A CROSS-NATIONAL ANALYSIS
OF THE EFFECTS OF MINIMUM
WAGES ON YOUTH EMPLOYMENT

David Neumark
William Wascher

A Cross-National Analysis of the Effects of
Minimum Wages on Youth Employment
David Neumark and William Wascher
NBER Working Paper No. 7299
August 1999
JEL No.  J23, J38

## ABSTRACT

We estimate the employment effects of changes in national minimum wages using a pooled cross-section time-series data set comprising sixteen OECD countries for the period 1975-1997. We pay particular attention to the impact of cross-country differences in minimum wage systems and in other labor market institutions and policies that may either reduce or amplify the effects of minimum wages. Overall, our results generally are consistent with the view that minimum wages cause employment losses among youth. However, the evidence also suggests that the employment effects of minimum wages vary considerably across countries. Disemployment effects of minimum wages appear to be smaller when there are subminimum wages for youths, while, in the longer run at least, minimum wages set by collective bargaining may entail more deleterious employment effects. We also find that government policies restricting employers' ability to adjust nonpecuniary characteristics of jobs (such as hours restrictions or work rules) tend to exacerbate the negative effects of minimum wages on youth employment, while countries with active labor market policies designed to bring non-employed individuals into the work force tend to exhibit smaller disemployment effects from minimum wages.

David Neumark
Department of Economics
Michigan State University
East Lansing, MI  48824
and NBER
neumarkd@pilot.msu.edu

William Wascher
Board of Governors of the
    Federal Reserve System
20th and Constitution Ave., NW
Washington, DC, 20551

I.  Introduction

A distinguishing characteristic of the "new minimum wage research" of recent years has been a shift away from a reliance on time-series variation in minimum wages towards the use of cross-section or panel data to identify the employment effects of minimum wage laws.  In earlier decades, the time-series approach dominated research on minimum wages in the U.S. and was instrumental in shaping economists' views of the economic implications of minimum wages. However, this emphasis on time-series evidence was largely due to the absence of other variation to exploit, and researchers frequently pointed to two important limitations of relying solely on such evidence: the relatively few legislated minimum wage changes in the time-series data, and the fact that national changes in minimum wages often coincided with other events, such as recessions, that were also likely to affect youth employment.

After a number of U.S. states raised their minimum wage levels above the national minimum, researchers began to examine the employment changes generated by this regional variation in wage floors.  In some cases, the studies focused on specific states that had recently raised the minimum wage and examined employment changes in those states relative to states in which the minimum had been held constant (e.g., Card, 1992; Card and Krueger, 1994).  Other studies employed a panel data approach, using both the time-series and cross-section variation in the data to identify minimum wage effects (e.g., Neumark and Wascher, 1992; Burkhauser, et al., 1999).

One potential shortcoming of this recent literature from a national policy perspective is that it addresses a somewhat different question than did the time-series studies of the 1960s and 1970s.  More specifically, much of the recent literature addresses the implications of subnational changes in the minimum wage rather than the implications of changes in the national wage floor.  But, because factor inputs can move across regional boundaries more easily than across national boundaries, employers may respond differently to a state minimum

1

wage increase than to an increase in the national minimum, particularly in countries (such as the U.S.) where labor and capital are relatively mobile.

In this paper, we return to the question of the employment effects of changes in the national minimum, while at the same time exploiting cross-sectional variation in minimum wage levels. In particular, we estimate the effects of minimum wages on youth employment rates using a pooled cross-section time-series data set comprising sixteen OECD countries for the period 1975-1997. The countries in our study have rather different patterns of minimum wages changes over time, which helps to separate the influences of minimum wages from other macroeconomic events affecting employment in multiple countries. In addition, the levels of minimum wages differ considerably across countries, with wage floors substantially higher in many European countries than in North America.[1] Hamermesh (1996) argues that minimum wage research is an area in which international data are particularly valuable, precisely because of the greater variation contained in such data. However, he cautions against ignoring international variation in labor market policies or institutions that might affect estimates relying on cross-country variation in minimum wages. With this caution in mind, we pay particular attention to the impact of cross-country differences in minimum wage systems and in other labor market institutions and policies that may either reduce or amplify the effects of minimum wages.

Overall, our results generally are consistent with the view that minimum wages cause employment losses among youth. There is strong evidence that countries with higher minimum wage levels have lower youth employment rates, and even when fixed country effects are removed from the data, the overall results tend to conform to this traditional view. However, our results also suggest that the employment effects of minimum wages vary considerably across countries. One source of variability in the estimates appears to be associated with other cross-national differences in minimum wage systems. For example,

disemployment effects of minimum wages appear to be smaller when there are subminimum wages for youths, while there is some evidence that, in the longer run at least, minimum wages set by collective bargaining may entail more deleterious employment effects. In considering how differences in other labor market policies and institutions interact with minimum wages, we find that government policies restricting employers' ability to adjust nonpecuniary characteristics of jobs (such as hours restrictions or work rules) tend to exacerbate the negative effects of minimum wages on youth employment, presumably because other margins of adjustment are restricted. In contrast, countries with active labor market policies designed to bring non-employed individuals into the work force tend to exhibit, not surprisingly, smaller disemployment effects from minimum wages. Thus, while generally confirming that the effects of minimum wages on youth employment are negative, the evidence also points to the potentially important influence of labor market policies and institutions on these effects, thereby highlighting the types of labor markets in which minimum wages are likely to have more or less adverse consequences for employment.

II. Previous Estimates of Minimum Wage Effects Using International Data

As indicated in the Introduction, much of the new minimum wage research has attempted to exploit the additional cross-sectional variation in the U.S. produced by the increases in state-specific minimum wage rates in the late 1980s and early 1990s. The specific consequences of this approach for estimates of employment elasticities are summarized in Card and Krueger (1995) and in Neumark and Wascher (1996). However, the bottom line is that this new strain of research led to a substantially wider range of elasticity estimates than was reported in the earlier time-series literature, prompting some economists to question the consensus view that minimum wages reduce employment among lower-skilled workers.

Following on the results for the U.S., there also has been a renewed interest in reassessing the effects of minimum wages in European (and other) countries. This interest undoubtedly stems to some extent from the challenge presented to the conventional wisdom in the U.S. by the wider range of estimates reported in the recent literature. But, in addition, the increasing integration of European labor markets associated with the expansion of the European Community and, more recently, the European Monetary Union, has drawn attention to the potential impact of differing degrees of labor market rigidity across countries—the minimum wage being one possible source of such rigidity—in the context of increasing factor mobility and a unified monetary policy.

As in the U.S., the results reported for individual European countries differ considerably across studies. The variability in reported results is probably most striking for France, where it is often argued that high minimum wage levels are the main cause of high unemployment rates among youths. For example, Bazen and Skourias (1997) conclude that the large increase in the minimum wage in France in 1981 (and subsequent smaller increases) reduced youth employment rates in the early 1980s. Similarly, Abowd, et al. (1997), using longitudinal data, find negative effects on youth employment probabilities from real minimum wage increases in France (and in the U.S.) during the 1980s. However, Dolado, et al. (1996) and Machin and Manning (1997), who use regional variation in average wages to identify minimum wage effects, find little evidence of a negative impact on employment from the wage floor during that period. Among other industrialized countries (including some outside of Europe) for which researchers have attempted to estimate the effects of minimum wages on employment, differing results are also evident in studies of the U.K. (see, for example, Minford and Ashton (1996) vs. Machin and Manning (1994, 1996)), the Netherlands (Van Soest (1994) vs. Dolado, et al. (1996)), and New Zealand (Maloney (1995) vs. Mare (1995) and Chapple

(1997)). In contrast, consistently negative employment effects have been reported for Canada (e.g., Baker, et al. (1999)) and Spain (Dolado, et al. (1996); Dolado, et al. (1997)).[2]

Surprisingly, there have been few studies that use the variation in minimum wages and employment rates across countries to estimate minimum wage effects, which is the methodology we adopt in this paper. Indeed, the only one of which we know is a recent OECD study (1998a), which estimates pooled time-series cross-section regressions for a set of seven OECD countries.[3] The results in that study show negative and statistically significant minimum wage effects on employment rates of teenagers across a variety of specifications. The authors also report consistently negative point estimates of the minimum wage elasticity for 20-24 year-olds, although these tend not to be statistically significant.[4] Although the results are based on the experience of a fairly limited set of countries, the OECD study tentatively concludes that minimum wages have a "negative effect on teenage

The dearth of studies focusing on the international evidence pertaining to minimum wage effects may reflect concerns about the ability to separate the impact of minimum wages on employment from the consequences of other labor market policies or institutions, which sometimes also differ significantly across countries. We attempt to address this concern in three ways. First, we employ the ratio of the minimum wage to the average wage as our minimum wage variable. Aside from the usual reasons for using the minimum wage relative to an average wage, this form of the variable mitigates potential biases arising from a correlation between the minimum wage and other labor market policies and institutions that affect wage levels (including the minimum) more generally. Second, we alternatively either include fixed country effects, or incorporate explicit information on cross-country differences in labor market policies and institutions and include proxies for these in many of our regressions; these alternative strategies should remove persistent employment differences

associated with long-standing characteristics of a country's labor market (other than the minimum wage). In other specifications, we include country-specific time trends to capture incremental changes in policies influencing youth labor markets. Finally, we report additional results from empirical specifications that permit the effect of minimum wages to differ with the types of policies and institutions present in each country. In addition to providing more reliable estimates of minimum wage effects, these specifications are informative about how minimum wages interact with other labor market policies and institutions.

III. Data

The data we use in this study are drawn primarily from two sources. The majority of data on population, unemployment rates, and employment rates are taken from OECD published sources, including *Labour Force Statistics* and the annual *Employment Outlook* reports. In particular, we use information on employment and unemployment rates for youths, the unemployment rate for prime-age adults (as a business cycle control), and the relative cohort size of the youth population (as a supply-side control) for each country in our sample.[5] For most countries, the overall youth age group is defined as ages 15 through 24 (or for teenagers, 15 to 19); the exceptions are Italy, where this population begins at age 14, and the U.S., the U.K., Norway, Spain, and Sweden, where the relevant age groups start at age 16. The prime-age adult age group refers to individuals aged 25 to 54 in most countries; the only exception is Italy, where the relevant age group is 25 to 59. For simplicity, we refer to the 15-24 year-olds as "youths", the 15-19 year-olds as "teenagers", and the 25-54 year-olds as

Data on minimum wages are available from the OECD for countries where a national minimum wage is set by statute or by national collective bargaining agreement.[6] For countries where no national minimum exists, but where industry- or occupation-specific minimums are set by legislation or collective bargaining agreements, we use summary

estimates constructed by Dolado, et al. (1996) and, for Australia, by Richardson (1998). [7]  In all cases, the minimum wage measure is defined as the ratio of the nominal value of the minimum wage to an average wage.[8]  This is one of the standard indicators used in the literature on minimum wages and is intended to measure the extent to which the minimum wage cuts into the wage distribution, and to capture variation in the relative prices of less-skilled and more-skilled labor induced by minimum wages.

Finally, we also have some information on other labor market policies in effect in OECD countries.  Generally, this information is cross-sectional and refers to policies in effect in the late 1980s or early 1990s.  We use three indicators of such policies, all of which were assembled by the OECD (1994, 1996).  The first is an indicator of labor standards in existence in 1993.  This measure is constructed as the sum of the OECD's assessment of the stringency of regulations in four areas: working time, fixed-term contracts, employment protection, and employees' representation rights.[9]  The second indicator, which refers to 1989, is a more detailed measure of employment protection, derived from rankings of the strictness of protection for regular and fixed-term contract workers.  The third indicator is a measure of the extent to which countries use active labor market policies to promote employment.  This measure is defined as the percent of GDP spent by the public sector in 1995 on three types of labor market programs: public employment services, labor market training, and employment subsidies.

In general, our sample is limited to those countries for which the OECD publishes time-series data on labor market activity for most or all of the period dating back to the mid-1970s and for which we could obtain information on minimum wages.  For recent years, we have data on the 20 major industrialized countries listed in Table 1.  However, we were unable to obtain a sufficient time-series history of minimum wages for Australia, Finland, Ireland, and Norway, and so these countries are dropped from much of the analysis.

IV.  Empirical Results

*Preliminary Data Analysis*

The first two columns of Table 1 display the minimum wage ratios in 1976 and 1993, ordered by the relative value of the wage floor in 1993.[10]  As can be seen in the second column, there is substantial variation in the bite of minimum wages across countries, with the level of the minimum ranging from more than 70 percent of the average wage in Italy to less than 35 percent in Spain.  As is often noted, the higher minimum wage levels are almost universally found in continental Europe.  Indeed, of the countries with a minimum wage ratio above 50 percent in the 1990s, only Australia is outside of Europe.  In contrast, the other Anglo countries and Japan are at the bottom of the distribution, with minimum wage ratios typically at 40 percent or below in 1993.

A comparison of the first and second columns also indicates that some countries have experienced substantial changes in relative minimum wages over the past 20 years, which, in most cases, have reduced the level of the minimum wage relative to an average wage.  Of the 16 countries where figures are available in both years, 12 experienced a reduction in the minimum wage ratio over that period, and only Luxembourg saw a meaningful increase in the minimum wage.  Particularly notable are the declines for the Netherlands, where the government implemented a cut in the nominal minimum wage in 1984 (and a freeze through the remainder of the 1980s), and for some Southern European countries (Greece, Portugal, and Spain), where nominal minimum wage increases significantly lagged behind the overall pace of wage growth.  In addition, the U.K. abolished its system of Wage Councils in August 1993 and did not introduce a national minimum wage until April 1999.  Thus, the entry for the U.K. in the second column refers to the minimum wage ratio in the first half of 1993, and in the empirical analysis data for the U.K. are included only through 1992.[11]

The remaining columns of the table summarize some other characteristics of minimum wage provisions in these countries as of the early 1990s. In particular, the third column shows how minimum wage levels are determined in each country, while the fourth column indicates the level of disaggregation in the process. Except for France, countries with relatively high minimum wage ratios are those that tend to allow unions to play an active role in deciding the appropriate level of minimum wages, while the countries with low ratios tend to be those where the wage floor is set by statute. In addition, there are differences in the extent to which minimum wage levels vary across industries, occupations, or geographic regions, particularly in those countries where the wage floor is determined through the collective bargaining process.

The last column of the table displays information on the existence of a minimum wage level for youths that is below the level applied to adults. Most countries have some form of youth subminimum, although it often is quite limited in terms of age or is applicable only for youths with short tenure. Because we were unable to compile sufficient time-series information to construct minimum wage ratios explicitly for youths, the ratios we use in our subsequent analysis are measured as the adult minimum relative to an average wage for the entire working population. This procedure may introduce some error into our wage ratio for some countries, an issue to which we will return later in the paper when we incorporate information on youth subminimums into our analysis.

In Table 2, we repeat the information for minimum wage ratios in 1976 and 1993, and add data on employment-to-population ratios and unemployment rates for 15-24 year-olds. It is difficult to see an unambiguous pattern in the cross-section data. In some countries with high minimum wage ratios (e.g., Italy), youth labor market conditions appear to be relatively weak, while in others (e.g., Germany), employment rates look relatively high and unemployment rates low. Similarly, among those countries with low minimum wage ratios in

1993, there are countries with favorable youth labor market conditions (e.g., Japan) and those with poor youth labor market conditions (e.g., Spain). Nevertheless, as shown in the second to last row, there is a significant negative correlation between the minimum wage ratio and the employment-to-population ratio in both 1976 and 1993, and a significant positive correlation between the minimum wage ratio and the unemployment rate in 1976.[12]

To gain a better perspective of the time-series movements in the raw data, we plotted the minimum wage ratios and the youth employment-to-population ratios for each of the sixteen countries for which we had sufficient data. These plots are presented in Figures 1a to 1d, with both ratios set equal to 100 in 1990. There is substantial variation in the patterns of minimum wages and employment-population ratios across countries. Clear inverse movements are evident in Canada, the Netherlands, Luxembourg, and to a lesser extent, in the U.S. and the U.K. In contrast, downward trends in minimum wage rates have been accompanied by declines in employment rates over time in Italy, Belgium, Spain, Portugal, and Greece. In other countries, there is no distinct pattern, either because there was little variation in the minimum wage ratio over time (e.g., Germany, Sweden, France, and Japan) or because both patterns were evident at various times (e.g., New Zealand and Denmark). These charts clearly indicate that minimum wages were not the only factor affecting youth labor markets over this period and point to the need for other controls in our subsequent analysis. Indeed, as can be seen in the last row of Table 2, the raw correlation between the change in minimum wages and the change in employment rates over the sample period as a whole is close to zero.

As a first step toward including additional controls, Figures 2a to 2d show similar plots comparing movements in minimum wages and youth employment-population ratios after subtracting out the partial correlation between the youth employment-population ratio and the adult unemployment rate. More specifically, we regressed the employment-population ratios

10

on the adult unemployment rates and plotted the residuals from that regression for each country. The intent of this procedure is to control for the influence of events that affect labor markets more generally, including business cycle movements and other government policies. In particular, there were sharp increases in adult unemployment rates in France (+8.4 percentage points), Germany (+5.5), Italy (+8.1), and Spain (+15.2) over the sample period as a whole, as well as significant cyclical movements in unemployment rates in almost all countries.

As can be seen in the figures, the effect of controlling for general labor market conditions in this way seems to tilt the evidence toward a negative correlation between minimum wages and youth employment rates.[13] The inverse movements that were evident before in Canada and the Netherlands are now even more pronounced, other countries now demonstrate clearer evidence of an inverse relationship (e.g. Japan, Italy, and Spain), and there are fewer countries showing strong movements in the same direction (two exceptions being Portugal and Belgium). Reflecting this, the simple correlation between the change in the employment rate residuals and the change in the minimum wage over the sample period is -0.25.

*Basic Regression Results*

In Table 3, we implement this procedure more formally in a regression context, relating the minimum wage to youth employment rates using data pooled across both countries and years. In addition to the adult unemployment rate, we introduce as a supply-side control the ratio of the youth population to the adult population (referred to as relative cohort size in the table). In particular, the model we estimate is of the form:

$$E_{it} = \alpha_i + \delta_t + \beta MW_{it} + X_{it}\Gamma + \nu_{it}, \quad i=1,\ldots,I; \ t=1,\ldots,T .$$

In this specification, $E_{it}$ is the employment-to-population ratio for youths, $MW_{it}$ is the ratio of the minimum wage to the average wage, and the vector $X_{it}$ includes the unemployment rate for adults and the relative size of the youth cohort; i indexes countries and t indexes years. In some specifications, we include fixed country effects ($\alpha_i$) and year effects ($\delta_t$), while in others we include separate trend variables for each country.[14] The sample period for the regression is 1975 to 1997 where possible; countries for which we had to use shorter samples are listed in the notes to the table.

Panel A of the table presents results for the 15-24 year-old age group. The first two columns of the table report estimates for specifications that exclude fixed country effects; column (1) also excludes year effects, while column (2) includes them. For both of these models, the coefficient on the minimum wage variable is negative and statistically significant. The estimated elasticities (shown in the bottom row and evaluated at sample means) are in the -0.3 to -0.4 range, somewhat larger than those typically reported for the U.S. In addition, the adult unemployment rate has a strong negative relationship with youth employment rates, with the size of the coefficient suggesting that changes in general labor market conditions are amplified in the labor market for young workers. The coefficient on the relative size of the youth cohort in column (1) indicates a positive effect of that variable on youth employment rates. Including year effects (column (2)) reduces the magnitude of the cohort size effect, but has little impact on the other coefficients in the regression. In general, these results tend to confirm the negative simple correlation between minimum wages and youth employment rates reported in Table 2.

In the remaining columns of the table, we add in country-specific trends and/or fixed country effects. These additional parameters are intended to capture other country-specific factors that may influence levels of or trends in youth employment rates, independently of general labor market conditions (as captured in the adult unemployment rate). Examples of

12

such factors might include government policies—such as youth employment programs—as well as cultural differences across countries that lead to differences in the propensity of youths to work. A drawback of introducing fixed country effects is that they eliminate much of the cross-sectional variation in minimum wages that would help to identify the effects of wage floors on employment. Such variation is particularly important in our data set because of the high level of persistence in relative minimum wage levels (the correlation between country-specific minimum wage ratios in 1976 and 1993 is 0.78), and is one of the attractions of a cross-national analysis. Thus, this specification, which is necessarily vague about the origin of cross-section variation in the data, may be too stringent. We report on our attempts to separate the cross-sectional variation in minimum wages from other cross-country differences in youth labor markets in a less stringent fashion later in the paper.

As can be seen in columns (3)-(6), adding in the country-specific effects reduces the size of the estimated minimum wage effect. When country-specific trends are included (column (3)) to control for the varying trends evident in Figures 2a-2d, the coefficient on the minimum wage ratio falls to -0.15, although it is still statistically significant. When fixed effects are introduced, either with or without year effects, the minimum wage coefficient is near zero or positive and not statistically significant. However, when both fixed country effects and country-specific time trends are included (column (6)), the coefficient is -0.22 and is statistically significant. The estimated elasticity in this case is -0.18, within the range reported in previous time-series studies for the U.S.

In Panel B, we show results when the population under consideration is restricted to teenagers aged 15 to 19. It is often argued that employment effects should be larger for teenagers because this group includes a higher concentration of workers whose market wage would be below the legislated minimum wage. On the other hand, theoretical implications and empirical results for teenagers may be more ambiguous because of interactions between

minimum wages, employment, and schooling (Neumark and Wascher (1996)). In addition, results for teenagers may be more prone to measurement error, both because of the smaller size of this population and because of the higher frequency of reporting problems for teenagers in household-type surveys.

Nonetheless, as can be seen in columns (1) and (2), the disemployment elasticities are somewhat larger for teenagers than for the youth group as a whole in the specifications that exclude country-specific fixed effects or time trends. These differences are not statistically significant, however, and the pattern is reversed once country-specific effects are included. The minimum wage coefficient is positive when fixed country effects (but no country-specific time trends) are included and is negative but not significant when the country-specific trends are included. It is thus clear from the table that the evidence in support of negative employment effects from minimum wages on teenagers comes from the cross-country variation in the data.

In Table 4, we examine the robustness of the results to the inclusion of lagged minimum wage effects. In previous studies of the U.S. and Canada, the evidence suggested that the employment effects of minimum wages take at least a year to be fully reflected in the data because of the time it takes employers to adjust factor inputs to changes in factor prices (Neumark and Wascher, 1992; Baker, et al., 1999). One might think that this adjustment process would be even slower in European countries, where legal restrictions on dismissals are generally stricter than in the U.S. To the contrary, we find little evidence of such lags in the context of the basic model specification. As can be seen in the top panel, when we add one lag of the minimum wage to the specifications in Table 3 (the exact specifications are indicated in the bottom panel), the lagged variable is positive and is never statistically significant. Moreover, the sums of the contemporaneous and lagged coefficients are fairly similar to the coefficients on the corresponding contemporaneous terms alone in Table 3.[15]

These same qualitative results also carry through when we include lags on the adult unemployment rate and the relative cohort size variable as well (bottom panel). Thus, in the remainder of the paper, we only consider specifications that use the contemporaneous value of the minimum wage variable.

On balance, the results from the basic specification and its variants provide some support for the view that minimum wages tend to reduce youth employment in the 16 countries we analyze. However, the strongest evidence for deleterious minimum wage effects comes from the cross-country variation in the data, for which it may be difficult to distinguish minimum wage effects from other policies or country-specific attributes that might influence youth labor markets. Moreover, the figures discussed earlier suggest that there is sufficient disparity in the individual country experiences to question whether it is possible to use this basic model to arrive at any firm conclusions about the influence of minimum wages on employment, without taking account of other aspects of minimum wage systems in each country and of other youth labor market policies and institutions. We address these questions further in the next section.

*The Sensitivity of the Estimates to Other Characteristics of Minimum Wage Systems*

As indicated in Table 1, there are differences in minimum wage systems across countries that extend beyond the wage floor itself. We have singled out three areas in particular where minimum wage policies might be expected to influence the employment effects of a wage floor. The first of these is the process by which minimum wages are determined. In some countries, minimum wage levels are set by statute, while in other countries, they are the product of a collective bargaining process, with unions, employers, and the government all participating in the negotiations.[16] It seems possible that the method used to set minimum wages might influence the extent to which a wage floor affects labor markets, although the direction of this influence is not obvious. For example, if unions and employers

15

have a better sense of what constitutes a relevant market wage for unskilled labor and use that information in deciding on the appropriate level of the minimum wage, taking account of potential adverse employment effects, then one might expect the minimum wage to have a weaker distortionary effect on the labor market. In contrast, if the presence of unions in the negotiating process simply results in a higher minimum wage than would otherwise be set (say, for example, because unions viewed a higher minimum as raising the demand for their more-skilled members), then countries using a collective bargaining approach might see greater disemployment effects than countries with legislated minimums. Finally, if minimum wages determined through collective bargaining tend to rise when economic conditions are good, while legislated increases are more random or even tend to occur when conditions are bad (as has sometimes occurred in the U.S.), then the estimated minimum wage effects conditional on a particular specification may differ across the two systems. In particular, in the collective bargaining system contemporaneous minimum wage increases may not be associated with contemporaneous employment declines, while in the longer run or steady state, countries using this system may evolve toward relatively higher minimum wages and lower youth employment rates.

Second, there are differences across countries in the extent to which minimum wages vary across regions or industries.[17] Such variation might also influence the impact of minimum wages on labor markets, although the direction of the effect could again be in either direction. On the one hand, regional or industry variation in minimum wages implies greater flexibility in the process, which could be used to set more appropriate minimum wage levels for specific subgroups of workers. If the alternative were a national minimum wage that was appropriate in only a few cases (i.e., industries or regions) and too high in most others, this added flexibility would reduce any disemployment effects. If, however, the alternative was a low national minimum wage, or if the variation represented a tendency for some regions or

industries to set high minimum wage levels regardless of the relative productivity of the applicable subgroup, then the added dispersion might be associated with a greater bite from minimum wages than indicated by our national measure.

Third, countries differ in the degree to which the minimum wage for youths is lower than that for adult workers.[18] In contrast to the other characteristics we consider, the presence of a youth subminimum should unambiguously reduce the disemployment effect of the minimum wage as we measure it. As we noted earlier, constraints on the availability of data have led us to use an adult minimum wage, despite our focus on the youth labor market. Thus, for countries in which a youth subminimum is important, we have potentially overstated the extent to which the minimum cuts into the wage distribution. Moreover, if a youth subminimum leads employers to substitute youths for low-skilled adults, any negative impacts of raising the national minimum might be even more difficult to distinguish because of a potentially offsetting positive impact on youth employment.[19]

In Table 5, we attempt to assess the importance of these institutional differences in minimum wage systems by permitting the coefficient on the minimum wage variable to differ across these three characteristics of minimum wage setting. These estimates are based on the same set of specifications as in Table 3, although we have deleted those that included year effects, which had little effect on the results. The specifications shown in the first two columns for each age group exclude country fixed effects, but allow the average employment rate (in addition to the minimum wage effect) to vary across the three classifications.

The results for these specifications suggest that countries where the minimum wage is determined through the collective bargaining process have higher average employment rates when the minimum wage is very low, but that the disemployment effect associated with increasing the minimum wage in such countries is considerably larger. At the average minimum wage ratio of 0.51 for the entire sample, the estimated youth or teenage

employment ratio for countries with a collectively bargained minimum would be similar or a bit higher than that for countries with a legislated minimum. However, because of the larger coefficient on the minimum wage variable and the fact that the average minimum wage ratio prevailing in countries with collectively bargained wage floors (0.58) is somewhat higher than that for countries with minimum wages set by legislation (0.47), the estimated employment ratio for the former countries (computed at the subsample mean of the minimum wage ratio) is generally below that for the subset of countries with a minimum wage set by legislation.

In contrast, these results evaporate in the models that add country fixed effects (columns (3) and (6)), in which the institutional dummy variables must be dropped. The coefficient on the minimum wage interacted with the collective bargaining dummy is not statistically significant and is positive for youths and negative for teenagers. The difference in results when country effects are added suggests that the cross-sectional correlation between minimum wages and employment rates is particularly important for the group of countries that use a collective bargaining process to set minimum wage levels, and may indicate that, although contemporaneous minimum wage increases are not associated with contemporaneous employment declines for these countries, in the longer run such countries are more likely to exhibit high minimum wages and low youth employment rates.

Turning to the other two institutional characteristics of minimum wage systems, neither the existence of subnational variation in minimum wages nor the presence of a youth subminimum wage has, by itself, a consistently significant effect on average employment rates. However, both characteristics appear to influence the size of the disemployment effects associated with the minimum wage. In particular, the presence of a youth subminimum consistently reduces the negative consequences of the minimum wage in the equations for youths; for teenagers, the coefficient is not statistically significant in the specifications that exclude fixed country effects, but is significant and quite large when those fixed effects are

added.  These results are consistent with our suspicion that by using the adult minimum wage in constructing the minimum wage ratio, we overstated the relevant (or "effective") minimum wage for the age groups under study in some countries.

The coefficients on the indicator of subnational variation in the minimum wage are more difficult to decipher.  For both age groups, the presence of industry or geographic minimums tends to reduce the disemployment effects of the minimum wage in the specification that excludes country fixed effects and time trends, although the coefficient is only statistically significant in the regressions for youths.  However, the estimates weaken when country-specific time trends are included and turn negative when the country fixed effects are added.  That is, with the full set of controls, the disemployment effects of the minimum wage appear greater in countries where the minimum wage varies across regions or industries, which might suggest that such variation is primarily used to raise the overall level of the minimum wage to levels where disemployment effects set in, rather than to target minimum wages to relative productivity levels in particular industries or to living costs in particular regions.

These results must be interpreted cautiously.  They do not necessarily mean, for example, that in a country with a national minimum wage there are no disemployment effects of minimum wages.  As Table 1 indicates, countries differ simultaneously in terms of how minimum wages are set, whether they are national or subnational in scope, and whether they use youth subminimums.  Furthermore, along these and other dimensions each country is to some extent unique, and a disaggregated approach that tried to account for this uniqueness would take us back to individual country studies, entailing some potential gains but also the loss of the cross-national variation.  Nonetheless, we believe these estimates are informative regarding some of the institutional features of minimum wage systems that are more likely to cause minimum wage increases to be associated with contemporaneous decreases in youth

employment. In the next subsection, this same point is driven home with respect to other labor market policies and institutions.

*The Sensitivity of Minimum Wage Effects to Other Labor Market Policies and Institutions*

Another dimension along which differences across countries might influence the effects of the minimum wage on youth labor markets is variation in other labor market policies and institutions. For example, a country raising its minimum wage in the presence of other labor market rigidities, such as restrictions on adjusting hours or other work rules, might experience larger disemployment effects than a country where employers have alternatives to adjusting employment levels. In contrast, if a country couples an increase in the minimum wage with policies designed to bring unemployed individuals back into the work force, the disemployment effects of minimum wages might be hidden by an increase in the use of such active labor market policies.[20]

In Table 6, we report indexes developed by the OECD as indicators of the importance of other such labor market policies and institutions in the countries in our sample. The first is a labor standards index, which is constructed from OECD characterizations of the rigidity of labor standards in four areas: legislated working time rules, the ability of employers to use flexible employment contracts, employment protection regulations, and workers' representation rights. In particular, each category is assigned a value from 0 to 2 (with 0 meaning that government regulations are light and 2 meaning that regulations are strict), and the values are summed to form the index. Thus, high values of the index (such as those in Greece and Sweden) indicate the presence of substantial rigidities associated with labor standards, whereas low values (e.g., the U.K. and the U.S.) are suggestive of flexible labor markets.

The second measure we use provides a more detailed classification of employment protection regulations across countries. This index, which also was constructed by the

OECD, is based on rankings of countries according to the strictness of employment legislation in three areas: regular procedural inconveniences (in terms of the types of procedures that need to be followed to dismiss an employee and the delay associated with following such procedures), notice and severance pay requirements for no-fault dismissals, and the difficulty of dismissal (e.g., what constitutes an unfair dismissal, how long after a dismissal an appeal can be made, and the penalties associated with an unfair dismissal ruling).[21] As in the case of the labor standards index, high values are associated with countries having a high degree of employee protection, while low values indicate relative ease in dismissing employees.

The final measure we consider is the extent to which the public sector in each country uses active labor market policies to bring unemployed individuals into the work force. Such policies could include public employment services (e.g., job search assistance), labor market training programs, or employment creation programs, either in the form of subsidies to private employers or direct job creation. The variable is defined as the level of public expenditures on such programs in 1995 as a percent of GDP, so that a higher value indicates a greater commitment on the part of a particular country to such policies and institutions.

All three indicators of other labor market policies and institutions are cross-sectional in nature, and as can be seen in the bottom row of Table 6, they tend to be positively correlated with the level of relative minimum wages across countries. As a result, we first added these three indicators to the regressions that exclude fixed country effects as a means of controlling for other factors that are both correlated with minimum wages and could potentially affect youth employment rates, without necessarily stripping out the between-country covariation between minimum wages and youth employment (as the fixed effects model does). These estimates are shown in columns (1)-(2) of Table 7 for youths and columns (6)-(7) for teenagers.[22] In columns (1) and (6), which exclude country-specific trends, the overall coefficients on the minimum wage ratio are negative and significant. However, the point

estimates, at –0.28 for all youths and –0.19 for teenagers, are somewhat smaller than those reported in column (1) of Table 3, indicating that the magnitude of the disemployment effects in those earlier specifications was boosted by the omission of information on labor market policies and institutions. In addition, the coefficients on the labor market indexes are statistically significant and indicate directions of impact consistent with our priors: more rigid labor standards and more stringent employment protection regulations are estimated to reduce youth and teenage employment rates, while countries with more active labor market policies tend to have higher employment rates, other things equal.[23]

Adding country-specific trends to the specification (columns (2) and (7)) has, for the most part, only a minor influence on the results. The estimates of the minimum wage effect are still negative and statistically significant, while the coefficients on the labor standards index and the extent of active labor market policies are a bit larger in absolute value. The exception to this pattern is the coefficient on the employment protection index, which switches sign when the country trends are included, suggesting that there are important omitted changes over time in the types of legislation and institutional procedures captured by this index (or in variables correlated with them).

The remaining columns add interaction effects that permit the effect of the minimum wage to vary with the labor market indexes.[24] When we add these interactions without additional controls in the regression for youths (column (3)), none of the coefficients on the labor market policy variables is statistically significant, except for the interaction between active labor market policies and the minimum wage, with the sign of that coefficient suggesting that countries with more active labor market policies tend to have smaller disemployment effects from minimum wages. In addition, the average minimum wage effect is similar to that in the prior columns. The same specification for teenagers (column (8)) also shows a similar overall minimum wage effect to that in the previous regression, but does not

22

provide evidence that active policies reduce this effect, perhaps because such policies are less frequently targeted at teenagers. When country-specific trends are added to the specification (columns (4) and (9)), the overall minimum wage effect is about unchanged, but the coefficients on the labor policy variables alone and on the interaction terms are often statistically significant. In this specification it is most straightforward to evaluate the overall effect of these labor market policies and institutions on employment rates by considering the effect at the mean of the minimum wage variable. In the case of the labor standards index, the results for all youths indicate a slight negative effect on employment rates from a one-unit increase in the index, while for teenagers the overall effect is slightly positive. With respect to the employment protection index, the effect on employment rates is about zero for all youths and slightly negative for teenagers.

However, the more important findings concern the effects of variations in these labor market policies on the size of the disemployment effect from minimum wages. In particular, more restrictive labor standards tend to exacerbate the effects of minimum wages, consistent with the notion that such standards force more of the adjustment to a higher minimum to occur through the employment channel. In contrast, stricter employment protection regulations are estimated to reduce the negative employment consequences of a wage floor, perhaps because it is more costly to dismiss workers in countries with such regulations.[25] Finally, the coefficients on the extent of active labor market policies are positive but not statistically significant in this specification.

The final set of columns ((5) and (10)) replace the cross-sectional indicators of other labor market policies and institutions with the fixed country effects. As in previous tables, the overall effect of the minimum wage becomes much smaller when fixed effects are included and, in the case of teenagers, turns positive. Nonetheless, even in this specification, there is evidence of interactions between the effects of minimum wage laws and the presence of other

labor market policies. In some respects, the results are similar to that in the previous specification, with more restrictive labor standards increasing the disemployment effects of minimum wages and stronger employment protection legislation mitigating the effects. In addition, the fixed-effect specifications provide evidence that the presence of more active labor market policies or institutions tends to reduce the size of the minimum wage effect, perhaps because they absorb some of the workers displaced from private-sector jobs by a higher wage floor. Alternatively, active labor market policies (e.g., training) may provide the means for low-skilled workers to raise their productivity to a level permitting employment at the minimum wage.

Although we have focused thus far on the signs of the coefficients on the interaction terms between the labor market policy and institution variables and the minimum wage ratio, the magnitudes of the estimated coefficients are sufficiently large to suggest that minimum wage effects may vary widely across countries. This point is illustrated in Table 8, in which we report the implied variation in minimum wage effects across countries associated with the rather substantial differences in the importance of the three types of labor market policies and institutions included in the regressions shown in Table 7. For example, the estimated minimum wage effects for Belgium and Portugal using these specifications are consistently positive, reflecting the high values for the employment protection index and the percent of GDP spent on active labor market policies and institutions. In contrast, Greece and Spain, which have relatively restrictive labor standards and very little in the way of active labor market policies, show consistently negative estimates of the effect of minimum wages on youth employment. We do not regard these specifications as necessarily providing reliable estimates of minimum wage effects for each country, for the same reasons discussed at the end of the previous subsection.[26] In addition, while we can explain why some set of labor market policies or institutions might reduce or nearly eliminate minimum wage effects, it is

unclear why they would generate positive effects; in our view, further theoretical work on this question, and empirical work extending our findings, would be invaluable. Nonetheless, the evidence indicates that the interactions of minimum wages with other labor market policies and institutions are sufficiently strong so that results for one country should not blindly be applied to other countries.

*Sensitivity to Changes in the Sample*

As a robustness check, we examined the sensitivity of the basic model estimates in Table 3 to the inclusion or exclusion of specific countries. We have no reason to believe that any particular country in our sample should be excluded from the sample. However, it can be informative to see whether our overall results are driven by the relationship between minimum wages and youth employment rates in one or two countries. For the most part, excluding specific countries had little effect on the coefficient estimates. However, as shown in Table 9, there are a couple of exceptions. In particular, excluding Spain and Portugal from the regressions results in considerably stronger negative employment effects of minimum wages, consistent with the results reported by the OECD (1998a) using their more limited sample of countries. In the other direction, excluding Canada from the sample tends to reduce the estimated disemployment effects somewhat, and in fact results in positive and statistically significant coefficients in some of the fixed effects models. Finally, though, when all three countries are excluded, the coefficients are more negative than the baseline results in almost all of the specifications. Thus, although we find one or two countries for which the data are quite influential, the fact that the results obtained when these countries are dropped simultaneously are similar to those for the entire sample illustrates the robustness of the overall results.

<u>V. Conclusions</u>

We have attempted to exploit the substantial differences across countries in minimum wage provisions to obtain new estimates of the employment effects of the minimum wage. Although reference is often made to the importance of such differences in explaining labor market outcomes across countries, there have been relatively few studies that attempt to test this proposition directly. Using a panel data approach similar to recent studies that exploit regional or industry differences within a country, we investigate the role that minimum wages play in determining youth employment rates in 16 industrialized countries.

In general, our results provide additional evidence that minimum wages tend to reduce employment rates among the youth population. A clear negative correlation between the level of the minimum wage and youth employment-to-population ratios appears both in the raw data, and in simple time-series cross-section regressions relating employment rates to minimum wages, with controls for overall economic conditions and cross-country variation in labor market policies and institutions. The disemployment effects also appear in some of the models that control for country- and time-specific factors (including country-specific time trends), although the results from these specifications are clearly weaker.

We also find that the impact of minimum wages differs substantially across the countries in our sample. In attempting to identify the sources of such differences, we have focused on two specific areas that might be expected to lead to some variation in the employment effects of minimum wages. The first is the role played by other cross-country differences in minimum wage systems. We find, in this regard, that the negative effects of the minimum wage are larger in those countries where the wage floor is set by the collective bargaining process. In addition, we find evidence that the presence of a youth subminimum wage tends to reduce the impact of the overall minimum wage on youth employment.

26

The second source of variability we consider is the presence of other labor market policies or institutions that could either exacerbate or mitigate the effects of minimum wage laws. Our results suggest that these indeed have important influences on the size of the disemployment effects we estimate. In particular, the presence of rigid labor standards tends to exacerbate the effects of the minimum wage on employment, while stronger employment protection policies tend to diminish the minimum wage effect. In addition, countries that tend to make greater use of active labor market policies to reduce unemployment tend to show smaller disemployment effects from the minimum wage.

These findings on the influence of particular features of minimum wage systems and other labor market policies and institutions are generally robust to the inclusion of country-specific effects, time trends, etc. Moreover, the results we obtain for the other labor market policies and institutions are consistent with theoretical predictions regarding their direct effects, and the ways in which they should influence the impact of the minimum wage. These findings therefore highlight the importance of accounting for institutional and other policy-related differences when using data for different countries to study the effects of economic policies such as the minimum wage, and, from a policy perspective, when predicting the effects of changes in the minimum wage for particular countries.

# References

Abowd, John, Francis Kramarz, Thomas Lemieux, and David Margolis. 1997. "Minimum Wages and Youth Employment in France and the United States." National Bureau of Economic Research, Working Paper No. 6111.

Baker, Michael, Dwayne Benjamin, and Shuchita Stanger. 1999. "The Highs and Lows of the Minimum Wage Effect: A Time Series-Cross Section Study of the Canadian Law." *Journal of Labor Economics*. 17(2): 318-50.

Bazen, Stephen, and Nicolas Skourias. 1997. "Is There a Negative Effect of Minimum *European Economic Review*. 41(3-5): 723-32.

Burkhauser, Richard V., Kenneth A. Couch, and David C. Wittenburg. 1999. "A Reassessment of the New Economics of the Minimum Wage Literature Using Monthly Data from the CPS." Cornell University Working Paper, Department of Policy Analysis and Management.

Card, David. 1992. "Do Minimum Wages Reduce Employment? A Case Study of *Industrial and Labor Relations Review*. 46(1): 38-54.

Card, David, and Alan Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast Food Industry." *American Economic Review*. 84(4): 772-93.

Card, David, and Alan Krueger. 1995. *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, NJ: Princeton University Press.

Chapple, S. 1997. "Do Minimum Wages Have an Adverse Impact on Employment? *Labour Market Bulletin*. 2: 25-50.

Di Tella, Rafael, and Robert MacCulloch. 1999. "The Consequences of Labour Market Flexibility: Panel Evidence Based on Survey Data." Mimeo. Harvard University.

Dolado, Juan, Francis Kramarz, Stephen Machin, Alan Manning, David Margolis, and Coen Teulings. 1996. "The Economic Impact of Minimum Wages in Europe." *Economic Policy*. October, 319-70.

Dolado, Juan, Florentino Felgueroso, and Jan Jimeno. 1997. "The Effects of Minimum Bargained Wages on Earnings: Evidence from Spain. *European Economic Review*. 41: 713-21.

Hamermesh, Daniel. 1996. "What Can We Learn from International Evidence on Labor-Market Policies?" Mimeo, University of Texas.

Korenman, Sanders, and David Neumark. "Cohort Crowding and Youth Labor Markets: A Cross-National Analysis." Forthcoming in David Blanchflower and Richard Freeman, eds., *Youth Employment and Unemployment in Advanced Countries*. Chicago: University of Chicago Press.

Machin, Stephen, and Alan Manning. 1994. "The Effects of Minimum Wages on Wage Dispersion and Employment: Evidence from the U.K. Wage Councils." *Industrial and Labor Relations Review*. 47(2): 319-29.

Machin, Stephen, and Alan Manning. 1996. "Employment and the Introduction of a *The Economic Journal*. 106: 667-76.

Machin, Stephen, and Alan Manning, 1997. "Minimum Wages and Economic *European Economic Review*. 41: 733-42.

Maloney, T. 1995. "Does the Adult Minimum Wage Affect Employment and *New Zealand Economic Papers*. (1): 1-19.

Mare, D. 1995. "Comments on Maloney." Mimeo. New Zealand Department of Labour.

Minford, P., and P. Ashton. 1996. "Minimum Wages: A Macroeconomic Assessment." Mimeo, University of Liverpool.

Neumark, David, and William Wascher. 1992. "Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws." *Industrial and Labor Relations Review*. 46(1): 55-81.

Neumark, David, and William Wascher. 1996. "Reconciling the Evidence on Employment Effects of Minimum Wages: A Review of Our Research Findings." In Marvin Kosters, ed., *The Effects of Minimum Wages on Employment*. Washington, DC: American Enterprise Institute. 55-86.

Nickell, Stephen. 1997. "Unemployment and Labor Market Rigidities: Europe versus *Journal of Economic Perspectives*. 11(3): 55-74.

Organisation for Economic Co-operation and Development. 1994. *The OECD Jobs Study: Evidence and Explanations, Part II: The Adjustment Potential of the Labour Market*. Paris: OECD.

Organisation for Economic Co-operation and Development. 1996. *Employment Outlook*. Paris: OECD.

Organisation for Economic Co-operation and Development. 1998a. *Employment Outlook*. Paris: OECD.

Organisation for Economic Co-operation and Development. 1998b. *Labour Force Statistics*. Paris: OECD.

Richardson, Sue. 1998. "Who Gets Minimum Wages?" Discussion Paper No. 386, Centre for Economic Policy Research, Australian National University.

Van Soest, A. 1994. "Youth Minimum Wage Rates: The Dutch Experience." *International Journal of Manpower*. 15(2-3): 100-17.

</ref_section>

# Endnotes

[1] This difference is often asserted to be one reason for the high rates of structural unemployment evident in European economies (e.g., OECD, 1994).

[2] The age groups vary slightly in these studies, but generally cover some subset of workers between the ages of 15 and 24.

[3] Indeed, there are few cross-country panel studies focusing on the effects of labor market flexibility on employment or unemployment more generally. However, for a recent example using this approach, see Di Tella and MacCulloch (1999).

[4] The OECD study also reports results adding Spain and Portugal to the sample of countries in the analysis. When these countries are included, the estimates are smaller and often not statistically significant for teenagers and are close to zero for 20-24 year-olds.

[5] See Korenman and Neumark (forthcoming) for an analysis of cohort size effects in OECD countries.

[6] These countries include Belgium, Canada, France, Greece, Japan, Luxembourg, the Netherlands, New Zealand, Portugal, Spain, and the U.S. See OECD (1998a) for further details.

[7] Although 1997 was the first year since 1967 in which a national minimum wage was set in Australia, the awards system in that country has traditionally set formal minimum wages for a wide range of industries and occupations. We were, however, unable to obtain any summary measure of the minimum wage for earlier years.

[8] In the case of OECD data, the average wage is a median wage. Dolado, et al. use a mean wage in constructing their indices.

[9] The OECD also includes an indicator of the bite of minimum wages in the summary index. However, because of our interest in estimating the effects of minimum wages directly, we dropped that component and recalculated the index.

[10] Where information was not available for 1993, we have indicated in parentheses the year for which we report this ratio.

[11] We excluded the U.K. observations with values of zero for the minimum wage for two reasons. First, the implied minimum wage change would be very large relative to the other minimum wage variation in our sample, and thus the employment changes in this single episode would tend to have an inordinate effect on the overall coefficient. Second, and more importantly, even when the minimum wage is eliminated, there is surely a floor well above zero (e.g., the value of leisure) below which wages would not fall, implying that using a zero value for the minimum wage for these observations would result in a gross misspecification of the model.

[12] As has often been noted, the predictions of various economic theories about the labor market effects of minimum wages pertain more to employment than to unemployment, because of the ambiguous effects of labor force participation decisions on the latter. This is particularly true in the case of youths, for whom unemployment and nonparticipation in the labor force are typically not distinct states. Thus, in the remainder of the paper, we focus our analysis on the implications of minimum wages for employment-population ratios and drop references to youth or teenage unemployment rates.

[13] We included fixed country effects in the regression, and therefore plot both the employment-to-population ratios and the minimum wage ratios as differences from country-specific means. This affects only the scale of the minimum wage series.

[14] In general, our specification is similar to that used by the OECD (1998a) and to the specification used by Neumark and Wascher (1992) for the U.S.

[15] These results likely reflect the substantial collinearity between the contemporaneous and lagged minimum wage ratio in our sample. Indeed, when only the lagged value of the minimum wage is included in the regression, the coefficients on that variable are very similar to those shown for the contemporaneous minimum wage variable in Table 3.

[16] The U.K., where minimum wages were set by Wage Councils prior to 1993, is included in the group of countries using a collective bargaining approach. As indicated in Dolado, et al. (1996), the Wage Councils "consisted of an equal number of employer and worker representatives, plus a maximum of three independent members (nominated by the government of the day) who had the casting vote if an agreement was not reached" (p. 353).

[17] Some judgement was necessary to classify the countries into two distinct groups; see Table 1 for our classification. As significant regional variation in the U.S. exists only in the second half of our sample, we also used a classification in which we coded the U.S. as having a national minimum wage. This change had little effect on the results.

[18] This classification is also subject to some discretion. Countries for which we classified youth subminimum wages as important in our sample include Belgium, Denmark, Luxembourg, the Netherlands, New Zealand, Portugal, Spain, Sweden, and the U.K. Countries that we classified as having no or limited youth subminimum provisions include Canada, France, Germany, Greece, Italy, Japan, and the U.S.

[19] Such an effect could be particularly important if the youth subminimum was low enough to be essentially nonbinding.

[20] In that case, any disemployment effects of the minimum wage might appear as higher government spending rather than lower employment rates.

[21] See Chapter 6 of OECD (1994) for details. Nickell (1997) has also used these data.

[22] These regressions exclude Luxembourg because of a lack of data on other labor market policies and institutions for that country. However, excluding Luxembourg from specifications in Table 3 as well had no material effect on those results.

[23] Of course we have to be wary of giving these estimates a causal interpretation, since the policy variables are measured at one point in time, and hence the estimates are based on cross-sectional variation.

[24] For the results reported in this table, we differenced the policy variables from their mean values prior to estimation, so that the coefficient on the minimum wage ratio can be interpreted as the employment effect of minimum wages at the means.

[25] Of course, as was suggested by the coefficient on the employment protection variable alone, employment protection legislation may reduce employment levels to begin with so that the employment rate following a minimum wage increase in a country with strict employment protection rules may not be higher than in a country with more lax regulations.

[26] In addition, changes in the parameter estimates across specifications lead to some instability in the estimates for particular countries. In particular, referring to Table 7, in the specifications that include country-specific trends but exclude country fixed effects, the coefficients on the interaction terms for the labor standards index are relatively large in absolute value, while the coefficients on the interaction term for active labor market policies are quite small. In contrast, active labor market policies have the largest coefficients in the specifications that include fixed effects. Looking across the specifications, these changes in coefficients would imply opposite signed estimates of the effects of minimum wages in a number of countries where the values of these variables differ substantially from sample means. For other countries, these parameter changes would sometimes imply considerably larger or smaller estimates of minimum wage effects, even if not a change in sign.

Table 1

**Minimum Wage Levels and Other Characteristics of Minimum Wages in Selected Countries**

| Country | Ratio of Minimum Wage to Average Wage | | Other Characteristics of Minimum Wage Systems (1993) | | |
|---|---|---|---|---|---|
| | 1976 | 1993 | How Set | What Level | Youth Subminimum |
| Italy (1991) | 0.78 | 0.71 | Negotiated | Industry | Some |
| Norway (1994) | -- | 0.64 | Negotiated | Industry | No |
| France | 0.59 | 0.59 | Statute | National | Limited, <18 |
| Germany | 0.60 | 0.58 | Negotiated | Industry | Some |
| Denmark | 0.59 | 0.57 | Negotiated | Industry | <18 |
| Ireland | -- | 0.55 | Labor Committees | Industry | <18 |
| Greece | 0.69 | 0.55 | Negotiated | National | No |
| Belgium | 0.58 | 0.53 | Negotiated | National | <21 |
| Finland | -- | 0.52 | Negotiated | Industry, Region | No |
| Luxembourg | 0.45 | 0.52 | Statute | National | <18 |
| Sweden | 0.52 | 0.52 | Negotiated | Industry | <24 |
| Australia (1997) | -- | 0.52 | Statute | National | <21 |
| Netherlands | 0.66 | 0.51 | Statute | National | <23 |
| Portugal | 0.61 | 0.47 | Statute | National | <18 |
| New Zealand | 0.58 | 0.45 | Statute | National | <20 |
| Canada | 0.50 | 0.40 | Statute | National, Provincial | No |
| United Kingdom | 0.43 | 0.40 | Wage Councils | Industry | <21 |
| Japan | 0.37 | 0.38 | Statute | Prefecture | No |
| United States | 0.47 | 0.37 | Statute | National, State | Limited |
| Spain | 0.49 | 0.34 | Statute | National | <18 |

Notes: Minimum wage ratios are from the OECD minimum wage database and Dolado, et al. (1996). The OECD uses a median wage to calculate the ratios, while Dolado, et al. use a mean wage. Other information is taken from Table 2.1 in OECD (1998a) and Table 1 in Dolado, et al. Figures in parentheses refer to the year for which information on minimum wages was available for countries where we did not have data for 1993. For the U.K., the minimum wage ratio in 1993 refers to the months prior to the elimination of the Wage Councils.

Table 2

**Minimum Wage Levels and Youth Labor Market Conditions**

| Country | Minimum Wage Ratio | | Employment/Pop. Ratio | | Unemployment Rate | |
|---|---|---|---|---|---|---|
| | 1976 | 1993 | 1976 | 1993 | 1976 | 1993 |
| Italy (1991) | 0.78 | 0.71 | 0.32 | 0.29 | 14.5 | 30.8 |
| Norway (1994) | -- | 0.64 | 0.50 | 0.48 | 5.7 | 7.4 |
| France | 0.59 | 0.59 | 0.45 | 0.24 | 10.1 | 24.6 |
| Germany | 0.60 | 0.58 | 0.58 | 0.52 | 5.6 | 8.2 |
| Denmark | 0.59 | 0.57 | $0.53^1$ | 0.60 | $18.9^1$ | 14.6 |
| Ireland | -- | 0.55 | $0.52^2$ | 0.35 | $13.2^2$ | 25.1 |
| Greece | 0.69 | 0.55 | $0.33^1$ | 0.28 | $23.1^1$ | 28.8 |
| Belgium | 0.58 | 0.53 | $0.33^1$ | 0.31 | $23.9^1$ | 18.4 |
| Finland | -- | 0.52 | 0.56 | 0.34 | 7.0 | 30.5 |
| Luxembourg | 0.45 | 0.52 | $0.56^1$ | 0.46 | $6.8^1$ | 4.4 |
| Sweden | 0.52 | 0.52 | 0.68 | 0.52 | 3.7 | 18.4 |
| Australia (1997) | -- | 0.52 | 0.61 | 0.56 | 9.8 | 15.9 |
| Netherlands | 0.66 | 0.51 | 0.46 | 0.55 | 7.3 | 9.7 |
| Portugal | 0.61 | 0.47 | 0.61 | 0.42 | 13.9 | 12.0 |
| New Zealand | 0.58 | 0.45 | $0.67^3$ | 0.53 | $7.9^3$ | 17.2 |
| Canada | 0.50 | 0.40 | 0.55 | 0.52 | 12.6 | 17.6 |
| United Kingdom | 0.43 | 0.40 | 0.64 | 0.59 | 11.8 | 17.3 |
| Japan | 0.37 | 0.38 | 0.45 | 0.45 | 3.1 | 5.1 |
| United States | 0.47 | 0.37 | 0.56 | 0.57 | 14.7 | 13.3 |
| Spain | 0.49 | 0.34 | 0.56 | 0.26 | 10.2 | 43.2 |
| Correlation with minimum wage | -- | -- | -0.50 | -0.26 | 0.42 | 0.00 |
| Correlation with the change in the minimum wage | -- | -- | -- | 0.08 | -- | -0.24 |

Notes:  Unless otherwise indicated, the figures refer to 1976 and 1993.  The employment-to-population ratios and unemployment rates refer to youths ages 15 to 24 (14-24 in Italy and 16-24 in the U.S., the U.K., Sweden, and Norway).  Footnotes denote data limitations as follows:

1.  Data refer to 1983.
2.  Data refer to 1977.
3.  Data refer to 1986.

Table 3

**Estimates of the Standard Minimum Wage Model Using International Data**

| Variable | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | *Panel A: Youths (15-24)* | | | | | |
| Minimum wage ratio | -.43 | -.48 | -.15 | .13 | -.01 | -.22 |
| | (.07) | (.07) | (.06) | (.08) | (.08) | (.08) |
| Adult unemployment rate | -1.76 | -1.49 | -1.32 | -1.56 | -1.34 | -1.49 |
| | (.20) | (.24) | (.17) | (.10) | (.12) | (.11) |
| Relative cohort size | .42 | .14 | .49 | .16 | -.10 | -.01 |
| | (.13) | (.17) | (.08) | (.06) | (.07) | (.10) |
| $R^2$ | .28 | .32 | .92 | .61 | .68 | .85 |
| Minimum wage elasticity | -.35 | -.39 | -.12 | .11 | -.01 | -.18 |
| | *Panel B: Teenagers (15-19)* | | | | | |
| Minimum wage ratio | -.38 | -.44 | -.02 | .38 | .11 | -.11 |
| | (.09) | (.09) | (.09) | (.10) | (.10) | (.10) |
| Adult unemployment rate | -1.28 | -.93 | -1.22 | -1.46 | -1.07 | -1.48 |
| | (.27) | (.32) | (.24) | (.13) | (.15) | (.14) |
| Relative cohort size | .66 | .34 | .50 | .06 | -.29 | -.07 |
| | (.18) | (.23) | (.11) | (.07) | (.08) | (.13) |
| $R^2$ | .14 | .17 | .89 | .54 | .64 | .83 |
| Minimum wage elasticity | -.47 | -.55 | -.03 | .47 | .14 | -.14 |
| | *Controls (both samples)* | | | | | |
| Country effects | N | N | N | Y | Y | Y |
| Year effects | N | Y | N | N | Y | N |
| Time trends | N | N | Y | N | N | Y |

Notes: The dependent variable is the employment-to-population ratio for the age group indicated. Standard errors are shown in parentheses. The sample period is from 1975 to 1997, except for the following countries: Germany (1975-1994), Italy (1976-1991), Sweden (1975-1992), U.K. (1984-1992), New Zealand (1986-1997), Belgium (1983-1997), Luxembourg (1983-1996), Greece (1983-1997), and Denmark (1983-1994). The sample includes all of the countries listed in Table 1 except Australia, Norway, Finland, and Ireland.

Table 4

**Estimates of the Standard Model with Lags**

|  | Youths | | | Teenagers | | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *Lags on minimum wage variable:* | | | | | | |
| Contemporaneous MW ratio | -.54 | -.16 | -.28 | -.75 | -.15 | -.14 |
|  | (.42) | (.15) | (.11) | (.57) | (.22) | (.13) |
| Lagged MW ratio | .12 | .05 | .06 | .37 | .17 | .00 |
|  | (.41) | (.15) | (.10) | (.56) | (.21) | (.13) |
| Total minimum wage effect | -.42 | -.11 | -.22 | -.38 | .02 | -.14 |
|  | (.07) | (.06) | (.09) | (.09) | (.07) | (.11) |
| *Lags on all variables:* | | | | | | |
| Contemporaneous MW ratio | -.86 | -.29 | -.20 | -1.31 | -.36 | -.09 |
|  | (.49) | (.18) | (.11) | (.68) | (.25) | (.14) |
| Lagged MW ratio | .51 | .24 | .04 | .99 | .43 | -.01 |
|  | (.49) | (.18) | (.10) | (.67) | (.25) | (.13) |
| Total minimum wage effect | -.36 | -.05 | -.16 | -.32 | .07 | -.10 |
|  | (.07) | (.06) | (.09) | (.09) | (.10) | (.11) |
| Country effects | N | N | Y | N | N | Y |
| Time trends | N | Y | Y | N | Y | Y |

Notes: The dependent variable is the employment-to-population ratio for the age group indicated. Standard errors are shown in parentheses. The sample period is from 1976 to 1997, except for the following countries: Germany (1976-1994), Italy (1977-1991), Sweden (1976-1992), U.K. (1985-1992), New Zealand (1987-1997), Belgium (1984-1997), Luxembourg (1984-1996), Greece (1984-1997), and Denmark (1984-1994). The sample includes all of the countries listed in Table 1 except Australia, Norway, Finland, and Ireland. In the top panel, the specification includes one lag of the minimum wage ratio. In the bottom panel, the specification includes one lag of the following variables: the minimum wage ratio, the adult unemployment rate, and relative cohort size.

Table 5

**Differences in Minimum Wage Effects by Other Characteristics of Minimum Wage Systems**

| Variable | Youths | | | Teenagers | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Minimum wage ratio | -.39 | -.38 | -.13 | -.22 | .21 | -.19 |
| | (.20) | (.20) | (.19) | (.30) | (.29) | (.24) |
| *Dummy variables:* | | | | | | |
| Bargained minimum | .57 | .45 | | .52 | .33 | |
| | (.11) | (.11) | | (.16) | (.15) | |
| Subnational minimum rates | -.14 | -.12 | | -.01 | .18 | |
| | (.14) | (.13) | | (.22) | (.19) | |
| Youth subminimum | -.19 | -.14 | | -.04 | .29 | |
| | (.11) | (.12) | | (.16) | (.18) | |
| *Interaction with minimum wage:* | | | | | | |
| Bargained minimum | -1.13 | -.69 | .31 | -1.02 | -.53 | -.27 |
| | (.20) | (.17) | (.26) | (.31) | (.25) | (.32) |
| Subnational minimum rates | .65 | .27 | -.53 | .51 | -.10 | -.43 |
| | (.27) | (.21) | (.21) | (.40) | (.31) | (.27) |
| Youth subminimum | .55 | .44 | .72 | .34 | -.16 | 1.38 |
| | (.19) | (.20) | (.23) | (.28) | (.29) | (.29) |
| Country effects | N | N | Y | N | N | Y |
| Time trends | N | Y | Y | N | Y | Y |
| $R^2$ | .72 | .95 | .87 | .58 | .92 | .86 |

Notes: The dependent variable is the employment-to-population ratio for the age group indicated. Standard errors are shown in parentheses. The sample period is from 1976 to 1997, except for the following countries: Germany (1976-1994), Italy (1977-1991), Sweden (1976-1992), U.K. (1984-1992), New Zealand (1987-1997), Belgium (1984-1997), Luxembourg (1984-1996), Greece (1984-1997), and Denmark (1984-1994). The sample includes all of the countries listed in Table 1 except Australia, Norway, Finland, and Ireland.

Table 6

**Minimum Wage Levels and Other Labor Market Policies and Institutions**

| Country | Ratio of Minimum Wage to Average Wage | | Other Labor Market Policies and Institutions | | |
| --- | --- | --- | --- | --- | --- |
| | 1976 | 1993 | Labor Standards | Employment Protection | Active Policies |
| Italy (1991) | 0.78 | 0.71 | 5 | 14.25 | 0.93 |
| Norway (1994) | -- | 0.64 | 5 | 9.75 | 1.35 |
| France | 0.59 | 0.59 | 4 | 9.50 | 1.17 |
| Germany | 0.60 | 0.58 | 5 | 12.00 | 1.33 |
| Denmark | 0.59 | 0.57 | 2 | 3.25 | 2.32 |
| Ireland | -- | 0.55 | 4 | 2.75 | 1.48 |
| Greece | 0.69 | 0.55 | 6 | 11.00 | 0.36 |
| Belgium | 0.58 | 0.53 | 3 | 10.50 | 1.39 |
| Finland | -- | 0.52 | 4 | 10.50 | 1.55 |
| Luxembourg | 0.45 | 0.52 | -- | -- | 0.26 |
| Sweden | 0.52 | 0.52 | 6 | 8.50 | 3.00 |
| Australia (1997) | -- | 0.52 | 3 | 3.26 | 0.73 |
| Netherlands | 0.66 | 0.51 | 4 | 7.25 | 1.06 |
| Portugal | 0.61 | 0.47 | 3 | 12.50 | 0.73 |
| New Zealand | 0.58 | 0.45 | 3 | 0.72 | 0.69 |
| Canada | 0.50 | 0.40 | 1 | 1.65 | 0.56 |
| United Kingdom | 0.43 | 0.40 | 0 | 2.25 | 0.53 |
| Japan | 0.37 | 0.38 | 1 | 3.71 | 0.11 |
| United States | 0.47 | 0.37 | 0 | 0.36 | 0.20 |
| Spain | 0.49 | 0.34 | 5 | 11.25 | 0.72 |
| Correlation with minimum wage | -- | -- | 0.60 | 0.52 | 0.47 |

Notes: Minimum wage ratios are from the OECD minimum wage database and Dolado, et al. (1996). The labor standards index, which refers to 1993 standards, is taken from OECD (1994) and excludes the contribution of minimum wages to the index. The employment protection index is taken from OECD (1996) and refers to legislation as of 1989. The active labor market policies index is taken from OECD (1996) and is measured as public expenditures on public employment services, labor market training, and subsidized employment measures in fiscal year 1995 as a percent of GDP.

Table 7

**Differences in Minimum Wage Effects by Other Labor Market Policies and Institutions**

| Variable | Youths | | | | | Teenagers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Minimum wage ratio | -.28 | -.36 | -.34 | -.32 | -.04 | -.19 | -.30 | -.29 | -.24 | .03 |
| | (.07) | (.07) | (.08) | (.07) | (.09) | (.10) | (.11) | (.12) | (.11) | (.12) |
| *Coefficient on:* | | | | | | | | | | |
| Labor standards index | -.03 | -.06 | -.07 | .19 | | -.03 | -.06 | -.01 | .51 | |
| | (.01) | (.01) | (.06) | (.08) | | (.01) | (.01) | (.09) | (.12) | |
| Employment protection index (coefficient x 10) | -.04 | .20 | -.06 | -.60 | | -.07 | .26 | -.34 | -1.8 | |
| | (.02) | (.04) | (.18) | (.29) | | (.04) | (.06) | (.26) | (.44) | |
| Active labor market policies | .10 | .14 | -.06 | .08 | | .11 | .13 | .01 | -.06 | |
| | (.01) | (.01) | (.07) | (.10) | | (.01) | (.02) | (.11) | (.15) | |
| *Interaction with:* | | | | | | | | | | |
| Labor standards index | -- | -- | .10 | -.40 | -.29 | -- | -- | -.03 | -.89 | -.28 |
| | | | (.11) | (.12) | (.14) | | | (.16) | (.19) | (.18) |
| Employment protection index | -- | -- | .01 | .12 | .16 | -- | -- | .05 | .29 | .15 |
| | | | (.03) | (.04) | (.05) | | | (.05) | (.06) | (.06) |
| Active labor market policies | -- | -- | .34 | .02 | .46 | -- | -- | .21 | .15 | .46 |
| | | | (.14) | (.15) | (.19) | | | (.21) | (.23) | (.24) |
| Country effects | N | N | N | N | Y | N | N | N | N | Y |
| Time trends | N | Y | N | Y | Y | N | Y | N | Y | Y |
| $R^2$ | .63 | .95 | .64 | .95 | .87 | .45 | .91 | .46 | .92 | .84 |

Notes:  The dependent variable is the employment-to-population ratio for the age group indicated.  Standard errors are shown in parentheses.  The sample period is from 1975 to 1997, except for the following countries: Germany (1975-1994), Italy (1976-1991), Sweden (1975-1992), U.K. (1984-1992), New Zealand (1986-1997), Belgium (1983-1997), Greece (1983-1997), and Denmark (1983-1994).  The sample includes all of the countries listed in Table 1 except Australia, Norway, Finland, Ireland, and Luxembourg.

Table 8

**Implied Minimum Wage Effects from Interactions with**

**Labor Market Policies and Institutions Indexes**

(Based on specifications in Table 7)

| Country | Youths | | Teenagers | |
|---|---|---|---|---|
| | (4) | (5) | (9) | (10) |
| Italy | -.24 | .49 | .18 | .51 |
| | (.12) | (.19) | (.18) | (.25) |
| France | -.39 | .12 | -.29 | .18 |
| | (.08) | (.11) | (.12) | (.14) |
| Germany | -.49 | .31 | -.42 | .36 |
| | (.10) | (.15) | (.15) | (.19) |
| Denmark | -.28 | .22 | -.19 | .32 |
| | (.23) | (.25) | (.35) | (.33) |
| Greece | -1.03 | -.58 | -1.74 | -.52 |
| | (.27) | (.40) | (.42) | (.51) |
| Belgium | .13 | .67 | .92 | .71 |
| | (.23) | (.24) | (.35) | (.31) |
| Sweden | -1.26 | .23 | -2.08 | .32 |
| | (.23) | (.20) | (.35) | (.26) |
| Netherlands | -.65 | -.29 | -.97 | -.21 |
| | (.11) | (.15) | (.16) | (.20) |
| Portugal | .35 | .69 | 1.41 | .71 |
| | (.24) | (.25) | (.36) | (.33) |
| New Zealand | -.97 | -.47 | -1.81 | -.34 |
| | (.20) | (.20) | (.30) | (.26) |
| Canada | -.11 | -.56 | -.03 | -.46 |
| | (.12) | (.10) | (.18) | (.12) |
| United Kingdom | .36 | -.19 | 1.02 | -.10 |
| | (.19) | (.18) | (.29) | (.23) |
| Japan | .12 | -.44 | .51 | -.35 |
| | (.13) | (.11) | (.20) | (.14) |
| United States | .13 | -.65 | .42 | -.54 |
| | (.15) | (.11) | (.23) | (.15) |
| Spain | -.60 | -.09 | -.73 | -.04 |
| | (.11) | (.21) | (.17) | (.27) |

Notes: Implied minimum wage effects are calculated as the coefficient on the minimum wage variable in the indicated specification in Table 7, plus each of the coefficients on the interaction terms multiplied by the value of the policy/institution variable (less its mean) for each country. Standard errors are shown in parentheses.

Table 9

**Sensitivity of Minimum Wage Coefficient Estimates to Exclusion of Influential Countries**

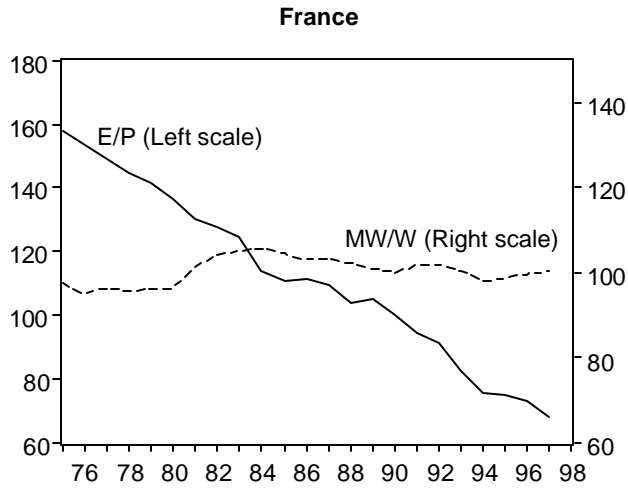|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| *Panel A: Young Adults (15-24)* | | | | | | |
| Baseline results (from Table 3) | -.43 | -.48 | -.15 | .13 | -.01 | -.22 |
|  | (.07) | (.07) | (.06) | (.08) | (.08) | (.08) |
| *Excluding:* | | | | | | |
| Portugal and Spain | -.56 | -.63 | -.33 | -.41 | -.44 | -.34 |
|  | (.07) | (.08) | (.06) | (.08) | (.08) | (.08) |
| Canada | -.36 | -.42 | -.15 | .19 | .05 | .06 |
|  | (.07) | (.07) | (.07) | (.08) | (.09) | (.09) |
| Canada, Portugal, and Spain | -.50 | -.58 | -.33 | -.40 | -.48 | -.10 |
|  | (.09) | (.09) | (.06) | (.09) | (.09) | (.10) |
| *Panel B: Teenagers (15-19)* | | | | | | |
| Baseline results (from Table 3) | -.38 | -.44 | -.02 | .38 | .11 | -.11 |
|  | (.09) | (.09) | (.09) | (.10) | (.10) | (.10) |
| *Excluding:* | | | | | | |
| Portugal and Spain | -.53 | -.62 | -.25 | -.29 | -.42 | -.29 |
|  | (.10) | (.11) | (.08) | (.11) | (.10) | (.10) |
| Canada | -.30 | -.36 | .03 | .48 | .21 | .23 |
|  | (.10) | (.10) | (.10) | (.10) | (.11) | (.12) |
| Canada, Portugal, and Spain | -.45 | -.54 | -.20 | -.25 | -.41 | .02 |
|  | (.12) | (.13) | (.09) | (.12) | (.12) | (.12) |
| Country effects | N | N | N | Y | Y | Y |
| Year effects | N | Y | N | N | Y | N |
| Time trends | N | N | Y | N | N | Y |

Notes: The dependent variable is the employment-to-population ratio for the age group indicated. Standard errors are shown in parentheses. The sample period is from 1975 to 1997, except for the following countries: Germany (1975-1994), Italy (1976-1991), Sweden (1975-1992), U.K. (1984-1992), New Zealand (1986-1997), Belgium (1983-1997), Luxembourg (1983-1996), Greece (1983-1997), and Denmark (1983-1994). Except where explicitly indicated, the sample includes all of the countries listed in Table 1 except Australia, Norway, Finland, and Ireland.
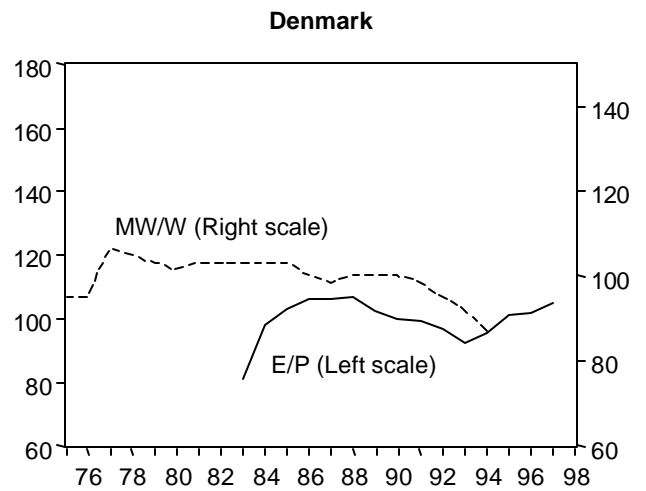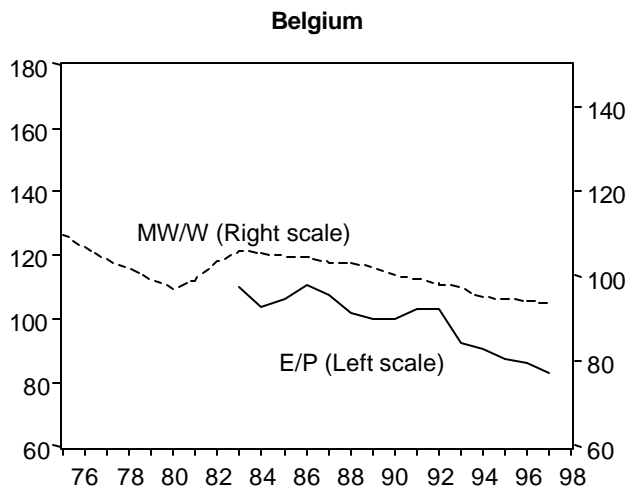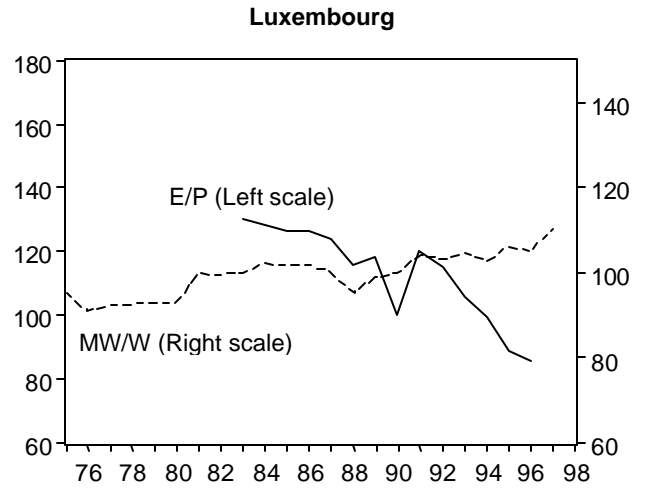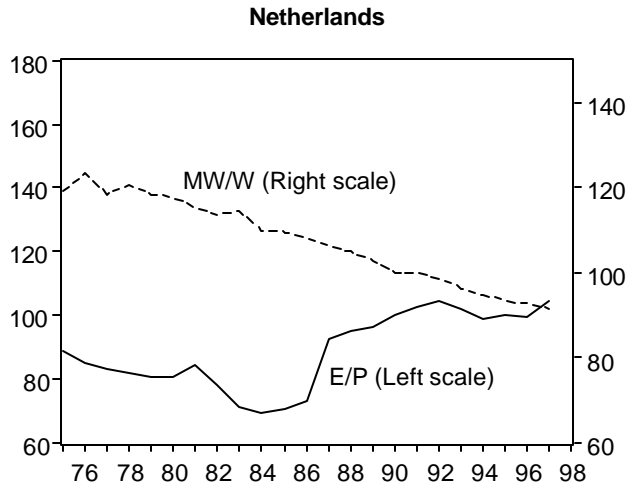
# Figure 1a: Minimum Wages and Youth Employment Rates
## 1990=100

**United States**
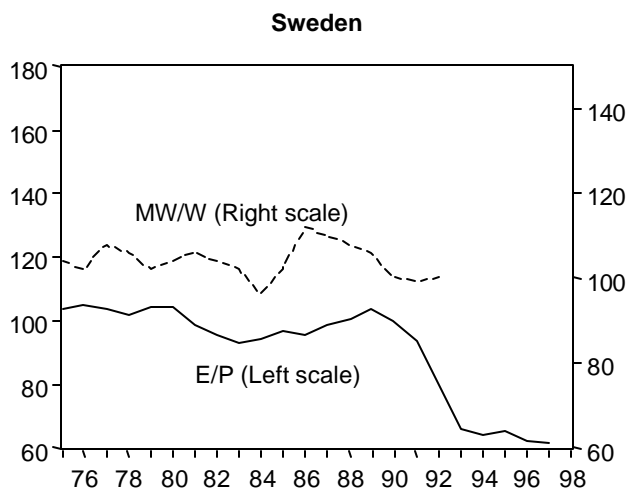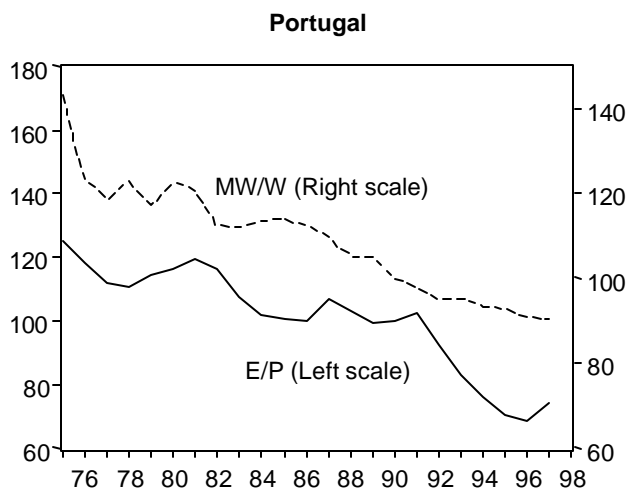


**Japan**



**Canada**



**New Zealand**
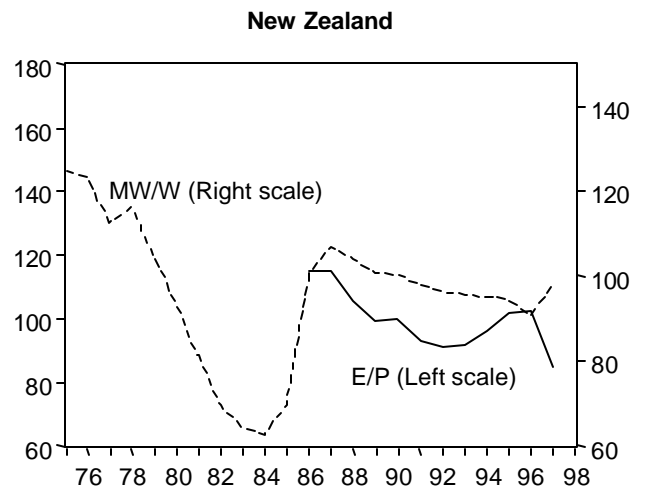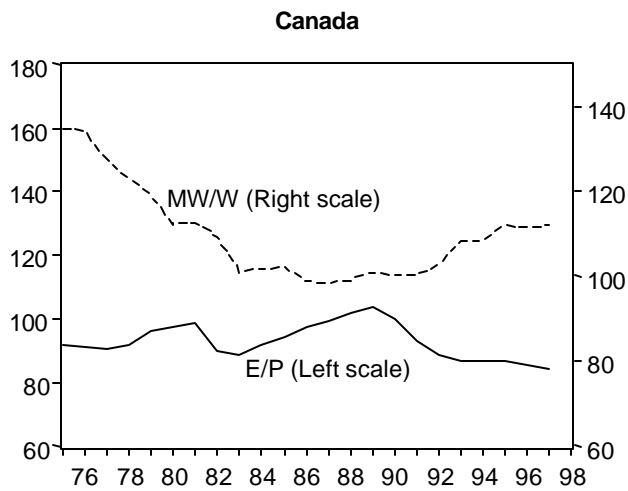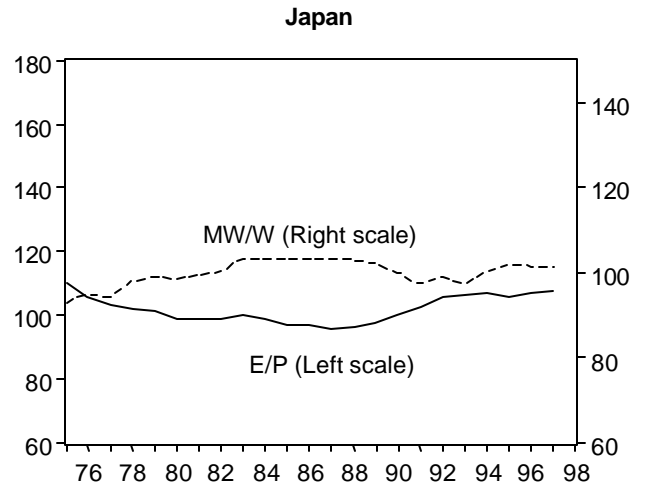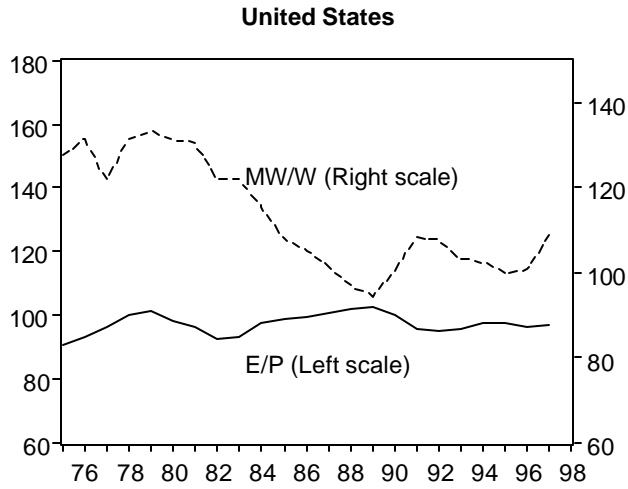
# Figure 1b: Minimum Wages and Youth Employment Rates
## 1990=100

**France**



**Italy**



**Germany**



**United Kingdom**
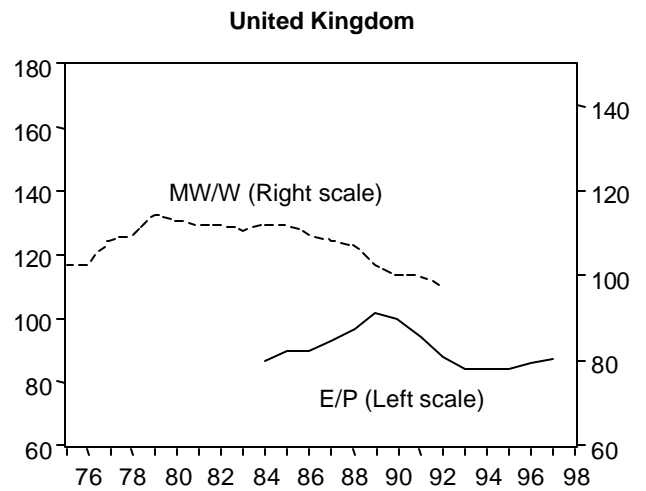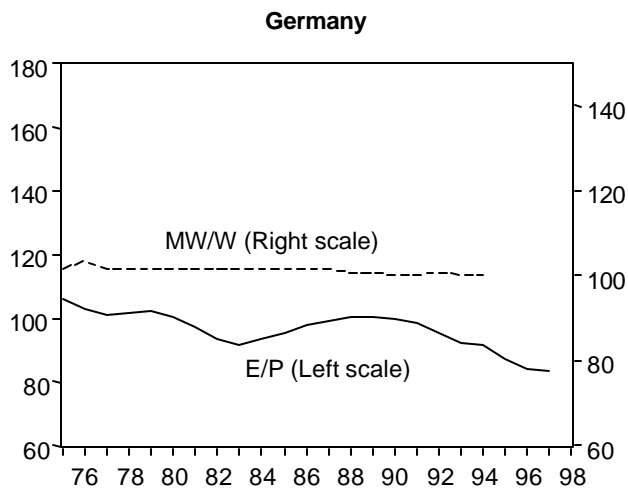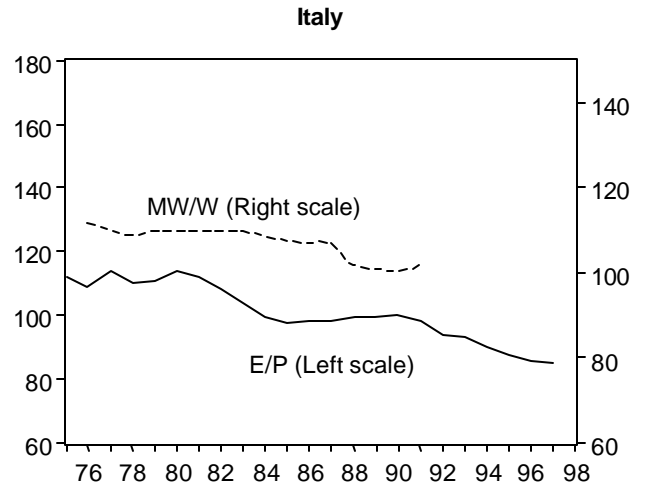
# Figure 1c: Minimum Wages and Youth Employment Rates 1990=100

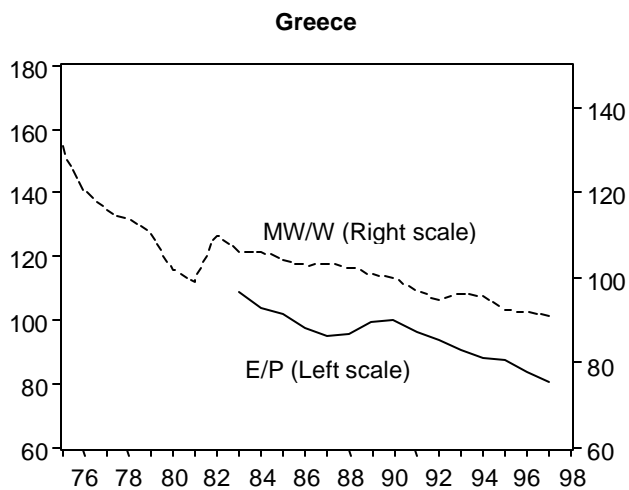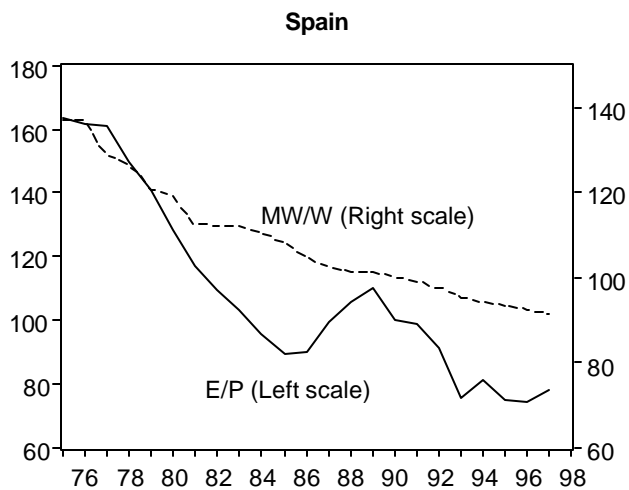**Netherlands**



**Luxembourg**



**Belgium**



**Denmark**

# Figure 1d: Minimum Wages and Youth Employment Rates
## 1990=100

**Spain**



MW/W (Right scale)

E/P (Left scale)

**Greece**



MW/W (Right scale)

E/P (Left scale)

**Portugal**



MW/W (Right scale)

E/P (Left scale)

**Sweden**



MW/W (Right scale)

E/P (Left scale)

# Figure 2a: Minimum Wages and Youth Employment Rates

*Differences from Country Means, excluding Cyclical Effects*



**United States**

**Japan**

**Canada**

**New Zealand**
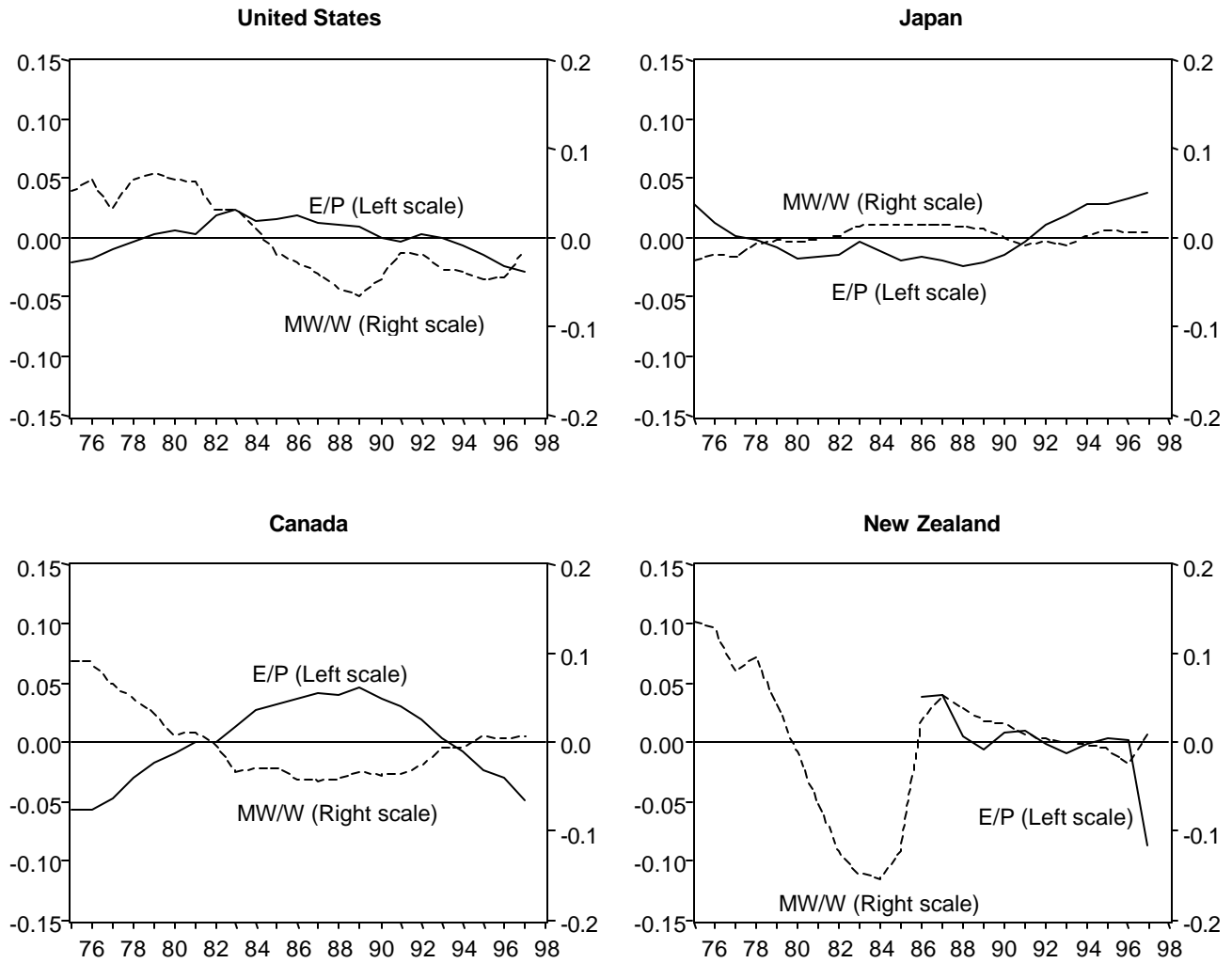
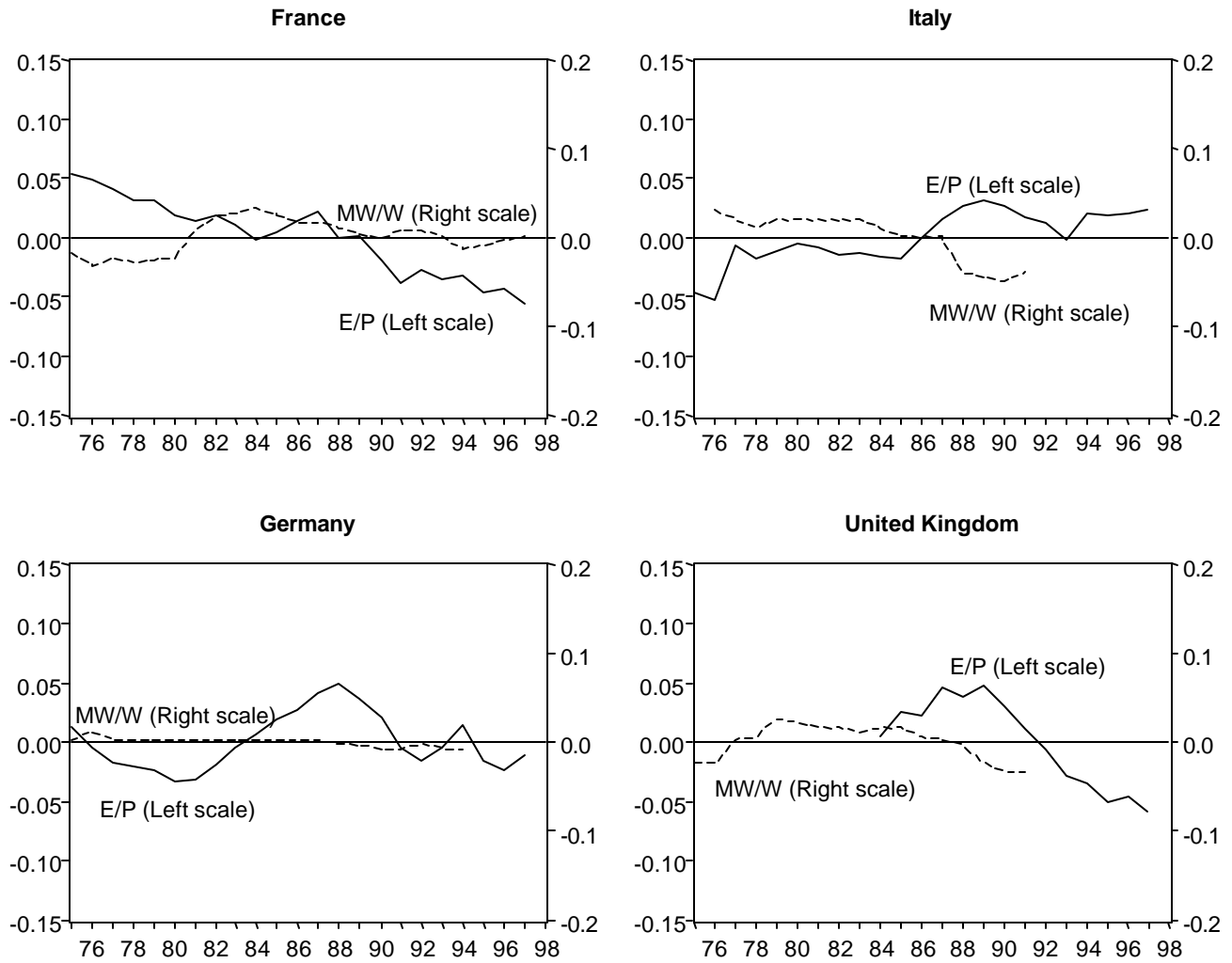# Figure 2b: Minimum Wages and Youth Employment Rates

*Differences from Country Means, excluding Cyclical Effects*

**France**



**Italy**



**Germany**



**United Kingdom**

# Figure 2c: Minimum Wages and Youth Employment Rates

*Differences from Country Means, excluding Cyclical Effects*



**Netherlands**

E/P (Left scale)

MW/W (Right scale)

**Luxembourg**

E/P (Left scale)

MW/W (Right scale)

**Belgium**

E/P (Left scale)

MW/W (Right scale)

**Denmark**

E/P (Left scale)

MW/W (Right scale)
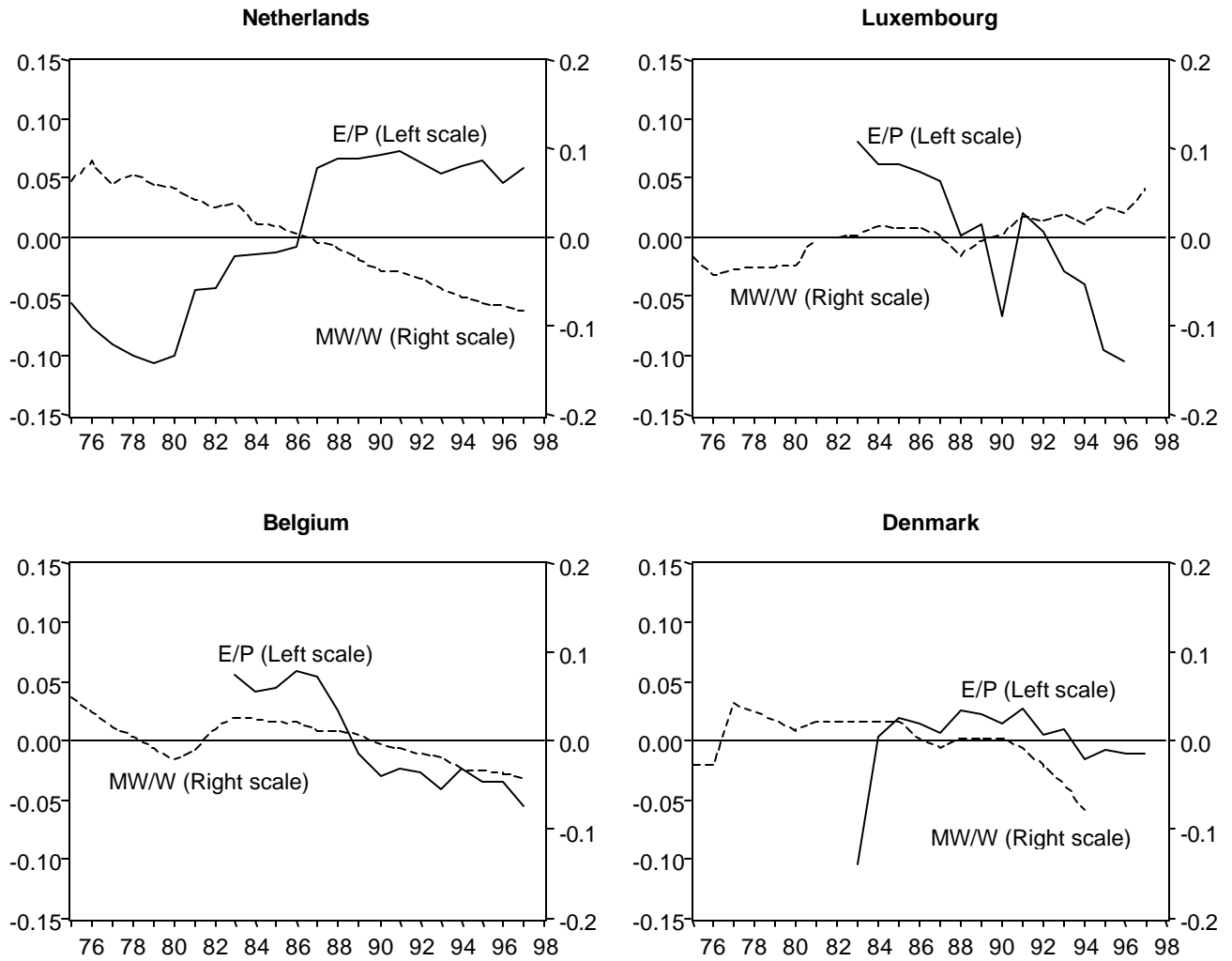
# Figure 2d: Minimum Wages and Youth Employment Rates

*Differences from Country Means, excluding Cyclical Effects*



**Spain**

E/P (Left scale)

MW/W (Right scale)

**Greece**

E/P (Left scale)

MW/W (Right scale)

**Portugal**

E/P (Left scale)

MW/W (Right scale)

**Sweden**

E/P (Left scale)

MW/W (Right scale)