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WORKING PAPER

Overeducation in the Flemish Youth Labour Market

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Abstract

Based on three definitions, we measure overeducation among Flemish labour market entrants and investigate its determinants to test the validity of different theories and to shed more light on the validity of the measures themselves. Depending on the measurement method, overeducation varies in the first job from 26 to 54%. Looking for the determinants of mismatch, the results differ for the various measures and schooling levels. We find clear evidence that the probability of overeducation is lower for search intensive individuals, individuals with better study results and for jobs in small firms. Furthermore, overeducation differs greatly among jobs in different occupations and industries. These results are largely explained by the difficulties that some occupations and industries have to fill their vacancies. As expected, the measure based on job analysis delivers the most consistent results. However, we find indications that part of the mismatch, measured by job analysis and to a lesser extent by indirect self-assessment, results from differences in job complexity.

JEL classification: I21; J24

Keywords: Overeducation, Overschooling, Qualification Mismatch

I. Introduction

The importance of schooling and education is now generally recognised, not only for social cohesion but also as a crucial determinant of sustained economic growth (see e.g. Storesletten & Zilibotti (2000)). Investments in education have risen in most industrialised countries. As a result, educational levels of the population in general and schoolleavers in particular are now much higher. Parallel to this evolution, there have been growing concerns about overeducation. Freeman (1976) was one of the first to warn for overinvestments in schooling. Now an extensive literature on the subject exists, with estimates for different countries ranging from 10% to more than 40% (Groot et al. (2000)).

The Flemish SONAR-database, resulting from a survey of 3015 23 year olds about their educational and labour market career, not only makes it possible to test the stylised facts about overeducation for Flemish labour market entrants, but can also provide additional insights into the problem. The objective of the paper is twofold: to measure the incidence of overschooling (and its counterpart, underschooling) for Flemish labour market entrants in their first job and to look for the determinants of overschooling. Measured overeducation is highly sensitive to the definition used. Definitions of overeducation can be divided in four categories. The SONAR-database gives us the opportunity to measure overeducation relying on the different methods. Based on these measures, we investigate the determinants of overeducation among labour market entrants during their first job to test the validity of the different theories and to shed more light on the validity of the measures themselves.

This article is structured as follows. In section II we discuss different theories of over- and undereducation and the empirical evidence on the subject. The measurement of overeducation is discussed in section III. In section IV we measure skills mismatch for Flemish labour market entrants. Section V deals with the estimation method. The determinants of overschooling in the first job are investigated in section VI and section VII. Finally, in section VIII, we summarise the paper and draw some conclusions.

II. Theory and existing evidence

Someone could be defined as being overeducated if attained skills exceed the required skills to do his job. However, there are some conceptual problems with this definition of over- and undereducation. First, as Green et al. (1999) state, in a pure human capital framework, the concept of overeducation may be meaningless. According to *Human Capital Theory* (HCT), which is based on neoclassical economics, a worker is paid his marginal product. As a consequence, overeducation can only be the result of a temporary labour market disequilibrium and there is no problem with overinvestments in schooling. Second, observed overeducation may compensate for lower quality of education, for example by differences in quality of institutions or study results. Third, formal education in itself is an incomplete measure of human capital. Overeducation could be permanent if it compensates for a lack of other elements of human capital like experience, on-the-job training or ability. Undereducated people should then have a more than average amount of these kinds of human capital. To overcome these conceptual problems, a clear distinction has to be made between educational mismatches and skill mismatches (see e.g. Allen & van der Velden (2001)). In this paper we always use the terms overeducation or overschooling in the meaning of educational mismatches, if the formal educational level exceeds the job level.

There is a lot of evidence in the literature that the probability of being overeducated depends on differences in the quality of education or other elements of human capital. Dolton & Vignoles (2000) found more overeducated British graduates among those with a polytechnic degree and those with lower degree classes. The generally observed decline in overeducation and rise in undereducation by age (see e.g. Van Hoof (1996)) are in line with the hypothesis that educational mismatches result from differences in other skills, as experience and the amount of on-the-job training rise with age. Indeed, evidence is found that overeducated workers have less experience (see e.g. Alba-Ramirez (1993), Groot (1996), Sloane et al. (1999)). However, after several years on the labour market, a large group remains overeducated. Green et al. (1999) found some evidence that the

overeducated are less able[1]. As we concentrate in this paper on the first job, differences in overeducation can only be explained by differences in quality of education or ability.

Since the returns to on-the-job training are lower for part-time and temporary jobs, the employer could opt to recruit someone with a higher qualification if formal education and on-the-job training are substitutes. The same holds true for women since they have a higher probability of leaving their job. Indeed, van Smoorenburg & van der Velden (2000) found that overeducated get less on-the-job training. Renes & Ridder (1995) found that women need more experience than men to be hired for the same job. The *Career Mobility Hypothesis* (CMH, Sicherman & Galor (1990)) builds on the Human Capital theory. Overeducation may be a good investment opportunity if higher education implies a higher probability of upward mobility within or across firms. Job seekers may accept jobs below their schooling levels because the skills learned on the job by experience and on-the-job training may lead to promotion or to a higher job level outside the firm. Sicherman (1991) found that overeducated workers had a higher chance to move to a higher level job. However, he also found this for the undereducated, for which no explanation was given.

While human capital theory concentrates on the supply side of the labour market, in *Job Competition Theory* (JCT, Thurow (1975)) the demand side matters. According to job competition theory, productivity is only determined by job characteristics and not, as in human capital theory, by individual characteristics. Workers are placed in a queue on the basis of their schooling level, which is used by the employer as an indicator for their trainability. If there is an oversupply of highly educated job seekers for high level jobs, some educated workers will look for jobs at lower levels. Relatively less educated job seekers will be driven to the jobs at the lowest levels or, worst, crowded out of the labour market. The consequence is overeducation for higher educated workers and more unemployment for the lower educated. With the general rise of educational levels over the past decades in most industrialised countries, there have been growing concerns about overinvestment in schooling and crowding out of the less educated. Freeman (1976) was one of the first to stress the problem of overinvestments in schooling. He saw this as an explanation for the diminishing returns to education during the seventies in the U.S.

However, along with the rise in supply, there has also been a rise in demand for higher educated individuals. With technological progress, jobs may become more complicated and require more skills. If mismatch is measured on the basis of former job requirements, overeducation may be upwardly biased. Mendes de Oliveira et al. (2000) found some evidence for the *Technology Hypothesis* (TH).

A more realistic assumption is that productivity is determined by the combination of individual and job characteristics, as stated by *Assignment Theory* (AT, Sattinger (1993)). This is strongly confirmed by research on the relationship between mismatch and earnings. A great part of the mismatch literature has concentrated on the estimation of the returns to over- and underschooling. Almost without exception, returns to overeducation are found to be positive but smaller than returns to required education, while returns to undereducation are negative, but this penalty is also smaller than returns to required education[2]. Not only educational and job levels are important, so are educational subjects and job types. The skills of a student in engineering at a higher vocational level will be of more use in a university level engineering job than the skills of an academic historian. Battu et al. (1999) and Dolton & Silles (2001) found clear differences in mismatch between different educational subjects and occupations.

A last group of theories concentrates on the search and selection behaviour of employers and employees. According to *Signal Theory* (ST, Spence (1973)) education in itself is not productive, but is used as a signal for ability and effort. It departs from the assumption that the willingness to pay the costs of education fundamentally depends on ability. If, due to an exogenous factor, global educational costs fall, less able students will decide to learn longer. As a result, the signal of a particular educational level will fall and the employer will upgrade the educational requirements, without any change in content[3]. This is also referred to as qualification inflation. Also study results and diplomas from educational subjects considered as being difficult can be used as signals for ability. According to the *Educational Credential Hypothesis* (ECH) of van der Meer & Wielers (1996) overeducation is mainly concentrated in large organisations and in the financial and professional services sector. They suppose that large organisations rely more on

educational credentials as they encounter more difficulties to measure worker productivity.

Another explanation for educational mismatch lies in *Matching Theory* (MT, Jovanovic (1979)). According to this theory, search costs and imperfect information result in an imperfect match. A process of gradual adjustment to labour market requirements leads to a perfect match. So, in line with the predictions of Career Mobility Theory, overeducation is only temporary. While Career Mobility Theory didn't give an explanation for undereducation, in a matching theory framework this is also a temporary phenomenon. The outcomes of Robst (1995) are more in line with these hypotheses. He obtained for overeducated a higher and for undereducated a lower probability for movement to a higher level job. Overschooling may also result from low geographical mobility (GMH). Battu et al. (1999) and Dolton & Silles (2001) found a positive influence of regional mobility on the quality of the match. The *Theory of Differential Overqualification* (TDO, Frank (1978)) explains the higher probability of being overeducated among women by their low geographical mobility opportunities. This follows from the observation that family residence is mostly determined by the husband's career choice.

To test for the different theories, we formulate some hypotheses that will be tested in the empirical section of this paper. Some of them clearly correspond to one theory, others are compatible with different theories. The main theories on which these hypotheses are based are mentioned in parentheses.

H1: Overeducation declines with age (HCT, CMH, MT).

H2: Better study results decrease the probability of being overeducated (HCT, ST).

H3: The probability of overeducation is higher in part-time and temporary jobs (HCT).

H4: Cohabiting women have a higher probability of being overeducated (HCT, TDO).

H5: Overeducation is concentrated less in entry jobs for occupations with difficulties to fill vacancies and more among individuals from educational subjects with a relatively high supply in the labour market (JCT, AT).

H6: Technological progress induces more measured overeducation (TH).

H7: Overeducation is also concentrated in large firms and in the financial and professional services sector (ECH).

H8: Search intensive individuals have a lower probability of being overeducated (MT).

H9: Geographically mobile individuals have a lower probability of being overeducated (GMH).

III. Measuring overeducation

The measurement of over- and undereducation has been the subject of extensive discussions in the literature. Although the measurement of attained schooling is not without problems[4], most discussion is about the measurement of required education. Broadly speaking, overeducation (resp. undereducation) has been measured in four ways, which can be divided into two objective and two subjective measures (see e.g. Groot et al. (2000)). The subjective definitions are based upon a *self-assessment technique*. Firstly, workers are directly asked whether they are rightly, over- or underschooled to do their job. Secondly, a more indirect way is to ask respondents what minimum level of education is required to get or to do their job[5]. To measure over- and underschooling, this is compared with the attained educational level. The *job analysis method* is a more objective approach, based on the evaluation of required schooling by job analysts, which classify the job in an occupational classification. A last objective method derives mismatch from *realised matches*. Required education is measured by the median or mode of the educational level of workers in a certain occupation. Verdugo & Verdugo (1989) e.g. defined a worker to be overeducated if his education is more than one standard deviation above the average for his occupation[6].

All these measures have their shortcomings. However, the Verdugo & Verdugo measure has been criticised most. Not only is the choice of one standard deviation highly arbitrary, it not really measures mismatch, but only deviations from what is actually realised and not from what should be realised. Self-assessment techniques also have their drawbacks. With

direct self-assessment methods, the interpretation of job level and educational level is totally left over to the subjective assessment of the respondent. Measures based on questions about what is needed to get a job may reflect more the screening and selection behaviour of employers than mismatch. The subjective assessment of what is needed to do a job may also be influenced by what is asked to newly hired workers or biased to the median level of education of identical workers in their firm. With the job analysis method, the subjective assessment of the respondent is replaced by the subjective assessment of a job analyst. The classification of jobs is not straightforward. Jobs that are at first sight identical, may in reality be quite different. Another problem is the changing content and complexity of jobs as a consequence of technological progress. If the classification system is not redefined from time to time, overschooling may be upwardly biased. However, the same holds for subjective methods if respondents base their answers on former requirements. Balancing the pros and cons, Hartog (2000) concludes that job analysis is the best method. Some have tried to determine the best method on a more systematic basis. Van der Velden & van Smoorenburg (1999) find a systematic overestimation for job analysis and conclude that self-assessment is the best technique. Anyhow, despite differences in measured mismatch among different studies and different measurement approaches, the stylised facts about the relationship between mismatch and earnings are robust (see e.g. Hartog (2000)).[7]

We base our research on data about school to work transitions from the SONAR-database. SONAR is an interdisciplinary research group that investigates the transition from school to work in Flanders. During the last months of 1999, 3015 Flemish 23 years old were questioned by face-to-face interview on the basis of a random sample. The interview consisted of an extensive questioning of their educational and early labour market career. We make a subsample of respondents for which we have data on the first job. A problem with our sample is that 457 respondents (15.2%) still study, mostly at the university level. However, SONAR-researchers decided to interview at 23 to minimise recall error. A second interview at the age of 26 will provide the data on labour market entry for this group. As a consequence, the data on the first job are not a random sample for the highly educated. Another 119 respondents (3.9%) never had a first job. This reduces our

subsample to 2439 respondents. Of this subsample 44.6% were still working in their first job, 46.1% in another job and 9.3% were unemployed at the time of the survey. For an extensive description of the data, we refer to SONAR (2000).

While most studies have to rely on a single measure of mismatch, we assess over- and undereducation relying on the two subjective definitions and the job analysis method. Using more than one indicator enables us to test the robustness of our results. Few European studies make use of the job analysis method. In the SONAR survey, jobs are specified by the Standard Job Classification of 1992 of the Dutch CBS[8]. This classification is based on five functional levels: elementary, lower, medium, higher and scientific. This enables us to compute an objective measure (OV1). Some problems are apparent with the estimation of required education. Firstly, we have to choose between years of schooling and educational standards for the measurement of educational human capital. Although most U.S. research relies on years of schooling, we follow other European studies (see e.g. Dolton & Vignoles (2000)) and opt for educational standards. Given the complexity of the Flemish educational system (see Appendix A), years of education would be an oversimplified approximation of educational human capital. Secondly, the translation of the different educational standards into functional levels is not evident. Although international standards like ISCED and CASMIN have been developed, they have their drawbacks (see e.g. Kerckhoff & Dylan (1999)). In Appendix B, we report our translation of the different educational standards into the different functional levels. Broadly, they correspond to the following educational levels: primary, lower secondary, higher secondary, lower tertiary and higher tertiary education. Someone is defined to be overeducated according to our first measure (OV1) if his educational level is higher than the educational level of the job.

For our second measure (OV2), required education is based on the question: 'To get your job, what educational level were you required to have?'[9]. To ensure comparability of the two approaches, we group these levels into the same five educational classes as for the objective measure. Again, someone is defined to be overeducated according to our second measure (OV2) if his educational level is higher than the required level for his job. Since

this measure is based on the level needed to get the job and not on the level to do the job, this measure may be highly sensitive to the situation on the labour market. The direct self-assessment measure (OV3) is derived from the answers to the question: 'Do you have a level of education which is according to your own opinion too high, too low or appropriate for your job?'. Along with the problems already stated, another problem with this measure may be that it is influenced by the adapted expectations of what maximum job level the worker thinks he can acquire and his satisfaction of this level. Due to the numerous drawbacks of the measure based on realised matches, we do not compute a second objective measure.

Relying on the different theories we have already formulated some hypotheses. We formulate some additional hypotheses concerning the measurement of overeducation:

H10: The measure based on job analysis delivers the most consistent results.

H11: The results for the measure based on indirect self-assessment are biased by the selection and screening behaviour of the employer.

H12: Overeducated workers occupy more complex jobs than their appropriately educated colleagues at the same job level.

IV. Overschooling among Flemish labour market entrants

The overschooling figures are reported in table 1. The results show large differences among the different measures. Overschooling for the first job varies from 25.8% for the third measure (OV3) to 53.7% for the objective measure (OV1), while the second measure (OV2) lies somewhere in between with 44.7% overschooled. This contradicts the results from the meta-analysis of Groot et al. (2000) which suggest that there are only small differences between these three measures. However, the results are more in line with those from Groeneveld (1997) who also computes overschooling based on these three measures for a database of Dutch workers. She also finds that the percentage of overschooled based on job analysis (30.7%) is more than twice that based on the first subjective measure (13.4%), while according to the second subjective measure 19.3% is overschooled.[10] Also

for undereducation different results are found. The declining group of overeducated at the age of 23 is in line with the existing literature, showing a negative relation between age and overeducation. Together with the higher undereducation at 23, this suggests that experience is a determining factor for the mismatch status of a worker.

***Table 1**: Mismatch in the Flemish youth labour market*

	OV1		OV2		OV3	
	First job	At 23	First job	At 23	First job	At 23
Overeducated	53.7%	48.3%	44.7%	37.5%	25.8%	15.9%
Adequately educated	42.0%	46.2%	52.6%	58.5%	68.5%	77.9%
Undereducated	4.3%	5.5%	2.7%	3.9%	5.6%	6.6%

***Table 2**: Educational and job levels in the first job*

	Job level (OV1)					
	elementary	Lower	Medium	higher	Scientific	total
< LS	37	28	12			77 (3.4%)
LS	55	63	16			134 (5.9%)
HS	274	516	387	34		1211 (53.5%)
LT	10	56	183	362	6	617 (27.3%)
HT	5	9	40	77	92	223 (9.9%)
Total	381 (16.8%)	672 (29.7%)	638 (28.2%)	473 (20.9%)	98 (4.3%)	
	Job level (OV2)					
	<LS	LS	HS	LT	HT	total
< LS	64	6	3	1		74 (3.4%)
LS	114	12	5	1	1	133 (6.0%)
HS	651	63	425	33	1	1173 (53.2%)
LT	60	6	45	482	9	602 (27.3%)
HT	14	1	9	19	180	223 (10.1%)
Total	903 (41.0%)	88 (4.0%)	487 (22.1%)	536 (24.3%)	191 (8.7%)	
	OV3					
	Undereducated		Adequately educated		Overeducated	
<LS	14.7%		68.0%		17.3%	
LS	6.8%		61.7%		31.6%	
HS	6.8%		62.0%		31.2%	
LT	3.4%		78.8%		17.7%	
HT	1.3%		73.2%		25.4%	
Total	5.6%		67.9%		26.5%	

Note: For the OV1 and OV2 measure, every entry indicates for a given educational level the number of respondents in our sample that work at a given job level, measured by the two measurement methods. For the OV3 measure, every entry indicates for a given educational level the percentage of under-, adequately or overeducated in our sample.

To gain more insights into our mismatch figures, we relate in table 2 educational levels to job levels (OV1), required education (OV2) and overeducation according to the OV3 measure. As can be observed, overeducation according to the OV1 measure is largely the result of the relatively large group of elementary and especially lower level jobs in comparison with a majority of individuals who leave school with a higher secondary degree. Undereducation is mainly concentrated among those with less than a lower secondary diploma. For the OV2 measure, overeducation results from the large group of jobs for which no or less than a lower secondary diploma was required to get the job and the large group with a higher secondary diploma. Finally, for the OV3 measure, undereducation is as expected negatively related with schooling level. However, overschooling is concentrated among those with a lower and higher secondary education, as with the OV2 measure. This is an indication that reported mismatch may be influenced by the required education to get a job.

Since our second measure (OV2) is based on the educational level asked by employers, it is more an indication of what sociologist call the credential gap. This is the difference between the acquired qualifications and the qualifications demanded by the employer (Pollet et al. (1999)). If we suppose that jobs are rightly classified by job analysis, we can gain more insights into the selection behaviour of employers, by comparing the job level with the level asked. Dolton & Silles (2001) use this as an indicator for qualification inflation and deflation[11]. For an elaborated analysis of the differences between job level and required education, we refer to Appendix C.

***Table 3**: Qualification inflation & deflation and mismatch*

	OV1			Total
	Undereducated	Adequately educated	Overeducated	
Qual. Deflation	10.9%	33.0%	56.1%	30.3%
Good level	1.5%	65.4%	33.1%	46.9%
Qual. Inflation	1.0%	5.5%	93.5%	22.8%

The results in table 3 indicate that in 22.8% of the cases the minimum level asked during selection was higher than the level of the job. This qualification inflation is mainly concentrated among those with a higher secondary and lower tertiary diploma (see

Appendix B). This may be due to employers who respond to the higher supply of schoolleavers with a higher secondary and lower tertiary diploma by increasing the educational levels to get a job. In 93.5% of the cases this qualification inflation also resulted in overeducation. In still 33.1% of the entry jobs for which the right educational level was asked, someone with a higher level of education was recruited and for the 30.3% of the cases for which a lower than normal educational level was asked, even 56.1% still led to overeducation. These last figures can mainly be explained by the combination of a large group of jobs at the lower and medium level for which no requirements were asked and the relatively small group who enters the labour market without a secondary diploma (see Appendix C). Globally, these results indicate that overschooling is the result of the vacancy profile as well as the effective recruitment by the employer.

V. Estimation method

In the literature so far most attention went to the relationship between mismatch and earnings. Far less attention has been given to the investigation of differences in mismatch themselves. Exceptions are Battu et al. (1999) and Dolton & Silles (2001) for UK graduates and Groot (1996) and Sloane et al. (1999) and Alba-Ramírez (1993) for all educational levels in the UK and Spain respectively. In this section we try to contribute to this literature by investigating what determines overeducation in the first job. Suppose we have n observations of matches i of individuals with educational level E_i and jobs with job level J_i, resulting from supply and demand behaviour in the labour market. The overeducation status (OV_i) of a match i could be defined as:

$$OV_i = E_i - J_i \qquad (1)$$

If we retake table 2, then the combination of the 5 job levels and 5 educational levels delivers 25 cells. Then, a match i has probability P_{ej} of having an educational level E_i

and a job level J_i. We could test the former equation by running a multinomial logit that estimates the probability of each combination of attained level E_i with required level J_i in comparison with the probability of a reference combination, e.g. P_{33}, based on individual characteristics X and job characteristics F that determine mismatch. However, there are some problems with this estimation. Estimation based on our OV3 measure is not possible as we have no job levels for this measure. Further, for the two other measures, some cells are empty or have extremely low frequencies (cf. table 2), mostly due to the small proportion of undereducated schoolleavers. Instead, we estimate the probability of being overeducated with as reference the probability of being adequately educated (when $E_i = J_i$) or undereducated (when $E_i < J_i$). So we have:

$$\begin{cases} OV_i = 1 \Leftrightarrow E_i > J_i \\ OV_i = 0 \Leftrightarrow E_i \leq J_i \end{cases} \qquad (2)$$

For this estimation, we restrict our sample to the 2201 non self-employed with a job in Flanders (Brussels including). We do the estimations for each of our three measures of mismatch. Note that for the OV1 and OV2 measures someone with the lowest educational level can not be overeducated. Therefore, we have to restrict our sample to the four highest educational levels for these two measurement methods. Our estimation method is binary logit estimation. A first group of theories concentrate on individual characteristics and explain why two individuals with the same educational level fill jobs with different required levels. Therefore, the first equation we estimate for our three measures is of the following form:

$$Log\left[\frac{P(OV_i = 1)}{P(OV_i = 0)}\right] = CONSTANT_1 + a_1 X_i + b_1 E_i + e_{1i} \qquad (3)$$

Along with educational levels (E_i), we control for other individual characteristics (X_i) as ethnicity and gender. We make a distinction between singles and cohabitants to test for Frank‘ s theory of differential overqualification. This status is measured at the beginning

of the first job. We control for ethnicity by including a dummy that takes the value one if the grandmother at the mother' s side has a non-European nationality. To control for the search intensity of the job seekers, we include a variable 'search behaviour' that measures the moment at which an individual has begun his search for a job in relation to the moment of leaving school. Furthermore, the unemployment duration between labour market entry and the beginning of the first job is included. The influence of this variable on overeducation may be positive if this duration is used by employers as a signal for capacities. As individuals stay unemployed longer, they may also be forced to accept a job below their educational level. However, this positive influence may be counteracted by the lengthening of the search period. The probability of finding an appropriate job could be enhanced if one is prepared to accept a job outside one's region. So, we include a dummy that equals one if the first job is outside one's province. Dummies for the different regions are included to control for differences in local labour market conditions.

Specification (3) is quite restrictive since it assumes that the coefficient of each independent variable is the same for all cells below the diagonal. The influence of variables such as search behaviour or gender may however be different for the various educational levels. Therefore, we introduce interaction terms of the different schooling levels with the other independent variables. Furthermore, we control for differences in study results, educational subjects and extra educational years and diplomas. The availability and definitions of these variables differ for the various educational levels. Therefore, we introduce some extra interaction terms for the different educational levels. For those with a higher secondary degree, we control for the type of education and for those who obtained their degree in part-time education. We include dummies for those who followed a seventh year of secondary education or extra part-time education, for those with an extra vocational degree and for those who passed at least one year in tertiary education, but never ended their studies. We introduce an interaction term for the higher educated with their study results in the last year of higher education. For those with a lower tertiary diploma, we control for the educational subject and include a dummy for those who passed an extra year in another study field but never ended these studies. For

those with a higher tertiary degree, we control for the educational subjects and include a dummy for individuals with a university diploma.

A second group of theories concentrates on job characteristics and explains why two jobs with the same level are filled by individuals with different educational levels. So, we also estimate the following equation, based on job levels (J_i). As we have no job level data for our third measure (OV3), we could only do this estimation for the first two measures.

$$Log\left[\frac{P(OV_i = 1)}{P(OV_i = 0)}\right] = CONSTANT_2 + a_2 F_i + b_2 J_i + e_{2i} \qquad (4)$$

The job characteristics for which we control (F_i) are firm size and sector variables. The inclusion of industry dummies and firm size could test for the theory of van der Meer & Wielers (1996). Furthermore, we include dummies for type of contract and dummies for technical, clerical and socio-cultural professions. Overeducation may simply result from mismeasurement, due to different job complexity within occupations. To test for this we also estimate equations with the inclusion of dummies for different job skills needed in the job. The job skills included are leadership skills, foreign language skills, mathematical skills, computer skills and communication skills.

As already stated, our OV2 measure may be a rather incomplete measure of mismatch since it is biased by the specific selection behaviour of the employer. If we make a distinction between the level asked for a job and the job level, we could test for qualification inflation and deflation. With the objective level (J_i^{JA}) and the required level (J_i^R), we define Qualification Inflation (QI_i) as:

$$\begin{cases} QI_i = 1 \Leftrightarrow J_i^R > J_i^{JA} \\ QI_i = 0 \Leftrightarrow J_i^R = J_i^{JA} \\ QI_i = -1 \Leftrightarrow J_i^R < J_i^{JA} \end{cases}$$

To test for qualification inflation, we estimate an ordered probit model. For the modelling of the ordered probit, we refer to Davidson & MacKinnon (1993). This estimation also helps evaluating the hypothesis that the OV2 measure is biased by selection and screening behaviour (H10). Along with the objective job level (J_i^{JA}), the other job characteristics for which we control (F_i) are the job location, sector, firm size, professions and type of contract. Again, we restrict our sample to the 2201 non self-employed with a first job in Flanders. Furthermore, we also estimate an equation including job skills dummies. In this interpretation, we test for deviations of the OV2 job levels (J_i^R) from the OV1 job levels (J_i^{JA}). For definitions of all explanatory variables, we refer to Appendix B.

VI. The determinants of overeducation: Individual characteristics

The estimation results are reported in table 4. Depending on the overschooling measure, results differ substantially. Globally the results for the OV1 measure (equation (1)) are most consistent with our intuition. As already motivated, we also consider our OV1 measure to be the most appropriate measure for mismatch. Therefore we start our discussion from this measure and then try to explain differences with the other measures. Interactions are included for the lower and higher tertiary educational level with gender, search behaviour, unemployment duration, mobility and province[12]. Only for the measure based on job-analysis this significantly improved the Log Likelihood.

The results for the educational levels are difficult to interpret, since they should be analysed together with the results for their interactions with the other variables. Therefore, we also computed some probabilities (see Appendix D). These probabilities do not only largely diverge between but also within the educational levels[13]. The results suggest that being higher educated not necessarily leads to a higher probability of being overeducated. For the OV2 and OV3 measure, the lower educated have the highest probability of being overeducated in the first job. For the OV1 measure, the results are less clear and highly depend on educational subjects and other interaction variables. Furthermore, these results

should be interpreted carefully since part of the explanation could lie in differences in the business cycle. The improving macro-economic situation over the nineties partly explains the advantageous situation for the higher educated, since they entered the labour market at the end of the decade.

The results for gender are in line with Frank' s theory for the OV1 measure[14]. Cohabiting women have a higher probability of being overeducated. However, this was not found for the other two measures. The results for the OV3 measure may indicate that women not only adapt their career opportunities in function of their husband' s but are also satisfied with this implied lower job level. Clark (1997) found, even after controlling for a large number of job and individual characteristics, that women are more satisfied with their job than men. Based on the SONAR data, this was also found in Verhofstadt et al. (2001). The results for the OV2 measure are hard to explain. As for the interaction effects in equation (1), note that the effect from gender on the probability of being overeducated is even larger for school leavers with a lower tertiary diploma. On the other hand, women with a higher tertiary diploma have a lower probability of being overeducated in comparison with men. Further, it seems that non-Europeans have a higher probability of being overeducated. However, these results are never significant and for the OV3 measure, the opposite is found. The small proportion of non-Europeans in our sample may explain the insignificance of these results.

The moment that an individual starts searching for a job seems crucial for the quality of the match. Someone who starts his search behaviour after he leaves school has a significantly higher probability of being overschooled. This result holds for the three measures. It is especially true for the lower educated and holds far less for those with a tertiary diploma. For the OV1 and OV2 measure, there is a small, insignificant influence of the duration of unemployment before the first job on the probability of being overeducated. A positive influence is in line with the hypothesis that unemployment creates a negative signal for the employer and forces an individual to accept a job below his educational level. However, we again find opposite results for the OV3 measure. The opposite results for the OV3 measure may just reflect that, the longer one is unemployed,

the more one is prepared to accept a lower job level and the more one is satisfied with that level. Furthermore, results differ for individuals with a lower tertiary education.

The results for the geographic mobility variable are not straightforward either. Although the coefficients have the expected negative sign, we find no clear evidence that accepting a job outside the province of residence improves the match. The effect is slightly significant only for the OV2 measure and rather small for the OV1 measure. A person may be mobile because he is less satisfied with a certain job level, what can explain the different results. Furthermore, the opposite is found for those with a diploma of university level. This opposite effect may result if those with unobserved inferior characteristics are forced to search for a job outside the residential region. Therefore, it may be better to control for the willingness to accept a job outside one' s region instead of effective geographical mobility itself. While we find differences among the various regions, these differences are not consistent among the measures and schooling levels. These results may be influenced by particular labour market developments in the different regions[15].

The variables which control for differences in study results, educational subjects and extra educational years and diplomas seem highly relevant in explaining differences in overeducation. The results for the OV1 and OV2 measure are largely similar. The OV3 regression shows some different results, which can be explained by the way that this measure is computed. Those with a technical secondary diploma have the smallest probability of being overeducated. This is not surprising since general secondary education is not directed to labour market entry but rather prepares for tertiary education. However, for the OV3 measure, we find the lowest probability of being overeducated among those with a vocational degree. This results from the disadvantage of direct self-assessment techniques to leave the interpretation of educational level to the opinion of the respondent. So, a general degree may be seen as of a higher and a vocational degree as of a lower level in comparison with a technical degree. Also for school leavers from the lower tertiary education, the educational subjects play a significant role in explaining overeducation.

***Table 4**: Logit estimates of the probability of being overeducated: individual characteristics*

	OV1 (1)	OV2 (2)	OV3 (3)
Constant	0.237	-0.069	-1.731 ***
Non-European	0.193	0.238	-0.008
Educational level			
Lower secondary	-1.481 ***	1.053 ***	0.193
Higher secondary (ref.)			
Lower tertiary	-3.736 ***	-3.547 ***	-2.334 ***
Higher tertiary	0.166	-2.558 **	-1.820 *
Sex/status			
Women (coh.)	0.669 *	-0.213	0.170
Women (single)	0.258 *	0.240 *	-0.104
Man (ref.)			
Women (coh.)*LT	0.213	0.381	-0.407
Women (single)*LT	0.515 *	-0.337	0.046
Women (coh.)*HT	-1.022	1.078	0.409
Women (single)*HT	-0.880 **	-0.462	-0.125
Search behaviour			
> 1 month before (ref.)			
< 1 month before	0.428 *	0.472 **	0.451
< 1 month after	1.021 ***	0.732 ***	1.060 ***
> 1 month after	1.050 ***	0.781 ***	1.121 ***
Immediately working	0.378	0.091	0.559 *
Don't know, never searched	0.517 *	0.682 **	0.240
< 1 month before*LT	-0.425	-0.638	0.299
< 1 month after*LT	-1.039 ***	-0.642	-0.384
> 1 month after*LT	-0.754 *	-0.613	-0.257
Immediately working*LT	0.606	0.001	-0.385
Don't know, never searched*LT	-1.031 *	-0.983	-1.262
< 1 month before*HT	-0.164	-0.697	-0.385
< 1 month after*HT	-0.998 *	-0.755	-0.554
> 1 month after*HT	-0.540	-0.204	-0.349
Immediately working*HT	-0.652	-0.091	-1.583
Don't know, never searched*HT	-0.495	-1.224	-0.296
Unemployment duration	0.006	0.002	-0.015 *
Unemployment duration*LT	0.014	0.020	0.042 **
Unemployment duration*HT	0.012	-0.044	-0.010
Geographical mobility	-0.233	-0.356 *	-0.057
Geographical mobility*LT	-0.039	0.349	-0.118
Geographical mobility*HT	0.835 **	0.650	0.441
Province			
Oost-Vlaanderen (ref.)			
West-Vlaanderen	0.008	0.514 **	-0.098
Limburg	0.189	0.761 ***	0.403 *
Antwerpen	-0.157	0.212	0.136
Brabant	-0.032	0.008	-0.082

West-Vlaanderen*LT	-0.493	0.048	0.096
Limburg*LT	0.118	-0.411	0.315
Antwerpen*LT	0.532	0.536	0.389
Brabant*LT	0.228	0.171	0.227
West-Vlaanderen*HT	-0.891 *	-0.171	0.313
Limburg*HT	-1.357 **	-1.536 *	-0.248
Antwerpen*HT	0.158	0.316	0.597
Brabant*HT	0.076	-0.524	-0.188
Interaction Higher Secondary			
Type of education			
General	0.051	0.280	1.147 ***
Technical	-0.519 ***	-0.424 ***	0.418 **
Art	-0.045	0.628	1.113 **
Vocational (ref.)			
Part-time education	0.538 **	0.678 **	-1.002 ***
Extra part-time education	-0.486	-0.391	-0.409
Seventh year	-0.389 **	-0.589 ***	-0.088
Fourth vocational degree	-3.954 ***	-3.099 ***	-1.923 **
Higher education (not finished)	-0.497 **	-0.544 **	0.210
Interaction Tertiary Education			
Study results (last year)			
Sufficient	1.144 ***	1.377 ***	1.184 ***
Distinction	0.809 ***	1.205 **	0.780 *
Great distinction (ref.)			
Interaction Lower tertiary			
Extra year	0.394	0.264	0.765
Educational subjects			
Health care	0.279	-0.338	0.033
Commercial, business administr.	2.782 ***	0.939 ***	1.123 ***
Social	1.273 ***	0.506	0.752 *
Technical, scientific	2.555 ***	0.828 **	1.595 ***
Teaching (ref.)			
Interaction Higher Tertiary			
Educational subject			
(Applied) science/ (para) medical	-0.585	-0.624	0.065
Cultural/ social	0.279	0.528	0.833 *
Economics / law/ administr. (ref.)			
At university	-1.200 ***	-0.528	0.106
-2LL	2198.4	1978.4	1967.3
Chi² Final (61)	443.9 ***	638.3 ***	244.0 ***
Chi² Final – Reduced (26)	55.7 ***	27.0	21.5
N	2087	2029	2062

*: significant at the 10% level, **: significant at the 5% level, ***: significant at the 1% level;
LT = Lower Tertiary, HT = Higher Tertiary, EL = Educational Level;

Better study results in tertiary education strongly reduce the probability of being overeducated for the three measures. Having a diploma from university in comparison with a non-university institution significantly decreases the probability of being overeducated according to the OV1 measure. Additional years of education after the completion of higher secondary education also decrease the probability of being overeducated according to the OV1 and OV2 measures. Only having a part-time degree increases this probability. For the OV3 measure, these effects diminish strongly or go in the opposite direction. Theoretically, different explanations for these findings are possible. Individuals with extra diplomas and better study results may have acquired more skills or simply be more able. Employers may also use extra diplomas and better study results as a signal for ability or trainability. The results for the OV1 measure indicate that individuals assess these diplomas and extra educational years as improving their skills and leading to a higher educational level.

VII. The determinants of overeducation: Job characteristics

The results for the determinants of overeducation are reported in table 5, while those for qualification inflation and deflation are reported in table 6. As expected, overeducation is negatively related to required education. Furthermore, the results indicate that qualification inflation is mainly concentrated among elementary and medium level jobs. As already explained, this may result from the high proportion of individuals who leave school with a secondary and tertiary diploma.

Based on the OV2 measure, we find that part-time workers and those with temporary contracts have a higher probability of being overeducated, although this is not significant. This could be explained as if on-the-job training and formal education are substitutes. However, based on the OV1 measure, we find a non-significant negative influence. A more plausible explanation for the OV2 results could be that, like overeducated workers, part-time and temporary workers are individuals who are forced to accept those jobs because of their unobserved inferior characteristics. This hypothesis is confirmed by the

answers to questions about the reason for accepting a part-time job or temporary contract. By far the most frequently mentioned reason is that they could not find a full-time or permanent job[16]. The results for qualification inflation and deflation are in line with this hypothesis. Employers seem to lower their educational requirements for part-time jobs, because these jobs are less attractive. Also Dolton & Silles (2001) found no effect from part-time employment in the first job on the probability of overschooling. However, they found a positive effect in the current job. Sloane et al. found a significant negative effect of part-time unemployment on the probability of undereducation for women.

Socio-cultural professions have a significantly higher probability of being performed by individuals with a higher than necessary educational level. Furthermore, there is significantly more qualification inflation for these jobs. This is not surprising given the relatively large group that has a degree in a related field of study in comparison with the number of jobs for these professions. These positive results are also found for clerical professions. The opposite results for technical professions are in line with the difficulties for filling in vacancies for these jobs. This leads to significant lower qualification inflation. We also find significant differences in overschooling and qualification among the different regions. However, as with the results for individual characteristics, we have no clear explanation.

The results based on the OV1 measure are in line with the theory of van der Meer & Wielers (1996) since overschooling is mainly concentrated in large firms. For the OV2 measure, no significant effect is found. However, if the required educational level underlying the OV2 measure mainly reflects the selection behaviour of firms, this does not contradict the theory since more overschooling in large firms results from higher asked educational levels for jobs with the same job level. Another explanation may be that larger firms are more attractive as they deliver more career opportunities and in general pay higher wages. The results for qualification inflation and deflation are in line with the findings for overschooling. It may indicate that large firms indeed set higher educational requirements, as a consequence of their greater attractiveness or their organisational structure.

***Table 5**: Logit estimates of the probability of being overeducated: job characteristics*

	OV1		OV2	
	(1)	(2)	(3)	(4)
Constant	-0.035	-1.020 ***	-2.936 ***	-3.552 ***
Job Level				
Elementary	3.099 ***	3.824 ***	5.280 ***	5.652 ***
Lower	2.845 ***	3.368 ***	4.054 ***	4.370 ***
Medium				
Higher	-1.356 ***	-1.627 ***	-1.627 ***	-1.824 ***
Part-time contract	-0.132	-0.074	0.121	0.188
Temporary contract	-0.077	-0.090	0.214	0.221
Profession				
Socio-cultural.	1.471 ***	1.299 ***	2.504 ***	2.121 ***
Clerical	0.784 ***	0.374 *	1.633 ***	1.160 ***
Technical	-0.820 ***	-0.680 ***	-0.246	-0.260
Firm size				
Large (ref.)				
Medium	-0.364 **	-0.268	0.127	0.152
Small	-0.772 ***	-0.719 ***	-0.044	0.028
Unknown	-1.006 ***	-0.948 ***	-0.491	-0.337
Sector				
Industry (ref.)				
Primary	-0.933 *	-0.674	-1.414 **	-1.180 *
Construction	-0.032	-0.049	0.026	0.041
Commerce	-0.186	-0.310	-0.413	-0.466
Catering	-0.322	-0.407	-0.229	-0.507
Transp. & commun.	-0.415	-0.712 **	0.187	-0.086
Finance	0.518	0.282	-1.307 **	-1.538 **
Prof. Services	0.091	-0.120	-0.282	-0.401
Government	-1.353 ***	-1.484 ***	-1.223 **	-1.208 **
Education	-1.110 ***	-1.061 ***	-0.096	-0.336
Health care	-0.632 **	-0.378	-0.466	-0.469
Other services	-0.406	-0.294	0.098	-0.076
Unknown	-0.326	-0.264	0.266	0.173
Region of Employment				
Oost-Vlaanderen (ref.)				
West-Vlaanderen	0.155	0.218	0.687 **	0.667 **
Limburg	0.002	0.052	0.231	0.242
Antwerpen	-0.156	-0.158	-0.045	-0.035
Brabant	0.480 **	0.400 *	0.547 *	0.457
Job Skills				
Leadership skills		-0.378 **		0.257
Foreign language skills		0.585 ***		0.479 *
Mathematical skills		0.222		0.060
Computer skills		1.038 ***		0.780 ***
Communication skills		0.080		0.070
-2LL	1338.6	1531.4	760.8	843.8
Chi²	1106.1***	1169.6***	1754.2***	1757.0***
N	2068	2047	1921	1904

*: significant at the 10% level, **: significant at the 5% level, ***: significant at the 1% level.

***Table 6**: Ordinal probit estimates of the probability of qualification inflation and deflation*

	(1)			(2)		
Treshold						
Qualification deflation (-1)	-1.199	***	(0.133)	-0.705	***	(0.153)
Good level (0)	0.199		(0.131)	0.750	***	(0.153)
Job level						
Elementary	0.150		(0.099)	0.418	***	(0.105)
Lower	-0.498	***	(0.070)	-0.363	***	(0.072)
Medium (ref.)						
Higher	-0.243	***	(0.084)	-0.398	***	(0.086)
Scientific	-0.457	***	(0.135)	-0.702	***	(0.138)
Part-time contract	-0.272	***	(0.069)	-0.239	***	(0.070)
Temporary contract	-0.053		(0.057)	-0.013		(0.058)
Profession						
Socio-cultural	0.266	*	(0.154)	0.131		(0.156)
Clerical	0.037		(0.088)	-0.211	**	(0.093)
Technical	-0.397	***	(0.095)	-0.336	***	(0.097)
Firm size						
Large (ref.)						
Medium	-0.150	**	(0.071)	-0.122	*	(0.072)
Small	-0.261	***	(0.083)	-0.215	**	(0.084)
Unknown	-0.239	*	(0.131)	-0.139		(0.134)
Sector						
Industry (ref.)						
Primary	-0.947	***	(0.263)	-0.876	***	(0.268)
Construction	0.221	*	(0.119)	0.275	**	(0.122)
Commerce	-0.295	***	(0.088)	-0.342	***	(0.090)
Catering	-0.209		(0.140)	-0.256	*	(0.143)
Transport & communication	-0.225	*	(0.127)	-0.356	***	(0.129)
Finance	0.515	***	(0.153)	0.401	***	(0.154)
Prof. Services	0.181	*	(0.106)	0.126		(0.108)
Government	-0.005		(0.166)	-0.013		(0.169)
Education	0.045		(0.131)	0.075		(0.134)
Health care	0.124		(0.110)	0.239	**	(0.113)
Other services	-0.317	**	(0.156)	-0.304	*	(0.158)
Unknown	-0.488	***	(0.179)	-0.461	**	(0.010)
Region of employment						
Oost-Vlaanderen (ref.)						
West-Vlaanderen	-0.163	**	(0.080)	-0.157	*	(0.081)
Limburg	-0.220	**	(0.089)	-0.202	**	(0.091)
Antwerpen	-0.106		(0.073)	-0.111		(0.074)
Brabant	0.107		(0.080)	0.087		(0.082)
Job Skills						
Leadership skills				-0.098		(0.062)
Foreign language skills				0.152	**	(0.062)
Mathematical skills				0.238	***	(0.058)
Computer skills				0.496	***	(0.067)
Communication skills				0.106		(0.071)
-2LL	3321.9			3763.9		
Chi^2	328.2***			448.7***		
N	2098			2081		

*: sign. at the 10% level, **: sign. at the 5% level, ***: sign. at the 1% level; Standard errors in parenthesis

We measure significant differences among individuals who work in different sectors. According to the OV1 measure, workers in the primary, transport & communication, government, education and health care sectors have a significantly lower probability of being overeducated than workers in industry. The sector part of the theory of van der Meer & Wielers (1996) is not clearly confirmed. Although workers in the financial sector have a higher probability of being overeducated, this is not significant. However, there is significantly more qualification inflation in the financial sector. The results for the government, education and health care sectors reflect the recruitment behaviour in these sectors that is highly institutionally determined. The results for qualification inflation and deflation can be explained by labour market developments. The less than necessary educational levels asked in commerce, catering and transport and communication reflect difficulties by these sectors to fill their vacancies. The same holds for the primary sector where working conditions are less attractive.

Including the job skills dummies in the overschooling equations (equations (2) and (4), table 5) has no large repercussions on these results. Furthermore, for both measures, the overschooled need significantly more computer and foreign language skills in their job. These results suggest that part of overeducation according to the OV1 and OV2 definition results from mismeasurement, due to different job complexity within occupations. However, we find opposite results for leadership skills in case of the OV1 measure. The conclusion that overschooled workers need more computer skills in comparison with their colleagues at the same job level is in line with the technology hypothesis. Furthermore, also globalisation seems to make jobs more complex by the need for more foreign language skills. The results of the qualification inflation equation (equation (2), table 7) indicate that employers partly count for the need of computer, foreign language and mathematical skills, when they set the acquired educational level for the job. Again, we find opposite results for leadership skills.

VIII. Summary and conclusions

The main focus of this paper is to measure under- versus overeducation among Flemish labour market entrants and to examine what determines this mismatch. We make use of 3 measures, respectively based on job analysis, on indirect self-assessment of the required level to get the job and on direct self-assessment. This makes it possible to test for the robustness of the results and delivers also some interesting insights into the validity of the measures themselves. Following the discussions of the different theories and measurement methods, we formulated some hypotheses. The following conclusions are made:

(1) The scope of overeducation is highly sensitive to the measurement method and varies for the first job from 26% based on direct self-assessment to 54% based on job analysis. This sensitivity has to be taken in mind when results are interpreted.

(2) Looking for the determinants of this mismatch, the results differ for the various measurement methods. The results for the measure based on job analysis are most in line with our expectations. Given the shortcomings of the two other measures, this is not surprising (H10).

(3) As expected, the results for our measure based on indirect self-assessment seem to be biased by the selection and screening behaviour of the employer (H11).

(4) Our results indicate that part of the measured overschooling results from different job complexity (H12). Workers who are overeducated by the job analysis measure and to a lesser extent by the indirect self-assessment measure occupy more complex jobs since they need more computer skills in their job. This is in line with the technology hypothesis (H6). Furthermore, workers who are overeducated according to the job analysis measure need also more foreign language skills.

(5) More schooling does not necessarily lead to a higher probability of overeducation. Furthermore, the determinants of being overeducated differ for the various educational levels.

(6) Along with the findings in literature, the overeducation figures decrease with age (H1).

(7) Better study results in the last year of higher education largely reduce the probability of being overeducated (H2).

(8) We find no evidence that part-time and temporary employment increases the probability of overeducation in the first job (H3).

(9) We have no clear evidence that cohabiting women have a higher probability of being overeducated (H4).

(10) As expected, overschooling is less concentrated in occupations and industries that have difficulties to fill their vacancies (H5)).

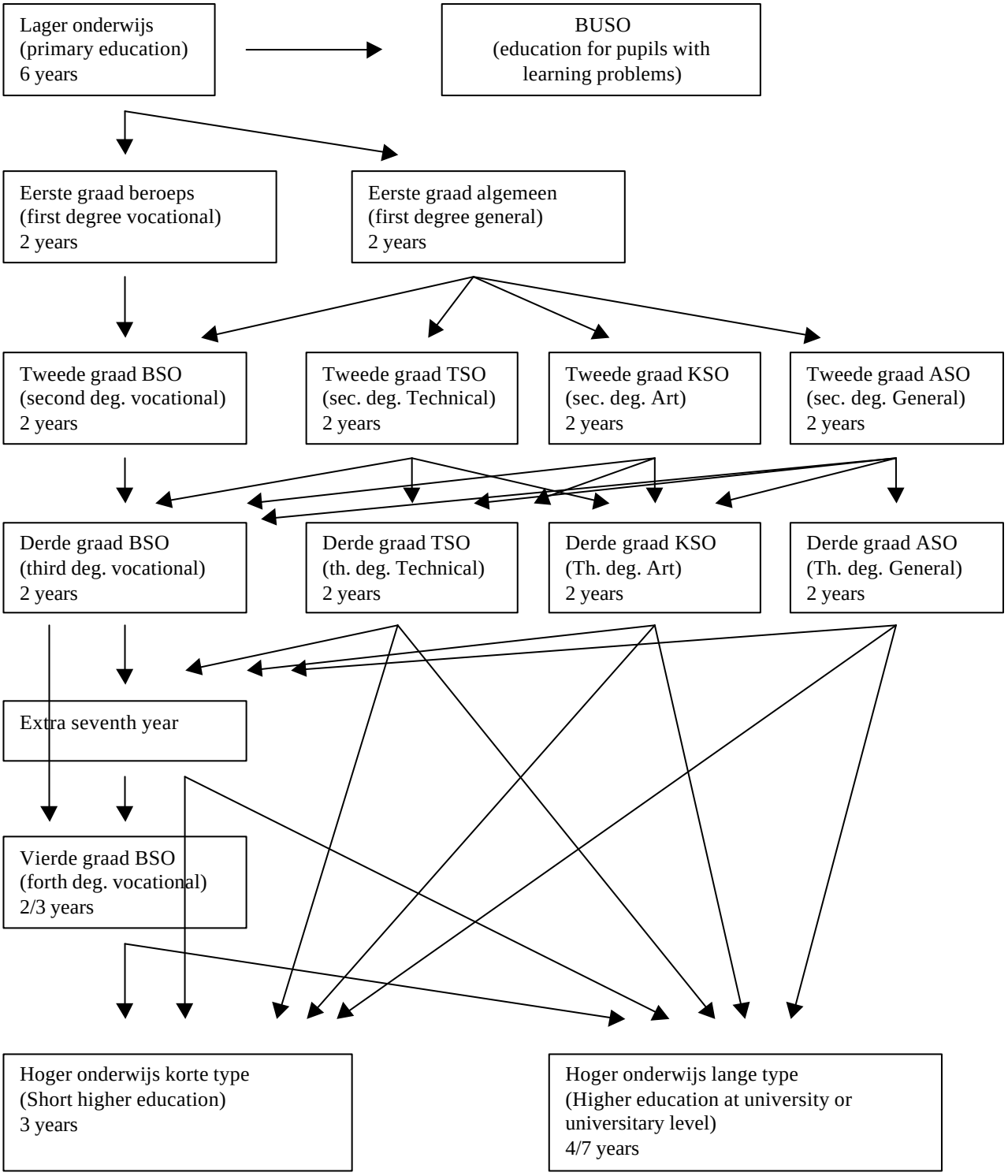
(11) In line with van the educational credential hypothesis, jobs in large firms are more filled with overschooled workers (H7). The evidence for the financial and professional services sector is less clear.

(12) We find strong evidence that search intensive individuals have a lower probability of being overeducated (H8). This is especially true for the lower educated.

(13) School leavers with a job outside the residential region do not have a lower probability of being overeducated (H9).

Some of these results simply confirm the robustness over the different measures of previous findings in the overeducation literature. Others are new and invite for more focussed research.

Appendix A


Lager onderwijs
(primary education)
6 years
BUSO
(education for pupils with
learning problems)
Eerste graad beroeps
(first degree vocational)
2 years
Eerste graad algemeen
(first degree general)
2 years
Tweede graad BSO
(second deg. vocational)
2 years
Tweede graad TSO
(sec. deg. Technical)
2 years
Tweede graad KSO
(sec. deg. Art)
2 years
Tweede graad ASO
(sec. deg. General)
2 years
Derde graad BSO
(third deg. vocational)
2 years
Derde graad TSO
(th. deg. Technical)
2 years
Derde graad KSO
(Th. deg. Art)
2 years
Derde graad ASO
(Th. deg. General)
2 years
Extra seventh year
Vierde graad BSO
(forth deg. vocational)
2/3 years
Hoger onderwijs korte type
(Short higher education)
3 years
Hoger onderwijs lange type
(Higher education at university or
universitary level)
4/7 years

Appendix B: Descriptions and definitions of variables

Educational levels

Primary	Less than a second degree secondary education or BUSO education.
Lower secondary	The highest attained level is a second degree secondary education.
Higher secondary	The highest attained level is a third degree secondary education, a seventh year secondary education or a fourth degree vocational secondary education.
Lower tertiary	A higher degree of the short type.
Higher tertiary	Higher education at university or universitary level.

Mismatch measures

OV1	Measure based on SBC classification.
OV2	Measure based on question: ’To get your job, what educational level were you required to have?’
OV3	Measure based on question: ‘Do you have a level of education which is according to your own opinion too high, too low or appropriate for your job?’

Job skills	The variable is coded 1 if the respondent totally or rather agrees. Based on the question: ’Do you totally agree, rather agree, rather disagree or totally disagree that …’
Leadership skills	In your job you need to supervise other people.
Foreign lang. sk.	In your job you need the knowledge of foreign languages.
Mathematical sk.	In your job you need the skills to calculate and deal with numbers.
Computer skills	In your job you need the skills to work with a computer.
Communication sk.	In your job you need to collaborate with other people.

Other Variables

Cohabiting	Measured at the beginning of the first job.

Non-European	Coded 1 if the respondent has a grandmother at the mother' s side with a non-European nationality.
Search behaviour	Starting point of job search with the moment of leaving school as reference.
Unemployment duration	Duration of unemployment before the start of the first job.
Geographical Mobility	Is coded 1 if the individual has a job outside the residential province.
Extra year	Is coded 1 if the individual has passed at least one extra year in another study field but never ended this education.
Firm size	Small: 0-9, Medium: 10-249, Large: +250 employees
Professions:	
Socio-cultural	Language and Culture (SBC15), Behaviour & Society (SBC16)
Clerical	Economical, administration and commercial (SBC11)
Technical	Technical (SBC6)
Sector	Sector dummies based on NACE classification.

Appendix C

Required education (OV2)	Job level (OV1)					
	Elementary	Lower	Medium	Higher	Scientific	Total
< LS	324	412	139	19	2	896 (40.9%)
LS	11	40	32	5		88 (4.0%)
HS	37	165	252	31	1	486 (22.2%)
LT	2	28	162	335	8	535 (24.4%)
HT		4	28	68	87	187 (8.5%)
Total	374 (17.1%)	649 (29.6%)	613 (28.0%)	458 (20.9%)	98 (4.5%)	

Note: Every entry indicates for a given required educational level to get the job the number of respondents in our sample that work at a given job level, measured by job analysis.

Appendix D: Estimated probabilities based on individual characteristics

Overschooling Measure	OV1				OV2				OV3			
Educational Level	LS	HS	LT	HT	LS	HS	LT	HT	LS	HS	LT	HT
Reference:												
Man of European origin from Oost-Vlaand., not geog. mobile and starting job-search > 1 month before leaving school (1)*	0,224	0,559	0,029	0,599	0,728	0,483	0,026	0,067	0,177	0,150	0,017	0,028
As (1), except:												
Single women	0,272	0,621	0,061	0,445	0,773	0,543	0,024	0,055	0,162	0,138	0,016	0,022
Cohabiting women	0,360	0,712	0,068	0,512	0,684	0,430	0,031	0,147	0,203	0,174	0,013	0,049
> 1 month after	0,452	0,784	0,039	0,714	0,854	0,671	0,031	0,114	0,397	0,352	0,039	0,058
Geographic Mobility	0,186	0,501	0,023	0,732	0,652	0,395	0,026	0,088	0,169	0,143	0,014	0,040
Limburg	0,258	0,605	0,039	0,318	0,851	0,666	0,037	0,032	0,243	0,209	0,034	0,032
Sufficiently			0,087	0,824			0,096	0,223			0,053	0,086
General		0,572				0,553				0,358		
Technical		0,430				0,379				0,212		
Part-time education		0,685				0,648				0,061		
7th year		0,462				0,341				0,140		
4th vocational degree		0,024				0,040				0,025		
Commercial, business administration			0,328				0,064				0,050	
Technical, scientific			0,280				0,058				0,078	
(Applied) science/ (para) medical				0,455				0,037				0,030
Cultural / social				0,664				0,109				0,062
At university				0,311				0,041				0,031

* Additionally: for HS schoolleavers with as highest education 6th year vocational, for LT schoolleavers with great distinction in the last year and teaching education and for HT schoolleavers with great distinction in the last year and economics/law/administration education outside university;
LS = Lower Secondary, HS = Higher Secondary, LT = Lower Tertiary, HT = Higher Tertiary.

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Notes

[1] They found a positive influence of mathematics test scores on overeducation. However a negative, but insignificant influence was found for reading test scores.

[2] For an overview, see Hartog (2000).

[3] Interesting information is given by more profound research on the selection behaviour and motives of screening personnel in case studies. There are indications that educational levels are used as signals for ability. Gheldorf et al. (2000) found, on the basis of interviews with selection managers, that the higher educated were perceived to have more language and mathematical skills, be more ambitious, work independently and be better in solving problems. Pollet et al. (1998) and Gheldorf et al. (2000) also found that the lower educated were perceived to be less trainable, which is in line with job-competition theory.

[4] And, as van der Meer (2000) states, the reliability of the outcomes is as high as the worst measurement.

[5] The research of Sicherman (1991) e.g. was based on the question 'How much formal education is required to get a job like yours?'. Alba-Ramírez (1993) used answers to the question ''What kind of education does a person need in order to perform your job?', while Dolton & Vignoles (2000) used the question 'What was the minimum formal qualification required for (entering) this job?'.

[6] For a more elaborated overview of the used measures in literature, we refer to Hartog (2000) and Groot & Maassen van den Brinck (2000).

[7] More extensive discussions on the validity of the different methods are found in Hartog (2000) and van der Meer (2000).

[8] Centraal Bureau voor de Statistiek

[9] In first instance was asked whether or not a qualification was required for the job. If the answer was positive, then was informed to the educational level required to get the job.

[10] The fact that, in comparison with the results of Groeneveld (1997), our second measure lies more in the neighbourhood of the measure based on job analysis can be explained by the different questions underlying the second measure. In the study of Groeneveld (1997), the second measure was based on the question 'What educational level is, according to the management, supposed to be minimal required to do your occupation for the moment?'.

[11] Dolton & Silles (2001) derived job levels from respondents' answers on the question: 'What do you believe to be the education level required to *actually do* this job?'.

[12] Those with a lower secondary education are only a small sub sample of about 130 individuals. The removal of the interaction terms with this educational level did not lead to a significant decline of the Log Likelihood. Furthermore, we did not include interaction terms with ethnicity. In the case of the OV3 measure, we had problems with zero cell count, while for the two other measures, the inclusion of these interaction terms did not significantly improve the Log Likelihood.

[13] For example, based on job analysis (OV1), a reference person with a lower tertiary education has only an estimated probability of being overeducated of 3%. This is far less in comparison with the other educational levels. However, if we change the reference educational subject to commercial & business administration, this probability increases to 33%, what is more than the estimated probability for a reference person with a lower secondary education (22%).

[14] The significance of two coefficients is close to the 5% level (5.1% and 5.4% respectively).

[15] For example, for the OV1 and OV2 measure, there is a significant lower probability on overschooling among individuals with a higher tertiary diploma from Limburg. Limburg is in our sample the province with the lowest percentage of school leavers with a diploma of university level.

[16] Of those with a part-time first job, 63.6% reported to have accepted their job because they could not find a full-time job. Only 4.6% reported to wish a part-time job. For those with a temporary contract these figures were respectively 40.4% and 2.5%.

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