CENTRE FOR ECONOMIC PERFORMANCE

DISCUSSION PAPER NO. 276

February 1996

WOULD CUTTING PAYROLL TAXES ON THE UNSKILLED HAVE A SIGNIFICANT IMPACT ON UNEMPLOYMENT?

STEPHEN NICKELL and BRIAN BELL

ABSTRACT

This paper states two recommendations from an OECD Report: (1) "Reduce non-wage labour costs, especially in Europe, by reducing taxes on labour ..."; (2) "Reduce direct taxes (social security and income taxes) on those with low earnings ...". After looking at the first recommendation we conclude that any attempt to generate a significant reduction in the unemployment rate by cutting across-the-board tax rates on employment is likely to fail. We then turn to the second recommendation and give three arguments as to why it may be a good idea. The remainder of the paper investigates the arguments. We look at why the unemployment rate of the unskilled might be higher than that of the skilled, and how we might expect their relative unemployment rates to respond both to relative demand shocks and to more neutral shocks. We then examine the facts - what has happened to relative unemployment (and non-employment) rates, and wage rates throughout the OECD. Finally, we discuss the implications of these facts for the proposed policy measures.

This paper was produced as part of the Centre's
Programme on Corporate Performance

WOULD CUTTING PAYROLL TAXES ON THE UNSKILLED HAVE A SIGNIFICANT IMPACT ON UNEMPLOYMENT?

Stephen Nickell and Brian Bell

FEBRUARY 1996

Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

ISBN 0 7530 0320 1

WOULD CUTTING PAYROLL TAXES ON THE UNSKILLED HAVE A SIGNIFICANT IMPACT ON UNEMPLOYMENT?

Stephen Nickell and Brian Bell

The Centre for Economic Performance is financed by the Economic and Social Research Council.

ACKNOWLEDGEMENTS

This paper was prepared for the CEPR/Consorcio Zona Franca de Vigo Conference on `Unemployment Policy' in Vigo, Spain on 24/27 September, 1994. We are extremely grateful to Erik Brouwer, Juan Dolado, Bertil Holmlund, John Martin, Barbara Petrongolo, Toshiaki Tachibanaki, Jan van Ours, Jane Roberts and Giles Hancock (Statistics New Zealand) for help with the data and to Bob Gordon, Olivier Blanchard, Edmond Malinvaud, Derek Morris, Denis Snower, Richard Layard and Patrick Minford for helpful comments. We must also thank Andrew Glyn, Richard Freeman and particularly Adrian Wood for stimulating our interest in this area. Indeed, this paper can be viewed as an appendix to Wood's brilliant book, *North-South Trade, Employment and Inequality* (Wood, 1994). Finally, we are grateful to the ESRC Data Archive for use of the General Household Survey. Material from the General Household Survey made available through the ESRC Data Archive has been used by permission of the Controller of H.M. Stationary Office.

WOULD CUTTING PAYROLL TAXES ON THE UNSKILLED HAVE A SIGNIFICANT IMPACT ON UNEMPLOYMENT?

Stephen Nickell and Brian Bell

Introduction

> "Reduce non-wage labour costs, especially in Europe, by reducing taxes on labour ...".

So says an OECD Jobs Study as one of its policy recommendations for the reduction of unemployment.[1] As a further recommendation, it adds

> "Reduce direct taxes (social security and income taxes) on those with low earnings ...".

The idea here is to boost the relative demand for low skill workers.

The first recommendation is one which is often made. Indeed commentators point to the very high level of social security contributions faced by employers in many European countries (over 40 per cent in Belgium, France and Italy, for example) as being crucial to the allegedly poor state of the European labour market, including its high unemployment. However, a glance at Denmark - where employers pay **no** social security contributions, non-wage labour costs are **negligible** and unemployment is around the EU average - quickly reveals the weakness of this view. Figure 1 shows why. Here we see average unit labour costs (i.e. labour costs incurred in producing $10 of value-added) in 13 OECD countries where we have split these into wage costs and payroll taxes. The figure shows clearly that there is no significant relationship between unit labour costs and payroll tax rates, the slope of a regression of the former on the latter being a mere 14 cents for every 10 percentage points of tax, with a t statistic of 0.5. The reason is that, in the long run, payroll taxes tend to be shifted onto employees.

In fact, not only do non-wage labour costs tend to be borne by employees but so do income taxes and excise taxes. So shifting the tax burden from one

type of tax to another is not going to have much impact on employment in the long run as the cross-section evidence[2] reported in OECD (1990, annex 6A) indicates. The only possible significant effect arises from the fact that income taxes and excise taxes tend to fall on non-labour income as well as labour income whereas payroll taxes fall only on the latter. So a shift from one tax to another will change the ratio of post-tax non-labour income to post-tax labour income, thereby changing work incentives and hence unemployment. This effect is likely to be small because the typical unemployed person has very little non-labour income aside from benefits. Thus, for example, in 1987 over 50 per cent of entrants to unemployment in Britain had no savings and only 15 per cent had savings of over £1000. Furthermore, switching from payroll taxes to income taxes, say, is a very complicated way of changing the effective tax rate on non-labour income, given that it can be adjusted independently without any difficulty.

To summarise, any attempt to generate a significant reduction in the unemployment rate by cutting across-the-board tax rates on employment is likely to fail. There may be some short-run real wage resistance effects and some effects because benefits are subject to income taxes but not payroll taxes. But the former will not last and the latter will be small. So let us turn to the second recommendation quoted at the outset, namely to focus tax reductions (or subsidies) on those with low earnings - basically the unskilled.

Why might this be a good idea? The following arguments have been proposed. First, because the unskilled have much higher unemployment rates than the skilled.[3] Second, because the relative situation of the unskilled is getting worse, either on account of technological change (e.g. Machin, 1994 or Berman *et al.*, 1994) or because of competition from the 3rd World (e.g. Wood, 1994) or both. Third, because the falling relative demand for the unskilled is an important part of the reason for the dramatic rise in unemployment in the OECD over the last twenty years, particularly in Europe.

According to the first two arguments, any increase in the relative demand for unskilled labour which can be induced by selective tax cuts would certainly improve the lot of the unskilled and reduce their high levels of unemployment. According to the third argument, it might do more by having a significant impact on overall levels

of unemployment.

Our intention in the remainder of this paper is to investigate these arguments. In the next section we look briefly at why the unemployment rate of the unskilled might be higher than that of the skilled, and how we might expect their relative unemployment rates to respond both to relative demand shocks and to more neutral shocks. In section 2, we examine the facts - namely what has happened to relative unemployment (and non-employment) rates, and wage rates throughout the OECD. Then, in the final section we discuss the implications of these facts for the proposed policy measures.

1. The Determinants of Unemployment Rates by Skill

Why might the unskilled have higher rates of unemployment? There are a number of straightforward reasons. First, there is the obvious fact that the skilled can do many of the unskilled jobs and during recessions firms can make use of this fact to `hoard' skilled workers for the usual reasons. The second related reason is that the unskilled have higher turnover rates because their lack of human capital, particularly of the specific type, much weakens their attachment to firms. As a consequence they have much higher entry rates into unemployment. Third, their low wages ensure that their unemployment benefit replacement rates tend to be higher than for skilled workers, reducing their incentives to work. Finally, any tendency for there to be a floor on wages will raise the unemployment of the unskilled relative to the skilled both by reducing the relative demand for the unskilled and by raising the relative supply since the incentive to acquire skills is reduced. Such floors on wages may arise because of minimum wage laws, the activities of unions, the ready availability of a given level of benefits or simply because some employers may find it distasteful or indeed unprofitable to pay very poor wages.

A Simple Model of Sectoral Unemployment

To illustrate one or two further points let us provide a simple model which follows that set out in Layard *et al.* (1991, pp.301-306). Suppose output (Y) is produced by a CES production function of the form

$$Y^{\rho} = \Phi \sum \alpha_i N_i^{\rho} \qquad (\rho \leq 1, \sum \alpha_i = 1) \tag{1}$$

where $1-\rho = 1/\sigma$, σ being the elasticity of substitution. N_i is the ith type of labour and the α_i parameters reflect productivity. Assuming competition in the product market, labour demand is given by

$$W_i = \alpha_i \phi (N_i / Y)^{-1/\sigma} = \alpha_i ((1-u_i) L_i / L)^{1/\sigma} X \qquad (i = 1...n) \tag{2}$$

where W_i is the real wage, L_i is the labour force in the ith sector, L is the total labour force, u_i is the unemployment rate among type i workers and $X = \phi (Y/L)^{1/\sigma}$, an aggregate productivity factor.

Suppose wages in each sector are determined by a standard wage equation of the form

$$W_i = \gamma_i f(u_i) X \qquad (f' < 0) \tag{3}$$

which may contain elements of labour supply, efficiency wages or union bargaining.

These equations immediately reveal the short-run level of unemployment for each group of workers (i.e. for L_i/L given). Eliminating W_i yields

$$u_i = g(\underset{+}{\gamma_i/\alpha_i}, \underset{+}{L_i/L}) \tag{4}$$

so unemployment is increasing in wage pressure γ_i, relative to productivity, α_i, and in the relative size of the group. Wages are given by

$$W_i = \omega(\underset{+}{\alpha_i}, \underset{+}{\gamma_i}, \underset{-}{L_i/L}, \underset{+}{X}) \; . \tag{5}$$

This short-run equilibrium is illustrated in Figure 2.

In the longer run, the size of each group (L_i/L) is not given because migration occurs. Such migration will tend to equalise expected rewards in each sector,

$W_i(1-u_i)$, relative to the (flow) cost of belonging to the sector, $(1+c_i)$, say. So groups in which $W_i(1-u_i)/(1+c_i)$ is low will experience outmigration and vice-versa.

The Impact of Relative and Neutral Shocks

Consider first, the impact of a rise in the relative demand for skilled workers. Suppose, in the context of the model, there are two types of workers with equation (1) having α_s, α_u as the productivity coefficients of skilled and unskilled workers respectively. Then we want to know the consequences of a rise in α_s and a fall in α_u. In the short-run, it is immediately clear that skilled unemployment will fall and wages will rise. The opposite will happen to the unskilled. In the longer run, however, the unskilled may respond to the additional incentive to acquire the training necessary to become skilled (the rise in u_u/u_s and the fall in W_u/W_s). As a consequence both relative wages and relative unemployment rates will start to move back towards their original positions. However, given all the practical constraints which operate in this process of adjustment, it is likely to take a very long time.

Now let us consider the consequences of a neutral shock. Although there is no explicit role for aggregate demand shocks in this model, such shocks are equivalent to equiproportional changes in the wage equation parameters γ_i. Note that we can introduce nominal inertia in the wage equation by temporarily fixing the nominal wage and letting the output price change, thereby generating equiproportional shifts in W_i. Of course, neutral wage shocks are also captured by equiproportional shifts in γ_i. So in response to these shocks, we find from (3) that

$$\frac{W_u}{W_s}\,\frac{f(u_s)}{f(u_u)} = \frac{\gamma_u}{\gamma_s} = \text{constant} \qquad (6)$$

and keeping the shares L_i/L $(i = u,s)$ constant, we can use (2) to eliminate W_u/W_s and obtain

$$\frac{(1-u_s)^{1/\sigma}f(u_s)}{(1-u_u)^{1/\sigma}f(u_u)} = \frac{\alpha_s}{\alpha_u}\,\frac{\gamma_u}{\gamma_s}\,\frac{(L_u/L)^{1/\sigma}}{(L_s/L)^{1/\sigma}} = \text{constant}$$

This implies that the elasticity of unskilled unemployment with respect to skilled unemployment in response to a neutral shock is given by

$$\frac{\partial \log u_u}{\partial \log u_s} = \frac{\eta(u_s) + u_s/\sigma(1-u_s)}{\eta(u_u) + u_u/\sigma(1-u_u)} \tag{7}$$

where η is the absolute elasticity of f with respect to u (i.e. $\eta(u) = -uf'(u)/f(u)$). In order to obtain some idea of the order of magnitude of this number, note first that we now have a considerable body of evidence that the best fitting wage equation corresponding to (3) has the constant elasticity (double log) form. (See, for example, Oswald, 1986; Nickell, 1987 and Blanchflower and Oswald 1994a, 1994b). Unfortunately, none of these papers provide us with estimates of the elasticity of skilled (unskilled) wages with respect to skilled (unskilled) unemployment. However, by making use of the British General Household Survey for the years 1978-1992, we were able to compute these elasticities for these two groups and we obtained 0.062 for the skilled (those with qualifications) and 0.054 for the unskilled (those without qualifications).[4] So we suppose that $\eta(u_s) = 0.062$ and $\eta(u_u) = 0.054$. Looking in the next section, sensible average numbers for u_s, u_u are 0.03 and 0.09 respectively and we set the elasticity of substitution between skilled and unskilled labour at $\sigma = 3.0$ (this is the average substitution elasticity between blue and white collar workers in aggregate manufacturing in Table 3.7 of Hamermesh (1993)). The formula above then yields

$$\partial \log u_u/\partial \log u_s = 0.83 \tag{8}$$

This tells us that if we have a neutral adverse shock, we may expect the unskilled unemployment **rate** to rise by around four fifths of the skilled unemployment **rate**.[5] This shift is illustrated in Figure 3. Since the question of how skilled and unskilled unemployment rates move in response to neutral shocks is such a vital one, we pursue this further by looking briefly at the structure of unemployment by skill in practice.

Two facts are particularly relevant. First, it appears that the variation in unemployment rates across skill levels is mainly due to variations in entry rates as opposed to mean durations (see Table 1). Second, the **secular** trends in

unemployment over the last two decades correspond, in most countries, to relatively stable inflow rates and sharply increasing durations. This suggests that neutral shocks, will, in the long run, tend to raise unemployment durations across the board and unemployment rates across skill groups will rise near to equiproportionately.

To summarise, therefore, we can expect changes in the relative demand for skills to shift relative unemployment rates in the short-term and indeed in the longer-term if skill supplies do not adjust. Relative wage rates will tend to shift in the opposite direction and, in so far as there are rigidities which limit relative wage adjustments, the impact on relative unemployment rates will be even bigger. Neutral shocks will tend to move unskilled rates by somewhat less than skilled rates. As a consequence, if falls in the relative demand for skills are important in practice, we should expect to see a rise in the unskilled unemployment rate and a fall in the skilled unemployment rate, with these changes being superimposed on the rises in both rates generated by adverse neutral shocks of the kind described above. So if we see a rise in the unskilled rate which is proportionately **greater** than the rise in the skilled rate, this implies that the relative decline in the demand for unskilled workers has played a significant role. So in the next section we shall look at relative unemployment rates across the OECD to see what has happened.

2. Unemployment and Wages by Skill

Our aim in this section is to try and elicit just how important the decline in the relative demand for the unskilled has been in explaining the increase in OECD unemployment in the last two decades. Recall that we are looking for an increase in the relative unemployment rate of the unskilled and a fall in their relative wages. Furthermore, if this is to have been a significant factor in the overall increase in the unemployment rate, then we must expect most of the increase in unemployment to be concentrated among the unskilled, as Juhn *et al.* (1991) argue has occurred in the United States.

Relative Unemployment Rates

The data on which we focus are the unemployment rates for men in different education groups. We concentrate on men because measured women's unemployment often depends crucially on unemployment benefit and other rules which change from time to time, thereby corrupting intertemporal comparisons. Sometimes we have to replace the education grouping by an occupational breakdown because the former is unavailable. However, the occupational breakdown is less satisfactory because the notion of an occupational unemployment rate is less clear cut. The numerator of such a rate refers to those unemployed whose last job was in relevant occupation group. But these individuals are not restricted to searching for work within this group and may well search in other groups, particularly at a lower level. Consequently, the allocation of unemployed individuals across occupation groups is, to some degree, arbitrary. This problem does not, of course, occur with education groupings.

Our basic unemployment data are presented in Table 2 and Figure 4 with the relevant wage data appearing in Tables 3 and 4. The following broad brush facts emerge clearly. First, for most countries where the data are available, the relative unemployment rate of the low education group has risen from the 1970s to the 1980s. Second, during the recent recession, the relative unemployment rate of the low education group has fallen substantially in the vast majority of countries. Third, only in Britain and the United States have there been dramatic falls in the relative wages of the unskilled during the 1980s although there has been a significant small decline in Germany. In some other countries there have been slight shifts in relative wages over this period and there are no countries where the relative wages of the less educated have risen in this period except the Netherlands. Overall, therefore, there is some evidence that from the 1970s to the 1980s, the fall in the relative demand for unskilled workers has had the expected impact on unemployment rates. However, there seems to be no evidence that the unemployment rate effects are any more severe in countries where the wage effects are minimal or perverse (i.e. where there is apparent wage rigidity).

The Impact of Unskilled Unemployment on the Overall Unemployment Rate

The next step is to see the extent to which overall increases in unemployment are concentrated on the unskilled or low educated. Here we focus on the change from the early (if available) or mid 1970s to the middle or late 1980s. We can divide the countries where the data are available into two groups. In the first group, most of the unemployment increase is concentrated on the unskilled. In the second group, the rise in unemployment has involved a substantial increase in high education unemployment as well as in low education employment. The key results are in Table 5. The first group of countries consist of the United States, Japan, Norway and Sweden and what they have in common is that the total rise in unemployment to be accounted for is small in terms of percentage points (successively 1.4, 1.6, 2.7, 0.6). The second group of countries contains Germany, Netherlands, Spain, UK and Canada. In this group, the total rise in unemployment to be accounted for is more substantial in terms of percentage points (successively 3.7, 7.3, 9.2, 4.6, 3.9) and, in each case, the proportionate rise in high education unemployment is also significant although generally somewhat smaller than the proportionate rise in low education unemployment. So we can conclude that, when looking at the rise in unemployment from the 1970s to the 1980s, there is a group of countries (two non-EU European, two non-European) where the rise in unemployment is small and mostly due to the rise in low skill unemployment. Then there is a larger group of countries (four EU European, one non-European) where there was a substantial increase in unemployment, a considerable part of which appears to consist of increases in unemployment rates across skill groups arising from neutral shocks with a smaller part being due to excess unemployment among the unskilled.

Turning to the subsequent further rise in unemployment in the sharp recession of the early 1990s, in all countries except Japan we see substantial increases in **skilled** unemployment (often relative to unskilled unemployment) suggesting that this latest episode was neutral or even biased towards the higher skill group.

Unemployment versus Non-Employment

It may be that we are getting a false impression by focusing on unemployment rates, because it is possible that the unskilled have been leaving the labour force in

increasing numbers because of their inability to find work. Thus, the hypothesis is that if we look at non-employment rates (i.e. include non-participants who are neither employed nor looking for work and add them to the unemployed job-seekers) we shall find a different picture with bigger increases in the relative non-employment rates of the unskilled from the 1970s to the 1980s.

In Table 6, we present the data for the UK and the US, including unemployment rates for comparison purposes and restricting ourselves to the over 25s to remove problems with changes in higher education. The upshot is plain from the numbers in Table 6. The **pattern** of non-employment rates is very similar to the **pattern** of unemployment rates. In particular, in the UK, we see that the high education non-employment rate more than doubles from the early 70s to the late 80s. Just to check that it is not simply due to an increase in early retirement by those on occupational pensions, we repeat the exercise in Table 7 for the UK under 55s. While the numbers are lower, the pattern remains the same with the percentage of skilled non-employed rising by a factor of over two and a half from the early 70s to the mid to late 80s.

As an aside, it is interesting to ask why we have all these new prime age male non-participants. In fact, the biggest category of increase in both UK and US is in the number of men suffering from illness or disability (see Yellen (1991), Table 1, for the US). In Table 8a, we set out the number of male disability pensioners of working age over the last two decades in the UK, and we see a continuing increase which over the whole 20 year period represents over 4 per cent of the labour force. Furthermore, there is no evidence that the increase has been particularly rapid during recessions, indeed the small boom of the late 70s and the large boom of the late 80s show some of the biggest increases. In Table 8b, we use an alternative data source (GHS) which uses self-reported information and confirms the overall picture. Why there has been this increase is not clear, but one element is, presumably, that it has become easier to obtain invalidity benefit. This, at any event, is the implication of the UK National Audit Office Report in 1989 on the subject.[6]

Returning to our main theme, we may, in summary, conclude that there is no evidence that looking at non-employment as opposed to unemployment has any impact on the conclusions of the previous section.[7] In particular, it remains true that

in those countries where unemployment increased significantly in the 1980s, a substantial part of that increase was due to neutral shocks across skill groups and could not, therefore, be attributed to the fall in the relative demand for unskilled workers. However, it is difficult to say **precisely** how much of the rise can be so attributed but we can try and obtain some rough orders of magnitude.

How Much of the Rise in Unemployment is due to the Fall in Unskilled Demand?

It is clear that in the first group of countries displayed in Table 5, most of the unemployment increase from the 70s to the 80s is due to a fall in the demand for unskilled workers. The second group is more interesting, however, because the overall rise in unemployment is substantial in terms of percentage points. Taking the average over all five countries, we find that over the periods specified in Table 5, the skilled unemployment rate rose from 2.44 to 4.96 per cent (103.3 per cent), the unskilled unemployment rate rose from 5.54 to 14.22 per cent (156.7 per cent) and the total unemployment rate rose from 4.68 to 10.42 per cent (122.6 per cent). In order to allocate these changes between relative demand shifts and neutral shocks, we may first note from equations (1), (2), (3) that a relative demand shift corresponds to $d\alpha_s = - d\alpha_u = d\alpha > 0$ and a neutral shock has the form $d \ln \gamma_s = d \ln \gamma_u = d \ln \gamma > 0$. But we must also take account of the shifts in the supplies of skilled and unskilled workers over the relevant period. So taking differentials of (2), (3) and solving out, we find that the relative demand shift, $d\alpha$, satisfies[8]

$$\frac{\alpha_u \alpha_s}{\alpha_u + \alpha_s} \left[\varphi(u_u) du_u - \varphi(u_s) du_s + \frac{1}{\sigma} d\ln\left(\frac{L_s}{L}\right) - \frac{1}{\sigma} d\ln \right. \qquad (9)$$

where $\varphi(u) = 1/\sigma(1-u) + \eta(u)/u$. Having computed $d\alpha$, we can then work out the unemployment changes which would have come about as a consequence of the relative demand shift alone. Setting $d \ln \gamma_i = 0$ in the differentials of (2) and (3) yields

$$) du_u = \frac{1}{\sigma} d\ln\left(\frac{L_u}{L}\right) + \frac{d\alpha}{\alpha_u}, \varphi(u_s) du_s = \frac{1}{\alpha} d\ln\left(\frac{L_s}{L}\right) - \qquad (10)$$

In order to obtain numerical estimates, we require some parameter values. In Section 1, p. 8, we have already provided estimates of $\eta(u_s) = 0.062$, $\eta(u_u) = 0.054$, $\sigma = 3$. The average values of unemployment given above are $u_s = 0.037$ and $u_u = 0.099$. Our data also reveal that over the relevant period, the average shares of skilled and unskilled are 14.5 per cent and 37.3 per cent respectively. Furthermore, the proportional changes in these shares are 0.65 and -0.66 respectively. Finally, from equation (2), we have that $\alpha_u / \alpha_s = (W_u / W_s)((1-u_u)L_u / (1-u_s)L_s)^{1/\sigma}$. Assuming $W_u / W_s \simeq 0.66$ from Table 3 and using information on unemployment and skill shares, we calculate that $\alpha_u / \alpha_s = 0.8845$. Using (9) and (10) then reveals that the relative demand shock alone raises unskilled unemployment by 2.95 percentage points and reduces skilled unemployment by 0.07 percentage points. Since the unskilled represent 37.3 per cent of the labour force and the skilled represent 14.5 per cent (with the middle group remaining unaffected by the relative demand shift), this reflects an overall unemployment increase which is about 19 per cent of the total increase of 5.74 percentage points. The remaining 81 per cent is, therefore, down to neutral shocks.

To summarise, it seems likely that for the second group of countries in Table 5, somewhere around 10 to 25 per cent of the increase in unemployment from the 1970s to the 1980s could have arisen from the collapse in demand for the unskilled. Since this is obviously a rough and ready guesstimate, in the next section we consider this question for Britain in more detail.

The Impact of the Decline in Demand for Unskilled Workers on Long Run Unemployment in Britain

The main problems with attempting to measure the effect of the collapse in demand for the unskilled on overall unemployment is finding variables which accurately capture changes in the excess demand for labour by skill. In Britain, the Confederation of British Industry (CBI) collects, from a large number of companies, answers to the questions (i) Is a shortage of skilled labour likely to limit your output over the next four months? and (ii) Is a shortage of other labour likely to limit your output over the next four months? As a measure of the **relative** excess demand for **skilled** labour (Skill), we simply take the percentage of firms saying yes to (i) divided

by the percentage saying yes to (ii). In Table 9, we report this variable and the aggregate level of unemployment, for comparison.

Three points are clear. First, while the skill variable fluctuates a lot, its level has risen substantially over the last three decades, particularly from the boom years before the first oil shock to the boom years of the late 80s. Second, relative skill shortages tend to hit their cyclical peak when the economy is emerging from a slump (i.e. late 70s, mid 80s), for the demand for skilled labour then appears to pick up sharply whereas that for unskilled labour appears to be more sluggish. Third, in the recession of the early 1990s and its aftermath, skill shortages seem less severe than in the early 1980s, confirming the general pattern we observed in relative unemployment rates. As a consequence of these points, we might expect some positive long run relationship between unemployment and relative skill shortages but the short-run dynamics are likely to be complicated.

In order to investigate the contribution of relative skill shortages to the shifts in long-run equilibrium unemployment, we simply investigate the long-run empirical relationship between unemployment and the supply-side variables which we would expect to influence it over the longer term. As well as the skill variable, we follow the analysis in Layard *et al.* (1991) (ch. 9) by considering a terms of trade variable (TT = log real import prices weighted by the import share), union power variable (UP = log union/nonunion wage mark-up), the benefit replacement ratio (RR = log benefits to net income ratio), the tax wedge ($T = t_1 + t_2 + t_3$, t_1 = payroll tax rate, t_2 = income tax rate, t_3 = excise tax rate), an index of employment turbulence (IT).[9] Note that if taxes tend to be borne by labour in the long run, as we suggested in our introduction, we should find that the tax wedge, T, has no significant long run effect on unemployment.

In order to investigate the long-run effects of these variables on unemployment, we focus simply on long-run cointegrating relationships. Of the above variables, all are I(1) (including log unemployment) with the exception of industrial turbulence (IT) which, not surprisingly, is stationary.[10] Of course, the existence of an apparent unit root in some of these series is a `local' result. For example, unemployment appears to have a unit root over this particular period despite the fact that it certainly does not have a unit root over the long haul. Thus, during the period 1850-1990 it

exhibits no trend whatever. This is not to say that it is stationary, for it exhibits apparent mean shifts from time to time.

We use two methods to compute a long-run relationship between log u and the supply side variables. First we use the standard Johansen (1988) multivariate procedure and second we estimate an unrestricted dynamic regression with log u as the dependent variable (five lags on all variables) and take the long-run solution. The former method enables us to investigate the extent of cointegration whereas the latter is a simple method which eliminates the substantial small sample biases inherent in the static regression method recommended in the original presentation by Engle and Granger (1987) (see Banerjee *et al*. 1986, 1993 for a discussion of these).

The Johansen cointegrating vector (the eigenvalue tests reveal there is only one), normalised on log u, gives

$$\log u = 26.7TT + 0.059Skill + 0.76T + 8.95RR + 2.14UP \ (+ \text{constant}). \qquad 1964(4)\text{-}1992(4)$$

and the long-run solution of general dynamic model is

$$\log u = -35.7 + \underset{(4.51)}{17.99TT} + \underset{(0.042)}{0.108Skill} + \underset{(1.39)}{1.60T} + \underset{(1.73)}{4.88RR} + \underset{(1.26)}{1.94UP} + \underset{(0.22)}{0.22IT}$$

(standard errors in parentheses). 1964(4)-1992(4).

Several points are worth noting. First, the tax wedge effect is not significantly different from zero, which is consistent with the hypothesis that these taxes fall on labour in the long run. Second, (log) unemployment is cointegrated with the available supply side variables, confirming the results reported in Nickell (1988). Of course, unemployment will also be cointegrated with a set of demand variables more or less by definition (combine demand = output, and the production function). We make this remark because it is sometimes mistakenly supposed that this fact is evidence against the natural rate hypothesis.[11] Third, the skill effect is both statistically and numerically significant.

So what is the overall contribution of the change in relative skill demand to the rise in unemployment in the long-term? The answer is that the skill variable contributes 0.42 percentage points to the 2.25 percentage point increase in u from the 60s to the 70s (19 per cent) and 1.42 percentage points to the 6.6 percentage point increase in u from the 70s to the 80s (21.5 per cent). So our estimate is that in Britain, the decline in the relative demand for unskilled workers has contributed around 20 per cent of the long-run increase in unemployment up to the 1980s. This looks quite consistent with the numbers for Britain reported in Table 5 and the overall estimates presented in the previous section.

Having ascertained the facts to the best of our ability, it simply remains for us to discuss the policy of cutting payroll taxes on the unskilled or, equivalently, subsidising their employment. This is the topic of the final section.

3. Should Payroll taxes on the Unskilled be Cut?

Here, we shall address a number of questions. First, what are the aims of cutting payroll taxes on, or providing job subsidies for, the unskilled? Second, are these aims going to be fulfilled? Finally, is this policy going to have a significant impact on overall unemployment? Before plunging in, two points are worth noting. First, even if unemployment rises solely as a result of neutral shocks, the position of the unskilled is seriously worsened because their absolute rise in unemployment is so great. Second, we should point out that much of our discussion here is based on already published work, notably Layard *et al.* (1991) (Ch. 6) and, more especially, the analysis in Wood (1994) (Ch. 10) which could hardly be bettered.

The basic idea behind cutting payroll taxes or providing job subsidies for the unskilled is to raise the demand for unskilled labour. This will, potentially, reduce unskilled unemployment, raise unskilled take-home pay and contribute towards an overall reduction in unemployment. If this can be achieved, it is good on efficiency grounds (although, of course, taxes have to rise elsewhere, generating efficiency costs) and, furthermore, it is good on social grounds. There are strong social reasons for raising both living standards and employment opportunities among the unskilled in a world where, for example, one quarter of **prime** age men in this category are currently not working (see Table 7) compared with around 5 per cent a mere 20 years

ago. The social problems exacerbated by this level of non-employment are numerous and very costly, so they provide an independent reason for trying to generate more unskilled jobs.

So is cutting payroll taxes or providing job subsidies for the unskilled going to work? Given the following two propositions, the outlook does not, at first sight, look very hopeful.

(i) If there are no barriers to the acquisition of training, shifts in the demand for unskilled relative to skilled workers may have little long-run impact on relative unemployment rates because changes in unemployment rates and wages will tend to be offset by `migration' from the unskilled to the skilled.

(ii) In the long run, if wages are flexible, payroll taxes are borne by labour. So labour costs and employment are unaffected although take-home pay will change.

The first proposition (see Section 1) seems to suggest that there is not much point in doing anything. Indeed cutting payroll taxes on the unskilled may mean fewer people training for skilled work with wages and unemployment rates little affected. But, we may safely argue that barriers to the acquisition of training are extensive enough to ensure that (i) simply does not apply. However, then we run into (ii) (see Introduction) which indicates that payroll tax cuts will not influence unemployment other than via the roundabout route of raising take-home pay and hence reducing the benefit replacement rate or, more generally, the ratio of non-labour income to labour income (post-tax). The argument we must make here is that wages at the low end are not flexible because of the wage floor generated by minimum wage laws, unions or the benefit system. This fact ensures that payroll taxes are not wholly borne by labour at the bottom end of the pay distribution. Thus, when payroll taxes are imposed, wages at the bottom end cannot fall because of the minimum wage, say, and unemployment goes up instead. This ensures that moving in the opposite direction with payroll tax cuts and job subsidies may have a significant long-run employment effect as well as some positive impact on take-home pay.[12] The overall effect will, however, reduce the incentive for the unskilled to acquire training.

Finally, what role should this policy play in a concerted effort to cut overall unemployment? At the outset, it is worth noting that it is not possible for us to give

a full answer to this question, because we are not in a position to compare this policy with other ways of spending the money either on the unskilled (e.g. subsidised training, public sector job creation) or more generally (e.g. reforming the benefit system, active labour market policy). However, several points can be made. First, even if we could completely reverse the impact of the decline in the relative demand for the unskilled, we would only reduce **overall** unemployment by a relatively small, albeit significant amount. This is because the majority of the increase in unemployment has been the consequence of factors which have operated neutrally with regard to skill (in those countries where unemployment has risen substantially). Second, we must be careful not to reduce significantly the incentive to acquire skills. This may require some additional policy on the training front. Third, the social problems which have arisen not only from the collapse in the relative demand for the unskilled but also from the substantial rise in overall unemployment remain a crucial issue, particularly as they seem to be getting worse. These require special attention based on an analysis which goes far beyond just unemployment questions.

Overall, therefore, we can argue that cuts in payroll taxes or job subsidies for the unskilled cannot be expected to play a major role in reversing the inexorable rise in aggregate unemployment. But they could make a contribution. Finally however it is worth emphasizing that the parlous position of the unskilled in an era of high unemployment is producing a slew of social problems which are becoming one of the most intractable issues facing the developed world. This makes an overall reduction in unemployment and, thereby, an improvement in the position of the unskilled, a matter of urgency.

ENDNOTES

1. See OECD (1994), p. 46.

2. There is also a lot of time series evidence on the question of the incidence of various taxes. Indeed every time series wage equation in existence contains explicit or implicit estimates of the incidence of both employment and excise tax rates. In fact many wage equations imply very large effects of taxes on labour costs simply because relevant tax effects are omitted entirely. However, from those studies which take tax effects seriously, the evidence is very mixed. For example, Knoester and van der Windt (1987) report large long-run effects of employee taxes on labour costs for 10 OECD countries. Furthermore, Calmfors (1990), Table 3, reports long-run payroll tax effects in all Nordic countries except Finland. However, Bean *et al.* (1986) only find significant tax effects in 5 out of 15 OECD countries.

There are three basic problems. First, the time series results in this area tend to be very fragile. Second, short time series find it very hard to discriminate between fairly long-lasting temporary effects and permanent long-run effects. And finally, many macro-models are constructed with little care or thought given to tax effects and how they feed through into the long-run real equilibrium of the economy.

The consequence of this last point is that if one feeds various tax changes into macro models, one often finds that they have dramatic long-run effects on employment and output, not via their aggregate demand effects but because of their impact on wages. Generally, these effects should not be taken seriously because of the strong cross-section evidence that the pattern of employment, income and excise taxes does not make a significant difference to employment rates in the long run.

3. This is not true in countries without unemployment benefit systems. In many such countries, measured unemployment rates are higher for the well-educated, essentially because the uneducated cannot afford to be unemployed (for example, Bhalotra, 1993, for India, and Table 2 below for Italy).

4. The elasticities were computed as follows. First we split the General Household

Survey male sample into two groups, those without qualifications and those with qualifications. Then, within each sample we ran a cross section regression for each year (1978-92) explaining ln wages by age, age^2, sic code, part-time dummy, race dummy, marital status dummy and 11 region dummies. We then took the fitted value for a standardised individual for each region. Using these standardised wages for each region along with regional unemployment rates for the two education groups, we ran separate ln wage, ln unemployment pooled regressions over the period 1978-92 with time dummies and region dummies. The reported elasticities are the absolute coefficients on ln unemployment in the two regressions.

5. It is natural to ask how a shock which leads initially to equiproportional rises in wage rates and equiproportional falls in **employment** rates (and hence equal **percentage point** rises in unemployment rates), can lead eventually to rises in unemployment which are getting on for **equiproportional**. What happens is that the initial rise in skilled unemployment is **proportionally** much greater than the initial rise in unskilled unemployment. The constant elasticity form of the wage equation then induces a much greater second round fall in skilled wages relative to unskilled wages and hence a much larger second round rise in skilled employment relative to unskilled employment, particularly as demand is highly elastic. The final outcome is then as described in equation (8).

6. See, in particular, some of the comments on pages 2 and 3 of National Audit Office (1989).

7. Another point worth raising is the possibility that we might get a different picture if we focused not on the unemployment rates of particular education or skill groups, but on certain percentiles of the skill distribution. The argument for doing this is that because of the overall increase in skill levels, the high education groups have, on average, become bigger and less `skilled', and the low education groups have become smaller and less `skilled', thereby raising unemployment rates in both groups. Looking carefully at the available data indicates that taking account of this does not appear to change the overall pattern of our findings.

8. Eliminating W_i between (2), (3) and taking differentials yields

$$(1/\sigma(1-u_u) + \eta(u_u)/u_u)du_u = d\alpha/\alpha_u + d\ln\gamma + \frac{1}{\sigma}\, d\ln(L_d/L)$$

$$(1/\sigma(1-u_s) + \eta(u_s)/u_s)du_s = -d\alpha/\alpha_s + d\ln\gamma + 1/\sigma\, d\ln(L_s/L)$$

Eliminating $d\ln\gamma$ gives equation (9) in the text and setting $d\ln\gamma = 0$ gives equation (10).

9. $TT = s\ln(P_m/P^*)$, s = imports/GDP (ETAS). P_m = import price index for the UK (ETAS), P^* = unit value index of world manufacturing exports from UN Monthly Bulletin of Statistics converted from dollars to pounds using the exchange rate (ETAS). UP = log(union/non-union mark-up). This is estimated using the method described in Layard *et al.* (1978). RR = benefit replacement ratio from Social Security Statistics, Table H3.10, using a weighted average of different family types. $T = t_1 + t_2 + t_3$. t_1 = employment `tax' borne by the firm = ln (total labour costs per unit of output/wages and salaries per unit of output); t_2 = direct tax rate = (DT + SS)/HCR, DT = direct taxes on household income, SS = households' contributions to social security schemes, HCR = households' current receipts less employer contributions to social security schemes from OECD National Accounts; t_3 = indirect tax rate = ln(GDP deflator at market prices/GDP deflator at factor cost). IT = industrial turbulence = absolute annual change in the proportion of employees in production industries (BLSHA, YB, DEG). BLSHA = British Labour Statistics, Historical Abstract, DEG = Department of Employment Gazette, ETAS = Economic Trends Annual Supplement, YB = British Labour Statistics Year Book (published annually from 1969-1976).

10. The data are quarterly from 1963-92. Unit root tests are as follows: variable (DF, ADF(4)), log u (-.71, -1.31), Δ log u (-5.39*, -3.97*), TT (-.93, .22), ΔT (-13.6*, -4.7*), UP (-1.26, -1.46), ΔUP (-4.06*, -3.58*), RR(-.16, -1.93), ΔRR (-3.32*, -2.66), T (-2.34, -2.33), ΔT (-13.5*, -4.2*), OIL (-1.19, -1.48), ΔOIL (-8.84*, -4.66*), IT (-3.01*, -3.41*), Skill (-1.49, -3.32*), ΔSkill (-4.81*, -5.71*). DF is the Dickey-Fuller t statistic with a constant in the model. ADF (4) is the Augmented DF t statistic with a

constant and four lags. * means significant at the 5 per cent level.

11. Consider the simple log-linear natural rate model:

(i) $y = m - p$ demand (y = output, m = money stock, p = prices)

(ii) $y = a_1 n$ production (n = employment)

(iii) $\bar{y} = a_1 \ell$ full utilization output ($\bar{y}$ = full utilization output, ℓ = labour force)

(iv) $p = w + \beta_0 + \beta_1(y-\bar{y}) - \beta_2(p-p^e) + z_p$ prices (w = wages, z_p = exogenous shifts in price behaviour)

(v) $w = p + \gamma_0 - \gamma_1 \log u - \gamma_2(p-p^e) + z_w$ wages (z_w = exogenous wage pressure)

(ii), (iii) imply $y - \bar{y} = -a_1 u$ ($u = \ell - n$) and hence unemployment will be cointegrated with demand. However (ii), (iii), (iv) and (v) imply that $\beta_1 a_1 u + \gamma_1 \log u = (\beta_0+\gamma_0) + (z_p+z_w) + (\beta_2+\gamma_2)(p-p^e)$. Since $(p-p^e)$ is I(0) and in practice β_2 tends to be very small (and UK wage equations tend to be based on log u), this equation implies that log u will be cointegrated with the supply-side variables z_p, z_w.

12. Note that with a pay floor, payroll tax cuts have different effects from income tax cuts which have no effect on labour costs and hence on employment. With flexible pay, of course, payroll tax cuts have exactly the same effect as income tax cuts.

TABLE 1

Unemployment by Occupation: Inflow and Duration, US and Britain

	US (1987)			Britain (1984)		
	Inflow rate (% per mo.)	Duration (mos.)	u(%)	Inflow rate (% per mo.)	Duration (mos.)	u(%)
Professional and Managerial	0.74	3.0	2.3	0.50	11.2	5.3
Clerical	1.58	2.6	4.3	0.88	10.1	8.0
Other non-manual				1.14	11.8	12.2
Skilled manual	1.97	2.9	6.1	1.02	14.2	12.6
Personal service	2.96	2.4	7.7			
Other manual	2.84	3.0	9.4	1.32	14.1	15.5
All	2.23	2.6	6.2	0.94	12.8	10.8

Source: (Layard et al. 1991, chapter 6, Table 3).

TABLE 2

Male Unemployment Rates by Education or Occupation

		1971-74	1975-78	1979-82	1983-86	1987-90	1991	1992	1993
FR	Total			5.2[a]	6.7[b]	7.2	7.0	7.9	9.4
	High ed.			2.1[a]	2.5[b]	2.6	2.8	3.9	5.9
	Low ed.			6.5[a]	9.0[b]	10.8	10.6	12.1	13.6
	Ratio			3.1	3.6	4.1	3.8	3.1	2.3
GE	Total		3.1	3.8	7.6	6.8	5.4		
	High occ.		1.6[e]		1.6	3.0	2.9		2.4
	Low occ.		3.1[c]		4.5	8.8	7.6		6.2
	Ratio		1.9[c]		2.8	2.9	2.6		2.6
IT	Total			1.8[d]		4.7[e]			
	High ed.			3.4[d]		4.6[e]			
	Low ed.			1.6[d]		4.7[e]			
	Ratio			0.47[d]		1.02[e]			
	Total				7.1	7.9	7.5	8.1	
	High ed.				8.5	8.4	8.1	8.6	
	Low ed.				4.4	5.9	5.4	5.6	
	Ratio				0.52	0.70	0.67	0.64	
	Total (M+F)		7.2	8.2	10.5	11.8	10.9	11.5	
	High ed.		12.3	12.2	13.1	13.1	12.2	12.8	
	Low ed.		4.4	4.8	6.4	8.1	7.3	7.7	
	Ratio		0.36	0.39	0.49	0.62	0.60	0.60	
NE	Total		4.4[f]	5.4[g]	11.7[h]				
	High ed.		2.1[f]	2.4[g]	4.6[h]				
	Low ed.		4.7[f]	6.8[g]	16.9[h]				
	Ratio		2.2[f]	2.8[g]	3.7[h]				
	Total (M+F)		5.5[f]	7.1[g]	13.2[h]	6.9[i]	6.5	6.5	7.5
	High ed.		2.9[f]	3.4[g]	6.2[h]	5.2[i]	4.6	5.1	5.4
	Low ed.		5.7[f]	8.3[g]	18.0[h]	9.9[i]	9.5	9.3	10.9
	Ratio		2.0[f]	2.4[g]	2.9[h]	1.9[i]	2.1	1.8	2.0
SP	Total		6.1	11.7	18.5	15.3	12.8	14.5	17.9
	High ed.		4.5[j]	7.9	11.0	8.8	7.3	8.9	10.7
	Low ed.		7.7[j]	13.5	21.4	17.7	16.7	19.2	24.0
	Ratio		1.7[j]	1.7	1.9	2.0	2.3	2.2	2.2

continued.....

TABLE 2 (Continued)

	1971-74	1975-78	1979-82	1983-86	1987-90	1991	1992	1993	
UK Total	2.9[k]	4.4	7.7	10.5	7.5	10.0	11.5		
High ed.	1.4[k]	2.0	3.9	4.7	4.0	5.7	6.6		
Low ed.	4.0[k]	6.4	12.2	18.2	13.5	17.4	16.9		
Ratio	2.9[k]	3.2	3.1	3.9	3.4	3.1	2.6		
AL Total			6.8	9.8	7.9	9.5	11.5	12.1	
High ed.			3.5	4.4	3.9	4.8	5.9	6.2	
Low ed.			8.3	12.2	10.0	11.7	14.2	14.8	
Ratio			2.4	2.8	2.6	2.4	2.4	2.4	
NZ Total					5.4	8.4	10.6	10.1	
High ed.					2.2	4.8	6.6	6.5	
Low ed.					8.8	14.2	17.6	17.0	
Ratio					4.0	3.0	2.7	2.6	
CA Total		6.9	6.6[l]	10.3[m]	7.8	10.8	12.0	11.7	
High ed.		2.6	2.4[l]	4.3[m]	3.4	4.5	5.6	5.3	
Low ed.		8.2	8.3[l]	12.5[m]	11.3	15.4	16.3	16.6	
Ratio		3.2	3.5[l]	2.9[m]	3.3	3.4	2.9	3.1	
US Total	3.6	5.5	5.7	7.3	5.0	5.8			
High ed.	1.7	2.2	2.1	2.7	2.1	2.8			
Low ed.	5.3	8.6	9.4	12.8	9.8	11.0			
Ratio	3.1	3.9	4.5	4.7	4.7	3.9			
JA Total	1.4[n]			2.4[o]		3.0[p]			2.1
High ed.	1.2[n]			1.6[o]		1.4[p]			1.2
Low ed.	1.6[n]			2.9[o]		4.1[p]			2.6
Ratio	1.3[n]			1.8[o]		2.9[p]			2.2
AU High occ.				1.1	1.0	1.3			
Low occ.				4.9	3.9	3.7			
Ratio				4.5	3.9	2.8			
FN Total				6.6[q]	4.6	9.3	15.5		
High ed.				1.6[q]	1.2	3.1	6.3		
Low ed.				8.8[q]	5.9	11.2	18.4		
Ratio				5.5[q]	4.9	3.6	2.9		
NW Total	1.2[r]	1.9	2.1	2.7	3.9	5.5	5.9		
High ed.	1.0[r]	0.8	0.9	0.8	1.5	2.3	2.8		
Low ed.	1.9[r]	2.2	2.9	3.8	6.0	8.8	8.9		
Ratio	1.9[r]	2.8	3.2	4.8	4.0	3.8	3.2		

continued.....

TABLE 2 (Continued)

	1971-74	1975-78	1979-82	1983-86	1987-90	1991	1992	1993
SW Total	2.8	1.9	2.4	3.1	1.8	3.1	5.6	8.8
High ed.	1.3	0.8	0.9	1.1	1.0	1.5	2.8	4.2
Low ed.	3.2	2.4	3.1	4.1	2.4	3.9	6.5	10.4
Ratio	2.5	4.0	3.4	3.7	2.4	2.6	2.3	2.5

Notes:

FR, France. Source: Enquête sur L'Emploi, INSEE (annual publication). Low education: no certification or only primary school certificate. High education: two years university education or further education college degree or university degree. [a] = 1982 only,[b] = 1983, 1986 only. Data refer to males, aged 15 plus.

GE, (West) Germany. Source: ILO Yearbook of Labour Statistics (various issues, Tables 3C, 10C). Low occupation: production and related workers, transport equipment operators and labourers. High occupation: professional, technical and related, administrative and managerial workers. [c] = 1976-78 only. Data refer to males.

IT, Italy. Source: first set, Rilevazione delle forze di lavor, reported in an as yet unpublished OECD Table (our thanks to John Martin). Remaining sets, Annuario Statistico Italiano, ISTAT (our thanks to Barbara Petrongolo and Marco Manacorda). Low education: lower secondary or less. High education: upper secondary or higher. [d] = 1980 only,[e] = 1989 only. Data refer to males, aged 25-64 except for (M+F) which refers to males and females.

NE, Netherlands. Source: Dutch Central Bureau of Statistics, provided for us by Jan van Ours and Erik Brouwer. Low education: basic education or completed junior secondary school or junior vocational training. High education: completed vocational college or university education. [f] = 1985, 1977;[g] = 1979, 1981;[h] = 1983, 1985; [i] = 1990. Data in the first set refer to males aged 15-64; in the second set (M+F) to males and females aged 15-64.

SP, Spain. Source: Spanish Labour Force Survey from the Bank of Spain data base (our thanks to Juan Dolado). Low education: illiterate and without studies or primary. High education: superior (essentially university). [j] = 1976-78. Data refer to males, aged 16-64.

UK, United Kingdom. Source: General Household Survey data tapes. Low education: no qualifications. High education: passed A levels (18+ examination) or

professional qualification or university degree. [k] = 1973-4. Data refer to males, aged 16-64.

AL, Australia. Source: The Labour Force: Educational Attainment, Australia, Australian Bureau of Statistics. Low education: did not attend highest level of secondary school. High education: university degree. Data refer to males aged 15-69.

NZ, New Zealand. Source: Statistics New Zealand (our thanks to Giles Hancock). Low education: no qualification. High education: School or Post-School qualification. Data refer to males, aged 16-64.

CA, Canada. Source: The Labour Force, Statistics Canada (various issues). Low education: up to level 8. High education: university degree. [l] = 1979, [m] = 1984-6. Data refer to males, aged 15+.

US, United States. Source: Handbook of Labor Statistics, Bureau of Labor Statistics, 1989 (Table 67). Statistical Abstract of the United States, 1993 (Table 654). Low education: less than 4 years of high school. High education: 4 or more years of college. Data refer to males aged 25-64.

JA, Japan. Source: Employment Status Survey (our thanks to Toshiaki Tachibanaki). Low education: junior high school. High education: university. [n] = 1971, 1974; [o] = 1979, 1982; [p] = 1987. Data refer to males aged 16-64.

AU, Austria. Source: as Germany. Low and High occupation as Germany. Data refer to males.

FN, Finland. Source: Työvoiman Koulutus ja Ammatit, 1984-1992/1993, Statistics Finland. Low education: basic education only. High education: higher education both lower and upper levels. [q] = 1984-6. Data refer to males aged 15-74.

NW, Norway. Source: Labour Market Statistics, Statistik Sentrallyra. Low education: primary level. High education: university level. [r] = 1972-4. Data refer to males and females, aged 16-74.

SW, Sweden. Source: Swedish Labour Force Surveys (our thanks to Bertil Holmlund). Low education: pre-upper secondary school up to 10 years. High education: post-upper secondary education. Pro-rata adjustments as follows: post 1986, change in measurement reduced aggregate unemployed by 16 per cent. Post 1982, change in measurement increased aggregate unemployed by 9 per cent. Data refer to males aged 16-64.

TABLE 3

Earnings Differentials by Education (Males)

	Ratio of High to Low Education Groups		
	Early '70s	Early '80s	Late '80s
FR		1.66	1.63
GE		1.36	1.42
IT	1.96	1.60	1.61
NE		1.50	1.22
UK	1.64	1.53	1.65
AL	1.89	1.54	1.58
CA	1.65	1.40	1.42
US	1.49	1.37	1.51
JA	1.33	1.26	1.26
SW	1.40	1.16	1.19

Source: OECD Employment Outlook (1993), Table 5.6. Davis (1992).

TABLE 4

Earnings Dispersion for Males

		1973	1975	1979-81	1985-86	1987-88	1989-90	1991
FR	D9/D5	2.00	2.09	2.05	2.10*	2.09	2.11	2.11
	D1/D5	0.62	0.61	0.63	0.64*	0.66	0.66	0.66
	D9/D1	3.23	3.43	3.25	3.28*	3.17	3.20	3.20
GE	D9/D5			1.47	1.65*	1.65	1.65	1.65
	D1/D5			0.67	0.69*	0.71	0.72	0.71
	D9/D1			2.19	2.39*	2.32	2.29	2.32
IT	D9/D5			1.44	1.51	1.56		
	D1/D5			0.69	0.73	0.75		
	D9/D1			2.09	2.07	2.08		
UK	D9/D5	1.70	1.66	1.72	1.85*	1.91	1.96	1.99
	D1/D5	0.68	0.70	0.68	0.63*	0.62	0.61	0.59
	D9/D1	2.50	2.37	2.53	2.94*	3.08	3.21	3.37
AL	D9/D5		1.50	1.50	1.56	1.55	1.55	1.59
	D1/D5		0.75	0.74	0.72	0.71	0.70	0.70
	D9/D1		2.00	2.03	2.17	2.18	2.21	2.27
CA	D9/D5	1.67		1.67	1.68	1.71	1.75	
	D1/D5	0.52		0.48	0.42	0.45	0.44	
	D9/D1	3.21		3.48	4.00	3.80	3.98	
US	D9/D5		1.93	1.95	2.09	2.10	2.14	
	D1/D5		0.41	0.41	0.38	0.38	0.38	
	D9/D1		4.71	4.76	5.50	5.53	5.63	
JA	D9/D5			1.63		1.67	1.73	
	D1/D5			0.63		0.61	0.61	
	D9/D1			2.59		2.74	2.84	
SW	D9/D5	1.57		1.68!	1.50	1.56		1.57
	D1/D5	0.76		0.78	0.76	0.76		0.73
	D9/D1	2.07		2.15	1.97	2.05		2.15

Notes: D9, D5, D1 are upper limits of the deciles of the earnings distribution. * implies change in measurement, so not comparable to previous numbers. OECD Employment Outlook (1993), Table 5.2.

TABLE 5

Percent Increases in Male Unemployment from the 1970s

		Countries where most of the increase to the 1980s is among the unskilled			
		US[a]	JA[a]	NW[a]	SW[b]
Percent increase from early or mid 1970s to late 1980s	Total	39	114	225	22
	High ed.	24	17	-50	-8
	Low ed.	85	156	216	59
Percent increase from early or mid 1970s to 1990s peak	Total	61	50	392	214
	High ed.	65	0	180	223
	Low ed.	108	63	378	225

		Countries where a significant part of the increase to the 1980s is among the skilled				
		GE[c]	NE[d]	SP[c]	UK[a]	CA[d]
Percent increase from early or mid 1970s to late 1980s	Total	119	166	151	158	49
	High ed.	81	119	96	185	65
	Low ed.	145	260	129	237	52
Percent increase from early or mid 1970s to 1990s peak	Total			193	281	74
	High ed.			137	625	115
	Low ed.			212	336	99

Notes: Based on Table 2. [a] = 1987-90 / 1971-4; [b] = 1983-6 / 1971-4; [c] = 1987-90 / 1975-8; [d] = 1983-6 / 1975-8. We only go to the mid 1980s in SW because unemployment in the late 1980s is so much lower than in the early 1970s, the numbers are hard to interpret. Late 1980s figures for males in NE are not available.

TABLE 6

UK Male Unemployment and Non-Employment Rates by Education

(Age 25-64)

	1971-74	1975-78	1979-82	1983-86	1987-90	1991	1992
Unemployment							
Total	2.7	3.8	6.9	9.6	7.0	9.0	10.3
High ed.	0.8	1.6	2.9	3.6	3.1	4.7	5.8
Low ed.	3.6	5.0	9.8	15.4	12.1	15.2	15.7
Ratio	4.5	3.1	3.4	4.3	3.9	3.2	2.7
Non-employment							
Total	7.9	9.7	14.8	19.9	18.3	20.9	22.6
High ed.	4.0	5.1	6.8	9.1	8.7	11.5	13.4
Low ed.	9.8	12.6	20.3	29.7	29.5	32.7	34.7
Ratio	2.5	2.5	3.0	3.3	3.4	2.8	2.6

US Male Unemployment and Non-Employment Rates by Education

(Age 25-64)

	1971-74	1975-78	1979-82	1983-86	1987-90	1991
Unemployment						
Total	3.6	5.5	5.7	7.3	5.1	5.8
High ed.	1.7	2.2	2.1	2.7	2.1	2.8
Low ed.	5.3	8.6	9.4	12.8	9.8	11.0
Ratio	3.1	3.9	4.5	4.7	4.7	3.9
Non-employment						
Total	11.3	15.1	15.6	17.8	15.6	16.3
High ed.	5.6	6.7	6.6	8.0	7.6	8.3
Low ed.	18.0	25.8	28.3	34.0	31.0	32.4
Ratio	3.2	3.9	4.3	4.3	4.1	3.0

Source: UK: General Household Survey data tapes.
US: As in Table 2.

TABLE 7

UK Male Unemployment and Non-Employment Rates by Education (Age 25-55)

	1971-74	1975-78	1979-82	1983-86	1987-90	1991	1992
Unemployment							
Total	2.4	3.7	6.7	9.1	6.6	8.5	10.2
High ed.	0.8	1.5	2.6	3.4	2.9	4.4	5.7
Low ed.	3.4	5.3	10.1	15.6	12.3	15.2	15.7
Ratio	4.3	3.5	3.9	4.6	4.2	3.5	2.8
Non-employment							
Total	4.4	6.0	9.7	12.9	11.2	13.9	15.7
High ed.	2.0	3.2	4.4	5.6	5.1	7.5	9.3
Low ed.	5.7	8.3	14.1	21.3	20.3	23.5	25.1
Ratio	2.9	2.6	3.2	3.8	4.0	3.1	2.7

Source: General Household Survey data tapes.

TABLE 8

(a) Males aged 20-64 in Receipt of Invalidity Benefit (in thousands)

1972	322	1980	522	1988	781
1973	341	1981	538	1989	818
1874	349	1982	578	1990	852
1975	352	1983	617	1991	891
1976	437	1984	664	1992	963
1977	452	1985	701		
1978	488	1986	722		
1979	529	1987	746		

Source: UK Social Security Statistics (annual), Table D1.22 (also includes those in receipt of Severe Disability Allowance, known as Non-Contributory Invalidity Pension prior to November 1984. This started in 1976, hence the jump in the series between 1975 and 1976).

(b) Proportion of Males in the Population who are Unable to Work because of Long-term Sickness or Disability

	Age 25-64	Age 25-55		Age 25-64	Age 25-55
1973	2.1	1.0	1983	4.5	2.2
1974	2.5	1.1	1984	3.9	1.9
1975	2.3	0.9	1985	4.8	2.3
1976	2.4	0.9	1986	4.6	2.4
1977	2.4	1.0	1987	4.4	2.0
1978	2.5	1.2	1988	4.6	2.3
1979	3.1	1.3	1989	4.9	3.1
1980	3.5	1.6	1990	5.2	2.9
1981	3.3	1.7	1991	4.9	2.6
1982	4.2	2.1	1992	5.9	3.5

Source: General Household Survey Data Tapes.

TABLE 9

Relative Skill Shortages and Unemployment, 1963-92

	Skill	u(%)		Skill	u(%)
1963-66	2.54	2.63	1979-82	4.30	8.13
1967-70	3.42	3.03	1983-86	8.93	11.63
1971-74	3.85	3.55	1987-90	6.45	7.98
1975-78	5.48	5.55	1991-94	4.51	9.67

Source: CBI Industrial Trends Survey, Layard et al. (1991) Table A3 and OECD Employment Outlook, 1994. Unemployment is the OECD standardised rate.

REFERENCES

Banerjee, A., Dolado, J., Hendry, D.F. and Smith, G.W., `Exploring Equilibrium Relationships in Econometrics through Static Models: Some Monte Carlo Evidence', Oxford Bulletin of Economics and Statistics, Vol.48, 1986, pp.253-277.

Banerjee, A., Dolado, J., Galbraith, J.W. and Hendry, D.F. (1993), Cointegration, Error-Correction and the Econometric Analysis of Non-Stationary Data, Oxford University Press: Oxford.

Bean, C.R., Layard, R. and Nickell, S.J., `The Rise in Unemployment: A Multi-County Study', Economica, Vol.53: S1-S22, 1986.

Berman, E., Bound, J. and Griliches, Z., `Changes in the Demand for Skilled Labor within U.S. Manufacturing: Evidence from the Annual Survey of Manufactures', Quarterly Journal of Economics, Vol.109, 1994, pp.367-397.

Bhalotra, S. (1993), `Differentials in Urban Unemployment Rates Across Indian States', Wolfson College: Oxford (mimeo).

Blanchflower, D.G. and Oswald, A.J. (1994a), The Wage Curve, MIT Press: Cambridge.

Blanchflower, D.G. and Oswald, A.J., `An Introduction to the Wage Curve', Journal of Economic Perspectives, (1994b).

Calmfors, L. (ed.), (1990) Wage Formation and Macroeconomic Policy in the Nordic Countries, Oxford University Press: Oxford.

Davis, S.J. (1992), `Cross-Country Patterns of Change in Relative Wages', NBER Working Paper 4085: Cambridge.

Engle, R.F. and Granger, C.W.J., `Cointegration and Error Correction: Representation, Estimation and Testing', Econometrica, Vol.55, 1987, pp.251-276.

Hamermesh, D. (1993), Labour Demand, Princeton University Press: Princeton.

Johansen, S., `Statistical Analysis of Cointegration Vectors', Journal of Economic Dynamics and Control, Vol.12, 1988, pp.231-254.

Juhn, C., Murphy, K.M. and Topel, R.H., `Why Has the Natural Rate of Unemployment Increased over Time', Brookings Papers in Economic Activity, Vol.2, 1991, pp.75-126.

Knoester, A. and Windt, N. van der, `Real Wages and Taxation in Ten OECD Countries', Oxford Bulletin of Economics and Statistics, Vol.49(1), 1987, pp.151-169.

Layard, R., Metcalf, D. and Nickell, S., `The Effect of Collective Bargaining on Relative and Absolute Wages', British Journal of Industrial Relations, Vol.16(3), 1978, pp.287-302.

Layard, R., Nickell, S. and Jackman, R., (1991) Unemployment: Macroeconomic

Performance and the Labour Market, Oxford University Press: Oxford.

Machin, S. (1994), `Changes in the Relative Demand for Skills in the UK Labor Market' in A. Booth and D. Snower (eds.), The Skills Gap and Economic Activity, Cambridge University Press: Cambridge, forthcoming.

National Audit Office (1989), Invalidity Benefit: Report by the Comptroller and Auditor General, HMSO: London.

Nickell, S.J. (1987), `Why is Wage Inflation in Britain So High', Oxford Bulletin of Economics and Statistics, Vol.49(1), 1987, pp.103-128.

Nickell, S. (1988), `The NAIRU: Some Theory and Statistical Facts' in Rod Cross (ed.), Unemployment, Hysteresis and the Natural Rate Hypothesis, Basil Blackwell: Oxford.

OECD (1990), Employment Outlook, OECD: Paris.

OECD (1994), The OECD Jobs Study: Facts, Analysis, Strategies, OECD: Paris.

Oswald, A.J., `Wage Determination and Recession: A Report on Recent Work', British Journal of Industrial Relations, Vol.24, 1986, pp.181-194.

Wood, A. (1994), North-South Trade, Employment and Inequality: Changing Fortunes in a Skill Driven World, Clarendon Press: Oxford.

Yellen, J.L., `Discussion of Juhn *et al.*', Brookings Papers in Economic Activity, Vol.2, 1991, pp.127-133.