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MEASURING LABOUR MARKET FLEXIBILITY IN THE OECD COUNTRIES

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ABSTRACT: This paper investigates the adjustment of employment to population shocks in 22 OECD countries over the period 1960–1997. Most of the countries have experienced significant population shocks during that period – due to migration and other reasons. We estimate the speed of adjustment parameter which is used as a measure of the functioning of the labour market. If the OECD countries are compared using this measure, it turns out that the Anglo Saxon countries clearly outperform the other (European) countries in terms of labour market adjustment. In the case of the Nordic countries, the results presented are the most extreme. In practically all OECD countries, the functioning of the labour market seems to have deteriorated over time. These observations seem to be helpful in explaining for the behaviour of unemployment rates in the OECD area.

Key words: employment, population shocks, ageing, migration

JEL-classification code: J21, E24

1 Introduction

The strong employment growth of the U.S. has frequently been characterised as an employment miracle – at least when compared with the more sluggish Western Europe.[1] The growth of employment has been steady in the U.S. for the whole post-war period whereas the employment has been stagnant in most Western European countries since the early 1970s. The difference becomes even clearer when one looks at the employment rate, or the ratio of employed people to the working-age population. This can be clearly seen from Figures 1 and 2.[2] Although the employment/population ratio has changed cyclically in all countries, in the USA (and other Pacific rim countries) a positive growth trend is clear while in the Continental Europe the growth trend is negative. In Continental Europe economic upturns have not shown in employment growth while recessions have decreased employment.

These developments and the high and seemingly persistent unemployment in Europe (and low unemployment in the U.S.) have given rise to a widely accepted perception (which has become a conventional wisdom) that the European labour markets do not function properly; that they are inflexible and suffer from excessive regulation. Thus, the high unemployment in Continental Europe is mainly viewed structural. In contrast, the labour markets of the Anglo-Saxon countries are usually seen as competitive and flexible.

What we indeed intend to do in this paper is to analyse the functioning of the labour market. We will focus on the employment/population rates and to investigate how employment and unemployment have responded to population shocks (here we utilise the idea presented in Tarkka and Virén (1987)). As for the population shocks, we measure them by changes of working-age population. These changes can be decomposed into natural population growth and net immigration. That is why we use the number of immigrants (immigration of working-age people) as an additional variable. We have collected data on employment and working-age population from 22 OECD countries; the data covers years 1960–1999 and includes many different periods. During the first half of the time period the unemployment rates were generally higher in the U.S. than in Europe. In the latter half of the period the European average has been higher than the U.S. figure.

As for the precise aim of the study, we try to assess the flexibility of the national labour markets by estimating how long does it take before employment adjusts to the ”equilibrium level” after population shocks. A rapid adjustment can be seen as a sign of flexibility. In most of the countries in our data set there have been significant population shocks during the last 40 years. It is not a priori impossible that they can have an important role in explaining the fluctuations in employment and unemployment. We do not dwell in any speculations whether wage setting responses are sufficient or what is the effect of different benefit systems. Such questions have been studied extensively elsewhere[3]

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1 It is easy to get assured of this by reading a random issue of The Economist, or the OECD Jobs Study (OECD 1994).

2 The Pacific rim countries are comprised of the USA, Canada, Australia, New Zealand and Japan while the following OECD countries are classified as Continental Europe: Austria, Belgium, Finland, France, Germany, Greece, Italy, Netherlands, Spain and Sweden. The numbers are unweighted averages of the employment/population ratio.

3 See e.g. OECD (1994), Layard et al (1991), Nickell and Layard (1997).

although there are not very much clear-cut answers. Instead, we treat the national labour market institutions as a ”black box” which produces the outcome we are interested in.

Our findings are related not only to labour market analysis but also to research on the impacts of migration on labour markets. Flexible labour markets should adapt relatively quickly to any changes in labour supply, whether caused by changes in fertility or migration. The results of this paper give some support to the view according to which population shocks are not be blamed for unemployment or low employment rates; to the contrary, countries with increasing employment rates tend to attract immigrants and hence increase their working-age populations.[4]

In the next section we discuss briefly the different ways to evaluate labour market flexibility. Section 3 contains our empirical analysis and the last section provides some concluding remarks.

2 How to evaluate labour market flexibility?

Most labour market analyses are based on observations of unemployment and wage adjustments. Another indicator of success is job creation – how much an economy can expand employment. These variables may not, however, give a full picture of the functioning of different national labour markets. The reported unemployment rates may depend on the availability and generosity of the national benefit and pension systems, which may either encourage or discourage people without work to register themselves as officially unemployed. As a result, there are significant differences in open unemployment not only between the U.S. and Europe but within Western European countries, too.

Tests of labour market flexibility based on the wage variable also suffer from several shortcomings. First of all, the wage rate does not directly convey any information of labour market rigidities. One has to specify a model in which wages are made conditional to various determinants of supply and demand. Obviously, there is a lot of specification uncertainty in terms of this kind of model in particular when we take into account expectations. Secondly, we have to deal with nominal and real wage flexibility, which are quite different concepts and, thirdly, we have to consider various measurement problems in terms of wages (unfortunately, we have several different measures of wages, which may differ a lot in different countries).

Hence, different indicators may yield lots of ambiguity. Analyses based on various aspects of wage flexibility and other labour market characteristics may even produce contradictionary results, which do not help one to make judgements on the functioning of markets. For instance, evidence on real and nominal wage rigidity (see Table 1) gives a mixed view on various OECD countries and does not help one much in labour market appraisal. In Table 1, the LNJ rigidity indicators (both real and nominal) are uncorrelated and the VJ indicator has only a weak correlation with the unemployment rates. The Spearman rank correlation coefficients between the four alternative labour market

[4] This is line with the studies on the impacts of migration by Card (1990) and Hunt (1992) as well as with the discussion of Olson (1996).

indicators turn out to be insignificant (for the data samples consisting of both 14 and 19 countries).[5] The only exception is the relationship between the Vinas-Jimeno real wage rigidity index and the unemployment rate (in this case rs=.767).[6] If observed real wage rigidity were critical for unemployment, then Australia and the UK should be countries with highest unemployment; if nominal wage rigidity were important, then Canada and the US should have high unemployment.

On average the unemployment has been higher in Europe than in the U.S. since the mid-1970s. Nevertheless, there are many European countries which are exceptions to this rule. It is hence not justified to treat all Western European countries as a bulk (see Figure 2 for country differences). The superior performance – especially since the mid-1980s –- of the U.S. labour market dominates, however, the picture.

Employment growth can also be used as a measure of labour market flexibility. If the labour market functions well, new jobs are created under good demand conditions because firms expect to find easily new employees, and if the employees are no longer needed, firms can relatively easily get rid of them. On the other hand, changes in labour supply show up in wage adjustment and in changes in employment. Hence, population shocks should affect employment permanently and have only temporary effects on unemployment.[7]

Population shocks represent some sort of an ideal exogenous factor which can be used in empirical tests.[8] Contrary to various demand shocks, population shocks are relatively easy to measure and the employment effects are also easily predictable. Although the population shocks have not been in the OECD countries very large or sudden, they have, after all, been large enough to facilitate meaningful empirical tests (for the size of the shocks, see e.g. Figure 3 in the end of the paper).

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5 The pairwise Spearman rank correlation coefficients for 14 countries (for which data are available for all indicators) turned out to be the following: rs12=.51, rs13=.38, rs14=.13, rs23=.18, rs24=.19, rs34=.77 where rs12 denotes the coefficient between the indicators in columns 1 and 2. The other coefficients follow the same notation. The corresponding values for 19 countries concerning indicators 1,2 and 4 were: rs12=.31, rs14=.26 and rs24=.12. The 5 per cent critical values for rs with different degrees of freedom are the following: rs(14 observations)=.54, rs(19 observations)=.46.

6 The Kendall coefficient of concordance, W, which measures the degree of overall association among all these four indices turns out, however, to have a value of 0.51, which corresponds to the chi-square value of 26.97 just exceeding the 5 per cent critical value. Thus, one cannot conclude that the indicators are completely unrelated although the relationships are quite weak.

7 Obviously, employment growth is ultimately constrained by population growth. In the long run, faster employment growth is enabled by migration. Well-known examples of countries that have attracted sizeable amounts of immigrants are Germany, France, Sweden, Switzerland and, of course, the USA. Thus, treating the rate of job creation as a measure of labour market flexibility is not totally unproblematic, since population may become an endogenous variable. In this study, we try solve this problem by subtracting net immigration from population growth. .

8 A famous study on such a natural experiment is Card (1990). He showed that an exogenous population shock in the form of Cuban refugees did not have negative effects on the Miami labour market.

3 Empirical analysis

3.1 Estimated equations

We assume that there is some equilibrium relationship between employment and population of working age. This relationship is determined by such factors as taxes, benefits, the pension system, schooling, demographics, and so on. A common feature for all of these variables is that they change very slowly over time, which suggests that the employment ratio (the ratio of employment *EMP* to working-age population *POP*) is either constant or it contains a deterministic trend.

In the empirical analysis we proceed in the usual way and test whether *EMP* and *POP* are indeed cointegrated. Given the fact that these variables seem to be cointegrated (see Table 2 and the Appendix), we specify the following estimating equation for the cointegration relationship: [9]

$$EMP_t / POP_t = a_0 + a_1 t + u_t, \tag{3.1}$$

where t the time trend and u is the residual. In other words, we assume that in equilibrium, $EMP = a_0 POP + a_1 t^* POP$. According to equation (3.1) employment is basically a constant share of working-age population. The employment rate *ER* can, however, change if there are structural changes in the labour market.

Equation (3.1) is estimated from the annual OECD data for 22 countries for the period 1960–1999 (with minor differences) and the estimates are utilized in specifying the final error-correction model which takes the following form:[10]

$$\Delta EMP_t = a + bPOP_t + cEC_{t-1} + e_t, \tag{3.2}$$

where Δ denotes the first difference operator and EC_{t-1} the lagged error-correction term from equation (3.1). This model is the basic specification in our empirical tests. More precisely, we focus on the coefficient of the error-correction term *EC*, which is simply the residual form of equation (3.1). We are interested in the size of this coefficient. If it is zero, then there is no tendency for employment to return to the equilibrium level. By contrast, if the coefficient is (minus) one, the previous periods' errors (shocks) tend to be eliminated within one period. In other words, the coefficient equal to one implies that the employment adjusts to all population shocks within one year.

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[9] A complete set of the DF and ADF test results are available upon request from the authors. The Johansen Trace test statistic for the *EMP* & *POP* model are reported in Table 2 (see the first column). There are several cases in which the test statistic does not exceed the 5 per cent critical value but this failure depends on the design of the test. If, however, the constant term is deleted from the model, all test statistics (except for France) exceed this corresponding critical value. The ADF test statistics in Appendix point to same direction. Thus, *EMP* and *POP* are quite clearly I(1) variables while the error-correction term is I(0). Again, some ambiguity exists with respect to France, Ireland and (this time) the Netherlands.

[10] For space reasons, the estimates of (3.1) are not reported here. They are, of course, available from the authors upon request.

The equations are estimated both by OLS and SUR but only the (more efficient) SUR results are reported here. When the SUR estimator was used, some coefficients are restricted to be equal for all countries (with the justification of a Wald test statistic). In fact, here we report only SUR estimates with all coefficients except the constant terms and error correction terms being restricted to be equal.

When we estimate equation (3.2) we use additional explanatory variables to control both demographic and the cyclical situation. First of all, we use both the growth (rate) of output *Y* and real wages *W*/*P* to control the employment effect of both demand and supply shocks. Moreover, we control the age structure of employment by using variable S which is the share of population aged 50–64 of total working age population (ages 15–64). This variable may take into account the effects of (other) demographic changes in the labour force, and it can be motivated by some recent findings by e.g. Haltiwanger and Shuh (1999). They show that unemployment is clearly (positively) affected by the labour force share of workers aged 16 to 24, since youth unemployment rates tend to be higher than average unemployment. Finally, we try to control the effect of migration by introducing the variable *NET* which is net immigration relative to total population (i.e. (immigration-emigration). We use this variable to re-specify the population shock variable ΔPOP so that it only includes changes of (working-age) population which are not caused by migration. As can be seen from a migration equation reported in Table 4 migration is quite clearly endogenous so that if not adjustment is made the coefficients of the corresponding equation will suffer from simultaneity bias.

3.2 Estimation results

The results for equation (3.2) are presented in Tables 2 and 3. In addition, Figure 3 illustrates the residuals of (the most parsimonious version of) equation (3.2) while Figure 4 illustrates the values of the speed-of-adjustment parameter *c*.

The estimating equation fits into the data reasonably well and the residuals are not autocorrelated (see Figure 3). Moreover, the results show that for most European OECD countries the speed of adjustment to population shocks is very low even though the corresponding error-correction coefficient is generally different from zero. However, in several cases (Austria, France and Ireland) we cannot reject the hypothesis that the coefficient is even zero (see Table 2 and the Appendix for the related cointegration test statistics).[11] By contrast, these coefficients are reasonably high in all Anglo-Saxon (including also the UK) countries. Most notably, the coefficient for the USA is –0.4 which suggests that it takes less than three years for U.S. employment to absorb the population shocks. For European countries the value ranges from 5 to 10 years, which obviously translates to worse performance of the labour market and helps one to understand the high European unemployment.

There are only a few countries which make an exception to this rule (Denmark and Greece. The size of the coefficient in these countries is about the same as in the UK and Canada, although clearly less than the figures of the US, Australia and New Zealand. Thus a typical adjustment period in the best European countries is 4–5 years after a population

[11] See also Kremers et al (1992) for co-integration interpretation and distributional assumptions of this result

shock. In other European countries it is not clear whether any adjustment takes place at all. In any case the adjustment periods are very long, from 5 to 10 years.[12] The result implies that under the current labour market institutions (or broadly speaking, economic policies), the unemployment is determined by population shocks and employment remains stagnant in most European countries.

The results are striking similar for all specifications. Thus, introducing output and wage growth, or change in the age structure does not seem to affect the (relative) magnitude of the error correction coefficients. Only if we correct the population shock variable by net immigration, we obtain slightly different results. Most notably, the coefficient of the error correction parameter for Ireland increases substantially (and has the correct sign) being of the same magnitude as in the case of the UK.

If the results for different time periods are compared, some quite clear changes can be detected. First, the error-correction term appears to be somewhat higher for the first part of the data sample. It is interesting that this deterioration seems to apply the European (excluding the UK) countries only. Thus, the average value of c for a sub-period 1960–1979 turned out to be 0.14 while the corresponding number for the latter sub-period 1980–1997 was only 0.05. For the Anglo-Saxon countries (plus Japan) the corresponding values are 0.16 and 0.20 (the coefficient has, in fact, increased). Thus, there seems to be some support for the notion that the functioning of labour market has deteriorated over time in Europe. Furthermore, this deterioration has taken place at the same time as the population growth has stabilised. On average, the growth of working age population was faster and unemployment lower in the 1960s and 1970s than in the latter period.

Now turn to Table 4 in which we report a set of the parameter estimates for the equations (3.2) (estimated in a panel data setting using a fixed effects SUR estimator and constraining the coefficients of other than country dummies and error-correction coefficients to be equal across countries).

These results show that population growth has a negative short-run effect on the employment ratio which obviously makes sense. The effects seems to be quite similar across countries so that the common coefficient well represents the individual country population shocks effects.

As for the other variables, one output and wage growth seem to affect employment in the way which is well consistent with standard demand for labour model. The important thing is that including these variables does not seem change the relative magnitudes of the error-correction coefficients although the coefficients do somewhat decrease for all countries. Notice that the coefficient of the wage variable does also reflect the flexibility of the labour market.

As for the age structure variable, we find that its effect on employment is negative indicating that ageing does indeed show up in a deteriorated employment rate. Thinking the size of the effect we have to acknowledge that there obvious measurement problems with this effect. The unemployment problem of old employees has been solved in many

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[12] Ireland is the most exceptional country with a statistically significant error correction term with the wrong sign. It possible that the Irish case is connected with the country's exceptionally rapid population growth and its closeness to the UK labour market.

countries by various pension schemes (e.g. so-called unemployment pensions in several countries) so that conventional unemployment figures exclude these persons and hence the corresponding unemployment effects cannot be detected in empirical analysis.

Finally, a comment on migration may merit note. As can be seen from the last columns of Table 4, migration (in the cross-country setting) seems to behave well according to conventional a priori reasoning. Thus, net immigration increases in economic upturns (when output increases and unemployment decreases). Moreover, an increase in real wages also motivates increased net immigration. Thus, there are good reasons to treat migration as endogenous. If that is not done, all measures which use actual labour market data (either employment or unemployment or population figures) gives a misleading results.

The results presented here can be compared with the results presented earlier by Tarkka and Virén (1987) based on observations from 1957–1984. The overall picture is the same: in the U.S. the employment responds fastest to population shocks while in the OECD-Europe the labour market is more sluggish. However, there are a few exceptions. In particular, the UK had earlier error-correction estimates close to zero while they now fare quite well. The opposite has happened to the Nordic countries, which now do even worse than before. An exception is Denmark, which has had a relatively well-functioning labour market all the time.

4 Concluding remarks

In this paper we tried to find out whether the differences in employment growth between OECD countries could be explained by population shocks, i.e. by changes in the working-age population. While knowing that in the long run even the populations are endogenous, in short and medium term shocks to working-age population can be treated as exogenous. We assumed that in the medium term the labour supply shocks should be reflected in employment if the economies and labour markets function properly; increasing working-age population should be reflected in rising employment so that the employment-population ratio would not decline. Our results confirm the widely adopted view according to which particularly the U.S. labour market is more flexible in this sense. The U.S. economy has managed to respond quickly to all increases of population so that unemployment has not increased. Other well-functioning economies in this respect are Australia, Canada, New Zealand and the U.K. The performance of the European countries is relatively poor. Even the most flexible European countries are less flexible than the U.S. On average, the European economies have failed to provide employment for even modest increases in working-age populations.

This paper does not address the way the labour markets function in different countries. The observed differences in the job creation may be caused by national labour market institutions but they can also result from product market imperfections.[13] The rather good results for Denmark and the U.K., which in many ways differ from the U.S., suggest that not very straightforward policy implications cannot be drawn.

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[13] As suggested recently by Krueger and Piscke (1997).

Another point worth noting is that the existing measures of labour market flexibility are rather confusing and even contradictionary. Different angles produce different views. Data on wage formation and other institutional factors are also hard to interpret and prone to contain errors. Our intention in this paper was to present a simple and straightforward way to identify whether the labour market in a given country functions or not. It seems that our approach has indeed some merit in this respect.

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Table 1. Different indicators of labour market flexibility

	(1) real wage ridigity (LNJ)	(2) nominal wage ridigity (LNJ)	(3) real wage ridigity (VJ)	(4) unemployment rate in 1996
Belgium	0.25	0.04	1.42	9.8
Denmark	0.58	0.08	1.10	6.9
France	0.23	0.20	1.58	12.4
Germany	0.63	0.49	1.48	8.9
Ireland	0.27	0.31	1.68	11.6
Italy	0.06	0.14	1.00	12.0
Netherlands	0.25	0.24	1.52	6.3
Spain	0.52	0.56	1.94	22.1
UK	0.77	0.70	1.16	8.2
Austria	0.11	0.46	0.85	4.4
Finland	0.29	1.01	1.71	15.3
Sweden	0.08	0.39	1.41	10.0
Norway	0.08	0.37	–	4.9
Switzerland	0.13	0.41	–	4.7
Australia	1.10	0.10	–	8.6
New Zealand	0.23	0.22	–	6.1
Canada	0.32	1.37	–	9.7
USA	0.25	0.80	0.73	5.4
Japan	0.06	0.05	0.89	3.4

Sources: LNJ = Layard, Nickell and Jackman (1991), VJ = Vinals and Jimeno (1997), OECD (1996). With all indicators, high values indicate a lower level of wage flexibility (or higher level of rigidity).

Table 2. Estimates of the error-correction parameter

	unit root	eq 1	t(b)	eq 2	t(b)	eq 2'	t(b)	eq 4	t(b)	eq 6	t(b)
Australia	21.43	0.415	3.22	0.305	2.37	0.424	3.48	0.249	2.25	0.434	3.27
Austria	16.26	0.078	1.62			0.0518	0.92	0.059	1.07	0.077	1.53
Belgium	24.64	0.103	3.71	0.115	1.57	0.035	1.34	0.076	2.42	0.117	3.86
Canada	28.04	0.253	5.38	0.353	4.12	0.2	4.05	0.131	2.86	0.259	5.27
Denmark	21.07	0.293	5.37			0.322	6.49			0.279	5.34
Finland	17.02	0.143	3.86	0.085	1.43	0.132	3.67	0.095	2.51	0.131	3.35
France	13.46	0.017	0.35			–0.039	0.76	–0.013	0.36	0.06	1.33
Germany	14.83	0.163	4.45	0.165	3.71	0.117	3.21	0.143	3.71	0.177	4.9
Greece	22.04	0.25	4.96	0.149	0.77	0.255	5.19	0.334	2.89	0.297	6.08
Iceland	23.42	0.175	3.71	0.116	1.87	0.178	3.49			0.149	3.02
Ireland	24.57	–0.045	1.2	0.202	3.14	–0.088	2.13	–0.053	1.49	0.077	2.28
Italy	22.96	0.153	3.77	0.152	2.92	0.145	3.19	0.165	2.63	0.198	5.46
Japan	30.36	0.165	4.56	0.203	3.29	0.146	4.14	0.23	5.86	0.107	3.1
Netherlands	20.48	0.075	2.19	0.11	3.68	–0.001	0.03	0.074	2.24	0.129	3.86
New Zealand	21.43	0.334	6.38	0.237	3.57	0.237	3.57	0.173	2.51	0.318	5.07
Norway	31.51	0.193	4.27	0.145	2.7	0.249	5.25			0.168	3.8
Portugal	31.59	0.245	4.11	0.066	0.84	0.275	3.82	0.192	1.2	0.211	3.75
Spain	21.89	0.075	2.1	0.075	1.88	0.092	2.89	0.055	1.72	0.118	3.61
Sweden	16.53	0.08	2.8	0.063	1.76	0.025	0.82	0.034	0.97	0.05	1.63
Switzerland	30.03	0.147	3.45	0.157	1.93	0.161	3.4	0.102	1.89	0.156	3.61
UK	14.77	0.263	5.61	0.241	4.43	0.285	5.83	0.181	3.57	0.278	5.84
USA	21.56	0.405	9.51	0.421	6.58	0.412	9.17	0.303	7.05	0.417	9.63

Unit root denotes the Johansen Trace test statistic (the corresponding critical values are 24.6 (1 per cent) and 19.96 (5 per cent)). Eq 1 refers to (–1 times) the error-correction coefficient of the first equation in Table 3 and the subsequent t(b) the corresponding t-value. The other equations are similarly related to Table 3. Eq2', however, refers to the estimates of the error-correction model which has been estimated allowing different coefficients for all countries (which are not, for space reasons, reported).

Table 3. Cross-country estimates of the error-correction model for employment

DATA	$\Delta POP/POP_{-1}$	$\Delta \log(Y)$	$\Delta(W/P)$	ΔS	R^2/SEE	N
ΔPOP	–.281				.102	818
	(8.93)				(0.010)	
ΔPOP-NET	–.312				.144	504
	(7.39)				(0.011)	
ΔPOP	–.284	.149			.275	818
	(8.84)	(18.49)			(.009)	
ΔPOP, WB	–.280	.172	–.345		.340	587
	(5.86)	(13.83)	(2.96)		(0.009)	
ΔPOP, WM	–.357	.173	–.374		.317	638
	(8.66)	(17.39)	(3.11)		(0.009)	
ΔPOP	–.259			–.155	.113	774
	(9.30)			(4.37)	(0.010)	
ΔPOP-NET	–.323			–.319	.161	499
	(6.92)			(3.69)	(0.010)	

ΔPOP denotes the change of total (working-age) population while ΔPOP–NET denotes the change of total population – net immigration, Y is the real the GDP, W/P the real wage and S the share of people aged 50–64 of total working-age population. WB denotes the business-sector wage rate and the WM the manufacturing wage rate. All equations include country dummies (not displayed) and country-specific error-correction terms (reported separately in Table 2). N denotes the number of observations.

Table 4. Estimates of the net immigration equation

$$NET/POP_{-1} = \text{country dummies} + \underset{(2.18)}{.632}\Delta \log Y + \underset{(4.13)}{.125}\Delta \log(W/P) - \underset{(0.80)}{.714}\Delta UN + \underset{(15.54)}{.634}(NET_{-1}/POP_{-2})$$

$R^2 = 662$, SEE = .003, N = 357.

NET denotes (immigration – emigration of working age population). UN is the unemployment rate.

Figure 1 Employment ratio in Continental Europe and In the Pacific rim countries

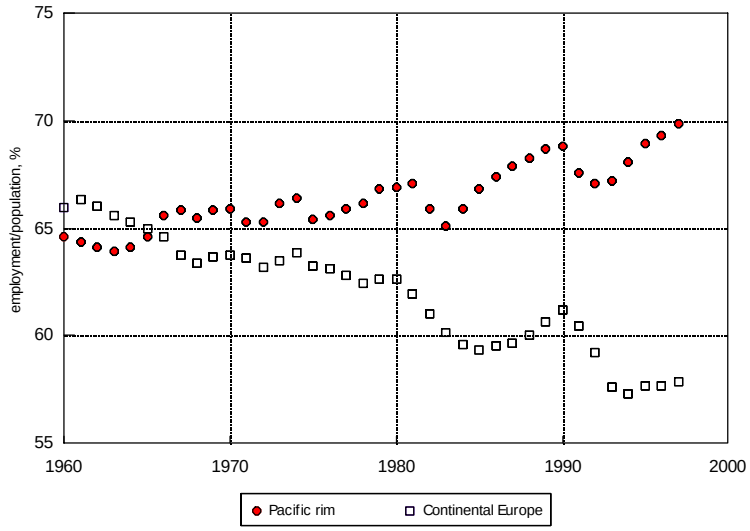


Figure 2. Employment/population ratio and growth of employment

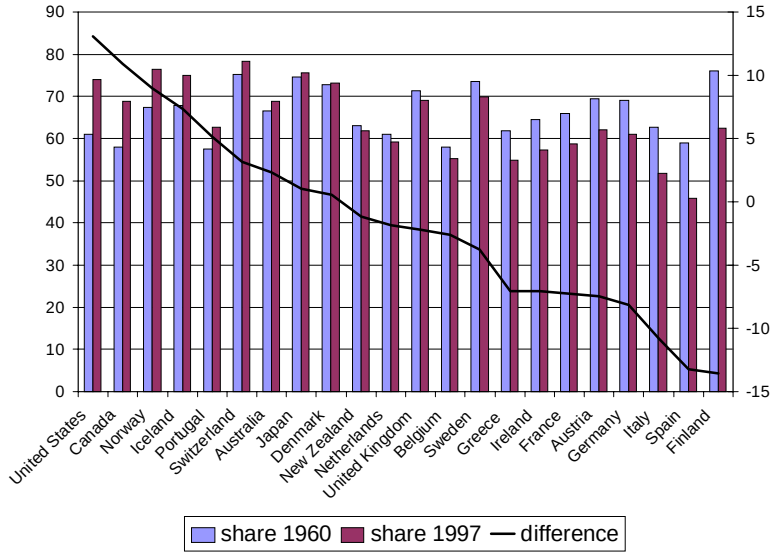


Figure 3 Residuals of equation 1 in Table 3.

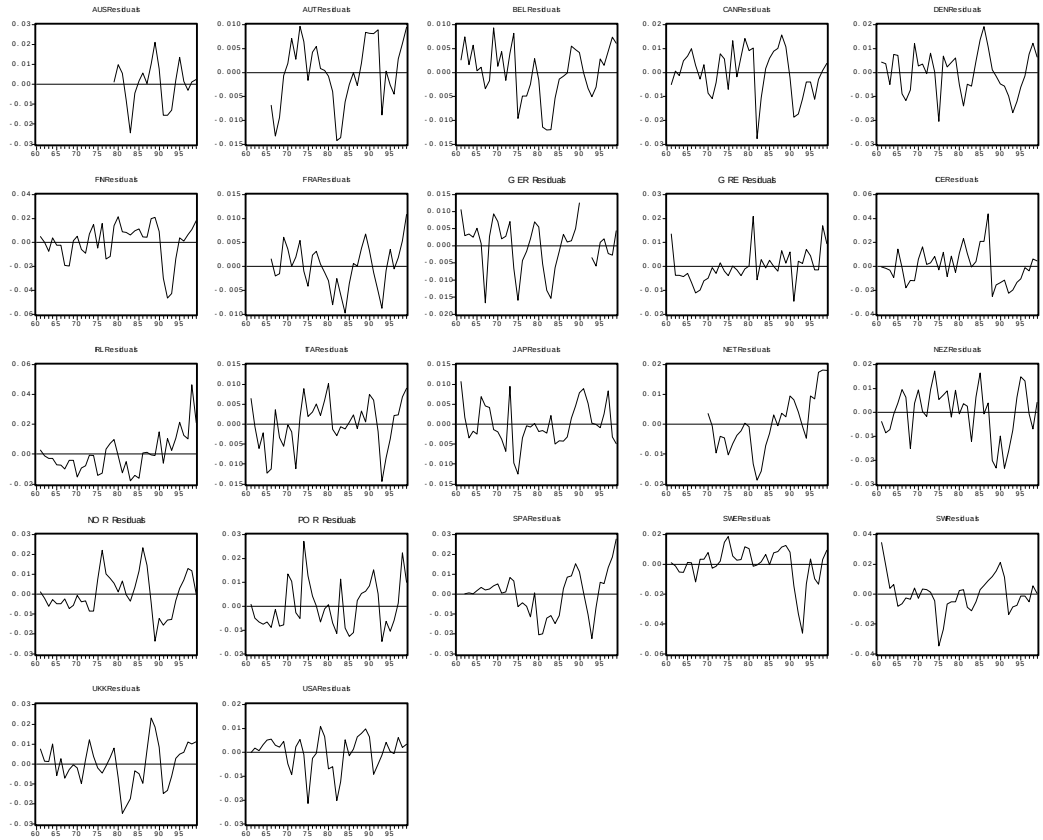
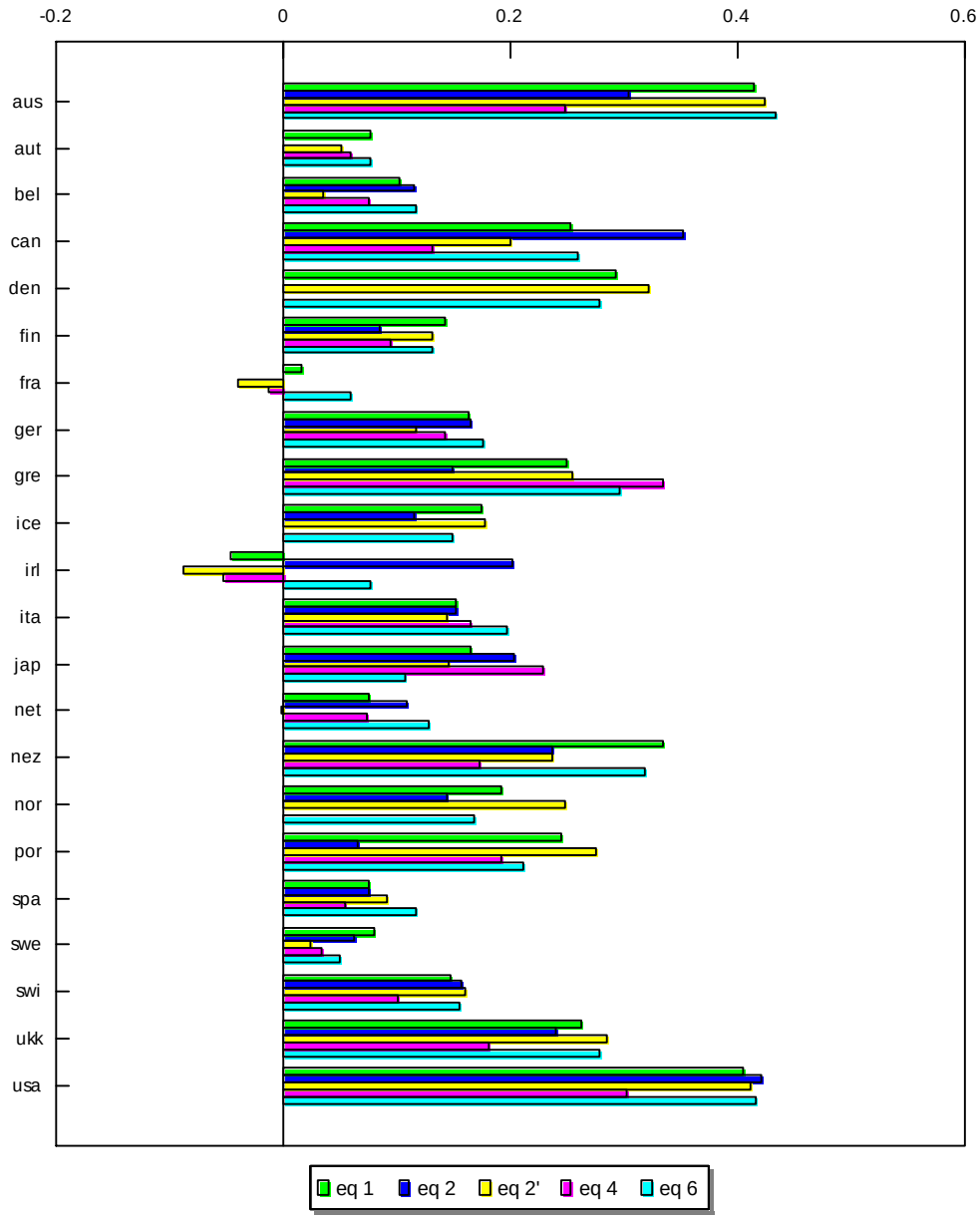


Figure 4. Error-correction coefficients for individual countries



Appendix

ADF –test statistics for EMP, POP and EC

Country	EMP	POP	EC (no constant)	EC (with constant)
Australia	–0.3363	–0.5712	–4.2877.	–4.1720
Austria	–0.5092	0.4340	–2.5365	–2.4785
Belgium	–1.4289	–2.2013	–1.9135	–1.8685
Canada	–0.3864	–1.8670	–3.4356	–3.3917
Denmark	–1.0303	–1.7066	–3.7604	–3.7021
Finland	–2.5794	–2.1771	–3.2081	–3.1630
France	0.0336	–2.5205	–1.9211	–1.8482
Germany	–0.5678	–0.5663	–2.3687	–2.3691
Greece	1.1705	0.0411	–2.9527	–2.9862
Iceland	–0.6257	–1.6493	–1.9762	–1.9485
Ireland	2.8361	1.0630	–0.3498	–0.1914
Italy	–1.8614	–1.7568	–3.4348	–3.4105
Japan	–1.3744	–5.0553	–2.9603	–3.0026
Netherlands	1.3621	–2.2593	–1.4904	–1.4017
New Zealand	–0.7379	–0.5516	–2.4407	–2.4136
Norway	–0.7090	–0.7387	–3.5777	–3.5292
Portugal	0.5561	–0.4898	–2.8914	–2.8462
Spain	–1.9675	–1.3846	–1.9175	–1.8319
Sweden	–1.9574	–0.2700	–2.3662	–2.3366
Switzerland	–0.4758	–2.2249	–2.7891	–2.7724
UK	–1.7049	0.0691	–3.4105	–3.3617
USA	0.3954	–2.4062	–3.2397	–3.2097
1%	3.6067	3.6067	2.6243	–3.6117
5%	2.9378	2.9378	1.9498	–2.9399
10%	2.6069	2.6069	1.6204	–2.6080

The test statistics have been computed for levels of the respective series with one laggged difference term. The percentage values denote the corresponding critical values of the test.

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