Overschooling and unemployment

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Abstract

Although overschooling is regarded as the result of imperfect allocation in the labour market, hardly any attention has been given to the influence of another imperfection, unemployment. Several researchers report about an increasing incidence of overschooling in the Netherlands. Although a lot of research has been done in the Netherlands on overschooling, this is not a phenomenon restricted to the Netherlands. Overschooling was found and measured in the United States, Germany, Spain, Portugal the United Kingdom and may be around in other Western European countries as well. Remarkably, however, is that in this line of research no attention has been paid to the effect of unemployment on overschooling. Because it can be argued that almost all unemployed are overschooled, the incidence and amount of overschooling and its rate of return should be directly affected by the unemployment rate in a country. However for the Netherlands we cannot find a relation between the unemployment rate and the amount of overschooling. The amount of overschooling is in 1998, a year with low unemployment, as high as in 1985, a year with high unemployment. After correcting the selectivity bias, caused by the unemployed, we also do not find changes in the rate of return on education, suggesting that wages in the Netherlands are rather sticky. Therefore efficiency wage theory seems to be a better candidate in explaining overschooling than a matching model as propesed by Hartog.

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1 Introduction

Since the early research into the rise of overeducation this has been regarded as the result of imperfect allocation in the labour market. Another important imperfection in the labour market which has received a lot of attention is unemployment, and although in some research these two imperfections have been studied simultaneously no attention, at least to our knowledge, has been given to the influence of unemployment on the rate of return on overschooling, yet. The research in which both types of misallocation received attention is research on processes like displacement and crowding out (i.e. Van Ours and Ridder, 1995). As a result of crowding out workers and employees become more overeducated and unemployment is concentrated at lowly educated workers. However, research into the effect of unemployment on the rate of return on the overschooled years has, to our knowledge, never been performed (cf. Hartog, 2000; Sicherman, 1991; Rumberger, 1987).

Because all, or almost all, unemployed can be regarded as overschooled, they not only affect, directly and indirectly, the incidence and amount and of overschooling, they will probably also affect the rate of return on schooling and overschooling. This means that the increases in the incidence and amount of overschooling and its rate of return as presented by Hartog (2000), Asselberghs et.al. (1998) and Van der Meer and Glebbeek (2001) could very well be different. The aim of this paper is to investigate if these developments in incidence and amount of overschooling and in the rate of return on (over)schooling change when unemployment is taken into account. The main question put forward in this paper is: Do the unemployed affect the incidence and amount of overschooling and its rate of return and, if yes, by how much?

The structure of this paper is as follow. In the next section we present some theories about overschooling in the labour market. Explicitly we will elaborate on the role and effect of unemployment on (effects of) overschooling. In section three we explain our research methodology with the emphasis on how the unemployed can be integrated into the common analysis of overschooling. We will put forward two options to integrate the unemployed in the wage analysis. The first method tries to establish the wage rate of the unemployed on basis of their unemployment benefit.

The second method tries to control for sample selectivity according to Heckman's procedure. In the fourth section we present our data and measurement solutions. We will use data from six cross-sections covering a period of 13 years between 1985 and 1998. In section five we present our results. In the final section we summarise this paper and draw some conclusions.

2 Overschooling and the labour market

Overschooling has been a research topic at least since the late seventies. In 1980 Huijgen, together with Conen and Riesewijk, published a series studies about the qualitative structure of the Dutch labour market and the match between educational level and job level of workers and employees. Since these studies overschooling and its consequences have been the topic of a lively debate in the Netherlands (cf. Van der Meer and Glebbeek, 2001; Groot and Maassen van den Brink, 2000). Also in the United States (Rumberger, 1981) and in other countries studies were published about the possible consequences of a rapid rise in educational attainment. Recently a special issue of the 'economics of education review' was devoted to this matter. In this issue[1] the state of the art can be found.

Remarkably, in this issue no attention is paid to the unemployed, although they belong to the labour supply and should be taken into account when analysing labour market problems. From a neoclassical point of view the neglect for unemployed is understandable. Neoclassical theory assumes, almost by law, that wages equal productivity and that this assumes an optimal allocation of labour (Borghans and De Grip, 2000, p.6). They deny, or are unable to explain, matters like overschooling and unemployment. If these occur they are the result of a temporal disturbance, may be an external shock to the labour market, and will disappear after the market has adjusted to the new situation. In reality this is not so. Periods of low unemployment follow periods of high unemployment, reflecting a less than optimal allocation.

[1] Economics of Education Review, 2000, Vol. 19, Issue 2

It is also known that overschooling in the labour market is a phenomenon that is common to all labour markets for which research was done. We find it for instance in the USA, the United Kingdom, Germany, Spain, Portugal, the Netherlands and Finland (Hartog, 2000; Borghans and De Grip, 2000). Despite the research effort until now overschooling is not yet fully explained and understood. Both job-competition models and wage-competition models are unable to explain the stylised facts. More successful were efficiency wage models and what Hartog calls 'matching models'. But also these models have their shortcomings.

Efficiency wage models can explain, lasting, unemployment, but have more difficulty in explaining the effect of unemployment on the rate of return on schooling. Efficiency wage theory is hardly applied to tackle questions about overschooling, but is useful in explaining displacement in the labour market (Van der Meer and Wielers, 1996). Therefor efficiency wage theory could be elaborated on to explain overschooling. According to efficiency wage theory (Akerlof and Yellen, 1986) wages do not adjust downward in periods of unemployment. Wages are sticky, because productivity of workers depends on the wages. A decrease in the wage will also lower productivity of the workers and the decrease in productivity is larger than the decrease in wages so employers will not profit from lower wages. This means that the rate of return on schooling is hardly affected by the unemployment rate. This rate can increase in times of labour shortages and will fall when the labour market becomes less tightened. However once unemployment has arrived wages will not fall further and therefor it is hard to expect that unemployment has a strong effect on the rate of return on schooling.

Also other models developed to explain unemployment, like implicit contract theory and insider-outsider models or search models (Sapsford and Tzannatos, 1990), do not pay attention to phenomena like overschooling. We therefor will not elaborate on these theories.

Although the matching model proposed by Hartog (2000) can explain overschooling, this model is not well suited to explain unemployment. Because it is based on neoclassical principles, eventually everyone who supplies labour will find a

job, although it might not be the job that fits best with his level of education. In this model wages adjust downward and upward to reach full employment.

We therefor have a theoretical problem, which we are not able to solve at the moment. However, we think that a link between unemployment, overschooling and the rate of return on (over)schooling exists. We can elaborate on this link by supposing that all unemployed are overschooled. At least in the Netherlands almost everyone has received some kind of schooling that makes them suitable for at least some jobs in the labour market. For example the rate of literacy is near 100 per cent and Dutch pupils in primary school, which is compulsory, have a high score in international maths tests. Also the lower educated in the Netherlands have a relatively high level of functional literacy compared to other countries (OECD, 1998). So almost all Dutch have reading, writing and arithmetical skills that can be used in almost, if not all, low level jobs. Also the Dutch unemployed possess these skills even if their highest level of education is primary school. This means that leaving the unemployed out of the overschooling analyses biases the results, because they have qualifications that can be made useful in the labour market. So at least the incidence of overschooling is affected by including the unemployed in the analysis.

Theoretically, the effect that we can expect from the unemployment rate on the rate of return on (over)schooling is less clear. On the one hand, according to more neoclassical ideas and probably the matching model too, we can expect a decreasing effect of unemployment on the rate of return. In periods of unemployment wages tend to drop and thereby decrease the rate of return on schooling and overschooling, whereas in periods with tight labour markets wages tend to rise, thereby increasing the rate of return on (over)schooling.

However, according to efficiency wage theory, this effect is less straightforward. According to efficiency wage theory and implicit contract theory, too, the sticky wages do not drop in periods of unemployment. So the rate of return on (over)schooling is not affected by unemployment. At least the issue is important and interesting enough to do some preliminary research into these effects.

Empirically, we know that unemployment is unevenly distributed over labour supply categories. The lower educated are, for one reason or another, more affected

by unemployment than highly educated employees. So leaving out the unemployed in the wage equations might downwards bias the estimated rate of return, especially when unemployment is high. Therefore, in the next section, we propose a method how to deal with the unemployed in the analysis about (over)schooling and its rate of return.

3 Method

Usually the measurement of the incidence and amount of overschooling is restricted to the labour force in paid employment. The reason for this restriction is that for the measurement of overschooling the required level of schooling is needed and we only know the level of required schooling of the employed. Because unemployed do not have a job the required level of schooling cannot be measured. Therefore the amount of overschooling of unemployed workers cannot be measured and they are left out of the analysis. The same holds for estimating the wage equation. Besides having no information about wages of the unemployed, researchers also do not have information about years of over- or underschooling of the unemployed.

However, it can be argued that almost every unemployed is overschooled. Because they are out of a job all of their schooling seems to be superfluous. Stated in this way the amount of required schooling is zero and all the attained schooling can be regarded as too much. So every year of schooling the unemployed have attained is regarded as overschooled. The percentage of overschooled needs to be recalculated roughly by adding the rate of unemployment to it. Roughly because the unemployed not only have to be added to the numerator but also to the denominator.

On the other hand it can be argued that to enter the labour market successfully the unemployed need at least as much education as is required in the lowest job levels. This means that not every unemployed is overschooled, only those who attained more education than what is minimal required in the lowest jobs. In most countries this minimum requirement is to be able to read and write and perform some simple calculations, i.e. primary education. Stated in this way every unemployed that attained more than primary education is seen as overschooled. So

the number of overschooled will increase but with less than the rate of unemployment.

A third option to incorporate the unemployed within the analysis about overschooling is to argue that the minimum required level of education is the level that can be obtained during compulsory education. In the Netherlands every inhabitant is compelled to go to school full-time until he has reached the age of 16 years. Within this period of compulsory education the level of lower secondary education can be reached. This is the next highest level above primary education. This would mean that some of the unemployed would be overschooled, some would have the required level of education and some, those who dropped out of lower secondary education, would be underschooled.

In our point of view the question of overschooling is a question about the mismatch in the labour market and therefore the minimum requirements to enter the labour market in a successful way should be the starting point of the analysis. So, we opt for the second proposal, saying that every unemployed person is overschooled if he or she has attained more than primary education. This also implies that underschooling among the unemployed cannot occur. However, this does not mean that unemployed were never underschooled before they became unemployed or that they cannot become underschooled by entering employment in a high level job.

According to this proposition we can measure the incidence and amount of overschooling, including the unemployed. However to estimate the rate of return on schooling, overschooling and underschooling we still need to take a second hurdle. To be able to estimate the wage equation we need some information about the (potential) wages of the unemployed. Again several solutions are at hand. Although we cannot apply all these solutions, due to restrictions of our data sets, we still would like to propose these.

The first solution would be to calculate the wage rate on basis of the unemployment benefits the unemployed receive. Because in the Netherlands unemployment benefits depend on wages formerly earned and time spend in paid employment, the benefits would give an adequate estimate of potential earnings or productivity.

The second solution would be to take the reservation wage of the unemployed as the wage to be analysed. According to search theory (Polachek and Siebert, 1993, p.216) this is the minimal wage that is required to let the unemployed accept a job. This reservation wage is dependent on personal characteristics of the unemployed like years of schooling, experience and position in the family or household. In some questionnaires this wage is asked for. Sometimes it is estimated using data about the behaviour of employed (switching regression techniques). If workers are unemployed because wages in existing jobs are too low, actual wages for comparable workers are an estimated minimum of the reservation wage of the unemployed (Wales and Woodland, 1980).

A third solution would be to control for sample selectivity (Heckman, 1979). Because the wages for the unemployed are unknown and the unemployed are not a random selection of the persons in paid employment the wage equation needs to be adjusted to estimate the rate of return on required schooling, overschooling and underschooling. This adjustment can be made according to Heckman's standard procedure. That is to estimate the inverse of Mill's ratio on basis of a participation equation and to include this estimate in the wage equation. This procedure resembles the second solution.

In this paper we will apply the third solution. We do not have reliable data on unemployment benefits to be able to calculate wage rates. We lack crucial information about hours worked in the last job before the person became unemployed. We also do not have enough information about the reservation wages of the unemployed. Although questions were asked to the unemployed which wage was necessary to accept a new job, these questions were answered too poorly. Because the procedure to estimate the reservation wage on basis of the behaviour of the persons in paid employment is almost the same as Heckman's standard procedure we decided to apply this last one.

This means that we estimate the following set of equations:

The participation equation:

$$P = \alpha Z \qquad (1)$$

with P = 0, 1 (0 = unemployed, 1 employed)
α = parameters to be estimated
Z = selection variables

and, given P = 1

$$\ln w = \gamma_0 + \gamma_1 r + \gamma_2 s^o + \gamma_3 s^u + \beta X_1 + \theta \lambda \qquad (2)$$

$$\lambda = \phi(\alpha Z) / \Phi(\alpha Z) \qquad (3)$$

with w = hourly wages
r = required schooling
s^o = attained schooling minus required schooling if attained schooling is greater than required schooling
$s^o = 0$ else
s^u = required schooling minus attained schooling if attained schooling is less than required schooling
$s^u = 0$ else
X = control variables
$\gamma_0, \gamma_1, \gamma_2, \gamma_3, \beta, \theta$ = parameters to be estimated
λ = inverse of Mill's ratio
ϕ = density function of the standard normal distribution
Φ = distribution function of the standard normal distribution

Although it is not required that the selection variables Z differ from the control variables X, it is advisable to incorporate some different variables to prevent identification problems. We estimate the parameters and their variances using the standard procedure within LIMDEP, version 7.0. This procedure consists of two steps and includes the necessary adjustments for the variance of the estimated parameters, inclusive the variance of the error term. To interpret the results we calculate marginal effects (Dolton and Makepeace, 1987). In this way we can see how the selection process affects the rate of return on education. The choice and measurement of variables is illuminated in the next section.

4 Data and measurement

Our data source is the OSA labour supply panel survey. Of this panel survey we have access to the surveys held in 1985, 1986, 1988, 1994, 1996 and 1998. This gives us six estimates of the incidence and amount of over- and underschooling in a thirteen-year period. These data give us a unique opportunity to analyse the rate of return and change in rate of return on schooling, including the effect of unemployment, which varied considerably during this period. In 1985 unemployment in the Netherlands was high. Also since 1985 the Dutch economy has recovered from an economic depression in the beginning of the eighties. The economy started to grow with an increasing growth rate, slightly hampered in 1993 by a small recession. Since 1994 until 1998 the growth rate and decrease of unemployment was among the fastest in Western Europe.

Although the OSA-survey is a panel study we do not use this characteristic. Each wave is treated as a separate cross-section. In each wave almost the same number of persons were contacted. The sample sizes do not differ significantly between the waves of the panel study. Attrition is combated by additional sampling. The sampling is performed in such a way that the respondents who refused to fill out the questionnaire again, are replaced by a representative group of new respondents. In this way each wave of the panel can be seen as a random sample of the Dutch labour force. More information on the OSA-labour supply surveys can be found in OSA (1989) and OSA (1997).

To measure over- and underschooling we need a measure for the required level of schooling. This level of schooling is measured with the job analysis method (cf. Hartog, 2000). In this study we use the coding of Huijgen (Batenburg and De Witte, 2001). Although others prefer more subjective methods like self-report, we have experienced the coding of Huijgen as reliable (Van der Meer and Glebbeek, 2001; Van der Meer, 2000). Huijgen maps all occupations into seven different job levels. The information used to code a job into one of these seven levels are the minimum schooling requirements, the necessary amount of on-the-job training and the level of discretion. The lowest job level consists of jobs for which no formal education is required, on-the-job training is minimal and employees have no or minimal discretion over their tasks. The highest job level requires scientific training, much on-the-job training and includes discretion over tasks. We use a key that makes it possible to recode the four-digit job classification of Netherlands Statistics into Huijgen's job levels. For this paper we added a job level to the scheme to incorporate the unemployed. All unemployed receive the code 0 as their job level. To these eight job levels we attach the required years of schooling, measured in effective years of schooling.

The highest attained level of education is converted into the effective years of schooling. Each diploma or level of schooling is measured as the minimum years of schooling necessary to obtain this diploma. This results in five levels of six, nine, twelve, fifteen and seventeen years of schooling. Although the questions concerning the level of education differ slightly between the surveys, the effective years of schooling can be measured in a consistent way.

The match between required and attained level of schooling is shown in Table 1. As argued in the previous section we regard every unemployed with more than primary education, i.e. six years of schooling, as overschooled. Unemployed cannot be underschooled. Everyone working on the lowest two job levels but who has more than six years of schooling (primary education) is regarded as overschooled. Employees working in job level three require nine years of schooling; employees working in job level four require twelve years of schooling and employees in job level five require fifteen years of schooling. All employees working in job levels six

and seven are regarded as underschooled if they have not obtained a university degree.

Table 1. The theoretical match between educational level and job level (0 perfect match, - underschooled, + overschooled)

	Years of schooling				
Job level	6	9	12	15	17
0 (unemployed)	0	+	+	+	+
1 (lowest)	0	+	+	+	+
2	0	+	+	+	+
3	-	0	+	+	+
4	-	-	0	+	+
5	-	-	-	0	+
6	-	-	-	-	0
7 (highest)	-	-	-	-	0

Source: Asselberghs et.al. 1998, p. 17

Weekly, monthly and four weekly after-tax incomes are translated into hourly wages. In the Netherlands after-tax income, as specified on the wage slips and received on bank accounts, is much better known than before-tax income. Therefor most surveys ask after-tax income. More importantly after-tax income allows us to estimate the private rate of return on schooling (Hartog and Oosterbeek, 1988), the effect we are interested in.

As control variables in the wage equation we use tenure and tenure squared, years of experience and its square. Furthermore we control for having a supervisory position. We also include a set of dummy variables for gender times marital status, creating four distinct categories: married men, unmarried men, married women and unmarried women. As a fourth control we use the natural logarithm of weekly hours worked. One reason to include this variable in the analysis is to control for effects of the tax system. In the Netherlands the marginal tax rate increases with income and thus by hours worked. Workers with the same gross hourly wage pay different taxes when they differ in the hours worked. If their is no relation between hourly wage and hours worked, the parameter should equal minus one (-1) (Petersen, 1989).

In the participation equation we use attained schooling, age and its square, a set of dummy variables indicating gender times marital status and a set of dummy variables indicating gender times the presence of children younger than age eighteen. We expect men with children to be employed more often than men without children and vice versa for women. The age of eighteen is chosen because at that age children (young adults) become more or less financially independent from their parents. They earn their own income or receive scholarships etc. It could be argued to limit the age of the children to twelve, because after that age children are more grown up, attend school full time and need less care and attention than children younger than twelve, allowing women to participate, again, in the labour market. For this paper this is an empirical question.

Included in the analyses are those persons who are in, or seek, paid employment. Self-employed and other persons (i.e. helping family members) in the labour market are excluded. Conform official Dutch statistics we code everyone who has a job for at least 13 hours per week as being in paid employment. All persons who are out of employment and report to be searching for paid employment and those with a job for less than 13 hours per week are coded as unemployed. Finally we restrict the analysis to those persons who answered all the relevant questions (list-wise deletion).

5 Results

Table 2 reports the upward trend in the Dutch labour market both of the required level of schooling and the attained level of schooling. Both estimates are a bit smaller than those reported in Van der Meer and Glebbeek (2001). The differences between the required level of schooling are larger than the difference between the attained level of schooling. This is not surprising because every unemployed was assigned the lowest level of required schooling, whereas the attained level of schooling of the unemployed varies between 6 and 17 years. The difference in attained level of schooling between both studies is accounted for by the overrepresentation of the lower educated among the unemployed. Persons with a high level of education have a higher probability of being employed than persons with hardly any education. The absolute growth in years of schooling is almost the same in both studies. The required

level of schooling has increased with 1.1 years whereas the attained level of schooling has increased with 1.2 years

Tables 3a and 3b contain the results about incidence and amount of overschooling, including and excluding the unemployed. We also report the unemployment rate in table 4. By comparing these statistics one can see what the influence of unemployment is.

Between 1985 and 1994 the percentage overschooled in the Dutch labour market has fallen from 40 per cent to 36 per cent. In this period the rate of unemployment also fell with 4 percentage points, according to our definition. One also sees a drop in percentage overschooled by 5 points if one excludes the unemployed. The incidence of overschooling has risen again since 1994 and reached in 1998 the same level as in 1985, in- and excluding the unemployed and despite a still further drop in unemployment. Incorporating the unemployed did not reveal the pattern one would expect. As the incidence of overschooling is higher, by definition, we expected it to drop together with unemployment. It did so until 1994 but since then the incidence of overschooling unexpectedly has risen again. So including the unemployed does not change the already established trend in overschooling (Hartog, 2000; Van der Meer and Glebbeek, 2001)

The percentage underschooled rises between 1985 and 1994 and then in 1998 drops to a slightly higher level than in 1985. This trend is, as one would expect, contrary to the changes in overschooling. The percentage underschooled is higher if one excludes the unemployed. This should be so because in calculating the percentage underschooled the total number underschooled (the numerator) did not change where as the total (the denominator) increased with the unemployed. The trend, however, does not change.

The changes in incidence in overschooling are reflected in the change in mean years of overschooling. The mean years of overschooling rise and fall with the rise and fall of the percentage overschooled. If we look at the mean years of overschooling of those that are overschooled we do not need to see such a change. This mean is more stable as one can see in table 3b. The overschooled have on average 4.6 years too much schooling for their job. On basis of these statistics we can

say that those being overschooled are not more overschooled in 1998 or 1994 than in 1985. In this respect the match in the labour market has not improved, despite a fall in unemployment.

However before saying something about the total mismatch in the labour market one also has to look at the underschooled. In table 3a we see that the mean years of underschooling is highest in 1994 and then fell back to the 1985 level. The mean years of underschooling of the underschooled were in 1994 considerably less than in 1985 or 1986, years in which the percentage underschooled was much lower. Since 1994 the mean years of underschooling of those being underschooled has further dropped to 3.2 years, the lowest mean in the 13 years covered by the surveys. So in a period with falling unemployment one sees a slight increase in the percentage underschooled and a drop in the mean years of underschooling. Considering the underschooled one sees a decline in the mismatch in the Dutch labour market.

Taken the developments among the over- and underschooled together, including the unemployed, one sees a slight increase in the mismatch in the Dutch labour market. Despite a decrease in unemployment, which implies or should imply a better match in the Dutch labour market, the total mismatch has increased. Both the incidence and amount of overschooling has increased and this increase outweighs the decrease in incidence and amount of underschooling.

In comparison with an analyses restricted to those employed, one sees a slightly different level of over- and underschooling, but the same trend. That is an increase in overschooling and a decrease in underschooling. This is contrary to the expectation, because in the period under investigation unemployment fell and unemployed are, by the definition of this paper, almost all overschooled but cannot be underschooled. If the unemployed find jobs some of them will meet the required level of schooling, some will stay overschooled, whereas the remaining will become underschooled. So the upward trend of overschooling in the Dutch labour market, must be explained by something else; the increase in labour market participation in the Netherlands.

The rise in incidence of overschooling since 1994 reflects the rapid growth of the number of jobs in the Netherlands. Many persons, previously outside the labour

market, took up a job since the mild recession in 1993. Many of them in marginal and half time jobs[2] for which they are overqualified (cf. Asselberghs et.al 2002). In this research persons having a marginal job are coded as being unemployed, in line with Statistics Netherlands, and therefor, at least most of them, as being overschooled. The increase of employed persons is much faster than the drop in unemployment. This is due not only because of school leavers entering the labour market but also because persons outside the labour market entered (students) or re-entered (housewives) the labour market (Wielers and Van der Meer, 2002). The growth in gross and net labour market participation is tremendous, which can also be seen by the growth of the samples included in this analysis.

It could also very well be that the 'hidden' unemployed have entered the labour market. 'Hidden' in the sense that they are not captured by Statistics Netherlands and labour supply surveys. It might also very well be that workers discouraged in the eighties to enter the labour market are no longer discouraged and now actually (re)enter the labour market, thereby increasing the labour force. These (re)entrants lack, of course, experience which they compensate with a relatively high level of schooling and thus increasing the incidence and amount of overschooling.

Table 5 contains the direct effects of required, over and underschooling on hourly wages and the indirect effect of attained years of schooling through the participation equation. The complete results are reported in the appendix. On interpreting the direct and indirect effects one should keep in mind that the attained years of schooling equal the required years of schooling plus the overschooled years minus the underschooled years. For those employees that are not over- or underschooled the rate of return on level of schooling equals the indirect effect of education plus the direct effect of required education. The marginal rate of return to schooling for the overschooled equals the indirect effect of education plus the direct effect of overschooling, while the marginal rate of return on schooling for the

[2] A marginal job is a job containing maximum 12 hours per week work. Statistics Netherlands regard these persons as unemployed or even outside the labour force if they are unwilling to work more hours per week.

underschooled equals the indirect effect of education plus the direct effect of underschooling.

First of all one sees that the indirect effect of education on wages is rather small, it is less than one per cent. And although the effect seems insignificant it still is relevant. The indirect effect of education enhances the rate of return on required, over- and underschooling between 1985 and 1994, and diminishes the rate of return for 1996 and 1998, making the initial differences between the 13 years smaller. In the early years the indirect of education is positive because the selectivity bias is negative, implying that education does not only help earning a higher wage but also helps entering the labour market and thus making it possible to earn a higher wage. In the latter years however the labour market has become so tight that the selectivity bias disappeared and even has become positive. So a higher level of education still helps earning a higher wage, the direct effect has even increased, but the advantage of entering the labour market, or finding a job has disappeared.

All years show a significant difference in the rate of return of required schooling on the one hand and the rate of return on over- and underschooled years on the other hand. The rate of return on over- and underschooled years is the same. One also sees increasing revenues from education. Both the rate of return on required and over- and underschooling has risen between 1985 and 1998, although less fast when one takes the unemployed into account.

How should these results be interpreted? In section two we argued that the effect of unemployment on the rate of return on education is not clear. Matching models and neoclassical economics would say that with a decline in unemployment the rate of return of human capital would increase. That is, at first sight, what we find in these analyses. However, the change in selectivity bias, which mitigates the changes in the rate of return on education, suggests that this rate is not that sensitive to changes in unemployment as one would think.

If one compares 1988, a year in which unemployment was still high and recovery of the economy seemed to be slow, to 1998 a year in which unemployment was low, the labour market tight and the Dutch economy still growing fast, one sees hardly any difference in the rate of return on education. The direct effects differ but

incorporating the indirect effect of education, the selectivity bias caused by the unemployed, lets disappear the differences. The rate of return on education of workers meeting the required level of schooling seems to be about equal, 6.9 per cent in 1988 and 6.6 per cent in 1998, whereas those overqualified for their job have a rate of return of 4.5 per cent in 1988 and 4.7 per cent in 1998 and those underqualified for their job 4.4 per cent in 1988 and 4.2 per cent in 1998. Only the years 1985 and 1986 show a somewhat lower rate of return on education in the labour market. These mitigating effects of the selectivity bias, of course, do not show up in the OLS analysis of wages presented in the appendix. The OLS analyses show a steady increase in the rate of return on education.

So at second sight one could argue that the rate of return on education is not that sensitive to changes in unemployment and that therefor the efficiency wage theory finds more support by these results than the matching model or neoclassical theory.

6 Summary and conclusion

In this paper we investigated whether unemployment affects the incidence and amount of overschooling and its rate of return. We posed this question because until now research into overschooling and its effects disregarded the problem of unemployment. Both unemployment and overschooling are results of imperfect allocation in the labour market. Beside that, almost all unemployed can be regarded as overschooled, especially if they have more than primary education. So one expects to find a reverse relation between the level of unemployment and the incidence of overschooling. However, in this paper we did not find such a relation. The incidence of overschooling in the Dutch labour market in the early eighties, a period with a high level of unemployment is as high as the incidence of overschooling in the late nineties, a period with a low unemployment rate.

The reason for not finding this relation is probably the strong growth of the Dutch labour force. Since 1993 the Dutch economy has grown with one of the fastest rates in Europe and an enormous amount of new jobs were created. This job growth gave ample opportunity for persons outside the labour force, like housewives and

students, to take up a job. This growth in the labour force was much faster than the fall in unemployment. Many of the new entrants in the Dutch labour market took up jobs for which they had more than sufficient education, thereby increasing the incidence of overschooling.

The amount of overschooling is actually rather stable. The mean years of overschooling of the overschooled did not change much over the years indicating that the overschooled did not become more overschooled. Also in this respect the allocation in the Dutch labour market did not improve despite the fall in unemployment.

Also the total mismatch, the incidence of overschooled and underschooled taken together, did not improve. On the contrary in 1998 it was slightly higher than in 1985. So despite the growth of the economy, the rapid rise in number of jobs and the fall in unemployment the match between required education (demand) and attained level of education of the labour force (supply) did not improve. Perhaps one could also say that despite the large changes in the Dutch labour market the match between demand and supply of labour did not become worse.

The fall in unemployment did not affect the rate of return on education Although in a simple OLS regression the rate of return on education has shown an upward trend since 1985, after correction for selectivity bias, needed for the unemployed, this rate of return was rather stable throughout the years. Both the rate of return on required education and on years of overschooling was the same in 1988 and 1998. This result is better explained by efficiency wage theory and other theories that explain sticky wages than by matching models or neoclassical theory. The latter theories would have expected the labour market revenues of education to increase with a drop in unemployment. However this did not happen.

Although the matching model as proposed by Hartog is capable of explaining overschooling this model cannot cope with unemployment in an adequate way. It also fails to explain the developments in the rate of return on education. Efficiency wage theory seems to be a better candidate in explaining both the phenomenon of overschooling, unemployment and the stickiness of wages

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Table 2. Mean Years of Required and Attained Schooling for the Dutch Labour Force for Six Different Years

Total	1985	1986	1988	1994	1996	1998
Required schooling	10.2	10.3	10.3	10.9	11.0	11.3
Attained schooling	11.0	11.0	11.4	11.2	11.7	12.2
N	2251	2382	2391	2615	2803	2811

Source: OSA Labour supply survey, our calculations

Table 3a. Incidence and Amount of Over- and Underschooling in the Dutch Labour Force for Six Different Years (without the unemployed)

	1985	1986	1988	1994	1996	1998
Percentage overschooled	40.3 (32.8)	39.4 (33.3)	41.5 (33.5)	35.9 (27.8)	38.8 (31.6)	40.3 (33.0)
Mean years of overschooling	1.86 (1.40)	1.83 (1.40)	1.96 (1.41)	1.57 (1.11)	1.79 (1.32)	1.84 (1.41)
Percentage underschooled	25.1 (30.6)	26.6 (31.3)	25.9 (31.0)	32.9 (38.2)	30.1 (34.7)	28.8 (32.8)
Mean years of underschooling	0.98 (1.20)	1.12 (1.32)	0.91 (1.10)	1.24 (1.44)	1.09 (1.26)	0.95 (1.08)
Number of cases	2251 (1846)	2382 (2029)	2391 (1991)	2615 (2250)	2803 (2431)	2811 (2475)

Source: OSA Labour supply survey, our calculations.

Table 3b. Mean Years of Over- and Underschooling for the Over- and Underschooled in the Dutch Labour Market for Six Different Years (without the unemployed)

	1985	1986	1988	1994	1996	1998
Mean years of overschooling	4.62 (4.26)	4.66 (4.20)	4.72 (4.20)	4.37 (3.99)	4.61 (4.18)	4.57 (4.29)
Number overschooled	908 (605)	938 (675)	994 (668)	940 (626)	1087 (768)	1134 (816)
Mean years of underschooling	3.92	4.22	3.53	3.76	3.65	3.29
Number underschooled	565	634	618	859	843	811

Source: OSA Labour supply survey, our calculations.

Table 4. Rate of unemployment in the Dutch labour market for six different years

	1985	1986	1988	1994	1996	1998
Unemployment according to Statistics Netherlands	0.091	0.086	0.084	0.085	0.074	0.050
Percentage unemployed in analysis	0.18	0.15	0.17	0.14	0.13	0.12

Source: OSA labour supply survey, our calculations.

Table 5. Direct and indirect effects of education on hourly wages, the Netherlands six different years

	1985		1986		1988		1994		1996		1998	
	direct	indirect	direct	indirect	direct	indirect	direct	indirect	direct	indirect	direct	indirect
attained schooling		0.006		0.010		0.007		0.008		-0.002		-0.007
required schooling	0.050*		0.051*		0.062*		0.062*		0.066*		0.073*	
overschooling	0.027*		0.028*		0.038*		0.043*		0.047*		0.054*	
underschooling	-0.033*		-0.025*		-0.037*		-0.038*		-0.046*		-0.049*	

Source: OSA Labour supply survey, our calculations

* $p < 0.05$

Appendix A. Complete results of the selection model

Table A1.Results for the Dutch labour market participation equation for six different yearsm (t-values)

	1985	1986	1988	1994	1996	1998
Constant	-0.71	-0.11	1.01	-0.06	1.04	0.04
	(-1.71)	(-0.24)	(2.25)	(-0.13)	(2.20)	(0.08)
Married men	reference group					
Non-married men	-0.86	-0.44	-0.62	-0.84	-0.62	-0.41
	(-6.63)	(-3.55)	(-4.97)	(-6.43)	(-4.67)	(-2.47)
Married women	-0.61	-0.60	-0.61	-1.13	-1.06	-0.97
	(-4.82)	(-5.47)	(-4.56)	(-7.91)	(-8.02)	(-6.51)
Non-married	-0.73	-0.65	-0.77	-0.90	-0.92	-0.78
women	(-5.62)	(-5.42)	(-5.96)	(-6.35)	(-6.78)	(-4.93)
Age	0.09	0.07	0.002	0.08	0.02	0.04
	(3.76)	(2.62)	(0.06)	(3.54)	(0.70)	(1.45)
Age squared	-0.001	-0.008	-0.0000	-0.001	-0.0004	-0.0007
	(-3.81)	(-2.38)	(-0.05)	(-3.79)	(-1.16)	(-2.05)
Attained education	0.06	0.03	0.05	0.06	0.07	0.13
	(5.97)	(3.07)	(4.64)	(4.96)	(5.96)	(9.40)
Women with	-1.04	-0.78	-0.95	-0.59	-0.57	-0.60
children	(-8.83)	(-7.61)	(-8.70)	(-5.55)	(-5.74)	(-5.80)
Men with children	-0.13	0.08	-0.12	-0.22	-0.15	0.10
	(-1.10)	(0.75)	(-0.98)	(-1.61)	(-0.12)	(0.59)
Number of cases	2251	2382	2391	2615	2803	2811

Source: OSA labour supply survey, our calculations

Table A2. Results for the wage equation for those employed in the Dutch labour market, for six different years, corrected for selectivity bias, (t-values).

	1985	1986	1988	1994	1996	1998
Constant	2.03	2.91	1.99	1.92	1.86	2.18
	(21.3)	(24.9)	(20.4)	(20.7)	(19.5)	(21.9)
Non-married men	-0.07	-0.06	-0.09	-0.10	-0.10	-0.10
	(-3.07)	(-2.92)	(-4.46)	(-4.92)	(-4.77)	(-4.67)
Married women	-0.14	-0.19	-0.15	-0.18	-0.21	-0.24
	(-6.57)	(-10.4)	(-7.69)	(-6.41)	(-5.89)	(-7.32)
Non-married	-0.15	-0.18	-0.14	-0.15	-0.18	-0.19
women	(-6.15)	(-7.59)	(-6.80)	(-6.78)	(-6.59)	(-7.08)
Experience	0.04	0.04	0.04	0.04	0.04	0.03
	(15.2)	(13.8)	(14.9)	(14.4)	(15.5)	(11.1)
Experience squared	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0004
	(-12.8)	(-10.6)	(-10.3)	(-10.8)	(-11.9)	(-8.31)
Tenure	0.03	0.001	-0.005	0.01	0.01	0.01
	(1.32)	(0.73)	(-2.44)	(6.39)	(5.50)	(4.23)
Tenure squared	-0.0000	-0.0000	0.0001	-0.0003	-0.0002	-0.0001
	(-0.002)	(-0.37)	(1.47)	(-5.04)	(-3.43)	(-1.97)
Supervisor	0.08	0.06	0.07	0.05	0.05	0.04
	(5.78)	(4.79)	(4.99)	(4.10)	(4.09)	(3.13)
Ln (hours worked)	-0.18	-0.22	-0.22	-0.14	-0.13	-0.19
	(-8.35)	(-11.1)	(-10.1)	(-6.69)	(-5.98)	(-8.75)
Required Education	0.051	0.055	0.64	0.065	0.065	0.070
	(22.4)	(25.6)	(27.3)	(30.5)	(24.7)	(20.3)
Overschooling	0.029	0.032	0.39	0.046	0.046	0.051
	(9.18)	(9.97)	(11.1)	(13.5)	(11.4)	(11.5)
Underschooling	-0.034	-0.027	-0.38	-0.040	-0.045	-0.047
	(-10.4)	(-10.1)	(-9.44)	(-15.4)	(-13.6)	(-10.3)
SIGMA(1)	0.24	0.25	0.27	0.23	0.26	0.27
	(61.0)	(53.2)	(81.9)	(56.7)	(150.2)	(167.0)
RHO(1,2)	-0.28	-0.60	-0.58	-0.21	0.04	0.05
	(-2.11)	(-7.48)	(-9.17)	(-0.93)	(0.14)	(0.17)
Loglikelihood	-805.02	-842.89	-975.75	-788.55	-1076.16	-1107.39
Number of cases	1846	2029	1991	2250	2431	2475

Source: OSA labour supply survey, our calculations

Table A3. Results for OLS wage equations, for the Dutch labour market for six different years (t-values).

	1985	1986	1988	1994	1996	1998
Constant	1.96	2.10	1.88	1.89	1.86	2.19
	(17.1)	(18.9)	(16.8)	(18.9)	(17.0)	(19.5)
Non-married	-0.09	-0.09	-0.12	-0.11	-0.10	-0.10
men	(-4.55)	(-4.47)	(-6.26)	(-6.95)	(-6.04)	(-5.93)
Married women	-0.16	-0.24	-0.20	-0.20	-0.20	-0.23
	(-9.12)	(-14.1)	(-11.0)	(-11.4)	(-10.96	(-12.69)
Non-married	-0.17	-0.22	-0.19	-0.16	-0.18	-0.18
women	(-8.26)	(-10.8)	(-9.12)	(-9.61)	(-9.92)	(-9.89)
Experience	0.04	0.04	0.04	0.04	0.04	0.03
	(14.0)	(13.0)	(14.8)	(14.0)	(14.2)	(10.8)
Experience	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0004
squared	(-11.5)	(-10.2)	(-10.1)	(-10.5)	(-10.8)	(-8.04)
Tenure	0.03	0.002	-0.005	0.01	0.01	0.01
	(1.37)	(1.01)	(-2.48)	(6.28)	(5.40)	(4.37)
Tenure squared	-0.0000	-0.0000	0.0000	-0.0003	-0.0002	-0.0001
	(-0.08)	(-0.67)	(1.49)	(-4.72)	(-10.8)	(-1.97)
Supervisor	0.08	0.06	0.08	0.05	0.05	0.04
	(5.99)	(5.09)	(5.82)	(4.39)	(4.32)	(3.36)
Ln (hours	-0.17	-0.21	-0.20	-0.14	-0.13	-0.19
worked)	(-6.14)	(-7.80)	(-7.40)	(-5.70)	(-4.98)	(-7.25)
Required	0.053	0.056	0.065	0.066	0.065	0.070
Education	(26.1)	(28.6)	(30.9)	(34.1)	(29.9)	(28.7)
Overschooling	0.031	0.033	0.041	0.046	0.046	0.051
	(10.4)	(11.0)	(12.5)	(13.7)	(13.2)	(13.4)
Underschooling	-0.035	-0.028	-0.40	-0.041	-0.045	-0.047
	(-11.4)	(-10.1)	(-11.2)	(-14.1)	(-13.5)	(-11.8)
adj. R2	0.50	0.51	0.56	0.59	0.54	0.49
Number of cases	1846	2029	1991	2250	2431	2475
s.e.	0.233	0.241	0.252	0.232	0.260	0.273
F	152.52	176.28	213.28	268.66	236.28	184.08

Source: OSA labour supply surveys, our calculations