Overqualification: Major or minor mismatch?

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A proportion of employees are overqualified for their work. This generates a wage premium relative to the job but a penalty relative to the qualification, and is therefore, a puzzle for human capital theory. A part of this derives from the use of measures of time spent in education for the calculation of overqualification. Analysing data from four European countries, we split years of education into two components, one reflecting certification, another reflecting time. While a qualification higher than required mostly generates a wage premium, time does not. The result is that the combination of time with excess (or deficit) qualification may make overqualification either a major or a minor mismatch. The probability of either outcome varies with the institutional arrangements of different countries’ educational systems.

1. Introduction

A growing literature argues that a large proportion of employees are over-educated or overqualified for the jobs they do (Borghans & de Grip, 2000; Hartog, 2000). Analytically this derives from decomposing the wage effect of education into a part required by the job (usually approximated by the respondent’s assessment of the years of education the job needs) and whether the respondent has more or less than this requirement (the so-called ORU specification). Having excess qualifications for a job increases the wages of the overqualified compared to those of ‘matched’ people in the same job, but produces lower wages compared to ‘correctly’ placed people with the same qualifications. Being overqualified generates a premium relative to the job but a penalty relative to the qualification.

Because of the primacy of human capital theory (HCT) in economics, overqualification (OQ) might be seen as a puzzle. People are not expected to invest in education which they cannot fully utilise. On the demand side, surplus qualifications should earn the same return as required qualifications (Sloane, 2003). Several theoretical ideas have been developed to help integrate the incidence and effects of OQ with HCT, but the empirical evidence varies in its implications. Some of the problem, we argue, derives from the difficulty of treating OQ, indeed education in general, in terms of time spent in education rather than of certification. The main point of the ORU specification is that excess time spent in education provides an addition to human capital, and is therefore an asset in job search. A certificate, in contrast, merely signals a capacity to learn. However, it is certificates that count in the labour market. Time spent in education not achieving a qualification, or in excess of what is needed to acquire a qualification, should not help. We separate the effects of time from the effects of certificates in our conceptualisation of OQ, to show that while having one qualification higher than needed for a job might lead to a wage premium, extra time itself does not. Thus, HCT is limited in its explanation of OQ where based on years of education.

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1 A term we prefer, as it is impossible to be over-educated. However, for ease of presentation we use ‘overeducation’ below to signify measures based on years of education as opposed to excess qualifications.

2 Although OQ can be viewed in terms of implications for other theories such as job queuing (Thurow, 1979).
2. Human capital theory and the problem of overqualification

In that the ORU specification envisages individuals obtaining a premium for their excess education, albeit lower than for the required level, then it can perhaps be seen as a refinement of HCT (Daly, Büchel, & Duncan, 2000). Is there empirical support for this? There have been a number of attempts to identify how this new form of rational investment might work. One looks to career adaptations, arguing that initial mismatches can be corrected in time—for instance, where a poor first job is taken as insurance against job-search failure (Büchel, 2001; Nicaise, 2000). Yet the empirical basis for any generalised job insecurity is unclear (European Commission, 2003: 125–155; OECD, 2003: 50–52). It has also been argued that people might take a job where their education is inadequately utilised at first if subsequent career mobility is more likely in this type of job (Sicherman, 1991), although empirically there is conflicting evidence on the longevity of OQ at the individual level (e.g. Dolton & Vignoles, 2000; Dorn & Sousa-Poza, 2006). Alternatively, the “heterogeneous skills within qualification levels” theory (Green & McIntosh, 2002) builds on the idea that a deficit in formal education can be balanced by superior skills or work experience. In this case OQ indicates a complex matching process consisting of more than one component of human capital. Chevalier (2000) finds some evidence that a proportion of the overqualified are satisfied with their jobs, so that some mismatches are more apparent than real.

These findings indirectly make a case for seeing OQ as a minor mismatch, corrected over time, compensated through variation in skills, or adjusted through attitudinal responses. In practice, though, it is difficult to know if OQ is a rational labour-market decision, because prior to this comes an educational decision about which we typically know very little. While Machin and Vignoles (2005) argue that the idea of education as a consumption good is theoretically redundant, it seems unlikely that in practice people see education only as an investment good. A number of reasons have been put forward by sociologists to explain persistent educational overinvestment by individuals, such as increased personal demand for social status (Collins, 1979; Heath & Cheung, 1998), or overprovision by state agencies with a vested interest in institutional expansion (Archer, 1982). Indeed, the general finding of a wage premium is becoming increasingly disputed in the literature on OQ. For instance, controlling for unobserved heterogeneity limits the returns to excess education (Bauer, 2000; Muysken, Hoppe, & Rieder, 2002). Gautier, van den Berg, van Ours, and Ridder (2002) show that workers with more years of education than required select themselves into high-paying firms. Somewhat differently, it is possible that OQ is indicative of failure (of ability or motivation), which might have negative effects over a career. Büchel and Mertens (2004) find that OQ in Germany is associated with reduced wage growth. There is little empirical evidence that individuals use OQ as a career investment (Groeneveld & Hartog, 2004).

Why would employers pay overqualified workers more than others? Splitting years of education into overeduca-

tion, required education and undereducation in the ORU specification allows required education to be interpreted as an indicator of employers’ needs, correcting the supply-side bias of the Mincer approach. But the difference between the return to expected and to surplus education remains difficult to explain. The penalty suffered by those who underutilise their qualification is obvious: a graduate doing non-graduate work will usually earn less than a matched graduate. But the basis of the premium an overqualified person gains relative to a matched person in the same type of job is unclear. It is unlikely that employers systematically seek overqualified workers to obtain higher skills cheaply (Groeneveld & Hartog, 2004). If they did, excess demand would become the norm in time, but trends in OQ do not appear to be downward-sloping (Hartog, 2000). It also seems likely that employers expect a consistent and predictable relationship between qualifications, skills, and job requirements. All in all, the incidence and effects of OQ remain a puzzle.

3 We do not discuss here the relative merits of different ways of measuring required education, which unfortunately are rarely evaluated empirically, though there are significant exceptions (Groot & Maassen van den Brink, 2000; Kler, 2005; Rubb, 2003).
4 We should also question whether people can accurately recall years spent in education, or even more, be able meaningfully to answer the question, how many years of education a job requires.
to full-time education is tightly controlled, so that time is less often extended, but there is a much looser relationship between education and employment than in Germany (Shavit & Müller, 1998). OQ based on certificates, if not on time, is quite likely. In our analysis we measure variation in time explicitly, by separating certification from the excess time spent in education (relative to the average) to obtain a given qualification, which we label ‘temporal overeducation’.

In our view, OQ is best calculated from a direct comparison of qualifications held and required, and ideally at all appropriate educational levels. The impact of overqualification on wages can then be estimated by means of a modified Mincer regression:

\[
\ln w_i = \alpha + X_i\beta + Q_i + \epsilon_i
\]  

(1)

where the dependent variable is the logarithm of individual hourly wages, \(X_i\) is a vector of individual characteristics, and \(Q_i\) is a set of OQ dummies defined by any combination of actual and required qualifications. The empirical literature, however, traditionally defines the mismatch in terms of years of education rather than of qualifications. Overeducation is measured by the excess of years of education compared to that required for the job:

\[
\ln w_i = \alpha + X_i\beta + \gamma Y_i E_i + \delta Y_i + \epsilon_i
\]  

(2)

where \(\gamma Y_i E_i\) is years of education required for the job in which individual \(i\) works. Overeducation (\(\delta Y_i\)) is the difference between years of education acquired and years needed. It is zero when education acquired is less than or equal to education needed. In a similar way, undereducation \(\delta Y_i\), the difference between years of education needed and acquired, is zero when education needed is equal to or higher than actual years of education.

While Eq. (1) is preferable to Eq. (2), the latter has the advantage of using a single interval-level measure of overeducation. But we can combine these methods by converting qualifications into years of education. The number of years that individual \(i\) takes to get a certain qualification \(E_i\) can then be decomposed into two components: years of education normally needed to reach that qualification, the mode \(E_i\), and the difference between this and the actual time an individual takes \(Y_i\), which we call ‘temporal overeducation’. Eq. (2) can then be rewritten as

\[
\ln w_i = \alpha + X_i\beta + \gamma Y_i E_i + \delta Y_i + \epsilon_i
\]  

(3)

where years of education are ultimately split into three components. The first \((\gamma Y_i E_i)\) is the mode years of education expected for a job. The second (comprising overqualification \(\delta Y_i E_i\) and underqualification \(\delta Y_i E_i\)) is the difference between the mode years of education of the qualification held and of the one required for the job. The third, temporal overeducation (excess \(\delta Y_i\) and deficit \(\delta Y_i\)), is the difference in years of education between individual \(i\) and the majority of people with the same qualification. This last component might signify either above or below average ability and motivation. Separating it out from the certification effect of OQ therefore might allow a better measure of the true wage effect of OQ.

We argue that at least one part of the traditional formulation of OQ – excess time spent in education to achieve a qualification – does not generate a wage premium. We demonstrate this through analyses utilising all three equations.

4. Data

The data derive from the e-Living project, funded by the EU. The project was based on a household survey of 1750 households in 6 countries—Britain, Bulgaria, Germany, Israel, Italy, and Norway. The analysis presented below excludes Bulgaria and Israel to produce a more homogeneous sample of European countries. Interviews in the four countries were by telephone and with one randomly selected adult aged 16 or over in each household. Using equivalent sampling strategies, the same questionnaire wording, as well as a single co-ordinating survey organisation, this is a valuable comparative dataset. Against this, telephone interviewing produces lower response rates than face-to-face interviewing. The average response rate across the four countries was around 40% in wave 1, but over 65% of these were re-interviewed in wave 2. The survey was undertaken towards the end of 2001, repeated in a second wave in 2002. The analysis pools the two waves and is based on a weighted version of the data designed to compensate for non-response bias.

The questions relating to construction of the overqualification variables are: What qualification does someone usually need to be able to do your job?, and What is the highest qualification that you have? Years of education are obtained by asking for the end date of completed full-time education (ignoring continuing part-time education). The data include information on computer skills, based on six questions asking whether the respondent knows how to download files from the web, to construct a web page, to email a file, to cut and paste, to reboot, and to copy files to a floppy. We use this as a partial control for general skills.

The analysis uses the three measures of overqualification defined above. The first, the ‘certification method’ is the categorical method described in Eq. (1). The number of categories of education can of course vary. We use four. This produces 10 dummies which relate required to actual qualifications. Four refer to well-matched individuals: ‘Matched Degree’ for graduates in graduates jobs; similarly, ‘Matched HSL’, ‘Matched LSL’ and ‘Matched Low’ denote individuals with a higher secondary level certificate (such as Abitur, baccalauréate, or A-levels), lower secondary level (such as Realschule or GCSEs), and a yet lower education level, respectively, all matched to their job. These dummies characterise the overqualified and those the underqualified. ‘Has Degree’ denotes overqualified graduates; ‘has HSL certificate’ overqualified individuals with a higher school leaving certificate; ‘has LSL certificate’ those with a lower school leaving certificate. The three underqualification (UQ) dummies are: ‘needs Degree’, indicating non-graduates in graduate jobs; ‘needs HSL certificate’ and ‘needs LSL certificate’ for underqualified individuals in jobs for which a higher or a lower school leaving certificate, respectively, is required.
The second method is our version of the traditional ORU specification, as in Eq. (2), although it is not exactly the same. It defines excess education as the difference between actual years of education and the average years associated with the qualification necessary for a job. Again, the number of qualification levels has to be decided (because, for instance, the range of years of education is larger for all degrees than just for first degrees). We use six levels. Our final measure of OQ implements the ‘combined’ definition shown in Eq. (3). It dispenses with actual years of education and uses the average years associated with the qualification held. Again we use six levels of qualification as the basis for calculating years of education. As already mentioned, this definition allows us to separate out from the traditional ORU measure the temporal overeducation component of years of education ($Y_i$).

5. Results

5.1. The extent and distribution of overqualification

Table 1 shows the percentage of the overqualified, computed using the three abovementioned methods. The first row shows this using the certification method. The second and third pairs of rows of Table 1 compute the proportion of the overqualified based on Eqs. (2) and (3).5 As expected, the incidence of OQ based on years of education is always higher than where the combined method is used. The figures can clearly be made (arbitrarily) smaller by defining small gaps between actual and required years of education as matched cases.

In Table 2 we examine the distribution of OQ by qualification level (the certification method), though in this we do not distinguish between having one and over one qualification level more than needed. Quite apparent in Table 2 are two profiles of overqualification. Britain and Germany have a relative excess at the middle and lowest levels, the other two countries higher up. Only in Norway, where 10.4% of workers are overqualified with a degree out of the total of 21.7% of the workforce who are overqualified, does higher education contribute to half of all OQ. In no country are more than one third of graduates overqualified. While Battu and Sloane (2000) show that in Britain overqualification is higher the greater the social status of the job someone does, and that it rises with wages, in general OQ seems to be more predominant at the school than the degree level. This suggests that OQ is as much a result of the general expansion of education as of its tertiary extension.

Average hourly wages in euros for each group are in the second of each pair of columns in Table 2.6 In Britain and Norway, while the overqualified suffer a penalty relative to those with equivalent, correctly matched qualifications, they earn a premium relative to those with the same types of job but lower qualifications. That this is not always so in Italy and Germany perhaps suggests a more institutionalised relationship between the education system and the labour market. OQ does not appear to earn a consistent wage premium.

5.2. Wages

We now look at the impact of OQ on the log of hourly wages. Controls in the vector $X_i$ of Eqs. (1)–(3) are gender, age, age squared, three dummies for industry, a dummy for whether the job is permanent, size of workplace, and a dummy for whether respondents have control over their own working schedule, a measure of potential experience (age minus age left full-time education), and the measure of computer skills.

First we turn to the certification method. The results of the estimation of Eq. (1) are shown in Table 3. In all countries except Germany a matched graduate earns more than an overqualified graduate. In all countries except Norway (where the difference is slight), someone matched with a higher school leaving qualification earns more than someone overqualified at the same level. OQ mostly, but not always, generates a premium.

It is clear that the premium derived from being overqualified varies by country and by educational level. Sometimes in fact OQ incurs a penalty. We now analyse this more fully through use of Eqs. (2) and (3). The results are shown in Table 4.

The first model, shown in column 1 of each sub-table, is a traditional Mincer regression with years of education. The second model (column 2) follows the standard ORU specification, splitting years of education into years associated with required education and excess and deficit years (but where years of required education is the average for a required qualification). The deficit years variable shows the effect of an increase in the deficit. The results reveal that in all four countries the effect of education required for the job is positive, also greater than that of years of education, while the $R^2$ also rises. In this sense, the ORU specification, through its focus on the job rather than only on the individual, might be an improvement on the Mincer specification. The effects of excess education are either positive, but with little statistical significance, or zero. In Britain and Norway, a larger and more significant effect arises through undereducation. Having less years of education that is needed for a job is likely to result in a wage penalty.

The third column of Table 4 uses the combined method. Excess qualifications (converted into years of education)

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5 The differences in sample sizes occur because of missing data for one or other variable used to formulate the three different definitions of OQ. It should also be noted that with some exceptions the results do not change much when we use a nine rather than six level classification of education.

6 The number of observations is reduced mostly through non-response to the pay question, and partly through elimination of some outliers.
have effect, not extra time in education. The latter is ‘noise’, which has no effect on wages, other than in Britain where in fact any deviation from the norm is penalised. There too we see the clearest premium for excess qualifications and penalty for the reverse. We therefore have a variety of effects of OQ in Europe. Whether the mismatches which can be inferred from some of these are major or minor would be difficult to say, but they are more complex than the emphasis on time alone suggests.

5.3. Robustness check

In the analysis of educational effects the measure of time used is often in practice only a proxy for real time, indicating either a stage reached in education or a qualification, which is then converted into the time institutionally expected for that qualification, e.g. as mostly in Harmon, Walker, and Westergaard-Nielsen (2001), which includes the four countries examined here. This removes some noise but the problem then becomes, what do we really mean by ‘years of education’? However, the other formulations we use, based on time calculated from when full-time education was completed, inevitably contain some measurement error, for instance as a result of unmeasured gap years between school and university. This means that we cannot be sure the non-effect for excess time that we demonstrate really reflects actual time (though the e-Living survey asked for completion of full-time education, so, while information on part-time education is lost, we avoid highly inflated times spent in education).

The completion year was top-coded in the survey to a maximum of age 31 for completion of full-time education.

Table 3
Effects on log of hourly wages of required and surplus qualifications (certification method)

<table>
<thead>
<tr>
<th></th>
<th>Britain</th>
<th>Italy</th>
<th>Germany</th>
<th>Norway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Underqualified</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Needs degree</td>
<td>0.460*** (0.092)</td>
<td>0.645* (0.273)</td>
<td>0.590*** (0.139)</td>
<td>0.237*** (0.077)</td>
</tr>
<tr>
<td>Needs higher school leaving certificate</td>
<td>0.253** (0.089)</td>
<td>0.754** (0.275)</td>
<td>0.138 (0.109)</td>
<td>0.110 (0.077)</td>
</tr>
<tr>
<td>Needs low school leaving certificate</td>
<td>0.064 (0.076)</td>
<td>0.084 (0.343)</td>
<td>0.112 (0.077)</td>
<td>0.021 (0.104)</td>
</tr>
<tr>
<td>Overqualified</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has degree</td>
<td>0.423*** (0.064)</td>
<td>0.719** (0.275)</td>
<td>0.401*** (0.101)</td>
<td>0.223** (0.080)</td>
</tr>
<tr>
<td>Has higher school leaving certificate</td>
<td>0.171** (0.057)</td>
<td>0.574* (0.268)</td>
<td>0.040 (0.067)</td>
<td>0.167* (0.076)</td>
</tr>
<tr>
<td>Has low school leaving certificate</td>
<td>0.044 (0.055)</td>
<td>0.236 (0.265)</td>
<td>-0.048 (0.083)</td>
<td>0.105 (0.089)</td>
</tr>
<tr>
<td>Matched</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has degree</td>
<td>0.562*** (0.051)</td>
<td>0.922*** (0.264)</td>
<td>0.322*** (0.108)</td>
<td>0.327*** (0.069)</td>
</tr>
<tr>
<td>Has higher school leaving certificate</td>
<td>0.340*** (0.054)</td>
<td>0.854*** (0.272)</td>
<td>0.309*** (0.073)</td>
<td>0.093 (0.095)</td>
</tr>
<tr>
<td>Has low school leaving certificate</td>
<td>0.055 (0.072)</td>
<td>0.501* (0.252)</td>
<td>0.216*** (0.063)</td>
<td>0.085 (0.070)</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.43</td>
<td>0.40</td>
<td>0.40</td>
<td>0.29</td>
</tr>
<tr>
<td>Observations</td>
<td>910</td>
<td>619</td>
<td>849</td>
<td>1395</td>
</tr>
</tbody>
</table>

OLS; robust standard errors in parenthesis; *significant at 5%; **significant at 1%; ***significant at 0.1%; other explanatory variables: gender; age and its square; dummy for whether the job is permanent; dummy for whether the individual has a fixed working schedule; size of the working place; three dummies for industry; computer skills; ‘experience’ (age-age left education).
Table 4
The effects on the log of hourly wages of different measures of education

<table>
<thead>
<tr>
<th></th>
<th>Britain</th>
<th>ORU</th>
<th>Combined method</th>
<th>Italy</th>
<th>ORU</th>
<th>Combined method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of education</td>
<td>0.027*** (0.008)</td>
<td>0.083*** (0.009)</td>
<td>0.103*** (0.009)</td>
<td>0.022*** (0.008)</td>
<td>0.035*** (0.010)</td>
<td>0.035*** (0.010)</td>
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<tr>
<td>Mode years education required by job</td>
<td>0.003 (0.008)</td>
<td>0.071*** (0.011)</td>
<td></td>
<td>0.012 (0.009)</td>
<td>0.017 (0.013)</td>
<td></td>
</tr>
<tr>
<td>Years overeducation/overqualification</td>
<td>−0.028* (0.013)</td>
<td>−0.045* (0.018)</td>
<td></td>
<td>0.004 (0.024)</td>
<td>−0.013 (0.014)</td>
<td></td>
</tr>
<tr>
<td>Excess temporal overeducation</td>
<td>−0.015* (0.008)</td>
<td>−0.031** (0.012)</td>
<td></td>
<td>0.007 (0.010)</td>
<td>0.049 (0.047)</td>
<td></td>
</tr>
<tr>
<td>Undereducation/underqualification</td>
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<td>0.000 (0.006)</td>
<td></td>
<td>0.000 (0.006)</td>
<td>0.000 (0.003)</td>
<td>0.000 (0.003)</td>
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<td></td>
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<td>0.000 (0.003)</td>
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<tr>
<td>Adjusted $R^2$</td>
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<td>592</td>
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<tr>
<td>Years of education</td>
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<td>0.020*** (0.004)</td>
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<td>0.009** (0.002)</td>
<td>0.015*** (0.002)</td>
<td>0.016*** (0.002)</td>
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<td>Mode years education required by job</td>
<td>0.000 (0.006)</td>
<td>0.006 (0.006)</td>
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<td>0.005* (0.003)</td>
<td>0.012*** (0.003)</td>
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<td>−0.11* (0.006)</td>
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<td>0.000 (0.003)</td>
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<td>Excess temporal overeducation</td>
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<td>0.000 (0.003)</td>
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<tr>
<td>Adjusted $R^2$</td>
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Columns (1) and (2) estimated by OLS. Robust standard errors in parenthesis; (*)significant at 10%; *significant at 5%; **significant at 1%; ***significant at 0.1%. Other explanatory variables: gender; age and its square; dummy for whether the job is permanent; dummy for whether the individual has a fixed working schedule; size of the working place; three dummies for industry; computer skills; ‘experience’ (age − age left education). However, experience was dropped in the models for Germany and Norway as a result of collinearity.
To limit extreme variation even more, we undertook a re-analysis with around 10% of the sample removed (people having 3 years more than the national average years of education for a specific qualification). In general, the change appears to improve the estimates. It strengthens the effects of years of education. For instance, the low coefficient for Norway rises from 0.009 in Table 4 to 0.024, the German coefficient from 0.10 to 0.26. Excess years of education are now also consistently positive, for instance rising from the non-significant 0.012 to the highly significant 0.027 in Italy. Years of undereducation are more clearly penalised in all countries except Italy. However, the effects of excess and deficit temporal education remain the same in three countries. In Italy excess time now has a large positive and also statistically significant coefficient.

The differences in the two sets of results therefore affect the impact of years of education more than of temporal overeducation. Any measure of the former will contain both measurement error and genuinely inflated times spent in education (‘not merely ‘gap years’), which often indicate no real increment to and might even indicate a failure of human capital.

6. Conclusions

We have analysed the incidence and wage impacts of overqualification in four European countries: Britain, Italy, Germany and Norway. We test the idea that overqualification can be a rational career investment. While we show that extra education generates higher wages in some circumstances, we do not find a consistent wage premium. We argue that the ORU specification conflates two factors: the effects of having an educational certificate and the effect of time spent in education which does not lead to a certificate. These work in very different ways. Certificates signal successful investment in human capital. Time reflects unpredictable variation in ability, motivation, and the effect of institutional factors. How long people take to obtain (or fail to obtain) a qualification might mean many disparate things. Thus overqualification can reflect rational career calculations but also completely the reverse. The combination of time with excess (or deficit) qualification may make overqualification either a major or a minor mismatch, while the probability of either outcome varies considerably with the institutional arrangements of different countries’ educational systems. Overqualification remains a puzzle for human capital theory.

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