Educational mismatch and cognitive skills: effects on wages

Lucía Mateos-Romero
(Universidad de Extremadura)

Inés P. Murillo Huertas
(Universidad de Extremadura)

María del Mar Salinas-Jiménez
(Universidad de Extremadura)

The study of the economic effects of education has known a great interest since the development of human capital theory with the decisive contributions by Schultz (1960, 1962), Becker (1964) or Mincer (1974). The empirical literature confirms the positive individual returns in terms of employment conditions and higher wages (see Card, 1999; and Harmon et al., 2003). However, there is a growing dissatisfaction with the use of variables related to formal education as a proxy for human capital since these variables might not reflect the skills actually acquired by individuals. In this context, the analysis of the economic effects of human capital has recently advanced with the development of standardized tests to measure the skills actually acquired by individuals. The empirical evidence confirms the role of skills on the probability of employment and on received wages (see, for example, McIntosh and Vignoles, 2001; or Green and Riddell, 2003).

The literature that examines the economic effects of the educational mismatch has already a long tradition, dating back to the seminal work by Duncan and Hoffman (1981). The empirical evidence tends to confirm overeducated workers receiving higher wages than their properly matched co-workers but lower wages than the individuals who, with the same level of education, carry out a job for which they are properly educated. It is often argued, however, that part of the educational mismatch can actually reflect differences in skills acquired by individuals with similar levels of education.

Studies analysing the economic effects of education taking account of skills actually acquired by individuals are scarce, probably due to the lack of statistical sources providing information on individuals personal and work characteristics as well as on their skills. However, the OECD has recently developed the Programme for the International Assessment of Adult Competencies (PIAAC). This database offers
valuable information which allows one to analyse the economic effects of education taking account not only of the amount of education received but also of its quality as reflected in the acquisition of cognitive skills.

In this context, the objective of this study is to analyse the economic effects of education and educational mismatch in 12 OECD countries considering both the years of schooling and the core skills actually acquired by the individuals.

The empirical analysis bases on the framework proposed by Mincer (1974), with the estimation of a wage equation that relates individuals’ years of schooling and experience with their earnings. The basic equation to estimate is as follows:

$$\ln(w_i) = \alpha + \beta S_i + \gamma_1 E_i + \gamma_2 E^2_i + \delta X + u_i$$  \hspace{1cm} (1)

In order to assess whether there are differences in returns to education depending on the job’s requirements, Duncan and Hoffman (1981) proposed a variant of the mincerian wage equation. This specification, usually known as ORU (Over-, Required-, and Under-education), takes the following form:

$$\ln(w_i) = \alpha + \beta_o S_o + \beta_r S_r + \beta_u S_u + \gamma_1 E_i + \gamma_2 E^2_i + \delta X + u_i$$  \hspace{1cm} (2)

To analyse the economic effects of education we estimate different specifications of models (1) and (2), taking account not only of years of education but also the level of skills actually acquired by the individuals.

In this study the sample was limited to employees with an hourly wage lower than 200 euros and for whom data is available for all control variables. Since the sample selection in the PIAAC database does not follow a pure random sampling, the Jackknife procedure is applied in the econometric analysis, allowing to take account of weights included in the PIAAC database for each individual in the sample and its 80 replications when standard errors are estimated, thus ensuring that the estimates are representative of the entire adult population aged 16 to 65 years.

The results indicate that both years of education and acquired skills contribute to determine wages, being the results obtained as regard years of education robust to the introduction of scores assessing the literacy and numeracy skills. Returns to education slightly decrease, however, when basic skills are introduced into the analysis, suggesting that part of the positive effects of education on wages manifested through
skills actually acquired by individuals. The effects of basic skills are also robust to the introduction of years of schooling in the specification, showing that both aspects of education (years of schooling and skills acquired) contribute to explain, among other variables, individuals’ wages.

When estimating the returns to years of required education and to years of educational mismatch, it is found that educational mismatch contributes to explain some of the observed wage differentials between workers who occupy a similar position, with positive returns to years of over-education and wage penalties in the case of under-education. Whereas assignment theories assume that the effects of educational mismatch on wages are due to the skills mismatch which goes with that educational mismatch, the results obtained in this study reject this hypothesis by showing that educational and skills mismatches are different phenomena being the educational mismatch, and not the mismatch in skills, what actually affects the determination of wages.

Finally, when analysing the heterogeneity in skills among workers it is found that returns to education and to years of educational mismatch vary depending on the level of skills actually acquired by workers.