

The Changing Balance between Educational Qualifications, Occupations and Gender in the Netherlands and five other EU Memberstates between the 70's and 90's

J. Dronkers

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# The Changing Balance between Educational Qualifications, Occupations and Gender in the Netherlands and five other EU Memberstates between the 70's and 90's

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## 1. Introduction

The changing balance between educational qualifications and occupations in six European memberstates<sup>1</sup> during the 70's and 80's has been the central topic of a two stage project sponsored by the European Union's Centre for the Development of Vocational Training (CEDEFOP). The question of this project is whether the changing educational qualifications within each occupation could be predicted either by the combination of higher educational levels of each younger generation entering the labour market and lower educational levels of each older generation leaving the labour market or by specific changes of required educational qualifications of each occupation. Béduwé and Espinasse (1995) developed a mathematical method to distinguish between general changes in the population as a whole and specific changes within occupations (the so-called RAS method). This method simulates the consequences of the changes in the educational levels, the age groups and the employment in occupations for a younger cohort, based upon the relations between educational levels, age groups and employment in occupations in a older cohort. This RAS method can the best be described as a combination of two 'shift-share' exercises, by using an interactive process to ensure that the absolute numbers of persons holding educational qualifications within each occupations are restricted while changing the numbers of persons of each occupation and of each educational qualification. For the more theoretical and mathematical background of this RAS method but to refer to Béduwé and Espinasse (1995).

The general conclusion of the first stage of this CEDEFOP project was that the majority of the increases of the educational levels of occupations of these six European memberstates could be predicted by the general increase of the educational level of the working population as a whole and by the general changes in the age of the working population. Only a minority of the occupations had changes in their educational levels which could not be predicted by the general changes in education and age (Mallet, 1997; Dronkers, 1997). This result of the first stage suggests that the increase of a better educated labour force allowed firms to employ more highly qualified staff to do jobs which previously were done by less educated staff, thus encouraging 'diploma inflation'. This high predictability of the increase of educational level across all occupations undermines the alternative technological explanation that it are foremost skill changes, which are technological necessary and specific for different occupations, driving up the

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\* Address: SCO-Kohnstamm Institute, University of Amsterdam, P.O. Box 94208, 1090 GE Amsterdam, the Netherlands. E-mail: [jaapd@sco.educ.uva.nl](mailto:jaapd@sco.educ.uva.nl). This article is the Dutch contribution to an international research programme, initiated by LIRHE (University of Toulouse, France) in 1995 and subsidised by CEDEFOP (Thessaloniki, Greece). Participants of this international programme were: LIRHE (co-ordinator), GRET of the Autonomous University of Barcelona (Spain), ZSH of the University of Halle (Germany), SCO-Kohnstamm Institute of the University of Amsterdam (Netherlands), CERES of the University of Rome (Italy) and the London School of Economics (United Kingdom).

educational level of the labour force. One could call this explanation a strong technological explanation of the increased level of the labour force in the EU memberstates. However, a possible counter-argument might be that nearly all occupations have undergone comparable changes in their required skills, next to specific changes for some occupations. One could call this a weak technological explanation, which assumes that the post-industrial society requires more qualifications of its citizens and thus of its labour force without much differentiation between the majority of the occupations. Both the weak or strong technological explanation would expect that within European Union the same occupations would deviate from the general rise of the qualifications of the labour force. Each occupation of the different memberstates of the European Union has to face more or less equally the changes in the technologies and productivity structures of their occupation, because they act on a single market under more or less the same technological and economic constraints and opportunities. If this technological explanation (both in his strong or weak version) is true, more or less the same occupations in the different EU memberstates would have occupation-specific changes in their educational level.

This article reanalyse the earlier Dutch study (Dronkers, 1997) but extends it in three important ways: 1. splitting the analysed period into two periods; 2. finer division of occupations, the addition of unemployment as 'occupation' and a improved measurement of educational level; 3. the introduction of the difference between male and female labour force.

The Dutch comparison of the first phase covered nearly two decades: from 1973 to 1992. During this period the economic situation in the Netherlands changed profoundly.

The labour market of 1973 reflected the economic boom which started in the 50's and ended in the earlier 70's. The hugh decline and restructuring of the Dutch industrial sector had still to start. Married women had not yet entered the labour market massively. The large post-war baby-boom<sup>2</sup> had just entered fully the labour market, because the baby-boom generation stayed much longer in school, college or university than older generations. The social security system was still expanding during the 70's, ensuring the rights for those who had already entered the labour market, but at the same time pulling down those rights for those who still had to enter or re-enter the labour market.

The labour market of 1992 reflected the decline of the Dutch industrial sector, the stagnation of the state-dependent sectors and the rise of the service sector. The large post-war baby-boom generation was in their mid-careers, while the early retirement schemes had virtually forced older generations out of the Dutch labour market into retirement, long-term sickness leave or physical inability for work. Women, both married and unmarried, had entered the labour market in increasing numbers, although the majority of the married women in part-time jobs. The flexibilization of the Dutch labour market had increased strongly in a joint effort of government, trade unions and employers organisations, not only for beginners but also for the established employees. The Dutch social security system had become more thrifty, perhaps not for European standards but certainly in Dutch opinion. The increase in part-time jobs, for both men and women, boosted the number of persons on the labour market to record levels without increasing the number of total worked hours. The educational level of young generations entering the labour market increased strongly, although the level of young women increased faster than those of young men. In order to be more comparable with the analyses of the other participants, which covered a smaller period, we added a extra point of comparison: a measurement of the Dutch labour force in 1985. The comparison 1973-1985 refers to the period with the deepest post-war economic crisis in the Netherlands, with the first measures to

flexibilize the Dutch labour market and with the majority of the post-war baby-boomers entering the labour market. The comparison 1985-1992 refers to the period with a again growing economy, but with falling numbers in the younger generations entering the labour market.

In this article we make a finer distinction of the occupations than we did in the earlier study (Dronkers, 1997). This might increase the probability of finding more occupation-specific changes in increased educational levels. If one distinguish only between very gross occupational groupings, one cannot be surprised by finding a low percentage occupation-specific changes and a high percentage general changes. Gross occupational groupings can easily hide occupation-specific changes by neutralising each other with a grouping. The finer the distinctions between occupations, the higher the probability of finding more occupation-specific changes.

One of the consequences of the economic crises since the 70's is a permanent category of unemployed in nearly all European societies. Given the structural nature of long term unemployment, we can treat unemployment as a 'occupational group', to seen whether the educational level held by the jobless has changed in a similarly predictable fashion as for the employed workforce.

As said before during the 70's and 80's the female labour market participation in the Netherlands grew strongly, as a consequence of increasing numbers of older women re-entering the labour market, growing percentages of married women who remain actively at the labour market after becoming a mother (although often with less working hours than before the birth of her children) and the introduction of an obligation for all female school-leavers to enter the labour market in order to be eligible for social welfare. However, the increased female participation has not been equal in all occupations, quite the contrary. Given the unequal participation of men and women in different occupations and the catch up of female educational levels with male educational levels, it make sense to analyse the changes of educational levels and of age structure within occupations separately for men and women. The separate analyses for men and women are only made for the 1985 and 1992 data.

## 2. Hypotheses

The first part of our first hypothesis states that *the majority of the changes in the educational levels of occupations during the 70's, 80's and early 90's are more not occupation-specific but can mainly be explained by general changes in education and age levels of the labour force and by changes in the occupational structure*, because a large part of the increase of the educational level of the labour force arises from 'diploma inflation'. The second part of our first hypothesis states that *the first part is true for the studied EU memberstates*, while their societies and its participants have to face more or less equal technological, economic and social constrains and opportunities.

The second hypothesis states that *some Dutch occupations have a significant weaker or stronger increase of the education and age levels than the other Dutch occupations, after control for the general changes in education and age levels of the labour force and by changes in the occupational structure*. The second part of the second hypothesis states that *more or less the same Dutch occupations deviate from the general changes in the 70's and 80's*, because a occupation within these two decades in Netherlands has more or less equal technological and

economic constraints and opportunities. If the second part of the second hypothesis is rejected, the strong version of the technological explanation of the growing educational participation cannot be accepted.

The third hypothesis states that *the first and second hypotheses are equally true for both the male and female part of the Dutch labour force, after control for the general changes in education and age levels of the Dutch labour force and by changes in the occupational structure*, because the gender segregation in the Dutch labour market and the household has not changed profoundly, despite the increased female participation in education and labour market.

### **3. Three labour market cohorts between 1973 and 1992**

The first measurement of the educational levels, gender and age characteristics of Dutch occupations is obtained from the 'Labour market Survey 1973', collected by the Dutch Central Office of Statistics and obtained from the Steinmetz Archives in Amsterdam.

The second measurement of these characteristics of Dutch occupations is obtained from the 'Labour market Survey 1985', also collected by the Dutch Central Office of Statistics and obtained from the Foundation of Economic Research of the University of Amsterdam.

The third measurement of the educational levels and the other mean characteristics of Dutch occupations is obtained from the 'Survey of the labour force 1992' of the Dutch Central Office of Statistics, which is available from the Scientific Statistical Agency of the National Science Foundation.

All three data surveys are stratified samples of all persons in the labour force. We reweighed the samples with the weights given by the Central Office in order to make the sample representative for the total labour force and as large as the labour force in 1973. This reweighing have increased the analysed numbers far above the measured numbers. The advantage of this procedure is that we can maintain a fine distinction of occupations. However, in occupations with small numbers of practitioners this might have let to misrepresentations because the results are based upon only a few cases. Given the procedures of the 1992 survey, everybody without employment who only wanted to work less than 12 hours pro week or was not immediately available for accepting a job was excluded from the survey. This restriction can have let to a underestimation of the unemployed women, given their preference for part-time jobs. The same 1992 survey posed another restriction: for reasons of privacy it makes the occupations on a less detailed level available for scientific research: the level of the 116 minor groups of occupations of the ISCO-88 code (ILO, 1990). This forces us to recode the available occupations, given in the two other samples, into these 116 minor groups of occupations.

All respondents with a unknown occupation, without an occupation, on early retirement, on long term sick leave or physically unable to work we coded together with the real unemployed as unemployed. The coding of the early retired<sup>4</sup>, the long term sick and the physically unable as a form of unemployment is justified by the functioning of the Dutch social security system as a safety net for potential unemployed and a way to increase productivity.

We made four educational levels, based on the highest obtained diploma: only primary education (including the unknown), first phase of secondary education, second phase of secondary education and tertiary level. We do not distinguish between general and vocational

education which are available on all but the lowest level.

We made five age groups: younger than 25 year, 25-35 years, 35-45 years, 45-55 years and older than 55 years.

All the occupational groups and their educational levels (both real and estimated by RAS), as they have been used by the RAS analyses, are shown in appendices I and II. Within some occupational groups employees with a certain educational level do not exist (for instance there are no economists (1G) with only primary education). The occupational groups are only named after the most important occupation within the occupational group, but also other occupations are clustered by the ISCO-88 into that occupational group. One of the requirements of the RAS method is that in a combination of occupation\*educational level\*age\*cohort group have more than zero employees. As a consequence combinations with zero employees in both cohorts are not included in the analyses. But it is possible that a certain combination has zero employees in one cohort and has more than zero employees in the other cohort. In that case that combination is also left out of the RAS analyses<sup>5</sup>. This might have led to some misrepresentations in the RAS analyses for occupational groups with small numbers of employees in one or two cohorts. But these small numbers in one cohort reflect real world changes, for instance the decline of mining in the Netherlands produced the fall of numbers of miners and quarrymen (72). The decline of numbers of employees below the age of 25 years from 26% in 1973 to 16% in 1992 has produced drastic changes in the distributions of employees within occupations, just as the decline of the employees with only primary education from 35% to 13% or the increase of employees with tertiary education from 11% to 24%. However, these small numbers or drastic changes in the distributions are mostly not survey-faults but reflections of real-world changes, and therefore no reason to be deleted from the analysis in order to smoothen the results. Inspection of the data shows in only a few cases this requirement of the RAS method might have led to some misrepresentations<sup>6</sup>.

The problems of drastic changes in numbers and distributions become even more clear if one splits the labour force into a male and a female part. The percentages of the female labour force grew from 22,7% in 1973, to 30,7% in 1985 to 34,7% in 1992 (table 1). At the same time the age distribution and the educational level of the female labour force changed more drastically than the age distribution and the educational level of the male labour force (see tables 2 & 3). These changes in numbers and distributions of female labour force in the Netherlands reflect the growing acceptance of working mothers by Dutch society<sup>7</sup>, the increased re-entering of older, often lower educated women into the labour market at the moment their children are grown-up<sup>8</sup>, the introduction of an obligation for younger women to enter the labour market to be eligible for social welfare, the increasing continuation of female labour market participation after birth giving and high educational levels as a mean for women to insure against the negative consequences of growing probability of divorce, the faster rise in educational participation by women than by men and the opening of some male dominated occupations (not all) for women. Generally speaking as a consequence of these drastic changes some combinations of older women with higher educational levels within certain occupations were not yet filled in the older cohort, while other combinations of younger women with a low educational level within certain occupations are no longer available in the younger cohort. The RAS requirement can be more harmful, because more combinations of educational level, age group and occupation will have a zero in one of the cohorts. Appendix II illustrates these problems clearly, but again these are mostly real-world changes and not artificial disturbances caused by the research and sample

design. In order to avoid too many problems, we restricted the RAS analyses for the separate male and female labour force to the 1985-1992 period.

In spite of these possible misrepresentations by this requirement of the RAS method and by the reweighing of the samples for the small occupations, we believe that maintaining as many as occupations possible is a better procedure than combining occupations into broader categories if one tries to distinguish between occupation-specific changes in increased educational levels and general increase of educational levels across all occupations.

Table 1 gives more general information about the distribution of gender, age groups, educational levels and occupations for the three surveys.

It gives clearly evidence of the increased female participation in the Dutch labour force, which comprehended increasing absolute numbers of persons. The entrance of the baby-boomers into the labour market in the 70's, followed by smaller generations in the 80's and 90's due to the fall in the birth rates since the 50's, and their march through the age groups in the 80's and 90's can also be seen clearly. Table 1 shows also a declining share of employees older than 55 years in the labour force, as a consequence of the rise of early retirement schemes. As a consequence absolute numbers in given combination of occupation\*age have can changed dramatically between 1973 and 1992.

This is specially true if we extend the combination to occupation\*age\*educational level, as the combinations are used in the RAS analyses. Table 4 shows clearly changed relation between educational level and age in the last tow decades. Young employees (<25; 25-35) with only primary education dropped from 28% or 27% in 1973 to 10% or 9% in 1992. In the same period young employees with higher secondary education or more grew from 18% or 31% in 1973 to 58% or 72% in 1992<sup>9</sup>. The percentages for the older employees (45-55; 55<) changed also dramatically: only primary education 43% or 56% in 1973 to 18% or 25%; higher secondary or more education 26% and 21% in 1973 to 58% and 50% in 1992. Given these strong demographic fluctuations at the Dutch labour market and the strong increase in educational attainment, the absolute numbers with each education\*occupation\*age combination changed strongly between 1973 and 1992.

Table 1 shows clearly the strong increase of the percentage unemployed from 5% in 1973 to 16% in 1992. It also illustrates the economic restructuring of the Dutch economy: the percentages in the labour market of construction worker (7S), painter (7Q), plumber (7J), blacksmith (7E), tailor (7A), production supervisor (7I), farmer-owner (6B), salesman (4F) and shopkeeper-/retail-owner (4D) declined more than 50% in the 1973-1992 period. In the same period other occupational groups doubled their share in the labour force, for instance: physicians & nurses (1E), mathematicians (1F) and not-specified scientific professionals (1X). More generally stated, this part of table 1 illustrates the results of the decline of the farming and industrial sectors and the rise of the service sector for the distribution of occupational groups.

## 4 Changes in the educational level of total labour force between the 70's and the 90's: general or occupation-specific?

This section deals with our first and second hypotheses and thus only the total labour force. The analyses of the separate male and female labour force will be discussed in section 5.

### 4.1 The degree of general and occupation-specific changes in some EU memberstates

In this sub-section we test our first hypothesis: *'the majority of the changes in the educational levels of occupations during the 70's, 80's and early 90's more not occupation-specific but can mainly be explained by general changes in education and age levels of the labour force and by changes in the occupational structure and this is true for the studied EU memberstates'*.

Table 5 shows the result of the analyses, not only of the Dutch data but also for Spain (Masjuan, Giret, Vivas & Zaldivar, 1997), France (Béduwé & Vincens, 1998), Germany (Lutz & Bayer, 1998), Italy (Frey, Ghignoni & Regoli, 1998) and the United Kingdom (Robinson, 1997). This table gives the result for many different comparisons, which have often not quite the same period, the same educational levels or the same numbers of occupational groups, but which are comparable in the applied models.

For the Netherlands it gives the results of the different analyses in five columns: 1. Total 85-92: analyses for the all relevant combinations of occupation\*age\*education\*gender between 1985-1992 in the total labour force; 2. F 85-92: analyses for all relevant combinations of occupation\*age\*education of the female labour force between 1985-1992; 3. H 85-92: analyses for all relevant combinations of occupation\*age\*education of the male labour force between 1985-1992; 4. Total 73-85: analyses for all relevant combinations of occupation\*age\*education between 1973-1985 in the total labour force; 5. Total 73-92: analyses for all relevant combinations of occupation\*age\*education between 1973-1992 in the total labour force.

For Spain, France, Italy and the United Kingdom table 5 gives three different analyses: one for the total labour force of two cohorts, one for the male and the other for the female labour force of the same cohorts. There are six different analyses for Germany: four with the total force of six cohorts and one for the male and the other for the female labour force of only two cohorts. The titles of the columns gives the years of the cohorts and compared labour force, in the same fashion as for the Netherlands.

The first part of table 5 (line 1-4) focuses on the similarity between the **absolute** numbers of employees in all occupation\*education\*age combinations of the older and younger cohort (Résultats en effectives). Line 1 (Variation observée) gives the similarity between the observed absolute numbers of employees in all occupation\*education\*age combinations of the older and younger cohort. Line 2 (Variation de l' offre de compétence) gives the similarity between the estimated absolute numbers of employees in all occupation\*education\*age combinations of the younger cohort (adjusted for the overall absolute changes in the educational levels and age in that period) and the observed absolute numbers of employees in these combinations of the older cohort. Line 3 (Variation de la demande de compétence) gives the similarity between the estimated absolute numbers of employees in all occupation\*education\*age of the younger cohort (adjusted for the overall absolute changes in the occupational groups in that period) and the observed absolute numbers of employees in these combinations of the older cohort. Line 4 (Variation simultanée) gives the similarity between the absolute numbers of employees in all occupation\*education\*age combination of the younger cohort (estimated with the RAS method,

which tries to adjust simultaneously as economically as possible for the overall absolute changes in educational levels, age groups and occupational groups in that period) and the observed absolute numbers of employees in these combinations of the older cohort.

The second part of table 5 (line 5-8) focuses also on the similarity between the occupation\*education\*age combinations of the younger and older cohort, but it uses **percentages** of the different age\*education combinations within each occupation in stead of absolute numbers (Résultats en structure). Line 5 (Variation observée) gives the correlation between the observed percentages of the education\*age combinations within the occupations in the older and younger cohort. Line 6 (Variation de l' offre de compétence) gives the similarity between the estimated percentages of the education\*age combinations within occupations in the younger cohort (adjusted for the overall percentage changes in the educational levels and age) and the observed percentages of these combinations in the older cohort. Line 7 (Variation de la demande de compétence) gives the similarity between the estimated percentages of the education\*age combinations within occupations in the younger cohort (adjusted for the overall percentage changes in the occupational groups) and the observed percentages of these combinations in the older cohort. The similarities of this line has to be equal to those of line 5. Line 8 (Variation simultanée) gives the similarity between the percentages of the education\*age combinations within occupations in the younger cohort (estimated with the RAS method, which tries to adjust simultaneously as economically as possible for the overall percentage changes in educational levels, age groups and occupational groups) and the observed percentages of these combinations in the older cohort.

The period compared for the Netherlands is the longest for the six memberstates. Also the 70's are scarcely included into any other comparison of this CEDEFOP project. Only the German comparison starts in the late 70's. As a consequence of the long compared period but also of the inclusion of the 70's with its economic crises and restructuring, with its massive entering of women in the labour market and with its entree of the large highly educated baby boom into the labour market, the similarity between the observed absolute numbers in the combinations of the Dutch older and younger cohort is lowest. The similarity between the observed absolute numbers in the occupation\*age\*education combinations of 1973 and 1992 is quite low (line 1: 24,9%), but it increased strongly if one controls for the overall absolute changes in the educational levels, age groups and occupational groups to 78,5% (line 4). Although it is still the lowest of the analysed memberstates it approaches the 89,7% of Germany for which the analysed period 1978-1993 is only five year shorter. The same holds for the similarity between the observed percentages in the age\*education combinations within occupations of 1973 and 1992: it is only 29,3% (line 5) but it increases to 63,4% after controlling for the overall percentage changes in the educational levels, age groups and occupational groups (line 8). Again this level of similarity approaches that of Germany for the 1978-1993 period: 81,2%. The differences between the results of lines 1 and 2 and between the results of lines 5 and 6 indicate that the low observed similarity can be mainly explained by the general changes in the educational levels and age between 1973 and 1992: if one controls for that general educational increase and the change in the age distribution the similarities are large. They are larger if one controls for the overall changes in educational levels than if one controls for the overall changes in the occupational groups, as one can see from the differences between the results of lines 2 and 3 and between the results of line 6 and 7. This suggests that changes in the educational level and age of the labour force (l' offre de compétence) explains more of the dissimilarities between

1973 and 1992 than changes in the occupational structure (la demande de compétence).

The resemblance between the results for 1973-1985 and 1973-1992 is larger than the resemblance between the results for 1985-1992 and 1973-1992. This can be explained in two ways. The first explanation is that the data for 1973 are not reliable. However I don't see a good argument for that because the tables 1 to 4 don't suggest such an unreliability. The second explanation is that the 70's and early 80's were a more radical period for the Netherlands than the late 80's: the economic crises (specially the second oil crisis) was severe with the rising high unemployment specially among the elder employees, the exodus of the elder employees out of the labour market, the decline of industrial sectors, the sudden and unplanned increase of female labour market participation and the inundation of the labour market by the far better educated large post-war babyboom. The observed and estimated similarities for the Netherlands in the period 1985-1992 are all higher than those for the 1973-1985 period (line 1: 73-85 38,5%; 85-92 81,0%; line 4: 78,3%; 94,0%). The Dutch results are equal to the absolute results of other memberstates for the education\*age\*occupation combinations during the same period (line 1: Netherlands 81%; Germany: 83%; UK 60%; line 4: 94%; 95%; 94%). However, the observed and estimated similarities between the percentages in the age\*education combinations within occupations are somewhat lower in the Netherlands for the period 1985-1992 than in the other memberstates in the same period (line 5: Netherlands, 68%; Germany, 79%; UK, 72%; line 8: 72%, 89%, 94%). This suggests that these more radical changes in the structure of the Dutch labour force still occurred during the late 80's and early 90's, compared to the changes in the other memberstates controlled for the overall changes in educational levels, gender and age groups.

Whatever one's preference for the explanation for the 'deviant' results for the 1973-1985 period of the Netherlands, the application of the RAS method shows that the majority of the changes in the educational levels within the occupations of these EU memberstates can be explained by the overall changes in the educational levels and the age groups of the labour force and not by occupation-specific changes. Only less than 10% of the changes in the absolute supply of qualifications within the occupations of these memberstates cannot be explained by the overall absolute changes in the occupational structure, age composition and educational level (line 4). Only around 10% to 20% of the changes in the relative supply within the occupations of the memberstates cannot be explained by the overall percentage changes in the occupational structure, age structure and educational level, with the Netherlands as an exception to this result with 28% to 37% (line 8). Thus, the majority of the changes of the demand and supply of the qualifications at the labour markets of these six EU memberstates reflects the increased output of their educational system, the demographic changes in their populations and the rise or fall of certain occupations and economic sectors. Only a minority of the changes of the demand and supply of the qualifications of the labour markets of these six EU memberstates reflect occupation-specific changes, which might indicates occupation-related changes in required educational skills. Both parts of the first hypothesis are thus confirmed by our analyses. This conclusion runs against a strong technological explanation of the increased educational level of the labour force, because it is not probable that the qualifications for the majority of the occupations have risen with the same rate. But this results does not run against a weak technological explanation, which assumes that the post-industrial society requires more qualifications of its citizens and thus of its labour force without too much differentiation between the majority of the occupations.

It is remarkably that lower similarities are found if one take percentages of the age\*education\*occupation combinations in stead of their absolute numbers, even if one take the RAS results (line 4 & 8). Although this difference can also be found in the results for the other EU memberstates, this difference is very pronounced for the Netherlands. This difference between the results of the absolute numbers and the percentages suggests that labour markets change less by simply increasing or decreasing the absolute numbers of men and women in all age\*education\*occupation combinations, but more by changing the relative position of one age\*education\*occupation combination. Stated differently, the absolute numbers in each age\*education\*occupation combination is more an expression of the importance of their relative qualifications compared with the qualification of other combinations than an expression of their absolute qualifications necessary for the production processes. This observation also contradicts a strong technological explanation, but again not against the weak version.

#### **4.2 Are the same occupations deviant in respect to changes in educational levels between the 70's and 80's in the Netherlands?**

In this sub-section we test the second hypothesis: *some Dutch occupations have a significant weaker or stronger increase of the education and age levels than the other Dutch occupations, after control for the general changes in education and age levels of the labour force and by changes in the occupational structure. More or less the same Dutch occupations deviate from these general changes in the 70's and 80's.*

Both the weak and strong technological explanation of the rise of qualifications of the labour force would expect that in both decades the same occupations would deviate from the general rise of the qualifications of the Dutch labour force, because a occupation has to face the same technological and economic constrains and opportunities in the Netherlands during both decades. But the strong technological explanation would expect that many occupations deviate from the general changes, because technological changes drive the occupational changes and thus the educational and age levels of occupations. The weak explanation acknowledge the importance of the general changes, but maintains that some occupations deviate because the specific technological developments or requirement of some occupations.

We define an occupation-specific change as a change in the educational or age levels of an occupation during these decades which cannot be explained sufficiently by the overall changes in the age groups and educational levels of the Dutch labour force in that period. We use as a yardstick of an occupation-specific change the deviance between the educational and age level of an occupation predicted by the RAS method for a certain period and the observed age and educational levels of that occupation at the end of this period. For each occupation we computed the average age and educational levels, both the observed averages in 1985 and 1992 and the averages for 1985 and 1992 predicted by the RAS method<sup>10</sup>. In the next step we regressed the observed education or age averages of the end of that period on the education or age averages, estimated by RAS for that period. The lesser observed averages can not predict RAS estimated averages, the lower the  $R^2$  of the regression. A low  $R^2$  means that the strong technological explanation is supported: it is difficult the predict the observed age of educational levels of occupations from the overall changes in the education and age levels. A high  $R^2$  supports the weak technological explanation. The closer the  $R^2$  gets to 1.00, the weaker becomes the support for any technological explanation of changes in the age and educational level, because the observed changes can nearly fully be explained by the overall changes. The RAS averages of

some occupations can better be predicted by the observed average: the worse the prediction, the higher the residual. We consider occupations with a standardised residual larger than the standard deviation of all residuals as significant deviations from the general changes in the age and education level of the Dutch labour force. Table 6 gives the results of these regressions and some further analyses.

The correlations between the observed educational level of occupations and the RAS estimation of the educational level is very high: the  $R^2$  is larger than .90, even for the longest period '78-'92. This means that only a few occupations are deviant in respect to changes in the educational level of their employees. The educational levels of the employees of the large majority of the Dutch occupations (more than 85%) increases in the same pace as the overall increase of the educational level of the labour force. Table 6 also shows those occupations which educational level increased deviantly from the overall increase, as estimated by the RAS method. A negative figure means that the observed increase of the educational level of that occupation was significantly<sup>11</sup> lower than the RAS estimation, while a positive figure means that the observed educational level was significantly higher than the RAS estimation. The strongest deviation in increase of the educational level can be found among the unemployed: in the period '78-'85 their educational level became 2.2 years lower than one could expect given the overall change of education and age in the labour force (first column of table 6), while in the period '85-'92 the educational level of the unemployed increased in the same pace as one would expect given the overall changes (third column of table 6). The combination of these two periods gives a still significant deviation of the educational level of the unemployed of 1.7 years, suggesting that the deviation in the '78-'85 period was larger than in the '85-'92 period. But the majority of these deviations are not very stable in time: the correlation between the deviations of the '78-'85 and the '85-'92 periods, given at the bottom of the table 6, is not positive or significant (-.09). Two other correlations at the bottom of table 6 (.67; .47) suggest that the deviations of '78-'85 were more dominant for the whole '78-'92 period than the deviations of '85-'92. The same holds for the differences in the standard deviations of the residuals: it is larger for the '78-'85 period (.6) than for the '85-'92 period (.5). All this support the idea that the 70's and early 80's were a period with more radical changes at the Dutch labour market than the late 80's and early 90's.

The correlations between the observed age of the employees of an occupation and the RAS estimation are lower, but still strong. For the whole period '78-'92 42% of the occupations deviated significantly<sup>12</sup> from the overall changes in the age of the labour force as estimated by RAS. Again this deviation is larger for the '78-'85 period (26%) than for the '85-'92 period (19%). Also the differences between observed and estimated figures were less in the latter period than in the former (1.7 years against 2.3 years). Occupations do not deviate equally from the overall changes in both periods: the correlation between these deviations is not positive or significant: -.13 (bottom table 6). Two other correlations suggest that the deviations of the period '78-'85 were more important than the deviations of '85-'92. The former deviations correlate higher with the deviations of the whole period '78-'92 (.60) than the deviations of the latter period (.44).

Occupations which deviate from the overall change in the educational level are not the same occupations which deviate from the overall change in age. The correlations between the residuals from the educational equations and the correlations between the age equations are not significant (-.18; -.15; -.22). This suggests that there exists not a trade-off between age (which can be seen as an indicator of work experience) and education (which can be seen as an

indicator of qualifications, related to technological requirements). Deviant development of the educational level of an occupation is not accompanied by a deviant development of the age level of that occupation.

The results of these analyses confirm that some Dutch occupations have a significant weaker or stronger increase of the education and age levels than the other Dutch occupations, after control for the general changes in education and age levels of the labour force and by changes in the occupational structure, although these deviations are not very strong. But it is not true that the same Dutch occupations deviate from these general changes in the 70's and 80's. Deviant occupations in the '78-'85 period were different from those in the period '85-'92.

## **5. Changes in the educational level of female and male labour force between the 70's and the 90's: are they comparable?**

In this section we test the third hypothesis: *'the first and second hypotheses are equally true for both the male and female part of the labour force, after control for the general changes in education and age levels of the labour force and by changes in the occupational structure but this is not true for all EU memberstates'*. In sub-section 5.1 we focus on the degree of general and occupation-specific changes, sub-section 5.2 on the gender differences in occupations which deviate from the general changes.

### **5.1. The degree of general and occupation-specific changes in the male and female labour force**

Table 5 gives also analyses of the changes in the educational levels, occupational structure and age distribution for the male and female labour force separately.

Line 1 (Variation observée) gives the similarity between the observed absolute numbers of all occupation\*education\*age combinations in the older and younger cohort. The similarity for Dutch men in the period 1985-1992 is higher than the similarity for Dutch women in the labour force (82,4 against 70,6). In Spain, France and the United Kingdom the similarity in observed absolute numbers is also higher for men than for women, but in Germany and Italy the similarity is higher for women than for men. This suggest that at least in the Netherlands but also in some other EU memberstates changes in the demand and supply of qualification in the labour market have been stronger for women than for men during the 80's and the 90's.

Line 2 gives the similarity between the estimated absolute numbers of all education\*age\*occupation combinations of the younger cohort (adjusted for the overall absolute changes in the educational levels and age) and the observed absolute numbers in these combinations of the older cohort. Again, we find that the similarity for Dutch men in the 80's and 90's is still larger than for Dutch women on the labour market, but that the difference in similarity has decreased. However, this is not true for other EU members, if one adjust for the overall changes in the educational levels. The difference in similarity remains more or less equal for Spain, France, while the difference increases for Italy and the United Kingdom. Only for Germany the differences decreases just like in the Netherlands.

The difference of the similarity for the male and female labour force remains equal during the 80's and 90's for the Netherlands, if we adjust for the overall absolute changes in the occupational groups (line 3). This is also true for the other EU memberstates.

Line 4 (Variation simultanée) gives the similarity between the absolute numbers of all

occupation\*education\*age combinations in the younger cohort (estimated with the RAS method, which tries to adjust simultaneously as economically as possible for the overall absolute changes in educational levels, age groups and occupational groups) and the observed absolute numbers in these combinations of the older cohort. In that case the difference in similarity between Dutch men and women has disappeared. That is also true for Italy. But for Spain, France and United Kingdom, the similarity is still higher for men than for women, while the similarity for German women remains higher.

If we focus in the second part of table 5 on the similarity between the percentages of the age\*education combinations within occupations, we find that the similarity in the 80's and 90's is larger for the Dutch female labour force than for the Dutch male labour force.

Line 5 (Variation observée) gives the correlation between the observed percentages of the age\*education combinations within occupations in the older and younger cohort. The similarity is a little lower than in the first part of table 5 but it is now higher for Dutch women than for men. The similarity period is both for Dutch men and women lower than the similarity in the other EU memberstates. Line 6 (Variation de l' offre de compétence) gives the similarity between the estimated percentages of the age\*education combinations in the younger cohort (adjusted for the overall percentage changes in the educational levels and age) and the observed percentages in these combinations of the older cohort. The similarity increases both for Dutch men and women, but it remains lower for Dutch men than for women and than the similarity in other EU memberstates. Line 7 (Variation de la demande de compétence) gives the similarity between the estimated percentage of the combinations of age\*education within occupations in the younger cohort (adjusted for the overall percentage changes in the occupational groups) and the observed percentages of these combinations in the older cohort. The similarities of this line has to be equal to those of line 5. Line 8 (Variation simultanée) gives the similarity between the percentages of the occupation\*age\*education combinations in the younger cohort (estimated with the RAS method, which tries to adjust simultaneously as economically as possible for the overall percentage changes in educational levels, age groups and occupational groups) and the observed percentages of the older cohort. The similarity for the '85-92 period is nearly equal for Dutch men and women, but it is still the lowest compared to the other EU memberstates. This underlines the earlier suggestion that the demand and supply of qualifications in the labour market of Dutch men and women have changed more radically in the Netherlands than in the other EU memberstates. This might be explained by the penetration of the Dutch labour market by Dutch married women, specially in part-time jobs, during the '80s and '90s. This penetration of Dutch women on the labour market was stronger in the Netherlands than in the other EU memberstates, because they had already before the '80s a larger percentage of working married women.

5.2. Do the same occupations in the male and female labour force deviates from the general changes?

We apply the same method as we did in section 4.2. to compute the averages for educational level and age of each occupation, both for the real averages in 1992 and the averages predicted by the RAS method for 1992. Table 7 gives the results.

The correlations between the observed educational averages of occupations and the RAS estimations of these averages are very high and hardly different for male and female version of occupations. The degree of deviation of certain occupations from the overall educational

changes in the Dutch labour market does not differ between men and women. Although the observed average age of occupations correlate less high with the RAS estimations of the age averages, the degree of deviation is again equal for Dutch men and women. Also the strength of the deviation, expressed by the standard deviation of the residuals, is equal for Dutch men and women. So, the penetration of the Dutch labour market by Dutch married women in the '80s and '90s didn't mean that it changed fundamentally occupations in their educational and age make-up. This penetration by women was not specially directed to new occupations or male dominated occupations: the gender segregation index for Dutch occupations changed only slowly in this period (Tijdens, 1990; Faber, van Doorne-Huiskes & van Schuur, 1995). This increase in the female labour market participation fitted nicely into the already existing proportions at the Dutch labour market, at least during this seven-years period.

But this correspondence between the degree of deviation between the observed averages and the RAS estimated averages doesn't mean that the same occupations deviate more or less from the overall changes in educational level and age of the Dutch labour market. The correlations between the residuals are not significant (bottom of table 7). This is illustrated by the list of deviant occupations in table 7: there is hardly any overlap between the deviant male and female occupations.

We can conclude that although the amount of deviation from the overall changes at the Dutch labour market is more or less equal for male and female versions of occupations, they differed strongly in their degree of deviation. This could be explained in two conflicting ways. Either one assume that male and female versions of occupations are in fact very different occupations, despite their equal titles, with different economic and technological constrains. If one accept this explanation, one has still the task to reveal the reasons for the overall similarity in the degree of deviation between observed and estimated averages. Or one rejects a technological explanation of the deviations of occupations from the overall development of the educational level and age at the Dutch labour market and one interpretate this deviations as coincidences, due to historical conjunctures, and the overall similarity in the degree of deviation between observed and estimated averages a consequence of random noise. But coincidences, conjunctures and random noise are very weak explanations and almost stopgaps for ignorance. Moreover this second explanation runs counter broadly accepted policy wisdom, which stresses the importance of technological changes to understand the labour market.

## **6. Conclusions**

The results of this study shows clearly that in the six EU memberstates the majority of the changes in the educational level of occupations during the '70s, '80s and early '90s are not occupation-specific but that these changes can mainly be explained by general changes in education and age levels of the labour force and by general changes in the occupational structure. This is more or less true for all analysed EU memberstates. The slightly deviant case of the Netherlands can be explained by the grave economic crises facing Dutch society in the late '70s and the early '80s and the profound adjustment in the labour market to this crises which continued during the late '80s and the early '90s. This explanation of the importance of the overall changes in the education and age levels is also true if one compared the male and female versions of occupations in the concerned EU memberstates. The majority of the changes of the educational and age levels of the male and female versions of these occupations are not

occupation-specific but general arising from the increased educational levels of the younger generations at the labour market and the low educational levels of the leaving older generations from the labour market and the changing balance between the educational and age levels of male and female employees. As a consequence of these results we can accept the first hypothesis.

There is hardly any relation between the deviations of occupations from these general developments during the late '70s and the early '80s and the deviations of the same occupations during the late '80s and early '90s, at least for the Netherlands. This runs counter a strong version of a technological explanation of the growing educational participation, because one would expect that Dutch occupations face more or less equal technological and economic constraints in both decades. Thus, while we can accept the first part of the second hypothesis, we have to reject the second part of it.

The male and female versions of occupations reacted more or less comparable in the different EU memberstates: the majority of the changes in the educational levels of these occupations during the '70s, '80s and early '90s are not occupation-specific but that these changes can mainly be explained by general changes in education and age levels of the labour force and by general changes in the occupational structure. Despite this correspondence for the male and female versions of Dutch occupations in the importance of the general developments, deviant male versions of occupations do not correspond with deviant female versions of occupations. This means that the first part of the third hypothesis can be accepted (the importance of general changes), while the second part of the third hypothesis (equal occupations deviate) has to be rejected.

On the whole these results confirm the outcome of the first phase of the CEDEFOP study (Mallet, 1997; Dronkers, 1997) with longer timespans and with the distinction between male and female versions of occupations. This means that the majority of the increase of the educational level of each occupation of these six European memberstates could be predicted by the general increase of the educational level of the working population as a whole and by the general changes in the age of the working population. Only a minority of the occupations had changes in their educational levels which could not be predicted by the general changes in education and age. This result suggests that the increase of a better educated labour force allowed firms to employ more highly qualified staff to do jobs which previously were done by less educated staff, thus encouraging 'diploma inflation'. This 'diploma inflation' seems not to be driven by clear technological developments, which requires higher qualifications for specific occupations, but by the unintended and partly perverse outcomes of the prisoners-dilemma facing each parent and pupil individually (Boudon, 1977).

Table 1: The percentages of men, age groups, educational levels and occupations in the surveys of 1973, 1985 and 1992 in the Netherlands.

	1973	1985	1992
Men	77.3	69.4	65.3
Younger than 25 years	25.5	22.0	16.0
25-35 years	25.5	27.7	31.1
35-45 years	19.9	23.9	26.8
45-55 years	17.2	16.8	18.3
55 and older	11.0	9.5	7.9
Only primary education	35.3	19.0	13.0
First phase secondary education	39.6	27.7	23.4
Second phase secondary education	14.2	36.4	39.9
Tertiary education	11.0	16.6	23.6
0: Unemployed	4.7	16.8	16.0
1A: Physicists, chemists	.6	.5	.4
1B: Architects, engineers	3.3	3.0	3.7
1C: Ships and aircraft officers	.4	.3	.2
1D: Biologists	.4	.5	.5
1E: Physicians & nurses	2.7	4.4	5.1
1F: Mathematicians	.5	.9	2.0
1G: Economists	.2	.3	.4
1H: Accountants	.2	.2	.4
1J: Jurists	.2	.3	.5
1K: Teachers	3.7	4.6	4.5
1L: Clergy	.2	.2	.1
1M: Authors & journalists	.2	.3	.6
1N: Creative artists	.5	.5	.8
1P: Musicians, singers, dancers, actors	.2	.3	.2
1Q: Professional athletes & sportsmen	.1	.1	.1
1X: Scientific professional, not specified	1.1	1.8	3.3
2A: Higher civil servant	.1	.1	.1
2B: Corporate managers	3.2	2.8	4.1
3A: Clerical supervisors	.3	.3	.4
3B: Governmental executive	.2	.3	.3
3C: Secretaries	2.5	2.5	2.1
3D: Bookkeepers	5.2	4.7	5.2
3E: Bookkeeping machine operator	.2	.2	.0
3F: Transport supervisors	.5	.5	.3
3G: Transport conductors	.0	.1	.0
3H: Mail distribution clerks	.7	.7	.5
3J: Telephone and telegraph operator	.2	.3	.1
3X: Clerical worker, not specified	6.8	6.2	6.8
4A: Managers wholesale	.3	.5	.5
4B: Managers retail	.2	.3	.2
4C: Wholesale proprietor	.5	.4	.4
4D: Shop keeper and retail owner	2.2	1.4	.7

4E: Sales supervision	.7	.7	.7
4F: Salesman	1.3	.8	.6
4G: Insurance agent, broker	.6	.6	.8
4H: Salesman retail	4.1	3.8	3.6
4X: Commercial functions, not specified	.0	.0	.4
5A: Hotel Bar director, manager	.1	.3	.3
5B: Hotel owner	.6	.5	.2
5C: Housekeeping supervisor	.2	.2	.1
5D: Cooks	1.7	1.6	1.8
5E: Housekeeping service worker	2.1	2.9	2.2
5F: Caretaker	1.2	2.1	1.4
5G: Launderers, washers	.3	.2	.0
5H: Hairdressers	.5	.5	.4
5J: Fireman, law officer	.8	1.0	1.0
5X: Service worker, not specified	.5	.5	1.0
6A: Farmers, fishers, managers	.1	.1	.1
6B: Farmers, owner	3.6	2.2	1.6
6C: Agricultural worker	2.3	1.9	1.7
6D: Forestry workers	.1	.1	.0
6E: Fishers	.1	.1	.0
71: Production supervisor	1.9	1.7	1.4
72: Miners Quarriers	.1	.0	.0
73: Metal processor	.3	.2	.1
74: Wood preparation worker	.2	.1	.1
75: Chemical process worker	.5	.5	.4
76: Textile workers	.6	.2	.1
78: Food & beverage worker	1.4	1.1	.9
77: Tanner & fellmonger	.0	.0	.0
79: Tobacco worker	.1	.0	.0
7A: Tailors	1.3	.4	.4
7B: Shoemakers	.2	.1	.0
7C: Cabinet makers	.6	.3	.3
7D: Stone polisher & cutter	.0	.0	.0
7E: Blacksmith	1.3	.7	.7
7F: Fitters	3.7	2.7	2.3
7G: Electric fitters workers	2.6	1.8	1.7
7H: Broadcasting station operators	.0	.0	.0
7J: Plumbers	3.3	1.8	1.7
7K: Gold silver smith	.1	.0	.0
7L: Glass former	.3	.1	.0
7M: Rubber plastic worker	.2	.3	.2
7N: Paper production worker	.1	.1	.0
7P: Printers	1.0	.8	.8
7Q: Painters	1.3	.7	.6
7R: Other industrial occupations	.4	.2	.2
7S: Construction workers	5.3	3.0	2.6

7T: Engine operator	.2	.1	.0
7U: Crane operators dockers	3.7	2.8	2.4
7V: Drivers	3.3	2.6	2.7
7X: Manual worker, not specified	1.7	.7	1.7
8A: professional military	.8	.6	.5
Absolute total numbers	4423466	5789253	7208792

Table 2: The educational levels of the male and female labour force in 1973, 1985 and 1992 in the Netherlands

	1973		1985		1992	
	m	f	m	f	m	f
Primary education	36.6	30.5	21.0	15.8	14.9	9.5
Lower secondary	38.8	42.3	26.8	29.6	23.5	23.3
Higher secondary	13.4	16.9	35.9	37.5	39.2	41.3
Tertiary	11.2	10.3	16.4	17.1	22.4	25.9
Total	3420609	1002858	4015226	1774027	4708694	2500099

Table 3: The age groups of the male and female labour force in 1973, 1985 and 1992 in the Netherlands

	1973		1985		1992	
	m	f	m	f	m	f
< 25 years	18.2	50.1	16.7	34.0	12.9	21.6
25-35	27.4	19.1	28.1	26.8	29.9	33.4
35-45	22.0	12.8	25.4	20.5	27.6	25.2
45-55	19.0	11.2	18.7	12.6	20.1	14.8
55 <	13.4	6.9	11.1	6.0	9.4	5.0

Table 4: The educational levels of the different age groups within the labour force in 1973, 1985 and 1992 in the Netherlands

	<25	25-35	35-45	45-55	55<
1973					
Primary education	27.8	26.6	36.3	43.3	56.3
Lower secondary	53.8	42.4	35.4	30.8	23.1
Higher secondary	13.6	16.9	14.3	13.7	10.0
Tertiary	4.7	14.1	13.9	12.3	10.6
total	100.0	100.0	100.0	100.0	100.0
1985					
Primary education	13.5	13.8	19.4	27.0	36.0
Lower secondary	38.9	23.6	24.9	26.0	23.1
Higher secondary	39.9	39.8	34.9	32.3	28.9
Tertiary	7.7	22.8	20.7	14.8	12.0
total	100.0	100.0	100.0	100.0	100.0
1992					
Primary education	9.6	8.5	13.6	17.7	25.1
Lower secondary	32.4	19.3	21.6	24.7	24.8

Higher secondary	47.8	42.7	36.8	35.7	33.2
Tertiary	10.2	29.5	28.0	21.9	16.9
total	100.0	100.0	100.0	100.0	100.0

Table 5: Results of analyses for six EU memberstates: the degree of similarity (correlation) between two compared cohorts

PAYS	ESPAGNE			FRANCE			ALLEMAGNE				ITALIE			PAYS BAS			UNITED KINGDOM						
	Total 87-96	F 87-96	H 87-96	Total 82-90	F 82-90	H 82-90	Total 90-95	Total 78-85	Total 78-93	Total 85-93	F 85-93	H 85-93	Total 91-96	F 91-96	H 91-96	Total 85-92	F 85-92	H 85-92	Total 73-85	Total 73-92	Total 84-94	F 84-94	H 84-94
<b>Population &amp; période</b>																							
<b>Résultats en effectifs</b>																							
(1) Variation observée	83,2	75,3	86,3	80,0	79,3	83,9	86,0	68,3	52,3	83,1	86,5	77,3	82,4	83,3	81,6	81,0	70,6	82,4	38,5	24,9	59,9	61,4	64,9
(2) Variation de l'offre de compétence	93,0	87,6	95,9	90,1	88,4	94,3	94,0	90,2	85,2	94,3	94,5	92,8	94,7	96,1	92,8	87,6	82,4	87,3	54,3	54,0	88,1	85,6	91,6
(3) Variation de la demande de compétence	87,2	80,0	88,4	83,6	82,2	86,9	88,7	57,9	45,6	85,0	87,7	79,3	86,5	87,5	85,7	85,4	74,7	88,4	70,9	48,2	70,7	70,2	72,6
(4) Variation simultanée	96,5	94,0	97,9	95,3	94,6	97,1	96,5	93,5	89,7	94,9	95,8	92,8	97,8	97,6	97,5	94,0	93,2	92,6	78,3	78,5	94,3	92,2	96,0
<b>Résultats en structure</b>																							
(5) Variation observée	74,8	79,9	75,0	82,1	77,7	82,1	79,8	61,2	47,1	79,0	82,1	61,0	77,1	76,4	75,5	67,7	68,4	64,4	42,0	29,3	72,3	59,4	71,3
(6) Variation de l'offre de compétence	91,2	87,1	87,6	92,5	87,2	92,4	85,1	87,2	78,4	89,3	91,8	66,4	86,6	85,6	84,8	71,8	70,3	68,0	61,4	60,0	93,1	76,2	90,1
(7) Variation de la demande de compétence	74,8	79,9	75,0	82,1	77,7	82,1	79,8	61,2	47,1	79,0	82,1	61,0	77,1	76,4	75,5	67,7	68,4	64,4	42,0	29,3	72,3	59,4	71,3
(8) Variation simultanée	91,0	86,2	88,1	92,8	87,8	92,5	85,2	90,3	81,2	89,3	91,7	66,4	88,7	87,2	87,7	71,9	70,2	68,1	64,5	63,4	93,5	77,0	91,1

Table 6: The  $R^2$  of the regression of the RAS estimation of the educational or age levels of occupations at the end of a period on the observed educational or levels of the occupations at the end of that period, the occupations which residuals were larger than 1 standard deviation of all residuals and the correlations between all residuals.

	period					
	'78-'85		'85-'92		'78-'92	
	educ	age	educ	age	educ	age
$R^2$	.95	.74	.96	.81	.92	.58
Occupation						
Standard deviation residual	.6	2.3	.5	1.7	.7	2.3
0 Unemployed	-2.2	4.8	-	-	-1.7	4.9
1A Physicists	-.6	-	-	-	-.7	-
1B Architects	-	2.4	-	-	-	-
1C Ships & aircraft officers	1.2	3.1	-.9	-	-	-
1F Mathematicians	1.2	-	-	-	1.4	-
1G Economists	-	-	-	-2.0	-	-
1H Accountants	-	-	1.0	-	1.1	-
1K Teachers	-	-	-	3.7	-	5.0
1L Clergy	-	3.0	-	-	-	-
1M Author & Journalist	-	-	1.6	-	1.8	-
1P Musicians	-.6	-	-	-	-	-
1Q Athletes	-1.2	3.7	-	-	-1.1	4.7
1X Scientific professional	.9	-	-	-	-	-
2A Higher civil servant	-	3.3	-1.0	2.5	-	4.3
2B Corporate manager	-	3.2	-	-	.8	-
3A Clerical supervisor	-	-	.9	-	-	-
3B Govern. executive	.7	-	-	-	1.1	-
3C secretary	.6	-	.5	-	1.1	-
3E Bookkeeping operator	-	5.7	-	-2.5	1.1	-
3F Transport supervisor	-	-	-1.0	2.2	-.9	-
3G Transport conductor	-	-2.7	-	-3.8	-	-
3H Mail distribution clerks	-	-3.6	-	2.5	-	-
3J Telephone operator	-.7	5.0	-	-	-.9	5.3
4A Wholesale manager	-	-	-.6	-	-	-
4B Retail manager	-	-	-	-4.5	-	-2.4
4C Wholesale owner	-	2.5	-	-	-	2.8
4D Shopkeeper owner	.8	-	-	2.0	.7	3.4
4E Sales supervisor	-	-	-	-2.7	-	-
4X Commercial functions	-	-	-	-	.8	-3.7
5A Hotel Bar director	-1.0	3.7	-	-3.6	-1.1	-
5B Hotel owner	-	-	-	1.8	-	-
5C Housekeeping supervisor	-	2.4	-	-	-	-
5D Cooks	-	-	-	-	-.9	-
5E Housekeeping worker	-.7	4.1	-	-	-	2.9
5F Caretaker	-	-	-.6	-	-1.5	-
5G Launderers	-	-	-	3.5	-	3.0

5H Hairdresser	1.4	-	-	-2.8	1.2	-5.2	
5J Fireman, law officer	.8	-2.9	-	-	.8	-	
6A Farmer & fisher manager	-	-	-1.0	-	-.7	-3.8	
6B Farmer owner	-	3.5	-	2.0	-	4.9	
6C Agricultural worker	-.6	-	-	-	-	-	
6D Forestry worker	.6	-	-1.7	2.7	-	-	
6E Fisher	-	-	-.7	-2.1	-	-2.6	
72 Miners	.9	-3.7	-	-	-	-	
73 Metal processor	-	-4.4	-	2.2	-	-	
74 Wood work	-	-2.6	1.2	-2.5	-	-3.9	
76 Textile worker	-	-	-	-3.0	-	-	
78 Food & Beverage w	-	-4.6	-	-	-	-3.4	
79 Tobacco worker	-	-2.5	-	2.8	1.1	-	
7A Tailors	-	-	-	2.0	-	-	
7B Shoemaker	-	-	-	-3.4	-	-	
7C Cabinet makers	-	-3.9	-	-	-	-3.5	
7D Stone polisher & cutter	-	-	-	2.2	-	-	
7E Blacksmith	.6	-	-	-	-	-	
7H Broadcast operator	-1.6	-3.2	-	2.1	-1.4	-	
7K Goldsmith	-.9	-	-	-	-	-	
7L Glass former	-	-3.5	.8	-	-	-2.7	
7M Rubber plastic worker	-	3.0	-	-	-	-2.8	
7N Paper worker	-	-	.9	2.5	.9	-	
7Q Painters	-	3.3	-	-	-	-	
7R Other industrial worker	-	-3.5	-	-	-	-	
7T Engine operator	-	-	-	-	-	4.1	
7U Crane operators	-	-	-	-	-.7	-2.4	
7X Manual workers	-	-	-	-2.9	-	-3.6	
8A Professional military	-	-	-	-	-1.0	-	
Correlations between all residuals							
Education '78-'85		1.00	-.18	-.09	-.02	.67*	-.17
Age '78-'85		1.00	-.11	-.13	-.18	.60*	
Education '85-'92				1.00	-.15	.47*	-.06
Age '85-'92				1.00	-.03	.44*	
Education '78-'92						1.00	-.22
Age '78-'92						1.00	

legenda: missing occupations did not have residuals larger than 1.0 standard deviation; \* indicates significant correlations.

Table 7: The  $R^2$  of the regression of the RAS estimation of the educational or age levels of occupations for the period '85-'92 on the observed educational or levels of the occupations in 1992 for men and women separately, the occupations which residuals were larger than 1 standard deviation of all residuals and the correlations between all residuals.

	men		women		
	educ	age	educ	age	
$R^2$	.95	.83	.96	.81	
Occupation					
Stand. deviation resid.	.6	1.7	.5	2.4	
0 Unemployed	-	-	-	2.7	
1A Physicists, chemists	-	-	-	-2.6	
1C Ships & aircraft officers	-.9	-1.9	-	-	
1F Mathematicians	-	-	.9	-	
1G Economists	-	-	.6	-	
1H Accountants	.8	-	-	2.4	
1K Teachers	-	4.1	-	3.3	
1M Authors & Journalist	1.2	-	1.5	-	
1N Creative artists	-	-	-.7	-	
1P Musicians, singers, dancers, actors	-	-	-	-2.4	
1Q Profess. athletes & sportsmen	-	-	-.5	-	
1X Other scientific prof.	-	2.0	-	-	
2A Higher civil servant	-.6	4.8	-	-	
3A Clerical supervisors	-	-	-	-3.7	
3C secretaries	1.2	-	-	-	
3E Bookkeeping machine operator	-.6	-	-	-	
3F Transport supervisors	-1.1	2.0	-	-	
3G Transport conductors	-	-3.9	-	-	
3H Mail distribution clerks	-	-	-	-	4.3
4A Managers wholesale	-.6	-	-	-	
4B Managers retail	-	-3.9	-1.3	-	
4C Wholesale proprietor	-	-	-1.8	-	
4D Shopkeeper & retail owner	-	-	-	3.5	
4E Sales supervision	-	-1.9	-	-	
4F Salesman	-	-	.8	-	
4H Salesman retail	-	-	-	-2.9	
5A Hotel & Bar manager	-	-2.5	-	-	
5B Hotel owner	-	2.4	-	-	
5C House keeping supervision	-	-2.9	-	-	
5E Housekeeping service worker	2.1	-	-	-	
5F Caretaker	-1.1	-	-	-	
5X Other service worker	-	-4.1	-.7	-	
6A Farmer & fisher, manager	-1.1	-	-	-	
6B Farmers, owner	-	1.8	.8	-	
6D Forestry worker	-1.6	2.4	-	-	
6E Fisher	-.6	-2.1	-	-	
71 Production supervisor	-	-	-1.1	-	

73 Metal processor	-	2.1	-	-
74 Wood preparation worker	1.2	-2.8	-	-
75 Chemical process worker	-	-	-.6	-
76 Textile workers	-	-3.4	-	-
78 Food & beverage worker	-	-	-	-5.7
79 Tobacco worker	-	2.1	-	-
7B Shoemakers	-1.0	2.3	-	-5.7
7D Stone polisher & cutter		-	2.2	-
7L Glass former	-.7	-	-	-
7M Rubber plastic worker	-	-	-	7.1
7N paper production worker	.9	-	-	-
7P Printers	-	-	-	-6.0
7R Other industrial workers	-	-	-	2.8
7U Crane operators	-	-	-	-3.1
7V Drivers	-	-	-	-3.1
7X Other manual workers	-	-2.1	-	-
Correlations between all residuals				
Education men	1.00	-.18	.19	.11
Age men		1.00	.20	.09
Education women			1.00	-.01
Age women				1.00

legenda: missing occupations did not have residuals larger than 1.0 standard deviation.

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Appendix I: Educational levels of the occupations in 1973, 1985 and 1992 (men and women) and RAS estimation of educational levels of the occupations in 1985 and 1992 (first two based on 1973, last on 1985), all in percentages.

	Real			Estimated by RAS		
	1973	1985	1992	73/85	73/92	85/92
0: Unemployed, unknown occupation						
primary	51	44	29	26	17	31
lower sec.	30	28	26	23	20	28
higher sec.	9	21	29	30	33	27
tert.	10	7	16	21	30	12
1A: Physicists, chemists and related professionals						
primary	6	3	2	1	1	1
lower sec.	25	10	10	9	7	7
higher sec.	22	40	36	36	32	35
tert.	47	48	53	53	61	58
1B: Architects, engineers and related professionals						
primary	2	1	1	1	1	0
lower sec.	25	7	6	9	6	5
higher sec.	36	42	43	54	49	35
tert.	38	51	50	37	44	60
1C: Ships and aircraft officers						
primary	20	9	8	5	1	2
lower sec.	24	7	7	10	6	3
higher sec.	35	29	30	60	60	26
tert.	21	55	54	24	33	69
1D: Biologists						
primary	2	1	0	0	0	0
lower sec.	8	4	3	3	3	3
higher sec.	25	19	25	36	30	15
tert.	66	77	72	61	66	83
1E: Physicians & nurses						
primary	7	1	1	2	1	0
lower sec.	22	5	4	7	5	3
higher sec.	45	59	54	66	62	52
tert.	26	35	42	25	33	45
1F: Mathematicians						
primary	3	1	1	1	1	1
lower sec.	27	6	6	9	7	4
higher sec.	47	43	34	68	64	37
tert.	22	50	60	23	28	59
1G: Economists						
primary	-	-	-	-	-	-
lower sec.	3	4	0	1	1	0
higher sec.	27	21	27	37	32	19
tert.	71	75	73	62	67	81

1H: Accountants						
primary	-	-	-	-	-	-
lower sec.	3	2	1	1	2	2
higher sec.	31	36	17	45	38	28
tert.	66	63	82	54	60	70
1J: Jurists						
primary	-	-	-	-	-	-
lower sec.	-	-	-	-	0	1
higher sec.	4	8	8	6	5	6
tert.	96	92	92	94	95	93
1K: Teachers						
primary	0	0	0	0	0	0
lower sec.	3	1	1	1	1	1
higher sec.	14	8	6	20	15	6
tert.	83	91	93	79	84	94
1L: Clergy						
primary	8	2	-	2	-	-
lower sec.	-	-	-	-	-	-
higher sec.	7	9	9	14	8	3
tert.	85	90	91	84	92	97
1M: Authors & journalists						
primary	2	2	0	0	0	1
lower sec.	10	12	2	3	6	8
higher sec.	55	48	28	69	62	43
tert.	33	38	70	27	32	48
1N: Creative artists						
primary	19	6	1	7	1	2
lower sec.	43	16	17	24	18	11
higher sec.	10	39	37	25	25	36
tert.	27	39	45	44	55	51
1P: Musicians, singers, dancers, actors and related artists						
primary	8	4	3	2	1	2
lower sec.	26	11	10	12	8	6
higher sec.	12	28	22	22	22	24
tert.	54	57	65	64	69	69
1Q: Professional athletes & sportsmen						
primary	16	9	0	7	1	0
lower sec.	54	45	38	30	21	37
higher sec.	19	34	40	45	51	38
tert.	11	12	22	19	27	25
1X: Scientific professionals, not specified						
primary	1	0	1	0	0	0
lower sec.	10	3	4	3	3	2
higher sec.	31	21	24	43	37	17
tert.	58	75	72	53	60	82
2A: Higher civil servant						

primary	-	-	-	-	-	-
lower sec.	2	5	-	1	-	-
higher sec.	27	21	46	40	40	19
tert.	71	74	54	59	60	81
2B: Corporate managers						
primary	13	6	2	3	2	3
lower sec.	29	12	10	12	10	9
higher sec.	35	47	40	61	59	44
tert.	23	35	48	24	29	44
3A: Clerical supervisors						
primary	1	1	0	0	1	0
lower sec.	31	17	10	11	9	14
higher sec.	55	71	64	78	75	74
tert.	12	11	26	11	15	12
3B: Governmental executive						
primary	-	-	-	-	-	-
lower sec.	11	6	3	4	1	1
higher sec.	41	33	20	56	47	20
tert.	48	61	77	40	52	78
3C: secretaries						
primary	18	3	2	6	2	1
lower sec.	57	29	15	32	26	22
higher sec.	23	49	56	57	64	53
tert.	3	18	27	5	8	24
3D: Bookkeepers						
primary	16	4	4	5	3	3
lower sec.	52	28	25	26	21	22
higher sec.	28	58	57	63	68	62
tert.	4	10	14	5	7	14
3E: Bookkeeping machine operator						
primary	22	10	8	10	2	4
lower sec.	62	45	54	42	39	47
higher sec.	15	43	38	45	58	49
tert.	1	2	-	2	2	-
3F: Transport supervisors						
primary	45	14	25	22	15	9
lower sec.	38	35	27	30	28	29
higher sec.	13	45	42	42	47	50
tert.	3	7	7	7	10	12
3G: Transport conductors						
primary	65	30	-	47	-	-
lower sec.	32	58	6	36	34	15
higher sec.	3	12	94	17	66	85
tert.	-	-	-	-	-	-
3H: Mail distribution clerks						
primary	67	30	20	49	38	21

lower sec.	29	47	49	32	36	37
higher sec.	3	21	29	15	21	51
tert.	1	2	2	4	4	8
3J: Telephone and telegraph operator						
primary	22	11	11	8	5	4
lower sec.	54	40	36	31	26	37
higher sec.	22	44	44	58	65	51
tert.	2	4	10	3	4	8
3X: Clerical worker, not specified						
primary	25	7	5	10	6	4
lower sec.	50	31	25	30	26	25
higher sec.	21	52	53	54	60	56
tert.	4	10	17	6	8	15
4A: Managers wholesale						
primary	18	10	5	5	2	3
lower sec.	31	17	18	14	12	13
higher sec.	36	50	57	64	64	51
tert.	16	22	21	17	22	32
4B: Managers retail						
primary	22	6	6	8	6	3
lower sec.	45	18	20	24	16	13
higher sec.	28	70	67	60	66	77
tert.	6	6	7	9	12	6
4C: Wholesale proprietor						
primary	47	24	8	21	14	16
lower sec.	33	21	24	24	23	19
higher sec.	15	41	58	45	51	49
tert.	5	14	9	10	12	16
4D: Shop keeper and retail owner						
primary	47	14	10	25	17	8
lower sec.	40	14	15	35	34	12
higher sec.	10	69	68	36	42	76
tert.	2	3	7	5	8	4
4E: Sales supervision						
primary	28	10	5	10	6	6
lower sec.	40	21	24	21	18	17
higher sec.	26	60	53	60	63	64
tert.	6	9	18	9	14	14
4F: Salesman						
primary	20	6	5	7	4	3
lower sec.	46	21	21	24	21	16
higher sec.	26	56	58	57	59	57
tert.	8	17	16	12	16	24
4G: Insurance agent, broker						
primary	21	5	1	7	3	2
lower sec.	39	14	11	19	16	11

higher sec.	33	65	65	66	68	65
tert.	7	16	23	9	12	23
4H: Salesman retail						
primary	42	16	12	24	18	11
lower sec.	50	48	38	44	40	42
higher sec.	7	33	44	26	33	41
tert.	2	3	6	5	8	5
4X: Commercial functions, not specified						
primary	-	-	-	-	37	-
lower sec.	100	100	100	100	34	100
higher sec.	-	-	-	-	29	-
tert.	-	-	-	-	-	-
5A: Hotel Bar director, manager						
primary	39	15	15	17	11	9
lower sec.	38	37	25	26	23	33
higher sec.	15	3	49	39	39	44
tert.	9	9	12	18	27	14
5B: Hotel owner						
primary	47	25	10	24	16	16
lower sec.	38	22	31	31	30	21
higher sec.	10	50	55	33	38	60
tert.	6	4	3	12	15	3
5C: Housekeeping supervisor						
primary	47	10	11	19	5	3
lower sec.	27	22	10	20	28	16
higher sec.	19	50	55	48	44	52
tert.	7	19	24	13	23	29
5D: Cooks						
primary	54	30	23	36	25	23
lower sec.	40	46	38	40	35	43
higher sec.	4	22	37	18	21	29
tert.	2	2	2	6	19	4
5E: Housekeeping service worker						
primary	43	21	16	20	15	15
lower sec.	38	34	27	26	22	32
higher sec.	17	43	48	49	55	49
tert.	2	2	8	5	7	4
5F: Caretaker						
primary	71	44	47	54	41	35
lower sec.	26	41	37	31	32	45
higher sec.	2	14	15	9	11	20
tert.	2	0	1	5	17	1
5G: Launderers, washers						
primary	76	44	41	63	45	24
lower sec.	23	44	38	29	53	67
higher sec.	1	12	22	8	2	9

tert.	-	-	-	-	-	-
5H: Hairdressers						
primary	20	5	1	9	3	2
lower sec.	70	5	13	55	61	3
higher sec.	9	89	84	35	32	93
tert.	1	1	1	3	5	2
5J: Fireman, law officer						
primary	14	6	4	7	6	4
lower sec.	75	18	18	60	55	15
higher sec.	8	73	70	25	27	78
tert.	3	3	8	7	12	4
5X: Service worker, not specified						
primary	43	13	13	20	14	8
lower sec.	38	27	24	26	23	23
higher sec.	17	51	53	49	56	55
tert.	2	9	9	4	7	13
6A: Farmers, fishers, managers						
primary	20	15	-	7	1	-
lower sec.	49	19	40	26	22	13
higher sec.	29	57	49	64	73	68
tert.	2	9	11	3	4	19
6B: Farmers, owner						
primary	44	15	10	22	15	9
lower sec.	42	45	38	35	34	42
higher sec.	12	39	50	40	46	46
tert.	2	2	3	3	5	3
6C: Agricultural worker						
primary	50	26	21	29	22	20
lower sec.	39	45	37	34	33	44
higher sec.	10	27	41	34	41	34
tert.	1	1	1	3	4	2
6D: Forestry workers						
primary	75	35	46	65	63	19
lower sec.	24	60	37	32	37	35
higher sec.	0	6	17	3	-	46
tert.	-	-	-	-	-	-
6E: Fishers						
primary	53	30	22	39	28	20
lower sec.	45	46	59	50	63	42
higher sec.	2	24	20	10	8	38
tert.	-	-	-	-	-	-
71: Production supervisor						
primary	26	11	9	11	7	6
lower sec.	52	24	24	36	33	21
higher sec.	16	59	58	44	47	64
tert.	6	6	9	9	13	9

72: Miners Quarriers						
primary	64	18	-	54	-	-
lower sec.	36	73	-	44	-	-
higher sec.	0	9	100	3	100	100
tert.	-	-	-	-	-	-
73: Metal processor						
primary	75	54	41	62	48	46
lower sec.	24	35	39	30	32	38
higher sec.	1	11	20	8	20	16
tert.	-	-	-	-	-	-
74: Wood preparation worker						
primary	77	45	23	64	57	42
lower sec.	22	45	35	28	31	41
higher sec.	1	9	43	8	12	17
tert.	-	-	-	-	-	-
75: Chemical process worker						
primary	47	22	11	27	18	15
lower sec.	41	25	26	34	29	23
higher sec.	8	50	61	30	33	59
tert.	3	3	2	9	20	2
76: Textile workers						
primary	78	57	44	69	52	45
lower sec.	21	37	35	27	29	39
higher sec.	1	4	21	3	7	15
tert.	0	2	-	1	12	-
77: Tanner & fellmonger						
primary	50	37	-	44	-	-
lower sec.	50	63	-	56	-	-
higher sec.	-	-	-	-	-	-
tert.	-	-	-	-	-	-
78: Food & beverage worker						
primary	53	28	28	33	27	22
lower sec.	40	38	36	40	42	34
higher sec.	4	33	35	17	23	44
tert.	3	1	1	9	7	1
79: Tobacco worker						
primary	67	36	9	49	74	21
lower sec.	31	50	41	36	10	15
higher sec.	2	14	50	15	16	64
tert.	-	-	-	-	-	-
7A: Tailors						
primary	52	32	23	36	28	24
lower sec.	44	42	45	45	47	42
higher sec.	4	25	32	18	24	34
tert.	0	1	-	1	-	-
7B: Shoemakers						

primary	60	44	17	43	35	24
lower sec.	36	41	50	40	38	37
higher sec.	4	15	33	18	27	39
tert.	-	-	-	-	-	-
7C: Cabinet makers						
primary	54	32	22	38	29	23
lower sec.	44	41	51	49	47	40
higher sec.	2	27	27	13	17	37
tert.	-	-	-	-	7	-
7D: Stone polisher & cutter						
primary						
lower sec.	100	100	100	100	100	100
higher sec.						
tert.						
7E: Blacksmith						
primary	47	25	20	32	23	17
lower sec.	50	36	37	53	50	33
higher sec.	3	40	43	15	18	50
tert.	-	-	-	-	8	-
7F: Fitters						
primary	26	15	12	14	10	10
lower sec.	66	38	30	56	52	33
higher sec.	7	46	57	25	30	55
tert.	2	1	2	5	8	1
7G: Electric fitters workers						
primary	25	14	7	13	9	9
lower sec.	63	32	27	48	43	27
higher sec.	10	51	63	35	40	59
tert.	2	3	3	5	8	5
7H: Broadcasting station operators						
primary	70	44	-	28	2	-
lower sec.	6	14	-	3	19	-
higher sec.	23	43	100	69	79	100
tert.	-	-	-	-	-	-
7J: Plumbers						
primary	37	16	16	25	19	11
lower sec.	59	49	46	59	58	46
higher sec.	3	34	38	12	16	43
tert.	1	0	0	3	7	0
7K: Gold silver smith						
primary	11	13	-	4	-	-
lower sec.	80	62	-	60	-	-
higher sec.	9	26	100	37	-	100
tert.	-	-	-	-	-	-
7L: Glass former						
primary	78	43	37	64	48	37

lower sec.	19	49	29	23	24	59
higher sec.	2	8	34	13	28	4
tert.	-	-	-	-	-	-
7M: Rubber plastic worker						
primary	74	46	25	59	49	33
lower sec.	24	43	45	30	34	42
higher sec.	2	11	30	11	18	25
tert.	-	-	-	-	-	-
7N: Paper production worker						
primary	87	56	20	83	70	37
lower sec.	13	44	53	18	30	53
higher sec.	-	-	27	-	-	10
tert.	-	-	-	-	-	-
7P: Printers						
primary	34	22	8	18	12	16
lower sec.	57	32	30	49	45	28
higher sec.	8	43	59	28	33	53
tert.	2	2	2	6	10	3
7Q: Painters						
primary	39	22	18	26	20	16
lower sec.	57	46	47	59	59	43
higher sec.	3	31	35	15	18	41
tert.	0	1	-	0	3	-
7R: Other industrial occupations						
primary	69	49	25	55	43	37
lower sec.	30	30	44	37	38	30
higher sec.	1	22	31	8	10	33
tert.	-	-	-	-	9	-
7S: Construction workers						
primary	42	25	22	27	20	18
lower sec.	53	45	43	51	48	43
higher sec.	4	30	35	19	24	38
tert.	1	0	0	2	8	1
7T: Engine operator						
primary	47	19	-	22	3	-
lower sec.	35	29	-	26	4	-
higher sec.	15	40	75	47	91	79
tert.	3	12	25	6	2	21
7U: Crane operators dockers						
primary	74	43	36	58	47	35
lower sec.	23	41	43	27	28	42
higher sec.	2	16	20	9	13	22
tert.	2	1	1	6	13	1
7V: Drivers						
primary	66	33	22	52	41	25
lower sec.	31	43	48	37	37	42

higher sec.	2	24	30	8	10	32
tert.	1	0	0	4	12	1
7X: Manual worker, not specified						
primary	86	60	39	77	62	49
lower sec.	13	28	35	19	20	32
higher sec.	1	12	26	4	6	18
tert.	-	-	-	-	12	-
8A: professional military						
primary	21	5	1	7	3	2
lower sec.	46	23	26	25	21	16
higher sec.	18	56	57	43	43	58
tert.	15	16	16	24	33	25

Appendix II: Educational levels of the occupations in 1985 and 1992 of men and women separately and RAS estimation of educational levels of the occupations in 1992, both for men and women separately and for men and women combined, all in percentages.

	Real				Estimated by RAS		
	men 1985	1992	women 1985	1992	men	women	combined
0: Unemployed, unknown occupation							
primary	46	36	36	18	36	22	32
lower sec.	28	25	30	28	28	27	28
higher sec.	20	26	25	32	25	33	28
tert.	6	13	10	21	10	18	13
1A: Physicists, chemists and related professionals							
primary	1	3	-	-	1	-	0
lower sec.	8	7	-	-	6	-	4
higher sec.	44	37	37	36	39	22	35
tert.	47	54	63	64	55	78	60
1B: Architects, engineers and related professionals							
primary	1	1	-	-	0	-	0
lower sec.	7	6	4	1	5	3	5
higher sec.	42	45	25	29	37	18	35
tert.	50	48	71	70	58	80	60
1C: Ships and aircraft officers							
primary	5	8	-	-	2	-	2
lower sec.	5	7	-	-	3	-	3
higher sec.	31	30	-	-	26	-	26
tert.	60	54	-	-	68	-	68
1D: Biologists							
primary	-	-	-	-	-	-	-
lower sec.	4	2	4	2	3	2	2
higher sec.	19	23	19	28	16	15	15
tert.	77	75	77	70	82	83	83
1E: Physicians & nurses							
primary	0	0	1	1	0	0	0
lower sec.	5	3	6	4	3	3	3
higher sec.	36	33	69	63	31	61	53
tert.	58	64	25	33	67	35	44
1F: Mathematicians							
primary	1	1	-	-	1	-	1
lower sec.	6	5	-	-	4	-	4
higher sec.	43	35	44	20	38	33	37
tert.	50	59	56	80	57	67	59
1G: Economists							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	23	27	42	25	19	32	20

tert.	77	73	58	75	81	68	80
1H: Accountants							
primary	-	-	-	-	-	-	-
lower sec.	2	1	-	-	1	-	1
higher sec.	33	16	100	100	27	100	30
tert.	65	83	-	-	70	-	69
1J: Jurists							
primary	-	-	-	-	-	-	-
lower sec.	1	0	-	-	1	-	1
higher sec.	11	8	-	-	9	-	6
tert.	88	92	100	100	90	100	94
1K: Teachers							
primary	-	-	-	-	-	-	-
lower sec.	1	1	1	0	1	0	1
higher sec.	5	6	12	7	4	8	6
tert.	94	93	88	93	96	91	93
1L: Clergy							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	3	5	-	-	2	-	2
tert.	97	95	-	-	98	-	98
1M: Authors & journalists							
primary	2	1	-	-	1	-	1
lower sec.	3	2	4	3	2	3	2
higher sec.	52	29	51	20	47	45	46
tert.	43	69	45	77	50	52	51
1N: Creative artists							
primary	4	1	-	-	2	-	1
lower sec.	18	19	10	8	14	4	11
higher sec.	42	37	38	39	40	26	35
tert.	36	43	52	53	45	70	53
1P: Musicians, singers, dancers, actors and related artists							
primary	2	2	-	-	1	-	1
lower sec.	5	13	8	6	3	4	4
higher sec.	33	25	21	17	28	17	22
tert.	60	61	72	77	68	79	74
1Q: Professional athletes & sportsmen							
primary	-	-	-	-	-	-	-
lower sec.	57	36	21	40	49	15	36
higher sec.	31	46	62	38	33	64	45
tert.	12	17	16	22	18	20	19
1X: Scientific professionals, not specified							
primary	0	1	0	1	0	0	0
lower sec.	2	4	5	3	1	2	2
higher sec.	21	22	22	26	17	17	16
tert.	77	73	73	70	82	81	82

2A: Higher civil servant							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	18	31	-	-	14	-	13
tert.	82	69	-	-	87	-	87
2B: Corporate managers							
primary	6	2	8	2	3	4	3
lower sec.	12	10	15	9	9	10	9
higher sec.	48	42	35	33	45	30	43
tert.	34	46	42	56	43	56	44
3A: Clerical supervisors							
primary	-	-	-	-	-	-	-
lower sec.	17	7	19	5	14	11	13
higher sec.	74	78	71	83	75	71	74
tert.	9	15	10	11	12	17	13
3B: Governmental executive							
primary	-	-	-	-	-	-	-
lower sec.	2	3	-	-	1	-	1
higher sec.	26	20	-	-	22	-	20
tert.	72	77	100	100	77	100	79
3C: secretaries							
primary	-	-	2	2	-	1	
lower sec.	25	2	29	16	22	20	20
higher sec.	64	71	50	55	63	54	54
tert.	10	27	19	27	15	25	25
3D: Bookkeepers							
primary	3	3	7	6	2	5	3
lower sec.	20	18	39	32	16	30	22
higher sec.	65	62	48	52	66	56	61
tert.	13	17	6	10	17	9	14
3E: Bookkeeping machine operator							
primary	10	5	-	-	8	-	6
lower sec.	33	56	-	-	29	-	37
higher sec.	57	39	59	58	62	68	57
tert.	-	-	41	42	-	32	-
3F: Transport supervisors							
primary	13	25	-	-	9	-	8
lower sec.	33	27	-	-	30	-	29
higher sec.	46	41	100	100	50	100	52
tert.	8	7	-	-	11	-	11
3G: Transport conductors							
primary	-	-	-	-	-	-	-
lower sec.	19	6	-	-	16	-	16
higher sec.	81	94	-	-	84	-	84
tert.	-	-	-	-	-	-	-
3H: Mail distribution clerks							

primary	30	20	19	11	25	13	22
lower sec.	51	52	39	43	49	40	47
higher sec.	19	27	42	46	25	47	30
tert.	1	2	-	-	1	-	1
3J: Telephone and telegraph operator							
primary	-	-	5	12	-	3	3
lower sec.	-	-	46	39	-	43	42
higher sec.	-	-	46	48	-	52	53
tert.	-	-	2	2	-	2	2
3X: Clerical worker, not specified							
primary	9	5	4	4	6	3	4
lower sec.	27	22	35	28	22	26	24
higher sec.	53	53	51	53	57	56	56
tert.	11	20	10	15	15	15	15
4A: Managers wholesale							
primary	6	5	-	-	3	-	3
lower sec.	17	18	22	33	13	19	13
higher sec.	53	56	78	67	52	81	52
tert.	24	21	-	-	32	-	31
4B: Managers retail							
primary	6	6	-	-	4	-	4
lower sec.	17	15	26	33	13	19	14
higher sec.	73	71	78	67	77	81	77
tert.	4	8	-	-	6	-	5
4C: Wholesale proprietor							
primary	27	8	-	-	19	-	17
lower sec.	21	24	40	22	19	30	20
higher sec.	42	58	19	69	49	17	46
tert.	9	9	40	9	13	52	17
4D: Shop keeper and retail owner							
primary	14	11	14	8	9	7	8
lower sec.	11	13	18	21	10	21	13
higher sec.	73	68	58	70	79	63	75
tert.	2	7	5	4	3	8	4
4E: Sales supervision							
primary	7	2	20	11	4	16	6
lower sec.	18	23	32	32	14	26	16
higher sec.	66	58	40	51	68	50	65
tert.	10	16	8	5	14	8	4
4F: Salesman							
primary	6	4	5	8	4	2	3
lower sec.	21	22	-	-	17	-	16
higher sec.	56	58	73	47	57	72	57
tert.	17	16	22	45	23	26	24
4G: Insurance agent, broker							
primary	3	1	4	1	2	3	2

lower sec.	12	9	32	11	9	17	11
higher sec.	69	66	48	72	67	52	64
tert.	17	24	16	15	22	28	23
4H: Salesman retail							
primary	16	10	17	13	11	11	11
lower sec.	37	30	53	44	31	47	43
higher sec.	43	52	28	39	51	37	42
tert.	4	9	2	4	6	4	5
4X: Commercial functions, not specified							
primary	-	-	-	-	-	-	-
lower sec.	100	100	-	-	100	-	100
higher sec.	-	-	-	-	-	-	-
tert.	-	-	-	-	-	-	-
5A: Hotel Bar director, manager							
primary	8	14	10	18	5	7	5
lower sec.	36	18	50	36	31	41	35
higher sec.	44	54	37	38	47	47	47
tert.	12	14	3	8	17	5	13
5B: Hotel owner							
primary	25	12	22	8	17	12	16
lower sec.	20	27	42	41	18	40	23
higher sec.	54	59	32	48	63	40	59
tert.	1	1	4	3	1	8	3
5C: Housekeeping supervisor							
primary	10	23	-	-	6	-	2
lower sec.	-	-	21	20	-	18	12
higher sec.	80	53	53	56	81	52	61
tert.	10	24	26	24	13	30	25
5D: Cooks							
primary	25	21	33	25	20	25	23
lower sec.	51	33	42	42	47	40	43
higher sec.	20	44	23	31	27	32	30
tert.	3	2	2	3	7	3	4
5E: Housekeeping service worker							
primary	43	33	21	16	31	14	14
lower sec.	18	4	35	28	19	33	32
higher sec.	33	19	43	50	42	50	50
tert.	5	44	2	7	9	4	4
5F: Caretaker							
primary	31	48	51	47	24	38	35
lower sec.	45	31	39	41	45	46	45
higher sec.	23	20	10	11	29	15	19
tert.	1	1	0	1	2	1	1
5G: Launderers, washers							
primary	-	-	28	19	-	22	23
lower sec.	-	-	68	63	-	74	72

higher sec.	-	-	4	17	-	5	5
tert.	-	-	-	-	-	-	-
5H: Hairdressers							
primary	-	-	3	1	-	1	1
lower sec.	2	7	6	14	1	3	2
higher sec.	98	93	91	84	99	95	95
tert.	-	-	1	0	-	1	1
5J: Fireman, law officer							
primary	6	3	-	-	4	-	4
lower sec.	18	18	12	24	15	12	15
higher sec.	73	72	88	76	77	88	78
tert.	2	6	-	-	3	-	3
5X: Service worker, not specified							
primary	26	19	5	8	19	3	7
lower sec.	44	28	19	23	42	14	22
higher sec.	26	49	70	62	32	71	60
tert.	4	4	6	7	7	12	11
6A: Farmers, fishers, managers							
primary	-	-	-	-	-	-	-
lower sec.	14	40	-	-	11	-	11
higher sec.	72	49	-	-	71	-	70
tert.	15	11	-	-	19	-	19
6B: Farmers, owner							
primary	15	10	18	4	10	11	10
lower sec.	44	37	59	44	42	58	43
higher sec.	40	51	18	46	46	23	45
tert.	2	2	4	6	3	8	3
6C: Agricultural worker							
primary	30	23	17	13	24	11	19
lower sec.	41	34	58	49	39	57	46
higher sec.	28	42	25	38	36	31	34
tert.	1	1	1	1	1	1	1
6D: Forestry workers							
primary	30	46	-	-	21	-	21
lower sec.	34	37	-	-	35	-	35
higher sec.	36	17	-	-	44	-	44
tert.	-	-	-	-	-	-	-
6E: Fishers							
primary	25	22	-	-	20	-	20
lower sec.	45	59	-	-	42	-	42
higher sec.	30	20	-	-	38	-	38
tert.	-	-	-	-	-	-	-
71: Production supervisor							
primary	10	8	28	42	6	20	6
lower sec.	24	24	30	20	20	27	21
higher sec.	60	58	36	32	65	44	64

tert.	6	9	6	6	9	9	9
72: Miners Quarriers							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	100	100	-	-	100	-	100
tert.	-	-	-	-	-	-	-
73: Metal processor							
primary	55	41	-	-	48	-	48
lower sec.	34	39	-	-	36	-	41
higher sec.	11	20	-	-	16	-	17
tert.	-	-	-	-	-	-	-
74: Wood preparation worker							
primary	47	23	-	-	42	-	42
lower sec.	41	35	-	-	40	-	41
higher sec.	12	43	-	-	17	-	17
tert.	-	-	-	-	-	-	-
75: Chemical process worker							
primary	24	11	-	-	18	-	16
lower sec.	23	25	35	49	21	26	22
higher sec.	51	62	65	51	59	74	60
tert.	1	2	-	-	2	-	2
76: Textile workers							
primary	56	47	-	-	50	-	47
lower sec.	32	38	-	-	36	-	34
higher sec.	12	16	100	100	15	100	18
tert.	-	-	-	-	-	-	-
77: Tanner & fellmonger							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	-	-	-	-	-	-	-
tert.	-	-	-	-	-	-	-
78: Food & beverage worker							
primary	29	28	17	21	23	12	22
lower sec.	36	35	62	52	32	65	35
higher sec.	35	37	20	27	44	24	42
tert.	0	0	-	-	1	-	1
79: Tobacco worker							
primary	33	11	-	-	23	-	23
lower sec.	15	31	-	-	15	-	15
higher sec.	52	59	-	-	62	-	62
tert.	-	-	-	-	-	-	-
7A: Tailors							
primary	42	30	25	18	33	18	24
lower sec.	34	41	49	50	35	47	42
higher sec.	24	29	26	31	32	36	34
tert.	-	-	-	-	-	-	-

7B: Shoemakers							
primary	30	28	-	-	21	-	13
lower sec.	13	34	75	70	13	68	33
higher sec.	58	39	25	30	66	32	54
tert.	-	-	-	-	-	-	-
7C: Cabinet makers							
primary	32	21	-	-	25	-	24
lower sec.	41	51	-	-	40	-	40
higher sec.	27	28	-	-	36	-	36
tert.	-	-	-	-	-	-	-
7D: Stone polisher & cutter							
primary	-	-	-	-	-	-	-
lower sec.	100	100	-	-	100	-	-
higher sec.	-	-	-	-	-	-	-
tert.	-	-	-	-	-	-	-
7E: Blacksmith							
primary	23	20	-	-	17	-	17
lower sec.	37	37	-	-	33	-	34
higher sec.	41	43	-	-	50	-	50
tert.	-	-	-	-	-	-	-
7F: Fitters							
primary	14	11	-	-	10	-	11
lower sec.	38	29	45	25	34	37	34
higher sec.	47	58	40	51	55	39	54
tert.	1	2	15	24	1	24	1
7G: Electric fitters workers							
primary	13	6	27	22	9	19	9
lower sec.	30	25	61	69	25	66	28
higher sec.	54	65	12	9	61	15	58
tert.	3	3	-	-	5	-	5
7H: Broadcasting station operators							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	100	100	-	-	100	-	100
tert.	-	-	-	-	-	-	-
7J: Plumbers							
primary	17	16	-	-	12	-	12
lower sec.	49	46	100	100	46	100	46
higher sec.	34	38	-	-	42	-	42
tert.	0	0	-	-	0	-	0
7K: Gold silver smith							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	-	-	100	100	-	100	100
tert.	-	-	-	-	-	-	-
7L: Glass former							

primary	42	56	-	-	39	-	38
lower sec.	58	44	-	-	61	-	62
higher sec.	-	-	-	-	-	-	-
tert.	-	-	-	-	-	-	-
7M: Rubber plastic worker							
primary	41	27	-	-	34	-	32
lower sec.	40	44	100	100	39	100	43
higher sec.	19	30	-	-	26	-	25
tert.	-	-	-	-	-	-	-
7N: Paper production worker							
primary	42	22	-	-	38	-	38
lower sec.	51	49	-	-	51	-	52
higher sec.	7	29	-	-	11	-	11
tert.	-	-	-	-	-	-	-
7P: Printers							
primary	23	9	4	1	17	2	15
lower sec.	31	32	46	21	27	27	27
higher sec.	45	58	50	78	53	71	55
tert.	1	1	-	-	2	-	2
7Q: Painters							
primary	22	18	-	-	17	-	16
lower sec.	46	47	-	-	44	-	44
higher sec.	32	35	-	-	40	-	40
tert.	-	-	-	-	-	-	-
7R: Other industrial occupations							
primary	49	25	33	36	40	27	39
lower sec.	23	45	67	64	23	73	27
higher sec.	28	30	-	-	37	-	35
tert.	-	-	-	-	-	-	-
7S: Construction workers							
primary	25	22	-	-	19	-	19
lower sec.	45	43	-	-	43	-	43
higher sec.	30	35	-	-	38	-	38
tert.	0	0	-	-	0	-	1
7T: Engine operator							
primary	-	-	-	-	-	-	-
lower sec.	-	-	-	-	-	-	-
higher sec.	83	75	-	-	79	-	79
tert.	17	25	-	-	21	-	21
7U: Crane operators dockers							
primary	43	37	42	28	37	34	36
lower sec.	39	41	49	53	39	52	42
higher sec.	17	21	99	19	23	14	22
tert.	0	1	-	-	1	-	1
7V: Drivers							
primary	33	23	14	9	27	9	26

lower sec.	43	48	43	37	42	37	43
higher sec.	24	29	40	52	31	49	31
tert.	0	0	3	2	0	5	1
7X: Manual worker, not specified							
primary	59	45	67	31	51	47	50
lower sec.	29	32	23	55	32	43	32
higher sec.	12	24	10	14	17	18	18
tert.	-	-	-	-	-	-	-
8A: professional military							
primary	3	1	-	-	2	-	2
lower sec.	24	26	-	-	17	-	17
higher sec.	57	57	100	100	58	100	58
tert.	16	17	-	-	23	-	23

## Notes

1. France, Germany, Italy, the Netherlands, Spain and UK.
2. The postwar baby-boom was in the Netherlands larger and continued longer than in other European societies, due to the competition between protestant and catholic groups for the religious majority in Dutch society. High birth rates and low labour market participation of married women were means in this competition (van Heek, 1954).
3. The high birth rates of the 40's and 50's dropped strongly during the 60's as a consequences of the secularisation of Dutch society and the breakdown of the religious 'pillars' which had dominates society and daily live since the start of the 20th century.
4. Not all persons with early retirements are included into this unemployment category. Some persons with some forms of early retirement were excluded from the definition of labour force. This may have changed during the studied decades with the general trend to define early retirers as outside the labour market.
5. This requirement of the RAS method is not unique. Log-linear analysis required also no cells with zeros. Often zero-cells are replaced in log-linear analyses by a cell with only 1 case, which makes it possible to handle all relevant combinations and cells. It might be advisable to apply the same procedure in the RAS method.
6. see table 1 in combination with appendix I: 3E, 3G, 4X, 5G, 6D, 6E, 72, 77, 79, 7B, 7D, 7H, 7K, 7L, 7N, 7T.
7. The growing acceptance of working mothers by Dutch society can have led to a decrease in the educational levels of the women at the Dutch labour market, while before the growth in this acceptance only women with a strong labour market and societal position could enter and stay at the labour market after marriage and child-birth. Higher educational levels often provide stronger labour market and societal positions.
8. This increase in the re-entering of older, often lower educated women can partly explain the lower rise of the educational levels of the female labour force during the studied decades, compared to the male labour force.
9. The relatively small rise of the percentage of employees younger than 25 years (from 5% in 1973 to 10% in 1992) can easily be explained by the limited possibilities for most tertiary student to finish their studies before the age of 25.
10. Using the absolute observed and estimated numbers for each age and educational level of each occupation we computed the average educational and age level of an occupation, both observed and estimated. Educational level was measured in years of school attendance: primary education 6 years, lower secondary 9 years, higher secondary 12 years, tertiary 17 years. Age was measured in years: < 25 20 years, 25-35 30 years, 35-45 40 years, 45-55 50 years, 55< 60 years.

11. More than the standard deviation of all deviations (=residuals) between observed level and level estimated by RAS.

12. More than the standard deviation of all deviations (=residuals) between observed level and level estimated by RAS.