ERASMUS UNIVERSITEIT ROTTERDAM

The Effect of Parental Education on Students' Educational Outcomes over Time in the Netherlands

Abstract: Recent debates in the Dutch education sector point towards increased differences in students' test scores, and parents' socio-economic backgrounds play a role in a more favorable teachers' advice. Both factors may lead to a higher inequality of education. Using data from 8th grade students in the Netherlands, this thesis tries to identify the factors contributing to student's test score, and teachers' advice. It is found that there is no significant evidence that higher parental education affects their CITO test score and probability of a more favorable teachers' advice. Moreover, positive assortative mating among parents have indeed occur, and shifted to a higher education level over time. High educated adults marry each other and have outnumbered those with lower education.

Master Thesis Policy Economics

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Section 1. Introduction

1A. Motivation and Research Questions

Recent studies in the Netherlands indicate that there is an increasing difference in educational attainment between children from high educated parents and children from low educated parents. As an example, both types of children would start at the same level (VWO or HAVO), but in the end 55 percent of children from high educated parents reach university, while the proportion of children is only 26 percent from low educated families. There is also an indication that parents greatly influence teachers' advice. At more than 700 schools, 20 percent of children from high educated and wealthy parents are given more favorable advice to continue to higher secondary education (*Ministerie van Onderwijs, Cultuur en Wetenschap*, 2016). This unequal opportunity in education is concerned to affect children's future, especially since it affects which track they should pursue; general or vocational track.

To observe the effect those indications may lead, it is important to firstly understand the reasons behind differences in school outcomes. One reason could be that parental education greatly affects children's schooling outcomes. If that is the case, then as parental education attainment becomes higher over time, children's schooling outcome should also become higher. Thus, the main research question this thesis aim to answer is whether parental education has any effects on student's school outcome over time, as measured by their test score and teacher's advice. Besides grades, teachers' advice is an aspect that the higher secondary schools take into account when accepting admissions. The hypothesis is that, parental education may contribute to children's school outcome. Carneiro (2008) explains that better parental education is associated with children's better school and environment. If the trend in children's educational outcome have indeed increased overtime, it may be due to a positive trend in parental education level and possibly assortative mating. Thus children with low outcomes must come from a disadvantaged family background in terms of low parental education. Another hypothesis takes teacher's advice as the school outcome and that it is affected by observing children's test score and their parents' educational background. Moreover, this thesis also aim to find out whether over time positive assortative mating occur among parents, thus positively affects children's test score.

Hypothesis are tested by observing parents and their children during a 20 year period, using data from 1994, 2004, and 2014. It is found that there is no significant evidence that higher parental

education affects children's test score. Furthermore, it does not lead to a higher probability of a more favorable teachers' advice even after controlling for children's test score. Finally, over time positive assortative mating indeed have occurred and may explain children's slightly higher test score compared to the negative assortative mating (also called the random match). Therefore, the inequality of opportunity concerns addressed by *Ministerie van Onderwijs, Cultuur en Wetenschap* may not be strongly accurate.

This thesis is divided into 3 sections; the first section lays out the theoretical backgrounds, literature review, empirical strategy, data information and an overview of the Dutch education system; the second section is the analysis section which consists of the Oaxaca decomposition, and the change in parental education overtime as well as assortative mating; the last section concludes.

1B. Theoretical Background

Education is tightly linked to human capital theory that has its roots in the 1960s. The key elements of this theory are that education creates wage differentials in the labor market and that education creates financial returns in the future, thus shifting the view of education from consumption to investment (Gillies, 2015). The nature of investment is linked to uncertainties and unknown future returns, which makes individuals often underinvest in their human capital. Underinvestment can take the form of dropping out of school, choosing a faster route to the job market, or choosing a lower track that would lead to blue collar jobs. Apart from underinvestment, opportunities also affect one's decision to attain schooling. Educational opportunity is the result of 2 components; individual's circumstances and their effort (Golley and Tao Kong, 2016). Individual's circumstances may refer to their gender, family background, wealth or socio-economic status, whilst effort refers to motivation and assertiveness they exert to obtain the desired outcome.

To create equal opportunity for all children, the distribution of outcome should be independent from circumstances in which the individuals have no control over (Roemer, 1998). In other words, a person's chance to attain an education should be unrelated to characteristics of origins such as race, gender, or class as these are things that are outside the individual's control (Breen and Jonsson, 2005). The only component that should matter is the individual's effort. However, effort itself differs across individuals due to different innate abilities such as IQ, qualities of schools, and motivation which contributes to the quality of human capital (Acemoglu and Autor,

2005). These sources of difference are often unobserved and may be linked to the child's family background such as their parents' origin, and education which would affect their upbringing. The mechanisms of this intergenerational transmission of human capital may be via cultural capital and assortative mating.

Cultural capital is the view that culture is possibly inherited by children from their parents. It consists of familiarity with the dominant culture in a society such as language, norms, and cultural conducts which will shape children's values and motivation (Werfhost and Hoftstede, 2007). The dominant culture, for example the culture found in school, may be different from the culture taught at home if the child is raised by non-native parents. Because they are not familiar with the dominant culture, their values and motivation are more likely to be different than their native counterparts, and thus perform worse in school.

Another channel is through assortative mating. Godoy et al (2008) explains that positive assortative mating occurs when couples of similar characteristics pair together whereas negative assortative mating occurs when they pair with someone of different characteristics (also known as random match). An example of positive assortative mating is when high-educated males marry high-educates females, or low educated males marry low-educated females. This non-randomness in marriage plays an important role in offspring characteristics being transmitted in the long run. Children whose parents are both low educated may perform worse than children with high educated parents, and are more likely to be in the lower educational track. Over time, assortative mating may bring up children with wide differences in abilities and school outcomes. Therefore the change in a country's human capital difference overtime might therefore be a result of persistent intergenerational transmission.

1C. Literature Review

Children's educational outcomes are tightly linked to both their observed characteristics such as race and also unobserved characteristics such as effort. Ferguson (2002) studies racial and ethnic disparities among children in the US, and found that Hispanic and African-American children perform worse than Asian and native children due to fewer family background advantages. A higher percentage of Hispanic and African-American reports to have parents that are divorced, obtained less than 12 years of education, and have more children. Moreover, skill gaps and home academic supports appear to have a significant role in children's understanding of

the course, more so than motivation. Thus, due to the differences in characteristics and outcomes, creating equal opportunity for all children would mean giving different teaching method for children from minority backgrounds.

Chevalier et al (2013) uses a British cross-section dataset to observe the causal effect of parental education on their children later school leaving. Mandatory schooling in the UK applies until the child reaches 16 years old. Using instrumental variable to control for endogeneity of parental education and paternal income, they found that there is a strong causal effect between mother's education and her daughter's increased probability of staying in school. This effect is less pronounced among her sons. In contrast, the role of father's education is found to be insignificant. Their findings suggests that policies aimed at alleviating income constraints at age 16 is not effective in encouraging school participation. A policy of increasing permanent income or increasing parental education would have more positive effects especially for daughters.

Another study that specifically investigate parental education on children's test scores on numeracy and literacy skills is done by Dickson et al (2016). Using a British longitudinal study on parents and children in England and Wales, they found that an increasing education level of parents positively affected children's test scores beginning from early childhood-4 years old- until the end of the mandatory schooling age-16 years old. Their findings suggests that the intergenerational outcomes works strongly through parental education, and not because of selection- where characteristics that lead parents to select into higher levels of education may also impact their abilities in child-raising factors that will lead the children to also achieve higher levels of education.

Some studies even control for genetic effects as family backgrounds may depend on genes, by comparing adopted and natural children. Sacerdote (2007) finds positive effect of mother's education on the children's education after controlling for ability and assortative mating. Furthermore, Behrman and Rosenzweig (2002) use twin pairs to eliminate the effects "nurture" and they did not find that maternal schooling increased children's educational attainment. Their findings may indicate the transmission occurs primarily through family environment and upbringing, rather than merely genetics. In line with that finding, Plug (2004) studies adoptees education outcomes in Wisconsin and found that for mothers, inherited abilities and assortative mating play an important role in the intergenerational transmission of schooling.

Cultural capital is another channel which may affect this transmission. Tolsma et al (2007) studies ethnic educational inequality in the Netherlands. They found that ethnic minorities tend to be in lower tracks than the native Dutch and are less likely to pursue tertiary education. The four major ethnic immigrants in the Netherlands (Turks, Moroccan, Surinamese, and Antilleans) tend to be lower educated than the native Dutch and also tend to favor vocational schooling more than university degree. Moreover, after controlling for background characteristics such as Father's job status, the chance to quit school among these minorities after higher secondary education is lower for students with high educated parents, but compared to their native Dutch counterpart they are less likely to continue their school career. Their findings imply that social origins may explain education inequality and this difference may not dissolve for later generations.

The increased inequality of children's performance over time may also be due to assortative mating. Studies have shown that assortative mating can be a predictor of intergenerational human capital transmission. When assortative mating occurs in a society, the society will become more closed compared to a random scenario (Mare, 2000). Handy (2015) studies parents and children in the United States and found that families in which parents education ranks are closely matched, intergenerational persistence on schooling and earnings is higher. Mare (2000) investigates whether the changes in assortative mating is a source of a long-run increases in educational inequality in the US. He found that although the association between husband's and wife educational attainment have indeed increased over the last 50 years, the impact on educational inequality is small. Moreover, assortative mating also contributes to the rising income inequality. Greenwood et al (2014) found that in the US, there is a rise in assortative mating which have contributed to the increase in household income inequality. Compared to a random matching scenario, assortative mating increase Gini coefficient by 0.09 point, hence increasing inequality.

The above studies point towards a positive relationship between assortative mating, parents' socio-economic status as measured by education, income, and race with children's educational outcomes. Similar studies for the Netherlands is still limited and needs to be investigated as different countries may point towards different results depending on the society's characteristics. However, the Netherlands have quite similar characteristics with the UK and US such as the high number of highly educated families, migrants, and educational achievements.

Thus, in line with the hypothesis, we would expect similar relationships in the case of the Netherlands.

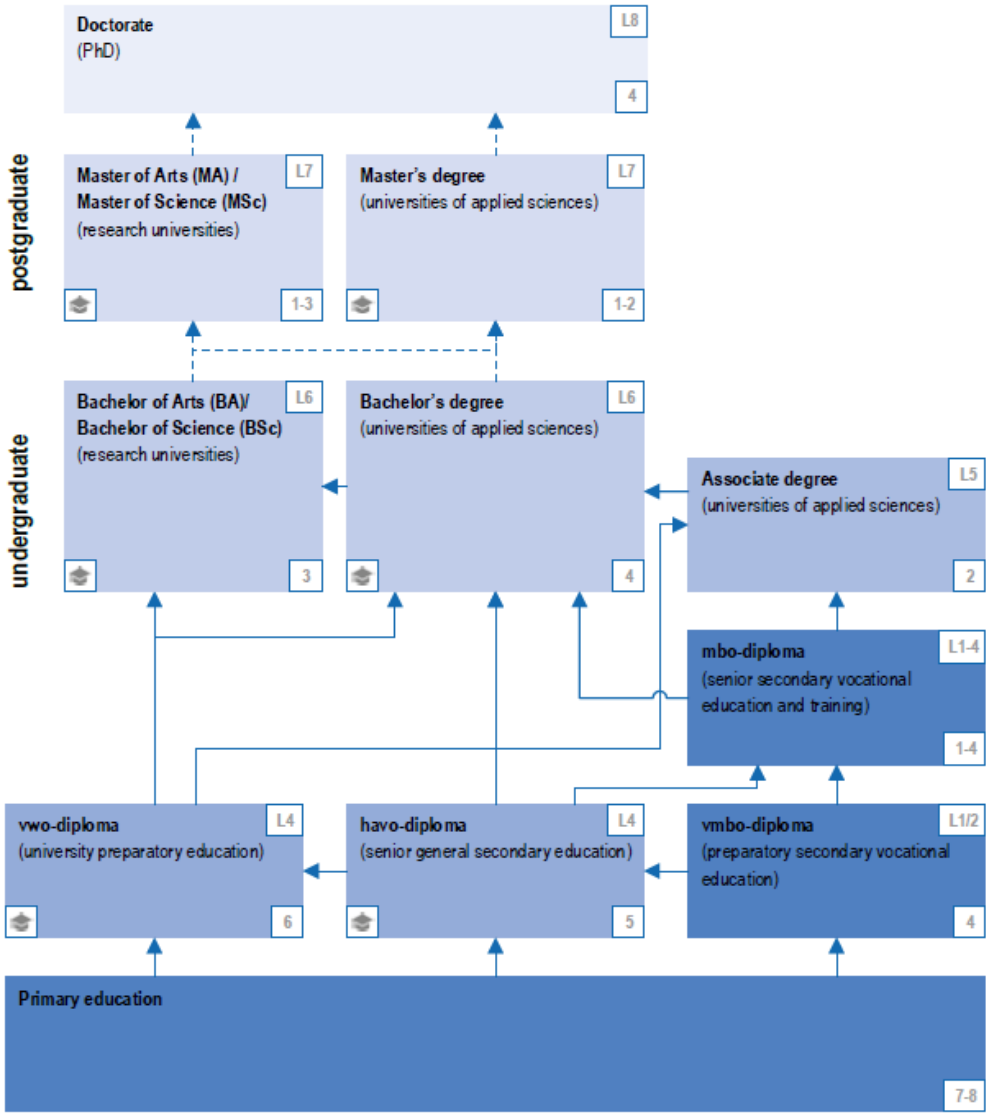
1D. Dutch Education System: An Overview

In the Netherlands, the schools (teachers), parents, and students are involved in the decision making process for the child to continue to a certain educational level. Students' ability determine which track they could pursue, teachers give advice to the parents on which track children should go after graduation by observing their ability and behavior in class, and parents have the ability to support their children's education outside school for example by exercising school choice as they are likely to obtain information and have the resources (OECD, 2012). This process begins from primary school level, thus ensuring from an early age that each student is enrolled at a level suitable for their ability. Moreover, to help prevent dropout, there are some flexibilities in the system, for example teachers' advice may be adjusted if the test score is higher than the initial advice (OECD, 2016), and there is a possibility of changing tracks (OECD, 2012).

Generally, the first education level is primary school which lasts for 8 years, from age 4 until 12. At the end of their primary school year, school examination as well as national examination take place to determine whether the child should continue to a higher education. After primary school, there are 2 different tracks of education; general secondary education, and preparatory secondary vocational education. The general secondary education consists of pre-university level (VWO) that lasts for 6 years or senior general secondary education (HAVO) which lasts for 5 years. The preparatory secondary vocational education (VMBO) is a vocational track that lasts for 4 years. Within VMBO, children are allowed to choose from 4 different study tracks; basic vocational, advanced vocational, combined track, and theoretical track. The theoretical track provides students the opportunity to enter the HAVO which will later allow them to enter university, while other study tracks only provides preparation to higher professional education.

The flexibility of the system allows children to change levels depending on their abilities and teachers' advice. Thus it is possible for a student to start from a low level (e.g: VMBO) and end in a higher level such as a research university in the future, as depicted in figure 1 below. The little box at the lower right hand side of each stage shows the duration in years, and the upper right hand box shows the level of education. Each arrow shows the possible path that students are able to continue to.

Figure 1. The Dutch Education System



Source: Education System The Netherlands, 2015

Apart from passing the school and national examination, secondary schools require independent information regarding the student before their admission. CITO is one of the independent bodies that provide students' assessment, and can be taken when they are in 8th grade. It is used by 85 percent of Dutch primary schools- that is around 6400 schools. It assess the child's language, and arithmetic skills which will help parents and teachers decide which secondary school is most suitable for the child (Van der Lubbe, 2017). Moreover, the primary school is obliged to give advice on which type of secondary school the student should attend, taking into account students' ability and parents' wishes. Recent policy change gives more weight to this advice than

to the child's test scores (OECD, 2016). Ideally, teachers give advice based on their observations on the students' ability and test scores. A high ability student should be advised to continue to a higher track, such as HAVO or VWO, while a low ability student should be advised to continue to MAVO or VMBO. Driessen (2011) found a 0.86 correlation between test scores and teachers' advice, showing that teachers' advice is indeed a good measure for child's ability. However, this aspect has recently been raised into question due to an observed increase in unequal advice between children that comes from an advantaged family background and those that comes from a less advantaged family background. This issue will be discussed further in the following sections.

1E. Data

In order to observe parents and children overtime, this thesis uses the Dutch national longitudinal survey data on primary education, PRIMA that was collected from 1994 to 2004, two waves each year. In 2005, the survey changed name to COOL. Thus, this thesis use data from PRIMA 1994, PRIMA 2004, and COOL 2014. Each of those years include data on students and parents characteristics in 692, 600, and 437 schools respectively across The Netherlands. However, not all schools participate in CITO tests, thus the number of sample school in this study is lower than in the survey data; 296 schools in 1994, 323 schools in 2004, and 305 schools in 2014.

The data structure is pooled cross section, and contains 16,146 observations of children in 8^{th} grade and took the CITO test out of 23,145 observations in the reference sample. The reference sample was designed to make a general statement about the population. The schools selected to be in the reference sample has to meet certain criteria, such as the degree of urbanization the school is located in, school's socio-economic composition, etc. Whereas the full sample consist of the reference sample and additional sample taken from low socio-economic status (SES) schools which consists of 22,067 students who took the test out of 32,592 observations. It is used in the regression as a robustness check to the results from the reference sample. Due to its low SES composition, we would expect lower or even negative results for this sample. Table 1 and 2 below show the descriptive statistics of each sample.

CITO score serves as the educational outcome in two regressions, first to identify whether parental education significantly affect the score, second to identify whether assortative mating have increased the differences in score overtime. Teachers' advice serves as another educational outcome to investigate whether parental education has any effects. The dummy is 1 if teachers

advise higher level of schooling, namely HAVO and VWO, whereas 0 is if teachers' advise lower level of schooling; MAVO, VMBO/ LBO.

The explanatory variables contain the child's gender, positive assortative mating that takes the value of 1 if both parents attained similar education level, whereas negative assortative mating is when parents attained different educational level. These two dummies are used separately to investigate the magnitude of the change in CITO score overtime. The dummy for whether or not the child is a native Dutch is controlled to observe teacher's advice. It takes the value of 1 if both of their parents were born in The Netherlands, and 0 otherwise. Furthermore, each of the parents' educational level is controlled, namely primary (LO), lower secondary (LBO/VMBO and MAVO), higher secondary (MBO, HAVO, and VWO), and tertiary (HBO and University).

Table 1. Descriptive Statistics: Reference Sample

	Mean			
Variables	1994	2004	2014	Pooled
Outcome Variables				
CITO Score	534.69	533.58	534.24	534.12
Teachers' Advice (higher track=1)	0.47	0.45	0.36	0.43
Explanatory Variables				
Female (yes=1)	0.5	0.5	0.49	0.49
Native (yes=1)	0.83	0.82	0.80	0.82
Primary	0.11	0.1	0.08	0.1
Lower Secondary	0.46	0.41	0.29	0.39
Higher Secondary	0.37	0.5	0.63	0.51
Tertiary	0.18	0.32	0.38	0.3
Positive Assortativity (yes=1)	0.5	0.49	0.52	0.5
Negative Assortativity (yes=1)	0.5	0.51	0.48	0.5
Observations	6874	8365	7906	23145

Source: PRIMA 1994, PRIMA 2004, and COOL 2014

Table 2. Descriptive Statistics: Full Sample

	Mean			
Variables	1994	2004	2014	Pooled
Outcome Variables				
CITO Score	532.61	532.41	533.69	532.81
Teachers' Advice (higher track=1)	0.41	0.41	0.32	0.38
Explanatory Variables				
Female (yes=1)	0.49	0.5	0.49	0.49
Low SES (yes=1)	0.38	0.27	0.21	0.29
Native (yes=1)	0.69	0.71	0.74	0.71
Primary	0.21	0.18	0.12	0.17
Lower Secondary	0.45	0.43	0.3	0.4
Higher Secondary	0.29	0.45	0.6	0.44
Tertiary	0.14	0.27	0.34	0.24
Positive Assortativity (yes=1)	0.51	0.5	0.5	0.5
Negative Assortativity (yes=1)	0.49	0.5	0.5	0.5
Observations	11058	11476	10058	32592

Source: PRIMA 1994, PRIMA 2004, and COOL 2014

1F. Empirical Strategy

First, I investigate whether parental education play a significant role in children's school outcomes in each year, controlling for children's gender, parents' educational assortative mating, and parental education level (primary, lower secondary, higher secondary, and tertiary). The first specification sets CITO score as the outcome variable (Y_1). Each of the regressions are run twice, first using the reference sample, and second using the full sample that includes low SES schools. Furthermore, the specification used in the full sample also controls for low SES dummy. We would expect the effect in the reference sample would be higher than in the full sample. The second specification is a pooled sample to observe the difference over time. Apart from controlling the above characteristics, interaction terms between year and parental education are added. The same regressions are run with teachers' advice as the outcome variable (Y_2), controlling for the aforementioned children's and parental characteristics and also adding children's CITO test score and nativity in the control to estimate whether teachers' advice is affected by children's parental education. Thus, the general reduced form specification is:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 T_t + \beta_4 Z_{it} * T_t + u_{it} \quad \text{.....(1)}$$

Where Y is the outcome variables, CITO score and also teachers' advice, X is student i's characteristics at time t, Z is their parents' education characteristics, T is time dummy, and u is the

error term. Our main parameter of interest is β_4 where it shows the interaction term between parents' education characteristics and time, to observe the changes in their associations over time.

Finally, further investigation aims to find out whether there is an effect of positive assortativity to the CITO Score. Positive assortative mating occurs when the high educated father is married to the high educated mother or the low educated father is married to the low educated mothers, whereas negative assortative mating is when the low educated father is married to the high educated mother or vice versa. I also investigate whether this assortativity over time affects children's test score and teacher's advice, therefore I also interact the year dummy with assortativity. Thus, similar with (1), the specification is:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 P_{it} + \beta_3 T_t + \beta_4 P_{it} * T_t + u_{it} \quad \ldots\ldots(2)$$

Where P is the positive assortative mating that occurs among parents' i in time t. The same regression is run controlling for negative assortative mating, which should yield the opposite magnitude. Again, these regressions are run twice using the reference sample and the full sample. We would expect a larger effect of positive assortative mating to children's test score in the reference sample than in the full sample, because the full sample contains a higher proportion of children from low socio-economic background, hence the assortative mating among parents may not be as high as in the reference sample. However, for teacher's advice, if we see that parental education increases over time, we would expect the results to be similar between the reference and full sample. This is discussed in more detail in the next section.

Section 2. Analysis

2A. Oaxaca Decomposition

To further understand the mean differences in test scores between year groups, an Oaxaca decomposition method is run. It is only run using the reference sample because it could give a general statement of the population. This method is often used to analyze, for example, wage gaps between sex, or race (Jann, 2008). However here, it is used to observe how the outcomes in year 2014 differ from the outcomes in year 1994. It is decomposed of 2 parts; the explained difference, and the unexplained difference. The explained difference measures the expected change in 2014 mean outcomes if that group had 1994's predictor levels. The unexplained part measures the expected change in 2014's mean outcome if that group had 1994's coefficients.

The decomposition works as follows: the test score is a function of the intercept that measures the change that remains after accounting for differences in the mean characteristics, and the parameter β_0 and β_1 respectively, and X contains the predictors of child's characteristics and parent's education, and ε is the error term. Thus for both years:

$$Y_{1994} = \beta_0 + \beta_1(X_{1994}) + \varepsilon \quad \text{.....(4)}$$

$$Y_{2014} = \beta_0 + \beta_1(X_{2014}) + \varepsilon \quad \text{.....(5)}$$

The expected mean outcome difference between the two years is then:

$$R = E(Y_{1994}) - E(Y_{2014}) = \beta_{1994}E(X_{1994}) - \beta_{2014}E(X_{2014}) \quad \text{.....(6)}$$

To observe the group differences in predictors to the outcome difference, the above equation is rearranged as follows:

$$R = \underbrace{\beta_{2014}\,[E(X_{1994}) - E(X_{2014})]}_{\text{Explained}} + \underbrace{(\beta_{1994} - \beta_{2014})\,E(X_{2014}) + (\beta_{1994} - \beta_{2014})\,[E(X_{1994}) - E(X_{2014})]}_{\text{Unexplained}} \quad \text{.....(7)}$$

Table 3 below shows the outcomes for both years. The mean in outcomes are 534.695 in 1994 and 534.239 in 2014, yielding a small gap of 0.456. The decomposition results are -1.99 for the explained difference and 2.4 for the unexplained. The explained difference shows that there would be a 1.99 point decrease in the mean score of 2014 students' if they had the same characteristics as students' in 1994. This is highly explained by the characteristics of parental education. In other words, if students in 2014 had parental education such as in 1994, they would score about 2 points less in their CITO test, therefore as seen from table 4, their average score

would have been 532.25. The coefficient difference shows the mean increase in 2014 score when applying the 1994 coefficients to 2014 characteristics. The difference in coefficient of 2.4 shows unexplained increase in 2014 score when 1994 coefficients are applied to 2014 parents education characteristic. Thus their score would have been 536.68 in 2014. This shows that the difference in the mean values of the Xs play a big part in explaining the difference in test score rather than the difference in the effects of the determinants.

Observing the breakdown of the explained and unexplained difference in table 3, we see that in the explained part, the variable tertiary education have the highest coefficient. Higher coefficient- more than 1.0- means that there is an increasing difference or gap in the test score, if the coefficient is close to 0, then the gap is closing. It is no surprise that children with parents who attained tertiary education experience an increased difference in test score among them as their proportions grew across the years. Whereas the gap is closing for those children with primary-educated parents because their proportions have shrunk over time. Thus there is less difference in test scores among them. Looking at the unexplained part, we see that although there is no increasing gap, but the coefficients for the variable female, higher secondary, and positive assortative mating are higher in the unexplained part than in the explained. Thus, these variables might affect test score through unexplained characteristics of the individual.

Table 3. Oaxaca Decomposition of Differences in CITO Score between 1994 and 2014

Overall	**Coef.**	**Robust SE**	**P>z**	**Coef.**	**Robust SE**	**P>z**
group_1 (year 1994)	534.695	0.144	0.000			
group_2 (year 2014)	534.239	0.149	0.000			
difference	0.456	0.207	0.027			
explained	-1.99	0.106	0.000			
unexplained	2.44	0.207	0.000			
	Explained			**Unexplained**		
Female	-0.001	0.003	0.730	-0.480	0.193	0.013
Primary	0.002	0.020	0.931	-0.333	0.082	0.000
Lower Secondary	-0.289	0.049	0.000	0.312	0.218	0.154
Higher Secondary	-0.573	0.064	0.000	0.764	0.334	0.022
Tertiary	-1.093	0.072	0.000	-0.251	0.193	0.194
Positive Assortativity	-0.035	0.012	0.043	-0.414	0.291	0.155
_cons				2.850	0.995	0.004

Source: PRIMA 1994, and COOL 2014

Table 4. Mean CITO Scores Derived from Oaxaca Decomposition

Mean CITO Scores		
	β^{1994}	β^{2014}
X^{1994}	534.695	532.25
X^{2014}	536.64	534.239

Source: PRIMA 1994, and COOL 2014

By looking at table 4, we could see that observed characteristics affect CITO scores only slightly. First of all, the average difference in test score over the 20 year period is small, around 0.45. Secondly, the observed characteristics that might contribute to this small difference also yields small effect, around 2 point decrease. Finally, the unexplained difference only increases the score by around 2.4. Therefore, it is clear that the slight change of test score over time is mostly due to the unexplained difference. This aspect will be observed more closely in the next sub-section.

2B. Change in Parental Education over Time

To closely observe the change in the explained difference, which is mostly seen in whether the parents are highly educated, table 5 gives the proportion of students in the reference sample and their parents' education level for each separate years. During the last 20 years, parental education have shifted towards a higher level. In 1994, 21.46 percent of the students have at least one parent who attained a tertiary level of education. This proportion increased to 33.3 percent and 38.56 percent in 2004 and 2014, respectively. The increasing pattern can also be seen for higher secondary education level. On the contrary, the proportion of students whose parent(s) only attained primary and lower secondary education have decreased over time. In 1994, there were almost 7 percent of students who have parents that only attained primary school, and in 2014 the number decreased to around 4 percent. The decreasing pattern also occurred for parents with lower secondary education.

Table 5. Proportion of Students with Parent(s) Obtaining Primary to Tertiary Education

Parent(s)' Level of Education (% of students)	Year		
	1994	2004	2014
Primary	6.98	5.67	4.19
Lower Secondary	36.54	21.41	11.08
Higher Secondary	35.03	39.59	46.17
Tertiary	21.46	33.33	38.56
Total (%)	100.00	100.00	100.00

Source: PRIMA 1994, PRIMA 2004, and COOL 2014

Moreover, the proportion of students and each parents' educational level is also observed in Table 6. In 1994, lower secondary educated parents dominated the sample with a proportion of 31.65 percent, while the proportion of primary educated parents is relatively quite low at around 6.5 percent. The proportion of parents that both attained higher secondary is 17.10 percent, whereas those that attained tertiary level is only 9.15 percent. These figures changed throughout the years. In 2004 as seen in table 7, the proportion of primary educated and lower secondary educated parents decreased to 5 and 17 percent respectively. On the contrary, those with higher secondary education and tertiary education increased to almost 20 percent and 14.50 percent, respectively. Finally, in 2014 as shown in table 8, the pattern continues, leaving small proportions of low educated parents at 4 and 8 percent for primary educated and low secondary educated respectively, and also an increase in higher secondary and tertiary educated parents to around 27 percent and 17 percent. Therefore, we would expect that a higher parental education shift over time could have an effect to children's school outcomes.

Table 6. Proportion of Students with Both Parents Attaining Various Education Levels in 1994

	Father's Education Level (% of students)				
Mother's Education Level (% of students)	Primary	Lower Secondary	Higher Secondary	Tertiary	Total (%)
Primary	6.48	2.47	0.70	0.13	9.77
Lower Secondary	2.01	31.65	8.98	2.26	44.91
Higher Secondary	0.68	7.87	17.10	7.42	33.06
Tertiary	0.09	0.77	2.24	9.15	12.26
Total (%)	9.26	42.76	29.02	18.96	100.00

Source: PRIMA 1994

Table 7. Proportion of Students with Both Parents Attaining Various Education Levels in 2004

	Father's Education Level (% of students)				
Mother's Education Level (% of students)	Primary	Lower Secondary	Higher Secondary	Tertiary	Total (%)
Primary	5.11	2.15	0.83	0.38	8.47
Lower Secondary	1.34	17.00	7.84	2.26	28.44
Higher Secondary	0.51	11.08	19.87	8.98	40.44
Tertiary	0.12	2.43	5.59	14.50	22.65
Total (%)	7.08	32.66	34.14	26.12	100.00

Source: PRIMA 2004

Table 8. Proportion of Students with Both Parents Attaining Various Education Levels in 2014

	Father's Education Level (% of students)				
Mother's Education Level (% of students)	Primary	Lower Secondary	Higher Secondary	Tertiary	Total (%)
Primary	3.93	1.42	0.99	0.29	6.63
Lower Secondary	0.92	8.00	5.58	1.36	15.87
Higher Secondary	0.87	11.20	27.02	11.27	50.36
Tertiary	0.17	1.85	7.66	17.47	27.14
Total (%)	5.88	22.47	41.25	30.39	100.00

Source: COOL 2014

To check whether it is true that parental education matters to the children's CITO test score over time, table 9 below shows the regression results using the reference sample. Firstly, the regressions are done for each individual years to observe the consistency of the results. Secondly, the three years observations are pooled and regressed, adding the interaction terms to see the significance of the effect over time. The main take away from table 9 is that even though parents with higher secondary and tertiary education have highly statistically significant effect each year, but over time higher parental education does not lead to a significant result. As shown, children whose parents attained only primary school scored on average 2.4 points (-5.458+3.017) lower in 2014 compared to 1994. The result is similar for those whose parents attained lower secondary schooling. This means that these particular groups of children perform worse over time. When parental education reach higher secondary, their test score is on average 1.18 points higher in 2014 than in 1994. The pattern continues when parental education reaches tertiary level, although it is statistically insignificant.

To check the robustness of the result, the same regression is run using the full sample, that is the reference sample plus the low SES sample. Therefore, we would expect that it would give

less significant or lower results due to the higher proportion of low SES students in this sample. Table 10 shows this regression results, and the interaction variable between tertiary education and year is indeed lower compared to the reference sample and also statistically insignificant. Thus, although there is an indication that children of low-educated parents perform worse over time, while children of high-educated parents perform better over time - thus increasing the gap of test scores among students- we have to keep in mind that the proportions have shrunk for the former and increased for the latter. Moreover, since the results are highly insignificant for tertiary education variable in both samples, we cannot conclude that higher parental education affect children's test score differently.

Another schooling outcome, namely teachers' advice is regressed using the same explanatory variables and also adding CITO score and whether the child is native Dutch. Because the outcome variable is binary, therefore the result shows the probability of teachers giving a more favorable advice. As seen in table 11, for the reference sample, there is no clear pattern that teachers would give a more favorable advice to children with higher parental education. On the one hand, the result indicates that over time on average, children whose parents attained tertiary education have a 4.4 percent (0.05-0.006)*100) increased probability in 2014 compared to 1994. This result however, is statistically insignificant. On the other hand, children with parents who attained below tertiary education do not experience an increasing probability over time. The full sample in table 12 shows similar results. Children whose parents attained tertiary education have a positively higher probability over time, but this is again statistically insignificant. Thus, in both samples and in both school outcomes, there is no evidence that higher parental education significantly affect those outcomes.

Table 9. Effects of Parental Backgrounds to Children's CITO Score: Reference Sample

Variables	Year 1994	2004	2014	Pooled
Female (yes=1)	-0.807***	-0.262	0.155	-0.301**
	(0.269)	(0.240)	(0.279)	(0.151)
Positive Assortativity (yes=1)	1.196***	1.237***	2.013***	1.355***
	(0.285)	(0.312)	(0.490)	(0.194)
Parental Education:				
Primary	-5.463***	-4.462***	-1.961***	-5.458***
	(0.530)	(0.508)	(0.682)	(0.528)
Lower Secondary	-1.150***	-2.646***	-1.934***	-1.152***
	(0.306)	(0.347)	(0.548)	(0.306)
Higher Secondary	3.264***	1.828***	1.670***	3.293***
	(0.300)	(0.328)	(0.520)	(0.292)
Tertiary	5.190***	5.899***	6.215***	5.213***
	(0.358)	(0.347)	(0.520)	(0.354)
Year Dummies:				
Year dummy (2004=1)				-1.315***
				(0.448)
Year dummy (2014=1)				-1.258**
				(0.535)
Interaction Terms:				
Primary*year2004				1.054
				(0.712)
Primary*year2014				3.017***
				(0.777)
Lower Secondary*year2004				-1.430***
				(0.433)
Lower Secondary*year2014				-1.293***
				(0.495)
Higher Secondary*year2004				-1.400***
				(0.394)
Higher Secondary*year2014				-2.107***
				(0.453)
Tertiary*year2004				0.745
				(0.469)
Tertiary*year2014				0.531
				(0.511)
Constant	533.3***	531.8***	530.5***	533.0***
	(0.396)	(0.529)	(0.915)	(0.343)
Observations	4,914	6,313	4,919	16,146
R-squared	0.122	0.156	0.120	0.136

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10. Effects of Parental Backgrounds to Children's CITO Score: Full Sample

Variables	Year 1994	2004	2014	Pooled
Female (yes=1)	-0.871***	-0.417**	0.142	-0.417***
	(0.227)	(0.204)	(0.259)	(0.131)
Low SES (yes=1)	-3.671***	-1.234***	-1.684***	-2.218***
	(0.274)	(0.249)	(0.385)	(0.166)
Positive Assortativity (yes=1)	1.278***	1.258***	1.277***	1.254***
	(0.239)	(0.266)	(0.392)	(0.162)
Parental Education:				
Primary	-4.801***	-3.240***	-2.282***	-5.294***
	(0.357)	(0.369)	(0.535)	(0.351)
Lower Secondary	-0.319	-2.122***	-2.356***	-0.291
	(0.258)	(0.298)	(0.444)	(0.259)
Higher Secondary	3.667***	2.157***	1.111***	3.875***
	(0.267)	(0.288)	(0.417)	(0.260)
Tertiary	5.810***	6.096***	5.703***	6.017***
	(0.331)	(0.311)	(0.426)	(0.328)
Year Dummies:				
Year dummy (2004=1)				-0.330
				(0.385)
Year dummy (2014=1)				0.0820
				(0.461)
Interaction Terms:				
Primary*year2004				2.397***
				(0.480)
Primary*year2014				3.083***
				(0.591)
Lower Secondary*year2004				-1.799***
				(0.370)
Lower Secondary*year2014				-2.084***
				(0.434)
Higher Secondary*year2004				-1.793***
				(0.348)
Higher Secondary*year2014				-2.810***
				(0.406)
Tertiary*year2004				-0.0388
				(0.428)
Tertiary*year2014				-0.372
				(0.467)
Constant	532.6***	531.3***	531.6***	532.0***
	(0.337)	(0.464)	(0.716)	(0.290)
Observations	7,229	9,025	5,813	22,067
R-squared	0.186	0.156	0.123	0.158

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11. Effects of Parental Education to Teachers' Advice: Reference Sample

Variables	Year 1994	2004	2014	Pooled
Female (yes=1)	0.0216**	0.0331***	0.00885	0.0218***
	(0.00989)	(0.00838)	(0.00994)	(0.00538)
CITO Score	0.0346***	0.0346***	0.0327***	0.0340***
	(0.000432)	(0.000388)	(0.000506)	(0.000256)
Native (yes=1)	-0.0281*	-0.0414***	-0.00629	-0.0251***
	(0.0150)	(0.0130)	(0.0144)	(0.00811)
Positive Assortativity (yes=1)	0.00339	0.00915	0.0212	0.00825
	(0.0105)	(0.0110)	(0.0157)	(0.00682)
Parental Education:				
Primary	-0.0151	-0.0241	-0.0303	-0.0172
	(0.0172)	(0.0167)	(0.0229)	(0.0167)
Lower Secondary	-0.0428***	-0.0429***	-0.0406**	-0.0439***
	(0.0116)	(0.0122)	(0.0176)	(0.0112)
Higher Secondary	0.0274**	-0.0115	-0.0130	0.0302***
	(0.0116)	(0.0116)	(0.0165)	(0.0111)
Tertiary	0.0519***	0.0521***	0.0628***	0.0554***
	(0.0138)	(0.0127)	(0.0176)	(0.0133)
Year Dummies:				
Year dummy (2004=1)				0.0414***
				(0.0156)
Year dummy (2014=1)				0.0427**
				(0.0183)
Interaction Terms:				
Primary*year2004				-0.00297
				(0.0224)
Primary*year2014				-0.0304
				(0.0256)
Lower Secondary*year2004				-0.00352
				(0.0153)
Lower Secondary*year2014				-0.00183
				(0.0173)
Higher Secondary*year2004				-0.0437***
				(0.0144)
Higher Secondary*year2014				-0.0517***
				(0.0162)
Tertiary*year2004				-0.00316
				(0.0169)
Tertiary*year2014				-0.00680
				(0.0185)
Constant	-18.02***	-17.98***	-17.01***	-17.70***
	(0.230)	(0.206)	(0.270)	(0.136)
Observations	4,914	6,313	4,919	16,146
R-squared	0.519	0.556	0.515	0.532

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12. Effects of Parental Education to Teachers' Advice: Full Sample

Variables	Year 1994	2004	2014	Pooled
Female (yes=1)	0.0206**	0.0213***	0.00700	0.0173***
	(0.00813)	(0.00698)	(0.00916)	(0.00459)
Low SES (yes=1)	0.0614***	0.0122	0.0122	0.0303***
	(0.00984)	(0.00839)	(0.0135)	(0.00576)
CITO Score	0.0328***	0.0336***	0.0324***	0.0330***
	(0.000346)	(0.000318)	(0.000456)	(0.000211)
Native (yes=1)	-0.0445***	-0.0234**	-0.00209	-0.0257***
	(0.0110)	(0.00966)	(0.0127)	(0.00630)
Positive Assortativity (yes=1)	0.00284	0.00261	0.0295**	0.00852
	(0.00853)	(0.00912)	(0.0128)	(0.00560)
Parental Education:				
Primary	-0.00201	-0.0382***	-0.0225	0.0152
	(0.0119)	(0.0123)	(0.0186)	(0.0115)
Lower Secondary	-0.0456***	-0.0460***	-0.0237	-0.0501***
	(0.00951)	(0.0103)	(0.0145)	(0.00928)
Higher Secondary	0.0368***	-0.0108	-0.00306	0.0300***
	(0.0102)	(0.0100)	(0.0135)	(0.00981)
Tertiary	0.0716***	0.0562***	0.0765***	0.0640***
	(0.0127)	(0.0112)	(0.0148)	(0.0122)
Year Dummies:				
Year dummy (2004=1)				0.0198
				(0.0133)
Year dummy (2014=1)				0.0157
				(0.0156)
Interaction Terms:				
Primary*year2004				-0.0608***
				(0.0155)
Primary*year2014				-0.0658***
				(0.0196)
Lower Secondary*year2004				0.00524
				(0.0128)
Lower Secondary*year2014				0.0152
				(0.0150)
Higher Secondary*year2004				-0.0348***
				(0.0126)
Higher Secondary*year2014				-0.0428***
				(0.0144)
Tertiary*year2004				0.00158
				(0.0153)
Tertiary*year2014				0.00115
				(0.0168)
Constant	-17.06***	-17.46***	-16.87***	-17.14***
	(0.183)	(0.168)	(0.243)	(0.112)
Observations	7,229	9,025	5,813	22,067
R-squared	0.513	0.553	0.513	0.529

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2C. Assortative Mating

The unexplained element in the Oaxaca decomposition shows high coefficients for the female variable, higher secondary and assortative mating. Here, I further investigate how assortative mating occur over time and how it affects children's test score. Firstly, similar to the previous method, I observe how assortative mating occurs through 1994, 2004, and 2014 in the reference sample. Assortative mating is defined as parents that have attained exactly the same education level. For example, father with a primary school degree marries mother with also a primary school degree.

Table 13. Proportion of Students with Both Parents Obtaining Similar Education: Reference Sample

Parents Education Level (% of students)	Year		
	1994	**2004**	**2014**
Primary	10.06	9.05	6.96
Lower Secondary	49.17	30.10	14.19
Higher Secondary	26.56	35.18	47.89
Tertiary	14.21	25.67	30.96
Total (%)	100	100	100

Source: PRIMA 1994, PRIMA 2004, and COOL 2014

Table 14. Proportion of Students with Both Parents Obtaining Similar Education: Full Sample

Parents Education Level (% of students)	Year		
	1994	**2004**	**2014**
Primary	24.32	17.23	10.61
Lower Secondary	46.28	31.87	15.57
Higher Secondary	19.28	30.02	46.12
Tertiary	10.12	20.88	27.70
Total (%)	100	100	100

Source: PRIMA 1994, PRIMA 2004, and COOL 2014

Positive assortative mating could be seen as indeed increasing over time for parents with higher secondary and tertiary education, whilst decreasing for primary and lower secondary educated parents. Looking at table 13, in 1994, the proportion of students with primary educated parents were 10.06 percent, while those with tertiary education were slightly higher, around 14.2 percent. In 2014 however, those who attained only primary education were only around 6.9

percent, while those who attained tertiary education have increased significantly to almost 31 percent.

To estimate how much effect this assortative mating contributes to children's test score over time, a similar regression is run using both the reference and full sample. Table 14 gives the result for the reference sample. Positive assortative mating is seen to be more significant to the children's test score in the year 2014 than in year 2004, giving a positive effect over time. Negative assortative mating, or the random match, gives lower effect than the positive scenario. Moreover, the result persists even after adding the low SES sample as seen in table 15. Positive assortative mating indeed results in a more positive test score. This result stems from table 13 that shows the proportion of positive assortative mating is higher among parents with higher secondary and tertiary education, thus affecting the results positively. Therefore, when parents have similar educational backgrounds, their children schooling outcome is more positive than children whose parents do not have similar educational backgrounds. However, it should be remembered that the variable positive assortativity includes parents who are both highly-educated and also who are both lowly-educated. Thus, it also shows that overtime, higher educated parents have outnumbered the lower educated parents.

A similar approach is done to observe how positive assortative mating affects teacher's advice. Table 17 shows the result for the reference sample. Over time, the probability of a child to be given a more favorable advice if their parents have similar education level has changed little. In 2014, the probability is 3.8 percent while in 2004 it is 2.6 percent higher compared to 1994. The opposite is true for the negative assortative mating scenario, where children whose parents attained different education level receive 3.8 percent less favorable advice in 2014 compared to children with parents of the same education level in 1994. Although both results are statistically significant, the magnitudes are small.

The result shows a similar pattern using the full sample in table 18. In 2014, the probability that children is given a favorable advice if their parents have the same level of education is 4.4 percent higher compared to 1994. While in 2004, the probability is 2.2 percent. Although the results are similar to the reference sample, the difference between 2004 and 2014 is bigger in this sample. This is because as seen in table 14, the change in proportion of students whose parents have similar level of higher education is higher in the full sample than in the reference sample.

This means that positive assortative mating have become increasingly equalized at both types of schools towards higher education, however the change seems to be more rapid in the full sample.

Table 15. Effects of Positive and Negative Assortative Mating to Children's CITO Score: Reference Sample

	Positive Assortativity				Negative Assortativity			
Variables	1994	2004	2014	Pooled	1994	2004	2014	Pooled
Female (yes=1)	-0.823***	-0.345	0.166	-0.335**	-0.823***	-0.345	0.166	-0.335**
	(0.287)	(0.261)	(0.297)	(0.162)	(0.287)	(0.261)	(0.297)	(0.162)
Year 2004 Dummy				-1.362***				-0.797***
				(0.270)				(0.278)
Year 2014 Dummy				-1.072***				0.110
				(0.294)				(0.290)
Positive Assortativity (yes=1)	0.0509	0.608**	1.233***	0.0438				No
	(0.287)	(0.261)	(0.297)	(0.287)				
Positive Assortativity*year2004				0.564				No
				(0.388)				
Positive Assortativity*year2014				1.182***				No
				(0.413)				
Negative Assortativity (yes=1)				No	-0.0509	-0.608**	-1.233***	-0.0438
					(0.287)	(0.261)	(0.297)	(0.287)
Negative Assortativity*year2004				No				-0.564
								(0.388)
Negative Assortativity*year2014				No				-1.182***
								(0.413)
Constant	535.1***	533.5***	533.5***	534.8***	535.1***	534.1***	534.7***	534.9***
	(0.246)	(0.222)	(0.265)	(0.217)	(0.250)	(0.229)	(0.253)	(0.220)
Observations	4,914	6,313	4,919	16,146	4,914	6,313	4,919	16,146
R-squared	0.002	0.001	0.004	0.004	0.002	0.001	0.004	0.004

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 16. Effects of Positive and Negative Assortative Mating to Children's CITO Score: Full Sample

	Positive Assortativity				Negative Assortativity			
Variables	1994	2004	2014	Pooled	1994	2004	2014	Pooled
Female (yes=1)	-0.875***	-0.536**	0.154	-0.470***	-0.875***	-0.536**	0.154	-0.470***
	(0.242)	(0.218)	(0.274)	(0.140)	(0.242)	(0.218)	(0.274)	(0.140)
Low SES (yes=1)	-6.508***	-3.934***	-3.480***	-4.817***	-6.508***	-3.934***	-3.480***	-4.817***
	(0.265)	(0.238)	(0.382)	(0.161)	(0.265)	(0.238)	(0.382)	(0.161)
Year 2004 Dummy				-0.572**				0.0175
				(0.230)				(0.231)
Year 2014 Dummy				-0.259				0.789***
				(0.262)				(0.257)
Positive Assortativity (yes=1)	-0.111	0.393*	0.934***	-0.186				No
	(0.242)	(0.218)	(0.274)	(0.243)				
Positive Assortativity*year2004				0.589*				No
				(0.326)				
Positive Assortativity*year2014				1.048***				No
				(0.366)				
Negative Assortativity (yes=1)				No	0.111	-0.393*	-0.934***	0.186
					(0.242)	(0.218)	(0.274)	(0.243)
Negative Assortativity*year2004				No				-0.589*
								(0.326)
Negative Assortativity*year2014				No				-1.048***
								(0.366)
Constant	535.2***	533.7***	533.7***	534.5***	535.1***	534.1***	534.6***	534.3***
	(0.222)	(0.200)	(0.251)	(0.192)	(0.223)	(0.204)	(0.240)	(0.190)
Observations	7,229	9,025	5,813	22,067	7,229	9,025	5,813	22,067
R-squared	0.082	0.030	0.017	0.043	0.082	0.030	0.017	0.043

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 17. Effects of of Positive and Negative Assortative Mating to Teacher's Advice: Reference Sample

	Positive Assortativity				Negative Assortativity			
Variables	1994	2004	2014	Pooled	1994	2004	2014	Pooled
Female (yes=1)	0.0227**	0.0326***	0.00851	0.0219***	0.0227**	0.0326***	0.00851	0.0219***
	(0.00995)	(0.00842)	(0.01000)	(0.00541)	(0.00995)	(0.00842)	(0.01000)	(0.00541)
CITO Score	0.0358***	0.0360***	0.0341***	0.0353***	0.0358***	0.0360***	0.0341***	0.0353***
	(0.000378)	(0.000335)	(0.000447)	(0.000223)	(0.000378)	(0.000335)	(0.000447)	(0.000223)
Native (yes=1)	-0.0309**	-0.0361***	0.00756	-0.0192***	-0.0309**	-0.0361***	0.00756	-0.0192***
	(0.0142)	(0.0109)	(0.0123)	(0.00709)	(0.0142)	(0.0109)	(0.0123)	(0.00709)
Year 2004 dummy				0.0199**				0.0461***
				(0.00929)				(0.00916)
Year 2014 dummy				0.0117				0.0499***
				(0.0102)				(0.00980)
Positive Assortativity (yes=1)	-0.0102	0.0155*	0.0275***	-0.0111				No
	(0.00998)	(0.00845)	(0.0101)	(0.00995)				
Positive Assortativity*year 2004				0.0262**				No
				(0.0130)				
Positive Assortativity*year2014				0.0382***				No
				(0.0141)				
Negative Assortativity (yes=1)				No	0.0102	-0.0155*	-0.0275***	0.0111
					(0.00998)	(0.00845)	(0.0101)	(0.00995)
Negative Assortativity*year2004				No				-0.0262**
								(0.0130)
Negative Assortativity*year2014				No				-0.0382***
								(0.0141)
Constant	-18.62***	-18.71***	-17.74***	-18.38***	-18.63***	-18.69***	-17.71***	-18.39***
	(0.201)	(0.177)	(0.238)	(0.119)	(0.201)	(0.177)	(0.239)	(0.118)
Observations	4,914	6,313	4,919	16,146	4,914	6,313	4,919	16,146
R-squared	0.514	0.551	0.509	0.526	0.514	0.551	0.509	0.526

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 18. Effects of Positive and Negative Assortative Mating to Teacher's Advice: Full Sample

	Positive Assortativity				Negative Assortativity			
Variables	1994	2004	2014	Pooled	1994	2004	2014	Pooled
Female (yes=1)	0.0221***	0.0212***	0.00679	0.0176***	0.0221***	0.0212***	0.00679	0.0176***
	(0.00819)	(0.00702)	(0.00921)	(0.00462)	(0.00819)	(0.00702)	(0.00921)	(0.00462)
Low SES (yes=1)	0.0500***	-0.00259	0.00261	0.0197***	0.0500***	-0.00259	0.00261	0.0197***
	(0.00970)	(0.00829)	(0.0133)	(0.00569)	(0.00970)	(0.00829)	(0.0133)	(0.00569)
CITO Score	0.0339***	0.0349***	0.0337***	0.0341***	0.0339***	0.0349***	0.0337***	0.0341***
	(0.000306)	(0.000279)	(0.000407)	(0.000186)	(0.000306)	(0.000279)	(0.000407)	(0.000186)
Native (yes=1)	-0.0514***	-0.0150*	0.0145	-0.0178***	-0.0514***	-0.0150*	0.0145	-0.0178***
	(0.0102)	(0.00838)	(0.0109)	(0.00559)	(0.0102)	(0.00838)	(0.0109)	(0.00559)
Year 2004 dummy				-0.00138				0.0208***
				(0.00775)				(0.00755)
Year 2014 dummy				-0.00770				0.0326***
				(0.00890)				(0.00867)
Positive Assortativity (yes=1)	-0.0126	0.00936	0.0257***	-0.0128				No
	(0.00821)	(0.00703)	(0.00925)	(0.00822)				
Positive Assortativity*year2004				0.0222**				No
				(0.0108)				
Positive Assortativity*year2014				0.0403***				No
				(0.0124)				
Negative Assortativity				No	0.0126	-0.00936	-0.0257***	0.0128
					(0.00821)	(0.00703)	(0.00925)	(0.00822)
Negative Assortativity*year2004				No				-0.0222**
								(0.0108)
Negative Assortativity*year2014				No				-0.0403***
								(0.0124)
Constant	-17.60***	-18.16***	-17.53***	-17.74***	-17.61***	-18.15***	-17.50***	-17.76***
	(0.162)	(0.147)	(0.217)	(0.0989)	(0.162)	(0.148)	(0.217)	(0.0987)
Observations	7,229	9,025	5,813	22,067	7,229	9,025	5,813	22,067
R-squared	0.506	0.547	0.507	0.522	0.506	0.547	0.507	0.522

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Section 3. Conclusion

Recent debates in the Dutch education sector point towards increased differences in children's test scores and parents' socio-economic backgrounds play a role in a more favorable teachers' advice. There is a concern that both factors may lead to a higher inequality of education. Using data from 8th grade students in the Netherlands during, this thesis tries to identify the factors contributing to children's test score, and teachers' advice. It is found that although parental education affects children's school outcomes in a given year, there is no evidence on the effects over time. Teachers' advice is also found to be independent from parents' educational attainment. Oaxaca decomposition further shows that the mean difference in test score in the last 20 years is small, only 0.45 point higher in 2014 compared to 1994. Moreover, positive assortative mating have indeed occur among parents, and shifted to a higher educational level over time. High educated adult marries each other and have outnumbered those with lower education. Thus, the concern that unequal opportunities in education has been increasing is therefore not supported. Other factors outside child's ability may affect children's test score and teachers' advice, such as children's behavior in class, work ethic, etc, however those aspects are not covered in this thesis. Moreover, as this thesis only observe primary education level, there is room for further research involving lower secondary and higher secondary level students.

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