OVEREDUCATION IN THE LABOUR MARKET

Séamus McGuinness

Melbourne Institute, Melbourne

Abstract. This paper presents a review of the literature on overeducation. The paper assesses the consistency of overeducation within the context of a number of theoretical frameworks including Human Capital Theory (HCT) and Assignment Theory. The analysis goes on to discuss the various measurement controversies associated with the study of overeducation in order to provide an assessment of the extent to which the impacts of the phenomenon represent an economic reality as opposed to a statistical artefact. After reviewing the literature, it is concluded that the impacts of overeducation are likely to be non-trivial and that the phenomenon may potentially be costly to individuals and firms, as well as the economy more generally. The existence of overeducation also raises some doubts with respect to the validity of some of the central assumptions and predictions of HCT that are unlikely to be fully explained by gaps in the standard wage equation framework.

Keywords. Overeducation; Returns to schooling

1. Introduction

Overeducation describes the extent to which an individual possesses a level of education in excess of that which is required for their particular job.[1] The phenomenon was first brought to the attention of researchers by Richard Freeman in his 1976 study of the US graduate labour market.[2] However, interest has mushroomed since the late 1980s as economists attempt to assess the implications of the continued rapid expansion in educational participation rates that has become a key feature of labour market policy in most developed economies. For instance, within the UK, it is the Government's current stated intention that half of all under 30s should benefit from some form of higher education. Such policies implicitly assume that there is either unmet demand for graduate labour or employers hiring graduates will upgrade their production techniques in order to take advantage of a more educated labour force. However, should demand prove insufficient or unresponsive to changes in relative supply, then workers may be forced to take jobs for which they are overeducated.

Overeducation is potentially costly to the economy, the firm and the individual. At a macroeconomic level, national welfare is potentially lower than would be the case if the skills of all overeducated workers were fully utilized within the

economy; in addition, it may be that tax revenues are also being wasted on equipping individuals with non-productive education. At a firm level, there is some evidence to suggest that overeducation is associated with lower productivity. Using firm level production and individual level employee data from companies in the US Bell corporation, Tsang (1987) estimated that a 1-year reduction in surplus schooling in these companies alone would increase output by more than 8% translating to an additional gain of almost $5billion. Tsang *et al.* (1991) investigating the impact of overeducation on a number of productivity corollaries (job satisfaction and intention to quit) also found that overeducated male workers were significantly less satisfied with their jobs and more likely to quit relative to male workers who were well matched. Higher rates of turnover amongst over-educated workers was also reported by Alba-Ramirez (1993) and Sloane *et al.* (1999), suggesting that firms hiring such workers are more likely to lose investments in training, recruitment and screening.

As individuals, overeducated workers, by virtue of the fact that a proportion of their educational investment is unproductive, are likely to earn a lower return on their investment relative to similarly educated individuals whose jobs match their education. Overeducated workers may also incur non-transitory costs associated with lower levels of job satisfaction (again see Tsang *et al.*, 1991; Battu *et al.*, 2000). It is also possible that previously well-matched workers in the economy will be 'bumped down' in the labour market and, perhaps out of it entirely, as over-educated workers move into lower level occupations thus raising the mean educational level within these occupations rendering some previously adequately educated individuals undereducated. Battu and Sloane (2000) found some bumping down at the higher educational categories; however, there was nothing to suggest that individuals at the lower end of the educational spectrum had been forced out of the labour market. Finally, in relation to individual level impacts, whilst there is little evidence to support Frank's theory (1978) of differential overqualification that married females in smaller labour markets are likely to be overeducated (McGoldrick and Robst, 1996; Sloane *et al.*, 1999; Buchel and van Ham, 2002; Buchel and Battu, 2003), there is some UK evidence to suggest that ethnic minorities are likely to be more severely affected. Battu and Sloane (2002) report that, relative to whites, individuals with an Indian background were statistically more likely to be overeducated.

However, not all economists believe that overeducation is either permanent in nature or associated with high costs. The unwillingness of many researchers to accept the notion is perhaps due to the fact that to do so raises some very serious questions with respect to the validity of some of the assumptions and predictions associated with the conventional (neoclassical) view of the labour market. Consequently, a good deal of the debate within the literature has focused on the extent to which the existence of overeducation represents a real challenge to Human Capital Theory (HCT) and, related to this, the extent to which over-education is merely a statistical artefact generated by either inadequate measurement techniques or a lack of sufficient controls within the standard wage equation framework.

This paper examines the overeducation literature in order to provide an overview of the theoretical and empirical debates that surround the notion of overeducation and the extent to which these stand up in light of existing evidence. The paper is structured as follows: Section 2 provides a summary of the main theoretical frameworks within which researchers have attempted to explain the overeducation phenomenon. Section 3 looks at the empirical and measurement issues in an attempt to assess the extent to which poorly defined empirical approaches may be obscuring or overstating the extent of overeducation in the economy and its associated costs. Section 4 reviews the international evidence on both the incidence of overeducation and the wage costs and assesses the extent to which studies have lent support to the different theoretical frameworks. A summary and conclusion are presented in Section 5.

2. Theoretical Frameworks

There is no accepted unified theory of overeducation, although some authors have attempted to conceptualize and explain the problem within the framework of semi-formal economic models (Freeman 1976; McMillen *et al.*, 1999). However, a significant portion of the literature on overeducation considers how the phenomenon sits within the context of existing views of the labour market, and quite a few studies have attempted to empirically test which theoretical perspective is most in keeping with the observed facts (Duncan and Hoffman, 1981; Rumberger, 1987; Hartog and Oosterbrook, 1988; Groot, 1996; Sloane *et al.*, 1999; Battu *et al.*, 2000; Dolton and Vignoles, 2000). In fact, Sloane (2003) argues that the major contribution of the overeducation literature has been to widen the debate on the importance of job characteristics in determining wages thus broadening the human capital framework. The following section gives a broad overview of the three labour market perspectives and makes an assessment of each views consistency given the presence of overeducation in the labour market.

2.1. *HCT*

Becker's (1964) monograph 'Human Capital' is the seminal work with respect to this view of the labour market which represents the dominant framework adopted for explaining the distribution of earnings within developed economies. In addition to this, as Heckman *et al.* (2003) points out, Mincer's earnings model (1974) also constitutes a cornerstone of economics as it provided the empirical framework within which the central predictions of HCT can be assessed and measured. In relation to HCT, the proposition that firms are willing to fully utilize the skills of their workforce by adapting their production processes in response to any changes in the relative supply of labour derives explicitly from Becker's repeatedly stated assumption that workers will always be paid their marginal product. Wages will always therefore equate to the individual worker's marginal product, which in turn will be determined by the level of human capital that they have accumulated through either formal education or on-the-job training. Thus overeducation,

which is associated with worker under-utilization and wage rates below the marginal product, would appear entirely inconsistent with this view of the labour market. However, as will become apparent, some economists have continued to argue that HCT remains fully consistent despite the existence of overeducation (see Section 4).

The overeducation phenomenon does not necessarily overturn HCT as it is entirely plausible that workers will be overeducated in the short run, whilst firms adjust their production processes in order to fully utilize the individuals' human capital or alternatively for as long as it takes workers to find a more appropriate match through job search. HCT can therefore be rationalized by allowing for the existence of short-run disequilibria. Of course, should overeducation prove to be a non-transitory phenomenon that persists in the long-run, this explanation will not 'save' HCT.

The empirical framework adopted for testing HCT may also provide an explanation for overeducation which might make it entirely consistent with the neoclassical view. The standard approach was developed by Mincer (1974) and is based on an earnings regression centred around years of schooling (see Section 3 below), and therefore, less formal measures of human capital such as on-the-job training, which Becker argues is directly substitutable with schooling, are ignored. Thus, individuals with more schooling may be compensating for a lack of work-related human capital, and the apparent lower earnings of these 'overeducated' may be attributable to an omitted variables problem, i.e. a lack of controls for less formal measures of human capital accumulation. The problem is illustrated graphically in Figure 1 which shows that different combinations of experience and education produce workers of similar productivity by an isoquant. Thus, relative to the average level of qualification Q*, some workers appear
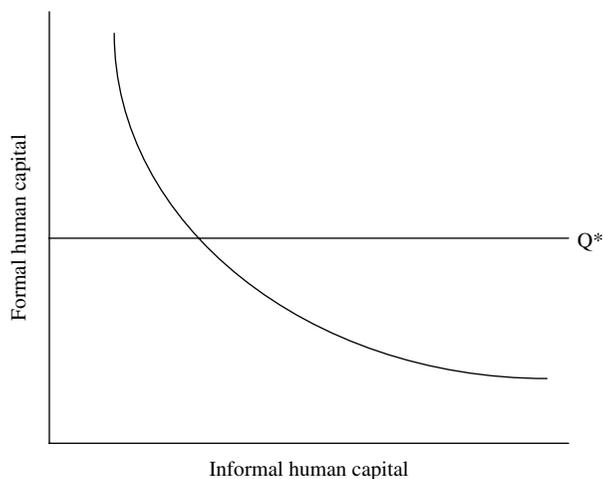
Figure 1. Human Capital Trade-Off.

overeducated (and underpaid in a model without experience controls), whilst some appear undereducated when in fact they all possess the same amounts of human capital and earn a wage consistent with it.

Finally, it may also be the case that overeducated workers are in some way less able relative to their adequately matched counterparts; therefore, lower wages are merely a reflection of lower ability/productivity. Should the empirical framework prove inadequate for picking up any such skill differences that might exist, this will also introduce bias into the estimated wage effects of overeducation. Therefore, to summarize, whilst some authors argue that overeducation suggests that HCT is not consistent with the observed facts [Dolton and Vignoles (2000)], this is only true should overeducation prove to be a long-run phenomenon and/or persist when controls are included for work-based human capital investments and/or worker skill heterogeneity.

2.2. *The Job Competition Model*

Some economists question the ease with which firms can adjust their production techniques to facilitate changing factor input prices (Duncan and Hoffman, 1981; Hartog and Oosterbeek, 1988) especially where firms have technology geared for team working which brings together groups of heterogeneous workers. Also, institutional arrangements (national pay agreements etc.) may be far more rigid than suggested by HCT. If firms cannot adapt quickly (or at all) then individual's productivity and hence their earnings will also depend on their jobs. Indeed, one particular framework, the Job Competition Model, suggests that job characteristics may be the only factor determining earnings. The Job Competition Model, which is based on Lester C. Thurow's (1975) book entitled '*Generating Inequality*', has attracted considerable attention within the overeducation literature.

Thurow's model characterizes a market within which individuals compete for job opportunities based on their relative training costs, as opposed to competition based on the wages individuals are willing to accept given their human capital. However, Thurow does not propose that his model adequately describes all labour market behaviour; instead he argues that the job and wage competition models can, and probably do, co-exist as market-clearing mechanisms. The central element of the Job Competition Model is based around the observation (Thurow cites US surveys) that the *majority* of workplace skills are acquired through on-the-job training as opposed to formal education. Thus, the labour market is not a bidding market for selling existing skills but a training market where training slots must be allocated to different workers. How these training slots are distributed across individuals depends on factors determining where individuals are located within a particular job queue and the distribution of jobs (training opportunities) in the economy. Once individuals reach the top of the queue and are allocated a job, their wage will be pre-determined by the characteristics of the job in question. Thus, the marginal product resides in the job rather than the individual's characteristics.

The Job Competition Model emphasizes the importance of a person's relative position. Thurow postulates that were an individual to observe his neighbour participating in education, then under the HCT framework that individual would be less likely to participate in education as supply would be higher and the return less. However, under the Job Competition Model, the same individual would now be more likely to participate as education is a defensive necessity, necessary to protect their place in the queue. The larger the numbers of educated persons in the economy the more imperative for individuals to invest in education. The Job Competition Model therefore provides a clear explanation for educational over-investment and thus overeducation. In many ways the model is very similar to the signalling framework in that individual investments are motivated by preserving ones position, although in the Spence (1973) model there is a limit to the amount of education an individual will invest in (based on the balance between earnings and the cost of education). However, it is difficult to determine how a ceiling is reached within the Job Competition framework with respect to educational participation. Nevertheless, it provides a theoretical framework with which over-education is entirely consistent. The implications of the Thurow model are that wages will be wholly dependent upon required education and that the returns to education that are over and above that required by the job (surplus education) will be zero.

2.3. *Assignment Models*

A middle ground between what could be argued as the two previous extremes is found within the assignment literature. Despite some differences, assignment models all specify the jobs or sectors available to workers, the relevant differences amongst workers, the technology relating job and worker characteristics to output and the mechanisms that assign workers to jobs. Within this framework, the earnings function is no longer a directly observable relationship but instead it is the equilibrium outcome to the solution of the assignment problem. Sattinger (1993) points out that relative wages have been changing over time with earnings becoming more unequal. He argues that these changes are hard to explain within the standard neoclassical framework in which the productivity and earnings are exclusively linked to education and experience and thus independent of the availability and/or quality of jobs in the economy.

Whilst there are various assignment interpretations of the labour market that are of interest in their own right, their general predictions with respect to the allocation of workers to jobs and their subsequent earnings are more important within the context of overeducation. Assignment models differ significantly from the Job Competition interpretation in that they stress that choice of job or sector creates an intermediate step between an individual's characteristics and their earnings, i.e. the job allocation process is not merely a lottery. Income maximization guides workers to choose particular jobs over others. Thus, higher wages for workers with some characteristics play an allocative role in the economy rather than simply being rewards for the possession of particular characteristics.

Workers found in a particular sector (or job) are not randomly distributed but are there based on the choices made to maximize their income or utility. Thus, the central and crucial prediction arising from the assignment literature is that in order to adequately explain changes in the distribution of earnings, we must give some consideration to both individual and job characteristics. Thus, overeducation is entirely consistent with an Assignment Interpretation suggesting that marginal product and thereby earnings will depend to some extent on both the individual and the job; these models also imply that there is no reason to expect that wage rates will be wholly related to acquired schooling or other individual attributes (Human Capital Model), neither should we expect that wage rates will be wholly related to the nature of the job (Job Competition Model).

2.4. *The Influences of Gender and Space*

Some explanations for overeducation have been put forward that, at first glance, appear to be largely unrelated to any major theoretical framework, in particular, a number of recent studies have examined the evidence in support of spatially based explanations for overeducation. However, that is not to say that spatial and theoretical considerations are necessarily independent. In the same way that Thurow hypothesized that different frameworks might co-exist within different markets, it is also plausible to suggest that variations in labour market characteristics at either national or regional level may also determine, or be determined by, the framework that prevails. Nevertheless, it must be pointed out that, to date, most of the research has focused on the importance of various spatial characteristics with very little attempt made to conceptualize the results within the context of the principal theoretical approaches. However, given the weight of literature on the issue, it certainly cannot be ignored.

Frank (1978), was the first economist to examine the link between overeducation and spatial factors; however, this was related to gender-segmented labour markets in dual earner households. In this context, the husbands' job seeking takes place in a global market, whereas the wives are largely restricted to a regional labour market exposing her to a higher relative risk of overeducation. This hypothesized inverse relationship between gender-based overeducation probabilities and labour market size is termed 'differential overqualification'. McGoldrick and Robst (1996) sought to further develop the relationship between space and overeducation by testing the proposition that geographic restrictions affect the labour market outcomes of all workers (as opposed to married women only). In a similar vein, Buchel and van Ham (2002) argue that employment opportunities will be determined at regional level as most people will tend to look for work on the local (regional) labour market due to limited spatial flexibility. They argue that job availability is determined by two factors, firstly, the location of their residence in relation to the spatial configuration of employment opportunities and secondly, the size of the labour market that can be searched from

their residence. The size depends on the spatial flexibility (commuting tolerance) of the job seeker in terms of their commuting and migration tolerances.

3. Empirical Measurement and Methodological Issues

As was noted, there are a number of empirical considerations relating to the measurement of both the incidence and wage effects of overeducation that are of crucial importance in assessing the true significance of the phenomenon with respect to both the economy and education policy more generally. The central empirical debates centre on the precision and consistency of the various measurement approaches and the lack of sufficient controls within the wage equation framework.

3.1. *The General Empirical Framework*

The typical specification adopted is based around the standard Mincer relationship (Mincer, 1974) which itself has its origins in Becker (1964). The typical human capital model assumes that an individual will participate in schooling up until the point where the present value of the Sth year of schooling just equals the cost, i.e.:

$$\sum\nolimits_{t=1}^{T-s} = \frac{W_s - W_{s-1}}{(1 + r_s)^t} = W_{s-1} + c_s \tag{1}$$

if T is sufficiently large and c_s sufficiently small we can rearrange the equation to get:

$$r_s \cong \frac{W_s - W_{s-1}}{W_{s-1}} \tag{2}$$

Thus, the internal rate of return to schooling r_s can be approximated by log W_s − log W_{s-1} implying that we can estimate the return to schooling by seeing how log wages vary with schooling. This is the basic premise of the Mincer regression, which is generally written, in the following form:

$$\log w = x\beta_1 + \beta_2 S + \beta_3 Ex + \beta_4 Ex^2 + \varepsilon_i \tag{3}$$

where x is a vector of personal characteristics correlated with earnings, S is years schooling and Ex is experience. The general educational mismatch specification varies slightly from this in that years schooling is decomposed into required, surplus and deficit education so that the model is now written as:

$$\log w = x\beta_1 + \beta_2 S^r + \beta_3 S^o + \beta_4 S^u + \beta_5 Ex + \beta_6 Ex^2 + \varepsilon_i \tag{4}$$

where S^r is years of required schooling (the methods of defining this required level for the job is discussed below), S^o is years of surplus schooling above the required level (overeducation) and S^u is years of deficit schooling below the required level (undereducation). Many overeducation studies will estimate both

equations 3 and 4 to allow comparisons between the returns to acquired, required, surplus and deficit schooling.

3.2. *The Use of Dummy Variables*

However, in some instances, the presence of overeducation is indicated through the presence of dummy variable on the basis that a decomposition of acquired schooling into required, deficit and surplus elements is not possible. In such instances, the educational mismatch model in equation 4 is modified slightly to become:

$$\log w = x\beta_1 + \beta_2 D^o + \beta_3 D^u + \beta_4 Ex + \beta_5 Ex^2 + \varepsilon_i \qquad (5)$$

Where D^o and D^u are dummy variables indicating if the individual is over-educated or undereducated, obviously in the case of an exact match both variables will equal zero. The benchmark with which individuals are being compared will vary depending on whether specification 4 or 5 is being estimated. When overeducation is measured in terms of years (equation 4) then the overeducated are being compared to people doing the same job who are not overeducated and who have less education. In the majority of studies that utilize equation 4, the overeducated have been found to earn a return to surplus education which is generally positive but less than the return to required education. When dummy variables are used (equation 5), the overeducated are being compared to people with the same education who are adequately matched, and the coefficient on overeducation is generally negative suggesting they earn less than their comparably educated counterparts who are appropriately matched. Cohn and Kahn (1995) demonstrate the potential dangers of misinterpretation by replicating the results of Verdugo and Verdugo (1989) who interpreted a negative coefficient on the overeducation dummy variables to indicate a negative return to overeducation. Using the Verdugo and Verdugo data, Cohn and Kahn estimate overeducation models under both specifications (4 and 5). They demonstrate that a negative estimate on the overeducation dummy does not necessarily imply a negative return to years of overeducation. Cohn and Kahn (1995) in fact found that overeducated workers earn less than persons with similar levels of schooling who are not overeducated (equation 5) but report that the return to overeducation is positive relative to workers in similar jobs who are well matched (equation 4) thus demonstrating that Verdugo and Verdugo had misinterpreted their results.

3.3. *Subjective and Objective Measures of Overeducation*

There are four basic approaches to measuring required education for a job and hence overeducation, two subjective measures and two objective measures. Realistically speaking, the choice is typically restricted by data availability; nevertheless, there is a growing literature centred on assessing the levels of consistency and potential biases associated with the various approaches.

Overeducation can be assessed subjectively by asking the respondent to give information on the minimum requirements of the job and then comparing this with the individual's acquired education or by simply asking the respondent whether or not they are overeducated. Overeducation can also be assessed objectively by using information provided by professional job analysts (such as in the Standard Occupational Classification System in the UK or the Dictionary of Occupational Titles in the US) to determine an individuals required education on the basis of their job title and again comparing this with their actual level of education. A second objective measure of overeducation is obtainable by calculating the mean education level for a range of occupations with an individual defined as being overeducated if they were more than one standard deviation above their occupation's mean education level.

Subjective measures of overeducation have been criticized on a number of grounds, firstly overeducated workers may be less likely to respond to questionnaires due to higher levels of job apathy which may lead to an underestimation of the incidence of overeducation. Secondly, workers in smaller and/or less-structured organizations may lack sufficient benchmarks against which to assess their job requirements, a factor, which will again lead to measurement error. Finally, even where benchmarks are available, respondents may be applying differing criteria when assessing their job requirements, i.e. the actual level of education required to do specific tasks or the formal educational requirements necessary to get the job. However, on this last point, Green *et al.* (1999) using an alumni dataset from Newcastle University in the UK found that in the vast majority of cases, the assessment of the education levels needed to do the job tended to match those needed to get the job suggesting a broad level of consistency between both subjective approaches.

The occupational dictionary-based objective measure is open to the criticism that occupations may contain a number of skill levels, so that in fact people with the same job titles may be doing very different jobs, for instance, the tasks undertaken by managers are likely to vary widely. Also, rising education levels in the economy imply that employers will allocate workers differently. For example, Mason (1996) reports that managers are now employing university graduates in mid-clerical positions, posts traditionally held be persons educated to O and A level standard (predominately high school graduates). Thus, the educational requirements of various occupations will evolve with changes in relative supply, a factor not always readily incorporated into occupational classification systems which tend to be relatively static in nature. The standard deviation-based objective measure of overeducation has also been criticized because of the arbitrary nature of the choice of cut off points; also, if a particular occupation contains a high proportion of overeducated workers, this will raise the occupational average and corresponding cut-off point thus underestimating the true level of overeducation. The assumption of symmetry that the standard deviation method implies seems unrealistic. In addition, the use of the occupational mean has also been criticized with a number of studies (Kiker *et al.*, 1997; Mendes de Oliveria *et al.*, 2000) arguing for the superiority of a modal-based measure.

3.4. *Is There Consistency Across the Various Definitions?*

A number of studies have sought to assess the correlation between the various measures of overeducation and/or the extent to which they generate varying estimates of the incidence of overeducation and/or the returns to overeducation. Taking these studies chronologically, McGoldrick and Robst (1996) found that the incidence of male overeducation varied according to the definition employed, over 50% were overeducated under the objective occupational dictionary-based measure, 30% under the subjective measure and just 16% under the objective standard deviation approach. Battu *et al.* (2000) take the analysis a step further by examining the level of correlation between two subjective and an objective-based measures derived from two separate panels of data (1985 and 1990). The subjective measures are based on respondents' opinions if (1) a degree was a requirement in the job specification and (2) the level of satisfaction with the match between the individuals, work and qualifications, whilst the objective measure is based around an occupational dictionary approach. The authors found that the various measures tended to identify different people as being overeducated, for instance, the correlation for overeducated males under the two subjective measures was 21 and 31% respectively, whilst the correlation between the objective and subjective measures ranged between 20 and 33% for males. The rates of correlation were somewhat higher for females; however, in no case did they exceed 50%. Despite poor correlation, the authors report that the various approaches generate similar results with respect to the effect of overeducation on earnings suggesting that the wage equation estimates may be picking up factors other than overeducation such as unobserved job and/or personal characteristics. The implication of this is that the more poorly specified the initial model the potentially more distorted the overeducation influence may be, thus the problem associated with the lack of a consistent definitional approach is potentially compounded by a tendency amongst researchers to examine the issue within the context of models omitting sufficient controls for job and/or individual characteristics. This point is illustrated in Table 1 which estimates the overeducation wage penalty under a number of specifications using data from a cohort of Northern Ireland University graduates collected in 1999 (see McGuinness 2003b for a full description of the dataset used). Specification 1 is a basic Mincer model,[3] specification 2 is expanded to include faculty controls whilst the final specification includes personal and job characteristics including A level point score which, to some extent at least, will measure ability heterogeneity amongst the graduates. It is obvious from the results that the more poorly specified the model the more upwardly biased the overeducation penalty will be. The results demonstrates the importance of including job characteristics and some form of ability heterogeneity control when attempting to estimate the relationship between overeducation and wages.

Groot and van den Brink (2000a) also measure the correlations between two objective (standard deviation and occupational dictionary measures) and one subjective-based measures (overeducated yes/no response). They report that the incidence of male overeducation varied from 8.7 to 12.3%; however, in this case,

Table 1. Graduate Overeducation Estimates for Northern Ireland Males.

	Specification 1	Specification 2	Specification 3
Constant	11.716 (0.554)†	11.345 (0.565)†	11.039 (0.536)†
Human capital			
Acquired schooling	−0.100 (0.029)†	−0.082 (0.030)†	−0.066 (0.028)*
Experience	−0.027 (0.018)	−0.016 (0.018)	0.006 (0.017)
Experience squared	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)
Faculty			
Arts		−0.173 (0.090)*	−0.178 (0.080)*
Medical and Med related		0.212 (0.079)*	0.187 (0.078)*
Science		−0.024 (0.081)	−0.019 (0.076)
Business		−0.074 (0.066)	−0.087 (0.063)
Math\Eng\Tech		0.065 (0.060)	−0.011 (0.056)
Combined		−0.097 (0.069)	−0.133 (0.064)*
Other			
Work Northern Ireland			−0.224 (0.036)†
Public sector			−0.177 (0.043)†
Married and Children			−0.121 (0.924)
A level score			0.008 (0.002)†
Overeducation	−0.175 (0.45)†	−0.134 (0.045)†	−0.111 (0.042)†
R^2	0.063	0.122	0.278
F-Statistic	6.39†	5.42†	10.27†

* 95% significant
† 99% significant

the subjective-based measure yielded the lowest estimate. In relation to the extent to which the definitions identified the same individuals as being overeducated, the results were again less than convincing. Groot and van den Brink (2000a) also sought to assess the extent to which the alternative definitions generated varying outcomes within the wage equation. To some extent, their results contradict the findings of Battu *et al.* (2000) who report that the various definitions generate broadly similar estimates within the wage equation framework. However, Groot and van den Brink's findings are somewhat less convincing due to the counter-intuitive nature of some of their results.[4]

Whilst the previous studies indicate the extent to which the various definitions tend to identify different people as being overeducated and generate different estimates of the incidence of and returns to overeducation within the context of the same dataset, they provide no indication of which measure is closest to the true incidence or the extent to which any particular approach generates biased estimates. To a large extent, the level of correlation is likely to vary according to the dataset being used and the institutional/economic arrangements of the country in question. The issue of empirical bias associated with the various definitions was more effectively addressed by Groot and van den Brink (2000b) who conducted a cross-country meta-analysis of 25 studies, utilizing the various subjective and objective methodologies. The authors found in a preliminary

examination of the data that the standard deviation-based measure again tended to yield the lowest estimate of the incidence of overeducation. This finding was verified within an OLS framework which estimated the 'true' incidence of overeducation to be 26% and that the standard deviation approach tended to reduce this 'true' incidence by 12% points. The finding of a lower incidence under the standard deviation approach is, of itself, not surprising, as the methodology requires education levels to be at least one standard deviation above the mean before overeducation is determined whilst the other approaches have no such requirement. In relation to the wage equation meta-analysis, the study reported that the 'true' return to a year of required education was 7.9%, a year of surplus education 2.6% and a year of deficit education, −4.9%. The authors did not find any of the methodological approaches to significantly influence estimated returns, suggesting that potential definitional biases may be restricted to estimates of the incidence of overeducation and limited to the objective standard deviation-based measure. A more recent meta-analysis by Rubb (2004) also found that neither the subjective nor occupational dictionary approaches yielded estimates of the overeducation wage effect that were significantly different from a measure based on the mean occupational level. Thus, one might reasonably conclude from such cross-country studies that whilst there are serious concerns relating to the low correlation between the various measures of overeducation, with the exception of the standard deviation measure, the balance of the evidence would suggest that, in terms of estimating the incidence and returns to overeducation, the various approaches generate broadly consistent evidence.[5]

3.5. *How Adequately do Existing Measures take Heterogeneity into Account?*

There are significant questions relating to the assumed relationship between education and skills that is embodied within the various approaches to measuring overeducation. Each approach assumes that persons acquiring the same years of education or possessing similar credentials shall have broadly similar skills. By not allowing for heterogeneity across the skill sets of persons with similar educational backgrounds, the various measurement approaches may be providing inaccurate measures of the incidence and labour market effects of overeducation. For instance, in relation to the graduate labour market, Chevalier (2003) argues that widening access to higher education has increased the heterogeneity of graduates through lower ability students accessing higher education and an increase in student-staff ratios. To some extent, the unobserved heterogeneity will relate to differences in the skills that exist amongst individuals with similar levels of education, in other aspects it will refer to ability levels. For instance, between 1994 and 2002, the number of new graduates entering the labour market has increased by 23% for males and 53% for females (O'Leary and Sloane, 2005). This raises questions with regard to the extent to which a degree is any longer a good signal of ability as one would assume that the rise in higher education (HE) participation levels must have led to a greater spread in the ability levels of graduates entering the labour market. Cohort-related effects can also potentially result in significant differences across individuals with similar levels of education.

Green *et al*. (2002) highlight potential heterogeneity effects that may arise because of grade drift, although they found little evidence to support it in a UK context. Grade drift describes a drop in educational standards implying that the level of human capital accumulation associated with various credentials has fallen over time. Grade drift will be evident if, *ceteris paribus*, employers are found to be increasing educational requirements for younger workers. The concept of grade drift is related to that of heterogeneity as it once again suggests that individuals with similar levels of education potentially have significantly different ability levels. The possibility of grade drift and other non-time-dependent causes of worker heterogeneity, such as highlighted by Chevalier (2003), demonstrate the potential importance of including adequate controls in the estimation framework that allow for variations in ability levels across apparently similar individuals.

To date, those studies that have attempted to control for heterogeneous skill effects have done so by using models that allow for some variability in worker characteristics by controlling for unobserved effects; these studies have concluded that when account is taken of skill differences across individuals with similar levels of education, the wage penalty associated with overeducation largely disappears (Bauer, 2002; Chevalier, 2003; Frenette, 2004). However, such studies appear to assume that all unobserved individual differences relate only to skill and thus ignore the impact of other personal/job characteristics that may have been omitted from their initial models. Such methodologies appear to implicitly accept the notion that wages will be fully determined by an individual's level of acquired human capital. However, should it transpire that HCT is rejected in favour of a Job Competition or an Assignment Interpretation of the labour market implying that wage rates will be determined, either in part or in full, by job characteristics, then it is likely that such methodologies will overstate the impact of heterogeneous skill effects on the wage distribution. McGuinness (2003a) sheds some light on the issue by deriving an explicit self-assessed subjective measure of skill based on the individual's average competency across 16 areas related to job performance. When this explicit control for skill heterogeneity was included in the wage equation, the results indicate that the impact of the effect was much smaller than that reported by those authors adopting the more implicit approach. Heterogeneous skill effects were found to account for less than 5% of the variance in wages, and it was reported after accounting for such effects, overeducated graduates still earned wages that were much lower than their well-matched counterparts. McGuinness and Bennet (2006) using quantile regression techniques to control for unobserved skill heterogeneity reported that over-education can impact male graduates of both low and average ability and female graduates of all ability levels, thus demonstrating that it is not sufficient to characterize overeducation as merely reflecting low ability levels. Finally, evidence from a UK study by Green *et al*. (1999) suggests that heterogeneity-linked biases in the estimates of the incidence of overeducation are not likely to be substantial. The study concentrated on mismatches between required and acquired *skill levels*, as opposed to years of education or credentials and thus was immune from biases associated with the assumed uniformity in the link

between educational attainment and productivity. The authors found that the determinants of overskilling were similar to those driving overeducation and that, as is the case with overeducation, overskilling has a significant negative impact on wages.

3.6. *Empirical Overview*

There are certainly a number of empirical issues that any researcher embarking on a study of overeducation should be aware of including the variety of approaches to measuring the phenomenon and the potential biases that lie within these. However, on balance, and despite concerns relating to poor correlations between the various approaches, there is no consistent evidence to suggest that any of the subjective or occupational dictionary-based measurement frameworks result in a systematic and significant underestimate of either the incidence, or wage effects, associated with overeducation. Those authors that question the extent to which existing measurement frameworks or modelling approaches allow for hetero-geneous skill levels amongst persons with similar levels of education are certainly making valid points when they assert that failure to include such controls will tend to overestimate both the incidence and effects of overeducation. Undoubtedly, as Sloane (2003) points out, much of the effects attributed to overeducation will in fact relate to unobserved skill heterogeneity; nevertheless, it would appear that perhaps too much weight is being attributed to the share of the unexplained component that is accounted for by differences in skill within models that attempt to control for such effects implicitly. As an alternative to such approaches, researchers should perhaps attempt to incorporate, where possible, some explicit measures of skill into their analysis.

4. Results

This section will examine the evidence from existing studies to determine trends in the incidence of overeducation, the estimated effect of overeducation on wages and which, if any, of the principal theoretical frameworks discussed earlier are most consistent with the observed facts. It should be noted that the analysis attempts to identify patterns from the general literature; however, it must be borne in mind that the studies are quite heterogeneous in nature as the cut across countries, time and labour markets, nevertheless, bearing this caveat in mind, some insightful patterns do emerge.

4.1. *The Incidence of Overeducation*

The various incidence estimates from the raft of overeducation studies are summarized in Table 2. In total, 33 studies generated 62 estimates with the number of subjective and objective estimates relatively evenly split at 34 and 28 respectively.[6] It is not easy to disentangle the information to derive any discernible patterns; however, some observations are possible. In line with the findings from the Groot and van den Brink (2000b) meta-analysis, objective-based approaches

Table 2. Reported Incidences of Overeducation.

Name of study	Year	Definition employed	Country	Data collection	Incidence of overeducation
Dolton *et al.*	2000	Self assessment – subjective job requirement	UK	1986	30%
Chevalier, A	2003	(1) Objective occupational dictionary-based measure	UK	1996	17%*
		(2) Subjective – job requirement		1996	32.4%*
		(3) Subjective – satisfaction		1996	16.2%*
Sloane *et al.*	1999	Subjective – job requirements	Britain	1986–1987	30.63%
Battu *et al.*	2000	(1) Subjective – satisfaction	UK	1996	40.4%*
				1996	40.7%*
		(2) Objective occupational dictionary-based measure		1996	21.75%*
				1996	22.15%*
		(3) Subjective – degree requirements		1996	33.65%*
				1996	38%*
Groot	1996	Objective standard deviation-based measure	UK	1991	11%
Dolton and Siles	2003	Subjective – not clear which one they used	UK	1998	22%
Daly *et al.*	2000	Subjective – required education	US	1976	37.65%*
			US	1985	32.65%*
			Germany	1984	17.5%*
Duncan and Hoffman	1981	Subjective – job requirements	US	1976	42%
Sicherman	1991	Subjective – job requirements	US	1976 and 1978	40.8%
Groot and van den Brink	2000b	Meta-analysis			26.2%*
Hartog and Oosterbeek	1988	Subjective – required education objective	Holland	1982	16%
				1960	7%
				1971	13.6%
				1977	25.7%
McGoldrick and Robst	1996	(1) Subjective – job requirements	US	1985	50%*

		(2) Objective occupational dictionary-based measure		1985	30.8%*
		(3) Objective standard deviation-based measure		1985	12.55%*
Verdugo and Verdugo	1989	Objective standard deviation-based measure	US	1980	10.9%†
Cohn and Kahn	1995	(1) Objective standard deviation-based measure	US	1985	13%
		(2) Subjective measure – Sicherman definition		1985	33%
Tsang et al.	1991	(1) Subjective – required education	US	1969	35%
				1973	27%
				1977	32%
		(2) Objective occupational dictionary-based measure		1973	57%
Patrinos	1997	Objective standard deviation-based measure	Greece	1977	16%
Alpin	1998	(1) Objective occupational dictionary-based measure	UK	1995	27%
		(2) Objective standard deviation modal measure		1995	37.7%
Rumberger	1987	(1) Subjective – job requirements	US	1969	35%
				1973	27%
				1977	32%
		(2) Objective occupational dictionary-based measure	US	1973	57%
Green et al.	1999	(1) Subjective	UK	1995	27.4%
		(2) Subjective	UK	1997	32%
Alba- Ramirez	1993	Subjective – job requirements	Spain	1985	17%
Groot and Maassen van den Brink	2000	(1) Objective standard deviation-based measure	Holland	1994	11.85%*
		(2) Objective occupational dictionary-based measure		1994	15.9%*
		(3) Subjective		1994	11.15%*

(*continued*)

Table 2. *Continued.*

| Name of study	Year	Definition employed	Country	Data collection	Incidence of overeducation
Bauer	2002	Objective standard deviation-based measure	Germany	1984–1998	11.5%*
Decker *et al.*	2002	Objective occupational dictionary-based measure	Holland	1992	30.6%
Buchel *et al.*	2002	Subjective – job requirements	Germany	1998	15.8%*
Robst	1995	Subjective – required education	US	1976, 1978 and 1985	44.68%
Allen *et al.*	2001	Subjective – required education	Holland	1998	14%
Vahey	2000	Subjective – required education	Canada	1982	31%*
Hersch	1995	Subjective – job requirements	US	1991	21%
Kiker *et al.*	1997	(1) Objective standard deviation mean measure	Portugal	1991	9.4%
		(2) Objective standard deviation modal measure		1991	25.5%
		(3) Objective occupational dictionary-based measure		1991	33.1%
Cohn and Ng	2000	Objective modal measure	Hong Kong	1986	35%*
				1991	34%*
Hannan *et al.*	1998	Objective standard deviation	Ireland	1992	20%
Groot	1993	Objective standard deviation-based measure	Holland	1983	16.1%
Burris	1983	Objective occupational dictionary-based measure	US	1977	21.7%
McGuinness	2003a	Subjective – job requirements	Northern Ireland	2000	20%
McGuinness	2003b	Subjective – job requirements	Northern Ireland	1999	24%

*Average.
†Males only.

were found to generate lower estimates with the mean objective-based incidence standing at 22%, some 7% points below the comparable subjective figure. In relation to cross-country comparisons, Holland yielded the lowest incidences under both subjective and objective measures (Hartog and Oosterbeek, 1988; Groot and van den Brink, 2000b), whilst studies of the US labour market generated the highest incidences irrespective of the measurement approach adopted (Tsang *et al.*, 1991; McGoldrick and Robst, 1996).

In order to determine whether the overeducation phenomenon may be becoming more important over time, Figure 2 plots subjective estimates against the year in which the relevant data were collected. There are no indications that the incidence of overeducation has been rising over time; in fact, fitting a linear time trend to the observations is suggestive of a slight decrease. Nevertheless, given the problematic nature of the data, it would be foolish to attach too heavy a weight to the very slight negative slope of the best fit line. This is confirmed by plotting the objectively based incidences over time and finding a slightly positively sloped trendline (Figure 3). Given Figures 2 and 3 and Tables 2 and 3, it is probably reasonable to conclude, on the basis of the graphical and tabular evidence, that the incidence of overeducation has remained relatively stable across time.

4.2. Wage Rates

Twenty-one studies provide estimates of the wage effects of overeducation on earnings; of these, 10 estimate a model based on the decomposition of earnings only (equation 4), seven estimate an overeducation penalty derived from a dummy variable model (equation 5), with four studies estimating both specifications. The vast majority of the 14 studies estimating a model based on equation 4 report a pattern consistent with the positive return to attained education being
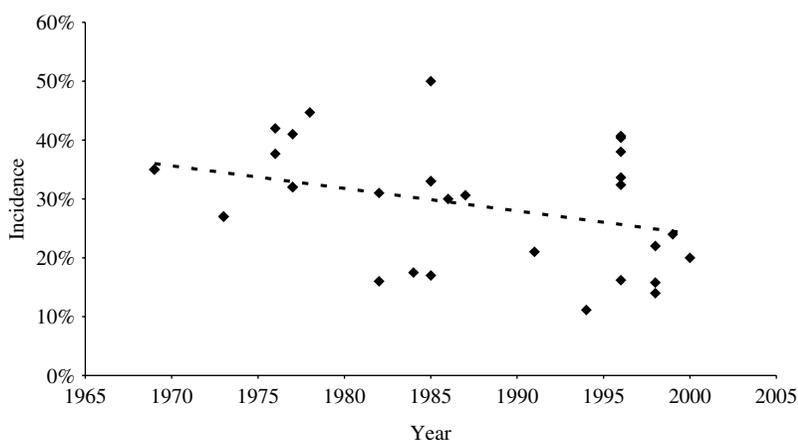
Figure 2. Subjectively Measured Incidences of Overeducation.
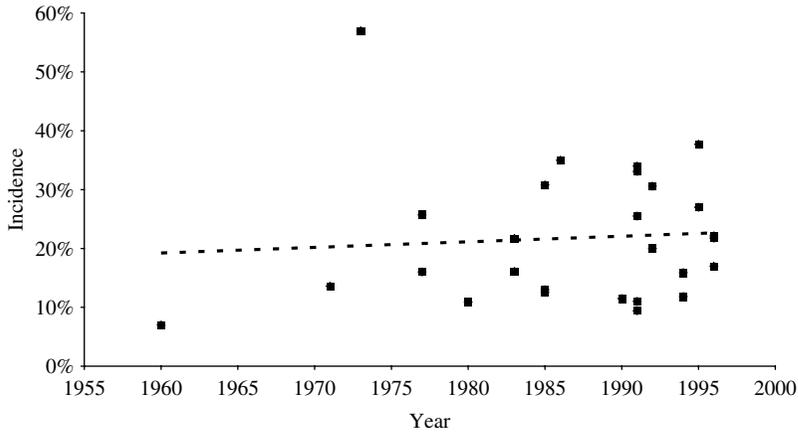
Figure 3. Objectively Measured Incidences of Overeducation.

less than the positive return to required education being greater than the positive return to overeducation being greater than the negative return to undereducation (Table 2). The only exceptions to this pattern are studies of the Dutch labour market by Groot (1993), Groot and van den Brink (2000a) and the UK labour market by Groot (1996) who reported a negative return to a year of over-education and a positive return to a year of undereducation. However, one must conclude that the atypical nature of these results is most likely related to the slightly unusual methodological approach adopted, i.e. the estimation of equation 4 on the basis of an objective standard deviation approach to measuring overeducation. In relation to the studies estimating equation 5, the penalty associated with being overeducated is estimated to lie within a range of −8 to −27% with a mean penalty of 15.3%. A final point to note is that the assumed exogeniety of overeducation could result in a significant under-estimate of its wage impacts; Dolton and Siles (2003) found that after controlling for endo-geniety within the context of a treatment model, the overeducation pay penalty in current employment rose substantially.

Generally speaking, the evidence on wages is in line with assignment theory given that the lower returns to surplus education and the overeducation penalty suggest that the overeducated are working below their potential but are deriving some benefit from surplus education; these lower returns are consistent with a scenario in which overeducated workers jobs are imposing an upper limit on the extent to which they can utilize their skills with this productivity ceiling reflected in lower wages. The evidence is certainly not consistent with HCT which suggests that the returns to surplus and required education should be equal and that the overeducated should not have any pay penalty inflicted upon them. Nor is it consistent with Thurow's Job Competition Model which suggests that the return to surplus education is zero.

Table 3. Reported Wage Effects.

Name of study	Year	Definition employed	Country	Data collection	Return to acquired education	Return to required education	Return to under education	Return to overeducation	Return to work experience	Penalty
Dolton and Vignoles	2000	Self assessment – subjective job requirement	UK	1986						−11.64%
Chevalier	2003	Objective occupational dictionary	UK	1996						−27%
Sloane et al.	1999	Subjective job requirements	Britain	1986–87			−3.4%	2.8%		
Groot	1996	Objective occupational dictionary	UK	1991	5.2%	8.8%	11.9%	−2.8%		
Dolton and Siles	2003	Subjective	UK	1998						−18%
Daly et al.	2000	Subjective – required education	US	1976	7.55%*	7.55%*	−3.5%*	5.3%*	4.35%*	
			US	1985	8%*	9.35%*	−2.05%*	7%*	5.4%*	
			Germany	1984	8.2%*	9%*	−5.8%*	5.75%*	3.5%*	
Duncan and Hoffman	1981	Subjective job requirements	US	1976	7.35%*	7.7%*	−2.8%*	4.05%*		
Sicherman	1991	Subjective job requirements	US	1976 and 1978		4.8%	−1.7%	3.9%		
Groot and van den Brink	1997	Meta-analysis				7.9%	−4.9%	2.6%		
Hartog and Oosterbeek	1988	Subjective – required education	Holland	1982	6.1%	7.1%	−2.5%	5.7%		
Verdugo and Verdugo	1989	Objective standard deviation based measure	US	1980						−13%
Cohn and Kahn	1995	Objective standard deviation	US	1985		8.4%	−4.4%	5.9%		−11.1%

Table 3. *Continued.*

McGUINNESS

Name of study	Year	Definition employed	Country	Data collection	Return to acquired education	Return to required education	Return to under education	Return to overeducation	Return to work experience	Penalty
		Subjective – sicherman definition	US	1995		8.2%	−3.9%	5.9%		−11.1%
Patrinos	1997	Objective standard deviation	Greece	1977						−9.4%
Rumberger	1987	Subjective job requirements	US	1973		7.6%*		4.4%*		
		Objective occupational dictionary	US	1973		8.8%*		4.45%*		
Alba- Ramirez	1993	Subjective job requirements	Spain	1985	7.4%	9.2%	−6%	4%		
Groot and van den Brink	2000a	Objective standard deviation Based	Holland	1994		5.95%*	3%*	−1.9%*		−11.95%*
		Objective occupational Dictionary	Holland	1994		5.4%*	10.8%*	2%*		−10.9%*
		Subjective	Holland	1994						−7.4%*
Bauer	2002	Objective standard deviation	Germany	1984–1998		11.6%*	−10.75%*	7.1%*		−12.85%*
Kiker *et al.*	1997	Objective standard deviation based	Portugal	1991						−8%
		Objective standard deviation modal	Portugal	1991		7.6%	−5.6%	4.8%		
		Objective occupational dictionary	Portugal	1991		10.1%	−4.8%	3.3%		
Cohn and Ng	2000	Objective modal measure	Hong Kong	1986		10%*	−5%*	4.5%*		−17%*
			Hong Kong	1991		14%*	−4.5%*	4.5%*		−26%*
Groot	1993	Objective standard deviation	Holland	1983	5.5%		2.6%	−7.4%		
McGuinness	2003a	Subjective – job requirements	Northern Ireland	2000						34%

*Average.

4.3. *Which Theoretical Framework is Most Consistent with Overeducation?*

A considerable amount of effort has been expended by researchers who have attempted to explain the overeducation phenomenon within the context of the various views of the labour market outlined earlier and/or to use the phenomenon itself in order to develop explicit tests of these various frameworks. The following section will evaluate the evidence with respect to the various theoretical viewpoints.

As stated earlier, most of the evidence emanating from studies estimating wage equations based on the decomposition of educational years acquired (equation 4) have found that the returns to surplus education, whilst positive and significant, tend to be lower than the returns to required education. Most researchers have interpreted this as evidence against HCT which implies that the returns to surplus and required education should be equal. However, Rumberger (1987) found that in some occupations, there was no reward to surplus schooling suggesting that the Job Competition Model may adequately explain behaviours within particular job markets, a point consistent with Thurow's initial analysis. Nevertheless, a number of studies have attempted to develop more formal tests on the basis of equation 4, specifically:

$$\beta_2 = \beta_3 = \beta_4 \tag{6}$$

and,

$$\beta_3 = \beta_4 = 0 \tag{7}$$

Equation 6 represents a formal test of the HCT, whilst equation 7 suggests that the marginal product is fully embodied within the requirements of the job and thus is a test of the Job Competition Model. Failure to accept either hypothesis implies that equation 8 will hold lending support to the assignment interpretations of the labour market.

$$\beta_2 \neq \beta_3 \neq \beta_4 \tag{8}$$

The majority of studies have tended to reject the hypothesis that the coefficients are equal (Hartog and Oosterbeek, 1988; Alba-Ramirez, 1993; Groot, 1996; Kiker *et al.*, 1997; Sloane *et al.*, 1999) either in the context of equation 6 or equation 7, suggesting that models based around assignment views of the labour market most accurately reflect the reality that is embodied within the data. However, Hartog and Oosterbeek (1988) did report that for Dutch females, the assignment specification whilst superior to the Job Competition Model was inferior to the specification derived from HCT, which they rationalize within the context of differences in labour supply behaviour. Hartog and Oosterbeek state that both for participation and hours worked, female labour supply has substantially higher wage elasticities than male supply. This explains why females have to be paid the returns to their actual education even in jobs for which they are overeducated (any reduction on this and relatively large proportions of them would not work). The model also suggests that female elasticities fall with education level thus allowing for full wage correction in jobs where females are undereducated;

nevertheless, as the authors point out, these results require further research. However, the finding whilst not universal is unlikely to be unique to the Dutch labour market given that Vahey (2000) reports no lower return to surplus education for overeducated Canadian females despite finding them for some overeducated Canadian males.

Some authors have adopted slightly differing approaches to assess the adequacy of the various frameworks. Battu et al. (2000) examined whether, as HCT suggests, firms upgrade the tasks they give to their overeducated workers, their hypothesis being that there should be convergence in graduates' jobs over time, thus making overeducation a temporary phenomenon. Convergence was tested for across time in the context of (1) a narrowing of the earnings gap, (2) improved job satisfaction amongst the overeducated, (3) job characteristics and (4) promotional prospects. They found that there is as much divergence as there is convergence in the nature of the work for the overeducated compared with those who are in matched employment. Therefore, there was no evidence to suggest that overeducated graduates have been able to upgrade their jobs, thus suggesting again that overeducation may be a long-term problem. Finally, McGuinness (2003a) rejected the hypothesis that coefficients on both human capital and job description variables were jointly zero within a hedonic wage equation model demonstrating that both human capital and job characteristics are important factors in determining wage rates lending further support to the assignment interpretation.

However, all this does not spell the end for HCT and, as pointed out earlier, a number of researchers have argued that it is still fully consistent with varying rates of educational return under the following three circumstances. Firstly, if overeducated workers possess lower amounts of informal human capital then lower rates of return are simply a reflection of their true worth to the firm. This substitution-based hypothesis argues that overeducated workers are merely compensating for a lack of experience, implying that the lower returns to surplus education reflect of an omitted variables problem (experience, on-the-job training etc.) as opposed to any real under-utilization. Secondly, if overeducated workers are less able than their well-matched counterparts, then again it is likely that they are in fact being paid their marginal product suggesting that HCT remains consistent. This interpretation is again consistent with that of an omitted variables problem in that it suggests that the measures of human capital contained within the standard Mincer equation do not sufficiently allow for the existence of heterogeneous skill sets amongst individuals with similar levels of education, and as we have seen, researchers have been making attempts to control for such influences within the empirical framework. Finally, HCT will remain consistent should overeducation proves to be a temporary phenomenon which declines with occupational mobility and exists only for as long as it takes workers to find an appropriate labour market match.

In support of the substitution hypothesis, a raft of studies (Duncan and Hoffman, 1981; Sicherman, 1991; Sloane et al., 1996; Kiker et al., 1997; Sloane et al., 1999; Cohn and Ng, 2000; Daly et al., 2000) all found that overeducated

workers tended to have lower levels of experience, tenure and/or training. However, Groot (1993) found nothing to support the hypothesis that overeducation and enterprise training (proxies on-the-job training) were substitutes, whilst Duncan and Hoffman (1981) found evidence to suggest that general labour market experience is not treated by employers as a substitute for formal education, and in addition, Alba-Ramirez (1993) still reported lower returns to overeducation after controlling for on-the-job training. Finally, the substitution hypothesis seems somewhat at odds with graduate studies that report significant differences in both the incidence and impacts of overeducation despite the fact that the graduates in question entered the labour market at the same point in time and thus possessed similar levels of experience (Dolton and Vignoles, 2000; McGuinness, 2003a; McGuinness 2003b).

It is also important to note that none of the studies reporting an overeducation/experience trade-off attempted to control for any cohort effects, whereby older workers are less likely to be overeducated due to the demand conditions prevalent on labour market entry. Groot (1996) is one of the few authors to highlight the cohort-based explanation by considering the possibility that the observed inverse relationship between overeducation and experience may be due to cohort effects rather than the usually argued substitutable nature of these alternative options for human capital investment Groot points out that if the growth in the education level of the labour force is greater than the growth of the educational quality of jobs, higher educated workers may displace lower educated workers and overeducation will increase. For the younger, higher educated cohorts, there are relatively less high-qualified jobs than for the older workers. Thus, the experience relationship may simply reflect these older (and now coincidentally more experienced) workers entering the labour market during a period where there was a higher availability of high-skilled jobs. Therefore, it can be argued that existing studies examining the link between overeducation and informal human capital accumulation are potentially weakened by a failure to account for cohort influences.

In terms of the evidence that overeducated workers are in some way less able than their well-matched counterparts, Groot (1996) reports that the negative wage effects of overeducation increase with time (for men) suggesting that over time as employers find out more about the productive capabilities of these workers they tend to pay them less, suggesting that overeducated men are unproductive. Sloane *et al*. (1999) argue that overeducated workers are less able on the basis that they are less likely to be promoted. Green *et al*. (1999) reported evidence that the overeducated tended to have lower mathematical abilities on the basis of which they argue that the overeducated are likely to have less innate ability. However, they also found that the overeducated were more likely to have better prose and documentation skills which, as the authors later concede, suggest that the differences they detected between the adequately matched and overeducated were more readily related to variations in the nature of the education undertaken. For instance, it may well be that, as is the case with graduates, students electing to take more Arts and Social Science GCSE's/A levels (as opposed to more

vocational subjects) may be exposing themselves to a higher likelihood of over-education.[7] However, there is also some evidence to suggest that overeducated workers are more able relative to their undereducated counterparts; Mendes de Oliveria et al. (2000) found that employers tend to value and prize overeducation and at the same time penalize undereducation; with prolonged tenure, overeducated workers were granted an ascending path of their relative earnings, while undereducated workers saw their relative position eroded.

Finally, the extent to which overeducation is consistent with models of occupational mobility has also been examined within the literature, and as with the previous two propositions, the evidence is mixed. Mobility-type frameworks argue that overeducation is merely a transitory phenomenon that will gradually disappear as workers improve their labour market position. In support of this, Sicherman (1991) reported that overeducated workers have higher rates of firm and occupational mobility, and they are more likely to move to a higher occupation. Alba-Ramirez (1993) found that the proportion of overeducated workers fell with age, hinting a defined pattern in the upgrading process of overeducated workers throughout their working lives. Alba-Ramirez also reported that over-educated workers have a high job turnover rate pointing to an improvement in the match over time. However, the finding that mobility does not necessarily equate with an improved labour market position was also reported by Sloane et al. (1999), whilst McGuinness (2003a) concluded that a large part of the observed mobility consists of workers moving from one state of overeducation to another. In addition, Dolton and Siles (2003) conclude that being overeducated in first employment tends to permanently constrain graduates to low-level occupations. Finally, more recent research has indicated that the permanency of the overeducation effect will be related to the nature of the labour market individuals are operating in; Groeneveld and Hartog (2004) report that career development within the internal labour market is much more substantially impeded as a result of overeducation.

4.4. Is Space Important?

Buchel and Battu (2003) report that, after controlling for distance to work, both married males and females living in rural locations are more likely to be over-educated. Buchel and van Ham (2002) build on these findings to further develop the hypothesis that the risk of overeducation is highest for workers in small regional labour markets and see spatial mobility as a potential means of avoiding overeducation. They found that spatial flexibility reduces overeducation with those with a car having lower probabilities (they acknowledge potential selection effects associated with car ownership). Overeducation probabilities were also positively correlated with potential commuting times. In terms of regional-specific variables, the longer the travelling time to a large conurbation the higher the overeducation probability suggesting that access to large concentrations of employment activities reduces overeducation. Contrary to their expectations, regional unemployment levels did not impact on overeducation (access to a

large agglomeration did) although they were important for employment prob-abilities (whereas access to a large agglomeration had no effect). This suggests that in order to avoid unemployment, it is not the size of the labour market that is important but the level of competition. For overeducation, the size of the labour market alone is relevant. To some extent, these findings contradict those of McGoldrick and Robst who report that, for married females, large numbers of vacancies in larger labour markets were offset be a larger number of job searchers. Taken together, one could potentially conclude that competition effects may be relevant in the context of married females, whereas for 'less tied' workers, it is the size of the labour market that is important in determining the likelihood of overeducation.

   Lastly, in relation to cross-country differences, by comparing US data from the Panel Study of Income Dynamics and The German Socio-Economic Panel, Daly *et al.* (2000) investigate how structural changes in the US labour market over the 1970s and 1980s effected the rewards and penalties associated with education-employment mismatches and make comparisons with the more structured German labour market. They cite the US structural shifts as being increases in both the demand and supply of highly skilled/educated labour, significant increases in the returns to schooling and the introduction of non-neutral technol-ogies that disproportionately benefit more educated individuals. Their results suggest that the nature of overeducation has remained relatively unchanged over time (mid-70s and mid-80s) in these countries and therefore had not reacted radically to changes in institutional factors. They conclude that neither the well-documented structural shifts in the US labour market between 1976 and 1985 nor the substantial structural differences between the US and German labour markets in 1984/1985 (Germany has more government involvement and stronger unions implying less flexibility) significantly affected the returns to either surplus or deficit education. They suggest that their results confirm a universal view of labour markets with respect to overeducation given that they found more similar-ities between countries at one point in time than within one country across different points in time.

4.5. *Results Summary*

In terms of the theoretical frameworks, it is probably reasonable to conclude that on the balance of evidence the assignment interpretation of the labour market is most consistent with the findings of existing studies. This conclusion is drawn on the basis that the evidence on the relative returns to education suggest differing returns to required, surplus and deficit education and on the grounds that the Human Capital or Job Competition Models were largely rejected by studies carrying out formal hypothesis tests. Clearly, there are concerns that the absence of controls for informal human capital accumulation and worker heterogeneity will tend to overstate the effects of overeducation and understate the role of human capital. In relation to the substitution hypothesis, the evidence is some-what mixed, and even disregarding this, it is unclear to what extent any observed

overeducation/experience trade-off is due to human capital substitution or cohort effects. In relation to the hypothesis that overeducated workers may be in some ways less able or have fewer skills than their well-matched counterparts, there is certainly some evidence to support this view. Nevertheless, the apparent acceptance of the assignment interpretation of the labour market within the literature implies that wages are determined within a hedonic price equation containing both individual and job characteristics. This would suggest that the methodologies that seek to control for worker heterogeneity implicitly by assuming that all of the unobserved differences relate only to differences in skills will tend to overestimate this effect. Taken together, the results would tend to support the inclusion of more explicit controls for worker heterogeneity within the empirical framework.[8]

5. Summary and Conclusions

On balance, the evidence from existing overeducation studies tends to support an Assignment interpretation of the labour market implying that both individual and job characteristics are important for determining wage rates in the economy. The arguments put forward by researchers who maintain that the apparent wage effects of overeducation arise largely from flaws in the empirical framework are at the very least debateable. Therefore, on the basis of the evidence, there is scope to conclude that the impacts of overeducation are likely to be non-trivial and that the phenomenon may potentially be costly to both individuals and firms and the economy more generally.

   The study therefore raises a number of important issues for policy. The wisdom of the current government policy in pursuing a 50% higher education participation target must surely be highly questionable. In a very recent study, Walker and Zhu (2005), using a very rough measure of graduate overeducation, indicated that, post-expansion, the incidence of overeducation in the UK has risen for both male and female graduates across almost all subject groups;[9] however, the rate of growth seemed particularly rapid for graduates in the Arts and Humanities. The obvious implication, therefore, is that should higher education participation continue to expand in line with current government targets then rates of overeducation will inevitably rise incurring further costs on individuals, firms and the economy. It is also clear from the literature that, particularly at the graduate level, the incidence of overeducation is non-random with respect to subject studied as graduates from backgrounds such as Arts, Humanities and some Social Sciences are much more likely to end up overeducated. This raises the question with respect to the extent to which government should seek to re-orientate the educational system away from the Arts and Humanities towards more vocationally orientated subjects with higher levels of job relevant skills. Nevertheless, it is likely that such a strategy, whilst providing some benefits, is unlikely to provide a solution to overeducation, as the evidence suggests that the problem effectively relates to the supply of educated labour exceeding demand coupled with an inflexible labour market, whereby employers are either unable or unwilling to

alter their production processes to fully utilize the skills of their overeducated workers.

Notes

1. Conversely, undereducation refers to the extent to which individuals acquired education levels fall below those required by the job.
2. Although Freeman's work is without doubt highly influential, it is not without its drawbacks, the first thing to point out is that Freeman employs 'Overeducation' merely as a descriptive term designed to characterize the observed collapse in the market for college workers during the 1970s based on the observed decline in college earnings. Freeman's work does not explicitly consider the level of mismatch that exists between education levels and job requirements, thus the extent to which declining wages were associated with any drop in the proportion of graduates gaining graduate level employment remained largely unknown.
3. The Mincer model performs very poorly when applied to graduate cohort data (see Dolton and Vignoles, 2000; McGuinness, 2003a) due mainly to the fact that there is little variation in the education and experience levels of individuals in the dataset.
4. Rather bizarrely, both objective specifications reported that the return to a year of undereducation was positive and significant with the magnitude of the return almost three times higher under the occupational dictionary measure; in fact, the return to undereducation under the occupational dictionary approach was over twice the estimated return to required education.
5. It should be noted that some researchers have adopted approaches to measuring over-education that are slightly different to those outlined above. Alpin *et al*. (1998) using UK data from the Spring 1995 Labour Force Survey (restricted to GB graduates) use two slightly alternative definitions, the first relates to SOC classification whereby they classify the following occupations as requiring degrees, managers and administrators (excluding Trade Union official's minor group 19), professional occupations and computer analysts from the associate professional occupations. The second definition is a modal measure again based on the SOC classification; they define graduate occupations as those where the qualification most frequently held by employees is a degree or higher (based on two-digit SOC analysis). Clearly, given that many manager and administrative occupations do not require degrees, it is likely that the modal method will generate higher graduate overeducation estimates (i.e. its deeming more occupations to be non-graduate).
6. The data relate to the combined sample; however, in circumstances where studies reported the incidences for males and females, only the mean has been taken.
7. This in turn relates back to the substitutability point. A number of graduate studies have found that overeducation is non-random with respect to faculty i.e. graduates from Arts and Social Science backgrounds are much more prone to the phenomenon Dolton and Siles (2003), McGuinness (2003a). Thus, rather than substituting formal for informal human capital, overeducated workers may, to some extent at least, be substituting higher amounts of 'non-relevant' education for a lack of job relevant education.
8. The strong evidence in support of assignment theory also serves to emphasize that the need to include job characteristics in the wage equation framework.
9. The exception was for females from Maths and Engineering backgrounds.

References

Alba-Ramírez, A. (1993). Mismatch in the Spanish labor market. *Journal of Human Resources* 28(2): 259–278.

Allen, J. and van der Velden, R. (2001). Educational mismatches versus skill mismatches: effects on wages, job satisfaction and on-the-job search. *Oxford Economic Papers* 53(3): 434–452.

Alpin, C., Shackleton, J. and Walsh, S. (1998). Over and undereducation in the UK graduate labour market. *Studies in Higher Education* 1: 17–34.

Battu, H. and Sloane, P. J. (2000). Overeducation and crowding out in Britain. In Borghans and de Grip (eds), *The Overeducated Worker* (pp. 157–175). Cheltenham: Edward Elgar.

Battu, H. and Sloane, P. J. (2002). To what extent are ethnic minorities in Britain over-educated. *International Journal of Manpower* 23(3): 192–207.

Battu, H., Belfield, C. and Sloane, P. (2000). How well can we measure graduate over-education and its effects? *National Institute Economic Review* 171: 82–93.

Bauer, T. (2002). Educational mismatch and wages: a panel analysis. *Economics of Education Review* 21: 221–229.

Becker, G. (1964). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. New York: Columbia University Press.

Buchel, F. and Battu, H. (2003). The theory of differential overqualification: does it work. *Scottish Journal of Political Economy* 50(1): 1–16.

Buchel, F. and van Ham, M. (2002). *Overeducation, Regional Labour Markets and Spatial Flexibility*. IZA Discussion Paper No. 424.

Burris, V. (1983). The social and political consequence of overeducation. *American Sociological Review* 48(4): 454–469.

Chevalier, A. (2003). Measuring overeducation. *Economica* 70: 509–531.

Cohn, E. and Khan, P. (1995). The wage effects of overschooling revisited. *Labour Economics* 2: 67–76.

Cohn, E. and Ng, C. Y. (2000). Incidence and wage effects of underschooling and Overschooling in Hong Kong. *Economics of Education Review* 19: 159–168.

Daly, M., Buchel, F. and Duncan, G. (2000). Premiums and penalties for surplus and deficit education: evidence from the United States and Germany, *Economics of Education Review* 19: 169–178.

Decker, R., de Grip, A. and Heijke, H. (2002). The effects of training and overeducation on career mobility in a segmented labour market. *International Journal of Manpower* 23(2): 106–125.

Dolton, P. and Siles, M. (2003). The determinants and consequences of overeducation. In Buchel, de Grip and Mertens (eds), *Overeducation in Europe* (pp. 189–217). Cheltenham: Edward Elgar.

Dolton, P. and Vignoles, A. (2000). The incidence and effects of overeducation in the UK graduate labour market. *Economics of Education Review* 19: 179–198.

Duncan, J. and Hoffman, S. (1981). The incidence and wage effects of overeducation. *Economics of Education Review* 1(1): 75–86.

Frank, R. H. (1978). Why women earn less: the theory and estimation of differential overqualification. *American Economic Review* 68(3): 360–373.

Freeman, R. B. (1976). *The Overeducated American*. NewYork: Academic Press.

Frenette, M. (2004). The overqualified Canadian graduate: the role of the academic programme in the incidence, persistence and economic returns to overeducation. *Economics of Education Review* 23: 29–45.

Green, F., McIntosh, S. and Vignoles, A. (1999). *"Overeducation" and Skills – Clarifying the Concepts*. London: Centre for Economic Performance.

Green, F., McIntosh, S. and Vignoles, A. (2002). The utilization of education and skills: evidence from Great Britain. *The Manchester School* 70(6): 792–811.

Groeneveld, S. and Hartog, J. (2004). Overeducation, wages and promotions within the firm. *Labour Economics* 11: 701–714.

Groot, W. (1993). Overeducation and the returns to enterprise related schooling. *Economics of Education Review* 17(4): 299–309.

Groot, W. (1996). The incidence and returns to overeducation in the UK. *Applied Economics* 28: 1345–1350.

Groot, W. and van den Brink, H. (1997). Allocation and the returns to overeducation in the UK. *Education Economics* 50(2): 169–183.

Groot, W. and van den Brink, H. (2000a). Skill mismatches in the Dutch labor market. *International Journal of Manpower* 21(8): 584–595.

Groot, W. and van den Brink, H. (2000b). Overeducation in the labour market: a meta analysis. *Economics of Education Review* 19(2): 149–158.

Hannan, D. F., McCabe, B. and McCoy, S. (1998). Trading Qualifications for Jobs – Overeducation and the Irish Youth Labour Market, Dublin ESRI.

Hartog, J. and Oosterbeek, H. (1988). Education, allocation and earnings in the Netherlands: overschooling? *Economics of Education Review* 7(2): 185–194.

Heckman, J., Lochner, J. and Todd, P. (2003). *Fifty Years of Mincer Regressions*, IZA DP, No. 775.

Hersch, J. (1995). Optimal "mismatch" and promotions. *Economic Enquiry* 33: 611–624.

Kiker, B., Santos, M. and Mendes de Oliveiria, M. (1997). Overeducation and under-education: evidence for Portugal. *Economics of Education Review* 16(2): 111–125.

Mason, G. (1996). Graduate utilisation in British industry: the initial impact of mass higher education. *National Institute Economic Review* 156: 93–103.

McGoldrick, K. and Robst, J. (1996). Gender differences in overeducation: a test of the theory of differential overqualification. *American Economic Review* AEA Conference proceedings.

McGuinness, S. (2003a). Graduate overeducation as a sheepskin effect: evidence from Northern Ireland. *Applied Economics* 35: 597–608.

McGuinness, S. (2003b). University quality and labour market outcomes. *Applied Economics* 35: 1943–1955.

McGuinness, S. and Bennet, J. (2006). Overeducation in the graduate labour market: a quantile regression approach. Forthcoming, *Economics of Education Review*.

McMillen, D. P., Seaman, P. T. and Singell, L. D. (1999). *A Hedonic Analysis of Overeducation and Undereducation*. University of Oregon Working Papers, University of Oregon.

Mendes de Oliveria, M., Santos, M. C. and Kiker, B. (2000). The role of human capital and technological change in overeducation. *Economics of Education Review* 19: 199–206.

Mincer, J. (1974). *Schooling, Experience and Earnings*. New York: Columbia University Press.

O'Leary, N. and Sloane, P. (2005). *The Changing Wage Returns to an Undergraduate Education*. IZA DP No. 1549.

Patrinos, H. (1997). Overeducation in Greece. *International Review of Education* 24(2/3): 203–223.

Robst, J. (1995). College quality and overeducation. *Economics of Education Review* 14: 221–228.

Rubb, S. (2004). Overeducation in the labor market: a comment and re-analysis of a meta analysis. *Economics of Education Review* 22: 621–629.

Rumberger, R. (1987). The impact of surplus education on productivity and earnings. *Journal of Human Resources* 22(1): 24–50.

Sattinger, M. (1993). Assignment models of the distribution of earnings. *Journal of Economic Literature* 31: 831–880.

Sicherman, N. (1991). "Overeducation" in the labour market. *Journal of Labor Economics* 9(2): 101–122.

Sloane, P. (2003). Much ado about nothing? What does the overeducation literature really tell us. In Buchel, de Grip and Mertens (eds), *Overeducation in Europe* (pp. 11–49). Cheltenham: Edward Elgar.

Sloane, P. J., Battu, H. and Seaman, P. T. (1996). Overeducation and the formal education/experience and training trade-off. *Applied Economics Letters* 3: 511–515.

Sloane, P., Battu, H. and Seaman, P. (1999). Overeducation, undereducation and the British Labour market. *Applied Economics* 31: 1437–1453.

Spence, M. (1973). Job market signalling. *Quarterly Journal of Economics* 87(3): 355–374.

Thurow, L. C. (1975). *Generating Inequality*. New York: Basic Books.

Tsang, M. (1987). The impact of underutilisation of education of productivity: a case study of the U.S. Bell companies. *Economics of Education Review* 11: 239–234

Tsang, M., Rumberger, R. and Levin, H. (1991). The impact of surplus schooling on worker productivity. *Industrial Relations* 30(2): 209–228.

Vahey, S., (2000) The great Canadian training robbery: evidence on the returns to educational mismatch. *Economics of Education Review* 19: 219–227.

Verdugo, R. and Verdugo, N. (1989). The impact of surplus schooling on earnings. *Journal of Human Resources* 24(4): 629–643.

Walker, I. and Zhu, Y. (2005). *The college wage premium, overeducation and the expansion of higher education in the UK*. IZA DP No. 1627.