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Trends in the Occupational Returns to Educational Credentials in the Dutch Labor Market: Changes in Structures and in the Association?

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ABSTRACT
In this article, we determine changes in the relationship between education and the labor market in The Netherlands since 1960, for which both developments in the distribution of the labor force according to educational attainment and level of occupation (structural changes) and shifts in the mechanism to allocate educated individuals to occupational positions (which modify the net association between education and occupation) are used. To observe both developments, we make use of data from the 1960 Census and four Labor Force Surveys held in 1973, 1977, 1985, and 1991. Loglinear analysis shows that the association between education and occupation has altered. We conclude that changes in the relationship between education and occupation are not only the result of structural changes, but also the outcome of changes in the way educated individuals are allocated to jobs. These shifts in the allocation mechanism are largely connected with the state of the business cycle: in times of high unemployment, employers increasingly select employees on the basis of their education. We also find some support for modernization theory, but as soon as the state of the business cycle is accounted for, the impact of modernization becomes non-significant.

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1. Introduction

Various studies have shown that the relationship between education and the labor market in The Netherlands has changed during past decades (Huijgen 1989, 1990; Van der Ploeg 1994; Wolbers & de Graaf 1996). The value of educational credentials has decreased, an increasing number of employees have jobs at a level that is below their educational level and the higher educated are replacing the less well educated in ever lower-skilled jobs, even pushing them out of the labor market in times of high unemployment. The inflation of educational credentials, skill underutilization and displace-

ment are socially undesirable phenomena if they decrease the economic returns of education in society. People stay at school longer without this creating a proportional contribution to the increase of the national economic growth (Walters & Rubinson 1983; Dronkers 1988). Such developments are also detrimental at the individual level, because many higher-educated persons fail to find suitable occupations and become frustrated (Burris 1983).

These changes in the relationship between education and the labor market can be described on the basis of two developments (Huijgen 1989:40). The first concerns *structural changes* in the labor market. The educational

level of the workforce in The Netherlands has expanded, while at the same time the employment structure has been upgraded. If the upgrading of occupations cannot compensate the educational expansion, the returns to credentials decrease. Secondly, there may have been *changes in the association*. Although developments in the link between educational qualifications and occupational positions could be caused by structural changes only, they could also be affected by changes in the mechanism to allocate educated individuals to jobs. A proper insight into the changing relationship between education and the labor market can only be obtained if one takes into account both developments.[1]

In this article, we determine changes in the occupational returns to educational credentials in The Netherlands since 1960, for which both structural developments and developments in the association will be used. In this way, we can investigate to what extent changes in the marginal distribution of individuals across educational and occupational levels go together with shifts in the allocation process. Both developments will be observed on the basis of the 1960 Census, and the Labor Force Surveys of 1973, 1977, 1985, and 1991 (in total 371,127 employed individuals).

2. Theoretical background

So far, Dutch research on the matching between educational and occupational levels has focused primarily on the effects of structural changes in the value of credentials. The changed relationship between an individual's level of education and his or her labor-market position is explained from the fact that upgrading of the employment structure has failed to keep up with the educational expansion (Huijgen 1989, 1990). The credentials of school-leavers have steadily improved, constantly qualifying them for jobs at higher levels, but the labor market has been unable to meet this large supply.

This view is compatible with the theory of job competition (Thurow 1975), which states that the match between education and the labor market can be approached by distinguishing two queues. In the one queue are job-seekers, ranked on the basis of their credentials. In the second are jobs, classified on the basis of their level. Job-seekers attempt to obtain the highest job possible, whereas employers seek to employ the best-educated candidate. After all, employ-

ers regard the educational level as an indicator for productivity and trainability (Arrow 1973). This theory holds that the best positions go to those with the highest education, and education is regarded as a positional good (Hirsch 1977; Ultee 1980).[2] Job competition theory provides an entirely structural explanation for the decreasing occupational returns to credentials. It is assumed that when there is a discrepancy between educational expansion and occupational upgrading, i.e. the queue of qualified people is longer than the queue of available jobs, the higher educated who no longer have access to the best positions will try to find a job further down the job queue. Highly educated employees will then suddenly find themselves competing with lower-educated employees, who originally had these jobs. This competition often ends in success for the higher educated. After all, they have superior qualifications.

One basic assumption of job competition theory, that all individuals (initially) strive for the highest certificates and highest labor-market positions, seems to be simplistic. Boudon (1974) argued that educational decisions, as made by parents and their children, do not necessarily focus on the highest educational and occupational positions. Instead, they take decisions to leave school or to stay based on evaluations of the costs and benefits involved. Breen & Goldthorpe (1997) stress that perceived probabilities play a crucial role in this decision-making-process. Risk aversion, differences in ability and expectations of success in school, and differences in resources mean that school-continuation-decisions vary between social groups. An additional important subjective feature of educational choices is the expectations individuals have with regard to their social position in adult life. Young people's occupational aspirations have consequences for their educational choices. The more equal distribution of parental resources and the decreasing cost of education have triggered educational expansion, and consequently, young people with the same occupational aspirations have incentives to undertake increasingly higher levels of education. Because occupational upgrading has not been in pace with educational expansion in The Netherlands, it has become even more attractive to prolong one's educational career. Crucial to our argument is that stable preferences with regard to social status coincide with changes in educational preferences and subsequent choices. People do not strive for an absolute amount of education

but for a relative educational position that gives them prospects of a satisfying social position. In this way, stable preferences with regard to social position will have given way to both massive educational expansion and decreasing returns to education. In periods in which educational expansion has been stronger than occupational upgrading, this will lead to credential inflation.

In addition to the structural changes mentioned above, it might also be the case that the way education is allocated in the labor market has changed during the course of time. Higher-educated individuals will always have better opportunities to obtain higher-level jobs than individuals with lower qualifications, but the relative size of their lead over the lower educated may vary. We have two theoretical arguments that support the idea that the allocation mechanism, and therefore, the association between education and occupation, net of structural changes, has altered.

A first argument for assuming a change in the association between education and occupation comes from modernization theory (Blau & Duncan 1967; Treiman 1970). This theory states that societies are characterized increasingly by efficient selection processes that no longer take place on the basis of *ascribed* properties such as social class, gender, race and religion. Instead, the allocation of scarce goods (such as high-status jobs) is increasingly based on *achieved* properties. As a result, modern, meritocratic societies should show an increasing association between education and occupational position. Empirical evidence for a trend from ascription to achievement in the Netherlands is found in de Graaf & Luijkx (1992).

It is claimed that this trend from ascription to achievement is caused by technological and economic developments in modern societies, which have led to an increased demand for a highly qualified labor force (Kerr et al. 1960). Moreover, in modern, industrialized societies, value patterns have shifted (Parsons 1951; West 1975). For example, values with regard to the allocation of scarce goods have changed. Particularistic value patterns, which were predominant in pre-industrial societies, have been replaced by universalistic ones. As a consequence, individuals nowadays believe that social positions should be distributed on the basis of achievement and merit. Furthermore, modern societies have become bureaucratic. The rise of organizations has enlarged the possibilities of control and formal procedures

of recruitment (Weber [1921] 1971). For this reason, processes of selection in the labor market are more likely to follow universalistic criteria.

A second argument for assuming a change in the association between education and occupation stems from the effect of macroeconomic conditions. It is said that employers raise their hiring standards and apply stricter educational requirements in periods of high levels of unemployment (van Ours & Ridder 1995). If unemployment increases and, as a consequence, the job queue lengthens, employers react by requiring higher levels of education from job applicants. Especially for employers for whom it is difficult to lower wages in times of high aggregate unemployment, this may be an attractive strategy. This implies that the association between education and occupation is higher in times of high unemployment. Against this hypothesis of changing preferences of employers, one may point out that school-leavers may become more indifferent in times of poor labor-market conditions. The higher educated who fail to find a job at their level, because of a surplus in the labor market, will adapt their occupational aspirations and apply for jobs at lower levels, instead of continuing their search for a matching job. This strategy seems to work: overeducated entrants in the labor market often make up for the initial loss during their later careers (Sicherman 1991). It might also be the case that in times of high unemployment, youngsters decide to stay in school rather than enter the labor market. As an unintended consequence, this individual strategy will lead to even more educational expansion at the societal level.

3. Data and measurement

To analyze changes in the relationship between education and the labor market in The Netherlands, we make use of large-scale, repeated, cross-sectional data. We have data from the 1960 Census, and the Labor Force Surveys for 1973, 1977, 1985 and 1991, all conducted by Statistics Netherlands (Centraal Bureau voor de Statistiek, or CBS).[3] These five surveys were combined into one data set. For this purpose, the comparability of the surveys has been enhanced as much as possible.[4] The data set contains information on the working population in paid employment (i.e. excluding self-employed persons and farmers), aged 15 to 64

years. In all, the data on 371,127 respondents were analyzed.

The educational level was operationalized on the basis of the Standard Education Classification (Standaard Onderwijs Indeling or SOI), drawn up by Statistics Netherlands (CBS 1987). We distinguish the following educational categories:

1. Primary education (LO);
2. secondary education, lower level (LBO/MAVO);
3. secondary education, higher level (MBO/HAVO/VWO);
4. tertiary education, non-university vocational colleges (HBO) and
5. tertiary education, university level (WO)

The occupational level is expressed using the grading of work by professional job analysts as it has been applied in The Netherlands in several studies to estimate the required schooling for a job (see for example: Hartog & Oosterbeek 1988; Huijgen 1990; Van der Ploeg 1994; Wolbers 2000). The grading, developed by the Dutch Ministry of Social Affairs and Labor and known as the ARBI-code, involves a distinction in seven occupational levels based on a systematic evaluation of all job titles in the Dutch occupational classification (CBS 1984). It focuses on the degree of complexity of jobs, taking into account the job content, and the workers' knowledge and ability needed to function adequately. The following seven job levels are distinguished:

1. Unskilled jobs (with very simple work and simple instructions, requiring little insight and consultation);
2. semi-skilled and trained jobs (with simple work and few complex instructions, requiring some insight and consultation);
3. and 4. skilled jobs (with slightly to fairly complex work, requiring insight, consultation and theoretical knowledge; compared with level 3, level 4 not only requires more specific training, but also considerably more practical experience;
5. 6. and 7. specialized to highly specialized jobs (the nature of the work ranging from complex, requiring considerable theoretical knowledge, to university level).[5]

One of the disadvantages of this objective grading of jobs could be that it fails to take into account any changes in the job level of occupations. It is sometimes said that the fact that occupations are currently being held by higher-educated individuals is caused by the fact that those occupations having become more complex (Halaby 1994). This idea ignores the fact, however, that individuals stay within the education system longer because a higher education offers better chances of a higher income and the costs of education are relatively low.

Along with education, we use a model that includes two other human capital factors: gender and working experience. First of all, we must take into account any differences between men and women to be able to represent changes in the relationship between education and the labor market. In The Netherlands, an increasing proportion of the working population consists of women and the increasing labor-market participation rate of women is largely based on part-time jobs. In part-time jobs, the returns to educational credentials are less than in full-time jobs (Groot & Maassen van den Brink 1996), and therefore, the growing labor-force participation of women may simply lead to decreasing returns to education.

Secondly, we expect that the relationship between education and occupation is strongest at the beginning of a career, and hence we must take into account the working experience of individual workers. Working experience was measured on the basis of the number of years after leaving school. The year in which an individual started to work was determined using the year of birth and approximated school-leaving ages. For individuals with only primary education or a certificate in secondary education, lower level, we assumed that they leave school at age 15 years. For individuals with secondary education, higher level, this age was set at 18 years, for individuals who complete a vocational college on the tertiary level of education this is 21, and for university graduates it is 24. Although there will be a considerable variation as to the actual school-leaving age, we believe that our estimates are reasonably accurate, particularly for men. For women, it is less appropriate to determine the number of years of working experience on the basis of age, because they often interrupt their working careers for care tasks within the family. Unfortunately, the large-scale surveys by Statistics Netherlands that are used in this article contain no information on the actual working experience of individuals.

Tables 1 and 2 show the levels of education and occupation of the working population in The Netherlands for the period 1960–91.

Table 1. *The distribution of levels of education in the working population in paid employment, 1960–91 (*n = 371,127*).*

Educational level	1960 (%)	1973 (%)	1977 (%)	1985 (%)	1991 (%)
Primary education	57.5	35.9	30.1	13.8	9.6
Secondary education, lower level	32.7	34.1	36.3	28.4	24.8
Secondary education, higher level	4.8	19.9	21.6	39.0	43.2
Tertiary education, vocational colleges	3.8	7.6	8.9	14.1	16.0
Tertiary education, university	1.2	2.5	3.1	4.6	6.3
Total	100.0	100.0	100.0	100.0	100.0
n	126,253	90,533	96,150	23,088	35,103

Source: CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.

Table 1 shows that the educational level of the Dutch working population in paid employment has risen strongly during the period 1960–91. In 1960, more than half of the working population (57.5 per cent) had no more than primary education, whereas in 1991 the percentage of workers with only primary education had dropped to 9.6 per cent. The share of the working population that obtained no more than a leaving certificate at the lower level of secondary education rose until 1977. Since then, this percentage has dropped. In 1991, the working population has a smaller percentage of individuals with no more than secondary education, lower level, than in 1960. In addition, the share of individuals with a certificate in secondary education, higher level, increased strongly between 1960 and 1991 (from 4.8 per cent to 43.2 per cent) and this has now become the largest educational category in The Netherlands. Lastly, Table 1 shows that the percentage of individuals with tertiary education has increased over the past decades (for non-university vocational colleges from 3.8 per cent to 16.0 per cent, and for university level from 1.2 per cent to 6.3 per cent). The main reason for the increased educational level of the working population is cohort replacement: the newcomers in the labor market have a higher education than the older workers who leave the labor market.

Table 2 illustrates how the occupational structure of the Dutch working population has also changed considerably during the period 1960–91. First, the share of individuals working in unskilled, semi-skilled and trained occupations (levels 1 and 2) has dropped (from 17.7 per cent to 5.8 per cent, and from 28.1 per cent to 19.3 per cent, respectively). Secondly, the percentages for the job levels 3, 4 and 5 have remained more or less the same during the past decades. Thirdly, the share of jobs at higher levels (levels 6 and 7) has increased. For job level 6 there is a rise from 6.5 per cent to 15.8 per cent, and for job level 7 the rise is from 1.1 per cent to 6.1 per cent. Whether the qualitative upgrading of the occupational structure fits with the rise of the educational level of the labor force will be analyzed in the following section.

4. Analysis and results

Credential inflation in the Dutch labor market

Before determining changes in the net associa-

Table 2. *The occupational structure of the working population in paid employment, 1960–91 (*n = 371,127*).*

Occupational level	1960 (%)	1973 (%)	1977 (%)	1985 (%)	1991 (%)
1 low	17.7	10.4	10.2	7.7	5.8
2	28.1	25.3	24.8	20.6	19.3
3	17.5	17.8	18.0	17.8	15.6
4	17.0	20.2	19.8	23.7	22.8
5	12.1	13.4	13.7	13.4	14.6
6	6.5	9.6	9.8	10.7	15.8
7 high	1.1	3.2	3.6	6.1	6.1
Total	100.0	100.0	100.0	100.0	100.0
n	126,253	90,533	96,150	23,088	35,103

Source: CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.
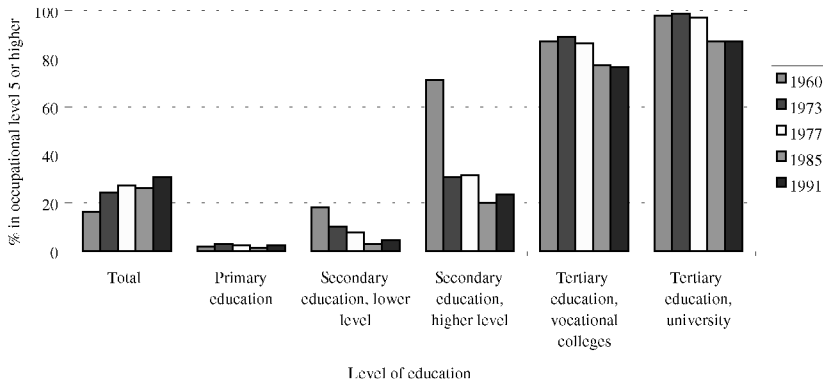
Fig. 1. The occupational returns to educational credentials in the Dutch labor market for men in paid employment, 0–10 years of working experience, 1960–91. *Source:* CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.

tion between education and occupation, developments in the returns to educational credentials on the basis of structural changes are described. We look at two snapshots in a career. The first moment is after 0–10 years of working experience at most, indicating the first stable occupational position. The second is after 11 or more years of working experience, referring to the definitive occupational position attained. We define the returns to education as the percentage of individuals of a given cohort and level of education that have reached job level 5 or higher (high-skilled occupations).

Figure 1 indicates that the overall percentage of male newcomers in the labor market that start in high-skilled occupations increased between 1960 and 1991. Apparently, school-leavers profited from the upgrading of occupations. The general increase at entry into the labor market is in sharp contrast with the decrease of the job level of all separate educational levels, with the exception of those entering the labor market with no more than primary education, who have no chance at all to start in high-skilled jobs. The probability of entering job level 5 or higher for those with a certificate at the lower level of secondary education dropped by 14 per cent (from 18 per cent in 1960 to 4 per cent in 1991), for those with higher secondary education by 47 per cent, for those with vocational college qualifications by 10 per cent, and for those with an academic degree by 11 per cent.

Figure 2 shows that for men who have been in the labor market for 10 years or more, the percentage of those in high-skilled occupations increased from 20 per cent to 43 per cent in 30 years. But also for those who are more experienced, the returns to credentials dropped in the course of time. With the exception of
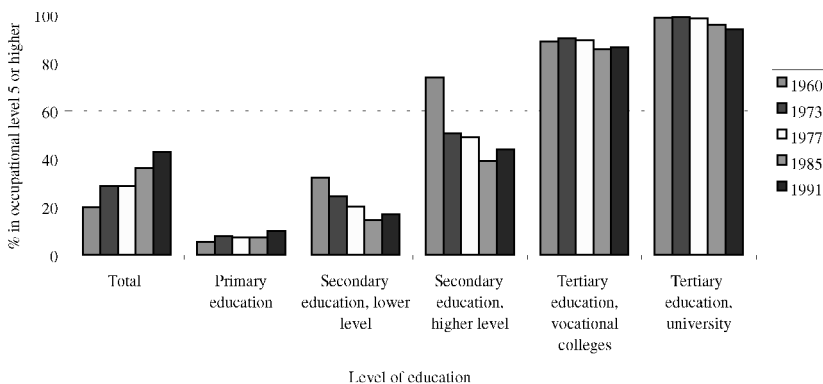

Fig. 2. The occupational returns to educational credentials in the Dutch labor market for men in paid employment, 11+ years of working experience, 1960–91. *Source:* CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.
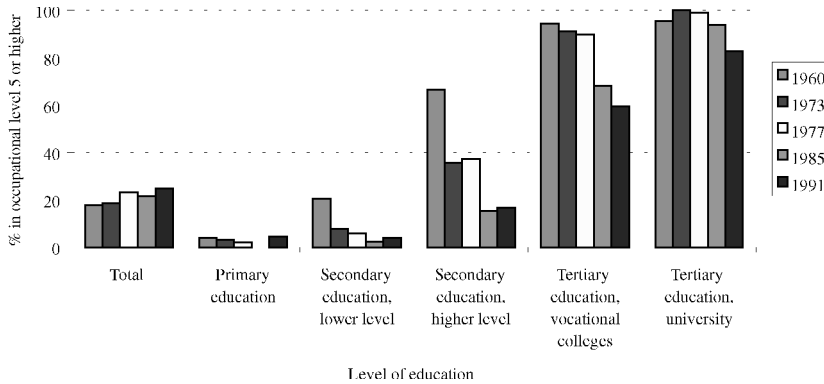
Fig. 3. The occupational returns to educational credentials in the Dutch labor market for women in paid employment, 0–10 years of working experience, 1960–91. *Source:* CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.

those with no more than primary education, the likelihood of being in job level 5 or higher with a given level of education decreased considerably in the period 1960–91. Once again, the credential inflation is strongest for those who hold a diploma at the higher level of secondary education.

Figures 3 and 4 display the situation for women. On average, women have a slightly lower chance of holding a high-skilled occupation than men, regardless of the educational level attained. For both women and men, we see that the percentage of being in job level 5 or higher has generally increased over time, whereas this percentage has decreased for individual educational categories. The pattern of credential inflation is therefore the same for women as for men. With the exception of individuals with no more than primary educa-

tion, female school-leavers ended up in high-skilled jobs less often in 1991 than they did in 1960. For secondary education, lower level, the drop is 17 per cent, for secondary education, higher level, it is 50 per cent, for tertiary education, vocational colleges it is 34 per cent and for tertiary education, university level it is 13 per cent. For the lowest-educated women who left school more than 10 years ago, the percentage of those in high-skilled occupations is also the same in 1991 as in 1960. However, this probability decreased by 26 per cent for those holding a diploma at the lower level of secondary education, by 47 per cent for those with higher secondary education, by 12 per cent for those with tertiary education, vocational colleges, and by 2 per cent for those with a university degree.
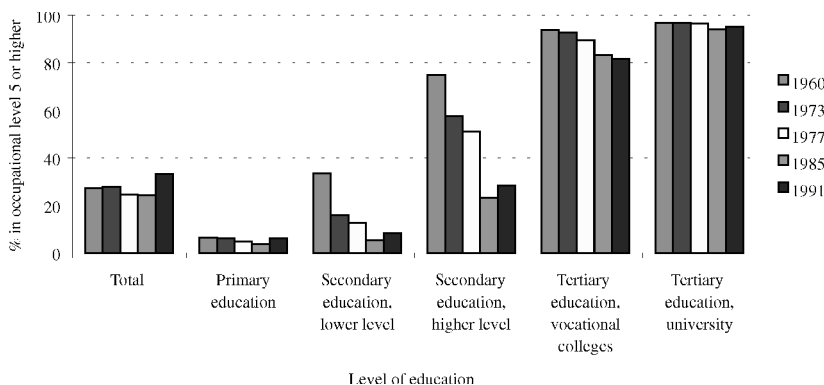
We conclude that in The Netherlands, the

Fig. 4. The occupational returns to educational credentials in the Dutch labor market for women in paid employment, 11+ years of working experience, 1960–91. *Source:* CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.

occupational returns to educational credentials decreased considerably between 1960 and 1991.[6] This is true particularly for school-leavers, but upward mobility does not seem to compensate for this and younger cohorts still lag behind older generations by a considerable margin even after more than ten years in the labor market. The observed trend of credential inflation applies to both men and women, and appears to have continued in the 1990s. The devaluation is greatest for the lower level certificates, which implies that the differences in occupational attainment between the higher and lower educational levels have increased over the past few decades. This is in accordance with the queuing hypothesis. As as long as there are marginal returns to education, it is rational for young people to have more education than their competitors in the labor market, despite this credential inflation (Boudon 1974; Thurow 1975; Breen & Goldthorpe 1997). Also, the finding of no changes in the returns to credentials for individuals with only primary education supports this hypothesis. Individuals without any certificates are not forced into even lower-level jobs – these are not available –, but into unemployment or into a position outside the labor market.

Changes in the association

The question, then, is whether in The Nether-lands the decreasing returns to educational credentials go together with changes in the mechanism to allocate educated individuals to jobs. As we have indicated, changes in the association between education and occupation can only be identified by taking into account changes in the marginal distribution of both characteristics. Loglinear models are useful in such cases. Applying such models, any differences in the marginals of a(n) (education * occupation) table can be eliminated. What remains is the relative, net distribution of individuals in jobs. This indicates which 'education–occupation combinations' are over- or underrepresented in relation to what could be expected on the basis of the numbers in the marginals. An additional advantage of loglinear analysis techniques is that these start from a nominal level of measurement. This enables us to avoid the discussion of whether the grading of jobs used here, is or is not at an interval measurement level (Wennekers 1980).

The types of models that we use in this article stem from studies on social mobility. These are the scaled association models. The basic model

is the one of uniform association, which can be represented as follows (Hout 1983:53):

$$\ln(F_{ij}) = a_0 + a_{1i} + a_{2j} + bX_iX_j,$$

where $\Sigma_i a_{1i} = \Sigma_j a_{2j} = 0$; $\ln(Fij)$ is the natural logarithm of the expected cell frequency in row i and column j; a_{1i} fits the row marginals, a_{2j} fits the column marginals; b is the uniform association parameter and $X_iX_j = ij$ (the product of the row and column scores). The uniform association model derives its name from the pattern of logodds ratios in the table. The model presupposes that the association parameter (= logodds ratio) between the row and column variables remains the same (i.e. is uniform) for each 2 * 2 subtable that can be made on the basis of the original table. For this reason, only one overall association parameter is estimated (b).

A less strict model is the one in which the uniform association parameter may vary across the rows and columns of the table. In this row and column effects model, the original scale values of the education and occupation variables are optimally rescaled. From this free rescaling, the row and column parameters are derived. By optimizing the scale values, the row and column effects model generally fits well with the data, but a serious disadvantage of such a model is that the rescaling is not based on theoretical considerations. This can be avoided by giving theoretically meaningful scale values to the row and column variables (Hout 1984; Kalmijn 1994). In this article we have opted for this approach and replaced the original scores for education (row variable) and occupation (column variable) by percentile scores (in proportions). Each education category and each occupational level is given a percentile score, indicating the part of the working population whose highest level of education attained is the one concerned, or who have an occupation at that particular level. In this way, we can represent the labor market as two queues in which the distribution of occupations across educated individuals is based on relative positions (in accordance with Thurow's job competition theory). An additional advantage of this procedure is the fact that we may vary the scale values between the periods, and also between men and women, or between working experience groups. This is not possible with the row and column effects model, because the variation in the rescalings and the developments in the association would be impossible to unravel.

Table 3. *Model selection for the association between education and occupation for the working population in paid employment, 1960–91 (n = 371,127).*

Model[a]	G^2	df	rG^2	Δ
1. Independence	213,810*	480	0.0	27.1
2. Uniform association	22,543*	479	89.5	7.2
3. Row and column effects	14,664*	471	93.1	5.8
4. Scaled association – percentiles constant over period, sex and working experience	57,452*	479	73.1	11.1
5. Scaled association – percentiles varying over period	55,307*	479	74.1	10.6
6. Scaled association – percentiles varying over period and sex	54,628*	479	74.4	10.4
7. Scaled association – percentiles varying over period, sex and working experience	54,643*	479	74.4	10.4
8. 6. + SAPS * P	54,499*	475	74.5	10.3
9. 6. + SAPS * M	54,552*	478	74.5	10.3
10. 6. + SAPS * W	54,511*	478	74.5	10.3
11. 6. + SAPS * M + SAPS * W	54,510*	477	74.5	10.3
12. 10. + SAPS * E	54,188*	477	74.7	10.3
13. 12. + SAPS * S	54,112*	476	74.7	10.3
14. 13. + SAPS * W * E	54,077*	475	74.7	10.3
15. 14. + SAPS * W * S	54,074*	474	74.7	10.3
16. 15. + SAPS * W * E * S	54,071*	473	74.7	10.3
Comparison of models				
1.–2.	191,267*	1		
1.–3	199,146*	9		
1.–4.	156,358*	1		
1.–5.	158,503*	1		
1.–6.	159,182*	1		
1.–7	159,167*	1		
6.–8.	129*	4		
8.–9.	53*	3		
8.–10.	12	3		
10.–11.	1	1		
10.–12.	323*	1		
12.–13.	76*	1		
13.–14.	35*	1		
14.–15.	3	1		
15.–16.	3	1		

[a] SAPS = scaled association – percentiles varying over period and sex; P = period; M = modernization index; W = unemployment rate; E = working experience; S is sex.

* Significant ($p < 0.001$).

Source: CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations

The fit of the scaled association models is determined by means of the following goodness-of-fit statistics: G^2 (likelihood ratio), rG^2 (percentage of the reduction in G^2 in relation to the baseline model) and Δ (dissimilarity index, indicating which percentage of all cases is predicted in the wrong cell by the model).

The model selection for the association between education and occupation in The Netherlands for the period 1960–91 is represented in Table 3. The analysis was carried out on a table containing 5 * 7 * 5 * 2 * 2 cells (education * occupation * period * sex * working experience). With a number of cells of 700 and with a sample size of 371,127 individuals, the average cell is 530 individuals. Only 45 of the 700 cells are not filled, and the results of our estimates are robust.

In model 1 (independence model), we investigate whether there is a relationship between the education level and the job level of workers. On the basis of the fit statistics, we conclude that the independence model must be rejected. There is in fact a relationship between education level and job level. In this respect, model 2 shows this relationship using a uniform association parameter. The inclusion of this parameter creates a considerable improvement over the indepen-

dence model. By using only one degree of freedom, G^2 of the independence model is reduced by no less than 89.5 per cent. We also see that Δ decreases from 27.1 to 7.2 per cent. Model 2 can be improved by varying the uniform association parameter over the rows and columns of the table (model 3: row and column effects model). By optimizing the scale values, the row and column effects model fits the data quite well ($rG^2 = 93.1$), but, as indicated above, the disadvantage of such a model is that the rescaling is not based on theoretical considerations. Hence, model 4 introduces scale values for the education and occupation variables based on percentile scores. We do not vary the percentile scores for education and occupation over period, gender and working experience. This scaled association model also creates a considerable improvement in relation to the independence model. By using only one degree of freedom, G^2 is reduced by 73.1 per cent. In addition, it appears that a priori assigning of scale values by percentile scores works well, because by using this method, we approach the optimally scaled row and column effects model by no less than 78.5 per cent (73.1 divided by 93.1). This confirms our idea that education is a positional property. The scale values in model 5 are also based on percentile scores, but unlike model 4, the percentile scores are now assigned within each year. In this way, we take into account the changes in the distribution of the labor force according to educational attainment and level of occupation. Model 5 fits the data better than model 4, because G^2 of this model is lower. In model 6, we varied the percentile scores not only between the different years, but also between men and women. This was done because, on average, women have a lower educational level, work in part-time jobs more often, and (partly) because of this end up in lower-level jobs. In addition, most women concentrate on a small part of the labor market (with occupations such as teachers, nurses, and so on), in which they rarely compete with men. We see that G^2 decreases further. If we also assume that school-leavers rarely compete with 'insiders' in the labor market, we arrive at model 7. In this model, we varied the percentile scores not only over period and gender, but also over the amount of working experience of individuals. As model 7 fits the data less well than model 6, we have decided to take model 6 as the starting-point for further analysis.

Using model 8, we investigate whether the scaled association parameter from model 6 has changed in the course of time. On the basis of Thurow's job competition model, we do not expect any differences. Education is a positional property and hence any developments in the returns to educational credentials are purely the result of structural changes. If it were to appear that the scaled association parameter varies over time, then the preferences of employers and employees have changed. After all, a logodds ratio is independent of marginal distributions in a table. Table 3 shows that G^2 of model 8 has decreased by 129 (54,628–54,499) points compared with model 6. This is significant, at a loss of 4 degrees of freedom ($p < 0.001$). This indicates that the scaled association parameter has changed during the period 1960–91. Table 4 represents the nature of the change. In the first column of parameters, the association between education and occupation is indicated for the various years. In 1960, the scaled association parameter equals 11.843. This means that the increase of the relative educational position (expressed in percentiles) is accompanied by a linear increase of the logodds of a high percentile score in the distribution of job levels. In the other years, the association between education and job level is considerably higher; in 1973 the loglinear association is 0.314 points higher, in 1977 it is 0.453 points, in 1985 it is 1.726 points, and in 1991 it is 0.890 points. Apparently, changes in the returns to credentials are caused not only by structural changes in the labor market, but also by changes in the preferences of employers and employees.

Next, we examine how the developments in this association can be explained. Are they the result of changes in the distribution regime of modern society (modernization) or of economic developments in the labor market? In model 9, we test whether the association between education and job level is positively related to the degree of modernization of the Dutch labor market. Modernization is determined on the basis of a modernization index created by de Graaf & Luijkx (1992), which includes such indicators as the domestic product per capita. The hypothesis is that the association between educational level and job level will be stronger in a modern economy. Although model 9 fits the data worse than model 8 ($G^2 = 53$; $df = 3$; $p < 0.001$), it is a reasonable improvement in relation to the scaled association model that does not assume a trend (model 6). Apparently, the modernization process cannot explain the

entire historical development in the association between education and occupation.

In model 10, we investigate the hypothesis that economic development plays a role. Is it true that employers set higher educational demands when the surplus supply in the labor market is greater? We use the unemployment rate as an indicator for the labor supply surplus in the years concerned (CBS 1994). Table 3 shows that model 10 fits the data less well than model 8, but better than model 9. Apparently, economic trends have a greater influence on the relationship between education level and job level than modernization. This also becomes apparent from model 11, in which the modernization index and the unemployment percentage have been included simultaneously. In the second column of Table 4 one can see that both parameters are positive, but that only the unemployment rate has a significant influence on the association between education and occupation. This conclusion is a preliminary one, however: the modernization of the labor market proceeded at the same pace as unemployment between 1960 and 1991, with the exception of the period between 1985 and 1991, when the unemployment rate dropped while production continued to increase. Partly because we only have five years to observe, it is difficult to decide whether the increased association between education and occupation should be attributed to modernization or to economic trends. The fact that the association decreased again between 1985 and 1991, however, suggests a slight preference for the economic fluctuation hypothesis.

In the other models from Table 3, we deal with the differences between men and women and with the differences between individuals with much and those with little working experience. These models should indicate whether our scaled association models are plausible. Models 12 and 13 show that the association between education and occupation does in fact vary between the two working experience groups and between men and women. In model 14, we test whether the economic developments have an effect on the relationship between working experience and the association between education and occupation. This four-way interaction model improves the model fit, which is not the case if we subsequently add the same interaction effect for gender (model 15). Model 16 is the most complex model; it shows that a five-way interaction is not necessary for an adequate description of the data.

The estimates of the significant interaction terms are represented in the last column of Table 4. First, we see that the logodds ratio of the association between education and occupation for individuals with more than ten years of working experience is smaller than that for individuals with up to ten years of experience (-0.734). Education has a greater effect on a person's position in the labor market at the beginning of one's professional career than later on. Also, the assumption that the association between education and occupation is stronger for women than for men is supported by this model (0.814). Lastly, the effect of economic trends on the association between education and occupation appears to be smaller for individuals with a great deal of labor-market experience than for school-leavers (-0.210). Such persons generally have a permanent job and are less vulnerable for economic fluctuations than newcomers in the labor market.

Model 14 is our final model, although it does not meet the conventional significance criteria with respect to a proper fit. The large number of respondents makes it difficult to find a fitting model. Also for theoretical reasons, we consider model 14 to be very powerful. Using only five parameters, we are able adequately to show the developments in the association between education and occupation ($rG^2 = 74,7$). In addition, Δ shows that the model fits reasonably well. Almost 90 per cent (100–10.3) of the cases are predicted in the correct cell by the model.

5. Conclusions and discussion

In this article, we have investigated changes in the occupational returns to educational credentials in the Dutch labor market between 1960 and 1991. For this purpose, we have made use of the most reliable labor-market data collected, i.e. the 1960 Census and four Labor Force Surveys conducted by Statistics Netherlands between 1973 and 1991. Trends in the returns to credentials have been measured by the occupational level attained by educated individuals from different cohorts, taking into account their working experience and gender.

The empirical results show that there is a considerable inflation of credentials in The Netherlands. School-leavers are affected most; despite their much higher level of education, the jobs that they obtain are hardly any higher in 1991 than they were in 1960. Nowadays, certificates give access to labor-market positions

Table 4. *Loglinear parameter estimates (standard errors between parentheses) for the association between education and occupation for the working population in paid employment, 1960–91* (n = 371,127)

Variable[a]	Model 8	Model 11	Model 14
SAPS	11.843* (0.047)	11.080* (0.058)	11.481* (0.066)
SAPS * P			
1960	Ref.		
1973	0.314 (0.098)		
1977	0.453* (0.096)		
1985	1.726* (0.172)		
1991	0.890* (0.140)		
SAPS * M		0.074 (0.075)	
SAPS * W		0.150* (0.023)	0.207* (0.018)
SAPS * E			
0–10 years			Ref.
11 + years			−0.734* (0.127)
SAPS * S			
Men			Ref.
Women			0.814* (0.092)
SAPS * W * E			
0–10 years			Ref.
11+ years			−0.210* (0.035)

[a] See Table 3 for the abbreviations used.
* Significant ($p < 0.001$).
Source: CBS, 1960 Census, and 1973, 1977, 1985 and 1991 Labor Force Surveys; own calculations.

at considerably lower job levels. During their professional careers, school-leavers partly make up the arrears *vis-à-vis* earlier cohorts of labor-market entrants, but part of the skill under-utilization remains. Earlier labor-market cohorts would have achieved a great deal more in their careers with the same certificates.

Furthermore, we conclude that the main reason for the inflation of educational creden-tials that has occurred lies in the dissimilar developments in the distribution of education and in the qualitative structure of employment. As the upgrading of occupational activity has not kept up with the great expansion of education, a process of credential inflation has started. This provides empirical support for the theory of job competition. Education is a positional property and those with the highest education are the primary candidates for the best jobs. The credential inflation is greatest for the lower educated. Individuals with lower secondary education are pushed into the lower regions of the labor market, where they compete with individuals who obtained no credentials whatsoever after primary education.

There are two historical trends in the net association between education and occupation. First, the influence of economic trends appears to be considerable. When the surplus labor supply in the labor market is great, the association between education and occupation is stronger. We assume that employers select more strictly in the case of ample supply. Secondly, we find support for the hypothesis that the modernization of the labor market causes an increase in the association between education and occupation. Between 1960 and 1991, the association between education and occupation has increased, but it is difficult to distinguish between the effects of economic trends and the effects of modernization. During this period, the economy experienced an upward trend and the modernization of the labor market continued. We also find indica-tions, however, that suggest that the influence of the economy is slightly stronger than the influence of modernization.

The principle behind job competition is as applicable at the beginning of the 1990s as it was in the 60s, and education has remained a positional property. The rat race between the higher and lower educated for higher-level jobs leads to a victory for the higher educated even more than was the case before. Employers have apparently increased the importance of educa-tional credentials as a selection criterion. The ample supply in the labor market provided them with the opportunity in this respect, but the increasing emphasis on productivity in the modern, efficient labor market has also played

a role. Our results suggest that the lower educated suffer most from these developments in the labor market. First of all, they have always experienced the greatest disadvantage from qualitative discrepancies between the expansion of education and the upgrading of occupational activity. This discrepancy has only increased during the past few decades. In addition, employers have increasingly used education as a selection criterion. Therefore, it is likely that the difference in the labor-market value between qualifications at the lower and the higher level will remain or even increase in the future.

Finally, we have to remark on two issues. First, education has only been considered here as an economic investment. However, it should be recognized that education brings benefits other than those of labor-market placement. Education not only affects an individual's labor-market position, but also his or her health, marriage opportunities, cultural behavior and political interest. In general, a high level of education leads to a higher life expectancy, more success in mate selection, better capacities and resources for the participation in so-called high-brow culture and a larger interest in political issues. Moreover, the proliferation of educational credentials in modern societies has contributed to their current high standards of living.

Secondly, in this article there is a strong assumption that employers place an extremely high value on educational qualifications. Although it is true that education is an important determinant of occupational success, it must be admitted that employers value various skills other than educational qualifications. Most employers also place a lot of value on 'soft' factors such as communication skills and certain personality traits in hiring decisions (Spencer & Spencer 1993). Only recently, however, attempts have been made to explore the importance of cognitive abilities, learning skills and personality (Nijhof 1998). For this reason, future research on allocation processes in the labor market could be improved by testing the predictive power of these characteristics of people on their occupational success.

Acknowledgements

Notes

[1] The distinction made here between changes in the marginal distributions of education and occupation, and the net association between education and occupation is analogous to the distinction between structural and circulation mobility that is made in the analysis of social mobility tables (Hout 1983).

[2] In The Netherlands, the linkage between the education and training system on the one hand and the employment structure on the other is more differentiated than the one-dimensional approach outlined here. Apart from a vertical hierarchy, there is also horizontal differentiation, as becomes clear from the existence of a (mainly) school-based vocational training system and the occupation-specific educational re-quirements on the labor market (de Graaf & Ultee 1998). The vertical arrangement, however, is usually the decisive factor, as can be seen from the advantages that the higher educated have. The risk of unemployment, occupational status, income level, legal security, and job satisfaction are all strongly related to educational level (SCP 1994). In our view, a one-dimensional approach does not give a complete, but adequate, and parsimonious view on the linkage between education and work.

[3] The data from the 1960 Census concern a sample taken from the data set available at the Steinmetz Archive. The sample includes every 22nd respondent. The data from the 1985 Labor Force Survey are based on a 50 per cent sample from the original counts.

[4] Although the data were collected for the same purpose, the different surveys were not comparable without any adaptations. First, the sampling method differed for the various years and the definition of the working population was changed several times. In the 1960 Census a narrower definition of the concept of working population has been used than in the Labor Force Surveys. To be considered as part of the working population in 1960, one needed to work for at least 15 hours a week (at least 8 hours for teachers). Such a criterion was not used for the other years. Nevertheless, we believe that this 15-hour criterion has no serious consequences for the analysis, because there were hardly any part-time jobs in 1960 (van den Born & van Ours 1992). In 1985, the definition of the working population changed again. With respect to the 1985 and 1991 Labor Force Surveys, this meant that respondents (1) had to be actively looking for and (2) be immediately available to accept work in order to qualify for the category of 'not working'. The questions asked in the 1991 survey also differed; contrary to the earlier Labor Force Surveys, individuals with a small job were included in the working population here. In addition, changes made by Statistics Netherlands in the classification of types of education and of occupations during the period 1960–91 have led to some difficulty in comparing the data. Before 1978, Statistics Netherlands made use of the education classification from the 1960 and 1971 Censuses. Although the two classifications are quite similar, the 1971 classification is more detailed. The 1973 and 1977 Labor Force Surveys made use of the classification from 1971. Since 1978, Statistics Netherlands has classified education data according the Standard Education Classification (Standaard Onderwijs Indeling, or SOI). The main difference between this classification and the previous one concerns the apprenticeship system, which has been indicated as higher secondary education instead of lower secondary

education since 1978. The most common changes have been included in a recoding scheme produced by Statistics Netherlands, allowing the education classifications applied before 1978 to be recoded to SOI 1978. Despite minor differences that remain, a comparison is quite possible. The problems relating to the comparability of occupational data can be attributed to the varying levels of detailing, without the occupational classification itself having changed notably in the course of time. For the 1960 Census, and the 1973 and 1977 Labor Force Surveys, we used 4-digit occupation data (at the level of occupations), while Statistics Netherlands only supplied 3-digit occupation codes (at the level of occupational groups) for the 1985 and 1991 Labor Force Survey.

[5] The grading of work used here is quite similar to that in the United States-developed General Educational Development (GED) scale of the Dictionary of Occupational Titles (DOT) to measure the years of schooling required (Eckhaus 1964; Scoville 1966). Furthermore, our seven-point job level scale highly correlates with international available scales for occupational status. The Pearsonian correlation between the scale used in this article and the International Socio-Economic Index of Occupational Status (ISEI) produced by Ganzeboom et al. (1992) is 0.74; the correlation with the Standard Index of Occupational Prestige (SIOPS) produced by Treiman (1977) is even higher: 0.81.

[6] The same pattern of credential inflation is found when using other scales for occupational status. For instance, for men with 0–10 years of working experience, the overall mean occupational status (ISEI) score rose from 38 in 1960 to 45 in 1991. This indicates that the labor force has occupationally upgraded. For each level of education, however, decreasing returns to education are observed. Once again, except for those with no more than primary education (mean ISEI score is 33 in 1960 and 1991). For school-leavers holding a certificate at the lower level of secondary education, the drop in ISEI score is 4 points, for those with higher secondary education 10 points, for those with tertiary education, vocational colleges 3 points and for those with an academic degree 5 points. Similar results are found when using Treiman's prestige scores (SIOPS).

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