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IS THERE A GENUINE UNDERUTILISATION OF SKILLS AMONGST THE OVER-QUALIFIED?

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Is there a Genuine Underutilisation of Skills Amongst the Over-qualified?

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Gallie, D., Felstead, A. and Green. F, (2002). *Changing Patterns of Employee Involvement.* SKOPE Research Paper No. 28
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SUMMARY

This paper attempts to explain why, according to the 2001 UK Skills Survey, 37% of employees are apparently over-qualified for the job that they do.

- Initially, three possible explanations are considered. First, are there simply too many skilled workers for the available number of skilled jobs in the economy? We argue that such an explanation would at present be inconsistent with several pieces of evidence currently available in the economics literature, such as widening wage inequality and increasing returns to education, and the skills deficiencies often reported by employers. If there were too many skilled workers, in a market economy we would expect that wage inequality would become narrower, and the returns to education would become lower.
- A second theory is one of mismatch, whereby the skills distribution of the workers matches the skills distribution of the available jobs, but due to imperfect information or labour market rigidities, workers do not find the most appropriate jobs for their skills. In this theory, some workers are under-utilising their skills
- A third possible theory is that employee skills are heterogeneous within qualification groupings. Individuals can be over-qualified in terms of formal qualifications, even though their skills or abilities are appropriate for the jobs that they do. The difference between this theory and the mismatch theory is that in this theory over-qualification is not associated with skill under-utilisation.
- Instruments were designed into the Skills Survey questionnaire that would enable direct measures of skills utilisation to be investigated alongside more standard measures of over- and under-qualification. The intention was to help fill gaps in knowledge about the relationship between under- and over-utilisation of skills and over- and under-qualification.
- There is evidence that both the heterogeneous skills theory and the mismatch theory are relevant in certain situations as a cause of (apparent and real, respectively) over-qualified status. Key findings in favour of the heterogeneous skills theory are that:
  - There is only a modest correlation between being over-qualified and over-skilled, and none at all between being under-qualified and being under-skilled.
  - Those with fewer mathematical skills are more likely to be over-qualified, and less likely to be under-qualified.

- Those who are over-qualified receive less pay than their peers with the same qualification level but who are not over-qualified. When we control for the presence of skill under-utilisation, this negative impact of over-qualification on wages remains, as does the positive impact of under-qualification.
- There is no evidence that under-qualified workers are especially lacking skills, any more than workers who are not under-qualified.

Key findings in favour of the mismatch theory are that:

- Over-qualification is greater for groups of people where one would expect labour market rigidities to be greatest, such as for women with dependent children
- Being over-qualified lowers non-wage measures of worker well-being, but this lowering is not significant when we account for under-utilisation of skills.

- The phenomenon of "over-qualification" is found also in other countries, and for some individuals being over-qualified may be only a temporary state, although we do not know for how many. Nevertheless, the problem of under-utilisation of skills supports policies on child care and careers advice in order to promote labour market flexibility. Moreover, if the returns to qualifications were to begin to fall substantially, while at the same time the extent of over-qualification were to continue rising, this would inevitably generate increased concern about the level of demands from employers in relation to the level of educational investment.
- We recommend, therefore, that the prevalence of over- and under-qualification be monitored more closely in Britain, alongside a monitoring of the returns to attaining qualifications. Timely information on both would be helpful for policy makers. Future research could also usefully focus on the dynamics of qualifications mismatches.

1. Introduction

There is evidence that, in the current period, an increasing proportion of workers are finding themselves in jobs that require qualification levels rather lower than those they have themselves obtained. According to the latest Skills Survey (Felstead et al, 2002), some 37 percent of workers were "over-qualified" in this sense in 2001, compared with just 32 percent in 1997. During this time, rather less than one in five workers remained "under-qualified" – that is, doing jobs that would require a new recruit to have a higher qualification level than currently held by the job-holder. The rise in over-qualification followed a period of relative stability dating back to the mid 1980s, though the decade before that saw an earlier rise in over-qualification (Green et al, 2002). If the recent rise heralds an ongoing trend, it becomes more urgent now to understand the significance and implications of this phenomenon. Who are performing the jobs for which they do not have the appropriate levels of education or skills, either too much or too little? Are the over-qualified genuinely under-using their skills, and is there any evidence that the under-qualified are suffering from a skills deficiency? What are the implications of being over- or under-qualified for wages received, job satisfaction and well-being? If the implications are unfavourable, why do people work in such jobs?

The puzzle of over-qualification and under-qualification needs to be unravelled in the light of two related stylised facts about the labour market: an ongoing rise in the level of skills utilised in workplaces, and at least a maintenance if not a rise in the gross returns to attaining higher qualification levels (particularly degrees, but also high vocational qualifications) (Machin, 1999).

The paper builds on an expanding literature about "over-education" that exists in Labour and Education Economics[1] (see for example Alba-Ramirez, 1993, Battu *et al*, 1999, Cohn *et al*, 1995, Dolton and Vignoles, 2000, Duncan and Hoffman, 1981, Green *et al, 2002,* Groot, 1993, 1996, Groot and Maassen van den Brink, 1997, 2000, Hartog, 1997, 2000, Rumberger, 1987, Sicherman, 1991, Sloane *et al*, 1996, Sloane *et al,* 1999, Tsang *et al*, 1991, Verdugo and Verdugo, 1989). This literature has documented the extent of overeducation and undereducation that exists in a number of countries, and highlighted the wage impact of

[1] In our own analysis, we prefer the terms 'over-qualifed' and 'under-qualified', and prefer not to use the terms over- and undereducation because of the connotation attached that there is too much or too little education being provided, which, as we describe below, is only one possible reason for the presence of over-qualified or under-qualified workers.

working in a job for which one is over- or under-qualified[2]. Describing the results very broadly, about a quarter to a third of a nation's employees tend to work in jobs for which they are over-qualified, with a somewhat smaller proportion working in jobs for which the required education level exceeds their actual qualifications. For example, the prevalence of over-qualification in the early 1990s was 24% in the Netherlands, 28% in Spain and 33% in Portugal; in the United States, the figure was 32% in 1977.[3]

Being over- or under-qualified makes a difference. Those who are over-qualified tend to earn less than their similarly qualified peers who work in appropriate jobs, although they do still earn more than those with the required qualification for the job in which they work. Similarly, those working in a job for which they are under-qualified tend to earn more than workers with the same qualification working in an appropriate job, but again this differential does not ensure parity with those better-educated workers employed with the appropriate required qualifications for such a job. A limited number of papers have also investigated the impact of being over-qualified on welfare variables such as job satisfaction (for example see Tsang *et al*, 1991). The outcome is that working in a job for which one is over-qualified tends to lower one's job satisfaction, relative to an employee with appropriate qualifications for the job.

What we do not know is how far these effects of over- and under-qualification reflect the putative impacts of under-utilising skills or of under-performing because of insufficient skills, as is commonly assumed. There is evidence that achievements in mathematics lower the likelihood of being over-qualified, which suggests that over-qualification may in part reflect lower levels of mathematical ability (Green et al, 2002). Little direct evidence has been produced that the over-qualified or under-qualified are on average genuinely "over-skilled" or "under-skilled". [4]

[2] Over- and undereducation are defined as the difference between actual qualifications held, and required qualifications for the job (overeducation if this difference is positive and undereducation if this difference is negative). Required qualifications for the job can be measured by self-reported qualifications required to get or to do the job, by expert job study analyses of the occupation being undertaken, or by the average qualification level amongst workers in a particular occupation grouping. See, amongst others, Hartog (1997) or Groot and Maassen van den Brink (2000) for a fuller description of these measurement methods, and for a discussion of their various benefits and limitations in econometric analyses.

[3] A fuller description of these various results can be found in, amongst others, Hartog (1997, 2000) or Groot and Maassen van den Brink (2000). Precise comparability with the figures for Britain is not possible.

[4] Allen and van der Velden (2001) use a direct measure of underutilisation with a sample of Dutch graudates, and find that under-utilisation of skill had relatively little relation to whether the graduates were working in a job below graduate level.

To address these gaps in our knowledge, instruments were designed to generate direct measures of skill utilisation, and inserted in the questionnaire of the second national Skills Survey collected in 2001. This paper contributes by investigating the extent, the determinants and the effects of over-qualification and under-qualification, alongside a parallel investigation of over-skilling and under-skilling. It also further explores the impact of mathematical ability indicators. Respondents are asked whether their jobs allow them to fully utilise their range of abilities and skills, or whether they have not been able to keep up to date with the skills required in their job. This combination of questions allows us to investigate whether those who are over-qualified in terms of formal qualifications really do have skills that they are failing to utilise in their jobs, and vice versa for the under-qualified. Such an investigation should be useful in helping to determine the reasons behind certain individuals working in jobs for which they are over- or under-qualified. The causes of such states of employment are generally less well researched than their incidence and outcomes.

2. Three Possible Reasons for Over-Qualification and Under-Qualification

One idea advanced as the reason why certain people work in jobs for which they are over-qualified is that there is an over-supply of skills compared to that which is demanded. Such a theory, indeed most of the overeducation literature in general, assumes that there is a skill level attached to a job regardless of the attributes of the person who fills it[5]. Thus, in the assignment theory of job allocation, as detailed, for example, by Sattinger (1993), individuals can be ranked from highest to lowest in terms of their skills, as can jobs in terms of their skill demands. Individuals are then assigned to jobs as appropriately as possible. Thus, the most skilled individual will work in the job requiring the highest level of skills, the next most skilled individual in the next most demanding job, and so on. If there is an overall level of over-qualification in the economy, with more skills being collectively supplied than are demanded, then as the economy works down the hierarchy of skills in assigning individuals to jobs, some individuals will end up in jobs for which they are over-qualified. As such, the skills and attributes that they have acquired during their education will be wasted, unless it

[5] Whilst this may sound reasonable, note that such an assumption does not feature in the basic human capital theory, in which an individual's particular level of human capital will provide a certain level of productivity, irrespective of the job in which that individual works. Essentially human capital theory assumes that firms will use workers in a way that utilises their full productivity potential. Here it is assumed that productivity in a job is determined jointly by the characteristics of the individual and of the job.

can be argued that the surplus qualifications have a social value not shown directly in the labour market. One policy response to such a situation would be to reduce the numbers receiving higher levels of education, since the economy is essentially producing too many skilled individuals, with a concurrent waste of resources. Obviously, such a response is diametrically opposite to current policy thinking in the UK and many other countries, where expanding the numbers in education is very much the aim, on economic grounds as well as for social reasons. Alternatively, the policy should be to encourage employers to raise their demands for skills to match the available skills.

A second possible explanation for the existence of over-qualified workers is, not that there are too many skilled workers for the jobs available, but that there is a degree of mismatch in the labour market. In the language of the assignment model outlined above, individuals are not necessarily assigned to the most appropriate job. If the labour market was working at its most efficient, everyone would be assigned to a job that made full use of their skills, and there would be no over- or under-qualified workers, but due to a lack of information or rigidities in the labour market, this does not happen. A lack of information implies that individuals do not find the most appropriate job for their skills, while rigidities may prevent them accepting the most appropriate job, even if they found it. Such rigidities may be related to family situations, whereby the presence of a partner or, especially, children, may prevent individuals from moving to accept the most appropriate job[6]. Some existing evidence supporting this mismatch explanation derives from the finding that workers with families, especially part-time workers, are more likely to be found amongst the over-qualified (Green et al, 2001). The policy prescription in this case is to improve the inefficient workings of the labour market, through more and better quality information and through providing family-friendly working policies to remove restrictions and improve flexibility, allowing individuals with such responsibilities to reach their potential in the labour market.

One possibility that we cannot investigate with the cross-section data at our disposal is that workers are mismatched into jobs only temporarily. For example, individuals join a company

[6] The use of the economists' jargon term 'rigidities' therefore should not be taken to imply that there is some impediment forcing individuals' into certain jobs against their wishes. Individuals responsible for childcare, for example, may actively choose employment, often part-time, that does not make full use of their skills, so that their energies can be reserved for their other responsibilities. The term 'rigidities' therefore refers to impediments to the labour market achieving its most efficient allocation, and not to impediments that prevent

performing initially quite menial tasks for which they are over-qualified, but with the full expectation that once they have mastered the processes involved, they will be promoted to a position more commensurate with their qualifications. Or alternatively, the mismatch that we observe is only temporary, with individuals accepting any low-level job while they continue searching for work more suitable for their qualification level. If either of these stories were correct, we would not need to be too concerned about the over-qualified workers observed. Unfortunately, we cannot tell how long the over-qualified workers in our sample have been over-qualified, or will remain over-qualified, because all we have is a single 'snapshot' of data. Most researchers in this area face a similar problem. One exception is the research undertaken by Dolton and Vignoles (1997), who have a sample of graduates observed in their first job after graduation, and again six years into their careers. The results show that, amongst graduates who are over-qualified in their first job, some two thirds are still working in a job for which they are over-qualified six years later. To the extent that this finding could be generalised, it suggests that the incidences of over-qualification that we observe, whatever their cause, are not temporary states for a substantial majority. This is an area in which more research of a longitudinal nature would be illuminating.

Is it possible to differentiate between the two theories of over-qualifications, either too many skilled workers or mismatch, that have been advanced so far? This would be useful to do, given that the policy implications are quite different. There are several arguments that lead us to reject the first explanation (too many skilled workers). First, the co-existence of both over-qualified and under-qualified workers in the economy is easy to understand within the mismatch theory, whereas it is more difficult, though not impossible, to rationalise within the 'too many skilled workers' theory. A possibility in the latter case is to imagine that most jobs in the economy require an intermediate level of skills, but workers are more equally spread across the distribution of skills. A certain number of lucky highly-skilled individuals will be assigned to the limited number of jobs requiring a high level of skills. Others, however, will be assigned to only intermediate level jobs. Once all highly skilled workers are assigned, intermediate skilled workers will begin to be assigned to the intermediate jobs. Because there are a large number of such jobs, there are insufficient high and intermediate skilled workers to fill all vacancies, however, and hence some low-skilled individuals must also be assigned to

individuals working in the job that they wish (which will be decided according to work allocations across labour market and household time, rather than simply the efficient allocation from the labour market's point of view).

such job openings. In this way, both over-qualified and under-qualified workers could co-exist in an economy, in which there are both too many highly-skilled workers and also too many low-skilled workers. Nevertheless, this explanation requires a particular distribution of skills demand and supply and as such is somewhat ad hoc.

Additional and strong evidence against the 'too many skilled workers' theory is provided by the wage inequality literature. It would be expected that, if there were too many highly skilled workers for the number of jobs requiring a high level of skills, then the individuals in possession of such skills would underbid each other in an attempt to gain the desired employment positions, and so reduce the high skill wage, relative to the wages of less skilled individuals. All of the evidence for the UK, however, suggests growing wage inequality and a widening differential between the wages of graduates and non-graduates[7]. There are sustained and substantial gross returns to academic qualifications at all levels and to vocational qualifications above level 2 (Dearden *et al*, 2002). This labour market evidence is very hard to square with the idea that there are too many graduates and other high skill workers in the UK economy. The point is reinforced by continual and sustained reports from surveys of the UK business community of skills deficiencies including, especially at times of cyclical upswing, recruitment difficulties (see Campbell *et al*, 2001).

Finally, if the mere existence of over-qualified workers were to be explained as deriving from there being too many skills, the same explanation would presumably apply to many other countries, where substantial over-qualification is found. We would, however, be reluctant to conclude that there could be such a widespread glut of skills in the industrialised world.

There is, however, a third possible explanation for the phenomena of over- and under-qualification. This explanation begins by dropping the assumption that qualifications represent a homogenous standard of skills and abilities across individuals, but maintaining that there can still be a match between individuals' skills and job requirements (even if that match is also imperfect). Thus, although workers are over-qualified or under-qualified in terms of their qualifications, in terms of their actual skills, they can be in jobs commensurate with their ability. In terms of the variables in our analysis, over-qualified workers would be

[7] See for example Machin (1999) or Machin *et al* (2002)

no more likely to be over-skilled than under-qualified workers or workers in jobs with a qualifications match.

There are two possible ways in which individuals could be apparently over-qualified in terms of their formal qualifications, but not over-skilled in terms of their actual skills. First, it may be the case that an over-qualified individual holds a certain qualification, but is at the lower end of the ability range of people obtaining that qualification. In terms of actual skills and abilities, such a worker may actually match more closely those with the appropriate (ie lower) qualification for the job that they are doing. For example, consider graduates doing jobs for which only A levels are required. If those graduate are less able than other graduates, and are actually doing a job that suits their skills and abilities, then they will appear over-qualified in terms of formal qualifications, but in actual fact will be in jobs for which they are well matched in terms of actual skills held. The alternative is a case where a job requires a skilled person, but the firm does not express this in terms of formal qualifications. For example, an individual with A levels works in a job for which no formal qualifications are actually required for an applicant to be considered, although the job itself is quite skilled, and would actually suit somebody with A level qualifications. In both cases, therefore, individuals appear to be over-qualified in terms of their formal qualifications, but are actually performing jobs for which their skills are very well suited. The problem is that formal qualifications are not always an accurate indicator of skills, either the skills held in the former case, or the skills required in the latter case.

There is some prima facie evidence in support of this third explanation. First, most respondents reported to the 2001 Skills Survey that qualifications were not the most important factor in gaining jobs (Felstead et al, 2002: 27). Educational and technical qualifications were ranked as the first or second most important factor in getting a job in only 3 out of 10 cases; for level 1 qualifications the proportion was only 17%. Relevant work experience and the right attitudes are frequently ranked more important. This finding is not new. Second, despite substantive returns to qualifications, evidence from the Skills Survey shows that there are substantial aggregate surpluses of workers with qualifications at level 3 and below over the numbers of jobs that explicitly require these qualifications for recruitment to those jobs. This surplus appears to reflect the tendency of employers in Britain often not to specify explicit qualification requirements, in contrast to recruitment practices in continental Europe. But,

because there remains the evidence of skills deficiencies amid the apparent surplus of qualifications, we have further reason to question how closely the qualifications and skill levels are aligned.

Of the three explanations for the phenomenon of over-qualification and under-qualification we have outlined, we have rejected the first, namely the view that there are too many skills. In the rest of the paper, our main aim is to utilise the Skills Survey to investigate the validity of the remaining two explanations: the view that qualification mismatch reflects a genuine mismatch of skills resulting from labour market rigidity, and the view that the qualifications mismatches have little to do with skills mismatches.

3. Data

We utilise data drawn from the 2001 Skills Survey, which is a cross-sectional representative survey of 4470 individuals aged between 20 and 60 in Britain in paid work at the time of interview in spring 2001. The design of the survey was patterned on that of the first Skills Survey, conducted in spring 1997 (Ashton *et al*, 1999). Random sampling methods were used, and the achieved sample was representative of the British population. Full details of the sampling frame and fieldwork methods can be found in Felstead *et al* (2002). The questionnaire comprised a detailed investigation of the nature of the individual's job with an emphasis on the activities that the job entails. Additional information was obtained on the organisation in which the individual worked, pay and changes that had occurred in the job in the last 5 years. Some background demographic information on each individual was also collected.

The key questions for our analysis are those that generate the over/under-qualified and over/under-skilled variables. For the qualification variables, a list with a large number of qualifications is offered to the respondents, from which they indicate those qualifications that they hold. We then ranked all of the qualifications, and assigned a level to each one. The five levels are a degree or higher degree (level 5)[8], higher level academic or vocational qualifications below degree level, such as diplomas in higher education and NVQ level 4 or HNC/HNDs (level 4), A-levels or their equivalent in vocational qualifications, such as NVQ

level 3 or ONC/OND s (level 3), GCSE/O-levels (at grade C or above) or their equivalent in vocational qualifications, such as NVQ level 2 (level 2), and GCSE/O-level passes below grade C or their vocational equivalent, such as NVQ level 1 (level 1). In addition, we have a level 0 category, representing individuals with no recognised qualifications. In this way, we derived a highest qualification level for each respondent. Earlier in the interview, the same list of qualifications was presented, but here the respondent was asked which would be required by someone now in order to get the job in which the respondent works. Using the same categories as before, this gave us a required education level for the job. A respondent was then classified as over-qualified if his/her actual qualification exceeded the required qualification for the job, ie

$$OQ_i = 1 \quad if \quad AQ_i > RQ_i$$
$$OQ_i = 0 \quad if \quad AQ_i \leq RQ_i$$

where OQ_i is a dummy variable taking the value of 1 if the respondent is over-qualified and 0 otherwise, AQ_i is individual i's highest qualification (on the 0-5 scale described above), and RQ_i is the required qualification level for individual i's job, on the same scale. Similarly, the under-qualified variable is defined as:

$$UQ_i = 1 \quad if \quad AQ_i < RQ_i$$
$$UQ_i = 0 \quad if \quad AQ_i \geq RQ_i$$

In some of the correlation analyses that follow we also use a variable describing the extent of over- or under-qualification, calculated as the absolute number of levels between the actual and required qualifications.

Turning now to the over-skilled variable, this is based upon the following two questions in the Skills Survey:

"How much do you agree or disagree with the following statement: 'In my current job I have enough opportunity to use the knowledge and skills that I have'?:

Strongly agree

Agree

Disagree

Strongly disagree"

[8] Note that we differ slightly from the NVQ classification here, which would assign degrees to level 4.

"How much of your past experience, skill and abilities can you make use of in your present job?:

Very little

A little

Quite a lot

Almost all"

If the respondent indicated that they were over-skilled according to either of these questions, i.e. they disagreed or strongly disagreed with the first statement, or they answered 'very little' or 'a little' to the second question, then we classified them as being over-skilled, since they were not making full use of their skills and abilities in their jobs[9].

The under-skilled variable was based upon the following questions:

"Was the training you received over the last five years adequate for keeping up to date with the skills required in your current job?

Very useful

Fairly useful

Of some use

Only a little useful

Not at al useful"

"Since five years ago, was there any time over this period when training would have been useful for keeping up to date with the skills required in your current job, but was not available from your employer?

Yes

No?

The first question was asked of those respondents who had received some training in the preceding five years, and the second question of those who had not. If respondents answering the first question reported that their training had not been sufficient to keep up with the skills required in the job, then we could argue that they no longer had the skills or abilities to perform the job competently, and so they are under-skilled. Similarly, amongst those with no recent training who answered the second question, if they reported that they actually needed

[9] The answers to these two questions were quite highly correlated, and just using one or the other as our measure of over-skilling did not substantially alter the results.

some training in order to have kept up with the skills required in their job, then again this would suggest that they are under-skilled in some way.[10]

Besides estimating the determinants of over/under-qualified and over/underksilled status, the other dependent variables that we use are wages and welfare measures. The wages measure used is the log of hourly pay. Three welfare measures are used, derived using a range of questions in the Skills Survey. First, the answers to questions asking respondents how often their job had made them feel cheerful, enthusiastic, optimistic, depressed, gloomy and miserable were combined into an 'enthusiasm-depression' scale, with the first three counting positively and the latter three counting negatively. Second, answers to questions asking respondents how often their job had made them feel calm, contented, relaxed, tense, uneasy and worried were combined into a 'contentment-anxiety' scale, again with the first three counting positively and the latter three counting negatively. The enthusiasm-depression scale and the contentment-anxiety scale are shown by Warr (1990) to represent separate but correlated emotional states of job-related well-being.[11] Finally, a job satisfaction variable was derived from a question asking respondents to rank how satisfied they were overall with their jobs, on a scale from 1 to 7, with 1 representing 'completely dissatisfied' and 7 representing 'completely satisfied.'

The Skills Survey also contains quite detailed information that allows us to control for a variety of background characteristics of the respondents and their jobs. With respect to personal characteristics, we control for gender, age, marital status, the presence of children and work experience. As well as their highest qualification level, as described above, we also know the highest maths qualification that each respondent has achieved. Previous research by Dolton and Vignoles (1999), using data from the National Child Development Study, has shown that graduates who hold a maths A-level qualification earn on average 7-10% more than graduates whose highest achievement in maths is below an A-level. It would be

[10] Another question in the Skills Survey, used by Allen and van der Velden (2001) for their sample of Dutch graduates, could have been used to measure the extent of under-skilling. This question asked respondents "How much do you agree or disagree with the following statement: 'I would perform better in my current job if I possessed additional knowledge and skills'?" However, almost 2/3rds of respondents either agreed or strongly agreed that they could perform better with additional knowledge and skills. This suggested that many respondents were performing adequately, while still admitting that there was room for improvement. We therefore decided that this variable was not accurately measuring a state of under-skilling, and so preferred to use the variables defined above.

[11] For a fuller description, see also the parallel paper in this series (Green and Gallie, 2002).

interesting to investigate whether a good maths qualification can reduce the likelihood of being an over-qualified or over-skilled employee, irrespective of other qualifications obtained. For graduates only, we also know the subject area of their degree, and the type of institution they attended. As for job characteristics, as well as the required education level for the job, as described above, we also have information on full-time/part-time status, permanent/temporary status, whether shift work is involved, establishment size, industry, public/private sector status and occupation. The next section examines some of the relationships amongst these variables.

4. Results

(i) Skills Usage by Industry and Occupation

Tables 1 and 2 show the extent and distribution of over/under-qualified and over/under-skilled status by industry and occupation for all employees. Consider first the overall incidence, as shown in the final row of each table. The results suggest that 37% of employees are over-qualified for the job that they do. This compares to the figure of 32% in the 1997 Skills Survey, implying a rise in the extent of over-qualification in the four years from 1997 to 2001. This is after a period of relatively stable levels of over-qualification, as described in Green *et. al.* (2002). The level of under-qualification is about half the rate of over-qualification, a finding that is commonly found in the literature. In terms of the less well-documented skill usage variables, we can see that 35% of UK employees are over-skilled and so do not make full use of all the skills and abilities in their possession. No comparable earlier figure is available for comparison. However, the second of the two questions used in deriving the over-skill variable was asked in an identical way in the Employment in Britain survey in 1992 (Gallie et al, 1998). Comparing the proportions who responded that they were able to make use "quite a lot" or "almost all" (the top two scale points) of their skills and abilities in their jobs, this rose significantly from 51% to 57% between 1992 and 2001. Thus, there is no suggestion here that underutilisation of skills is increasing, and if anything skills underutilisation is decreasing. Finally, the results suggest that 18% of UK employees are under-skilled; there is no means of comparison with earlier years using this definition.

One might expect to find that the over-qualified and the over-skilled are more likely to work in low-skill industries and occupations, and this pattern can be observed in the tables. The

three industries with the highest proportion of over-qualified workers are the wholesale/retail trade, hotel and catering, and transportation industries. The construction industry is an exception in that, although the required qualification levels would not be expected to be too high, we still observe a low rate of over-qualification, suggesting that few highly qualified workers find work in this industry. The lowest rates of over-qualification and over-skilling are found, as expected, in the industries where most jobs are skilled and require high-level qualifications for access, for example the education sector. An interesting sector is the finance industry. This industry has one of the highest proportions of over-qualified workers, and yet has the lowest proportion of employees expressing the view that they have skills and abilities that are not used in their job. One possibility to explain this result is that the finance industry is less likely than other industries to ask for formal qualifications, relying on other characteristics of potential employees when making the hiring decision, although it still expects skilled individuals to work in a skilled job, so that its employees appear over-qualified in terms of formal qualifications, but not over-skilled in terms of actual skills.

The industrial pattern is less clear for the under-qualified and under-skilled variables. The distribution of these variables varies less across the various industries than was the case with the over-qualified and over-skilled variables. Nevertheless, the industries with the lowest proportions of under-qualified workers are the wholesale/retail trade, and the hotels and catering industries, while the industries with the lowest incidence of under-skilling are mining, electrical and hotels/catering.

There is a clearer pattern of results across occupations than across industries[12]. Particularly on the over-skilled variable, we can see a monotonic relationship with the top three occupations (managers, professionals and associate professionals) having the lowest incidence of over-skilling, the middle three occupations (secretarial, skilled trades and personal services) having intermediate levels of over-skilling, and the lowest three occupations (sales, plant operatives and elementary occupations) having the highest incidence of over-skilling.

[12] Obviously, an industry can only be classified as high skill or low skill on average, with each industry actually employing workers from the full range of skills. With occupations, it is more likely that almost all will be of a certain required skill level, for example professional jobs requiring a high level of skills, and elementary occupations requiring a lower level of skills.

(ii) Are the Over-Qualified also Over-Skilled?

This section begins the investigation into the factors causing over-qualification (and under-qualification) by examining simple Spearman rank order correlation coefficients between these concepts, and the over/under-skilling variables. Here we are trying to establish whether the over-qualified are really in possession of skills that are being underutilised in their jobs[13]. The statistically significant positive correlation between the over-qualified variable and the over-skilled variable reveals that there is some relationship, although the 0.2 coefficient suggests one of only moderate strength. Among the employees who are over-qualified, less than half (47%) report having skills and abilities that they are not using in their job. This compares with 28% of those who are not over-qualified who report underutilising their skills. While some of the observed over-qualified workers thus appear to be over-skilled, consistent with the mismatch stories, other apparently over-qualified workers report being in jobs commensurate with their skills, consistent with the 'heterogeneous skill within qualification levels' theory.

The Skills Survey also asked respondents whether they had specific skills in four areas, selling skills, teamworking skills, computing skills and problem solving skills, which would be better used in an alternative job to the one they were in. Correlating the answers to these questions with the over-qualified variable allows us to examine whether the over-qualified who do report wasting skills are wasting any specific skills in particular that they possess. The resulting correlation coefficients are positive and statistically significant in each case, suggesting that the over-qualified and over-skilled do not make full use of their skills in all four areas. In the graduate sub-sample, it appears that the over-qualified are particularly not putting their computing and problem-solving skills to good use in their jobs.

The final row in Table 3 reveals that there is no relationship at all between under-qualified status and under-skilling; the under-qualified are no more likely to lack sufficient skills to perform their jobs than those who are adequately qualified. Thus the under-qualified are not, on the whole, a group desperately struggling out of their depth in jobs for which they do not possess sufficient skills. The interpretation is therefore that these are employees who have

[13] Since some authors researching in this area have considered all employees, while others have restricted their analysis to graduates only, we present all of our results first for all employees, and then separately for non-graduates and graduates. Note that it is not actually graduates who are more likely to be over-qualified. In our

gained skills through other routes after the end of their schooling, primarily through years of working experience. They are now capable of performing jobs that demand a higher qualification level of current new entrants.

Finally in this section, we return to examine further detail about the kinds of jobs being carried out by those who are over- or under-qualified, over- or under-skilled. The Skills Survey elicits information about a large range of particular job skills involved in respondents' jobs. A factor analysis reduced this number of skills down to a more manageable 10 factors, representing generic job skills that are used to varying extents in every job. The generic skill indicators are scaled in such a way that a score of 0 represents an average importance of those skills in the job. In addition, questions about the respondents' use of computers at work are used to construct a computing skills variable, which is measured on a scale of 0 to 4, indicating increasing complexity of computer use in the respondent's job. For full descriptions, see Felstead et al (2002) and Dickerson and Green (2002).

Looking down the first column in Table 4, the negative signs indicate that there is a below average importance attached to all skills, on average, where the over-qualified work, with the exception of low-level manual skills. In particular, the over-qualified are more likely to work in jobs in which there is a low importance attached to professional, high-level communication (such as making presentations, writing substantive reports, instructing others), planning, numeracy skills, literacy skills and problem solving. Column 3 reveals that those who claim to have unused skills and abilities work in jobs in which exactly the same skills are viewed as less important (with the addition of client communication skills). This could suggest, although not prove, that it is these skills that are being underused amongst the over-qualified and over-skilled. The results in columns 2 and 4 are essentially the mirror image of the results in columns 1 and 3, with all skills except low level manual skills being of above average importance in the jobs held by under-qualified or under-skilled employees. The results in the computing skills row suggest that the over-qualified (over-skilled) use computers to a lower level of complexity than the under-qualified (under-skilled), on average.

sample, 35% of graduates are over-qualified, compared to 45% of individuals at NVQ level 1, 50% of individuals at NVQ level 2 and 49% of individuals at NVQ level 3.

(iii) The Determinants of Over/under-qualified, Over/under-skilled Status

Thus far, the findings indicate that some, though not much, of the over-qualified can be seen as having under-utilised skills, while the status of being under-qualified has no apparent relationship to being under-skilled. In this section we investigate the multivariate determinants of over/under-qualified and over/under-skilled status, in an effort to distinguish further between the competing explanations.

The analysis begins with Table 5, which shows the estimated marginal effects of the various explanatory variables on the probability of being over-qualified, derived from a probit equation[14]. The results for all employees in the first column show that young employees are more likely to be over-qualified than prime age workers, as are those who have children[15]. The likelihood of being over-qualified reaches its minimum at approximately age 48. The results also show that higher achievements in mathematics increasingly lower the probability of being over-qualified, by 18 percentage points if a maths A-level is held and by 19 percentage points if a maths degree is held, relative to those with no formal qualification in maths.

When the sample is split into its graduate and non-graduate components, the same statistically significant effects continue to hold for non-graduates. For graduates, the coefficient on the children variable is reduced to statistical insignificance, although the coefficient itself remains of a similar size, and the statistical insignificance is more a result of the smaller number of observations in the graduate sample. In addition, holding a GCSE in maths does not reduce the likelihood of being over-qualified for graduates, although higher-level maths qualifications still have this effect. Subject of degree in general has an important impact for graduates, with the negative coefficients on all but one of the subject variables suggesting that the omitted category, business and management studies, has one of the highest over-qualified graduate rates, together with social sciences. Several subjects lead to an over-qualified probability that is significantly lower than that produced by these two subjects, namely English, physical sciences, 'other' (many of these are education degrees), maths, computing,

[14] Individuals with no qualifications are excluded from the analysis in this table as they cannot, by definition, be over-qualified.

[15] There are two questions in the Skills Survey asking about the presence of children, one asking about children of any age, and the other asking specifically about the presence of children under the age of 5. It made little difference to the results which variable we chose. We report the results obtained using the variable indicating the presence of any children.

arts and biology. Finally, when comparing the type of institution attended, graduates of Oxbridge and 'old', pre-1992, universities, are each about 10 percentage points less likely to be over-qualified than graduates of 'new', post-1992 universities, although due to the small size of the graduate sample, both results just fail to achieve statistical significance. Those graduates in the UK who obtained their degree at an overseas university are, however, almost 20 percentage points more likely to be over-qualified than graduates of new universities.

What do these results tell us about the causes of over-qualified status? They suggest unambiguously that the mismatch theory may be relevant, as highlighted by the increased likelihood of being over-qualified amongst employees with children. The presence of children can restrict parents' mobility in the labour market if they feel attached to particular schools or institutions, leading to possible acceptance of less than ideally-matched jobs (this may, of course, be a positive choice of parents). It could be hypothesised that the presence may affect the labour market decisions of women more than men. We allowed for this possibility by including an interaction term between the gender and children dummy variable. Although the coefficient on this interaction implied that the effect of children on the probability of being in an over-qualified job is 60% higher for women than for men, this coefficient was not statistically significant.

The findings about degree subject are, however, harder to interpret. Amongst the graduates only, while rising wage inequality suggests that there are not too many skilled workers overall, one argument could be that there are many graduates in particular subjects, leading to a shortfall in the number of suitable jobs in these fields. For example, social sciences and business/management studies produce amongst the highest numbers of graduates of all the subjects, which may be the cause of the higher rates of over-qualified employees amongst such graduates, there simply being insufficient numbers of appropriate jobs in these fields. However, in our view a more likely explanation is that graduates are quite heterogeneous. Comparatively few employers specify the subject of degree, but they are often interested in the quality of the degree, including the institution where the degree was obtained. If the graduates of some subjects fare better than others, this may not reflect that these are taught especially well, or that these subject-specific skills are in high demand: it may simply be that these subjects are deemed to be harder, and therefore their graduates more able. There is plenty of casual evidence in favour of such an interpretation. Certainly the institution type

(assuming more able students go to one of the old universities) and the highest maths qualification results suggest that there is some ability effect on the likelihood of being over-qualified. Thus, the results here remain consistent both with the possibility of mismatch in the labour market, and also with the view that to some extent the over-qualified have fewer skills than those not over-qualified.

Table 6 estimates the same equations as Table 5, with the addition of job characteristics. It can be seen that these job characteristics are strongly related to the probability of being over-qualified, while some of the statistically significant effects from Table 5 have disappeared, notably the effect of having children. In particular, part-time jobs, jobs involving shift work, jobs in small workplaces and jobs in the private sector are strongly associated with the likelihood of being over-qualified. Thus it appears that some of those who face rigidities in the labour market, due to family considerations, choose jobs that are less demanding on their time or take the only jobs available, and that these part-time, shiftwork, typically private sector, jobs do not match the higher level qualifications that they have.[16] We investigated whether it was only women who were overqualified in such jobs by including an interaction term between the gender and full-time/part-time status dummies. However, the coefficient on this interaction was highly statistically insignificant, suggesting that both men and women who choose or accept such jobs are more likely to be over-qualified. It is true, however, that about 90% of those individuals working in part-time jobs are women.

We reported above that approximately half of those who are over-qualified are also over-skilled. In the discussion section, it was also suggested that if mismatch is causing over-qualification then we would expect to see the over-qualified to be also over-skilled, while if the heterogeneous workers theory is relevant for over-qualification, then we should not observe a concurrent state of over-skilling. One question, therefore, is whether, considering only the over-qualified, there is more evidence of mismatch amongst the half who are over-skilled, compared to the half who are not over-skilled. The answer to this question is yes, although some of the differences are quite small. Amongst the over-skilled, over-qualified workers, 32% work in part-time jobs, compared to 23% amongst the non-over-skilled, over-

[16] In a further estimation, not shown, we also controlled for the highest qualification held, although this potentially creates an endogeneity problem as this variable is used in the construction of the dependent variable. This estimation did not alter the pattern of results.

qualified workers. Similarly, 52% of the over-skilled, over-qualified are women, 48% have children and 26% are mothers, compared to 48%, 45% and 21% respectively.

Table 7 examines the determinants of being under-qualified amongst non-graduates[17]. The results are essentially a mirror-image of the findings in Table 6, with full-time jobs, those not involving shiftwork and those in the public sector being more likely to be filled by an under-qualified worker. Older workers and those who are married are more likely to secure a job demanding a higher qualification than they actually hold. These findings are consistent with the view that employees who are more likely to acquire skills at work through the fact that they are in stable full time work are enabled to take on jobs above their qualification level. Similarly, the ability effect is shown in that those non-graduates who have achieved an A-level in maths are also more likely to obtain a job at a higher qualification level than they actually hold. These results thus reinforce the finding from the previous section that the under-qualified status has no correlation with being under-skilled.

In Tables 8 and 9, we consider skill levels rather than qualifications. The results reveal that those workers whom we argued were more likely to be mismatched, namely non-prime age workers and those with family responsibilities,[18] are again more likely to be over-skilled. It would appear that those who are mismatched in this way into unstable forms of employment (part-time, shiftwork in the private sector) are underutilising their skills. Other results suggest that maths skills are less likely to be underutilised, as we again notice in the full sample and the graduate sample that employees with higher maths qualifications are less likely to be over-skilled. It is interesting, however, that none of the other coefficients on the subject variables in the graduate equation attract statistically significant coefficients, with the exception of that on the medicine variable. It would therefore appear that, although graduates of social sciences and business or management degrees are less likely to be in a graduate level job than graduates of most other subjects (as shown in Tables 5 and 6), they are not more likely to be over-skilled or underutilising the skills that they have learnt, as we might have expected if there were simply too many graduates of these subjects for the available number of jobs. The fact that they are more likely to be over-qualified in terms of formal qualifications, and yet

[17] Since graduates have the highest level of qualification, they cannot, by definition be under-qualified, and so they are omitted from this analysis.

just as likely to be in a job making full use of their skills and abilities as graduates in other disciplines, suggests a number of possibilities. One is that the courses they have followed are not associated with the skills necessary to get a graduate level job. Another is that less able students choose subjects in these fields because they are perhaps perceived as less difficult than other subjects. Although such students obtain their degrees they do not really have the ability to do a graduate level job. The final possibility is that graduates of these subjects are more likely to go into jobs, such as in the finance industry, where a degree is less of a formal, explicit requirement, than graduates of other disciplines such as medicine, education, engineering and science, whose jobs upon graduation are more likely to stipulate a degree as a definite requirement. The first two hypotheses say that the reason for the lack of over-skilling amongst the over-qualified business and social science graduates is that they are really only able to do A level type jobs anyway. In the third explanation, they have graduate level skills and perform jobs that use these skills, although not demanding a degree of applicants. The fact that the wage results that follow show that business graduates, at least, are amongst the highest paid, on average, of all graduates, suggests in fact that the last explanation could be key.

Finally Table 9 offers results on the determinants of under-skilled status, which to a large extent are the mirror image of those in Table 8 for over-skilled status, although few variables attract statistically significant coefficients in the under-skilled equations. The results do suggest that women and those working in part-time jobs (which, of course, overlap to a large extent) are less likely to feel under-skilled.

(iv) The Wage Effects of Over/under-qualified and Over/under-skilled Status

As described in the introduction, many papers have estimated the impact of being over-qualified (under-qualified) on earnings, and found it to reduce (increase) earnings, relative to similarly educated peers who obtain a job at the appropriate qualification level. Tables 10, 11 and 12 provide similar results, for all employees, non-graduates and graduates respectively. In each case the dependent variable is the log of hourly pay.

[18] The children coefficient is again statistically significant when the job characteristics are omitted (not shown), but loses this significance once the job characteristics are included, again suggesting that the driving of some such workers into such unstable forms of employment is causing their over-skilling.

The results in the first columns of each table are consistent with the previous results in the literature; amongst all employees, the over-qualified earn, on average, 18%[19] less than individuals working in jobs for which they have an appropriate level of education. Amongst non-graduates this figure is 16% and amongst graduates it is 15%. Similarly, the under-qualified earn more than individuals with the same qualification level who work in a lower level job more in keeping with their formal education, by 18% amongst all employees and 19% amongst non-graduates[20]. So far, these findings are standard.

The key piece of analysis to be undertaken in this part of the paper, however, is to examine what happens to these wage penalties and premiums, once we control for the extent of over- and under-skilling. A reasonable hypothesis, consistent with a matching model and empirically consistent with the standard findings noted above, is that wages are related both to an individual's human capital and to the requirements of the job. Thus, individuals in a job where the qualification requirements are lower than the average for their qualification group will receive a lower wage. Thus, the expected impact of being over-qualified is negative. By a similar argument, the impact of being over-skilled is predicted to be negative, because individuals who are over-skilled are in jobs demanding lower skills and hence paying less. Moreover, if the reason why the over-qualified earn less is that they are not using their skills and abilities to the same extent as someone of the same education level in an appropriate job, then once we control for this fact via the over-skilling variable, the coefficient on over-qualification should be reduced.

The results, in the second columns of Tables 10, 11 and 12 reveal, however, that this is certainly not the case. Although the over-qualified coefficient does fall in each table, in each case the fall is not statistically significant. Amongst all employees, the over-qualified wage penalty falls by just under 2 percentage points, with this fall being again just under 2

[19] Calculated as $e^{\beta} - 1$, where β is the estimated coefficient in the log-linear equation, in this case –0.166.

[20] In addition, the other coefficients are all consistent with wage equation results in the literature. Wages are higher for males, married workers and those with children, and increase concavely with work experience. Hourly wages are higher in full-time than in part-time jobs, and in those jobs that never involve shift work. Wages increase monotonically with workplace size. The Dolton and Vignoles (1999) result is repeated in that individuals with higher formal qualifications in maths earn significantly more (9%, 19% and 46% for a maths GCSE, A-level and degree respectively) than an individual without a formal qualification in maths, holding constant across the comparison the highest education level achieved. Finally, in the graduate only sample, graduates of computing and maths earn the most, while graduates of English and humanities earn the least. Attending an Oxbridge or 'old' pre-1992 university raises wages by 16% and 11% respectively, relative to graduates of 'new' post-1992 universities.

percentage points for non-graduates and 4 percentage points amongst graduates, which, although being a larger change, still does not achieve statistical significance because of the larger standard errors in the graduate equations. Thus, holding constant the extent of over-skilling, over-qualified workers still earn less than their appropriately-qualified peers, suggesting that the reason for the wage penalty is not that skills are being underutilised and wasted, at least to any significant extent. There must be another reason why, for example, the over-qualified graduates are still earning less than those in graduate level jobs, even when we hold constant the utilisation of skills across this comparison. One possibility consistent with, although not proved by, these results is that the over-qualified graduates are less able or have less appropriate and marketable skills than those who find graduate level employment.
Another possibility is that our over-skilling variable is a poor measure of the actual utilisation of skills, and so it does not explain much of the over-qualified effect on wages. However, over-skilling attracts a strongly significant, negative coefficient, suggesting that it does contain important information. As expected, individuals not fully utilising their skills earn less.[21]

The under-skilled coefficient is much smaller in absolute value, and does not achieve statistical significance in any of the presented equations. However, we should not necessarily expect under-skilling to be the opposite of over-skilling. The two phenomena may be asymmetric for the following reason. Over-skilling is a plausible state from an employer's viewpoint because there is no direct reason that this would lead to inadequate performance on the job; but under-skilling to any great extent can hardly be acceptable to employers, especially if they pay the rate for the job and are continuing to employ someone who has insufficient skills to perform the job. Hence, we expect that the way the variable has been constructed indicates that, although the job-holder feels that training would help to improve his/her performance, this is not a reason for the wage to be any different. Nevertheless, the subjective self-report method of measuring under-skilling is especially problematic, since admission of the possibility of improved performance is particularly closely linked to an individual's self esteem. Moreover, recognising that performance could be improved does not necessarily imply that skills are deficient. These factors may mean that the variable carries comparatively little information.

[21] This result is robust to alternative specifications of the wage equation, including a hedonic wage equation as used in Dickerson and Green (2002).

(v) The Welfare Effects of Over/under-qualified and Over/under-skilled Status

The final piece of analysis in this paper is a consideration of the welfare effects of being over/under-qualifed and over/under-skilled, using the three welfare variables described in Section 3 above. We restrict our analysis, as presented in Table 13, to the whole sample, there being no important differences in the pattern of results between graduates and non-graduates. In each of the equations, estimated by OLS in the cases of the enthusiasm-depression scale and the contentment-anxiety scale, and by ordered probit in the case of job satisfaction, the full set of determinants are the same as used in the wage equations.[22] Here we focus on the issue of qualifications and skills utilisation. Psychological theory suggests that under-utilisation of skills will be linked with boredom and lower levels of job satisfaction (Warr, 1987).

Looking at the first column of Table 13 reveals that the over-skilled are significantly more depressed, significantly more anxious and significantly less satisfied in their jobs than those who are not over-skilled. The over-qualified, on the other hand, are no more likely to be depressed or dissatisfied than the non-over-qualified, and actually report being less anxious. This last result may be due to the over-qualified working in jobs that they find easy, so that they feel no anxiety or strain over getting the job done, although the boredom and lack of challenge involved leaves them dissatisfied and depressed. In the second and third columns, the qualifications utilisation and skills utilisation variables are entered separately. Once we are not controlling for the extent of over-skilling, we observe that the over-qualified are significantly more likely to be depressed or dissatisfied. A large part of this depression and dissatisfaction thus appears to be due to the over-qualified under-utilising their skills and abilities.

Turning to the roles of under-qualification and under-skilling, although under-qualification does not attract statistically significant coefficients, under-skilling does, suggesting that the under-skilled, like their over-skilled counterparts, are more depressed, anxious and dissatisfied. It appears, therefore, that a good match between employee skills and job requirements is important for the psychological well-being of those employees.

[22] A full analysis of the determinants of workers' well-being is presented in a parallel paper (Green and Gallie, 2002). The results here differ slightly because the included set of controls is less comprehensive, but the pattern and significance of the skill mismatch coefficients is the same.

5. Conclusions

Over one-third of UK employees in 2001 were over-qualified, in the sense that the highest qualification that they held was greater than the qualification level necessary to get the job in which they worked, while in a similar sense just under one in five employees were under-qualified. This phenomenon of qualifications not matching jobs is not an unusual finding. Previous studies[23] have shown that qualifications mismatch has applied to a substantial proportion of workers in Britain for a long time, and studies abroad show that over-qualification and under-qualification are common there too. Nevertheless, these latest estimates show a significant increase in over-qualification compared to estimates in the 1990s, suggesting that it would be wise to investigate the meaning and implications of being over- or under-qualified more closely than hitherto.

Interest in this phenomenon at the individual level also derives from the finding, reported in Felstead et al (2002), that in aggregate the number of jobs in the economy which appear to require no qualifications for new recruits considerably exceeds the numbers in the workforce who lack any qualifications; the reverse side of this coin is that there are substantive numbers of people with qualifications at levels 1 to 3, in excess of the numbers of jobs which ostensibly require these qualifications.

The principal aim of the paper was therefore to attempt to explain why individuals accept jobs for which they are over-qualified, while a subsidiary aim has been to explain also the opposite status of being under-qualified. Three possible theories were considered; firstly that there are simply too many well-educated workers in Britain for the number of skilled jobs available, and so some have to accept a job that requires a lower level of education than they actually have; secondly, that there are not too many skilled workers, but rigidities in the labour market or a lack of information leads to individuals accepting jobs that are a poor match for them in terms of the skills demanded; and thirdly, that the over-qualified are over-qualified in terms of formal qualifications, even though their skills or abilities are appropriate for the jobs that they do.

[23] See, for example, Battu *et al* (1999), Dolton and Vignoles (2000), Green *et al* (2002), Groot (1996) and Sloane *et al* (1996, 1999)

For several reasons outlined in Section 2 we consider that the first possibility is not an empirically plausible explanation at present: the continually high returns to attaining qualifications at all levels (suggesting a genuine sustained market demand), persistent reports of skills deficiencies in respect of a substantive minority of the workforce, the coexistence of both over-qualified and under-qualified workers, and the fact that over-qualification is also a widespread phenomenon in other countries.

The rest of the paper draws on evidence from the 2001 Skills Survey to attempt to distinguish between the second and third possibilities. A key feature of the mismatch theory is that the over-qualified really are underutilising their skills; and the under-qualified really are lacking in some required skills for the job. The essential feature of the 'heterogeneous skill within qualification levels' theory is that the over-qualified are over-qualified in terms of paper qualifications only, and in terms of actual skills, they are working in jobs that are completely appropriate. The advantage of the Skills Survey dataset that we use is that it has an indicator of over-skilled as well as over-qualified status, and so we can investigate this distinction.

We have found substantive evidence consistent with the 'heterogeneous skill within qualification levels' theory. Thus, although the correlation coefficient between over-qualification and over-skilling was positive and statistically significant, it was quite low at only 0.2. Less than half of the over-qualified are over-skilled. The correlation of under-qualification with under-skilling was insignificantly different from zero.

The fact that the wage penalty associated with being over-qualified is not significantly reduced once we control for possible over-skilling suggests that the reason why the over-qualified earn less is not because they are underutilising their skills relative to the appropriately-qualified. This finding is not consistent with the mismatch explanation above, but is consistent with the idea, although it does not prove, that the over-qualified are either less able or have less suitable skills. A similar finding is that, while being over-qualified appears as predicted to lower employee's welfare, making them less enthusiastic and more depressed about their jobs, this impact is not explained by them having underused skills; indeed underutilisation of skills has a separate negative impact on welfare.

Also consistent with the same explanation is the finding that holding a maths qualification – which is often taken as an independent signal of an ability that is valued in the labour market – is associated with a lower likelihood of being over-qualified and a greater likelihood of being under-qualified. A further piece of evidence is the finding that graduates in certain disciplines, particularly social sciences and business/management studies, are more likely to be over-qualified in terms of their formal qualifications, but are not more likely to be over-skilled or underutilise their skills. If such graduates are more likely to be in A-level, or below, standard jobs, but are not underutilising their skills relative to graduates from other disciplines in graduate level jobs, then this would suggest that graduates in these subjects are more likely to have only acquired skills suitable for an A-level standard job. This would imply that there is no under-utilisation of skills. An alternative explanation with the same implication is that social sciences and business/management studies graduates might be more likely to work in jobs that do not formally require a degree of applicants, although the work involved is appropriate for graduates. While we think this is quite feasible, it is unlikely to provide a general explanation for over-qualification amongst all graduates, since it would otherwise be hard to understand why over-qualified people experience a wage penalty.

Some evidence does, however, point also to the possibility of an underutilisation of skills amongst the over-qualified, in particular the relationship between over-qualification and the presence of dependent children and associated part-time working. In addition, some of the welfare results suggested that the reason we observe higher depression and dissatisfaction rates amongst the over-qualified is because they are not fully utilising their skills. This evidence of some mismatch supports the need for policies to ensure labour market flexibility, especially to reduce constraints implied by shortages of childcare facilities. It is arguable that improved careers advice could also help to reduce qualifications mismatches. More research on employment dynamics would be helpful to determine how long people tend to remain over-qualified, and hence gain a better understanding of the extent to which skills mismatch is a permanent problem.

By contrast, under-qualification is not at all related to the mismatch variables. Nor is its relationship with well-being accounted for by the under-skilling variable, although that may be a consequence of the shortcomings of the under-skilled measure. The simplest and most plausible theory to describe undereducated workers, consistent with the data, is that these are

workers who have acquired their extra skills over and above their education level through alternative routes, primarily through long and steady work experience.

Our findings reinforce the view that the qualifications held by workers constitute only relatively loose indicators for the skill level of job-holders. Even though higher qualification holders receive palpable gains from their educational achievements, in both being more likely to be in employment and earning more once employed, there remains very considerable heterogeneity in the skill level of those holding qualifications at the same level. This finding suggests that, to at least a certain extent, over-qualification does not imply a problem of waste, nor under-qualification one of deficiency. The only immediate policy implication is to persist in attempts to gain closer links between qualifications and job skills.[24]

Nevertheless, if the level of over-qualification were to continue to rise, as it has done in the last four years, it is possible that the "too many skills" explanation would come into play. In order to evaluate this, it will be important to assemble parallel evidence about the returns to qualifications attainment alongside the trend in the extent of over-qualification. If the returns to qualifications were to begin to fall substantially, while at the same time the extent of over-qualification were to continue rising, this would inevitably generate increased concern about the level of demands from employers in relation to the level of educational investment. Equally, it will be important to continue directly monitoring the usage of skills as measured by indicators other than the qualifications held by job holders. In both cases, whether monitoring the qualifications demand or the rates of return, the available measures are always going to be backward-looking. Timeliness will therefore be important if information about the labour market is to play a useful part in developing plans and targets for the supply of qualifications in the workforce.

[24] Note that this is not the same as saying that education needs to be more closely linked to the world of work.

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Table 1

Percentage of Employees Over/Under-qualified and Over/underskilled, by Industry

	over-qualified	under-qualified	over-skilled	Under-skilled
Agriculture/fishing	42	21	33	29
Mining	33	22	32	11
Manufacturing	35	20	40	20
Electrical	32	16	26	11
Construction	27	19	29	15
Wholesale/retail	52	13	43	19
Hotels/catering	50	10	56	11
Transportation	50	16	45	20
Finance	48	18	22	14
Real estate	28	20	34	18
Public admim.	35	20	31	17
Education	25	17	24	18
Health	34	19	28	16
Other community	44	13	37	19
all	37	18	35	18

Table 2

Percentage of Employees Over/Under-qualified and Over/underskilled, by Occupation

	over-qualified	under-qualified	over-skilled	Under-skilled
Managers	29	26	19	18
Professionals	18	16	18	21
Ass. prof./tech.	31	22	23	15
Secretarial	43	16	40	18
Skilled trades	34	20	34	20
Personal services	48	22	36	17
Sales	57	7	45	14
Plant operatives	44	16	50	17
Elementary occ's	49	9	61	17
All	37	18	35	18

Table 3

Correlations Between Measures of Over/under-qualification and Measures of Over/under-skilling

over-qualified			
	All employees	**Non-graduates**	**Graduates**
Over-skilled	0.201**	0.181**	0.298**
Underused selling skills	0.063**	0.057**	0.087*
Underused teamwork skills	0.083**	0.092**	0.037
Underused computing skills	0.152**	0.137**	0.245**
Underused problem solving skills	0.149**	0.134**	0.244**
under-qualified			
		Non-graduates	
Under-skilled		-0.028	

All reported correlation coefficients are Spearman Rank Order Correlation coefficients between the over/under-qualified variables, and the various over/under-skilling variables.

Table 4

Job Task Scores in the Jobs of the

Over/under-qualified and over/under-skilled

	over-qualified	under-qualified	over-skilled	under-skilled
Literacy skills	-0.115	0.217	-0.273	0.144
Low manual skills	0.069	-0.080	0.146	-0.010
Number skills	-0.138	0.169	-0.222	0.116
High manual skills	-0.070	0.112	-0.160	0.171
High-Level communication	-0.186	0.194	-0.329	0.089
Planning	-0.184	0.196	-0.367	0.092
Client communication	-0.035	0.094	-0.289	0.015
Horizontal communication	-0.028	0.232	-0.210	0.146
Problem solving	-0.111	0.196	-0.263	0.204
Problem checking	-0.042	0.129	-0.133	0.182
Computing skills	1.381	1.697	1.266	1.712

The job tasks are, with the exception of the computing skills variable, derived from a factor analysis of a range of skills asked about in the 2001 and 1997 Skills Surveys. They are scaled in such a way that a score of 0 represents average importance of the particular skills in the respondent's job. The computing skills variable measures the degree of computer complexity used by the respondents in their jobs, on a scale of 0 to 4 indicating increasing complexity of computer use. (See Dickerson and Green, 2002).

Table 5

The Determinants of Over-qualified Status

	All employees with qualifications	**Non-graduates**	**Graduates**
female	0.031 (0.017)	0.030 (0.020)	-0.032 (0.044)
age	-0.024 (0.007)**	-0.016 (0.008)*	-0.069 (0.019)**
Age^2 / 100	0.025 (0.009)**	0.015 (0.010)	0.087 (0.024)**
married	-0.037 (0.020)	-0.043 (0.022)	-0.031 (0.046)
has children	0.060 (0.020)**	0.057 (0.023)*	0.057 (0.050)
highest maths = GCSE	-0.053 (0.019)**	-0.049 (0.021)*	0.005 (0.059)
highest math = A level	-0.184 (0.025)**	-0.164 (0.034)**	-0.126 (0.062)*
highest maths = degree	-0.189 (0.079)*		
Maths degree			-0.193 (0.085)*
Computing degree			-0.177 (0.089)*
Physical Science degree			-0.199 (0.061)**
Biology degree			-0.147 (0.071)*
Social Science degree			0.008 (0.077)
English degree			-0.201 (0.070)**
Art degree			-0.163 (0.076)*
Humanities degree			-0.071 (0.076)
Law degree			-0.101 (0.102)
Medicine degree			-0.044 (0.092)
Other degree			-0.198 (0.062)**
Oxbridge university			-0.104 (0.087)
Old university			-0.092 (0.049)
other HE institution			0.060 (0.091)
foreign university			0.192 (0.093)*
Observations	3353	2651	640

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%

Estimation by probit. Marginal effects reported.

Table 6
The Determinants of Over-qualified Status

	All with	Non-graduates	Graduates
female	0.001 (0.020)	-0.003 (0.023)	-0.044 (0.048)
age	-0.014 (0.007)*	-0.009 (0.008)	-0.058 (0.020)**
Age^2 / 100	0.014 (0.009)	0.006 (0.010)	0.073 (0.025)**
married	-0.036 (0.020)	-0.043 (0.023)	-0.036 (0.047)
has children	0.022 (0.021)	0.020 (0.024)	0.033 (0.052)
in a permanent job	-0.033 (0.036)	-0.057 (0.042)	0.013 (0.072)
in a full-time job	-0.197 (0.025)**	-0.201 (0.027)**	-0.172 (0.066)**
ever do shift work	0.152 (0.021)**	0.121 (0.023)**	0.332 (0.062)**
25-99 employees	-0.048 (0.023)*	-0.024 (0.026)	-0.150 (0.051)**
100/499 employees	-0.050 (0.024)*	-0.024 (0.027)	-0.113 (0.053)*
500/999 employees	-0.085 (0.036)**	-0.057 (0.043)	-0.154 (0.066)*
1000+ employees	-0.109 (0.031)**	-0.086 (0.038)*	-0.161 (0.058)**
Public sector	-0.143 (0.019)**	-0.160 (0.022)**	-0.098 (0.047)*
highest maths = GCSE	-0.030 (0.019)	-0.031 (0.021)	-0.037 (0.062)
highest math = A level	-0.151 (0.026)**	-0.138 (0.035)**	-0.173 (0.062)**
highest maths = degree	-0.083 (0.094)		
Maths degree			-0.166 (0.095)
Computing degree			-0.232 (0.074)**
Physical Science degree			-0.210 (0.060)**
Biology degree			-0.131 (0.075)
Social Science degree			-0.007 (0.081)
English degree			-0.170 (0.079)*
Art degree			-0.176 (0.079)*
Humanities degree			-0.070 (0.080)
Law degree			-0.136 (0.097)
Medicine degree			-0.039 (0.101)
Other degree			-0.177 (0.070)*
Oxbridge university			-0.063 (0.092)
Old university			-0.078 (0.050)
other HE institution			0.055 (0.099)
foreign university			0.153 (0.097)
Observations	3316	2617	637

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.
Estimation by probit. Marginal effects reported.

Table 7
The Determinants of Under-qualified Status

	Non-graduates
female	-0.035 (0.017)
Age	0.017 (0.006)**
Age^2 / 100	-0.015 (0.007)*
married	0.057 (0.016)**
has children	-0.029 (0.017)
in a permanent job	0.051 (0.029)
in a full-time job	0.075 (0.018)**
ever do shift work	-0.056 (0.016)**
25-99 employees	0.006 (0.019)
100/499 employees	0.022 (0.020)
500/999 employees	0.005 (0.033)
1000+ employees	0.065 (0.033)*
Public Sector	0.053 (0.018)**
highest maths = GCSE	-0.014 (0.016)
highest math = A level	0.094 (0.033)**
Observations	3143

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

Estimation by probit. Marginal effects reported.

Table 8
The Determinants of Over-skilled Status

	All employees	**Non-graduates**	**Graduates**
female	-0.023 (0.018)	-0.034 (0.020)	0.023 (0.041)
age	-0.024 (0.006)**	-0.018 (0.007)**	-0.051 (0.016)**
Age^2 / 100	0.025 (0.008)**	0.018 (0.009)*	0.062 (0.020)**
married	-0.054 (0.018)**	-0.046 (0.020)*	-0.089 (0.041)*
has children	0.018 (0.019)	0.011 (0.021)	0.034 (0.043)
in a permanent job	0.014 (0.032)	0.003 (0.037)	0.007 (0.062)
in a full-time job	-0.182 (0.022)**	-0.184 (0.024)**	-0.159 (0.060)**
ever do shift work	0.050 (0.019)**	0.036 (0.020)	0.066 (0.058)
25-99 employees	0.005 (0.020)	0.006 (0.023)	-0.043 (0.045)
100/499 employees	0.066 (0.021)**	0.077 (0.024)**	-0.010 (0.046)
500/999 employees	0.003 (0.033)	0.037 (0.038)	-0.136 (0.048)**
1000+ employees	-0.020 (0.029)	0.023 (0.035)	-0.141 (0.043)**
Public sector	-0.063 (0.017)**	-0.054 (0.020)**	-0.060 (0.040)
highest maths = GCSE	-0.076 (0.017)**	-0.062 (0.019)**	-0.158 (0.050)**
highest math = A level	-0.076 (0.024)**	-0.010 (0.034)	-0.144 (0.050)**
highest maths = degree	-0.223 (0.056)**		
Maths degree			-0.192 (0.041)**
Computing degree			-0.077 (0.086)
Physical Science degree			0.048 (0.068)
Biology degree			0.026 (0.082)
Social Science degree			-0.056 (0.063)
English degree			-0.091 (0.069)
Art degree			0.066 (0.094)
Humanities degree			0.026 (0.076)
Law degree			0.020 (0.108)
Medicine degree			-0.140 (0.058)*
Other degree			-0.044 (0.070)
Oxbridge university			-0.041 (0.083)
Old university			-0.026 (0.043)
other HE institution			-0.061 (0.063)
foreign university			-0.063 (0.071)
Observations	3925	3214	643

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

Estimation by probit. Marginal effects reported.

Table 9
The Determinants of Under-skilled Status

	All employees	Non-graduates	Graduates
female	-0.032 (0.014)*	-0.017 (0.016)	-0.076 (0.039)*
age	0.006 (0.005)	0.004 (0.005)	0.023 (0.017)
Age^2 / 100	-0.009 (0.007)	-0.007 (0.007)	-0.027 (0.022)
married	0.002 (0.014)	0.003 (0.016)	0.007 (0.039)
has children	-0.017 (0.015)	-0.013 (0.016)	-0.044 (0.040)
in a permanent job	-0.032 (0.029)	-0.029 (0.033)	-0.052 (0.069)
in a full-time job	-0.012 (0.019)	-0.001 (0.020)	-0.076 (0.059)
ever do shift work	0.002 (0.015)	0.006 (0.016)	0.026 (0.055)
25-99 employees	0.012 (0.017)	-0.003 (0.018)	0.071 (0.050)
100/499 employees	-0.005 (0.017)	-0.011 (0.018)	0.015 (0.047)
500/999 employees	-0.012 (0.026)	-0.004 (0.029)	-0.027 (0.069)
1000+ employees	0.013 (0.024)	0.008 (0.027)	0.050 (0.062)
Public Sector	-0.033 (0.014)*	-0.050 (0.015)**	-0.002 (0.037)
highest maths = GCSE	0.001 (0.014)	-0.010 (0.015)	-0.004 (0.049)
highest math = A level	-0.021 (0.020)	-0.019 (0.027)	-0.071 (0.051)
highest maths = degree	-0.097 (0.054)		
Maths degree			-0.150 (0.050)**
Computing degree			0.278 (0.135)*
Physical Science degree			0.000 (0.061)
Biology degree			-0.097 (0.058)
Social Science degree			-0.045 (0.059)
English degree			-0.036 (0.074)
Art degree			0.035 (0.087)
Humanities degree			0.018 (0.071)
Law degree			0.032 (0.103)
Medicine degree			-0.040 (0.075)
Other degree			0.007 (0.071)
Oxbridge university			0.103 (0.097)
Old university			-0.021 (0.042)
other HE institution			-0.009 (0.074)
foreign university			-0.023 (0.074)
Observations	3707	3054	590

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.
Estimation by probit. Marginal effects reported.

Table 10
The Effect of Over/under-qualified and Over/under-skilling on Wages
All Employees

	log hourly pay	**log hourly pay**
over-qualified	-0.166 (0.015)**	-0.147 (0.016)**
under-qualified	0.170 (0.018)**	0.163 (0.018)**
Low level qualifications	0.136 (0.025)**	0.124 (0.025)**
GCSE qualifications or eq.	0.210 (0.022)**	0.188 (0.022)**
A level qualifications or eq.	0.349 (0.023)**	0.323 (0.023)**
Higher qualification below degree	0.550 (0.026)**	0.522 (0.027)**
Degree level qualification	0.741 (0.029)**	0.707 (0.030)**
female	-0.140 (0.014)**	-0.144 (0.014)**
years of work experience	0.027 (0.002)**	0.026 (0.002)**
work experience squared/100	-0.048 (0.005)**	-0.047 (0.005)**
married	0.057 (0.013)**	0.054 (0.013)**
has children	0.040 (0.014)**	0.040 (0.014)**
in a permanent job	-0.008 (0.031)	-0.008 (0.030)
in a full-time job	0.134 (0.018)**	0.122 (0.018)**
ever do shift work	-0.045 (0.015)**	-0.044 (0.015)**
25-99 employees	0.065 (0.017)**	0.067 (0.017)**
100/499 employees	0.109 (0.017)**	0.118 (0.017)**
500/999 employees	0.125 (0.030)**	0.127 (0.030)**
1000+ employees	0.201 (0.026)**	0.203 (0.026)**
highest maths = GCSE	0.091 (0.015)**	0.090 (0.015)**
highest math = A level	0.182 (0.030)**	0.182 (0.030)**
highest maths = degree	0.391 (0.162)*	0.372 (0.162)*
over-skilled		-0.101 (0.013)**
under-skilled		-0.012 (0.015)
Constant	1.175 (0.047)**	1.252 (0.047)**
Region dummies	Yes	yes
Observations	3367	3367
R-squared	0.49	0.50

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

Table 11

The Effect of Over/under-qualified and Over/under-skilling on Wages

Non-graduates

	log hourly pay	**log hourly pay**
over-qualified	-0.157 (0.016)**	-0.140 (0.016)**
under-qualified	0.176 (0.018)**	0.169 (0.018)**
Low level qualifications	0.130 (0.025)**	0.118 (0.025)**
GCSE qualifications or eq.	0.205 (0.022)**	0.184 (0.022)**
A level qualifications or eq.	0.344 (0.023)**	0.319 (0.023)**
Higher qualification below degree	0.547 (0.027)**	0.519 (0.027)**
female	-0.145 (0.014)**	-0.149 (0.014)**
years of work experience	0.025 (0.003)**	0.024 (0.003)**
work experience squared/100	-0.044 (0.006)**	-0.043 (0.006)**
married	0.055 (0.014)**	0.053 (0.014)**
has children	0.034 (0.015)*	0.034 (0.015)*
in a permanent job	0.015 (0.032)	0.012 (0.032)
in a full-time job	0.131 (0.018)**	0.121 (0.018)**
ever do shift work	-0.016 (0.015)	-0.016 (0.014)
25-99 employees	0.049 (0.017)**	0.050 (0.017)**
100/499 employees	0.098 (0.017)**	0.107 (0.017)**
500/999 employees	0.113 (0.032)**	0.117 (0.032)**
1000+ employees	0.180 (0.027)**	0.185 (0.027)**
highest maths = GCSE	0.095 (0.016)**	0.096 (0.015)**
highest math = A level	0.196 (0.040)**	0.200 (0.040)**
over-skilled		-0.093 (0.014)**
under-skilled		-0.019 (0.016)
Constant	1.168 (0.048)**	1.242 (0.049)**
Region dummies	Yes	yes
Observations	2775	2775
R-squared	0.44	0.45

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

Table 12

The Effect of Over-qualified and Over/under-skilling on Wages Graduates

	log hourly pay	**log hourly pay**
over-qualified	-0.132 (0.047)**	-0.092 (0.047)
female	-0.112 (0.044)*	-0.111 (0.044)*
years of work experience	0.039 (0.008)**	0.037 (0.007)**
work experience squared/100	-0.085 (0.022)**	-0.081 (0.021)**
married	0.089 (0.042)*	0.077 (0.042)
has children	0.057 (0.047)	0.054 (0.045)
in a permanent job	-0.060 (0.084)	-0.054 (0.081)
in a full-time job	0.110 (0.069)	0.081 (0.068)
ever do shift work	-0.292 (0.063)**	-0.281 (0.061)**
25-99 employees	0.156 (0.057)**	0.147 (0.055)**
100/499 employees	0.153 (0.058)**	0.146 (0.056)**
500/999 employees	0.099 (0.080)	0.068 (0.079)
1000+ employees	0.260 (0.072)**	0.238 (0.070)**
highest maths = GCSE	0.051 (0.063)	0.026 (0.060)
highest math = A level	0.097 (0.070)	0.074 (0.069)
Maths degree	0.080(0.165)	0.034 (0.167)
Computing degree	0.088 (0.190)	0.063 (0.194)
Physical Science degree	-0.168 (0.080)*	-0.147 (0.078)
Biology degree	-0.109 (0.095)	-0.108 (0.096)
Social Science degree	-0.189 (0.082)*	-0.203 (0.081)*
English degree	-0.353 (0.082)**	-0.367 (0.082)**
Art degree	-0.233 (0.115)*	-0.206 (0.113)
Humanities degree	-0.307 (0.084)**	-0.305 (0.083)**
Law degree	-0.292 (0.116)*	-0.281 (0.117)*
Medicine degree	-0.074 (0.094)	-0.117 (0.092)
Other degree	-0.265 (0.076)**	-0.278 (0.076)**
Oxbridge university	0.151 (0.123)	0.151 (0.125)
Old university	0.127 (0.048)**	0.127 (0.046)**
other HE institution	0.034 (0.075)	0.019 (0.077)
foreign university	-0.097 (0.106)	-0.111 (0.106)
over-skilled		-0.191 (0.050)**
Under-skilled		0.054 (0.048)
Constant	2.044 (0.158)**	2.155 (0.159)**
Observations	542	542
R-squared	0.35	0.37

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

Table 13
The Effect of Over/under-qualified and Over/under-skilling on Welfare

Enthusiasm-Depression[1]			
over-qualified	-0.026	-0.090	
	(0.032)	(0.033)**	
under-qualified	0.076	0.097	
	(0.040)	(0.040)*	
over-skilled	-0.343		-0.355
	(0.032)**		(0.031)**
under-skilled	-0.157		-0.157
	(0.037)**		(0.037)**
Observations	3624	3624	3624
R-squared	0.07	0.03	0.07
Contentment-Anxiety[2]			
over-qualified	0.090	0.058	
	(0.035)**	(0.035)	
under-qualified	-0.083	-0.072	
	(0.043)	(0.043)	
over-skilled	-0.172		-0.148
	(0.033)**		(0.033)**
under-skilled	-0.203		-0.203
	(0.038)**		(0.039)**
Observations	3626	3626	3626
R-squared	0.07	0.05	0.06
Job Satisfaction			
over-qualified	-0.067	-0.164	
	(0.041)	(0.041)**	
under-qualified	-0.012	0.023	
	(0.051)	(0.050)	
over-skilled	-0.553		-0.565
	(0.041)**		(0.040)**
under-skilled	-0.288		-0.288
	(0.047)**		(0.047)**
Observations	3627	3627	3627

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

1. Enthusiasm-depression scale derived from respondent's answers to how often their job made them feel cheerful, enthusiastic, optimistic, depressed, gloomy and miserable, with the first three counting positively and the latter three counting negatively. Estimation by OLS.

2. Contentment-anxiety scale derived from respondents' answers to how often their job made them feel calm, contented, relaxed, tense, uneasy and worried, with the first three counting positively and the latter three counting negatively. Estimation by OLS.

3. Job satisfaction measured on a scale from 1 to 7, with 1 representing 'completely dissatisfied' and 7 representing 'completely satisfied.' Estimation by ordered probit.

Other variables entered into the regressions were the same as for the wage equations in Table