2. Much ado About Nothing?
What does the Overeducation Literature Really Tell us?

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2.1 INTRODUCTION

There is now a substantial literature both in North America and Europe covering various aspects of imperfect job matching in relation to the educational attainments of workers and the educational requirements of jobs. We shall for shorthand purposes refer to this as the overeducation literature, but it has links with issues such as skill bumping, sheepskin effects\(^1\) or more broadly with the literature on internal labour markets and labour market discrimination. Its coming of age is reflected in a special issue of the Economics of Education Review on Overschooling (Oosterbeek, 2000), two survey papers by Green, McIntosh and Vignoles (1999) and Hartog (2000), and an edited book (Borghans and de Groot, 2000a) as well as a substantial literature, much of which is summarised in Table 2A.1. Its significance rests on the fact that there has been a major expansion in the proportion of the population acquiring educational qualifications, particularly but not exclusively at degree level in many countries. Furthermore, the incidence of both over- and undereducation appears to be substantial with their incidence ranging between below 10 and above 40 per cent in Europe, though some differences reflect differences in measurement. In countries such as the UK, Germany and Portugal, studies have generally found overeducation to be more pronounced than undereducation, while in the Netherlands and Spain, some studies have found the reverse. Also in some cases there are gender differences.

Overeducation raises a series of questions which this paper will seek to address. First, are there any challenges to human capital theory, which in its crudest form suggests that the rate of return to education is not contingent on how or where the qualifications are utilised in the labour market? (Section 2). Second, what is it that we are measuring in terms of a perceived mismatch between educational qualifications and job requirements? If overeducated workers are of poor quality for their level of qualification, overeducation does not nec-
essarily imply any inefficiency in the operation of the labour market (Section 3). Third, what is the impact of overeducation on the level of earnings in both the short-run and the long run? If there is a wage premium (cost), what form does this take and why are employers (employees) prepared to countenance it? Are earnings influenced by the distribution of workers with differing levels of education within particular establishments? (Section 4). Fourth, what is the impact on the provision of training by the employer? (Section 5). Fifth, does overeducation vary across regional locations? (Section 6). Sixth, what other questions are there relating to the dynamics of overeducation? For instance, to what extent does overeducation emerge as a consequence of overeducated workers moving into existing jobs or taking on new jobs and how does this impinge on the employability of previously matched workers? Does downward skill bumping continue throughout the skill distribution or is it restricted to certain skill levels? (Section 7). Seventh, how does overeducation impact on particular groups in the labour market as distinguished by their gender, age and ethnic origin? (Section 8). Finally, is overeducation a temporary or a permanent phenomenon and how does this relate to the operation of sheepskin effects? (Section 9).

2.2 CHALLENGES FOR HUMAN CAPITAL THEORY

The standard Mincer human capital model is sufficiently well-known that there is little need to express it formally save to say that it uses both years of education and experience in quadratic form. This model has been remarkably useful in explaining various labour market outcomes. Yet, it is not often subject to formal econometric tests relating to the normality and the homoscedasticity of the disturbance term and specification error, which relates to the assumption of functional form. Nevertheless, such tests suggest, *inter alia*, that at least for British data educational dummies outperform years of education both in terms of the Ramsey reset test and explanatory power. Potential problems arise from ability bias, the endogenous nature of schooling with respect to the optimal investment decision and measurement error. Furthermore, the long-run equilibrium specification of the human capital model omits the demand side of the labour market altogether. As Hartog (1986) states:

The model is compatible with perfect substitutability of labour by schooling levels within each and every job, as well as with ever perfect allocation; imperfect substitutability within jobs is circumvented by always assigning an individual to the job where his education has the proper value. Both assumptions are quite strong and seldom made explicit.

Yet, there is substantial evidence that precisely where a worker is employed has a significant effect on earnings. Thus, Bowles, Gintis and Osborne (2001) noted that apparently similar individuals receive quite different levels of earnings across the US. Correcting for race and sex as well as other personal characteristics including age, schooling experience and parental background between two-thirds and four-fifths of the variance in the log of hourly wages is unexplained. While transitory elements of pay and response error may explain some of this away, perhaps half of the variance in earnings is unexplained by the standard demographic variables. Studies by Wachtel and Betsey (1972), Dickens and Katz (1986), Krueger and Summers (1987) and Groshen (1991a, 1991b) found that a substantial part of the variance in wage earnings in the US can be explained by industrial structure. Krueger and Summers, for example, found that the pattern of inter-industry wage differentials across countries appears to follow a regular pattern with manufacturing industries tending to pay about 20 per cent more than service industries for comparable workers. Similar regularities are found for gender, age group and occupation.

The extreme position on the demand side is taken by Thurow (1975) who argued that marginal productivity resides in the job rather than with the worker. His so-called job competition model assumes that employers use personal characteristics including education as criteria for hiring workers, simply on the supposition that employing more educated workers in a job will require a lower investment in training by the firm. In the extreme, education simply serves to obtain the job, and there is a zero return to human capital beyond that required to do the job, as all workers in a given job are paid the same wage. Thus

$$\log W_t = \alpha_0 + \alpha_1 q' + \epsilon$$

(2.1)

where $q'$ equals the qualifications required to do the job. Any qualifications in excess of $q'$ are essentially unrewarded, so that we may regard the Mincer model and the Thurow model as the two extreme cases, being on the one hand purely supply side driven and on the other purely demand side driven.

A third strand of the literature is based on the job assignment model which goes back to Roy (1951) and Tinbergen (1956) and was developed further by Hartog (1977) and Sattinger (1993). This model is based on the proposition that there is an allocation problem in assigning heterogeneous workers to jobs that differ in their complexity. Hartog, for example, views labour supply and demand as consisting of a bundle of capabilities, and suggests that up to 40 per cent of the income variance can be attributed to capability variables. Following Tinbergen, let us suppose that $s_i$ equals the degree to which a skill $i$ is required and $t_i$ the degree to which it is present among potential employees. On the demand side, employers will specify a frequency distribution $M(s_1, \ldots)$ of the number of employees they require in each region of the variable $s_i$. On the supply side, a similar frequency distribution $N(t_1, \ldots)$ describes the availability of skills among potential employees. In practice, the frequency distributions are unlikely to match and overeducation may be a persistent problem if the job structure is relatively unresponsive to changes in relative supplies of educated labour. Earnings are then a function of both worker and job characteristics. We
can encompass both the Mincer and Thurow models in a more general equation (sometimes referred to as the Duncan and Hoffman or the ORU model).

\[
\log W_t = \beta_0 + \beta_1 q' + \beta_2 q'' + \beta_3 q'' + \epsilon_t \tag{2.2}
\]

in which actual educational qualifications are \(q\) decomposed into required \((q')\), surplus \((q'')\) and deficit \((q''')\) qualifications in relation to those necessary to do the job. The human capital specification implies that \(\beta_1 = \beta_2 = -\beta_3\) and the job competition specification that \(\beta_2 = \beta_3 = 0\). The hypothesis of earnings equations restricted to the human capital and job competition models can be tested with an F-test on the residual sum of squares. Such tests have been conducted on Dutch data (Hartog, 1988; Hartog and Oosterbeek, 1988) and by Sloane, Battu and Seaman (1999) using British data. In each case it was found that the job assignment model outperformed both the standard human capital and job competition models.

Using such an assignment approach, Sicherman (1991) suggests that there are two stylised facts relating to the earnings of over- and undereducated workers. The first is that earnings of overeducated workers are less than the earnings of those with the same level of education but who are in jobs with the required level of education, but more than those in their current occupation with the required level of education. The second stylised fact is that the earnings of the undereducated workers are more than the earnings of those with the same level of education but who work in jobs which require that level of education, but less than the earnings of their co-workers who have the required but higher level of education. These stylised facts have been found in a number of studies, but it is far from clear why and how employers are able to differentiate the pay of their workforces in this way. One possible explanation relates to the internal labour market. Workers may be initially hired for jobs below their educational capabilities with the expectations of internal promotion (Sicherman and Guler, 1990). This has been studied for the US, where seniority is particularly important, by Hersch (1993), for Spain by Garcia-Serrano and Malo-Ocana (1996) and for the Netherlands by Dekker, de Grijp and Heijke (2002). The Spanish study found, in fact, controlling for personal characteristics in a logistic regression model that overeducated workers have a lower probability of being promoted than properly matched workers. The Dutch study also found, contrary to expectations, that upward mobility was not significantly higher in the internal labour market than in the ‘supplementary’ market. While overeducation has the expected positive effect on upward mobility in general the coefficient is not significant for the internal labour market. Another possibility is that formal education is a substitute for other forms of human capital investment. That is, over- or undereducation may be a substitute for experience, tenure and on-the-job training, but this does not necessarily lead to the stylised facts referred to above. A third possibility is that overeducated workers are of inferior quality than matched employees with the same qualifications, but again it is not clear why such workers should attract a wage premium.

Recently, Bulmahn and Kräkel (2000) have offered a novel explanation. Employers hire overeducated workers as an insurance against the breakdown of the production process, since such workers are capable of improvisation. They tested this using firm data in Westphalia, and speculated that the implication of their model is that, if firms hire overeducated workers for insurance purposes this will lead to a lower average salary per white-collar worker and a positive correlation between material stock per white-collar worker and the average salary per white-collar worker. While their results are consistent with their model, the test does not appear to be particularly strong. Furthermore, the alternative of buying in external help when needed would seem likely to be much more cost effective. Answers to these questions seem to require a detailed study of employers to ascertain what their precise recruitment and promotion strategies are, but such studies are presently lacking.

2.3 MEASUREMENT ISSUES

Three main alternative measures have been used to estimate the degree of over-education:

(i) Systematic job evaluation, which states the level of qualifications required to perform a particular job. This is referred to as an objective measure though it is better regarded as an objective measure based on subjective values. It ignores the possibility that there may be a distribution of educational levels suitable for performing different tasks within a broad occupation and may become inappropriate over time as the nature of a job alters.

(ii) Worker self-assessment is referred to as a subjective measure and suffers from the fact that different questions may be asked, such as ‘how much education is required to get a job like yours?’ or ‘what level of education is required in order to perform the job?’ If there is credentialism, firms may specify a higher level of education to obtain the job than is required to perform it adequately, thereby leading to skill under-utilisation.

In both these measures reference is made to the level of education rather than the type of education. Thus a worker may still be mismatched if the level of education is appropriate, but its type inappropriate, such as a graduate in English being hired as a statistician. There is also disagreement over whether (i) or (ii) is more accurate in practice in defining the true educational requirements of jobs. Thus, van der Velden and van Smeorenburg (1997) favour (ii) on the grounds that the job evaluation method systematically over-estimates the
level of overeducation, while Hartog and Oosterbeek (1998) suggest worker assessment may lead to an upward bias.

(iii) The third method is used where there is no direct question on overeducation and is referred to as the empirical method. Mismatching is said to occur when the level of education is more than one standard deviation above or below the mean. This cannot be directly compared with the above measures as it ignores minor differences between actual and mean education. This difference is more striking when the question asked under (i) and (ii) requires a simple yes or no response. It also implies a symmetry between over- and undereducation, which is rarely found in practice and thus is likely to provide biased estimates. Indeed, it is doubtful whether we should refer to over- or undereducation in this context. If we consider individual occupations some will require rigid qualifications, such as in the professions, whilst in others educational qualifications may be relatively unimportant. It is, however, useful to consider whether the distribution of educational qualifications within particular occupations is narrow or broad. The analysis of overeducation by occupation is, however, a relatively neglected issue in the literature.

Notwithstanding the above, given asymmetry between over- and undereducation it seems more appropriate to use the modal rather than the mean measure of education. This also has the advantage of being less sensitive to outliers or technological change. Such a measure has been used, for example, amongst others, by Alpin, Shackleton and Walsh (1998), Kiker, Santos and De Oliveira (1997), De Oliveira, Santos and Kiker (2000) and Bauer (2002). De Oliveira, Santos and Kiker noted that in some occupations the number of workers may be so small or the dispersion of actual qualifications so wide that any measure of central location is likely to be unreliable. Thus, as a rule of thumb they limited their analysis to cases where the modal number of years of education was shared by at least 60 per cent of the workers in that occupation.

The frequent omission of any measure of ability in studies of overeducation is particularly serious because we do not know whether the overeducated worker is in this state simply because of low ability given the level of education. It is usually assumed in the literature that the more able an individual, the longer he or she will stay on at school. This would result in an upward bias in the ordinary least squares (OLS) estimated return to years of schooling (or qualifications dum- mies) and, therefore, an over-estimation of the rate of return to schooling. Hartog (2001) interpreted the literature as suggesting that the schooling coefficient would be reduced by no more than a third if ability variables such as IQ test scores were included, with a central tendency perhaps in the range of 10 to 15 per cent.\textsuperscript{5} At least four procedures have been used to deal with this problem—IQ tests, identical twins or siblings data, panel data, which treats ability as a constant over time and an instrumental variable technique, which purges schooling of any ability relationship. Without such a correction the overeducation literature implicitly assumes not only that ability bias is not a problem, but also that there is no ability variation within a particular education qualification level.

Few authors compare the results of using different measures of overeducation on the same dataset. One exception is Battu, Belfield and Sloane (2000). Using data from two cohorts of UK graduates they found that the scale of overeducation varies with measurement techniques, with only weak correlations between their three measures (answers to a yes/no question on whether a degree was a job requirement in current main employment, a measure of whether the modal worker was a non-graduate and answers to a question on how dissatisfied the graduate was with the match between work and qualifications). The effects of overeducation as measured in the three cases on earnings and job satisfaction are similar, despite the fact that each measure identifies different individuals as being overeducated (see Table 2.1, which provides correlation coefficients between different measures of overeducation with individuals as data points). Similar results were obtained for the Netherlands by Groot and Maassen van den Brink (2000b). Their three measures are the standard empirical method, a comparison between the education level and job level of the worker and worker self reports. They found that only a small fraction of those workers counted as overeducated when any of the three measures is counted as so by all three. Further, unlike Battu, Belfield and Sloane they found that the estimated rates of return to over- and

\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|c|}
\hline
\textbf{Degree requirements} & \textbf{Occupational skill level} \\
\textbf{1985} & \textbf{1990} & \textbf{1985} & \textbf{1990} \\
\hline
\textbf{Degree requirements} & \textbf{men} & \textbf{women} & \textbf{men} & \textbf{women} & \textbf{men} & \textbf{women} & \textbf{men} & \textbf{women} \\
\hline
Occupational skills level & 0.25 & 0.45 & 0.37 & 0.35 & 0.20 & 0.39 & 0.29 & 0.41 \\
Work match (mid cut) & 0.21 & 0.57 & 0.31 & 0.35 & 0.24 & 0.49 & 0.33 & 0.34 \\
Work match (third cut) & 0.21 & 0.42 & 0.31 & 0.35 & - & - & - & - \\
\hline
Degree requirement: & Yes/no response to question: "Was the degree gained in 1985 or 1990, a requirement in the job specification for your current main employment (including self employment)?" \\
Occupational skills-level: & More than 50 per cent of workers have a highest qualification below degree level. \\
Work match (mid cut): & Individual responses to the question: "How satisfied are you with the match between your work and your qualifications (in your current main job)?" \\
Work match (third cut): & A mid way cut off corresponds to a satisfaction score of 3 or less on a 6-point scale and a third cut corresponds to a satisfaction level of 1 or 2. \\
\hline
Source: Battu, Belfield and Sloane (2000). \\
\end{tabular}
undereducation varied markedly among the three definitions. Thus, one must conclude that the validity and reliability of mismatching measures is poor and any results from such studies should be treated with a degree of caution.

The key issue is, however, to what extent do perceived mismatches represent labour market sorting on the basis of the varying quality of labour within educational levels. This should be viewed in the context of increasing numbers of qualified individuals. If educational standards have fallen, the employer response might be to upgrade entry qualifications to ensure that new entrants have appropriate skills (grade-drift). Alternatively, employers may take advantage of a larger pool of qualified applicants by upgrading some traditionally lower-level jobs or recruiting, say graduates to previously non-graduate jobs (qualifications inflation). Little is known about the extent to which employers have gone down these paths, if at all, and if demand for highly qualified manpower has increased at least as fast as supply there would not necessarily be a surplus of qualified manpower to make such choices feasible.

Assuming that the heterogeneity of graduates has increased Chevalier (2000) distinguished between two categories of overeducated graduates by making a distinction between apparently overeducated and genuinely over-educated graduates (Table 2.2). In the former case, where mismatch is minor, these individuals should receive more initial training than matched workers to offset their inferior quality, whereas in the latter case they should receive less initial training, since their superior quality means they learn faster. He then proposed an alternative measure of overeducation based on the answer to a job satisfaction question, namely, 'how satisfied are you with the match between your work and your qualifications?' This was then used to form a dichotomous variable with satisfied workers classified as being apparently overeducated and dissatisfied as genuinely overeducated. We have two types of graduates—high-skilled (g) and low-skilled (type 1) and three classifications of jobs—graduate (G), upgraded (U) and non-graduate (L). All graduates who are in graduate jobs are defined as matched whatever their satisfaction, with all others dissatisfied described as overeducated. Chevalier estimated that two-thirds of the overeducated are only apparently so. However, this is dependent on both the classification of jobs according to expert opinion, the division of graduates into two types and the interpretation of the job satisfaction question.

A similar type of approach has been adopted, using a 1991 survey of graduates from Dutch universities and vocational institutes as part of the Higher Education and Graduate Employment in Europe project by Allen and van der Velden (2000), who allowed job levels to vary for a given educational level match. They distinguished a formal education mismatch (referred to as educational mismatch) from a mismatch between acquired and required skills (skill mismatch). Their dataset included two key questions. First, whether the current job offers sufficient scope to use acquired knowledge and skills (utilisation). Second, whether the graduate would perform better in their current job if additional knowledge and skills had been acquired (skill deficit). About 15 per cent of all graduates in their sample experienced under-utilisation, but a much larger proportion experienced high levels of skill deficits; and this measure was only weakly related to educational mismatches. Furthermore, their results cast doubt on one of the key assumptions of the assignment theory, namely, that a mismatch between education and jobs necessarily implies a serious mismatch between available and required skills. Skill mismatches have a strong negative impact on job satisfaction, unlike educational mismatches. One interpretation of their results is that graduates with the same level of education but differing abilities are efficiently sorted into the labour market according to their abilities, so that the apparent effects of over- and undereducation are spurious, masking unmeasured ability differences.

A third approach is to test directly whether the overeducated are less able than those who are properly matched. This was attempted by Green, McIntosh and Vignoles (1999) using the National Child Development Survey (NCDS), which, unusually, has questions on both aspects. Their results indicated that individuals who had higher scores in a maths test when aged 16 were significantly less likely to be overeducated later in their working lives, and this effect was substantial. This is also consistent with the finding that there are higher returns to numerate degrees. Further results from their analysis of the International Literacy Survey (ILS) support the argument that those individuals who lack good quantitative skills are more likely to be overeducated. Using the German Life History Study (GLHS), Büchel and Pollmann-Schult (2001) found that a poor grade in the school-leaving certificate had a strong effect on the later risk of overeducation for those graduating with a vocational degree, after controlling for selectivity effects.

Taking these results together, it seems clear that a substantial part of what is referred to in the literature as overeducation simply reflects the heterogeneity of individual abilities and skills within particular educational qualifications. Far from representing inefficient allocation this indicates that the labour market

<table>
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<tr>
<th>Table 2.2 Genuine and apparent overeducation</th>
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<tr>
<td>Skilled graduate (g)</td>
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<tr>
<td>Less skilled graduate (type 1)</td>
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<tr>
<td>Graduate job (G)</td>
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<tr>
<td>Perfect match (Gg)</td>
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<td>X</td>
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<td>Upgraded job (U)</td>
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<td>Genuine overeducation (Ug)</td>
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<td>Apparent overeducation (U1)</td>
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<td>Non-graduate job (L)</td>
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<tr>
<td>X</td>
</tr>
<tr>
<td>Genuine overeducation (L1)</td>
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Source: Chevalier (2000).
is functioning effectively in allocating workers to jobs which match their abilities and skills.

2.4 THE IMPACT ON PAY

As we saw earlier, there are certain stylised facts with regard to the impact of over- and undereducation on pay although, as Hartog (2000) pointed out, it would, in view of the previous discussion, be more informative if we knew the impact on productivity rather than on pay. Tsang (1987) had studied this, finding that reductions in job satisfaction lower productivity, with the implication that overeducation must do so too. This would seem to lead to the expectation that overeducation should lower pay rather than increase it relative to those who are properly matched. However, Büchel (2000) analysed several firm-related aspects of worker productivity using the German Socio-Economic Panel (GSOEP) over the period 1984 to 1995. He found, in fact, that overqualified workers were healthier, more strongly work orientated, more likely to participate in training and had longer tenure than their matched colleagues. This he interpreted as consistent with the payment of a wage premium for surplus education.

In fact, Groot and Maassen van den Brink (2000a) in their meta-analysis summarised 25 studies as producing unweighted average rates of return of 5.6 per cent for attained years of education, 7.8 per cent for required years of education, 3.0 per cent for years of overeducation and minus 1.5 per cent for years of undereducation, confirming Sickmer’s stylised facts (referred to in Section 2) and suggesting a real impact on pay. Whilst they find no tendency for overeducation to increase or decrease over time they suggested that overeducation has increasingly been concentrated among lower ability workers for whom the pay-off to a year of education is low. Likewise, Cohn and Ng (2000) found for Hong Kong that the wage benefits of overeducation decline as one gains more labour market experience. This is consistent with the existence of sheepeen effects. Workers are sorted into their most appropriate jobs after several years or so on the basis of actual performance rather than their educational qualifications. Again, this may be picked up by researchers without having such information as mismatching, when in reality productivity has been maximised. Evidence consistent with the presence of sheepeen effects has been found, for example, by Belman and Heywood (1997) and Denny and Harmon (2001).

The earlier discussion suggests that the returns to education for overeducated workers will vary according to their ability and skills, and there is some evidence for this. Thus, Chevalier (2000) found a pay penalty for overeducated graduates compared to matched graduates, which is 7 per cent for apparently overeducated graduates and 26 per cent for genuinely overeducated graduates, the latter suffering a pay penalty, which virtually wipes out the advantage of having a degree. However, this 7 per cent penalty for apparently overeducated graduates suggests that not all their overeducation is apparent as opposed to genuine. Allen and van der Velden (2001) found that skill under-utilisation reduced earnings by 6 per cent when over- and undereducation were excluded from their estimating equation as independent variables and 3.2 per cent when they were included, in both cases with significant coefficients. Battu, Belfield and Sloane (1999) found that class of degree had a significant effect on graduate earnings both one year and six years after graduation, with a first class degree having a premium of 8–13 per cent over lower second class honours. Similarly, the type of institution from which one graduated mattered, with those graduating from more established universities earning 8–11 per cent more than those graduating from former polytechnics, holding constant a measure of overeducation. Using a different dataset (the 1980 National Survey of Graduates and Diplomates) Dolton and Vignoles (2000) found, however, no evidence that overeducated workers with good degrees earned more than those with poorer degrees. They did, however, find that those with better degree classifications and those from more established universities, as opposed to polytechnics, were less likely to be overeducated.

Wage effects of overeducation are unlikely to be constant over all education levels or occupations. Thus, Vahey (2000) found for Canada that overeducated men only received a wage premium over properly matched workers in their job when the required level of education was a first degree. For undereducated males a wage penalty compared to properly matched workers only applies at lower required levels of education. For women, however, overeducation and undereducation have no impact on earnings, in contrast to findings in other countries. In one of few studies including an occupation-specific model, Verdugo and Verdugo (1989) found that the earnings of over-, adequately and undereducated workers do vary substantially by broad occupational group. Of nine occupational categories overeducation has significant effects on earnings in five cases and for undereducation significant effects in only three.

There is some recent evidence that returns to education may be affected by the education levels of co-workers, and this could be one explanation why employers pay a premium to overeducated workers if indeed this is really the case. Workers do not generally work autonomously—many tasks require teamwork, so that the productivity of workers is influenced by the performance of their colleagues. These positive effects may also be produced by information sharing, co-training, monitoring and more general support. In order to test these propositions matched samples of employers and employees are required. Battu, Belfield and Sloane (2002) have tested these hypotheses on the 1998 establish-
2.5 THE IMPACT ON ADDITIONAL TRAINING

If initial education and retraining are substitutes, overeducated workers will be less likely to participate in additional training than workers who are adequately educated. Less training will be required to perform the job because their education gives them more skills and experience, which increases the likelihood of being overeducated. Overeducated workers are more likely to be overeducated, while undereducated workers are less likely to be undereducated. The substitution hypothesis suggests that each group will acquire more skills and experience, which will increase their likelihood of being overeducated, and that workers who are more skilled and experienced will also provide the employer with more continuity in the labor force. Strong evidence in support of the substitution hypothesis was found by Alba-Ramirez (1993) using British data and Mertens, Shiere, Battu, and Seaman (1994) using Spanish data. The first of these found that underemployed workers were more likely to acquire more skills and experience, while the second found that underemployed workers had more experience, longer tenure with the firm, but also took longer to become overemployed. In both cases, the evidence was consistent with the substitution hypothesis. These findings tend to confirm the hypothesis that education and training can be substitutes, at least in the short run, and that workers who are more skilled and experienced are less likely to be overeducated.
were significant for both under- and overeducated workers, but with opposite signs. Büchel and Mertens, using the GSOEP, found a very strong correlation between formal and informal training and mismatch, with overeducated workers having far less access to on-the-job training and undereducated workers far more than adequately educated workers. In the US Robst (1995b) found, as did Büchel and Mertens, that overeducated workers had fewer opportunities to learn things that they considered useful for their future career, while Hersch (1995), for an individual firm, found likewise that training time for entry-level jobs was inversely related to overqualification and overqualified workers received less training and promotions. Van Smoorenburg and van der Velden (2000), using Dutch data, found also that overeducated workers were less likely to participate in firm training than properly matched workers, although an earlier Dutch study (Groot, 1993) could find no such relationship. Yet, they could not detect any relationship between undereducation and the likelihood of participating in training, whereas the earlier Groot study found that undereducated workers had the lowest probability of such participation. Interestingly, Smoorenburg and van der Velden found that school leavers who held a job outside their field of study were more likely to participate in training than those who were employed in their ‘own’ field.

What these and other studies appear to show is that formal education is but one form of human capital and deficits in it can be remedied by a number of means, one of which is on-the-job training. On the other hand, overeducated workers may be attractive to the employer precisely because less on-the-job training is required in their case than in the case of properly matched workers. For some, the difference may simply be shorter on-the-job training periods.

2.6 THE REGIONAL DIMENSION

One explanation for overeducation is restricted geographical job search. This includes two elements—the amount of time and effort that individuals are willing to spend on commuting and their willingness to migrate to another region. Frank (1978) noted in particular that for a married couple the search for a pair of jobs would be constrained geographically and only by coincidence would the best job offer for both spouses occur in the same location. If the family’s objective is to select the pair of jobs in a single location that maximises joint family income, husbands are likely to make smaller compromises than wives to the extent that they possess more human capital or are prepared to work longer hours in the labour market. In such circumstances a wife has three choices—non-participation, accepting a job below her level of qualification or commuting over longer distances.

One version of the above is the ‘tied stayers’ model in which the husband has already optimised and is unwilling to move to obtain another job. This was tested for the US by McGoldrick and Robst (1996). They did find partial support for the differential overqualification hypothesis, since married women had a higher probability of overqualification than married men.18 However, there was no support for Frank’s related proposition that overqualification would be greater the smaller the size of the labour market. An alternative version is the ‘tied mover’ model in which the husband decides to move in order to obtain a better job and the wife is forced to move with him. This was tested for Britain by Battu, Seaman and Sloane (2000), using Social Change and Economic Life Survey (SCEL) data.19 They found that migrant married women were less likely to remain employed than other groups, and more likely to suffer a reduction in pay when they retained employment, but they were no more likely to be overqualified than single women or non-migrants. However, Büchel (2000) using German data found support for both versions. Non-migrant married women, particularly in small local labour markets had a higher risk of overqualification than unmarried women or men of either type. Also migrant married women, especially those moving to smaller labour markets than in their former place of residence, faced a substantial risk of overqualification. Büchel and Battu (2003) made due allowance for the possibility that commuting may offer the likelihood of improving job matches, finding that higher commuting distances strongly reduced the probability of being overqualified, both for married women and for men living in rural areas. Recently, Büchel and van Ham (in press) have adopted a broader framework, postulating that spatial restrictions (i.e., the location of residence in relation to the spatial configuration of employment opportunities) were likely to affect the labour market outcomes of all workers. This may explain why, using the 1998 wave of the GSOEP and correcting for sample selection, they found that women living with a partner and with children were no more likely to be overeducated than single women or men. Spatial flexibility in the form of having a car for personal use or increasing commuting time reduces the probability of overeducation. The size of the labour market is also important, since job search in a larger market increases the probability of finding a job, regardless of underlying supply and demand conditions.

It appears, therefore, that some workers are overeducated because they are prepared to trade off being properly matched for locational advantage, in terms of their place of residence and a shorter journey to work.20 More research is required, however, in order to determine, more clearly, what proportion of overeducation can be explained by spatial factors.

2.7 OVEREDUCATION AND SKILL BUMPING

If the proportion of the workforce with various educational qualifications rises given the level of demand, it is possible that some of the educated will move
into lower prestige jobs (generating overeducation) and that the less educated will be crowded out or bumped down into lower prestige jobs than they currently occupy, so that the mean education level rises in all occupations and presumably some of the uneducated lose their jobs. The increase in the number of unemployed workers seeking jobs would have the effect of widening wage differentials at the lower end of the occupational distribution, thus offsetting the tendency for the wage differential of educated workers over the uneducated to fall with the increase in supply of qualifications.\textsuperscript{21} For this to happen there are certain requirements. Thus, Nickell and Bell (1995) noted that skilled workers can perform many of the tasks undertaken by the unskilled, which makes it easier to hoard skilled workers during recessions. A lack of specific skills will reduce the attachment to the firm of unskilled workers and raise their rate of turnover. These effects will be increased the higher the unemployment benefit replacement ratio and the higher the wage floor imposed by minimum wage legislation. There are, however, two distinctive explanations for the relatively high cyclical unemployment rates for lower educated workers. The hoarding model suggests that employers invest more in job specific capital for highly educated workers, leading to them being hoarded in recessions, with lower educated workers being laid off. This contrasts with the crowding out explanation in which lower-educated workers are replaced by higher-educated workers in recession. This would be reinforced where it is costly to adjust wages, as this would encourage firms to raise hiring standards for lower-level occupations. Both models are associated with flows into and out of the labour market, with the hoarding model focusing on inflows and the crowding out model focusing on outflows. Inflows into lower-level jobs have, at least in the case of Britain, been found to be surprisingly large. Thus, Evans (1999), taking a relatively prosperous year (1989) found that the annual flow out of full-time jobs for men aged between 20 and 60 as a percentage of total employment consisted of 3.16 per cent into no job, 5.11 per cent into a job at the same level, 3.06 per cent into a higher level job and 2.47 per cent into a lower-level job. Surprisingly, he found that both downward and upward movements are pro-cyclical. In their study of graduates, Dolton and Sillers (2001) found that of those entering graduate or post-graduate jobs, initially 13 per cent switch out of these jobs into lower-level jobs. Also, 8.4 per cent of graduates in sub-degree jobs move down further into lower-level jobs. In another study using unemployment flow data for Wallonia over the period 1989 to 1994, Cockx and Dejeinleppe (2002) found that 43 per cent of dismissed workers who found a new job were overeducated. According to these studies unemployment, therefore, appears to be the catalyst for skill bumping.

There have been relatively few formal tests of skill bumping. Some studies are contained in the edited book \textit{The Overeducated Worker} (Borghans and de Grip, 2000a), thus Battu and Sloane (2000) matched the 1986 SCEL1 dataset with the British Household Panel Survey (BHPS) 1991 and 1995, utilising the fact that both datasets incorporated the Hope/Goldthorpe scale for the social desirability of jobs. They found clear evidence of skill bumping at the higher educational levels, but this did not extend down to the less or no educational qualifications categories, so that there was no evidence that the unqualified had been forced out of the labour market as a consequence of an increase in the proportion of the workforce who were overeducated. Asplund and Lilja (2000) examined skill bumping in the context of the Finnish labour market over the period 1975 to 1995. Over this period the overall probability of remaining in the same occupation declined rapidly, but the negative consequences for the least educated were dealt with mainly through the retirement system and to a lesser extent by pushing the least educated into unemployment. For Belgium,Nicaisse (2000) found consistent with the bumping down theory, that men's wages lie far below potential earnings. As a consequence, mainly low-skilled workers are displaced and the burden of unemployment is shifted more to the bottom end of the labour market. However, in the case for women no such effects are found.

A substantial amount of work on crowding-out has been undertaken, however, by Dutch economists, largely based on matching models\textsuperscript{32} and recognising that a direct test of the crowding-out hypothesis must focus on the composition of new hires over the cycle.\textsuperscript{28} In an early study using indirect methods, Teulings and Koopmanschap (1989) focused on the relative change in the proportion of employees with a higher than required level of education in various occupations across regions in Holland. Finding that this was higher in regions with high unemployment they concluded there was crowding out. Van Ours and Ridder (1995) focused on new hires by computing unemployment vacancy ratios for different educational levels using data collected by the Dutch Central Bureau of Statistics between 1980 and 1988. Their results showed that crowding-out is limited to those with academic and higher vocational education, with no job competition at lower levels of education, in line with the UK evidence. In a recent paper, Gautier et al. (2002) utilised a matched employer/employee sample based on Dutch Ministry of Social Affairs and Employment data for 1992 to 1996, which enabled them to distinguish six job complexity categories and seven education levels. They use this to test whether the difference in years of schooling between the inflow and outflow of workers for a given job level in a particular firm is larger during low employment years. In fact, they found the reverse to be true.\textsuperscript{24} Further, their data enabled them to estimate a wage equation including fixed-match specific effects. Their results suggest that the wage differential between new workers with excess qualifications and their matched colleagues in simple jobs is close to zero, in contrast to Sieberman's stylised facts and consistent with Dolton and Sillers (2001). When they take out fixed match specific effects to make their models comparable to other studies they obtained the traditional results of a positive and significant return to over-
education. Together, these results suggest that the overeducated self select themselves into high wage firms, and the results of earlier studies are mainly driven by uncontrolled selectivity effects. The main conclusion, however, is that the evidence for crowding out is rather thin, being limited to outflows rather than inflows of workers with relatively low levels of education.\textsuperscript{25} It is interesting to speculate on how far such skill bumping as occurs is permanent. That is, are workers who move down to lower-level jobs able to return to their previous level jobs when economic conditions become more favourable? Further work is needed also to establish the extent to which jobs have been modified to take advantage of the influx of highly educated manpower into intermediate level occupations. Mason (1996) suggested that in Britain the increase in new graduate supply has been so rapid that many employers are only just beginning to adjust in this way. In a later paper (Mason, 1997), he reported that British managers found there to be a number of advantages in employing graduate engineers alongside traditional shopfloor-trained supervisors. These included the greater ability of graduates to develop and improve computer systems used on the shop floor and to keep up with technological developments elsewhere and their key role in some plants in planning and implementing new cellular work systems in conjunction with other highly qualified staff in production engineering departments. This suggests that this kind of apparent under-utilisation of skills should be seen as a natural part of the process of technological advance and as a permanent rather than a temporary phenomenon.

2.8 ARE PARTICULAR GROUPS VULNERABLE?

There is reason to expect that groups likely to suffer from discrimination will find it more difficult to compete in the labour market and overeducation may be one consequence of this.

Young workers are likely to be particularly vulnerable as new entrants into the labour market, and the finding that overeducation is linked to lack of work experience supports this. Thus, Dekker, de Grip and Heijke (2002) found that in their Dutch sample the proportion of overeducated decreased from 41.7 per cent for the 15–19 age group to 27 per cent for the 30–44 age group and 18 per cent for the 49–64 age group.

As we saw earlier, there is reason to expect that married women in particular are likely to be vulnerable to overeducation (Frank’s 1978 theory of differential overqualification), although support for this theory is rather mixed. Another reason may be the presence of fixed costs of employment and a higher quit rate for women than for men, implying that employers may require higher ability from women relative to men at the hiring stage for a given job. Using Dutch data to test this model, Renes and Ridder (1995) found that on average women require almost six months more work experience than men to be hired for the same job, implying that they are overqualified taking a broader view of human capital. In their meta-analysis, Groot and Maassen van den Brink (2000a) suggested that overeducation is more frequent among female workers than among male workers, while the opposite holds true for undereducation. Examination of those studies in Table A2.1, which differentiate their results by gender, suggests, however, that the likelihood of overeducation is not very different for men and for women, although exceptions can be found. Thus, in their study of young French workers aged 18 to 29, Forgeot and Gauthie (1997) found that 24 per cent of the women, as opposed to 18 per cent of the men, were overeducated, and in the case of undereducation for Germany Bauer (2002) found that 15.6 per cent of the women as opposed to 10.4 per cent of the men (using a mean index), were undereducated.\textsuperscript{26} Why these differences should arise across different countries and different groups is quite unclear.

Ethnic minorities may be more prone to overeducation than the white majority if there is hiring discrimination. Analysis of the relative position of ethnic minorities is, however, rare. However, Duncan and Hoffman (1981) found that about 49 per cent of black men were overeducated compared to 42 per cent of the male workforce as a whole. For the UK, Alpin, Shackleton and Walsh (1998) found that 30 per cent of non-white graduates were overeducated compared to 27 per cent of white graduates. Yet, it is important to distinguish between those ethnic minorities who are native-born and those who are foreign-born as well as the different ethnic groups. Battu and Sloane (2002) found such differences to be important. In fact, foreign qualifications, being native-born and language fluency all raise the likelihood of being both overeducated and undereducated, which does not conform to the predictions of the assimilation theory.

The analysis of particular labour market groups seems, therefore, to raise as many questions as it is able to answer.

2.9 IS OVEREDUCATION A TEMPORARY PHENOMENON?

If individuals were overeducated due to a temporary bad match or because they were substituting extra-edu- cation for other forms of human capital this may be regarded as the natural operation of the labour market and the only concern might be that these processes were taking too long.\textsuperscript{27} If, in contrast, overeducation was a permanent phenomenon but workers were only apparently overeducated this again would not necessarily be regarded as sub-optimal, as attempting to match workers at the lower end of the ability distribution for their
level of education in the sort of job that traditionally used that level of education may well lower productivity or leave such workers unemployed. Of more concern would be those who were permanently and genuinely overeducated, and we do not know the precise proportion of the overeducated that falls into this category.

The notion that overeducation is a temporary phenomenon is implicit in the theory of career mobility proposed by Sicherman and Galor (1990), and briefly referred to already in Section 2, which holds that part of the returns to education takes the form of a higher probability of occupational upgrading. Hence, individuals may be prepared to accept jobs with low direct returns to education if this is accompanied by a higher probability of promotion. Sicherman’s (1991) own empirical tests using panel data confirmed the expectation that overeducated workers had a greater probability of promotion in terms of career moves than adequately educated workers in the US. Robst’s (1995a) analysis, referred to in Section 5, found contrary to the career mobility hypothesis that overeducated workers were no more likely than adequately educated workers to receive the sort of training that would assist in the process. Büchel and Mertens (in press) tested the hypothesis for Germany on the basis of wage mobility as originally proposed in the theory developed by Sicherman and Galor (1990). Using the GSEOP they found that overeducated German workers had substantially lower rates of wage growth than adequately educated workers, as well as less access to formal and informal on-the-job training. Evidence for the career mobility model is, therefore, mixed.

What is not in doubt is that for some workers overeducation is a long-run phenomenon. Thus, for British graduates Dolton and Vignoles (2000) found that 38 per cent of 1980 graduates were overeducated in their first job and 30 per cent still were six years later in 1986. Battu, Belfield and Sloane (1999) examined panels of UK graduates from 1985 and 1990 at career points one year, six years and eleven years after graduation. They found that over these time spans about 30 per cent of graduates had never had a job that required a degree and at any given time 40 per cent were in work that did not require a degree. Both studies found that those graduating with more vocational degrees, such as engineering, science and law were more likely to be matched. Examining the whole range of occupations, Sloane, Battu and Seaman (1999) utilizing work history data found again for Britain that job changes did not ensure a permanently improved match for overeducated workers, since such workers may simply move from one state of overeducation to another or fail to hold on to any short-term progress they make, in line with the notion that overeducated workers are less employable than their matched counterparts. In order to unravel these issues with more certainty we require panel datasets, which include direct questions on over- and undereducation and which are presently lacking.

2.10 CONCLUSIONS

In the introduction a series of questions were raised. In relation to the first of these—challenges to human capital theory—perhaps the major contribution of the overeducation literature has been to emphasise that it matters precisely where a worker is employed both in terms of current and future earnings and of job satisfaction. In that sense, assignment type models, which generally outperform both the unaugmented Mincer human capital model and the job competition model, serve to broaden the human capital framework. Further, it is clear that education is but one form of human capital and there are many possibilities of substitution of one type of human capital by another.

As regards the second question of measurement, interpreting labour market outcomes requires detailed knowledge of the abilities and skills of individual workers, and by themselves neither years of education completed or qualifications achieved can measure adequately worker productivity. Yet, few datasets contain direct information on both imperfect matching and worker abilities. There are also severe measurement problems which bedevil comparisons across datasets, since different measures of overeducation are poorly correlated, which results in individuals being classified differently in terms of whether they are properly matched. The use of the mode rather than the mean as a central measure for determining matching should be obligatory given asymmetry between over- and undereducation. The distinction between apparent and genuine overeducation is a fruitful line of approach, as is the incorporation of job satisfaction measures to determine the goodness of match.

Given the above, it seems that a substantial part of what is referred to in the literature as overeducation simply reflects unobserved heterogeneity of abilities and skills within given educational levels and in no way represents market failure. For policy purposes, measured overeducation should not be taken as a clear indicator of an over-production of graduates or other levels of qualifications. Part of it may, indeed, reflect measurement error through sheeplike effects. However, a question does arise as to whether some individuals are receiving too much education, considered from an investment rather than a consumption perspective. However, if overeducated workers are of low quality it is possible that the additional education compensates for the lack of their skills valued in the market and serves to gain employment, which otherwise might have been more difficult.

As for the impact of overeducation on earnings in the short- and the long-run, Sicherman’s stylised fact that there is a positive wage premium to overeducation has been challenged by those studies that have been able to control adequately for worker heterogeneity, so that it appears that there is a substantial penalty on workers who are unable to find a job commensurate with their level of education. The bulk of studies that have examined the impact of mismatch-
ing on training have supported the substitutability hypothesis, with overedu-
cated workers receiving less and undereducated workers more training than
those who are properly matched. Turning to the regional dimension, it does
appear that some workers are overeducated because they are prepared to trade-
off labour market matching against location advantages with respect to place
of residence and commuting time, but the precise size of this effect is unknown.
The work on skill bumping and crowding out has shown that the effects are far
from uniform over the range of skills and over the cycle. Overeducation
declines with age, affects ethnic minorities to a greater degree than the majority
of employees, but does not appear to affect women more than men to any
marked extent. Certainly for a large group of overeducated workers this state is
likely to be more a permanent than a temporary feature of their working lives.

There are many areas in which further research is required. For example, pre-
cisely how employers behave strategically in hiring workers with particular
qualifications for particular jobs in the internal labour market is poorly un-
derstood. What is the significance of human capital spillovers for the job matching
process? What proportion of overeducation arises from spatial factors? Is skill
bumping substantial and is it a temporary or a permanent feature of the labour
market? Why do the proportions of over- and undereducated workers vary so
much across different countries? This is by no means an exhaustive list of ques-
tions and one which can only be answered by further research.

Would it be fair then to categorise the overeducation literature as much ado
about nothing? This depends in part on the extent to which the results from
those studies, which control for ability, utilise matched employer/employee
samples or panel data generalise to other datasets over different time periods
and across countries. Even if that were true, the overeducation literature has
served to shift the focus of attention in human capital analysis away from an
undue reliance on supply side issues and towards a recognition that demand
side forces are no less important in determining labour market outcomes. It also
suggests that the job matching process is much more complex than the earlier
literature implied.

NOTES

1 Sheepskin effects are returns specific to educational credentials in contrast to accumulated
years of education. The origin of the term lies in the Asian tradition in the second century BC
of presenting diplomas or parchments made out of sheepskins. They are based on the hypoth-
thesis that education serves as a credential, which signals high innate productivity, with the ex-
pectation that returns to the credential decline as workers gain increased experience and em-
ployers become better informed about their actual productivity.

2 Using a unique dataset covering five countries, Denny and Harmon (2001) tested for non-
linearity of schooling in a conventional earnings equation. They found that the imposition of a
linear relationship in the earnings equation was not robust and that there are well-deter-
mind positive returns to the completion of educational levels, having controlled for years of
schooling.

3 Mincer (1974) was well aware of this. On page 137 he states: 'The model of worker self-
investment as the basic determinant of earnings might be criticised as giving undue weight to
the supply of human capital while ignoring the demand side of the market. Certainly demand
conditions in general and employer investments in human capital of workers in particular,
impact wage rates and time spent in employment, and thereby affect earnings.' He goes on to
state: '…the present approach is an initial and simple one and greater methodological sophis-
tication is clearly desirable.'

4 Dolton and Silles (2001), for example, found that arts and humanities (including languages)
graduates are more likely to be overeducated than graduates from other faculties.

5 A confounding factor in the context of the overeducation literature is clear evidence of inter-
locking heterogeneities. That is, the relevance of factors such as abilities and personalities will
differ by type of occupation.

6 Dolton and Silles (2001) suggested that one can capture this effect using two separate ques-
tions on overeducation, which distinguish between qualifications required for entering a job
and qualifications required to actually do the job. In their sample of graduates only 58 per cent
believed that a degree was necessary actually to do the job, while 67 per cent of them needed
a degree to acquire the job, with respect to first employment.

7 Borghans and De Grijp (2000b), in contrast, refer to a genuine under-utilisation of skills occur-
bring when workers are employed in jobs in which they have lower productivity than others
with the same educational background.

8 This is similar to one of the three measures used by Battu, Belfield and Slane (2000), using the
same dataset.

9 It has generally been found that overeducated graduates express lower job satisfaction than
those graduates who are properly matched. Whilst confirming this, Belfield and Harris (2002)
were unable to detect any relationship between degree quality and job satisfaction.

10 Unusually, they also have a question on which field of education is most appropriate for the
job, finding that 20 per cent of graduates were in jobs for which their own field was not the
most appropriate. However, in their regressions this variable has no significant effect on
wages, job satisfaction or job search.

11 The NCDS is not ideal for this purpose, however, as it suffers from the problem of missing
values and the fact that the explanatory power of the models is relatively low.

12 Thus, Dolton and Vignoles (2000) found for the UK that individuals with GCE Advanced
Level Mathematics qualifications earn between 7 and 10 per cent more than similarly educated
workers without this qualification, after controlling for ability.

13 Negative externalities are also possible. Thus, if co-workers are overeducated, leading to lower
job satisfaction, this may have negative effects on performance or if co-workers have different
amounts of human capital this could lead to skills incompatibility.

14 They also show that own earnings are higher the wider the workplace dispersion of earnings.
This seems more consistent with the tournament theory in which a wider earnings spread tends
to lead to greater effort, in contrast to those theories, which suggest a narrower earnings dis-
ispersion is beneficial to cooperative behaviour.

15 As Martins (2001) noted this particular dataset contains relatively few controls and is of rela-
tively small size, which may raise the importance of unobserved heterogeneity and decrease
the precision of the estimates respectively.

16 If students incur substantial debt during their course, as is increasingly the case in the UK, this
may increase the pressure on them to find employment quickly and this may lead them to
accept a job with educational requirements below those that they possess.

17 Given the small sample size and questions about the instruments used for identification, a
degree of caution is required in interpreting these results.

18 Vahey (2000) tested the theory for Canada and likewise found only partial support for the
theory.

19 The SCELL 1986 is a household survey including work histories of 6,000 individuals in six
different local labour markets in the UK.
20 This is comparable to the suggestion that some workers will be underpaid because information about jobs is costly to acquire, because searchers have positive discount rates and because they also have finite time horizons. Hofer and Murphy (1992) using a stochastic frontier regression approach found for the US that workers' potential wages exceeded their actual wages for such reasons by roughly 10 per cent.

21 This, however, is not inevitable (see Borghans and de Grip, 2000).

22 For a similar approach analysing the labour market for youths in Spain see Dolado, Jimeno and Felgueroso (2000).

23 These studies ignore the possibility of crowding-out occurring through intra-firm mobility.

24 More particularly, their separate estimates for inflows and outflows show that when employment is low the average educational level of the inflow does not rise, though the average educational level of the outflow does fall. Thus, the upgrading of the skill level of the workforce results from an outflow of workers with relatively low educational qualifications.

25 For an attempt to analyse skill bumping in the context of the competing human capital and job competition models see Groot and Hoek (2000).

26 The corresponding figures for the mode index were 37.0 and 20.6 per cent respectively.

27 Timing may be critical here. Those graduating at a low point in the business cycle or when the output of graduates is relatively high are likely to face greater problems than those graduating when these conditions are reversed.

REFERENCES


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**APPENDIX**

**Table A.1 Summary of mismatch estimate**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Country</th>
<th>Time Period</th>
<th>Dataset</th>
<th>Measure(s)</th>
<th>Estimates and Comments</th>
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<tr>
<td>Verduco and Verdugo (1991)</td>
<td>Spain</td>
<td>1980</td>
<td>PSID</td>
<td>Subjective</td>
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<td>1983</td>
<td>Full Survey</td>
<td>Subjective</td>
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<td>1985</td>
<td>PSID</td>
<td>Subjective and standard deviation</td>
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<td>1985</td>
<td>Survey of Change in Employment Status (CES)</td>
<td>Subjective</td>
<td>Estimates not reported</td>
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<td>Time Period</td>
<td>Dataset</td>
<td>Measure(s)</td>
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<td>Groot (1996)</td>
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<td>1991</td>
<td>BHPS</td>
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<td>combined: OE 9%, UE 89% AE Women 18.5%, Men 5.5% AE</td>
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<td>UK</td>
<td>1995</td>
<td>Labor Force Survey (graduates only)</td>
<td>Two objective measures—degree required</td>
<td>53% of graduates OE</td>
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<th>Measure(s)</th>
<th>Estimation and Comments</th>
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<td>UK</td>
<td>1986, 1991</td>
<td>SCELJ</td>
<td>Objective: OE 15%, UE 35.1%</td>
<td>41.3% of graduates OE</td>
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<td>Green McIntosh and Vignoles (1995)</td>
<td>UK</td>
<td>1995</td>
<td>National Child Development Survey</td>
<td>Objective: OE 16%, UE 27%</td>
<td>53.2% of graduates OE</td>
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42
### Table 2A.1 Summary of mismatch estimates continued

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<th>Dataset</th>
<th>Measure(s)</th>
<th>Estimates and Comments</th>
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<td>Netherlands</td>
<td>1996</td>
<td>STOA (School leavers) Survey</td>
<td>Subjective</td>
<td>30% OE (men), 31% OE (women), 24% UE (men), 17% UE (women)</td>
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<td>Valley (2000)</td>
<td>Canada</td>
<td>1982</td>
<td>National Survey of Family Life</td>
<td>Subjective</td>
<td>Mean years of adequate schooling: 14.00; Mean years of under schooling: 0.13; Wages: 0.13</td>
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Current Issues in Theory and Policy

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Contents

Contributors vii
Preface xi

INTRODUCTION
1. The Overeducated European? Felix Büchel, Andries de Grip and Antje Mertens 3

PART ONE: MOBILITY
3. The Dynamics of Skill Mismatches in the Dutch Labour Market Wim Groot and Henriëtte Maassen van den Brink 49
4. Types of Job Match, Overeducation and Labour Mobility in Spain Alfonso Alba-Ramírez and Maite Blázquez 65

PART TWO: WAGES
5. The Causal Effect of Overqualification on Earnings: Evidence from a Bayesian Approach Markus Joachmann and Winfried Pohlmeier 93
7. Overeducation and Individual Heterogeneity Michael Maier, Friedhelm Pfeiffer and Winfried Pohlmeier 133

PART THREE: MEASUREMENT
8. Measuring Overeducation with Earnings Frontiers and Panel Data Uwe Jensen 155
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