Parental education and the transition to higher secondary education

A comparison of primary and secondary effects for five Dutch school cohorts (1965-1999)

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Summary

In this study we set out to address long term developments in the primary and secondary effect of social background on the transition to higher secondary education in the Netherlands, by analyzing panel data on five cohorts of Dutch pupils who made the transition to secondary education in 1965, 1977, 1989, 1993 and 1999 respectively. We examine whether the primary or secondary effect of social background is more important for the transition to higher secondary education, and whether the relative importance of these two effects has changed over time. Through counterfactual analyses and a variant of the technique of diagonal reference models, primary and secondary effects are decomposed. We show that the primary effect of social background has remained stable over time, whereas the secondary effect of social background has decreased to some extent. As a consequence, the relative importance of the primary effect of social background on the transition to higher secondary education has increased over time.

Introduction

Throughout the twentieth century, the importance of education for success in life has increased considerably in the Netherlands. With the long-term transformation from an agriculture society to an industrial society, and from an industrial society to a service society (Ultee, Arts & Flap, 1996), the proportion of occupations for which education is an essential recruitment criterion has clearly increased. Employers nowadays cannot afford it to attribute attractive occupations on the base of social background. Even for the less demanding occupations, an elementary educational qualification is required. The benefits of more and higher levels of education are getting more and more widespread; having an educational qualification is not sufficient enough for obtaining a good position in the labor market, it also has to be higher than the educational qualification of other applicants. Consequently, ever more children from all backgrounds enroll in the educational system to higher educational levels. The fact that the awareness of the value of a higher education qualification for children's life chances has increased considerably among parents might also play a role in this. Since parents want only the best for their children, they will help them to achieve the highest educational level possible in every conceivable way. In this paper we want to investigate to what extent the influence of parents on children's educational career occurs through the primary and/or secondary effect of social background.

At the age of twelve, most Dutch pupils have completed primary education and have to make a choice on which type of secondary education they will pursue. This is the most important branching point in the Dutch educational system, since it determines pupils' educational career to a great extent. Two levels can be distinguished in secondary education in the Netherlands. First, at the lower level lower vocational education and lower general secondary education are positioned (VBO and MAVO respectively). Secondly, the higher level contains higher general secondary education and pre-university education (HAVO and VWO respectively). The choice between these two levels is fundamental, since only the higher level gives access to tertiary education (De Graaf & Ganzeboom, 1993). As to these structural conditions of the Dutch educational system, the transition from primary to secondary education is an excellent and important opportunity for parents to influence the development of their children's educational career. Probably, parents will do everything to ensure that their children proceed to the higher level of secondary education, by which they increase the chance that their children will gain entrance to tertiary education.

The selection and allocation of Dutch pupils into a type of secondary education is mostly based on their abilities and performances (effect B in Figure 1). By reinforcing a child's ability to perform well in school (effect A in Figure 1), parents indirectly influence the choice for a particular type of secondary education. In addition to this so-called primary effect of social background (Boudon, 1974), pupils will make choices during their educational career that are directly related to their social background, independent of their ability level (effect C in Figure 1). This is the so-called

secondary effect of social background (Boudon, 1974). Previous empirical studies have found abundant evidence for the existence of both the primary and secondary effect of social background on educational decisions. High status children have higher educational performances than low status children and also, high status children proceed more often to higher educational types than low status children, even with the same ability level (Bakker & Cremers, 1994; Erikson & Jonsson, 1996; Erikson, Goldthorpe, Jackson, Yaish & Cox, 2005; Jackson, Erikson, Golthorpe & Yaish, 2006).

*** Figure 1 about here ***

In this paper we address long term developments in the primary and secondary effect of social background on the transition from primary to higher secondary education in the Netherlands. We analyze panel data on five cohorts of Dutch pupils who made the transition to secondary education in 1965, 1977, 1989, 1993 and 1999 respectively. The research questions read whether the primary or the secondary effect of social background is more important for the transition to higher secondary education in the Netherlands, and whether the relative weight of these two effects has changed over time. With this paper, we contribute to discussions about macro changes in the social inequality of educational opportunities in the Netherlands. Furthermore, we will make theoretical and empirical progress on existing historically comparative research on educational inequality in several ways.

First of all, hardly any of the previous historically comparative studies on educational inequality include children's cognitive ability. As a result, the distinction between the primary and secondary effect of social background hardly ever can be made. Furthermore, the limited attention for tracking trends in both the primary and secondary effect is caused by the often used assumption that primary effects are fairly stable over time. Then, changes in the effect of social background on educational opportunities are assumed to be due to changes in the secondary effects (e.g. Boudon, 1974; Goldthorpe, 1996; Erikson & Jonsson, 1996). In this paper we set out to challenge this assumption; to what extent a more meritocratic educational situation has been reached can only be determined if the primary and secondary effect of social background are analyzed simultaneously.

In more recent studies, the relative importance of primary and secondary effects of social background over time has been examined. For British society, Jackson et al. (2007) show that the secondary effect accounts for about 30 to 40 percent of the class differences in the transition to A-level education in 1974 and 1986. In 2001, this was reduced to about 20 to 25 percent. For Stockholm, Erikson (2007) demonstrates that the relative importance of the secondary effect on the transition to upper secondary school has decreased between 1969 and 1990. This paper presents a comparable study for the Netherlands. The Netherlands can be regarded as an interesting testing ground, since it has never been much of a 'class society'. Therefore, we conceptualize social background by parental education and not by social class as in the studies of Jackson et al. (2007) and Erikson (2007). Furthermore, the analyses here are based on five cohorts of Dutch pupils, ranging from 1965 to 1999,

which covers a time period of 34 years. This time period is long in comparison to previous historically comparative research. We think it is important to include as much generations in the analyses as possible. Comparing only two or three generations might present a distorted picture due to accidentally peculiarities.

In analyzing the relative importance of primary and secondary effects of social background on the transition to higher secondary education, we adopt the method of counterfactual analysis as proposed by Erikson and his colleagues (2005). We will extent this method by applying a variant of the technique of diagonal reference models. This makes it possible to estimate the relative weight of the primary and secondary effect with only a single parameter.

Finally, in previous research the primary effect of social background is often interpreted as the effect of social background on children's cognitive ability only (effect A in Figure 1) (e.g. Erikson et al., 1996; Erikson et al., 2005; Jackson et al., 2007). Probably, the assumption is made that the effect of children's cognitive ability on educational decisions is rather stable over time (effect B in Figure 1). We believe that this is not the case; the ability-education association has changed over time. Therefore, for scrutinizing the primary effect of social background, we will take the effect of children's cognitive ability on educational decisions into account.

Ability and educational decisions

Over the years, the Dutch government has strived for a meritocratic educational system, in which educational success is mostly based on children's abilities and performances. Theoretically, however, it remains to be seen to what extent the influence of children's cognitive ability on educational decisions is really meritocratic. The nature-nurture debate attempts to clarify how children's cognitive ability arises: are social environmental conditions or genetics more decisive for the development of children's cognitive ability? According to the adherents of the nature argument, cognitive ability is determined by genes and can not or hardly be changed by social environmental circumstances (e.g. Jensen, 1969; Herrnstein & Murray, 1994). This means that the influence of cognitive ability on educational success is completely meritocratic. Most researchers agree that genetic factors are important to children's cognitive ability. However, they do not subscribe to the non-existence of social environmental influences. They stress that it is inconceivable to study the development of children's cognitive ability without considering the nurture argument (Bronfenbrenner, 1979; Bronfenbrenner & Ceci, 1994; Fischer, Hout, Jankowski, Lucas, Swidler & Voss, 1996; Duyme, Dumaret & Tomkiewicz, 1999; Jonsson & Erikson, 2000; Meijnen, 2006). We agree with this point of view and think that non-meritocratic influences are perceptible in the development of children's cognitive ability. As a consequence, the influence of children's cognitive ability on educational decisions can not be completely meritocratic. This means that it is important to study the social background-ability

association, since it indicates to what extent the Dutch government has succeeded in making the educational system really meritocratic.

Theoretical framework

Social background differences in educational decisions arise through two mechanisms: the primary and secondary effect of social background. We will briefly explain how these effects work and to what extent changes can be expected in the magnitude of these effects. To understand the primary effect of social background, it is important to note the decisive role of children's abilities and performances in the Dutch educational system. High ability children have a larger chance to survive the various educational selections in comparison to low ability children. Over time, it is clear that parents have become more aware of the fact that the chance of educational success for most depends on the cognitive ability and educational performances of their children. In order to ascertain educational success, parents will try to reinforce their children's cognitive ability and improve their children's educational performances by employing cultural resources. Boudieu (1973) argued that children who acquire cultural capital at home are more likely to perform well in school and as a consequence, have better chances to achieve a high educational level. Kalmijn & Kraaykamp (1996) expound in what way cultural capital is linked to educational success. Children who are often exposed to cultural activities have less difficulties with the subject matter of the higher educational types and are believed to be familiar with abstract and intellectual concepts. In general one might say that parental cultural capital enhances competencies in children. Since high status parents have more and superior cultural resources at their disposal than low status parents, they probably will be more successful in influencing children's abilities. Due to the increasing awareness of parents regarding the importance of children's abilities and educational performances for educational success, it might be that the primary effect of social background on educational decisions has increased over time.

As to the secondary effect of social background, often rational choice approaches have been used (e.g. Boudon, 1974; Goldthorpe, 1996; Breen & Goldthorpe, 1997; Breen et al., 2005). The main reasoning of these approaches is that differences in educational decisions emerge, because social status groups differ in the expectation of the costs and benefits of education and also in the expectation concerning the probability of educational success of their offspring. Rational considerations of parents then lead to lower aspirations for low status children and higher aspirations for high status children. In addition to this, the rational choice approaches propose a tendency towards relative risk aversion. Parents of all backgrounds want to avoid that their children attain a position that is worse than their own and want to assure that children attain a position that is as least as good as that of their own (Breen & Goldthorpe, 1997). Consequently, the transition to higher secondary education is less often made by low status children. However, due to developments as the upgrading of the occupational structure, decreasing income inequality, decreasing educational costs, the declining family size and the

improvement of traveling, the choice for a high educational level has become more attractive for the low status groups as well, since the costs and risks of education have decreased and the benefits of education have increased (e.g. Erikson & Jonsson, 1996; Breen & Goldthorpe, 1997; Erikson, 2007). As a result, we think the secondary effect of social background on educational decisions might have decreased over time.

If high status parents do not succeed in influencing children's cognitive ability and educational performances directly, they will search for other strategies to see to it that their children make the transition to higher secondary education anyway. They exert pressure on the primary school to raise the advice for a type of secondary education (e.g. Dronkers et al., 1998; Driessen, 2006). As a consequence, children obtain higher school advices than their educational performances justify. Another possible strategy is that high status parents contact secondary education schools, in order to promote admission to a high secondary education level. These strategies would prevent a decreasing secondary effect of social background. If these strategies are successful, the secondary effect might have remained stable over time.

On the base of our expectations about historically changes in the magnitude of the primary and secondary effect of social background, it is possible to derive an expectation about the relative importance of these effects over time. Since we expect an increasing primary effect and an decreasing or stable secondary effect, the relative importance of the primary effect of social background will have increased over time. In other words, over the years the primary effect of social background has accounted for a greater part of the total educational inequality in the Netherlands.

Data & methods

Data

To answer the research questions, we use data from five cohorts of pupils from the Netherlands. The first national cohort is the 'From Year to Year' cohort. This cohort is a sample of 1,845 pupils who entered secondary education in 1965 (before the introduction of the Mammoth Law). The data for the pupils who proceeded to secondary education in 1977 are derived from the cohort "School Career and Background of Pupils in Secondary Education" (N = 37,242). Three waves of the "Cohort Survey of Secondary School Pupils" provide the data from the generations that proceeded to secondary education in 1989 (N = 19,524), 1993 (N = 20,331), and 1999 (N = 19,310) respectively. The total number of respondents is 98,333. In each dataset, pupils are followed from the first class in secondary education. Each year, schools are approached to provide information on the type of education, the school year of the pupils and the results of the exams. The parents have provided information on the background characteristics of the pupils by means of self-completion questionnaires.

We have used a multiple imputation procedure from STATA to generate multiple-imputed data sets without missing values, by which we are able to use all the information of all respondents.

We carried out imputations for each cohort separately. Most missing values were found in cohort 1993 on the variable *parental education*. For 18 percent of the pupils, we did not know the educational level of their parents. In cohort 1977, the *cognitive ability* was unknown for almost 17 percent. Even in situations with this many missing values, Rubin (1987: 114) shows that only a few imputations are necessary to get estimates with a high relative efficiency. Therefore, we have used five multiply-imputed data sets for each cohort.

Measurements

The information on the educational career is longitudinal starting with the transition to secondary education, which we used to construct our dependent variable *transition to higher secondary education*. This refers to the transition to higher general secondary education (havo) or pre-university education (vwo). A problem with constructing this variable is that pupils in their first year often are pre-selected for a so-called "bridge class" in which educational types are combined. So, the pupils do not have to choose right away for a particular educational type. We decided that pupils who proceed to a bridge class in which "havo" or "vwo" is included, score a 1 on the variable *transition to higher secondary education*, otherwise they score a 0.

Table 1 presents the distribution of pupils' choices regarding a type of secondary education over time. The rapid educational expansion is clearly perceptible; in 1965 more than 16 percent of the pupils who finished primary school entered a higher type of secondary education, in 1999 this is almost 60 percent.

*** Table 1 about here ***

Cognitive ability is represented by the score on a school test, consisting of a verbal and a mathematical component, which was taken halfway in the first year of secondary education. Test scores are an often used indicator for ability (e.g. Savage & Egerton, 1997; Marks & McMillan, 2003). The intention of this school test was to measure a student's starting level at secondary education. The fact that these tests are taken halfway the first year could cause some bias in our research findings. Students already have made their choice for a particular type of secondary education, by which the chronological order of making the test and the school choice is disturbed. This could lead to some overestimation in the effect of ability on the transition to secondary education. Since cohort 1989, this school test has undergone no changes. In cohort 1977, another verbal and mathematical test was taken and in cohort 1965 the level of performances was created in a complete different manner. For constructing the variable *cognitive ability*, the last obtained grades and test results on the subjects language skills, mathematics, geography and history were used. De Jong, Dronkers & Saris (1982) point out that this score is a good approximation for the total score on the verbal and mathematical test. Thereby, by

standardizing the absolute test-scores into Z-scores, the different measures of cognitive ability will be comparable.

Parental education is measured by the maximum level of the father's and mother's educational attainment. The educational categories are: 1) low educated (primary school or lower secondary education), 2) middle educated (higher secondary education), and 3) high educated (higher vocational education or university).

Methods and analyses

The analytical part of this paper starts with some analyses by which we provide insight in the underlying effects of the primary and secondary effect of social background (effect A, B and C in Figure 1). The next analytical step is establishing the importance of the primary and secondary effect and the relative weight of these two effects. For this, we adopt an approach originally introduced by Erikson et al. (2005): counterfactual analyses implemented by numerical integration. Primary and secondary effects are separated in this approach.

The underlying effects of the primary and secondary effect

To start with, we present in Table 2 the probability of making the transition to higher secondary education of pupils from different social backgrounds. Considerable more pupils from all backgrounds enter higher secondary education over time. However, social background differences did not disappeared; pupils with high educated parents have always had a higher odds of making the transition to higher secondary education in comparison to pupils with low or middle educated parents.

*** Table 2 about here ***

The transition to higher secondary education follows a logistic curve. Therefore, a first step in obtaining the underlying effects of the primary and secondary effect of social background is performing binary logistic regression analyses. This procedure yields both the effect of parental educational level on the transition to higher secondary education, controlled for performance scores (α), as well as the effect of performance scores on the transition to higher secondary education for each parental educational level (β). These estimated parameters for the transition to higher secondary education are represented in the first part of Table 3. It can be seen that children with high educated parents proceed more often to higher secondary education than children with low educated parents, even if they have the same performance score (effect C). Furthermore, in most cohorts the effect of children's performance score on the transition probabilities is somewhat stronger for children with

high educated parents than for children with low educated parents (effect B for each parental educational level).

Next, we determine to what extent social background differences exist in children's performance scores (effect A). Performance scores are assumed to have a normal distribution. Therefore, the association between parental education and children's performance scores is determined by estimating the mean and the standard deviation of the standardised performance scores separately for each parental educational level. These are shown in the second part of Table 3. The association between social background and performance scores clearly exists; children with high educated parents have the highest performance scores, followed by children with middle educated parents and then children with low educated parents. Historically, the difference in average performance scores between children with low educated parents and children with high educated parents has increased to some extent between 1965 and 1993; after 1993 it became smaller.

*** Table 3 about here ***

Counterfactual analysis implemented by numerical integration

To quantify the importance of the primary and secondary effect of social background and the relative weight of these effects, we have to determine the expected proportion pupils of parental educational level i, that makes the transition to higher secondary education. This proportion depends on the proportion of average performances, *x*, in parental educational level i (component A) and of the probability of going to higher secondary education among pupils, whose parents have this educational level, with an average score of *x (*component B*)*. Under the assumptions that component A follows a normal curve and component B a logistic curve, the proportion pupils making the transition to higher secondary education for each parental educational level can be written as:

$$\int_{-4}^{+4} \left(\frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/2\sigma^2} \right) \left(\frac{e^{(\alpha+\beta x)}}{1+e^{(\alpha+\beta x)}} \right) dx$$

By inserting the estimated parameters for performance (μ, σ) and transition (α, β) in this integral, the estimated proportion pupils proceeding to higher secondary education can be determined[1]. Table 2 shows that the estimated transition rates approximate the observed transition rates.

Since this integral consists of two components, we are able to perform counterfactual analyses. By combining the estimated performance distribution of pupils whose parents have a certain parental educational level with the performance-related transition probabilities of pupils whose parents have another parental educational level, we can estimate the expected counterfactual proportion of pupils proceeding to higher secondary education. These counterfactuals are represented in Table 4. The rows

[1] The integral has no closed form solution. Therefore, we have used a numerical integration procedure in R.

present the parental educational level of children, whose performance distribution is used and the columns present the parental educational level of children, whose performance-related transition probabilities are used. Note that the diagonal cells of each cohort are the same as the estimated transition rates in Table 2.

What can be seen from Table 4? For example in 1989, the proportion of pupils with low educated parents making the transition to higher secondary education was about 26 percent in comparison to about 73 percent of pupils with high educated parents. If the pupils with low educated parents retain their performance distribution, but would have the same performance-related transition probabilities as the children with the high educated parents, the estimated proportion of pupils with low educated parents making this transition would be about 44 percent. And the other way around, if they have the same performance distribution as the children with high educated parents, but retain their performance-related transition probabilities, the estimated transition proportion of these pupils would be about 49 percent.

Table 4 gives us an indication of the relative importance of primary and secondary effects of parental education on the transition to higher secondary education. However, it is preferable to obtain estimates for the relative importance of both effects. For this, we make use of log odds ratios (Erikson et al., 2005; Jackson et al., 2007; Erikson, 2007). A first step is determining the odds of the estimated transition probabilities. These are shown in the first part of Table 5. The odds ratio for the transition probabilities of pupils with high educated parents in comparison to pupils with low educated parents can be calculated as follows

$$Q_{HH.LL} = (P_{HH} / (1 - P_{HH})) / (P_{LL} / (1 - P_{LL}))$$

where P_{HH} is the proportion of pupils with high educated parents who proceed to higher secondary education and P_{LL} is the proportion of pupils with low educated parents who make this transition. Accordingly, we can determine the counterfactual odds ratios, in which the actual odds of pupils with high educated parents is related to a counterfactual odds in which the performance distribution or the performance-related transition probabilities is replaced by that of pupils with low or middle educated parents. For instance:

$$Q_{HH.LH} = (P_{HH} / (1 - P_{HH})) / (P_{LH} / (1 - P_{LH}))$$

or

$$Q_{HH.HL} = (P_{HH} / (1 - P_{HH})) / (P_{HL} / 1 - P_{HL}))$$

The actual and counterfactual odds ratios are presented in the second part of Table 5. Jackson et al. (2007) have shown that the sum of the logarithms of the paired counterfactual odds ratios is equal to

the logarithm of the actual odds ratio, which can be interpreted as the total inequality in educational opportunities. In formula:

$$L_{HH.LL} = L_{HL.LL} + L_{HH.HL} \quad (1)$$

or

$$L_{HH.LL} = L_{HH.LH} + L_{LH.LL} \quad (2)$$

The first term can be interpreted as the secondary effect of parental educational level, since it refers to situations with different transition probabilities, but similar performance distributions. The second term can be interpreted as the primary effect of parental educational level, since here the transitions probabilities are alike, but the performance distributions differ. The estimates of the primary and secondary effect in formula 1 and formula 2 respectively are in most cases fairly similar (Erikson et al., 2005; Erikson, 2007). Therefore, the primary effects will be estimated by

$$P = (L_{HH.HL} + L_{LH.LL}) / 2$$

And the secondary effects by

$$S = (L_{HL.LL} + L_{HH.LH}) / 2$$

Figure 2 shows that the average primary effect of social background on the transition to higher secondary education has remained rather stable between 1965 and 1999, which is not in line with our expectation. As we expected, Figure 3 demonstrates that the average secondary effect of social background has declined to some extent. Then, the relative importance of primary effects can be determined as

$$L_{HH.HL} / L_{HH.LL} \quad (3)$$

or

$$L_{LH.LL} / L_{HH.LL} \quad (4)$$

Formula (3) and (4) produce the figures represented in Table 5. By taking the average, we have established the estimates for the relative importance of the primary effect. It seems that over time, the primary effect of parental education has become more important for the transition to higher secondary education relative to the secondary effect of parental education. But still, this results in too many estimates to get a clear picture of developments over time[2]. To gain better insight, we perform a more general procedure derived from the technique of diagonal reference models. Originally, these models are used for the analysis of social mobility effects, in which the relative effects of origin and

[2] Especially if one decides to apply this procedure on more than three (background) categories.

destination on fertility are described (Sobel 1981, 1985). However, these models are applicable in a variety of research contexts. Here, we use them just to obtain a single estimate for the relative importance of the primary effect of parental education for each cohort.

The basic idea of this technique is that the diagonal cells of a cross-classification table with R rows and R columns are the reference categories for the off-diagonal cells. This procedure models the expected counterfactual transition probabilities in the off-diagonal cells as a weighted sum of the proportions in the diagonal reference categories. The diagonal reference model can be written as follows:

$$\hat{y} = p.\alpha_i + (1-p).\alpha_j$$

(a) $i = 1,2,3; j = 1,2,3$

(b) $0 \leq p \leq 1$

In this formula, $\hat{y}$ represents the chance of a pupil proceeding to higher secondary education. Subscript i stands for the performance distribution of pupils whose parents have a certain educational level and subscript j stands for the performance-related transition probabilities of pupils whose parents have a certain educational level. Each diagonal cell has a parameter α, which represents the expected proportion of pupils of a certain background that makes the transition to higher secondary education. Finally, parameter p gives an estimate of the relative effects of performance distribution and performance-related transition probabilities, or the relative primary and secondary effects of social background. The sum of these relative effects is 1, as restriction b shows. Values above .5 indicate that the performance distribution, or primary effect is more important for the transition to higher secondary education. Values below .5 indicate that the performance-related transition probabilities, or the secondary effect is more important for this transition. Because we deal with counterfactual transition probabilities, the off-diagonal cells do not contain any true cases. Therefore, we decided to estimate the diagonal reference model with a unit number of cases for each cell.

The values for each cohort are presented in the bottom of Table 5. In each cohort, the value exceeds .5, which means that the primary effect of parental education is more important for the transition to higher secondary education than the secondary effect. And over time, the relative importance of the primary effect has increased in comparison to the secondary effect.

Preliminary conclusions

The expectations we started with did not all find support. We expected an increasing primary effect of social background on the transition to higher secondary education over time. However, the results show that the primary effect has remained rather stable between 1965 and 1999. The finding that the secondary effect of social background on the transition to higher secondary education has decreased to some extent is in line with our expectation. As is the finding that the relative importance of the primary effect of social background on the transition to higher secondary education has increased over time. Over the years, the primary effect of social background has accounted for a greater part of the total educational inequality in the Netherlands.

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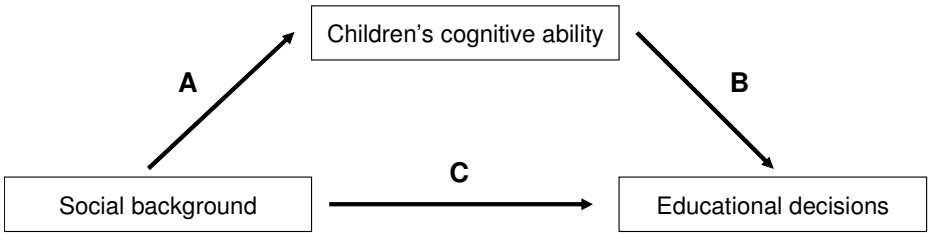
Figure 1: The primary and secondary effect of social background



A * B = primary effect of social background
C = secondary effect of social background
(A * B) + C = total effect of social background

Table 1: Transition to higher secondary education (in %)

	1965	1977	1989	1993	1999	Total
No higher secondary education	83,7	66,8	58,1	54,0	40,5	57,6
Higher secondary education	16,3	33,2	41,9	46,0	59,5	42,4
Total	100,0 (N=1,845)	100,0 (N=37,242)	100,0 (N=19,524)	100,0 (N=20,331)	100,0 (N=19,391)	100,0 (N=98,333)

Table 2: Observed and estimated percentage of pupils proceeding to higher secondary education

	1965			1977			1989			1993			1999		
	Observed	Estimated	N	Observed	Estimated	N	Observed	Estimated	N	Observed	Estimated	N	Observed	Estimated	N
Parental education															
Low	11.0	10.6	1555	21.6	21.1	19726	25.8	25.5	8740	25.9	25.6	6579	39.8	39.6	5485
Middle	40.0	39.1	178	37.4	36.7	11605	44.2	43.8	6873	45.8	45.2	9041	59.4	58.7	8700
High	52.3	51.6	112	63.4	62.6	5911	73.5	73.2	3911	74.2	73.6	4711	80.5	80.5	5206
All	16.3		1845	33.2		37242	41.9		19524	46.0		20331	59.5		19391
Odds ratios															
High / middle	1.65			2.90			3.50			3.41			2.82		
Middle / low	5.38			2.17			2.28			2.41			2.21		
High / low	8.85			6.29			7.97			8.22			6.23		

Table 3: Estimated parameters for performance (μ, σ) and for transition (α, β)

	1965		1977		1989		1993		1999	
Transition	α	β	α	β	α	β	α	β	α	β
Parental education										
Low	-3.378 [a] **	2.409 [b] **	-1.534 [a] **	1.859 [b] **	-0.949 [a] **	1.495 [b] **	-0.789 [a] **	1.756 [b] **	0.117 **	1.952 **
Middle	-1.622 [a] **	1.753 *	-1.098 [a] **	1.922	-0.517 [a] **	1.654 [b] **	-0.329 [a] **	1.766 [c]	0.502 **	1.904
High	-1.545 [a] **	2.234	-0.383 [a] **	2.031 **	0.317 [a] **	2.027 *	0.423 [a] **	2.015 **	1.320 **	1.984
Performance	μ	σ	μ	σ	μ	σ	μ	σ	μ	σ
Parental education										
Low	-0.116	0.970	-0.251	0.970	-0.344	0.961	-0.441	0.944	-0.414	1.008
Middle	0.549	0.949	0.130	0.950	0.096	0.930	0.023	0.941	0.024	0.956
High	0.739	0.871	0.584	0.897	0.598	0.879	0.565	0.882	0.401	0.885

[a] = significantly different from α 1999 (.01)

[b] = significantly different from β 1999 (.01)

[c] = significantly different from β 1999 (.05)

Table 4: Estimated probabilities of the transitions to higher secondary education for real and counterfactual combinations of estimated distributions of performance (rows) and transition probabilities (columns)

	1965			1977			1989			1993			1999		
Parental education	High	Middle	Low	High	Middle	Low	High	Middle	Low	High	Middle	Low	High	Middle	Low
High	0.516	0.443	0.278	0.626	0.504	0.425	0.732	0.584	0.490	0.736	0.614	0.535	0.805	0.701	0.645
Middle	0.453	0.391	0.237	0.482	0.367	0.300	0.580	0.438	0.356	0.573	0.452	0.376	0.703	0.587	0.526
Low	0.258	0.225	0.106	0.366	0.267	0.211	0.442	0.320	0.255	0.428	0.321	0.256	0.575	0.456	0.396

Table 5: Establishing the relative importance of the primary effect

	1965			1977			1989			1993			1999		
Parental education	High	Middle	Low	High	Middle	Low	High	Middle	Low	High	Middle	Low	High	Middle	Low
High	1.067	0.795	0.386	1.674	1.016	0.740	2.728	1.403	0.959	2.792	1.593	1.152	4.125	2.345	1.813
Middle	0.830	0.641	0.311	0.929	0.580	0.428	1.379	0.778	0.553	1.341	0.824	0.603	2.372	1.420	1.109
Low	0.347	0.290	0.119	0.578	0.364	0.268	0.791	0.471	0.343	0.748	0.473	0.344	1.353	0.837	0.655
	Odds ratio		Logarithm	Odds ratio		Logarithm	Odds ratio		Logarithm	Odds ratio		Logarithm	Odds ratio		Logarithm
$Q_{HH.MM}$	1.665		0.510	2.884		1.059	3.504		1.254	3.389		1.221	2.904		1.066
$Q_{HH.MH}$	1.342		0.294	1.648		0.499	1.944		0.665	1.753		0.561	1.759		0.565
$Q_{HH.HM}$	1.286		0.252	1.802		0.589	1.978		0.682	2.081		0.733	1.739		0.553
$Q_{HM.MM}$	1.294		0.258	1.601		0.470	1.771		0.572	1.628		0.488	1.670		0.513
$Q_{MH.MM}$	1.240		0.215	1.750		0.560	1.803		0.589	1.933		0.659	1.651		0.501
$Q_{MM.LL}$	5.406		1.687	2.166		0.773	2.270		0.820	2.396		0.874	2.170		0.775
$Q_{MM.LM}$	2.063		0.724	1.357		0.305	1.407		0.342	1.367		0.312	1.281		0.248
$Q_{MM.ML}$	2.207		0.792	1.597		0.468	1.651		0.502	1.742		0.555	1.697		0.529
$Q_{ML.LL}$	2.449		0.896	1.356		0.305	1.374		0.318	1.376		0.319	1.279		0.246
$Q_{LM.LL}$	2.620		0.963	1.596		0.468	1.613		0.478	1.753		0.561	1.694		0.527
$Q_{HH.LL}$	8.998		2.197	6.246		1.832	7.952		2.073	8.121		2.094	6.302		1.841
$Q_{HH.LH}$	2.767		1.018	2.263		0.817	2.843		1.045	2.424		0.885	2.275		0.822
$Q_{HH.HL}$	3.072		1.122	2.896		1.063	3.447		1.238	3.734		1.318	3.048		1.115
$Q_{HL.LL}$	2.929		1.075	2.157		0.769	2.307		0.836	2.175		0.777	2.067		0.726
$Q_{LH.LL}$	3.252		1.179	2.760		1.015	2.797		1.029	3.350		1.209	2.770		1.019
	(3)	(4)	Average	(3)	(4)	Average	(3)	(4)	Average	(3)	(4)	Average	(3)	(4)	Average
High / middle	0.494	0.423	0.458	0.556	0.529	0.542	0.544	0.470	0.507	0.601	0.540	0.570	0.519	0.470	0.495
Middle / low	0.469	0.571	0.520	0.605	0.605	0.605	0.612	0.583	0.598	0.635	0.643	0.639	0.682	0.680	0.681
High / low	0.511	0.537	0.524	0.580	0.554	0.567	0.597	0.496	0.546	0.629	0.577	0.603	0.605	0.554	0.580
Relative proportion primary effects	0.521			0.566			0.543			0.602			0.582		

Figure 2: The primary effect of social background on the transition to higher secondary education

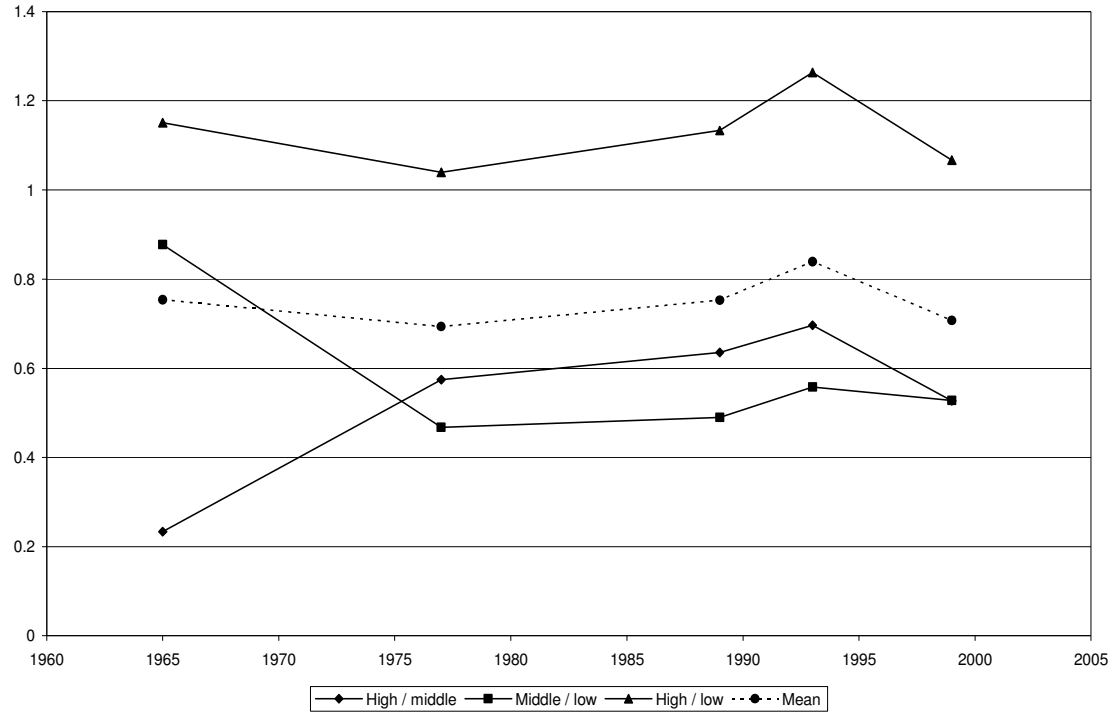


Figure 3: The secondary effect of social background on the transition to higher secondary education