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The role of human capital and technological change in overeducation

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Abstract

We employ Portuguese data to test two competing hypotheses about the impact of overeducation and undereducation on earnings. First, undereducation is the outcome of a process in which market-acquired capital substitutes for insufficient school-supplied qualifications, whereas overeducation is associated with excess schooling but short tenure and job experience. The second hypothesis calls upon changes in the technology of production and marketing to explain why some workers end up as inadequately educated for the tasks that they perform, while at the same time, others (holding identical jobs but more schooling) are perceived to be overeducated. Our findings appear to leave little room for explanations of the overeducation/undereducation phenomenon rooted in the trade-off between different forms of human capital. The hypothesis of technology-induced pockets of overeducation and undereducation is consistent with Portuguese reality, characterized in the last decade by intensive efforts to promote economic growth, to modernize the industrial structure and to upgrade educational qualifications. [*JEL* J24, I21, O30] © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

In the growing body of literature on overeducation and undereducation, perhaps the single most remarkable feature has been the consistency and robustness of empirical findings concerning the relationship between overeducation/undereducation and individual earnings. As stylized facts go, overeducated workers tend to earn higher returns to their years of schooling than co-workers who are not overeducated, but lower returns than workers with similar education who work in jobs that require the level of education they possess. Symmetrically, undereducated workers receive lower returns than their co-workers with the required, and thus higher, level of education, but higher returns than employees who have the

same educational attainment and work in jobs that just require their level of education.

These findings have been reported in a number of studies for economies at different stages of development, with widely different labor-market institutional frameworks or education systems, and employing strikingly different means of measuring overeducation and undereducation. A representative survey across countries might include reference to Duncan and Hoffman (1981); Rumberger (1987); Sicherman (1991); Tsang, Rumberger and Levin (1991) and Cohn and Khan (1995) for the United States; Hartog and Oosterbeek (1988) and Groot (1993) for the Netherlands; Alba-Ramírez (1992) for Spain and Kiker, Santos and De Oliveira (1997) for Portugal. Some authors employed workers' self-evaluation of educational requirements to measure overeducation/undereducation, as is the case with the seminal studies for the US and the Netherlands, whereas others relied upon independent evaluations of functional requirements

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and job-required qualifications (Burris, 1983; Tsang et al., 1991), and still others gave preference to data-based criteria (Verdugo & Verdugo, 1989; Kiker et al., 1997).

Despite the robustness of the findings, there is still little known about the inner mechanisms of the overeducation/undereducation phenomenon. Paucity or insufficiency of data generally have precluded analysts from probing deeper into the issue. It may be easy to understand why undereducated workers would prefer jobs for which they are not qualified enough, or why employers would hire overeducated workers below the rates of pay they could get at a job where their educational attainments were fully utilized; it is not as easy to explain why employers hire undereducated workers at a premium over their market rate, or why overeducated workers accept positions that pay below their market rate.

Two possible explanations for the existence of overeducation/undereducation emphasize either the role of human capital or that of technological change. Under the former, it is often argued that overeducated workers may substitute education for the lack of previous job experience, accepting jobs requiring less education than they actually possess in order to acquire the necessary experience and improve their chances of finding a better job match (Rosen, 1972; Sicherman & Galor, 1990). Similarly, undereducated workers may substitute experience for the lack of education and thus acquire a mix of human-capital endowments adequate enough for job performance. Overeducation might be seen as a transitory situation (at the individual level), as promotion (within the job) or job mobility would lead overeducated workers over time to positions compatible with their educational achievements. On the contrary, undereducation might be thought of as a long lasting situation, where employers and employees have reached a point where accumulated experience compensates for the lack of school-acquired qualifications. If this is the case, we would expect that workers who happen to hold a job for which they are not fully qualified would not experience a deterioration of their earnings status as tenure with the same employer increases. Overeducated workers, on the other hand, being more prone to turnover, should not expect substantial gains from staying longer with the same employer. Further, if overeducation has negative effects on productivity, by increasing job dissatisfaction and adverse workplace behavior (Tsang & Levin, 1985; Tsang, 1987), increased tenure would not be rewarded. This line of reasoning emphasizes a possible trade-off between different forms of human capital.

A second explanation for the overeducation/undereducation phenomenon focusses on the effects of technological change. It is argued that the rapid pace of technological change may require school-provided skills higher than those possessed by currently employed workers. In the presence of positive adjustment costs, replace-

ment of the workforce by better-educated workers cannot be made instantaneously. That is, both the employer and the employees could be locked into a situation of disequilibrium (at least in the short run) and hence pockets of undereducation would arise. In less flexible labor market settings (as is the case, in general, in European countries), these pockets might be persistent. At the same time, firms upgrade their hiring standards and recently-hired employees, with higher educational qualifications than their older co-workers, are perceived to be overeducated.

Empirically testable hypotheses derived under the technology-based hypothesis contradict those of the human capital approach. Overeducated workers are those that the employer wishes to retain and for whom the bulk of training and firm-specific investments is slotted; hence, their tenure is rewarded. Undereducated workers, on the other hand, confined in dead-end jobs, should expect no such benefits from continuing with the same employer.

We report below on research results that appear to be more supportive of the role of technological change than of human capital in explaining overeducation/undereducation for the Portuguese economy. Taking advantage of a data set of uncommon richness, we are able to probe deeper into the links among overeducation/undereducation, job characteristics and workers' earnings than perhaps others have done.

The paper is organized as follows. In Section 2 we deal with data and measurement issues and present arguments in favor of a new approach towards the quantification of overeducation/undereducation. In Section 3 the models are explained and the hypotheses we propose to test are set forth. Results are discussed in Section 4 and some concluding remarks are offered in the final section.

2. The data and measurement issues

The sample used in this study was drawn randomly from an extensive data set based on staff logs (Quadros de Pessoal) collected in 1991 by the Portuguese Ministry of Employment from all business firms with more than one paid employee. Available in the data set is information on workers' characteristics such as gender, age, education, skill/qualification level, occupation, years with the employing firm, hours worked and earnings, and on-job attributes such as type of industry, geographic location, plant size, type of management and form of ownership. With this information, the variables listed in Table 1 were constructed. Sample means and other descriptive statistics are given in Table 2.

In the regressions below, the dependent variable, $\ln Y$, is the natural logarithm of gross monthly earnings in Portuguese escudos. Independent variables include education (EDUC) which is proxied by the number of years

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