# Is Education Attainment determined at age 7?

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**Abstract**

This paper provides empirical evidence that suggests that variables present during the education process of an individual may affect his final school attainment. This is opposed to the hypothesis that characteristics present at very early stages, such as background or IQ, are the only determinants of the individuals later success in school.

This paper uses data from the National Child Development Survey (NCDS) of an entire cohort born in Britain in one week in 1958. We intend to question the fact that test scores at 7 being correlated with test scores at 16 implies that there is little in the education process between 7 and 16 that is going to affect final attainment. We want to suggest that factors affecting age 7 scores allow the individual to get a higher return from his education process at middle ages, say when he is 11, which will allow him to get a higher attainment at age 16.

## 1 Introduction

The power of education as an instrument to allow for social mobility has been questioned by various empirical studies. The large correlation between the performance of an individual as a child and as an adult has been taken to mean that the role of education as an instrument to allow for social mobility will always be small. Whatever determines an individual's performance as an adult is present when he is a child. There is some "ability" that characterizes the individual throughout his life and that will determine his attainment. There is little room for improvement. Several previous studies have tried to examine the relationship between age 7 test scores and future outcomes. For example, Hutchinson, Prosser and Wedge (1979) found that early test scores were strong predictors of future education attainment. Connoly, Mickelwright and Nickell (1992), and more recently Robertson and Symons (1996) and Harmon and Walker (1998) examine the relationship between early test scores and future earnings. All of these studies find that early test scores matter for future outcomes.

This paper wants to provide an alternative version of how and individual's attainment is determined, still compatible with the observed correlation but gives hope for the education process to matter. Characteristics that the individual is born with will determine his attainment in early stages. Scores at age 7 are correlated with background and school variables. "Better" background leads to higher performance. Having had a good primary education will allow the individual to learn better the new materials he's exposed to in later years and so on. That explains why we observe these big correlations. Better educated families take their children to better schools and teach them good studying habits. That will allow them to perform well initially and will provide them with a good basis to continue their education process. One is more likely to learn the material at 16 if he understood well what he was taught at 11. This paper wants to point out that when analyzing the education process we have to take into account that having a good understanding of some material will help in processing and mastering more advanced materials. Therefore the initial effect that the family and school have on you in early ages will multiply and become larger throughout the years. If this were the dynamics of the process then societies could try to change this correlation by providing what some individuals lack in their homes and schools in order to get them at the same level as all other individuals at age 11, for example, and in this manner reducing the multiplicative effect of letting the families be the main determinants of the early performance of children and their capabilities to further achieve a high education attainment.

The study makes use of a National Child Development Survey (NCDS), which includes information about the entire cohort born in Great Britain during one week in March 1958. Information about these individuals has been collected from before birth until the present.This information includes family characteristics and school characteristics at ages 7, 11 and 16. The individuals were given math and reading tests at these three different ages.

A second part of the paper describes in more detail the data used. The third section replicates the results obtained by different papers on the correlation between age 7 and age 16 test scores, first without conditioning on any other variable, then including family background variables and last including both background and school variables. A fourth section will include all of previous variables, but will control for test scores and school variables at age 11. A fifth part of the paper will decompose the different correlations in order to try to identify the different factors determining the dynamics of the education attainment process. The last section will try to test whether it is possible that the results we observe in the fourth section can be a result of test scores being a worse measure of ability for disadvantaged children at 7 then at 11. If advantaged children are exposed at home to similar questions and problems as the exams, for them test scores will be a better measure of ability than for disadvantaged children at age 7. But at age 11 disadvantaged children may have learned to take tests through having been exposed to the type of questioning. Hence test scores will become a better measure of their ability. If the tests were only a function of ability and some error term then the reduction in the error at age 11 would lead to the results found in section four. We will test and this alternative explanation of the results by doing the same analysis for two subsamples of most disadvantaged and advantaged children.

# 2 The data

The National Child Development Study (NCDS) is a continuing, multi-disciplinary longitudinal study which takes as its subjects all those living in Great Britain who were born between 3 and 9 March 1958.

It has its origins in the Perinatal Mortality Survey (PMS), sponsored by the National Birthday Trust Fund. This was designed to examine the social and obstetric factors associated with still birth and death early in infancy among the 17.000 children born that one week.

To date there have been six attempts to trace all memers of the birth cohort in order to monitor their physical, educational and social development. These were carried out by the National Children's Bureau in 1965 (NCDS1), 1969 (NCDS2), 1974 (NCDS3), and 1981 (NCDS4); by the Social Statistics Research Unit (SSRU) of City University in 1991 (NCDS5); and by the Centre for Longitudinal Studies od the Institute of Education, University of London and the National Centre for Social Research in 1999 (NCDS6). In this paper the following sources of information will be used:

| PMS (1958) | NCDS1 (1965) | NCDS2 (1969) | NCDS3 (1974) |
|---|---|---|---|
| Birth | 7 | 11 | 16 |
| 17,4141 | 15,568 | 15,503 | 14,761 |
| Mother | Parents | Parents | Parents |
| | School | School | School |
| | Tests | Tests | Tests |
| Medical | Medical | Medical | Medical |

For the birth survey information was obtained from the mother and from medical records by the midwife. For the purpose of the first NCDS surveys, information was obtained from parents (who were interviewed by health visitors) head teachers and class teachers (who completed questionnaires), the schools health service (who carried out medical examinations) and the subjects themselves (who completed tests of ability and, latterly, questionnaires).

Attrition is often a problem in longitudinal surveys and the NCDS is no exception. Overall responses have remained high, considering the length of the panel. However individuals disappear and reappear. In fact restricting the sample to those who appear in every wave would result in a drastic reduction in sample size. Instead, we will use the available sample for each analysis.

Previous analyses of these data suggest tha attriters are more likely to be from disadvantaged backgrounds, although observable differences between the two groups are quite small (Fogelman, 1976, 1983; Robertson and Symons, 1996; Connolly, Micklewright and Nickell, 1992). In this paper this problem will be solved by controlling for background characteristics.

The tests we focus on are standardized tests of reading and mathematics which were administered to the children in their schools by their teachers. We have standardized the results so that they have mean 0 and variance 1.

Our measures of background of the children consist on the highest education level attained by any of the two parents, whether one of tha parents has a skilled job and whether they wanted the child to continue studying after age 16.

For measures of school quality we will use different variables depending on their availability, but they will mainly include class size, stability of teachers in the school or whether the school has parent-teacher association.

# 3 Estimated effects of early test scores

## 3.1 Estimated effects of test scores at 7 on test scores at 16

The first table shows the results of running a simple regression of math and reading scores at age 16 on math and reading scores at age 7:

| | math score 16 | reading score 16 |
|---|---|---|
| cons | 0.005 | 0.0013 |
| (t-stat) | (0.66) | (0.18) |
| math score 7 | 0.49 | |
| | (57.43) | |
| reading score 7 | | 0.63 |
| | | (80.65) |
| $R^2$ | 0.24 | 0.38 |

As we can observe the coefficients are clearly significant and of considerable size, but we are missing variables that we know are going to have some explanatory power. The following sections will include different sets of variables including schooling, background and age 11 test scores.

## 3.2 Estimated effects of test scores at 7 on test scores at 16 controlling for background and school variables

### 3.2.1 Including parents' education and number of siblings

Table 2 shows the results from running a simple regression of math and reading scores at age 16 on math and reading scores at age 7, the highest education level attained by the parents and the number of siblings. This results replicate a similar analysis done by Currie and Thomas in 1998.

| | math score 16 | reading score 16 |
|---|---|---|
| cons | -1.69 | -0.84 |
| (t-stat) | (-20.39) | (-11.71) |
| math score 7 | 0.42 | |
| | (42.37) | |
| reading score 7 | | 0.55 |
| | | (59.1) |
| parents education | 0.13 | 0.08 |
| | (26.91) | (18.41) |
| siblings | -0.08 | -0.09 |
| | (-14.32) | (-17.50) |
| $R^2$ | 0.31 | 0.42 |

#### 3.2.2 Including a richer set of background and school variables for age 7 and 16

The following table shows the results obtained from running a simple regression of age 16 test scores on age 7 test scores, background and school variables. Background variables include parents education, whether some parent works on a skilled job, whether they want the child to continue studying after age 16 and the number of siblings. School variables include whether the school has parent-teacher association at age 7 and 16 (reflecting how involved parents are in the education of their children and also imposing some monitoring for the school's performance), class size at age 7 and age 16,and number of teachers who left the school during the school year at age 16 (reflecting the stability of the school). The choice of variables depended strongly on their availability in the data set and the coherence with the analysis.

| | math score 16 | reading score 16 |
|---|---|---|
| cons | -2.54 | -1.96 |
| (t-stat) | (-22.54) | (-20.05) |
| math score 7 | 0.41 | |
| | (43.26) | |
| reading score 7 | | 0.50 |
| | | (55.86) |
| parents education | 0.12 | 0.068 |
| | (23.04) | (15.65) |
| parent has skilled job | 0.21 | 0.19 |
| | (9.27) | (9.95) |
| par want kid study | 0.17 | 0.24 |
| | (3.44) | (5.51) |
| siblings | -0.065 | -0.07 |
| | (-11.92) | (-15.91) |
| parent-teacher assoc. at 7 | 0.11 | 0.04 |
| | (4.77) | (1.81) |
| class size at 7 | 0.002 | 0.05 |
| | (2.04) | (4.67) |
| n. teach. left during year at 16 | -0.006 | -0.003 |
| | (-3.96) | (-2.51) |
| parent-teacher assoc. at 16 | 0.062 | 0.11 |
| | (3.32) | (6.54) |
| class size at 16 | 0.023 | 0.025 |
| | (14.33) | (17.49) |
| $R^2$ | 0.35 | 0.46 |

All coefficients are significant and have the expected sign except for class size. We would expect a larger class size to result in worse scores, but this is a normal finding in the literature and can be a result of schools assigning students that are having difficulties into smaller classes to allow the to catch up. Also in the regression on reading test whether there is a parent-teacher association is not significant.The $R^2$ has increased with the inclusion of the richer set of explanatory variables, although not by a large amount.

## 4 Including age 11 scores and school variables

| | math score 16 | reading score 16 |
|---|---|---|
| cons | -1.06 | -0.8 |
| (t-stat) | (-10.6) | (-9.32) |
| math score 7 | 0.08 | |
| | (8.8) | |
| reading score 7 | | 0.17 |
| | | (19.56) |
| parents education | 0.056 | 0.014 |
| | (13.01) | (3.63) |
| parent has skilled job | 0.06 | 0.097 |
| | (3.42) | (5.97) |
| par want kid study | 0.003 | 0.18 |
| | (0.1) | (4.97) |
| siblings | -0.023 | -0.03 |
| | (-5.25) | (-9.85) |
| parent-teacher assoc. at 7 | 0.08 | 0.02 |
| | (3.79) | (1.42) |
| class size at 7 | 0.0002 | 0.002 |
| | (0.16) | (2.93) |
| math score at 11 | 0.68 | |
| | (69.29) | |
| reading score at 11 | | 0.61 |
| | | (70.63) |
| perc. of teacher less 2 exp. | 0.07 | 0.007 |
| | (2.26) | (0.26) |
| class size at 11 | 0.0001 | 0.0014 |
| | (0.17) | (1.46) |
| n. teach. left during year at 16 | -0.002 | -0.001 |
| | (-1.81) | (-1.43) |
| parent-teacher assoc. at 16 | 0.03 | 0.065 |
| | (1.95) | (4.83) |
| class size at 16 | 0.005 | 0.01 |
| | (4.18) | (11.14) |
| $R^2$ | 0.61 | 0.68 |

We have now included variables that contain information about the performance of the kids and schools at the middle stage, i.e. at age 11. This table reflects the results of running the same regression as in the last section, but now including test scores at age 11, percentage of teacher in the school who had less than two years of experience (which in the literature is taken as a bad characteristic of the school teachers) and class size at age 11.

The results in this case are surprising. Some school characteristics loose significance, but the rest of the variables are still significant. But the absolute value of the coefficients are all much smaller than in the previous section. Specially the coefficient on test scores at 7 are reduced from 0.37 to 0.07! And the $R^2$ has doubled, going from 0.35 to 0.61. These results are consistent with the education process having some relevant role in the middle stages too. We could think that the relevant part of the education process is primary school. There the basics for future success are determined. If kids have been able to perform well up until then they will most probably do well in the future also.

We have to be careful and think about other forces driving these results. One other possible consistent explanation would be that test scores have a bigger measurement error of some underlying ability in early stages than in, say, middle stages. We will test for a version of this in the sixth section of the paper, and we will refute this hypothesis.

# 5 Decomposition of the different correlations between factors affecting the child's performance

## 5.1 Explaining age 7 test scores through background and school variables at age 7

The following table shows the results of running a regression of age 7 test scores on different background variables. The $R^2$ is extremely small and the school variables are not significant, which is consistent with the literature (see Hanushek 1986). But background variables are significant. Better educated or skilled parents and their care about the kids studies will positively affect the performance of the kid in school.

| | math score 7 | reading score 7 |
|---|---|---|
| cons | -1.12 | -1.91 |
| (t-stat) | (-8.75) | (-15.97) |
| parents education | 0.07 | 0.08 |
| | (12.85) | (15.87) |
| parent has skilled job | 0.15 | 0.24 |
| | (5.62) | (9.98) |
| par want kid study | 0.44 | 0.64 |
| | (8.59) | (13.37) |
| local authority school | -0.46 | -1.19 |
| | (-6.86) | (-3.06) |
| parent-teacher assoc. at 7 | 0.034 | 0.03 |
| | (1.19) | (1.03) |
| class size at 7 | -0.001 | 0.002 |
| | (-0.77) | (2.05) |
| $R^2$ | 0.054 | 0.083 |

## 5.2 Explaining age 11 test scores through background and school variables

The following table presents the results of regressing test scores at age 11 on test scores at 7 together with various school and background variables. We see the clear effect that past test scores have. Again, having understood the materials thought at 7 well is highly correlated with understanding the new material at 11. Background variables are also important and school variables are significant, except for class size, which has been behaving differently throughout the analysis presented in this paper and in the literature, resulting from the endogeneity problem.

| | math score 11 | reading score 11 |
|---|---|---|
| cons | -2.06 | -1.57 |
| (t-stat) | (-17.96) | (-14.13) |
| math score 7 | 0.48 | |
| | (45.9) | |
| reading score 7 | | 0.53 |
| | | (47.91) |
| parents education | 0.096 | 0.09 |
| | (18.89) | (17.88) |
| parent has skilled job | 0.23 | 0.12 |
| | (9.13) | (5.02) |
| par want kid study | 0.34 | 0.14 |
| | (6.91) | (3.04) |
| siblings | -0.07 | -0.07 |
| | (-11) | (-12.2) |
| parent-teacher assoc. at 7 | 0.08 | 0.066 |
| | (3.15) | (2.58) |
| class size at 7 | 0.001 | 0.005 |
| | (0.85) | (0.38) |
| perc. of teacher less 2 exp. | -0.13 | 0.0013 |
| | (-3.17) | (0.03) |
| class size at 11 | 0.01 | 0.08 |
| | (7.75) | (5.26) |
| $R^2$ | 0.38 | 0.40 |

The results in this section should support the idea that background variables affect, together with school variables, the performance in schools through primary school. And in last section we see that the this performance at age 11 is what mainly determines future performance. Therefore, the initial positive effect families and schools have on certain children multiplies out throughout their lives. This suggests that if society was interested in allowing for social mobility it should intervene at the primary school level and compensate disadvantaged children through providing extra help in acquiring habits of study and interest to pursue their studies, and to provide extra libraries and tutoring services, elements which should try to substitute for elements which are missing in their homes and that justifies calling them disadvantaged children.

# 6 Are age 7 tests simply worse estimators of ability than age 11 test scores?

## 6.1 Do children "learn" to take tests?

In section 4 we saw that including age 11 test scores double the explanatory power of the regression, reduces the coefficients on early in life variables and results in a very large coefficient on age 11 test scores. The literature in sociology and psicology has often studied how the school systems test children in a way that is more advantageous for kids with certain backgrounds or cultures. For example, it is said that white-european families teach their kids by making them repeat what they just said. These families tend to be rather small and devote proportionately more attention to their kids. But latin-american families are big, with old, young and children living in the same house. Kids are expected to learn by looking and listening. They are good at paying attention to many things at a time because that is what they were exposed to in their homes. Therefore sitting down and focusing on simply repeating the material taught in class may be more difficult for a latin kid. If that is true the test will not reflect the true ability of the kid because of the framing of the questions. Well, if that's true than one can think that after four years in school the latin kids will adapt to the new way of learning and presenting what you have learned in school, and at age 11 they will be able to reflect their true ability better.

Now, suppose that the only factor driving test scores is some sort of ability. We will expect kids with less educated parents to have a larger error term in the age 7 tests than in the age 11. This could be a result of educated parents training or educating their children in a compatible way to how they know their kids will be expected to learn in school.

If that was the case, not allowing for different coefficients on the scores at 11 for kids with different backgounds can derive to the misleading conclusion that there is something else, other than ability driving the education process. In this section then, we try to test whether this sociological phenomenon may be driving the results in section 4. In order to do that we take two sub-samples from the data, one with the best educated parents and one with the worse educated parents. We would expect the coefficient on the test scores at 11 to be insignificant or at least significantly smaller for the well educated parents than for the less educated parents group. The tables bellow show the results of the regression in section 4, but in the two different samples:first for the sample of highly and then for that of the poorly educated parents.The results reject the hypothesis of the coefficient for the well educated parents group to be significantly smaller.

| | math score 16 | reading score 16 |
|---|---|---|
| cons | -0.8 | -0.28 |
| (t-stat) | (-4.8) | (-2.12) |
| math score 7 | 0.08 | |
| | (5.71) | |
| reading score 7 | | 0.2 |
| | | (14.72) |
| parents education | 0.042 | -0.002 |
| | (6.32) | (-0.36) |
| parent has skilled job | 0.12 | 0.07 |
| | (3.52) | (2.64) |
| par want kid study | 0.03 | 0.14 |
| | (0.45) | (2.38) |
| siblings | -0.023 | -0.04 |
| | (-3.18) | (-6.2) |
| parent-teacher assoc. at 7 | 0.06 | 0.04 |
| | (2.15) | (1.75) |
| class size at 7 | -0.0009 | 0.001 |
| | (-0.60) | (1.13) |
| math score at 11 | 0.71 | |
| | (47.46) | |
| reading score at 11 | | 0.55 |
| | | (46.13) |
| perc. of teacher less 2 exp. | 0.12 | -0.004 |
| | (2.4) | (-0.011) |
| class size at 11 | -0.0002 | 0.001 |
| | (-0.14) | (1.09) |
| n. teach. left during year at 16 | -0.005 | -0.001 |
| | (-2.36) | (-0.62) |
| parent-teacher assoc. at 16 | 0.02 | 0.041 |
| | (0.88) | (2.17) |
| class size at 16 | 0.005 | 0.01 |
| | (2.38) | (6.15) |
| $R^2$ | 0.63 | 0.68 |

| | math score 16 | reading score 16 |
|---|---|---|
| cons | -0.93 | -0.55 |
| (t-stat) | (-1.34) | (-0.89) |
| math score 7 | 0.07 | |
| | (4.64) | |
| reading score 7 | | 0.14 |
| | | (9.62) |
| parents education | 0.04 | -0.006 |
| | (0.87) | (-0.14) |
| parent has skilled job | 0.0008 | 0.07 |
| | (0.03) | (2.51) |
| par want kid study | -0.02 | 0.15 |
| | (-0.39) | (2.59) |
| siblings | -0.019 | -0.03 |
| | (-2.72) | (-5.15) |
| parent-teacher assoc. at 7 | 0.07 | 0.04 |
| | (1.84) | (1.02) |
| class size at 7 | 0.001 | 0.003 |
| | (0.16) | (1.44) |
| math score at 11 | 0.64 | |
| | (37.3) | |
| reading score at 11 | | 0.66 |
| | | (40.16) |
| perc. of teacher less 2 exp. | 0.03 | -0.03 |
| | (0.56) | (-0.55) |
| class size at 11 | 0.002 | 0.002 |
| | (0.77) | (1.43) |
| n. teach. left during year at 16 | 0.002 | -0.003 |
| | (0.81) | (-1.32) |
| parent-teacher assoc. at 16 | 0.03 | 0.07 |
| | (1.26) | (2.8) |
| class size at 16 | 0.01 | 0.01 |
| | (2.71) | (6.2) |
| $R^2$ | 0.68 | 0.65 |

## 6.2 How bad are tests at 7 compared to tests at 11?

This paper is not able to discard the hypothesis that the results presented are driven by the fact that at age seven tests are a worse estimators of ability than at age 11. In this section a very simple model of the education process is presented. Through running some simulations we characterize how much larger the variance in the noise at age 7 would have to be relatively to the noise at age 11 in order to generate the results presented in the previous sections.

To simplify the analysis, the structural model that we use to do the simulations ignores the variables other than tests scores that we know would determine the education attainment at each stage. We represent the joint effect of these variables on the test scores by a random variable,$w$, which we will assume to be distributed normally.

At age 7, the test score is determined by three factors: *ability*, representing all those characteristics of the individual that will help him succeed in school, $w_7$, including all the variables other than ability that could potentially be influencing the individual's achievement, and a random factor $u_7$, which represents the error of the test when measuring school attainment.

$$t_7 = w_7 + u_7$$

where $u_7 = \sigma_7 \epsilon$, $w_7$ is distributed $N(ability, 1)$, and $\epsilon$ and *ability* are $N(0, 5)$.

At age 11 and at age 16, test scores are determined not only by the variables mentioned above, but also potentially by what happened in the past, reflecting that there may be learning underlying the process, i.e. what you achieved in the past will determine how much you can achieve today.

$$t_{11} = \alpha \cdot w_7 + w_{11} + u_{11}$$

$$t_{16} = \alpha \cdot (t_{11} - u_{11}) + w_{16} + u_{16} = \alpha^2 \cdot w_7 + \alpha \cdot w_{11} + w_{16} + u_{16}$$

where $u_{11} = \sigma_{11}\epsilon$, $u_{16} = \sigma_{16}\epsilon$, and $w_{11}$ and $w_{16}$ are distributed $N(ability, 1)$ .

Without loss of generality we can fix $\sigma_{16} = \sigma_{11} = 1$, since we only care about the relative size of the variance at 7 with respect to the variance at 11, and since $\sigma_{16}$ affects only the error term in the regression.

Once the data has been simulated we have normalized, just as we did with the actual data. Then we have estimated the following regression:

$$t_{16} = \beta_0 + \beta_7 \cdot t_7 + \beta_{11} \cdot t_{11}$$

The following table shows the relevant results from the simulation and regression:

| $\alpha$ | $\sigma_7$ | $\beta_7$ | $\beta_{11}$ |
|---|---|---|---|
| 0 | 1 | 0.42 | 0.4 |
| 0 | 3 | 0.14 | 0.58 |
| **0** | **5** | **0.09** | **0.6** |
| **0** | **7** | **0.06** | **0.61** |
| 0.4 | 1 | 0.33 | 0.58 |
| 0.4 | 3 | 0.11 | 0.74 |
| **0.4** | **5** | **0.06** | **0.76** |
| **0.4** | **7** | **0.04** | **0.76** |
| 0.7 | 1 | 0.27 | 0.67 |
| **0.7** | **3** | **0.08** | **0.81** |
| **0.7** | **5** | **0.05** | **0.83** |
| 0.7 | 7 | 0.03 | 0.83 |
| 1 | 1 | 0.22 | 0.74 |
| **1** | **3** | **0.06** | **0.86** |
| 1 | 5 | 0.03 | 0.88 |
| 1 | 7 | 0.02 | 0.88 |

The results show that, in order to replicate the results presented in section 4, either there is some relevant cumulative effect of education attainment over time, reflecting the relevance of the years in school, or $\sigma_7 \geq 5 \cdot \sigma_{11}$ . Looking at the table it seems most likely that the two hypothesis are true,i.e. there is both some learning and some decrease of the variance of the error term over time. What seems less plausible is that there is no learning at all. If one believes the education process does not matter, than it also has to believe that the variance of the test 7 error is at least five times larger than at age 11, i.e. individuals reflect their knowledge significantly better when they are 11 than when they are 7.

# 7 Conclusions

Education has often been thought to be an instrument to allow for social mobility. Empirical evidence has been questioning this by noticing a very large correlation between early test scores and future outcomes and interpreting this results as evidence that no matter what the child does while growing up his future is basically determined. This paper wants to put forward an alternative interpretation of the process driving the observed facts and to provide some evidence for it. We want to show that children's experience between ages of 7 and 11 does matter for future outcomes, and that the strong correlation results from the process between ages 7 and 11 being correlated with what happened to the child before and during that period. Kids with a more advantaged backgrounds will be taught studying habits, may be more be motivated to study and will tend go to better schools. This will be reflected in them getting higher test scores initially. Then, once they get a good understanding of the basic materials they are better prepared to learn the materials they are exposed to later and that will again be reflected in better scores. But it is not necessarily the case that they will do well in the future no matter what they do when growing up. In the same way, what a disadvantaged kid does in the beginning will determine his chances of doing well when growing up and in the future. But if he manages to compensate his disadvantaged background with a "good" education process and, getting good scores at age 11, he will have big chances of changing what was thought to be a predetermined future.

The analysis provides evidence consistent with this by using the NCDS data. First we replicate the standard analysis in the literature, where future outcomes are shown to be correlated to initial background characteristics and tests scores. Then we introduce test scores at age 11 and school variables at age 11 and we see that the test scores at 7 and background variables are still significant, but that the coefficients are much smaller. And on the other hand the coefficient on age 11 test scores are significant and very large. The explanatory power of this new regression is also double as high as for the standard analysis. We take this to point out that there might be something important between the 7 and 11 ages.

Suppose that all that really mattered was ability, which was determined at age 7. If test scores had a higher measurement error at age 7 then at age 11, then we would get these same results too. We haven't figured out a way to show that this can not be the case under any circumstances. We do provide some evidence that it can not be true that the higher variance is a results of the heterogeneous backgrounds of the children.

Given the absence of a methodology that would allow to discard the alternative generating process we provide some simulations that suggest that most likely the two hypothesis are true, that is, there is both some learning and some decrease in the test error over time. What seem less plausible is that there is no learning at all, since that would require the variance in the noise in the test at age 7 to be at least five times larger than that at age 11.

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