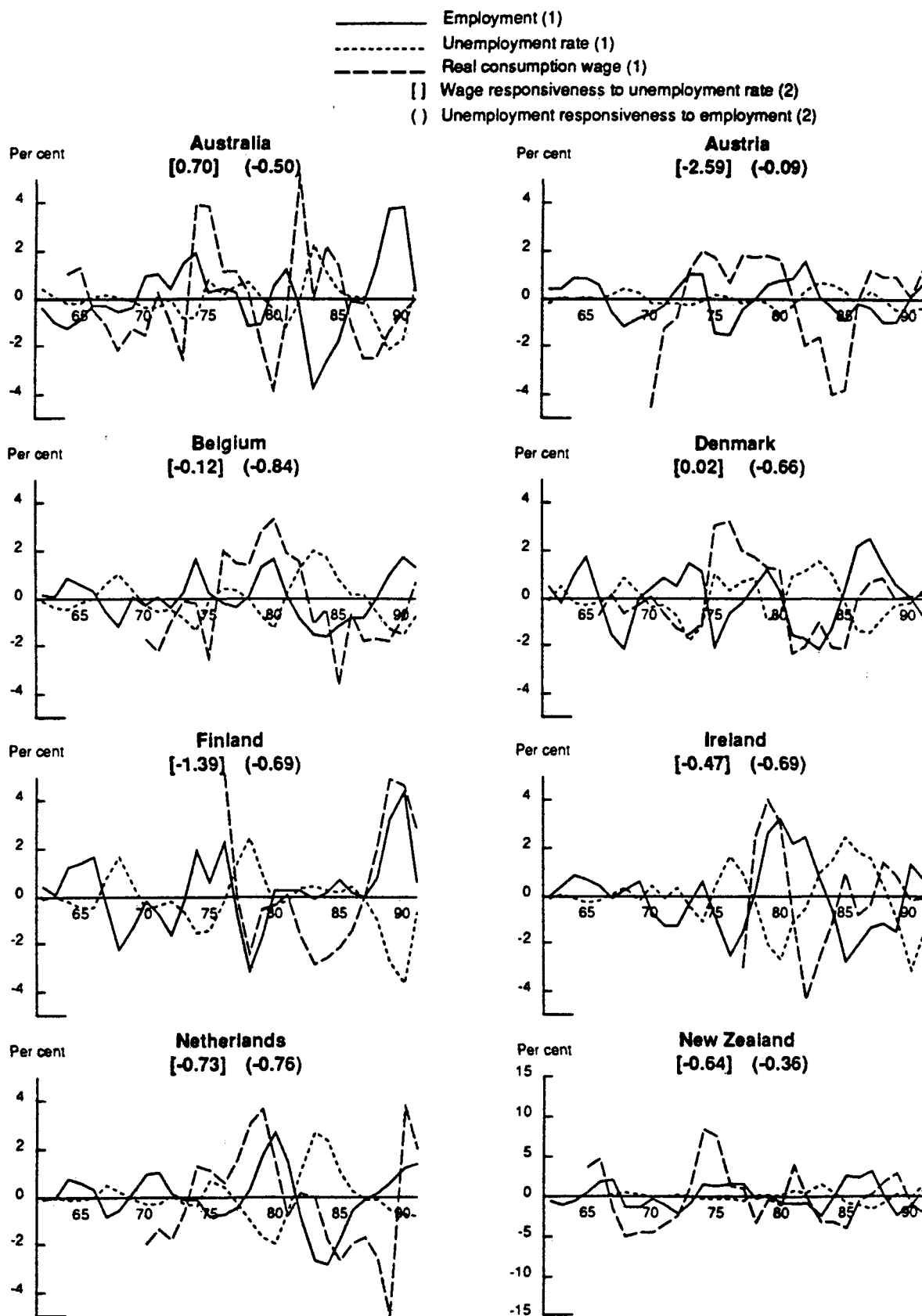
1. The curves show the relative difference between actual and trend figures for employment and real consumption wage. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the real wage with respect to trend deviations of employment based on regressions using annual data over the period 1970-91.

**Figure 6. Cyclicity of employment, unemployment rate and real wages**



1. The curves show the relative difference between actual and trend figures for employment, unemployment rate and real consumption wage. The trend figures are calculated using a Hodrick-Prescott filter
2. The responsiveness indicators in each panel of the graph are, respectively, the estimated elasticities of trend deviations of the real wage with respect to trend deviations of unemployment and trend deviations of unemployment with respect to trend deviations of employment, in both cases based on regressions using annual data over the period 1970-91

Figure 6 (continued)

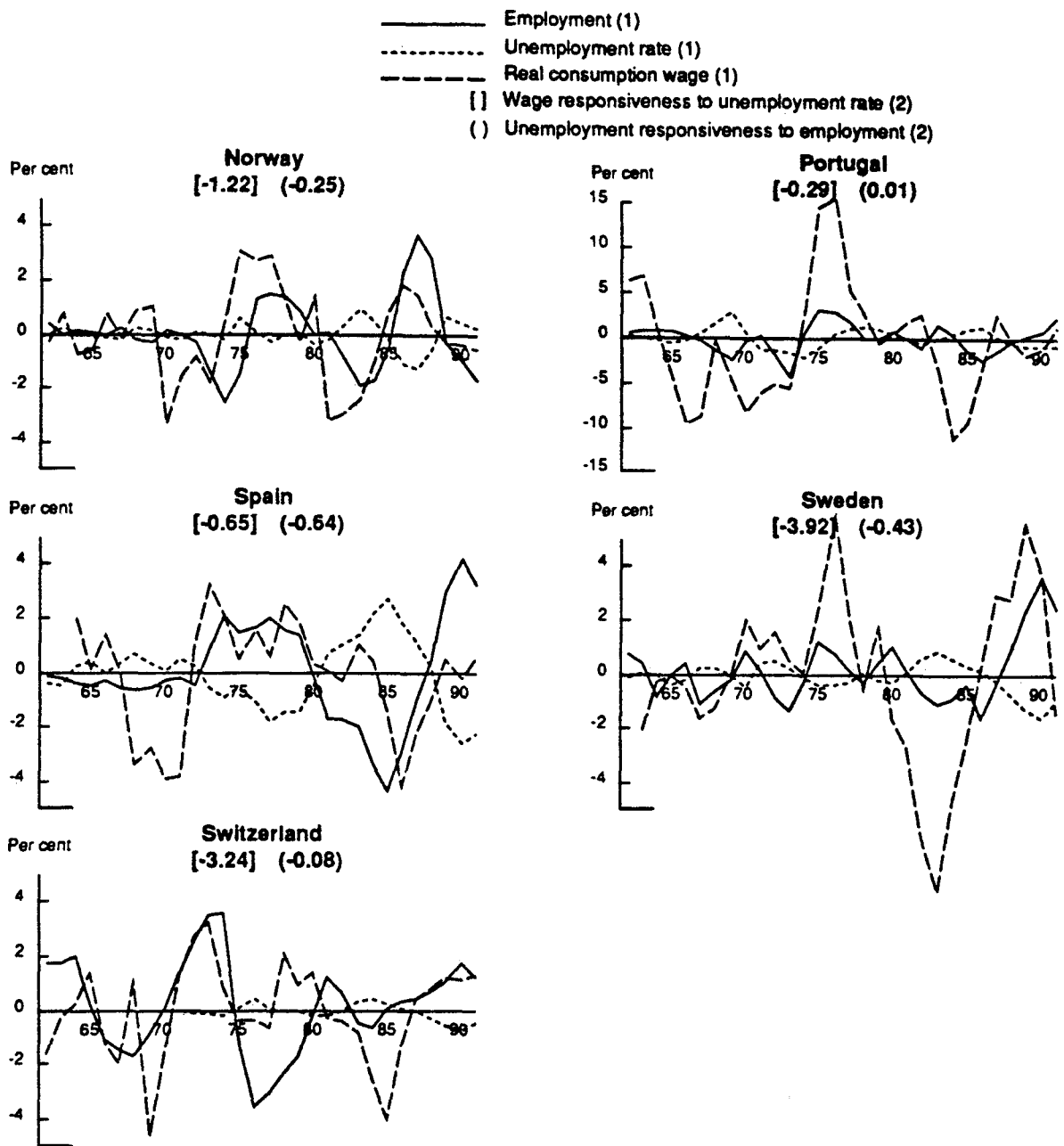


1 The curves show the relative difference between actual and trend figures for employment, unemployment rate and real consumption wage. The trend figures are calculated using a Hodrick-Prescott filter.

2. The responsiveness indicator in each panel of the graph are, respectively, the estimated elasticities of trend deviations of the real wage with respect to trend deviations of unemployment and trend deviations of unemployment with respect to trend deviations of employment, in both cases based on regressions using annual data over the period 1970-91.



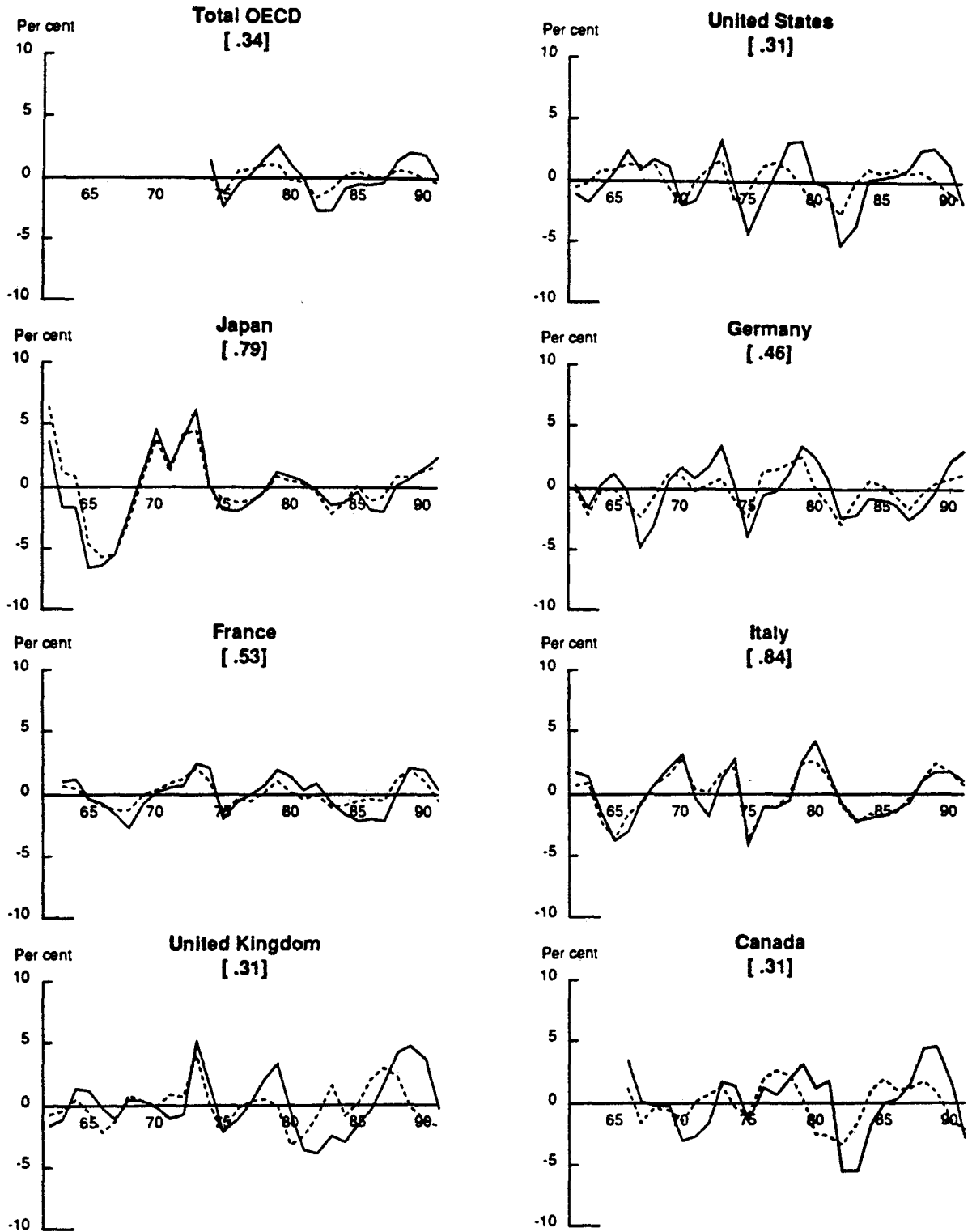
Figure 6 (continued)



- 1 The curves show the relative difference between actual and trend figures for employment, unemployment rate and real consumption wage. The trend figures are calculated using a Hodrick-Prescott filter.
- 2 The responsiveness indicator in each panel of the graph are, respectively, the estimated elasticities of trend deviations of the real wage with respect to trend deviations of unemployment and trend deviations of unemployment with respect to trend deviations of employment, in both cases based on regressions using annual data over the period 1970-91.

**Figure 7. Cyclicality of labour productivity**

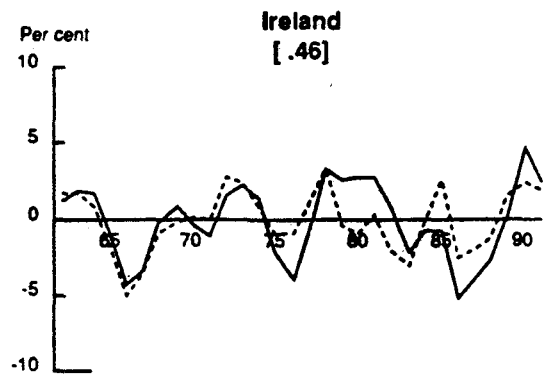
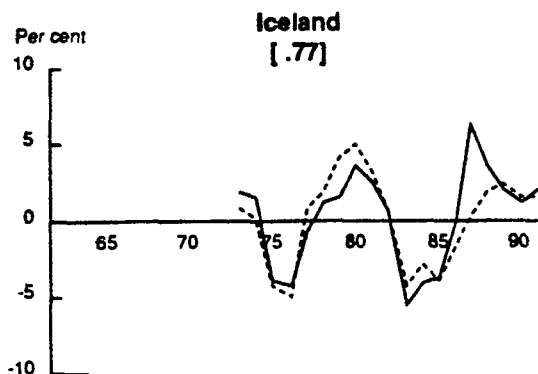
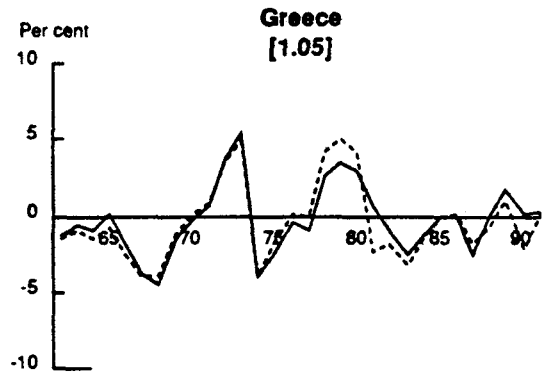
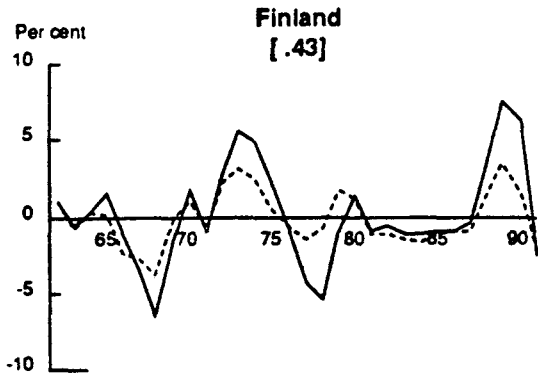
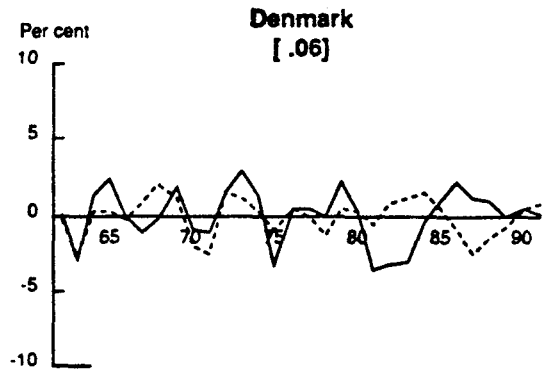
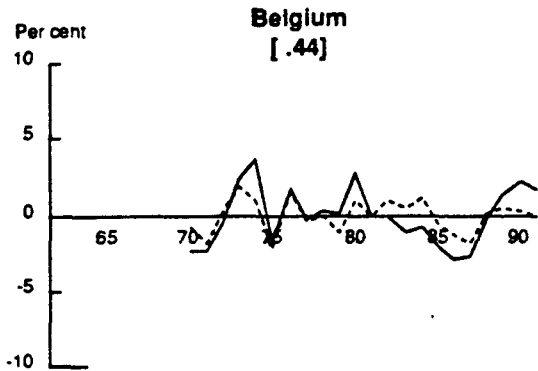
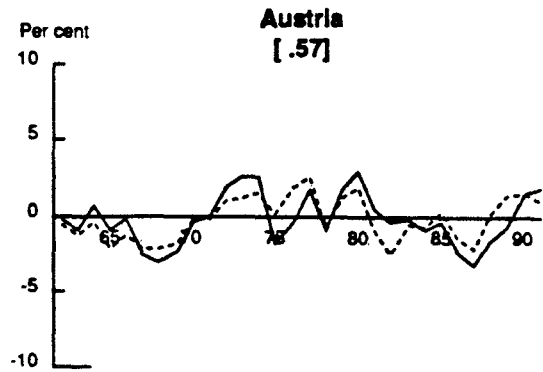
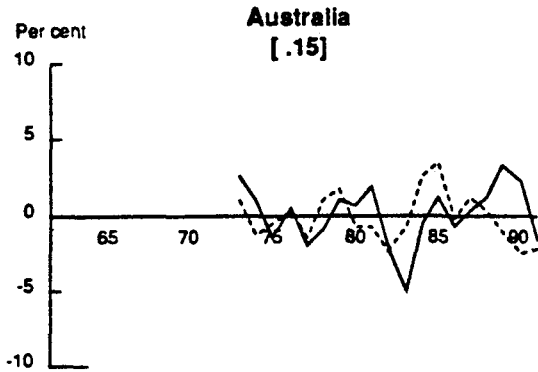
— Business sector output (1)  
 - - - Business sector labour productivity (1)  
 [ ] Labour-productivity responsiveness (2)



1. The curves show the relative difference between actual and trend figures for output and labour productivity. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the labour productivity with respect to trend deviations of output based on regressions using annual data over the period 1970-91.

Figure 7 (continued)

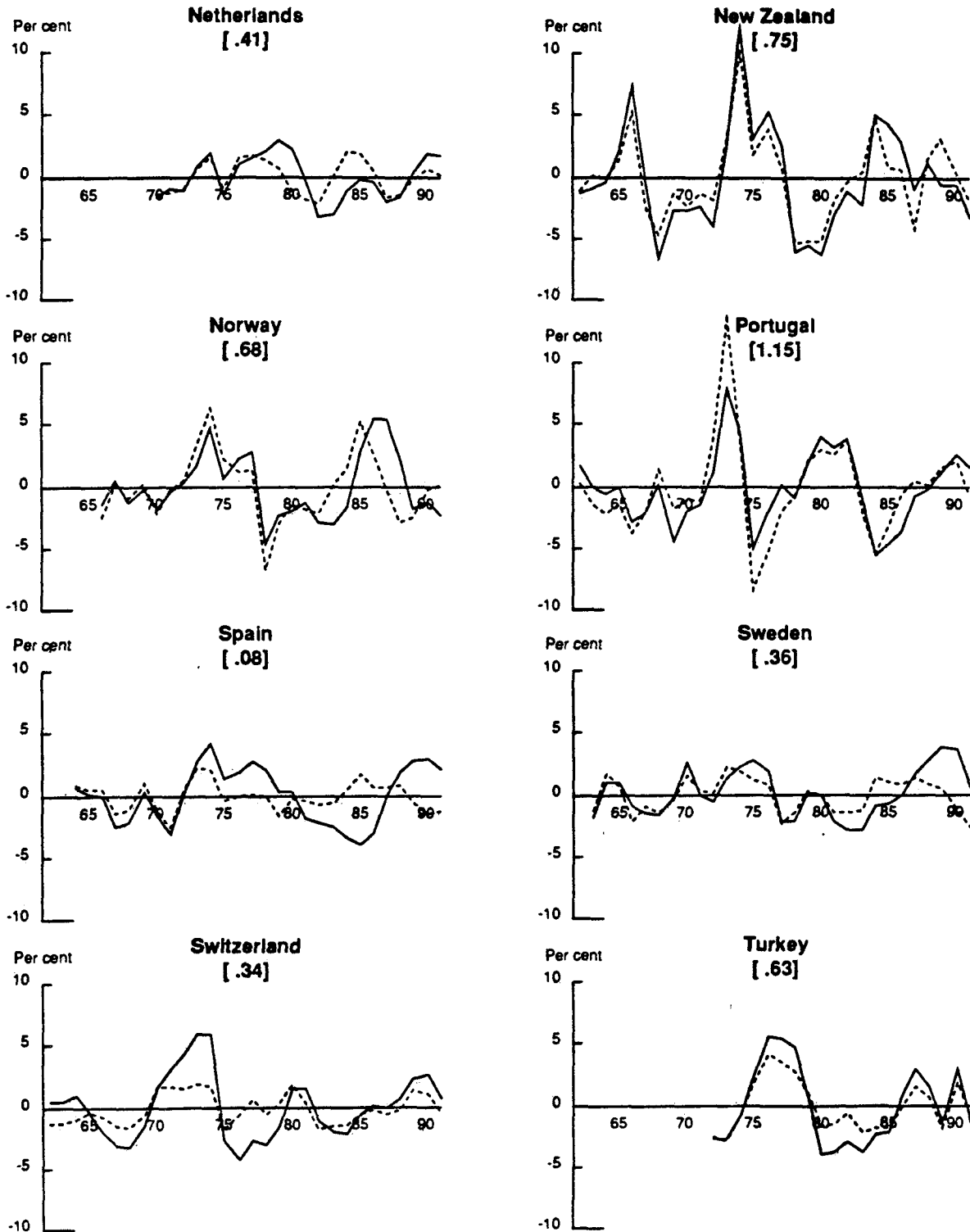
— Business sector output (1)  
 - - - Business sector labour productivity (1)  
 [ ] Labour-productivity responsiveness (2)



1. The curves show the relative difference between actual and trend figures for output and labour productivity. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the labour productivity with respect to trend deviations of output based on regressions using annual data over the period 1970-91.

Figure 7 (continued)

— Business sector output (1)  
 - - - Business sector labour productivity (1)  
 [ ] Labour-productivity responsiveness (2)



1. The curves show the relative difference between actual and trend figures for output and labour productivity. The trend figures are calculated using a Hodrick-Prescott filter.
2. The responsiveness indicator in each panel of the graph is the estimated elasticity of trend deviations of the labour productivity with respect to trend deviations of output based on regressions using annual data over the period 1970-91.

### 3.3 Summing up: Decomposing unemployment cyclicality

The quantitative evidence on the discussion of unemployment cyclicality is summarised in Table 1. The variability of the unemployment rate, as measured by the standard deviation of the first difference of the unemployment rate, differs widely across countries reflecting, *inter alia*, cross-country differences in the variability of output. Unemployment variability also depends positively on the extent to which employment responds to fluctuations in output, as indicated by the responsiveness indicator from Figure 3. Responsiveness of the labour force to employment, as illustrated by Figure 4, reduces unemployment variability. All of the three different factors operating on unemployment variability -- output variability, employment responsiveness and labour force responsiveness -- are affected by the flexibility of real wages in the face of cyclical variations of activity. Measured by the real wage responsiveness of Figure 6, it turns out that in a cross country regression this effect gives a contribution in addition to the indirect effects via the three other influences (23).

### 4. Is unemployment a good measure of slack?

The various mechanisms affecting the cyclical fluctuations of unemployment as discussed above have implications for the usefulness of unemployment as a measure of labour market slack. The implications depend, however, on what is meant by slack. Three aspects of this concept are considered below, namely:

- a measure of under-utilisation of labour
- an indicator of social hardship
- a determinant of wage pressure

From the point of view of under-utilisation of labour, both the cyclical employment responsiveness and labour force responsiveness have important implications. To the extent an increase in production gives rise to rising productivity and rising employment induces an increase in the labour force, potential output expands as a result of increasing actual output (24). Coming out of a downturn, countries with responsive productivity and labour force may thus be able to expand for longer, or more strongly, before inflationary pressures develop and corrective policies are called for. In this sense, cyclical fluctuations of productivity and cyclical labour-force variations -- and not just unemployment -- are relevant for measuring the full extent of under-utilisation of labour and the associated output loss during a slowdown. This view evidently hinges on cyclical labour-force withdrawal and non-entry not reflecting changed preferences, and cyclical productivity fluctuations not reflecting technology shifts, as would be argued by proponents of RBC.

Some of the same factors which reduce the usefulness of unemployment as a measure of labour utilisation render it dubious as an indicator of social hardship. Given the flexible response of the labour force to changes in employment, and given the flexibility of hours worked with respect to output, changes in unemployment under-represent changes in gainful employment and earned income. Unemployment, accordingly, does not fully reflect the amount of economic hardship caused by cyclical downturns. On the other hand,

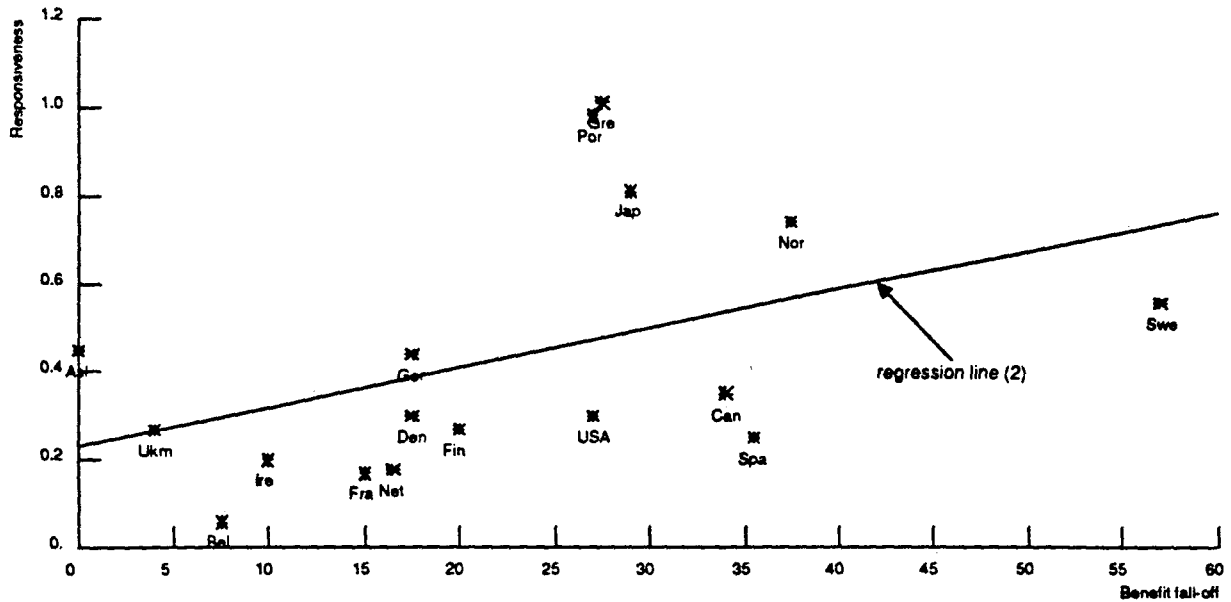
unemployment compensation partly cushions against economic hardship caused by job loss. To the extent that the status of "official" unemployment confers the right of receiving income transfers exceeding those available to non-participants of otherwise identical income and wealth characteristics, there is of course an obvious difference between the unemployed and the non-participants. Preferential access to income support may be one reason for individuals to remain "unemployed" rather than drop out of the labour force once they lose their job. Figure 8 indicates, that in countries where unemployment benefits are reduced significantly with the length of an unemployment spell, the labour force tends to respond more strongly to changes in employment (25).

Concerning the proper indicator of wage pressure, a major question is whether unemployment or a wider concept including persons outside the labour force serves best as the key variable linking labour market conditions to wage-price formation (26). Table 4 shows the key coefficients of simple estimated wage equations, specified so as to assure both static and dynamic homogeneity and with both unemployment and participation rates included. Other estimation work has demonstrated the importance of including both level and first difference terms of the slack variables. With both unemployment and participation rates appearing in level and first differences, lack of data does not allow a more elaborate specification and, in consequence, the statistical properties of the estimated equations leave a lot to be desired. Nevertheless, the table gives the impression that compared to participation rates, unemployment rates do a better job in explaining wage increases. Of the 38 estimated coefficients of levels or first differences of unemployment rates, only seven have the wrong sign, and of these only one at a level of significance exceeding 10 per cent. 14 coefficients are significant at a level above 10 per cent with the right sign. On the other hand, of the 38 estimated coefficients to participation rates, 21 come in with the wrong sign and of these, four are significant at least at the 10 per cent level. Of the 17 coefficients with the right (positive) sign, four are significant at the 10 per cent level or higher.

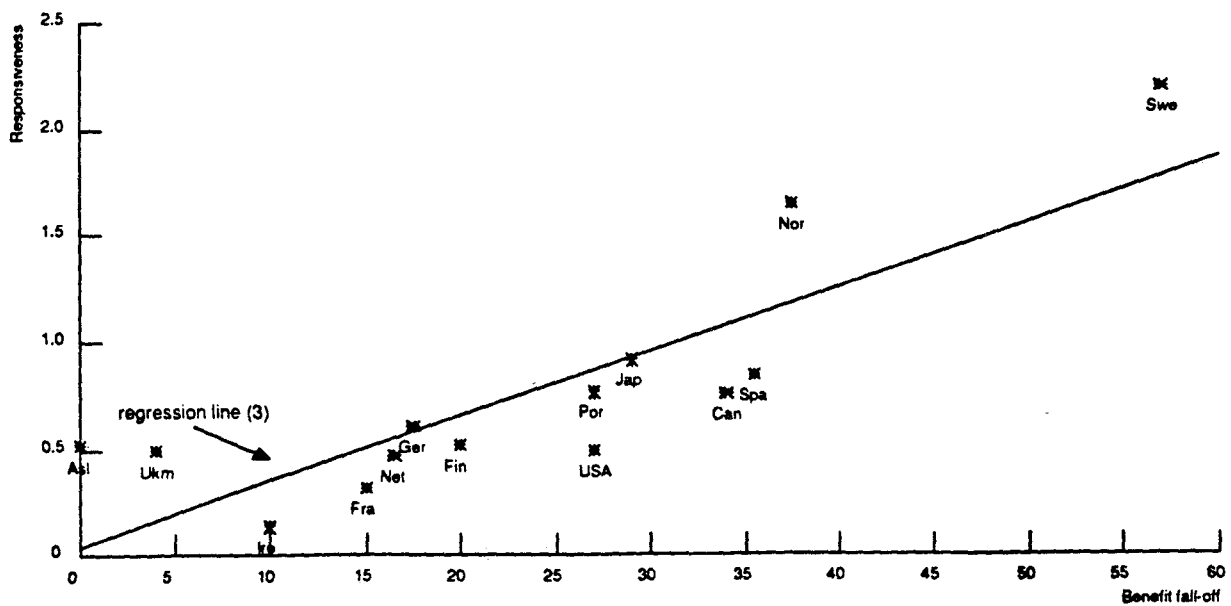
Table 5 reports the results of more formal tests for the role of labour force participation relative to unemployment. The basic specification is virtually the same as in Table 4, as also indicated by the first four columns of coefficient estimates. The only difference is that the unemployment rate has been measured relative to the total population between 15 and 64 years of age, so as to have the same denominator as the participation rate, thereby allowing tests of linear constraints between the sets of coefficients of, respectively, unemployment and participation. The first formal test concerns the exclusion of both the level and change of participation rates. This is accepted for all countries except four: the United States, Japan, Denmark and Norway. Of these countries, it was only for Denmark that a correctly-signed and significant coefficient to participation rates was found in the original specification. The opposite exclusion restriction, concerning levels and changes of unemployment, is rejected in more than half the countries, and of those where it is accepted, only for Switzerland does the participation rate get a significant coefficient of the right sign. The final set of tests concern the restriction that the effects of unemployment and cyclical labour force variations on wages are the same. This restriction is rejected for seven countries. However, where accepted, the restriction entails significant and correctly signed coefficient estimates in the cases of France, Italy,

**Figure 8. Labour-force responsiveness and unemployment benefits**

**A. Benefit fall-off and total labour-force responsiveness (1)**



**B. Benefit fall-off and youth labour-force responsiveness (1)**



1. Total labour-force responsiveness has been estimated as described in Figure 4. Youth labour-force responsiveness has been estimated from simple linear equations linking labour-force growth to employment growth and time trends. The indicator concerning the fall-off of unemployment benefits over individual spells of unemployment is based on OECD(1991) and refer to 1988. It is defined as the difference between the long- and short-term replacement rate indicator from that publication, averaged across gender.

2. The line is based on the estimated equation :  
 $\text{responsiveness} = .23 + .0089 \cdot \text{benefit fall off}$   $R^2 = .14$   
 t-values (1.8) (1.9)

3. The line is based on the estimated equation :  
 $\text{responsiveness} = .049 + .031 \cdot \text{benefit fall off}$   $R^2 = .67$   
 t-values (.30) (5.3)

Table 4. Wage equations including both unemployment and participation rates (1)

Results based on estimating  $D\log W/PC = c_0 + c_1 D\log W/PC + c_2 D^2\log PC + c_3 D\log PY/PC + c_4 D\log PY/PC + c_5 UR + c_6 DUR + c_7 PR + c_8 DPR$

Country	$c_5$	$c_6$	$c_7$	$c_8$	Durbin's h	Chow statistic
United States	-0.17	-0.63***	-0.15**	-0.26	-1.8*	0.3
Japan	-2.09**	-2.86*	0.47	-1.78**	-0.8	1.8
Germany	-0.54**	-1.19**	0.39	-1.01	0.5 (2)	3.6**
France	-0.67***	-0.80	-0.20	1.81**	1.1 (2)	3.0
Italy	-0.79**	-1.03	0.40	-0.73	-0.4 (2)	0.5
United Kingdom	0.07	-0.57	-0.26	-0.13	-1.3 (2)	1.3
Canada	-0.05	-0.97	-0.04	-2.52	-3.5*** (2)	0.7
Australia	-0.79*	0.10	0.81	-2.60	-0.4 (2)	1.0
Austria	-0.25	-2.93***	1.11*	-0.48	-2.5**	0.8
Belgium	-0.98***	-0.97	0.03	2.12	-2.2** (2)	--
Denmark	-0.92***	0.56*	0.56**	-0.40	-0.3	0.4
Netherlands	0.12	-1.58	1.98	7.21	-0.6 (2)	19.7**
New Zealand	-0.02	0.15	-0.08	1.67	-0.7 (2)	0.5
Norway	0.56	-1.77*	-0.31**	0.27	-2.0** (2)	2.5*
Portugal	-1.26*	-0.07	-0.14	0.05	2.0** (2)	1.3
Spain	0.30	-0.46	1.49	-2.71	-1.1 (2)	2.8*
Sweden	-0.37	-4.80***	-0.10	-0.25	-2.7***	2.2
Switzerland	-2.08	-1.60	0.44*	-0.84	-2.1** (2)	1.8
Turkey	-8.43	-3.57	-3.05*	2.05	-1.0 (2)	--

1. The variables are W = business-sector wage rate; PC = consumer price deflator; PY = business-sector value-added deflator; UR = unemployment rate; PR = participation rate.

Asterisks denote levels of significance:

\* = 10 per cent

\*\* = 5 per cent

\*\*\* = 1 per cent

2. Durbin's alternative h.



Table 5. Wage equations and tests for the influence of labour force variations (1)

Results based on estimating:  $D\log W/PC = c_0 + c_1 D\log W/PC + c_2 D^2 \log W/PC + c_3 D\log PC + c_4 D\log PY/PC + c_5 D\log PY/PC + c_6 U/POP + c_7 D(U/POP) + c_8 LF/POP + c_9 D(LF/POP)$

Country	Basic equation estimates				Testing $c_7 = c_8 = 0$				Testing $c_3 = c_4 = 0$				Testing $c_3 = -c_7$ and $c_4 = -c_8$			
	$c_3$	$c_4$	$c_1$	$c_2$	$c_3$	$c_4$	$c_5$	F	$c_3$	$c_4$	$c_7$	F	$c_3$	$c_4$	$c_7$	F
United States	-0.2	-0.9***	-0.1**	-0.2	-0.4**	-0.7***	4.8**		-0.1	-0.1	-0.1	12.2***	-0.2***	0.6***	-0.2***	7.5***
Japan	-2.9**	-3.9*	0.5	-1.7***	-2.0	-3.7*	2.7*		0.4	-0.9	0.4	5.5**	0.4	-0.7	0.4	5.6**
Germany	-0.8**	-1.8**	0.4	-1.0	-1.1***	-1.5**	1.5		0.9***	-0.6	0.9***	7.7***	0.6***	0.3	0.6***	3.7**
France	-1.0***	-1.2	-0.1	1.9**	-0.9***	-1.0	2.8		0.4	1.5	0.4	7.8***	0.5***	1.7**	0.5***	1.8
Italy	-1.3**	-1.6	0.5	-0.6	-1.4***	-2.3	1.1		0.2	-1.5	0.2	3.6**	0.8**	-0.8	0.8**	1.5
United Kingdom	0.1	-0.8	-0.3	-0.1	0.0	-0.6	0.2		-0.1	0.6	-0.1	0.8	-0.0	0.5	-0.0	0.3
Canada	-0.0	-1.3	-0.0	-2.4	-0.3	-0.4	1.3		-0.0	-0.7	-0.0	1.6	-0.0	0.1	-0.0	1.9
Australia	-1.1*	0.1	0.9	-2.6	-1.1*	1.1	1.4		0.6	-2.7	0.6	2.2	0.9**	-1.4	0.9**	0.9
Austria	-0.4	-4.4***	1.1*	-0.4	-0.4	-3.0**	2.3		0.3	-0.3	0.3	6.6**	0.3	0.5	0.3	5.7**
Belgium	-1.6***	-1.6	0.1	2.2	-1.8***	-1.2	0.6		-1.8	7.4	-1.8	7.9**	1.5***	1.6	1.5***	0.1
Denmark	-1.2***	0.7*	0.6***	-0.5	-0.4***	0.1	5.6**		-0.2*	-0.5	-0.2*	10.3***	0.3	-0.1	0.3	13.3***
Netherlands	0.2	-3.0	2.0	7.5	-0.8	-1.7	1.0		1.1	5.2	1.1	1.9	0.6*	2.4*	0.6*	0.5
New Zealand	-0.0	0.1	-0.1	1.7	-0.0	-0.4	0.8		-0.1	1.7	-0.1	0.0	-0.1	1.3	-0.1	0.2
Norway	0.7	-2.4*	-0.3*	0.3	-0.3	-1.9	3.3*		-0.2	0.1	-0.2	2.1	-0.3**	0.6	-0.3**	1.4
Portugal	-2.0**	-0.1	-0.0	0.1	-2.1***	0.0	0.0		-0.5	0.2	-0.5	3.1*	-0.4	0.2	-0.4	4.6**
Spain	0.5	-0.8	1.4	-2.6	-0.2	-0.4	1.5		0.8	-1.0	0.8	0.6	0.4*	0.2	0.4*	0.3
Sweden	-0.4	-6.2***	-0.1	-0.2	-0.9	-5.8***	0.2		-0.1	1.8*	-0.1	6.0**	-0.1	1.9	-0.1	3.3*
Switzerland	-2.7	-2.0	0.4*	-0.8	-5.0**	1.1	2.3		0.5**	-1.0	0.5**	2.1	0.5**	-0.7	0.5**	2.0
Turkey	-14.9*	-7.2	-1.8	3.0	-6.5	-5.5	1.9		-0.6	2.6	-0.6	2.2	-0.4	3.0	-0.4	2.3

1. The variables are W = business-sector wage rate; PC = private consumption deflator; PY = business-sector value added deflator; U = unemployment; POP = population 15-64 years old; LF = labour force. L is a lag operator and D is the first difference operator.

Asterisks denote levels of significance:

\* = 10 per cent.

\*\* = 5 per cent.

\*\*\* = 1 per cent.

Australia, Belgium, the Netherlands, Spain and Switzerland. In sum, for most countries variations in labour force participation appear to play, at most, a secondary role compared with open unemployment in explaining inflationary pressures.

One of the reasons why non-activity fails to have the same damping influence on wages as unemployment may be that different groups in the labour market react differently to changes in employment, as discussed above. Prime-age male labour is often assumed to carry a disproportionate weight in wage determination and, as shown above, is characterised by a much less responsive labour supply, while other groups with a more tenuous attachment to the labour force typically carry a much smaller weight in wage determination. In addition, to the extent outflows from the labour force are concentrated more heavily on persons with long spells of unemployment, these are generally found to exert less influence on wages even if they remain in the labour force and can, therefore, be assumed to have only marginal, if any, effect when they drop out.

## 5. Some tentative conclusions and remaining questions

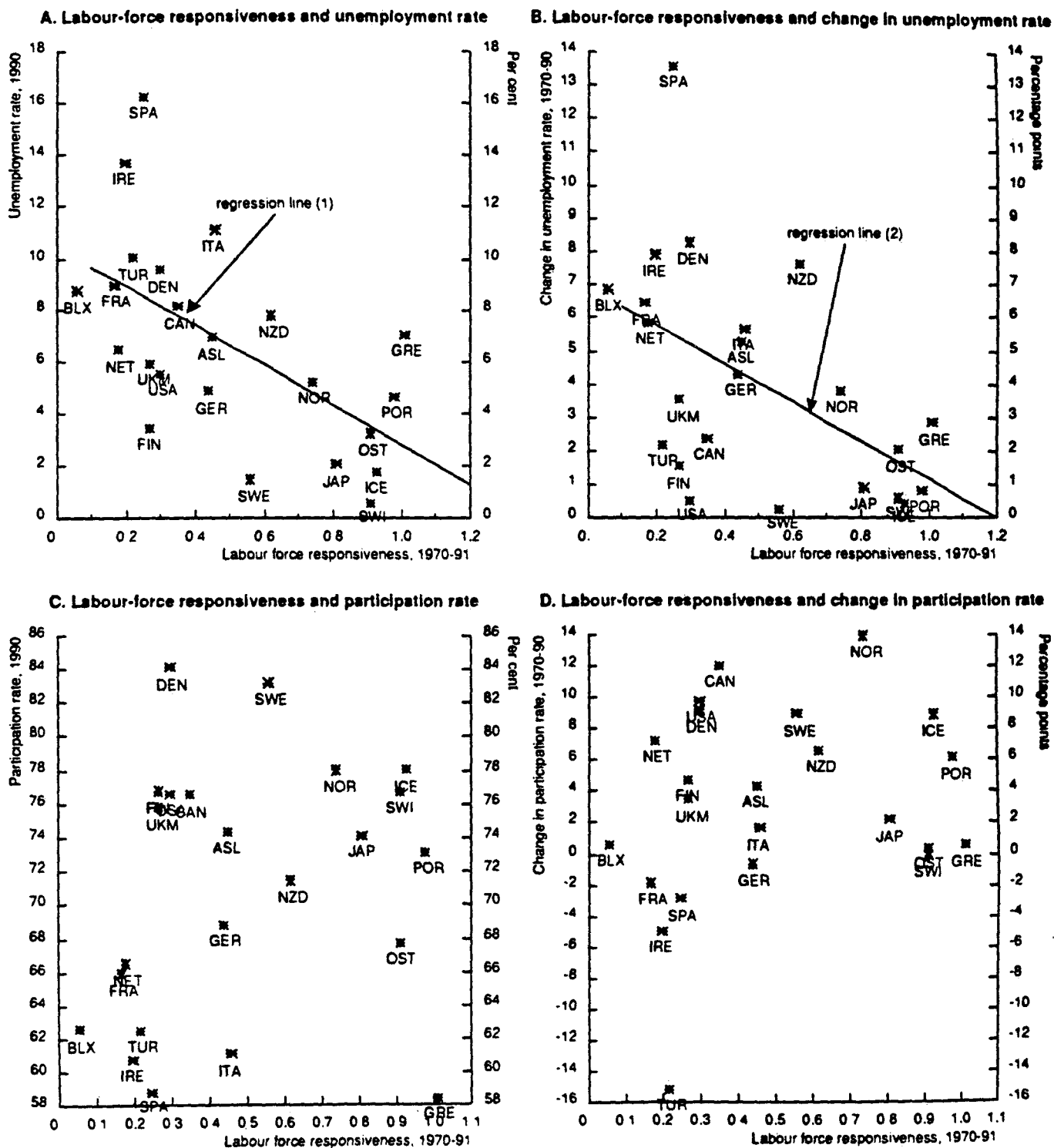
This paper has reviewed evidence on trends and cycles in unemployment and labour force participation across OECD countries. Cross-country differences are important for both trends and cycles. The empirical regularities presented in the text affect the interpretation of unemployment figures in some dimensions but less in others. They do not, however, support the view that cross-country differences in unemployment rates can be attributed to different participation rates. On the contrary, unemployment rates are just a partial reflection of cross-country differences in trends and levels of employment rates.

Some puzzles posed by the interactions between trends and cycles remain unsolved. Indeed, the cyclicity of unemployment is related to its trend increase: countries with very volatile unemployment rates typically have experienced larger increases in unemployment over long periods than countries with more cyclically stable unemployment (27). With the degree of labour force responsiveness being a major influence on unemployment volatility, it is perhaps not surprising, that a relationship is found also between this variable and the increase, as well as the level, of unemployment (Figure 9, Panels A and B).

*A priori*, it may seem surprising to find such a relationship between cycle and trend. However, it is generally acknowledged that in many countries unemployment tends to persist at or around whatever level it is brought to by a shock to the economic system (see e.g. Barro, 1988 or Alogoskoufis and Manning, 1988) (28). Thus, to the extent countries have been hit by predominantly negative shocks over recent decades, the observed empirical regularity may arise. Alternatively, persistence effects may be stronger in the wake of an upward shock to the unemployment rate than to a downward shock.

The degree of labour-force responsiveness does not, however, appear to bear much relation to trends or levels of participation rates (Figure 9, Panels C and D). If the interpretation of the evidence in Panels A and B in

Figure 9. Unemployment, participation and labour-force responsiveness



1 The fitted regression line is  
 unemployment rate = 10.4 - 7.6 \* responsiveness R2 = .32  
 t-values (8.0) (-3.4)

2 The fitted regression line is  
 unemployment rate = 6.9 - 5.7 \* responsiveness R2 = .24  
 t-values (5.8) (-2.8)

terms of unemployment persistence in the wake of negative shocks is maintained, Panels C and D seem to suggest that such persistence is much less prevalent for labour force participation. In other words, participation rates tend to return to their underlying trends while unemployment rates do not. Indeed, the data in Figure 2 even suggested that the trend growth of labour-force participation was stronger in countries with low (increases in) unemployment. These interactions between trends and cycles may seem puzzling and more research is necessary before the hypotheses presented above can be either falsified or regarded as more than an informed conjecture (29).

## Notes

1. The authors are currently working in the Economic Prospects Division of the OECD Economics Department, and the Institute for Advanced Studies in Vienna, respectively. The study was prepared when Mr. K. Pichelmann was a visiting scholar in the Resource Allocation Division of the OECD Economics Department. The authors would like to thank Mike Feiner and Peter Sturm for helpful comments. Thanks are due also to Isabelle Wanner for statistical assistance and to Lyn Louichaoui for technical assistance.
2. Possibilities for meaningful comparison of unemployment rates across countries have improved in recent years due to the development and harmonisation of labour force surveys according to standard definitions. However, while indispensable in comparative labour market analysis, even data sets such as the OECD Standardized Unemployment Rates cannot correct for the significant cross-country variation of institutional and structural factors shaping the overall labour market picture.
3. The size of the coefficient relating the (change in the) participation rate to the unemployment rate should be interpreted with care, as the estimation is likely to suffer from an omitted variables problem.
4. In general, the measurement concepts used in labour force surveys classify discouraged workers as those individuals who would like to work at the going wage and employment conditions, but have ceased looking for work because of (perceived) lack of job availability.
5. Discouraged workers are but one category of potential labour-force participants whose behaviour is affected by existing demand and supply conditions: young persons may choose to stay on in the education system rather than enter the labour market at times of high unemployment; older persons who are eligible for early retirement or similar schemes may choose to leave the labour forces in conditions of high unemployment, etc.
6. Distorting measurement practices, however, put an important caveat on these findings. For example, Sweden's employment rate -- an OECD maximum according to standard labour force statistics -- is close to the OECD median if the employed are defined as "people who have worked at least one hour in the survey week". Reporting of long maternity leaves, etc., as "employment" reduces unemployment and increases participation, as compared with other countries. For Spain, to take another example, it has sometimes been asserted that perhaps half the unemployed have at least some undeclared self-employment activity.

7. Over the 1980s, though, relatively few countries -- the Netherlands and the United States for men, Australia, the Netherlands, Portugal, Sweden, the United Kingdom and the United States for women -- experienced both rising labour-force participation and falling unemployment (OECD, 1992). Indeed, in gender-specific cross-country regressions, no significant correlation between changes in participation and changes in unemployment could be established over the period 1980-89.
8. Among the alternative fluctuation measures is the root-mean-square deviation of unemployment rates from their trends derived on the basis of the Hodrick-Prescott filter. Using trends derived with a smoothing factor of 50, the ranking of countries according to this measure is very similar to the ranking based on the measure used in Table 1. The Spearman rank-correlation coefficient between the two rankings is 0.964.
9. Several explanations for pro-cyclical movements in labour productivity are surveyed in Bernanke and Parkinson (1991).
10. Bertola (1990) illustrates the impact of job protection on employment dynamics in various, primarily European, countries.
11. Leonard and Schettkat (1991) attribute a large part of the difference between unemployment fluctuations in United States and Germany to the availability of income support in case of short-time working in the German system.
12. For an analysis of the cyclical sensitivity of self-employment, see OECD (1986), Note C.
13. Responsiveness of the labour force to worsening employment conditions does not only reflect withdrawal from or postponing (re-)entry into the labour market. For example, in countries like Austria and Switzerland the high cyclicalness of the labour force may partly be due to cyclical migration flows of so-called guest-workers.
14. In interpreting the results it should be noted that they are based on yearly observations. At least for the United States, it seems that a large share of the movements in and out of the labour force are of much higher frequency. As an example, in 1976, 78 per cent of those who withdrew from the labour force had re-entered within 12 months (Clark and Summers, 1979).
15. For Japan, Tachibanaki and Sakurai (1991) estimate that pro-cyclical fluctuations in the participation rates have reduced the fluctuation in unemployment by nearly 50 per cent over the period 1963-1986.
16. This seems to imply that other factors outweigh the so-called "added-worker effect", which refers to individuals joining the labour force because a family's principal income earner has lost his/her job. The existence of an added-worker effect has been documented in a number of research projects based on panel data (Arellano and Meghir, 1992; König *et al.*, 1992; Smith, 1991)

17. For a comprehensive analysis of labour market participation and retirement of older workers see OECD (1992).
18. For an extensive analysis of discouraged workers and other non-participants see OECD (1987).
19. Since the analysis is concerned with cyclical fluctuations, the relative position of the wage-setting schedule with respect to labour supply is assumed unchanged, i.e. factors affecting equilibrium unemployment are not considered. Shifts in the natural rate of unemployment as reflected in a shift of the wage-setting schedule relative to the labour supply schedule should, in principle, have been filtered out in the construction of the cyclical employment and labour-force indicators, since such shifts are likely to lead to permanent changes in the amount of labour supplied and demanded.
20. *A priori*, it is not clear whether the links between shifts of demand and supply schedules should be expected to be stronger for private sector labour demand or total labour demand, i.e. including the public sector. Shifts in labour supply would be expected to affect private-sector wage setting and employment, though government policy could also react in response to such a shift, initially affecting unemployment. In the reverse direction, total employment might be expected to best represent the labour demand concept affecting labour supply. In practice, it appears that the results are broadly the same for the two different employment concepts.
21. Using real product wages the same broad conclusions seem to hold though a few more countries show negative covariation between employment and real wages.
22. It is worth noting, however, that part of the positive covariation between productivity and output fluctuations, shown in Figure 7, is likely to be caused by variations in hours worked.
23. The estimated equation is:
- $$\begin{aligned}
 \langle \text{unemployment variability} \rangle &= 0.68 \\
 &\quad (0.22) \\
 &+ 0.55 * \langle \text{output variability} \rangle \\
 &\quad (0.22) \\
 &+ 0.37 * \langle \text{employment responsiveness} \rangle \\
 &\quad (0.24) \\
 &- 0.48 * \langle \text{labour force responsiveness} \rangle \\
 &\quad (0.25) \\
 &+ 0.14 * \langle \text{real wage responsiveness} \rangle \\
 &\quad (0.051)
 \end{aligned}$$

Standard errors are given in parentheses. It should be noted that the indicator of real wage responsiveness is more negative, the more real wages fall in response to higher unemployment.

24. Provided that potential output is defined with respect to actual labour supply and productivity. To the extent potential output is defined with respect to cyclically adjusted labour supply and productivity, it is obvious that cyclical swings in productivity and non-participation are implicitly seen as part of the slack.
25. Other factors may also play a role such as the expansion of labour market training programmes, etc. in periods of weak activity. Moreover, in some countries, e.g. the United States and Canada, rising unemployment typically leads to extensions of maximum duration of unemployment benefits (for the case of Canada, see, for example, Milbourne *et al.*, 1991).
26. It may also be argued that cyclical fluctuations in labour productivity could play a role. Thus, slack in the form of reduced hours or reduced work intensity may serve to reduce wage pressure in line with open unemployment. In many cases, short-term fluctuations of labour productivity has entered significantly in Phillips-curve type wage equations, see, for example, Chan-Lee *et al.* (1987).
27. Regressing the rise of the average unemployment rate between the period 1960-64 and 1985-91 on the indicator of unemployment variability from Table 1, gives the following results:  

$$D\langle \text{unemployment} \rangle = -0.54 + 7.55 * \langle \text{unemployment variability} \rangle$$

$$(1.86) \quad (2.32)$$
or  

$$\log(D\langle \text{unemployment} \rangle) = 0.74 + 1.19 * \log(\langle \text{unemployment variability} \rangle)$$

$$(0.09) \quad (0.32)$$
with standard errors in parentheses below estimated coefficients. Two countries, however, stand out as major outliers. The United States with very volatile unemployment experienced hardly any increase in unemployment over the period while France with cyclically stable unemployment experienced a massive increase of unemployment.
28. Empirical analysis typically finds it very difficult to reject the notion that unemployment rates contain a unit root, though over the very long run they are, of course, bounded. Among the hypotheses which have been invoked to explain such persistence are e.g. insider/outsider mechanisms in wage formation.
29. At present, it is only possible to speculate about the causes for the potential asymmetry between persistence of unemployment and non-participation. Among such causes could be the existence of "scarring" effects from unemployment, i.e. that a spell of unemployment puts persons at a disadvantage in obtaining a new job and influencing wages compared to a person entering the labour force.



## Annex I

### GROSS FLOWS ON THE LABOUR MARKET

Pro-cyclical swings in participation rates may have had a dampening impact upon cyclical swings in unemployment in many countries. Thus, different patterns in transitions to and from the labour force across countries may to a large extent determine different unemployment responses to cyclical disturbances.

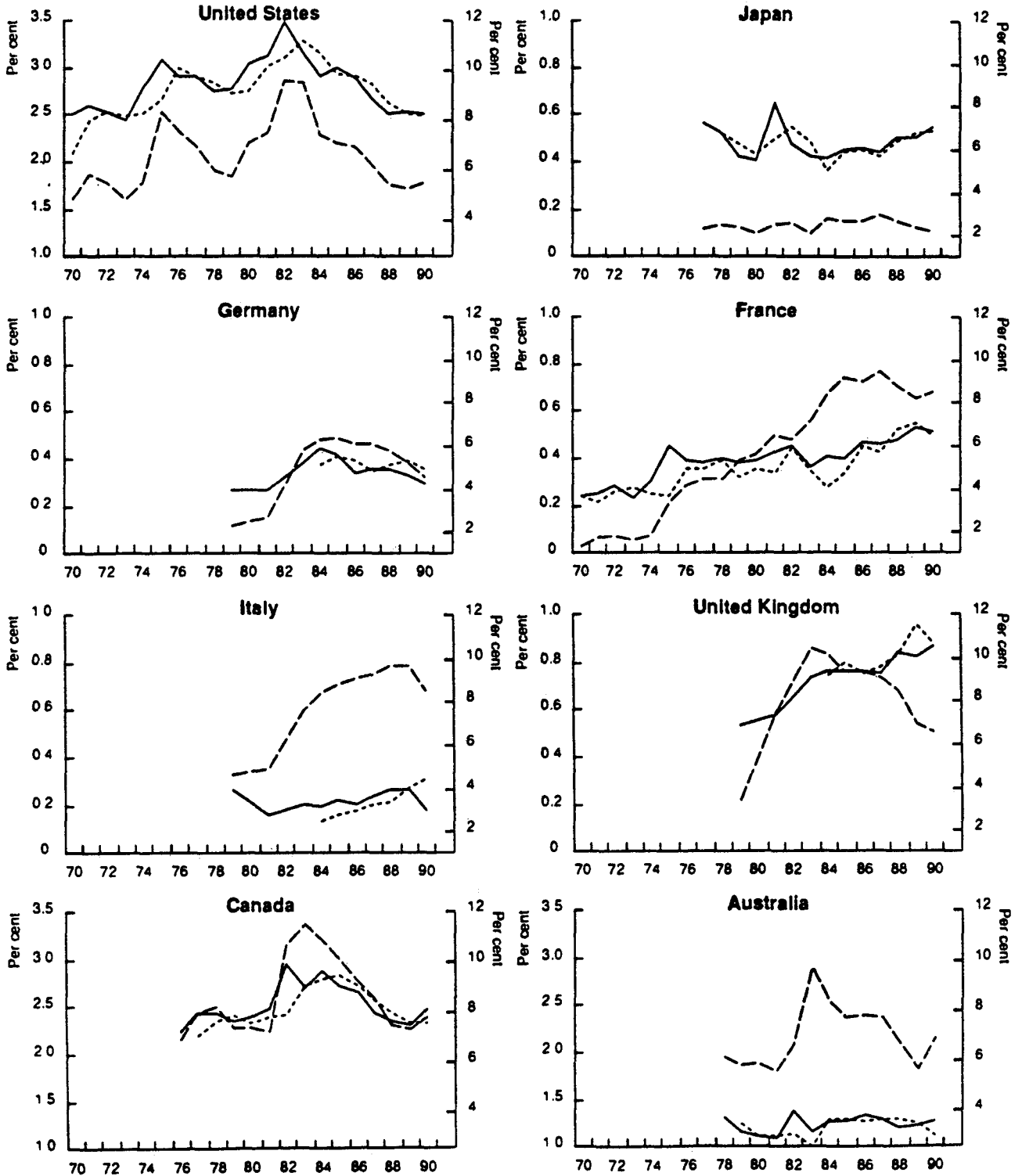
Unfortunately, data on gross flows between the various labour market states are not available on a consistent basis across countries. Based on available information, time series of gross flows into and out of unemployment can be constructed for most OECD countries, though they cannot be broken down according to whether the flows are to/from employment or non-participation (Figure A1). Despite these shortcomings, the gross flow data reveal some of the complexities of cyclical transition patterns in the labour market. For example, both inflows to and outflows from unemployment are counter-cyclical in most countries, with inflows tending to lead outflows. However, outflows as a fraction of unemployment tend to move pro-cyclically which is consistent with the general observation that the average duration of unemployment spells is counter-cyclical (1). The Figure also illustrates that turnover in unemployment is much more pronounced in North America than in the rest of the countries covered, with Australia and Finland having slightly higher turnover among the countries in the latter group. Finally, differences between rates of in- and outflow, leading to changes in unemployment rates, are usually quite small compared to the overall level of turnover.

Table A1 summarises in a stylised form evidence based on research carried out in a few countries on the cyclical variation of individual gross flows between employment, unemployment and inactivity (2). The main results are the following:

- The counter-cyclical flow into unemployment is the result of counter-cyclical inflows from both employment and from outside the labour force (non-activity), i.e. both flows rise in a downturn. The counter-cyclical nature of the flow from employment reflects that counter-cyclical layoffs dominate pro-cyclical quits.
- Total outflows from the labour force (inflows to non-activity) do not seem to be strongly cyclical, with opposing tendencies for the constituent flows, i.e. flows from employment falling and flows from unemployment rising in a downturn.
- Total outflows from non-activity tend to be weakly pro-cyclical, which is the net effect of (weakly) counter-cyclical flows to

**Figure A1. Flows Into and out of unemployment (1)**

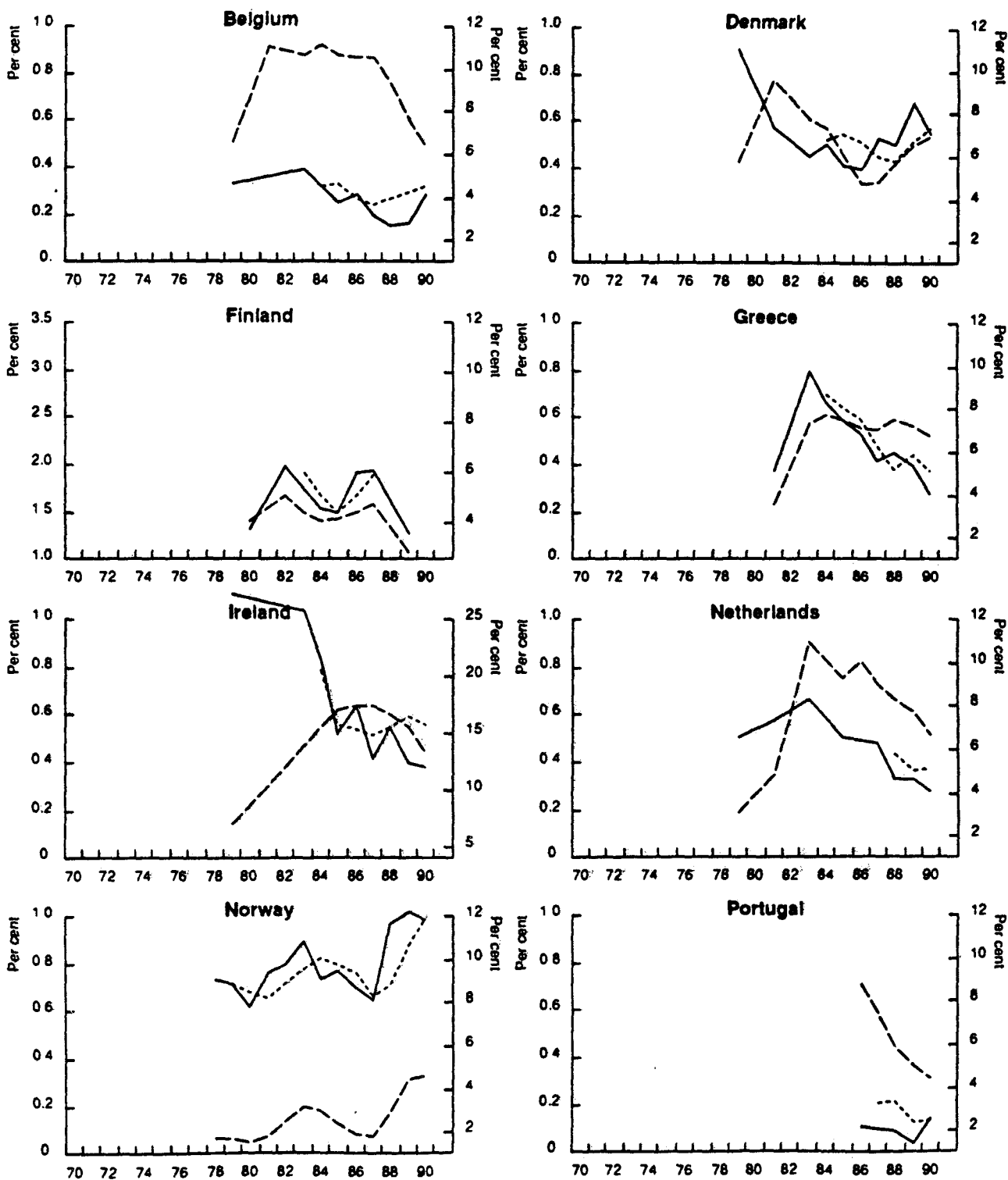
— Inflow (monthly inflow as a share of the labour force, left scale)  
 - - - Outflow (monthly outflow as a share of the labour force, left scale)  
 - - - Unemployment rate (right scale)



1. For an explanation of how the data were constructed, see OECD(1991).

Figure A1 (continued)

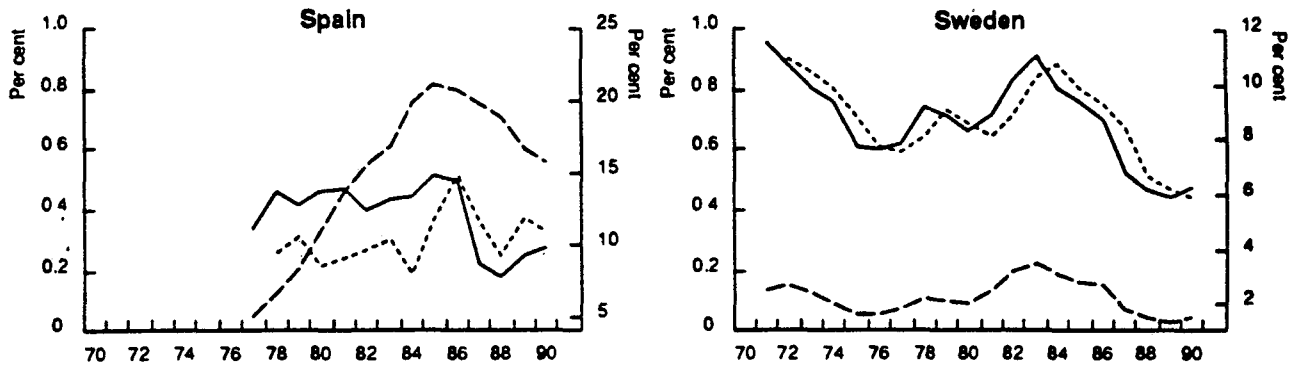
— Inflow (monthly inflow as a share of the labour force, left scale)  
 - - - Outflow (monthly outflow as a share of the labour force, left scale)  
 - - - Unemployment rate (right scale)



1. For an explanation of how the data were constructed, see OECD(1991).

Figure A1 (continued)

— Inflow (monthly inflow as a share of the labour force, left scale)  
- - - Outflow (monthly outflow as a share of the labour force, left scale)  
- - - Unemployment rate (right scale)



1. For an explanation of how the data were constructed, see OECD(1991).

Table A1. Cyclical variation of labour market flows					
From:	To:	Employment	Unemployment	Non-activity	Total
Employment		pc	cc*	pc	pc
Unemployment		cc	--	cc	cc
Non-activity		pc	(cc)	--	(pc)
Total		pc	cc	(pc)	

Notes:  
pc: Pro-cyclical.  
cc: Counter-cyclical.  
(): Weakly.  
\* Net result of pro-cyclical quits and counter-cyclical layoffs.

Source: Based on results in Burda and Wyplosz (1990), Blanchard and Diamond (1990), Clark and Summers (1979) and Lemaitre *et al.* (1992).

unemployment and pro-cyclical flows to employment, i.e. the direction of the outflow from non-activity changes over the cycle, with only modest variation in its overall size.

- The counter-cyclical nature of flows out of unemployment concerns flows both to employment and non-activity, i.e. both flows rise in a downturn (3).

The results cited above have been derived for countries with labour forces that seem to be relatively independent of cyclical conditions. Gross flows into and out of the labour force are likely to be less symmetric than indicated above in countries where labour-market participation varies stronger over the cycle.

### Notes

1. Results based on Swedish data suggest that the duration of unemployment spells is counter-cyclical independently of whether they eventually end with employment or labour-force withdrawal (Edin, 1989). Based on data for the United States, Baker (1992) showed that rising duration of unemployment during a slowdown is predominantly due to increasing duration of individual unemployment spells rather than a changed composition of unemployment across individuals with different duration propensities.
2. The countries are: the United States, Germany, France and Canada.
3. Data for the United States suggest that the proportion of unemployment spells ending in withdrawal from the labour force is relatively constant over the cycle at a level as high as around 45 per cent (Clark and Summers, 1979). Also for the United Kingdom, almost half of transitions out of unemployment appear to be to inactivity (Wadsworth, 1992). For Austria, the respective proportion seems to be around one quarter (Pichelmann and Riedel, 1991).

## References

- Alogoskoufis, G.S. and A. Manning (1988), "Unemployment persistence", *Economic Policy*, October.
- Arellano, M. and C. Meghir (1992), "Female labour supply & on-the-job search: an empirical model estimated using complementary data sets", *The Review of Economic Studies* 59(3).
- Atkinson, A.B. and J. Micklewright (1991), "Unemployment compensation and labor market transitions: a critical review", *Journal of Economic Literature*.
- Baker, M. (1992), "Unemployment duration: compositional effects and cyclical variability", *American Economic Review*.
- Barro, R. (1988), "The persistence of unemployment", *American Economic Review*, Papers and Proceedings.
- Bernanke, B.S. and M.L. Parkinson (1991), "Procyclical labor productivity and competing theories of the business cycle: some evidence from interwar U.S. manufacturing industries", *Journal of Political Economy* 99(3).
- Bertola, G. (1990), "Job security, employment and wages", *European Economic Review*, 34.
- Björklund, A. and B. Holmlund (1986), "The economics of unemployment insurance: the case of Sweden", Trade Union Institute for Economic Research, Working Paper No. 24.
- Björklund, A. and B. Holmlund (1989), "Effects of extended unemployment compensation in Sweden", FIEF Reprint series, No. 9.
- Blanchard, O.J. and P. Diamond (1990), "The cyclical behaviour of the gross flows of U.S. workers", *Brookings Papers on Economic Activity*, 2.
- Burda, M. and C. Wyplosz (1990), "Gross labour market flows in Europe: some stylised facts", memo 90/51/EP, INSEAD, Fontainebleau.
- Chan-Lee, J.H., D.T. Coe and M. Prywes (1987), "Microeconomic changes and macroeconomic wage disinflation in the 1980s", *OECD Economic Studies*, No. 8.
- Clark, K. and L. Summers (1979), "Labor market dynamics and unemployment: a reconsideration", *Brookings Papers on Economic Activity*, 1.

- Edin, P.-A. (1989), "Unemployment duration and competing risks: evidence from Sweden", *Scandinavian Journal of Economics* 91(4).
- Hughes, G. and B. McCormick (1989), "Measuring unemployment and cyclical participation in the British labour market", paper prepared for the Council of Economic Advisers Conference on Unemployment -- Inflation Tradeoffs in Europe, Stockholm.
- König, H., F. Laisney, M. Levhner and W. Pohlmeier, "On the marginal tax rates: evidence from French and German data on married women", mimeo.
- Lemaitre, G., G. Picot and S. Murray (1992), "An overview of labour turnover", *Canadian Economic Observer*, No. 11-010.
- Leonard, J. and R. Schettkat (1991), "A comparison of job stability in Germany and the US", *Labour*.
- Milbourne, R.D., D.D. Purvis and W.D. Scoones (1991), "Unemployment insurance and unemployment dynamics", *Canadian Journal of Economics*, XXIV/4.
- Moffit, R. (1992), "Incentive effects of the U.S. welfare system: a review", *Journal of Economic Literature*, Vol. XXX.
- OECD (1986), *Employment Outlook*, September 1986.
- OECD (1987), *Employment Outlook*, September 1987.
- OECD (1991), *Employment Outlook*, July 1991.
- OECD (1992), *Employment Outlook*, July 1992.
- Pichelmann, K. and M. Riedel (1991), "New jobs or recalls? Flow dynamics in Austrian unemployment reconsidered", Institute for Advanced Studies, Research Memorandum 289.
- Schmitt, J. and J. Wadsworth (1991), "A test of the effect of benefits on search activity in a model of endogenous job offer arrivals", *Centre for Economic Performance, Discussion Paper*, 38.
- Smith, N. (1991), "Labour supply, unemployment and taxes in Denmark", mimeo.
- Solon, G., R. Barsky and J.A. Parker (1992), "Measuring the cyclicalities of real wages: how important is composition bias?", *NBER Working Paper Series*, No. 4202.
- Tachibanaki, T. and K. Sakurai (1991), "Labour supply and unemployment in Japan", *European Economic Review* 35.
- Wadsworth, J. (1991), "Unemployment benefits and search effort in the UK labour market", *Economica*, 58.
- Wadsworth, J. (1992), "Unemployment benefits and labour market transitions in Britain", *CEP Discussion Paper* No. 73.



ECONOMICS DEPARTMENT

WORKING PAPERS

A complete list of Working Papers is available on request.

129. *Trends and cycles in labour productivity in the major OECD countries*  
(June 1993) Giuseppe Nicoletti and Lucrezia Reichlin
128. *International integration of financial markets and the cost of capital*  
(March 1993) Mitsuhiro Fukao
127. *The International spillovers of capital income taxation: an applied general equilibrium analysis* (January 1993)  
François Delorme, Lawrence H. Goulder and Philippe Thalmann
126. *The future of capital income taxation in a liberalised financial environment* (January 1993)  
David Carey, Jean-Claude Chouraqui and Robert P. Hagemann
125. *Global effects of the European carbon tax*  
(December 1992) Giuseppe Nicoletti and Joaquim Oliveira-Martins
124. *The Chinese Economic Area: Economic Integration Without a Free Trade Agreement*  
(July 1992) Randall Jones, Robert King and Michael Klein
123. *New Issues: The OECD's Second Survey of the Macroeconomic Costs of Reducing CO<sub>2</sub> Emissions*  
(July 1992) Peter Hoeller, Andrew Dean and Masahiro Hajafuji
122. *Costs of Reducing CO<sub>2</sub> Emissions: Evidence from Six Global Models*  
(July 1992) Andrew Dean and Peter Hoeller
121. *Results for the OECD Comparative Modelling Project from the WHALLEY-WIGLE Model*  
(July 1992) John Whalley (University of Western Ontario) and Randall Wigle (Wilfrid Laurier University)
120. *OECD's Indicators of International Trade and Competitiveness*  
(July 1992) Martine Durand, Jacques Simon and Colin Webb
119. *Les indicateurs de compétitivité et de commerce internationaux de l'OCDE*  
(July 1992) Martine Durand, Jacques Simon and Colin Webb
118. *The Cost of Reducing CO<sub>2</sub> Emissions: A comparison of Carbon Tax Curves with GREEN*  
(July 1992) Joaquim Oliveira-Martins, Jean-Marc Burniaux, John P. Martin and Giuseppe Nicoletti
117. *Adjustment under Fixed Exchange Rates : Application to the European Monetary Union*  
(July 1992) A. Steven Englander and Thomas Egebo

116. *GREEN: A Multi-sector, Multi-region, Dynamic General Equilibrium Model for Quantifying the Costs of Curbing CO<sub>2</sub> Emissions: A Technical Manual* (May 1992) Jean-Marc Burniaux, John P. Martin, Giuseppe Nicoletti and Joaquim Oliveira Martins
115. *The Costs of Reducing CO<sub>2</sub> Emissions: Evidence from Green* (May 1992) Jean-Marc Burniaux, John P. Martin, Giuseppe Nicoletti and Joaquim Oliveira Martins
114. *Carbon Taxes and CO<sub>2</sub> Emissions Targets: Results from the IEA Model* (April 1992) E. Lakis Vouyoukas, IEA
113. *Use of the Edmonds-Reilly Model to Model Energy-Related Greenhouse Gas Emissions* (April 1992) D.W. Barns, J.A. Edmonds and J.M. Reilly, Pacific Northwest Laboratory, Washington, D.C.
112. *The Welfare Effects of Fossil Carbon Restrictions: Results from a Recursively Dynamic Trade Model* (April 1992) Thomas Rutherford, University of Western Ontario
111. *Global 2100: Alternative Scenarios for Reducing Carbon Emissions* (April 1992) Alan S. Manne, Stanford University
110. *Energy Taxation and Price Distortions in Fossil Fuel Markets: Some Implications for Climate Change Policy* (April 1992) Peter Hoeller and Jonathan Coppel
109. *The Information Content of Interest Rate Spreads Across Financial Systems* (April 1992) Frank Browne and Warren Tease
108. *Is there a future for capital income taxation?* (March 1992) Jack M. Mintz
107. *A "Credit Crunch"? The Recent Slowdown in Bank Lending and its Implications for Monetary Policy* (March 1992) Paul Francis O'Brien and Frank Browne
106. *Energy Prices, Taxes and Carbon Dioxide Emissions* (July 1991) Peter Hoeller and Markku Wallin
105. *Savings Trends and Measurement Issues* (July 1991) Jeffrey Shafer, Jørgen Elmeskov and Warren Tease
104. *GREEN - A Multi-Region Dynamic General Equilibrium Model for Quantifying the Costs of Curbing CO<sub>2</sub> Emissions: A Technical Manual* (June 1991) J.M. Burniaux, J.P. Martin, G. Nicoletti, J. Oliveira-Martins
103. *The Costs of Policies to Reduce Global Emissions of CO<sub>2</sub>: Initial Simulation Results with GREEN* (June 1991) J.M. Burniaux, J.P. Martin, G. Nicoletti, J. Oliveira-Martins
102. *Patterns of Recoveries for the Major Seven OECD Countries* (June 1991) Marco Mira d'Ercole





ECONOMICS DEPARTMENT

WORKING PAPERS

This series of Working Papers is designed to make available, to a wider readership, selected studies which the Department has prepared for use within OECD. Authorship is generally collective, but main individual authors are named. The Papers are generally available in their original language, English or French, with a summary in the other.

The views expressed in this paper are those of the authors, and do not necessarily reflect those of the OECD or of the governments of its Member countries.

Comment on the Papers is invited, and may be sent to OECD, Economics Department, 2 rue André Pascal, 75775 Paris Cedex 16, France. Additional copies of the Papers on a limited basis can be forwarded on request.