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Underqualification as an opportunity for low-educated workers

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Abstract. Improving the labor market position of low-educated workers is one of the most important goals of regional labor market policy. Underqualification, meaning holding a job at a higher level than expected based on one's formal education, can be—under certain conditions—a favorable position from both an individual and a policy perspective. In this study we used repeated cross-sections of data about Dutch workers from 1996 to 2006 to relate the chances of underqualification to personal, firm, and labor market characteristics. Briefly, we found that, for low-educated workers, firm and personal characteristics are more important than regional characteristics in explaining underqualification. Higher regional unemployment rates lower the chances of being underqualified. Working in smaller firms or firms with many high-skilled jobs has a strong positive effect on the chances of attaining higher level jobs, while working in firms with many highly educated workers lowers these chances. Women and nonnatives are less often underqualified, whereas older workers are more often underqualified. Gaining more insight into the determinants of underqualification is important for developing more effective policy measures that aim to improve the labor market position of the most vulnerable groups in the labor market.

Keywords: underqualification, low educated, low skilled, regional labor market

1 Introduction

Recently, there has been a shift towards developing more place-based local skills strategies (eg, Lindsay and Pascual, 2009). Such a strategy is seen as one of the key elements in regional policy (McCann and Ortega-Argilés, 2011; OECD, 2011a; 2011b; 2012). In the global context of demographic change, technology shifts, globalization, human capital mobility, and changing occupational structures that affect every region in some way, it is important to upgrade the skill base to fulfill future skill demands (eg, Warrington, 2008).

In addition to attracting and retaining high-skilled workers and integrating disadvantaged groups, it is important to upgrade low-educated workers who are already employed to better job positions (OECD, 2009; 2012). Upgrading is not only an essential ingredient for building successful individual career paths, but it is also a way to create job openings at the lower skill levels on the labor market, especially for those with lower productivity levels who can successfully enter the labor market only by doing simple and elementary tasks. Despite the relevance just described, little is known about the labor market conditions under which low-educated workers hold higher level jobs than would be expected based on their formal schooling. Therefore, the aim of our paper is to learn more about the situations and environments in which low-educated workers achieve these better job positions, which we define as 'underqualification'.

We can look to the job allocation literature in answering this research question. Current research on this issue focuses mainly on the negative consequences of working at a job level that does not correspond with the educational level, corroborated by a huge body of empirical research (eg, Desjardins and Rubenson, 2011; Quintini, 2011). Mismatches are often seen as

market insufficiencies, leading to lower productivity on a regional or national level (Sattinger, 1993). People working at too-high job levels are assumed to be less productive because of a shortage of formal qualifications, while people working in jobs below their formal education level are expected to be less motivated and underemployed, also negatively impacting their productivity levels. Moreover, current literature about job matches and mismatches mainly looks at workers in general (and at explanatory characteristics) without making specific distinctions between groups of workers (eg, by education level).

However, focusing the study of underqualification on the relevance of upgrading low-educated workers can put things in a more positive perspective. First of all, from a microperspective, working at a higher level might increase personal development and is financially attractive (eg, Allen and van der Velden, 2008; Cohn and Khan, 1995). Moreover, from a policy point of view, more low-educated workers at higher job levels might lead to financial gains: less governmental support might be needed if workers earn enough to support their dependents. In addition, underqualification might be a sign that governments manage to upgrade their labor force, create more job openings in the lower areas of the labor market, and fully utilize the potential of the low-educated individuals in the labor force.

Despite the positive perspective just presented, we cannot ignore some potentially less positive effects of the prevalence of underqualification. For example, from the policy perspective, promoting low-educated workers may be a disincentive for higher educated workers to invest in formal education, since skills can be learned while already participating in the labor market. However, in contrast, it may also increase the productivity of higher educated workers as they feel more need to distinguish themselves. Moreover, higher educated workers will probably still be preferred by employers on the basis of their qualifications (Thurow, 1975) and be financially better off compared with their lower educated colleagues (eg, Allen and van der Velden, 2008). In addition, large numbers of underqualified workers might lead to lower productivity at the firm level in the longer term when these workers will not be able to learn extra skills required for the job (Kampelmann and Rycx, 2012).

Another consequence of underqualification at the individual level might be more stress because of a skills mismatch, unless the worker has the skills capacity to perform the job at a higher level. However, we might also assume that people switch jobs when they cannot work to the demanded skill level. Here, we relate to another issue in the discussion on mismatch: the role of personal skill heterogeneity. As an example, the OECD (2011b, page 200) Employment Outlook 2012 shows that, of the total of employed and self-employed workers, an unweighted average of 25.3% work in lower level jobs (defined as ‘overqualification’) and 22.3% work in higher level jobs than could be expected based on their formal education (‘underqualification’). In addition to these more or less objective measures, the OECD presents figures of ‘overskilling’ and ‘underskilling’ based on a worker’s own interpretation of his or her skills level compared with the skills level they perceive to be required for the job they perform. They show that only approximately 12% of formally underqualified workers also consider themselves to be underskilled (OECD, 2011b). This means that 88% of formally underqualified workers do not think they need more skills to perform their jobs adequately.

Following the heterogeneous skill theory (Green and McIntosh, 2007), the OECD (2011b) concludes that the variation of skills of individuals with the same qualifications plays a key role in explaining differences in educational and skills mismatches. Variation of skills can occur for a variety of reasons, ranging from subjective differences in personal self-image to more objective heterogeneity in skills between people with very similar formal education. Also, all kinds of aspects related to experience and learning lead to the development of skills during the working career (Quintini, 2011).

To summarize, the study of job mismatch is rather complex. The concept of learning we just referred to is especially relevant from a policy perspective: is it possible to define environments in which people are more likely to learn, to develop skills, and to be more successful in the job market? Our study will shed more light on the labor markets, firms, and personal situations in which low-educated workers are underqualified.

A more normative and statistical way of measuring underqualification has been used in this study. The analyzed dataset consists of repeated sets of cross-sectional data about Dutch workers in the Netherlands from 1996 to 2006, including data on the employees' formal qualification levels as well as the skill complexity of their jobs. Because workers in a firm and firms within a region are selected in a representative way, it is possible to aggregate information about workers at both the firm and the regional level (eg, we could calculate the percentage of workers in a firm on a certain skill complexity level), which makes it possible to say something about potential knowledge and learning spillovers.

In the next section we will describe a theoretical framework, followed by the empirical part in which our data, method, and results are presented. We finish with some concluding remarks. Briefly, our results show that characteristics of firms and persons are more important than regional characteristics in explaining underqualification among the low educated. We find evidence for the occurrence of substantial learning and experience effects during the working career. However, these effects are not equally strong for all groups of workers.

2 Theoretical framework

The presence of a job match or mismatch can be the result of sufficiencies or insufficiencies on the regional or national labor market, the organization of work within the firm or individual motivations, and variation in skills and experience throughout the working career. In this section we will discuss these factors in more detail.

One branch of literature states that the overall mismatch is actually a genuine mismatch and a consequence of an uneven development of the occupational structure and educational characteristics of the labor force. It is, for instance, widely acknowledged that ongoing globalization has resulted in the polarization of the qualification structure in most Western labor markets and a decrease in the number of medium-level jobs because of computerization and export of tasks to developing countries (eg, Autor et al, 2003; 2006; Goos and Manning, 2007; Sassen, 2000; Spitz-Oener, 2006; van der Waal, 2010; Warrington, 2008). This process restructures labor markets towards more advanced services, on the one hand, resulting in a high demand for highly skilled labor, and a group of supporting elementary and low-wage jobs, on the other (Sassen, 1988). Others argue that the nationwide investments in educational attainment made in the last decades have left us with an overqualified labor force for which insufficient jobs are available; educational levels also seem to have increased faster than job levels (Huijgen, 1989; Wolbers et al, 2001; Wolf, 2002).

Within this context, the position of the low educated is particularly important. Depending on the local occupational structure, the number of medium-skilled and low-skilled jobs might decline. Competition for jobs between low-educated and higher educated workers may increase as there are not enough jobs at a higher job level, with the consequence that lower educated workers might be forced into the lowest level jobs or may even become unemployed (Gesthuizen and Scheepers, 2010; Hensen et al, 2009; Thurow, 1975).

However, the interaction between high-educated and low-educated workers can also be explained from a more positive point of view. The presence of highly educated workers is often related to all kinds of positive spillover effects in the region (eg, Rodríguez-Pose and Tselios, 2010) and for the firm (Broersma et al, 2010; Canton, 2009). Low-educated workers can benefit from a higher abundance of better jobs and consumption effects.

Moreover, imbalances in the structure of regional labor markets in terms of supply and demand are very relevant in explaining the occurrence of job matches and mismatches. Bigger cities are attractive places to migrate to because of an abundance of jobs. The available literature points to a positive relationship between urbanity and job chances in general (Hensen et al, 2009; Yankow, 2009). However, with respect to the low educated, we might question whether they are also better off in urban areas, since more competition may be experienced when the higher educated are attracted to the bigger cities and take the best jobs.

Studies have found contradicting results regarding the relationship between regional unemployment and job matches or mismatches (Buchel and van Ham, 2002; Groot and Maassen van den Brink, 2000; Ramos and Sanroma, 2011). Focusing on low-educated workers may engender a more negative perspective. Following the labor queue theory (Thurow, 1975), in these situations low-educated workers will be worse off in the competition with higher-educated workers for scarcer jobs. Moreover, compared with higher-educated workers, low-educated workers are less likely to migrate to other areas in search of job opportunities (eg, Basker, 2002). From this we expect that low-educated workers are less often underqualified in situations with more regional unemployment. From the same reasoning we might expect better possibilities in periods of economic boom and deteriorating chances in worse economic situations.

In their search for work on the labor market, workers are confronted with different types of firms providing jobs. Some studies relate firm characteristics to the situation of underqualification and have found mixed results. Green and McIntosh (2007) found a higher chance of underqualification in the public sector, while an Quintini (2011) finds the opposite. The same studies found mixed results with respect to firm size. We hypothesize that low-educated workers have a better chance for underqualification in smaller firms because the range of tasks done by a worker is often broader and less specialized in smaller firms, which might have a positive effect on the job levels of low-educated workers. In addition, although it is possible in all types of firms, informal learning probably more often occurs in smaller firms since relationships between workers tend to be closer (Boschma, 2005), which is especially profitable for low-educated workers. From studies by Canton (2009) and Broersma et al (2010), we know that, in general, characteristics of firms are more important than labor market effects in explaining workers' success in terms of wages.

A third way of explaining job match differences is by personal and job characteristics. With respect to age, most research finds that underqualification increases with age and experience (eg, Alpin et al, 1998; OECD, 2011b; Sloane et al, 1999; Wolbers, 2003), while overqualification may compensate for a lack of experience and enterprise-related schooling (Groot, 1993) or be part of a career mobility or insertion process in the labor market (Groot and Maassen van den Brink, 2000). From this we might expect to come across at least some evidence of informal learning by taking into account the effect of age. In addition, several authors have found that men are more often underqualified than women (Alba-Ramirez, 1993; Alpin et al, 1998; Daly et al, 2000; Groot and Maassen van den Brink, 2000). In a related finding, part-time workers are less often underqualified than full-time workers (Alpin et al, 1998; Sloane et al, 1999). Both issues are often related to the position of women, who may give birth and care for children, which often negatively affects their careers. Another explanation may be the ongoing discrimination against women in the labor market (Böheim et al, 2007). Concerning ethnicity, Alpin and colleagues (1998) found that people from ethnic minorities had a lower chance of being underqualified. As labor market differences based on gender and ethnicity slowly seem to decrease, we might expect the differences between men and women and native and nonnative workers in terms of underqualification to be larger for older workers.

Other personal differences can come from skill heterogeneity (eg, Quintini, 2011) and people's motivations (eg, Buchel and Mertens, 2000). As a consequence, despite the number of objective characteristics we could use to explain differences for a group of workers with comparable qualifications, a substantial amount of variance is likely to remain unexplained.

3 Data and method

3.1 Dataset used

To research the effects of regional, firm, and personal characteristics on the chance of being underqualified, we used 1996–2006 data from the Working Conditions Survey (WCS) conducted by the Dutch Ministry of Social Affairs and Employment. The WCS is an annually matched employer–employee dataset based on a stratified survey of firms in which a sample of employees working at these firms is also questioned. Each annual wave of the WCS comprises an average of 37 000 employees in about 2000 firms. It is not a panel in the sense that firms and workers can be followed during a period, but it comprises a repeated set of cross-sections (of firms and associated workers for each year) through time. The WCS includes a lot of background characteristics about both employees and firms, such as the first two digits of the firms' postcodes, which makes it possible to link regional data and to compose aggregated variables on the regional and firm levels.

3.2 Dependent: defining job match

Table 1 shows the distribution of workers within the dataset over job levels and educational levels. The job (skills) levels are based on a classification system consisting of eight levels [classified by the Ministry of Social Affairs, called 'Loon Technische Dienst' (LTD) levels]. Level one (I) consists of very simple and repeating tasks; level eight (VIII) consists of managerial tasks for leading large firms.⁽¹⁾ From table 1 we observe that workers with the same education level [defined by the International Standard Classification of Education ISCED levels] are not restricted to one job (skill) level, but work on different levels instead. A more detailed description of the Dutch educational system and the job classification system can be found in appendices A and B.

As referred to before, a worker's job allocation can be measured in several ways, by more objective or subjective interpretations, and these distinctions in measurement could lead to different outcomes. Following Quintini (2011), we can identify three methods for determining whether a worker is overqualified or underqualified. The first one is a normative approach in which a presumed connection is established between the employee's education and the job's skill level. A second method of measurement is a statistical approach in which the observed distribution is taken as a starting point and the mean or mode of the distribution within an educational category is defined as the observed job match. A deviation from this mean or mode leads to underqualification or overqualification. Finally, the self-declared measure uses individuals' own opinions. It incorporates workers' learning and experience during their working careers and heterogeneity in skills. However, this could also be biased by differences in people's own interpretations about themselves.

As we wanted to gain more insight into the circumstances in which workers have opportunities to work in higher job levels (eg, because of learning and experience), the self-declared measure was less suitable because it already corrects for these aspects. Moreover, we do not have information about people's own job interpretations. For these reasons we opted for an objective measurement method based on the job-level classification system available

⁽¹⁾In defining the job match of workers in our research, we follow the possibilities given by the data used. As the dataset does not include information on workers' direction of formal education or a more detailed job classification system, our analysis is restricted to comparing seven educational levels with eight skill levels.

Table 1. Number of workers by education and skill level.

	I	II	III	IV	V	VI	VII	VIII	Total
Primary education (ISCED 0–1)	5459 25.28%	9580 44.37%	6103 28.26%	404 1.87%	42 0.19%	5 0.02%	0 0.00%	0 0.00%	21 593 100.00%
Prevocational secondary education (ISCED 2)	3183 2.59%	15 586 12.67%	89 376 72.67%	13 831 11.25%	947 0.77%	67 0.05%	2 0.00%	0 0.00%	122 992 100.00%
Lower secondary general education (ISCED 2)	2833 6.51%	11 031 25.34%	26 211 60.21%	2990 6.87%	420 0.96%	46 0.11%	4 0.01%	0 0.00%	43 535 100.00%
Higher secondary general education (ISCED 3)	501 1.52%	2164 6.56%	13 803 41.86%	14 322 43.43%	1976 5.99%	200 0.61%	11 0.03%	0 0.00%	32 977 100.00%
Secondary vocational education (ISCED 3–4)	172 0.20%	1206 1.44%	23 550 28.03%	48 981 58.30%	9394 11.18%	685 0.82%	30 0.04%	0 0.00%	84 018 100.00%
Higher professional education (ISCED 5)	30 0.06%	234 0.47%	2226 4.51%	11 633 23.56%	30 433 61.64%	4618 9.35%	194 0.39%	3 0.01%	49 371 100.00%
University (ISCED 5–6)	12 0.09%	43 0.32%	308 2.32%	1290 9.70%	4901 36.85%	6198 46.61%	530 3.99%	17 0.13%	13 299 100.00%
Total	12 190 3.31%	39 844 10.83%	161 577 43.93%	93 451 25.41%	48 113 13.08%	11 819 3.21%	771 0.21%	20 0.01%	367 785 100.00%

Note: ISCED = International Standard Classification of Education; bold represents the skill level which is most common with a certain education level.

in the dataset. Since we wanted to say something about the stability of our outcomes by using different measures, we compared a normative and a statistical approach in our analysis of underqualification.

3.3 Calculating normative and statistical measures of underqualification

The skill levels given in our dataset (LTD level) are not directly ‘linked’ to education levels. To define the normative measure, we therefore made use of the Standard Occupational Classification (SOC) system. This system does formally link skill levels to educational levels. We linked the LTD skill levels to the corresponding SOC to determine the normative corresponding educational levels for each LTD skill level. The situation of an individual worker was then compared with this official classification. Working in a lower level job than expected was defined as overqualification, while working in a higher level job than expected was defined as underqualification.

The statistical measure is defined by the mode job level for each educational level, which is the matched level. Working on a job level below the matched level was again defined as overqualification, while working on a job level above the matched level was considered underqualification. Table 2 shows an overview of the statistics that belong to the different measures.

Table 2. Defining the job match based on a normative and statistical measure.

	Number of cases with education level	Job match based on normative measure	Job match based on statistical measure
Primary education (ISCED 0–1)	21 593	I	II
Prevocational secondary education (ISCED 2)	43 535	II + III	III
Lower secondary general education (ISCED 2)	122 992	II + III	III
Higher secondary general education (ISCED 3)	32 977	IV	IV
Secondary vocational education (ISCED 3–4)	84 018	IV	IV
Higher professional education (ISCED 5)	49 371	V+VI+ VII+ VIII	V
University (ISCED 5–6)	13 299	V+VI+ VII+ VIII	VI
Total	367 785	III	III

Note: ISCED = International Standard Classification of Education.

3.4 Explanatory variables

We included the following labor market characteristics in the statistical analysis: a general *trend*, the *business cycle effect*, the *regional unemployment rate*, *urbanity*, and the *percentage of highly educated workers* and *high-skilled jobs* on the labor market. The first two digits of firms' postcodes—the level at which the firm location is indicated—were used to give the regional level of analysis.

A year trend was included to look into the trend of underqualification. Moreover, we added the unemployment rate by year on the national level to cover the business cycle effect and linked the regional average unemployment rate over the period of analysis (1995–2006) to our dataset. Both were gathered from Statistics Netherlands. After a correction for the economic situation, the regional unemployment rate is quite stable, so it tells us something about the structure of the region. Urbanity was included by using a dummy for working in one of the four biggest cities of the Netherlands (based on the first two postcode digits for these cities). In addition, we added the percentage of the highly educated and high-skilled workers in the region to look at the effect of regional spillovers and competition. To calculate both, we aggregated workers in our dataset by partial (two-digit) postcode, educational level, and job level by year. This led to a spatial distribution into ninety-nine regions.⁽²⁾ The accumulated numbers were corrected for the specific firm in which the worker was working, resulting in a 'firm-specific calculated' regional variable. The accumulated numbers were then used to calculate percentages. A high correlation exists between the percentage of high-skilled jobs and the percentage of highly educated workers within a firm or region; we included both variables because we wanted to distinguish between possible negative competition and positive spillover effects on low-educated workers' chances.

We included the following firm characteristics: *firm size*, *firm sector*, and the *percentage of highly educated workers* and *high-skilled jobs in the firm*. Again, both percentages were calculated by aggregating workers, but this time at the firm level, which excludes

⁽²⁾We also tested a broader definition of the labor market (NUTS 3). However, the results are quite stable.

the individual worker. This led to ‘worker-specific calculated’ firm variables. Firm size was included on a ratio scale, and firm sectors (thirteen in total, like agriculture or trade) were included as dummies.

The last group of variables we added were personal and job characteristics: *age*, *gender*, *ethnicity*, *education*, *working hours*, and *functional types*. Age, which we use as a possible indication of informal learning, was grouped to investigate whether chances for underqualification proportionally increase over time. Four age groups were defined: 15–24, 25–34, 35–49, and 50 and above. With respect to gender and ethnicity, we included a dummy for being female and nonnative. There is a significant group of workers with missing ethnicity data; as we did not want to lose data, we also included a dummy for ‘ethnicity unknown’. Education was included by a dummy for level ISCED 2 (compared with ISCED 1). Working hours were included as a ratio variable and functional types as dummies (six in total, such as having a technical or care-related job). In a model extension, we included *interaction effects* to see whether the difference between men and women and native and nonnative people is different for older and younger age groups. To ease interpretation, we replaced our four age groups with two groups: workers younger than 40 years and workers who were at least 40 years old. The interaction terms were calculated by multiplying this age dummy with being women and being nonnative, respectively.

3.5 Descriptive characteristics

All workers with ages of above 15 and below 66 years were selected. Because of our focus on the low educated, we selected all workers with a low education level, which we defined as prevocational secondary education level (ISCED 2) at most.

Table 3 shows the differences in job match for the low-educated based on the normative and statistical measures. On the basis of the statistical measure, the number of respondents in a job match and in a position of underqualification was lower, while the percentage of overqualified people was higher compared with the normative measure. This latter aspect is due to the fact that people with the lowest education level (ISCED 1) are matched to the lowest skill level in the normative situation (see table 2). The reason that we did find overqualified people at this level was because our group of low-educated workers consisted of both the people with the lowest education level (ISCED 1) as well as people at the ISCED-2 level. This latter group could be overqualified when working at the lowest job level (level I; also see table 2).

Table 3. Percentage of low-educated workers by job allocation for the normative and statistical measures.

Condition	Resulting job match	Percentage of low-educated (ISCED 1–2) workers based on a normative measure	Percentage of low-educated (ISCED 1–2) workers based on a statistical measure
Job level < education level	job match = overqualified	3.2	20.2
Job level = education level	job match = match	78.5	66.4
Job level > education level	job match = underqualified	18.3	13.4
Total		100.0	100.0

Note: ISCED = International Standard Classification of Education.

Figure 1 shows the spatial distribution of the percentage of underqualified low-educated workers based on the normative and statistical measures over the period from 1995–2006 in the Netherlands, based on our dataset. Because the overall level of underqualification was higher with the normative measure, this is also reflected in the maps. However, the spatial distributions of both measures were largely the same, although there were some differences on the detailed spatial level. Especially in peripheral areas, the levels of underqualification for the low educated seemed to be the lowest, although there are exceptions.

Figure 1. (In colour online.) Geographical spread of underqualification among low-educated workers.

To distinguish the real success situations, we excluded all overqualified workers from the analyses. Table 4 shows descriptive characteristics of the final dataset, which consists of low-educated workers with at least a job match (being in a match or being underqualified). Because of this focus, the total N in table 4 is lower than in tables 1 and 2, in which all workers are still included.

3.6 Modeling technique

We estimated binary logistic regression models with clustered errors at the postcode (two-digit)⁽³⁾ level to estimate the chance of being underqualified for a job with respect to having a job match. We then checked for multicollinearity issues between the independent variables. Both the normative and statistical measures of underqualification were compared. We started the analysis with a model that includes the labor market, firm and personal/job characteristics we described above. In the next step we added interaction effects to the model with age, gender, and ethnicity.

4 Results

Table 5 shows the results of our binary logistic models. We describe our findings on labor market, firm, and personal characteristics in explaining underqualification based on the statistical significance and economic significance of the effects. With respect to the latter, we present both the marginal effects (MEs) showing the change in percentage point at a one-unit

⁽³⁾We also experimented with clusters on the firm level; results were approximately stable.

Table 4. Descriptive characteristics of the group of low-educated workers with at least a job match for each measurement.

	Normative measure				Statistical measure			
	mean (%)	SD	min	max	mean (%)	SD	min	max
<i>Labor market: general</i>								
Trend ^a								
1995	7.4				7.1			
1996	10.1				10.3			
1997	10.3				10.4			
1998	10.3				10.5			
1999	10.0				10.1			
2000	9.9				10.2			
2001	11.7				11.4			
2002	8.9				9.1			
2004	11.0				10.5			
2006	10.6				10.4			
Business cycle								
national unemployment rate	1.8	0.5	1.0	2.6	1.8	0.5	1.0	2.6
<i>Labor market: regional</i>								
Urbanity:								
working in one of the four biggest cities	18.3				18.6			
Structure:								
regional unemployment rate	5.3	1.5	3.1	10.2	5.3	1.5	3.1	10.2
Type of region								
percentage of high-skilled jobs in region, excluding firm	15.3	7.6	0.0	55.9	15.4	7.6	0	55.9
percentage of highly educated in region, excluding firm	15.6	8.3	0.0	60.2	15.7	8.3	0.0	60.2
<i>Firm characteristics</i>								
Firm size (number of employees)								
1–4	3.2				3.2			
5–9	6.7				6.6			
10–19	11.2				11.1			
20–49	16.6				16.6			
50–99	15.6				15.8			
100–199	15.8				16.0			
200–499	15.2				15.5			
≥500	15.7				15.2			
Economic sector								
agriculture and fisheries	2.9				2.7			
mineral extraction	0.6				0.6			
manufacturing	33.3				36.2			
energy and water control	1.3				1.5			
construction	10.3				11.5			
trade, repair of consumer articles	19.3				18.9			
hotels, restaurants, cafes	3.6				2.8			
transport, storage, and communication	8.2				9.1			
financial institutions	1.4				1.6			

Table 4 (continued).

	Normative measure				Statistical measure			
	mean (%)	SD	min	max	mean (%)	SD	min	max
<i>Economic sector (continued)</i>								
rental and business services	7.8				7.1			
public administration/social services	0.4				0.4			
education	0.4				0.4			
health and social services	6.4				5.9			
culture, recreation	4.0				3.9			
<i>Type of firm</i>								
percentage of high skilled in firm, excluding worker	9.1	12.0	0.0	100	9.7	12.4	0.0	100
percentage of highly educated jobs in firm, excluding worker	8.2	12.0	0.0	100	8.6	12.3	0.0	100
<i>Job characteristics</i>								
<i>Function type</i>								
technical manual labor	49.8				51.2			
administration	8.8				9.9			
automatics	0.4				0.5			
commercial	8.4				8.1			
nursing/provision of services	30.5				27.7			
creative	0.2				0.3			
management	1.9				2.3			
<i>Hours</i>								
working hours per week	33.2	10.2	0.1	50.0	34.4	9.1	0.1	50.0
<i>Personal characteristics</i>								
<i>Age: 4 groups</i>								
16–24	16.5				13.1			
25–34	27.8				28.7			
35–49	37.5				38.9			
> 49	18.2				19.3			
<i>Gender</i>								
female	31.4				27.4			
<i>Ethnicity</i>								
native	65.8				66.3			
nonnative	5.9				5.5			
ethnicity unknown	28.2				28.3			
<i>Education</i>								
primary education (ISCED 1)	11.8				10.7			
prevocational secondary education (ISCED 2)	88.2				89.3			
<i>Dependent</i>								
<i>Job match</i>								
percentage match	81.1				77.0			
percentage underqualified	18.9				23.0			
<i>N</i>	181 067				149 146			

^aIn 2003 and 2005 no data were collected.

Note: ISCED = International Standard Classification of Education.

Table 5. Modeling results binary logistic regression.

Underqualification (1) versus job match (0)	Normative measure				Statistical measure			
	<i>B</i>	ME	Size effect	<i>Z</i>	<i>B</i>	ME	Size effect	<i>Z</i>
<i>Labor market: general</i>								
Trend								
year trend (1996–2006)	–0.036	–0.004	–0.040	–3.52***	–0.038	–0.004	–0.0418	–3.75***
Business cycle								
national unemployment rate	–0.103	–0.010	–0.016	–1.39	–0.086	–0.009	–0.0134	–1.32
<i>Labor market: regional</i>								
Urbanity								
working in one of the four biggest cities	–0.243	–0.023	–0.023	–1.87*	–0.140	–0.014	–0.014	–1.09
Structure								
regional unemployment rate	–0.056	–0.006	–0.038	–1.68*	–0.049	–0.005	–0.033	–1.68*
Type of region								
percentage of high-skilled jobs in region, excluding firm	0.013	0.001	0.081	1.68*	0.003	0.000	0.018	0.48
percentage of highly educated in region, excluding firm	–0.005	–0.001	–0.031	–0.66	0.001	0.000	0.005	0.14
<i>Firm characteristics</i>								
Size								
firm size	–0.075	–0.007	–0.055	–6.56***	–0.072	–0.007	–0.053	–7.87***
Economic sector								
agriculture and fisheries (reference = manufacturing)	–0.266	–0.024	–0.024	–1.85*	–0.265	–0.024	–0.024	–2.14**
mineral extraction	0.354	0.041	0.041	1.94*	0.388	0.045	0.045	2.31**
energy and water control	0.700	0.091	0.091	5.24***	0.584	0.073	0.073	4.11***
construction	–0.053	–0.005	–0.005	–0.79	–0.046	–0.005	–0.005	–0.67
trade, repair of consumer articles	–0.058	–0.006	–0.006	–1.04	–0.191	–0.080	–0.018	–3.57***
hotels, restaurants, cafes	0.263	0.029	0.029	2.44**	0.122	0.012	0.013	0.89
transport, storage, and communication	1.084	0.152	0.152	9.77***	0.923	0.123	0.123	7.80***
financial institutions	0.435	0.051	0.051	3.71***	0.452	0.054	0.054	4.10***
rental and business services	–0.458	–0.040	–0.040	–3.55***	–0.132	–0.013	–0.013	–1.61
public administration/ social services	0.567	0.070	0.070	2.54**	0.548	0.068	0.068	2.42**
education	0.039	0.004	0.004	0.12	0.035	0.004	0.004	0.12
health and social services	0.320	0.036	0.036	2.84**	0.152	0.016	0.016	1.35

Table 5 (continued).

Underqualification (1) versus job match (0)	Normative measure				Statistical measure			
	<i>B</i>	ME	Size effect	<i>Z</i>	<i>B</i>	ME	Size effect	<i>Z</i>
<i>Economic sector (continued)</i>								
culture, recreation	0.209	0.022	0.023	1.34	0.027	0.003	0.003	0.23
<i>Type of firm</i>								
percentage of high-skilled jobs in firm, excluding worker	0.040	0.004	0.749	16.26***	0.039	0.004	0.725	15.88***
percentage of highly educated in firm, excluding worker	-0.013	-0.001	-0.087	-5.01***	-0.013	-0.001	-0.087	-5.48***
<i>Job characteristics</i>								
<i>Function type</i>								
technical manual labor (reference = commercial)	-1.651	-0.172	-0.172	-25.44***	-1.681	-0.179	-0.179	-26.85***
administration	-0.622	-0.051	-0.051	-8.54***	-0.698	-0.057	-0.057	-9.15***
automatics	-0.084	-0.008	-0.008	-0.74	-0.255	-0.023	-0.023	-2.16**
care	-0.148	-0.123	-0.123	-21.17***	-1.345	-0.110	-0.110	-19.03***
creative	0.373	0.043	0.043	2.54**	0.360	0.041	0.041	2.67**
management	2.181	0.410	0.411	25.91***	2.056	0.379	0.379	24.43***
<i>Hours</i>								
number of working hours per week	0.042	0.004	0.176	14.94***	0.043	0.004	0.172	12.49***
<i>Personal characteristics</i>								
<i>Gender</i>								
female (reference = male)	-0.937	-0.083	-0.083	-21.73***	-0.929	-0.080	-0.080	-22.57***
<i>Ethnicity</i>								
nonnative (reference = native)	-0.583	-0.048	-0.048	-8.27***	-0.504	-0.042	-0.043	-9.89***
ethnicity unknown	-0.104	-0.010	-0.010	-1.13	-0.100	-0.010	-0.010	-1.07
<i>Age</i>								
16–24 (reference = 49+)	-1.434	-0.102	-0.102	-23.09***	-1.689	-0.109	-0.109	-22.87***
25–34	-0.885	-0.077	-0.077	-22.50***	-0.921	-0.080	-0.080	-21.94***
35–49	-0.287	-0.028	-0.028	-10.44***	-0.292	-0.029	-0.029	-10.18***
<i>Education</i>								
ISCED 2 (reference = ISCED 1)	-4.511	-0.460	-0.807	-51.43***	-0.226	-0.234	-0.410	-35.73***
Constant	8.078			3.88***	8.022			3.91***
<i>N</i>	181 067				149 146			
Pseudo <i>R</i> ²	0.369				0.220			
Wald χ^2	6444.26				7509.01			
Prob > χ^2	0.000				0.000			

***≤1%; **<5%; *<10%.

Note: ISCED= International Standard Classification of Education.

change, as well as the effect size when letting a variable run from its smallest to its largest value. These are evaluated at the default values (ie, the mean of the independent variables).

4.1 Labor market characteristics

Generally, we can conclude that the labor market effects we included show only a limited number of significant coefficients and weak economic significance. Thus they contribute to only a limited extent to explaining underqualification.

With respect to more general aspects of the labor market, we found that the year trend was strongly negatively significant. This is in line with our theoretical statement that competition for jobs is increasing because of globalization, on one hand, and an increasing number of highly educated workers, on the other hand. We did not observe a significant effect from the business cycle (measured by the national unemployment rate) on low-educated workers' chances to be underqualified. The effect of economic prosperity is probably more directly related to the job match outcomes for highly educated workers; it probably influences low-educated workers more indirectly through lower levels of unemployment (eg, Edzes et al, 2011).

Regional unemployment lowers the chance for underqualification of low-educated workers, although the coefficient is significant at only the 10% confidence level. These findings are in line with our assumptions about the low educated and could be explained by high competition for jobs on these markets and negative labor queue effects for the low educated (Thurow, 1975).

With respect to urbanity, we found that working in a bigger city has a marginally negative effect on underqualification for low-educated workers. This is in contrast to studies linking urbanity to positive chances (Yankow, 2009) and in line with our reasoning that low-educated workers suffer from more competition. However, this effect is significant at only the 10% level when a normative measure is used.

Instead, chances for the low educated to be underqualified are slightly better in regions with a relatively high percentage of high-skilled jobs, but again only in the situation of a normative measure and measured at only a 10% significance level. This may reflect the fact that if more high-skilled jobs are available, low-educated workers have slightly more chances to get a job above their educational level. Interestingly, a relationship between the percentage of highly educated workers in the region and the chance to be underqualified was not found after correcting for the other variables in the model; this implies that no direct competition effects can be observed coming from the highest educated workers on the labor market.

4.2 Firm characteristics

We found a negative significant relationship in both models between firm size and the chance to be underqualified at the 1% significance level, which is in line with our theoretical reasoning: the variety of tasks and the proximity of workers within smaller firms (Boschma, 2005), on one hand, and more competition from the higher educated in larger firms, on the other hand, might improve chances for the low educated in smaller firms. Moreover, low-educated workers are, compared with the manufacturing sector (in which the majority of low-educated workers in our dataset works), especially more often underqualified in jobs related to the financial, transport, communication, and energy sectors, while being less often underqualified when they work in agriculture and trade.

Although we did not find strong evidence for knowledge spillovers and direct competition effects at the regional level, we did find strong and stable relationships between the percentage of high-skilled jobs and the percentage of highly educated workers within firms and the chances for the low educated. The chances of being underqualified are much better in firms with a high percentage of high-skilled jobs. At the same time, crowding-out effects seemed to be present at the firm level as well; when the share of highly educated workers in a firm

(controlled for the percentage of high-skilled jobs in a firm) increases, chances for the low educated to work at higher level jobs deteriorate. However, because the economic significance of the percentage of high-skilled jobs is much stronger than the negative effect caused by the percentage of highly educated workers, it still seems desirable for the low educated to be in environments in which they are in proximity to higher skilled jobs.

In summary, we conclude that the firm effects are highly significant and show relatively large MEs compared with included regional variables. The firm effects are robust in both models and help explain underqualification of the low educated. This finding is in line with studies looking into interactions between high-educated and low-educated workers in explaining personal differences in salary; they also found that the firm level is more important in general (Broersma et al, 2010; Canton, 2009).

4.3 Personal and job characteristics

In addition to regional and firm characteristics, personal and job characteristics were added to the model. In general, we found that the personal and job characteristics we included are highly significant, with relatively large MEs that are in line with other studies on the individual job match for all workers (Alba-Ramirez, 1993; Alpin et al, 1998; Daly et al, 2000; Frank, 1978; Sloane et al, 1999). We found that low-educated women, nonnatives, and people working fewer hours per week have a smaller chance of being underqualified. Also, the negative effects for all younger age groups compared with the oldest group of workers are in line with our expectations and with other research: the chance of being underqualified increases proportionally with age (eg, Alpin et al, 1998; Quintini, 2011; Sloane et al, 1999; Wolbers, 2003). The effects are approximately the same for both measurements.

Moreover, compared with workers with a commercial function, people working in technical jobs, administration, and care are less often underqualified, while people working in management-related functions are more often underqualified. The latter is logical, as management is a typical kind of function in which a higher skill level is demanded. Finally, workers with a formal qualification at the ISCED 2 level are less often underqualified than workers at the ISCED 1 level; this is as expected based on our measurement of underqualification and is a consequence of the limited number of jobs at the lowest skill level.

4.4 Interaction with age

From the results in table 5, we can conclude that low-educated women and nonnatives are less often underqualified. However, is this backlog stable at different age groups?

Table 6 shows the coefficients of the interaction effects. As the effects of the other variables are hardly affected by the inclusion of interaction effects, we do not show them again in this table. We found that the interaction effects with age are negative and significant for women as well as for nonnatives. This implies that the difference in chance for underqualification is larger for older age cohorts compared with younger ones. Discrimination on the labor market (fewer learning possibilities) and differences in career paths could explain this. However, cohort effects could also play a role here (as we used cross-sectional data) since differences may have become smaller recently.

4.5 Overall fit

In general, the results are robust when we compare the normative and statistical measurements. Although we found significant indicators in explaining the chance of being underqualified, the overall fit of the model indicates that there is still quite some variance left unexplained. Omitted variables or personal heterogeneity could be important reasons for this.

Table 6. Interaction effects between age, women, and ethnicity.

Underqualification (1) versus job match (0)	Normative measure				Statistical measure			
	<i>B</i>	ME	size effect	<i>Z</i>	<i>B</i>	ME	size effect	<i>Z</i>
Single effects								
gender = female	−0.710	−0.066	−0.066	−16.50***	−0.865	−0.078	−0.078	−17.64***
nonnative	−0.289	−0.027	−0.027	−5.10***	−0.233	−0.022	−0.022	−3.94***
age >39	0.928	0.101	0.101	30.37***	0.854	0.093	0.093	30.50***
Interaction effects								
nonnative × age>39	−0.645	−0.052	−0.052	−5.98***	−0.558	−0.047	−0.047	−6.49***
women × age>39	−0.509	−0.045	−0.045	−9.53***	−0.183	−0.018	−0.018	−3.44***
<i>N</i>	181 067				149 146			
Pseudo <i>R</i> ²	0.365				0.212			
Wald $\chi^2(36)$	6858.15				8960.94			
Prob > χ^2	0.000				0.000			

***≤1%; **<5%; *<10%.

5 Conclusions

From a policy as well as an individual perspective, job mismatches leading to underqualification could—under certain conditions—be evaluated as positive labor market outcomes, when we think in terms of learning effects and higher incomes at the microlevel and budget savings and upgrading of the labor force at the policy level. However, current research on job allocation mainly deals with the negative consequences of job mismatches and the relation to lower productivity levels. It lacks focus on specific groups on the labor market, which could lead to unwarranted generalizing of findings that ignore differences in education and skill levels and might lead to inadequate recommendations.

This study addresses both shortcomings by looking in detail at successful labor outcomes for low-educated workers. We compared regional, firm, and personal characteristics and their impacts in explaining underqualification. On the basis of this, we can draw some conclusions and make some suggestions for policy and for further research.

First of all, our study provides empirical evidence that studying underqualification could benefit from distinguishing between specific groups on the labor market. We showed that the mechanisms at work are sometimes different for the low educated—for example, with respect to the relationships with unemployment, urbanity, and firm size.

Second, in terms of both statistical and economic significance, our findings show that the labor market characteristics we included are less important than firm characteristics in explaining the chances for the low educated to end up in better job positions. With respect to firm characteristics, we found that low-educated workers have better chances of being underqualified when working in smaller firms and in firms with many high-skilled jobs. However, when the number of highly educated workers exceeds the number of high-skilled jobs in the firm, there are fewer chances for the low educated to work at higher positions. Nevertheless, the positive effect of being in such firms is stronger than the negative competition effects that are likely to exist.

With regard to the labor market characteristics we included, except for the negative year trend effect, no stable significant effects were found with respect to the type of region (in terms of the business cycle, high-skilled jobs percentage, highly educated workers percentage, and urbanity), except for the small negative significant effect of structural unemployment on

the chance of being underqualified. From a policy perspective, more research is needed to shed light on the causes of positive working environments for the low educated. Are they caused by market insufficiencies or personal heterogeneity (eg, caused by learning)? For example, with respect to the firm level, are positions better from the beginning (workers self-selecting into specific types of firms), or are these better positions reached by benefitting from knowledge spillovers over a longer period of time spent in a firm? Could we better classify specific firms and labor markets with favorable characteristics for specific groups on the labor market?

Third, some personal characteristics are among the main explanatory variables in our models. In general, the effects of age and experience proportionally increase underqualification, meaning that older workers are more often underqualified. However, this age effect is not the same for all groups of workers. In our results, we separated this effect for women versus men and nonnatives versus natives. Aside from the finding that women and nonnatives are less often underqualified, this difference is even bigger for older age groups. Men and natives may have more possibilities to improve their position during their working career. However, the difference might also be an indication of a cohort effect, indicating that discrimination and career differences are decreasing and leading to smaller differences for younger cohorts. Further research is required, using longitudinal data that make it possible to follow workers over time.

Finally, our results show indications of learning on the labor market over the life cycle. In addition, despite the several variables that were introduced to explain underqualification, a lot of variance can still not be explained by our model. Personal heterogeneity could be a reason for this: people with the same educational level could differ in skills. Differences in motives could also be underlying this variance. These personal differences mean that some people may be able to reach better labor market positions than others. This last point illustrates the usefulness of studying more subjective forms of underskilling: as studies such as the OECD reports show, taking another perspective on skills does make a difference. And, more importantly, working on a more objective system for measuring people's true skills is worthwhile in order to get a better picture of the true scope of the 'problem' of job mismatch since there are drawbacks to using either objective measures of underqualification or people's own interpretation of skills. It is essential to gain more insight into these issues in order to develop more effective policy measures aimed at improving the labor market position for the most vulnerable groups in the labor market.

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Appendix A

Job classification system

LTD function level	Description of level	Linked to education level
I	very simple labor activities, repetition, no schooling, and marginal experience required, performed under direct supervision	primary education (ISCED 1)
II	simple or quite simple labor activities, repetition, some lower administrative or technical knowledge, and some experience required; requires some independence, performed under direct supervision	prevocational secondary education (ISCED 2) + lower secondary general education (ISCED 2)
III-low	less simple labor activities, repetition, lower administrative or technical knowledge, and some experience required, performed independently to a certain degree	prevocational secondary education (ISCED 2) + lower secondary general education (ISCED 2)
III-high	less simple labor activities, alternating, lower administrative, or technical knowledge, and a vocational education in a specific technique and some experience required, performed independently to a certain degree	prevocational secondary education (ISCED 2) + lower secondary general education (ISCED 2)
IV	difficult labor activities, medium administrative, or technical level of knowledge plus experience required, intended to be performed independently	senior general secondary education and preuniversity education (ISCED 3) + secondary vocational education (ISCED 3)
V	composed labor activities within a speciality, higher knowledge level, and/or experience required, performed independently	higher professional education (ISCED 5) + university (ISCED 5–6)
VI	executive or policy-preparing labor activities, creative or communicative, independent point of view, academic knowledge level required	higher professional education (ISCED 5) + university (ISCED 5–6)
VII	leading medium-sized units, participating in policy preparation and creation	higher professional education (ISCED 5) + university (ISCED 5–6)
VIII	leading big firms/units	higher professional education (ISCED 5) + university (ISCED 5–6)

Notes: LTD = Loon Technische Dienst; ISCED = International Standard Classification of Education.

Appendix B
Dutch educational system