Unemployment, Education and Earnings Growth*

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Abstract

I use the European Community Household Panel to ask whether unemployment affects the relationship between education and subsequent earnings growth. I show that individuals with more education have more to lose in terms of subsequent earnings growth from the experience of unemployment. This result partially compensates the fact that more education reduces the incidence of unemployment: unemployment is less likely among the better educated, but its occurrence has more sizeable effects on subsequent earnings growth.

- Keywords: education, unemployment, Europe.
- JEL: J24, J31

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1 Introduction

Despite the huge empirical literature on the private returns to education (see Psacharopoulos [1985] for a recent review), relatively little research has been devoted to the relationship between unemployment, education and earnings. A well known result in this area is that, ceteris paribus, more education reduces the risk of unemployment (Mincer [1991]). An implication of this result, first noted by Nickell [1979][1], is that the lower probability of unemployment for the more educated should be taken into account in the calculation of the rate of return: education pays off not only because it yields higher wages but also because it increases the probability of gainful employment.

More education reduces but cannot eliminate the risk of unemployment. In the OECD area, the unemployment rate in 1992 was 10.5% for individuals with primary and lower secondary education, 7.2% for individuals with upper secondary education and 3.8% for individuals with a college degree (OECD [1995]). The experience of unemployment not only affects current earnings but can also influence future job prospects and future earnings growth. Importantly, these effects can vary with education attainment, either because higher education depreciates faster with unemployment or because the negative labor market signal generated by an unemployment spell varies with educational attainment[2]. Skill depreciation and negative labor market signals are likely to be stronger the longer the unemployment spell.

Since the private rate of return to education includes both current and future earnings, this rate can be affected by unemployment in two ways: first, and most obviously, because the return to unemployment is usually lower than the return to labor; second, because an unemployment spell can lead to a labor market career with significantly different earnings growth. To my knowledge, the latter aspect of the relationship between unemployment, education and earnings has been somewhat

[1] See also Groot and Oosterbeek [1992].

[2] The higher incidence of unemployment among the less educated is likely to reduce the information on individual quality conveyed to prospective employers by an unemployment spell.

overlooked by the literature.

The purpose of this short paper is to investigate whether unemployment significantly affects subsequent earnings growth and whether this effect varies with educational attainment. The empirical analysis is based on the European Household Community Panel (*ECHP*), a large dataset that contains labor market information on individuals from 14 European countries.

2 An Illustrative Example

The following illustrative example helps clarifying the focus of the paper. Consider an individual who lives for two periods after completing education. During the first period, she is unemployed with probability $p_t(e)$, where e is educational attainment, and draws benefits b_t, or employed with probability $1 - p_t(e)$ and earns the (hourly) wage $w_t(e)$. Typically, more education reduces the probability of unemployment p and increases wages w. Therefore, $p^{'}(e) < 0$ and $w^{'}(e) > 0$. During the second period, there is no unemployment and the individual works at the wage $w_{t+1}(e, u_t, u_t * e)$, where u_t is a dummy indicating whether she has been unemployed during the first period. Wages in the second period depend both on (time invariant) educational attainment and on the experience of unemployment during the first period. Moreover, the impact of unemployment on subsequent wages can vary with educational attainment. This effect is captured by the interaction between unemployment u_t and education e, $u_t * e$.

For the sake of simplicity, let e take the value e_o for compulsory education and e_1 for higher education. Next, define c_o as the monetary and nonpecuniary costs of higher education and r as the real rate of interest. The internal rate of return to higher education is

$$[1 - p_t(e_1)] \frac{1}{1+r} \left\{ w_t(e_1) + \frac{1}{1+r} w_{t+1} [u_t = 0, e_1, (u_t = 0) * e_1] \right\}$$
$$+ p_t(e_1) \frac{1}{1+r} \left\{ b_t + \frac{1}{1+r} w_{t+1} [u_t = 1, e_1, (u_t = 1) * e_1] \right\} =$$
$$c_0 + [1 - p_t(e_0)] \frac{1}{1+r} \left\{ w_t(e_0) + \frac{1}{1+r} w_{t+1} [u_t = 0, e_0, (u_t = 0) * e_0] \right\}$$

$$+p_t(e_0)\frac{1}{1+r}\left\{b_t+\frac{1}{1+r}w_{t+1}\left[u_t=1,e_0,(u_t=1)*e_0\right]\right\} \qquad (1)$$

This return is affected by unemployment both because it depends on the probability of unemployment, that varies with educational attainment, as remarked by Nickell [1979], and because unemployment can affect future earnings. The latter effect can also vary with education.

3 The Data and the Empirical Model

The data used in this paper are drawn from the 1994 and 1996 waves of the European Community Household Panel, a household survey that covers 14 European countries[3]. The main advantage of these data is that the same "community" questionnaire is adopted by the national data collection units in each participating country, which obviously increases comparability. Each wave includes a household and a personal file, and the same households and individuals are interviewed over time[4].

I consider only individuals aged between 20 and 60 who at the time of the survey have completed schooling and are working in paid employment more than 15 and less than 60 hours per week[5]. The ECHP survey asks each individual about the highest level of general education completed, and codes the answers into three categories: less than second stage level or lower secondary education (E_1 : ISCED 0-2), second stage level or upper secondary education (E_2 : ISCED3); recognized third level education (E_3 : ISCED 5-7). I make sure that individuals in the sample have completed college education by considering only college graduates with at least 27 years of age. In the ECHP there is also a question asking whether the person has been unemployed during the five years before joining the survey ($U5 = 1$ if yes; 0 if no) and, conditional on having been unemployed, whether at least one of the unemployment spells was longer than one year ($Ul5 = 1$ if yes; 0 if no).

[3]The countries are: Germany, Denmark, Netherlands, Belgium, France, UK, Ireland, Italy, Luxembourg, Greece, Spain, Portugal, Austria and Finland. I exclude Luxembourg from this study because of its small size.

[4]See European Commission [1999].

[5]I exclude individuals whose main activity status at the time of the survey is paid employment for less than 15 hours per week, paid apprenticeship, training or education, self-employment, unpaid family worker, out of the labor force and unemployed.

I study whether the experience and the duration of unemployment affects subsequent wages by looking at the empirical relationship between unemployment before 1994 and earnings growth between 1994 and 1996. For this purpose, I restrict my attention to the subsample of individuals employed in both years and define the following Mincerian earnings function

$$\ln W_{ti} = f_i + Y_i^{'}\alpha_t + \beta U5_{94i} + \gamma Ul5_{94i} + \rho X_{ti} + \upsilon X_{ti}^2 + \sum_h \gamma_h E_{hi}$$
$$+ \sum_h \delta_h E_{hi} U5_{94i} + \sum_h \eta_h E_{hi} Ul5_{94i} + \sum_h f_h E_{hi} X_{ti} + \sum_h g_h E_{hi} X_{ti}^2$$
$$+ \sigma X_{ti} U5_{94i} + \varsigma X_{ti}^2 U5_{94i} + \phi X_{ti} Ul5_{94i} + \psi X_{ti}^2 Ul5_{94i}$$
$$+ \sum_h q_h E_{hi} X_{ti} U5_{94i} + \sum_h v_h E_{hi} X_{ti} Ul5_{94i} + \epsilon_{ti} \qquad (2)$$

where $h = 2, 3$, $t = 1994, 96$, i is the subscript for the individual, W is hourly net earnings in 1994[6], $U5_{94}$ and $Ul5_{94}$ are unemployment and unemployment duration before 1994, Y is a vector of country, occupational and sectorial dummies, X is labor market experience, defined as age minus age at labor market entry, and I include the interactions among unemployment, education and experience. The error term is composed of two parts, a time invariant individual effect f_i and a time specific effect, ϵ_{ti}.

The individual fixed effect includes unobserved characteristics, such as ability, and is clearly correlated with education, experience and unemployment. For this reason, I use the data from the two waves to eliminate the time invariant individual fixed effect f_i by taking first differences over time[7]. I also use the fact that $X_{96} = X_{94} + 2$ to obtain

$$\Delta \ln W_{ti} = Y_i^{'}\Delta\alpha + \lambda_o U5_{94i} + \lambda_1 Ul5_{94i} + \sum_h \lambda_{2h} E_{hi} + \lambda_3 X_{ti}$$
$$+ \sum_h \lambda_{4h} E_{hi} X_{ti} + \sum_h \lambda_{5h} E_{hi} U5_{94i} + \sum_h \lambda_{6h} E_{hi} Ul5_{94i}$$

[6] With the exception of France, where earnings are gross of taxes.

[7] By so doing I am forced to eliminate from the sample the data for Austria and Finland, that are available only for 1996.

$$+\lambda_7 X_{ti} U5_{94i} + \lambda_8 X_{ti} Ul5_{94i} + \Delta\epsilon_{ti} \quad (3)$$

where λ_k are combinations of the parameters in (2). In this empirical setup, unemployment experience and duration affects subsequent earnings growth if λ_o and λ_1 are different from zero. This effect varies with experience if λ_7 and λ_8 are different from zero, and with education if λ_{5h} and λ_{6h} are different from zero. When unemployment has only a temporary negative influence on earnings, I expect λ_o and/or λ_1 to be positive, thereby reflecting the fact that earnings in 1994 decline but earnings in 1996 remain unchanged as a result of unemployment. When the negative influence is permanent, however, it affects subsequent earnings growth only if it shifts earnings to a lower growth path.

The temporary shock $\Delta\epsilon_{ti}$ is unlikely to be correlated with education, experience and unemployment, that are all predetermined, but can induce endogeneity in employment status in 1996 because of the effect this shock can have on turnover decisions. I follow Blundell, Dearden and Meghir [1994] and deal with this problem by estimating an employment selection term θ_E from an employment probit, where the dependent variable is employment in 1996, conditional on having been employed in 1994, and the explanatory variables, drawn from the 1994 survey, are marital status, days of absence, health conditions, assignment to private employment, hours worked, training and job search in 1994 and $U5_{94}$[8].

4 The Results

The data show that the percentage of individuals who have experienced unemployment during the five years before 1994 varies by educational attainment and ranges from 19.5% among those with less than upper secondary education to 13% among college graduates. Similarly, the percentage of individuals who have experienced at least one unemployment spell longer than 1 year in the five years before 1994 ranges from 7.41% among the less educated to 3.96% among the more educated.

Table 1 shows the summary statistics of the variables in (3) and Ta-

[8]Results on the employment probit are available from the author upon request.

ble 2 presents the results of the estimate of (3). In the regressions, I only include earnings growth within the range [-100% ,100%]. For ease of interpretation, I exclude from Table 2 the coefficients associated to unemployment, unemployment duration and to the interactions involving unemployment that are not significantly different from zero[9]. The first two columns in Table 2 show the findings for both sexes and the remaining columns are devoted to the results by gender. I find that:

- unemployment before 1994 significantly reduces the earnings growth of college graduates and of employees with upper secondary education;
- the negative impact of unemployment on earnings growth is higher among males than among females;
- long term unemployment, defined as a spell of unemployment longer than a year, negatively affects earnings growth, especially among females;
- the correlation between the temporary shock $\Delta\epsilon_{ti}$ and employment status in 1996 is positive among males and negative among females.

The negative impact of unemployment on the subsequent earnings growth of individuals with more education excludes the possibility that unemployment has only a temporary negative effect on earnings. The positive correlation between $\Delta\epsilon_{ti}$ and the employment status of male workers is consistent with the view that productivity shocks and employment move in the same direction over the business cycle. The negative correlation for females is somewhat puzzling, and suggests that females enjoy more leisure in the presence of positive temporary shocks.

Based on these results, and comparing individuals with the same measured characteristics who did not experience unemployment in the five years before 1994, earnings growth between 1994 and 1996 for a college graduate is 14.2% higher than earnings growth for an employee with

[9] In practice, I have eliminated sequentially from the original regression the variables with an insignificant coefficient.

less than upper secondary education. This relative gain falls to 9% when the comparison is between individuals with previous unemployment experience. Therefore, unemployment affects the earnings prospects of college graduates more than the earnings prospects of employees with less education.

When I compare a college graduate with no previous unemployment with a college graduate with the same characteristics who has had at least one spell of long term unemployment in the five years before 1994, the latter has an expected earnings growth that is 8.1% lower than the former. This differential is much higher than in the case of individuals with less than upper secondary education, who experience a decline lower than 3% in earnings growth between 1994 and 1996.

5 Conclusions

I conclude that individuals with higher education have more to lose in terms of subsequent earnings growth from the experience of unemployment. This result partially compensates the fact that more education reduces the incidence of unemployment: unemployment is less likely among the better educated, but its occurrence has more sizeable effects on subsequent earnings growth.

An important implication is that ignoring unemployment in the computation of the private returns to higher education has two effects on these returns: first, as mentioned by Nickell, it underestimates them, because the better educated have a lower risk of unemployment; second, it overestimates them, because it ignores that unemployment damages more the subsequent earnings of those with more education.

One question for future research is whether the negative effects of unemployment on subsequent earnings growth persist beyond the two years period considered in this paper or disappear over a longer span of time. This question cannot be answered using the European Community Household Panel and requires the availability of longer panels of individuals.

References

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Table 1. Summary statistics of the variables in the earnings growth regression.

	Mean	Stand. Dvt.
Δ lnW	.041	.358
Age	38.52	10.37
Exp	19.97	10.40
E_2	.413	-
E_3	.235	-
Gender	.584	-
θ_E	.394	.282

Note: gender is equal to 1 for males and to 0 for females.

Table 2. Earnings growth regressions. MF: males and females; M: males; F: females. Dependent variable: $\Delta \ln W$

	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
	MF	MF	M	M	F	F
$Gender$	.074**	.006	-	-	-	-
E_3	.142**	.016	.132**	.021	.144**	.023
E_2	.050**	.012	.056**	.016	.028	.018
X	-.0002	.0003	.0008*	.0004	-.001**	.0005
$Ul5$	-.029**	.011	-	-	-.051**	.013
XE_3	.001**	.0006	.002**	.0008	.002	.001
XE_2	.0005	.0005	-.0001	.0006	.002**	.0007
E_3U5	-.052**	.014	-.062**	.019	-.043**	.020
E_2U5	-.037**	.010	-.053**	.014	-	
θ_E	.004	.012	.065**	.020	-.031**	.015
$Nobs$	23261		13567		9711	
R^2	0.084		0.079		0.084	

*significant at the 10% level of confidence;** significant at the 5% level of confidence. Robust standard errors. Nobs: number of observations. Each regression includes a constant, country, occupation and sector specific dummies.