The Roma – Non-Roma Test Score Gap in Hungary

Preliminary and Incomplete Draft

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Abstract

We document and decompose the test score gap between Roma and non-Roma 8th graders in Hungary in 2006. The magnitude of the gap is practically identical to the corresponding Black – White gap in the U.S. in the early 1980's both in mathematics and reading (one standard deviation in mathematics and 0.9 standard deviations in reading). In reduced-form regressions, the gap all but disappears when a relatively small set of family background variables is controlled for. In separate analyses we show that almost half of the gap is explained by home environment and parenting practices. Similarly, half of the gap is explained by school fixed effects. The combined effect is a reduction of the gap by 60 per cent. Without over-interpreting the results they indicate the potential importance of ethnic differences in home environment, parenting and school quality. Ours is the first study that documents and decomposes the Roma – non-Roma test score gap in Central and Eastern Europe. Besides the particular contribution, our results add to the knowledge about the magnitude and origins of test score gaps of ethnic minorities in general. The paper is preliminary and incomplete.

JEL Codes: J15, I20

Introduction

The Roma (also known as the Romani people or Gypsies) constitute one of the largest and poorest of the ethnic minorities of Europe. The size of the population was of over 4 million in the early 1990's (Barany, 2002), and it has grown since. The European Roma population is concentrated in a few countries of Central and Eastern Europe. The same source from the early 1990's shows their share in the total population to be 10 per cent in Bulgaria and Slovakia, 5 percent in Hungary and Romania, and 2 per cent in the Czech Republic. While the majority population shrinks in most of those countries, the Roma population continues to grow, resulting in increasing population shares. In

Hungary, the fraction of Roma students in primary schools (grades 1 through 8) is 12 per cent. Roma employment dropped dramatically during the post-communist transition and stayed low since. Non-Roma are more than twice as likely to be employed as Roma in Hungary; the absolute employment gap is roughly the same for men and women; and low education of the Roma is the most important measured factor in explaining the gap (Kertesi and Kézdi, 2010a). Wide-spread poverty and poor labor market outcomes of the Roma minority are increasingly important European issues, and the skills and education of the Roma are likely to be crucial in their future success.

This paper looks at the test score gap between Roma and Non-Roma students of Hungary in 8th grade. We make use of a unique dataset that connects national standardized test scores to an individual panel survey with detailed data on ethnicity and family background. The paper has three main contributions. First, it documents the test score gap in mathematics and reading; second, it shows that in reduced-form regressions almost the entire gap is explained by a few socio-economic background variables; third, it shows that home environment and schools play significant roles of in the gap. This is the first study that documents the Roma – non-Roma test score gap in the region and analyses its origins. Besides the particular contribution, results of the analysis add to our knowledge about the magnitude and origins of test score gaps of ethnic minorities in general.

Racial and ethnic test score gaps have been subject of intensive research in the United States, with a special focus on the Black-White test score gap. By claiming strong genetic origins of the gap, Herrnstein and Murray's controversial book (1994) was in part responsible for a lot of new research (see Heckman, 1995, the volume edited by Jencks and Phillips, 1998, or Fryer and Levitt, 2004). Conclusions from this research include the following: genetic factors play a limited role if at all; the gap increases through grades; family background characteristics explain a relatively small part of the gap in upper grades in reduced form regressions, but they may explain the entire gap in pre-school years; and racial differences in home environment, parenting practices, school quality and student attitudes towards schools and other cultural attitudes are likely to be important factors in the emergence of the gap.

Many other countries have sizeable disadvantaged ethnic minorities, but the evidence on test score gaps is scarcer. Patacchini and Zenou (2007) document smaller Black – White gaps in the U.K. than those found in the U.S., they find that the gap widens until age 11 but narrows afterwards, and racial differences in parenting are important factors in the evolution of the gap. We found no evidence on Roma versus non-Roma students.

We find that the Roma – non-Roma test score gap among 8th graders in Hungary in 2006 is practically identical to the corresponding Black – White gap in the U.S. in the early 1980's both in mathematics and reading. The gap is one standard deviation in

mathematics and 0.9 standard deviations in reading. In reduced-form regressions, the gap all but disappears when a relatively small set of family background variables is controlled for. This result is different from the U.S. findings. In separate analyses we show that almost half of the gap is explained by home environment and parenting practices. Schools explain at least half of the gap as well: within-school differences are half of the raw gaps, while within-class differences are a little bit smaller. The combined effect is a reduction of the gap by 60 per cent.

The rest of the paper is organized in the following way. The next section describes the data, followed by the description of the Roma – non-Roma test score gaps. The following section shows reduced-form regression results on the gap after controlling for family background variables. Besides OLS results it shows matching estimates. The subsequent section takes a closer look at the potential role of home environment, parenting practices, and schools. The last part concludes. The paper is preliminary and incomplete: in the last section we list some of the further analyses we plan to carry out.

Data

We use test scores from 8th grades measured by the Hungarian National Assessment of Basic Competences (NABC) in May 2006, linked to the sample of the Hungarian Life Course Survey (HLCS).

The National Assessment of Basic Competencies (NABC) is a standard based assessment, designed similarly to the OECD PISA survey. It measures mathematical and reading literacy of the 6th, 8th and 10th grade students. In its current form the NABC is repeated cross-sections, but future assessments will be linked at the individual basis. Starting 2006, the entire population of 8th graders has been covered (full cohorts of 6th graders and 10th graders have been added in later years).[1] Usually, the NABC does not cover students with special education needs[2] except for year 2006, in which a special version of the reading test was administered to them. In order to have results on different tests comparable, we exclude all students with special education need from the main analysis. Besides the tests, the NABC administers additional questionnaires,

[1] See Hermann and Molnár (2008) for a Hungarian language, description of the NABC database

[2] Students of special education needs consist of some 8 per cent of the cohort of 8th graders in 2006. Many (though not all) of them study in segregated schools or classes and are subject to different curicula and standards. Besides those with physical disabilities they inlcude include rather flexible category of the mildly mentally disabled (who are the largerst group by far). The Roma are over-represented among students with special education needs.

including a family background survey to be filled out by parents of the students. This survey provides a lot of important information, but it does not contain ethnic markers.[3]

The Hungarian Life Course Survey (HLCS) is a yearly panel survey that follows the model of the National Longitudinal Surveys of Youth in the United States (NLSY79). The original sample was drawn from the population of students who were in their 8th grad in May 2006 and completed the NABC. A special subsample contains students with special education needs. The original sample size is ten thousand. Students with special education needs and those with reading test scores in the lowest third are overrepresented in the survey. Population distributions are restored by the use of sampling weights. The first survey wave was completed during the winter of 2006/7, and subsequent waves have been fielded on a yearly basis. The survey contains detailed questions on ethnicity, schools, family background including poverty and home environment, as well as many other dimensions.

Our sample consists of all students who lived with at least one of their biological parents in the winter following their 8th grade (for virtually all respondents this was the winter of their 9th grade). We need biological parents in order to infer students' ethnicity from their parents' ethnicity (the students themselves were not asked). This is a minor restriction: of the ten thousand initial respondents, less than three hundred lived with in households with neither biological parent present.

The first two waves of the HLCS include questions about the parents' national and ethnic identity (ethnicity of the students was not asked directly because of their legal minor status). Each survey wave includes two questions allowing for respondents: one about ethnic or national identity in the first place, and another one about ethnic or national identity in the second place. These question-pairs allowed parents to declare multiple identities, and many did. In this paper we consider Roma all whose (biological) mother or father chose Roma as her or his identity as a first or second choice in either of the two waves. For comparison, we define Hungarians in an analogous way: someone is Hungarian if at least one of the parents declares chose Hungarian nationality to at least one of the questions. Table 1 shows the distribution of the sample in terms of Hungarian and Roma identity.

[3] Ethnic markers are not used in administrative databases in Central and Eastern European countries for historical reasons. An unfortunate result is that ethnic differences are impossible to measure without survey information. As long as this practice remains in place, our approach (linking administrative data to surveys that contain ethnic information) is a promising way for measuring ethnic differences.

Table 1. Hungarian and Roma identity of students in the HLCS (Per cent).

	Roma	Non-Roma	All
Hungarian	7.6	91.5	99.1
Non-Hungarian	0.3	0.6	0.9
All	7.9	92.1	100.0

Data: Hungarian Life Course Survey, Waves 1 and 2.
Notes. Identity is defined by self-declared identity of biological parents, in an inclusive way (for more details see above). Observations are weighted by sampling weights.

The numbers show that Hungary is rather homogenous in terms of Hungarian identity: virtually all students in our sample have at least one parent who stated Hungarian as her or his first or second identity in one of the two survey waves (typically in both).[4] Importantly, the vast majority of students whose parents have Roma identity also have parents with Hungarian identity, typically because the same parents chose both Hungarian and Roma for their identities.

According to our definition, the fraction of Roma students is close to 8 per cent. This number can be compared to the 12 per cent estimate for the fraction of Roma students in the entire primary school population (1st through 8th grades), which number is based on school principals' estimates of the fraction of Roma in their school. Because of the differences in Roma versus non-Roma demographics, the fraction in 8th grade is certainly below 12 per cent, probably closer to 10 per cent. The analysis of identity is beyond the scope of this paper, but preliminary analysis suggests that (1) whether one's parents declare Roma as their first or second identity does not seem to matter; (2) whether one's parents declare Roma in the first or second survey wave does not seem to matter; (3) the majority of Roma students who live with both biological parents have both parents Roma; and (4) those who are considered Roma by the interviewer but not by our definition seem to be fairly similar to the Roma by our definition.[5] In sum, our Roma definition is likely to capture more than three quarters of all Roma students in the sample, with little systematic bias.

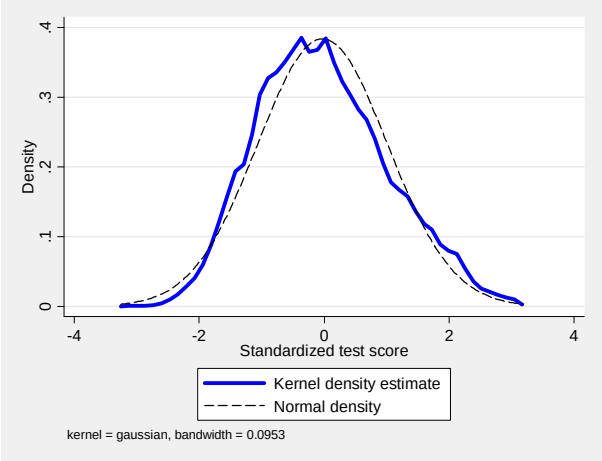
The sample for our analysis consists of all students in the HLCS sample who lived with at least one of their biological parents in wave 1 and are Hungarian or Roma by our inclusive definitions. Students with special education needs are excluded from the analysis because they do not have a mathematics test score, and their reading test was also different from the rest of the students (although they are comparable in principle). The size of this sample is 8772. Additional eight hundred observations had to be

[4] These figures are biased because students whose parents don't speak Hungarian are a lot less likely to be respondents to the survey; the analysis of this problem is beyond the scope of our paper.
[5] The ethnic labels based on the interviewers' consideration are not part of the public use sample but are kept as restricted use data.

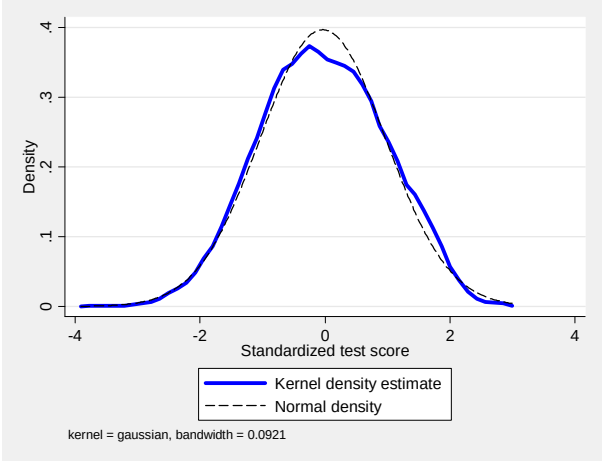
excluded because of item nonresponse on right-hand side variables. The size of the final sample is 7949.

Figure 1 shows the distribution of the test scores in the sample, with the normal density superimposed. The mathematics test score is distributed approximately normal, and the reading test score is almost perfectly normal. The test scores are standardized according to the national mean and standard deviation. The corresponding sample values of the mean and standard deviation are very close to zero and one, correspondingly, indicating that the sample selection was largely independent of the test scores.

Figure 1. The distribution of standardized mathematics and reading test scores in the sample, and the corresponding normal densities.



Mathematics
mean = -0.02
std.dev = 1.00



Reading
mean = -0.01
std.dev = 1.04

The Roma – Non-Roma Test Score Gap

Table 1 shows summary statistics of the standardized test scores for Roma and non-Roma students separately.

Table 2. The ethnic gap in standardized mathematics and reading test scores in 8th grade.

	Mathematics			Reading		
	mean	median	standard deviation	mean	median	standard deviation
Roma	-0.96	-1.05	0.81	-0.86	-0.91	0.89
Non-Roma	+0.06	-0.02	1.02	+0.04	+0.04	0.98
The ethnic gap (Roma minus Non-Roma)	-1.02	-1.04	-0.21	-0.90	-0.94	-0.09

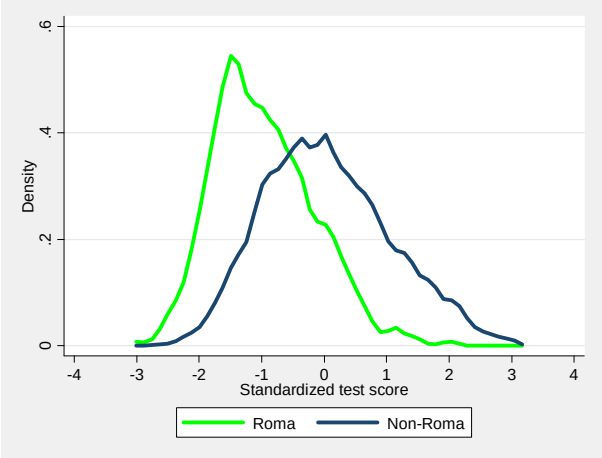
Notes.

Defined as the mean difference in standardized test scores, the Roma – Non-Roma test score gap in mathematics is 1.02 standard deviations, and the gap in reading is 0.9 standard deviations. These 8th grade gaps are identical to the corresponding Black-

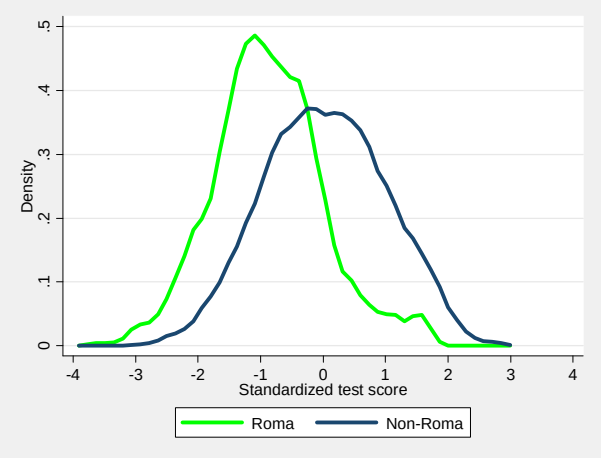
White gaps in the United States in the early 1980's.[6] Differences between median scores are very similar to the mean differences. The standard deviation of scores is somewhat smaller among Roma students, most likely because the tests are slightly less differentiating towards the bottom of the distributions.

The test score distributions behind the summary statistics are shown on Figure 1. They reveal that the mathematics score among Roma students is not only lower on average than the reading test score but it is also more skewed so that larger mass is on the left part, and its right tail is a lot thinner as well.

Figure 1. The distribution of Roma and Non-Roma test scores.



Mathematics



Reading

Besides the standardized scores, the test results allow for a cardinal representation of the students' mathematical and reading competences.

Table 3. The ethnic gap in achievement levels in mathematics and reading in 8th grade.

	Mathematics			Reading		
	Roma	Non-Roma	Difference	Roma	Non-Roma	Difference
Below level 1	48	12	+36	19	5	+14
Level 1	33	28	+5	42	21	+21
Level 2	15	29	-14	30	34	-5
Level 3	3	19	-15	7	28	-21
Level 4	1	12	-11	2	12	-10
All	100	100	-	100	100	-

Notes.

[6] Phillips, Crouse and Ralph (1998), Table 7A-1 on pp. 258-261 list the Black – White test score gap measured at various grades from various years. According to the National Assessment of Educational Progress data, the gap for 8th graders was 1.02 in mathematics in 1982, and it was 0.91 in readings in 1980 (each subject, plus vocabulary, is assessed in every three years).

The next section shows our main regression results together with a description of the right-hand side variables.

Reduced-Form Regressions

The right-hand side variables in our regressions measure parental education, family composition, parental employment and employment history, measures of poverty, and regional variables.

Parental education dummies measure the highest educational attainment of the parents in four categories: no parent has completed more than 8 grades; at least one parent has a vocational training degree; at least one parent has a secondary school degree with a maturity diploma; at least one parent has a college degree or higher. The family composition variables include a dummy for whether the individual lives with her/his biological mother, one for biological father, and a count variable for household size. Parental employment is measured by a dummy for whether the father works, and a continuous variable that shows the fraction of the years the father had a stable employment from among the years since the student was born. Poverty, or more generally, permanent income of the household is measured by a set of variables: dummies for whether the household had no money for food or utilities in the previous year, whether the student was on holiday with the family, and whether the apartment or the neighborhood is poor according to the interviewer; the size of the apartment (log of square meters per capita); and the (log of the) number of books at home. We include a dummy for the gender of the respondent and her/his birth weight. Regional differences are captured by dummies for the seven large (NUTS-2 level) regions of Hungary and for four township types (Budapest, large cities defined as the 18 county centers, small towns defined as other cities/towns, and villages).

Table A1 in the Appendix lists the right-hand side variables and their mean and standard deviation in the Roma and the non-Roma samples. The numbers show that Roma and non-Roma students come from very different families on average. Roma parents are significantly less educated. This is of course not surprising, but the magnitude of the difference is remarkable. The role of parental education in children's outcome is likely to be strong, and therefore educational differences in parental education are likely to play a significant role in ethnic achievement gaps. Of course the causal mechanisms are impossible to identify from those correlations. Perhaps somewhat surprisingly, there are no significant ethnic differences in single parenthood. Roma and non-Roma students are just as likely to live with their biological parents. Roma households are one person larger on average (note that average household size in

this sample is naturally larger than the national average because families here contain at least one child by construction).

Roma fathers are significantly less likely to be currently employed (employment rate is 35/76=46 per cent for the Roma, 59/71=83 per cent for the non-Roma). A similar difference is present in the fathers' employment history. Roma families are substantially poorer, they hold a lot less books, and they live in smaller apartments (per capita) and in substantially poorer neighborhoods. Quite naturally there are no gender differences, but Roma children are born with 10 per cent lower weight than non-Roma children. Finally, the geographic distribution of the two groups has significant differences: the Roma are over-represented in the South-West and the North and in the villages, and they are underrepresented in the central and western regions, in Budapest and the other large cities.

For both mathematics and reading, we estimated three regressions of the following form:

$$s_i = \alpha + \beta R_i + u_i \quad (1)$$

$$s_i = \alpha + \beta R_i + \boldsymbol{\gamma}' \mathbf{FAM}_i + v_i \quad (2)$$

$$s_i = \alpha + \beta R_i + \boldsymbol{\gamma}' \mathbf{FAM}_i + \boldsymbol{\delta}' \mathbf{REG}_i + w_i \quad (3)$$

where s_i denotes the standardized test score result of individual i, R_i is the Roma dummy, $\mathbf{Fam}_i$ is the vector of family background variables, and $\mathbf{REG}_i$ is the vector of regional variables. The parameter of major interest is β. In model (1) β measures the raw gap; in models (2) and (3) β measures the residual gap after controlling for the right-hand side variables. Table 4 contains the estimates of the Roma coefficient from the regressions. The full set of estimates is contained in the Appendix table A2.

Table 4. The ethnic gap in mathematics and reading test scores in 8th grade. Raw gap and residual gap conditional on family background variables and regional variables.

	Mathematics			Reading		
	(1)	(2)	(3)	(1)	(2)	(3)
Roma – non-Roma	-1.02	-0.19	-0.19	-0.90	-0.09	-0.08
test score gap	[0.05]**	[0.05]**	[0.05]**	[0.05]**	[0.05]	[0.05]
Family background variables		Yes	Yes		Yes	Yes
Regional variables			Yes			Yes
Observations	7949	7949	7949	7949	7949	7949
R-squared	0.06	0.28	0.28	0.05	0.30	0.32

Notes. Left-hand side variables are from the National Assessment of Basic Competences of Hungary, 2006; right-hand side variables are from the Hungarian Life Course Survey (waves 1 and 2). The left-hand side variables are standardized to have zero mean and standard deviation of one in the population. Observations are weighted by sampling weights. Detailed results are in the Appendix table A1. Standard errors in brackets are robust to heteroskedasticity
* significant at 5%; ** significant at 1%

The Roma estimates in model (1) repeat the test score gap defined as the Roma – non-Roma differences in the mean standardized test scores. The gap is one standard deviation in mathematics and 0.9 standard deviation in reading. The results from model (2) show the residual wage gap after controlling for family background variables. The coefficient can be interpreted as the average Roma – non-Roma gap between students who share the same family background variables. Inclusion of the family background variables makes the reading gap all but disappear and the mathematics gap shrink by more than 80 per cent. The residual gap is a mere 0.2 standard deviation in mathematics and a statistically insignificant 0.1 standard deviation in reading. Inclusion of regional variables in model (3) does not change the estimated residual gap or the rest of the coefficients.

Most coefficients of the family background and regional variables are all in line with our expectations, while some may seem a bit surprising. Of course the interpretation of these reduced-form parameters, holding other right-hand side variables constant, is problematic. Therefore we give a just quick overview of the results. Parental education is strongly related to test scores, but family composition is at most weakly related. Whether one lives with the mother does not seem to be related to scores at all. It looks as if the presence of the (biological) father was negatively correlated with test scores, but that is true only if the father's employment variables are all zero (not currently working and never worked). Household size is weakly negatively related to test scores. The poverty indicators show weak correlations item by item, but the combined correlations are strong. The number of books at home stands out as one of the strongest one; of course that is a measure of many things besides income. Current employment of the father is not related to test scores in the regressions, but past employment is strongly related. This latter finding is consistent with our expectations: in previous work we showed that long-term parental unemployment in childhood has long-lasting effects on educational attainment (Kertesi and Kezdi, 2007; similar results were found on wages by Kouropoulos, Page and Stevens, 2005). Female students score somewhat worse in mathematics and significantly better in reading; birth weight is significant in mathematics but not in reading. Conditional on family background variables, regional variables are not related to test scores except for the somewhat lower results in the North and the somewhat higher results in Budapest and other large cities.

The Roma coefficient in the linear regression with other covariates measures the residual gap under the assumption of linearity and common support. None of these assumptions are likely to be fully satisfied in our case. While most of our right-hand side variables are dummies, their interactions are not included, which may lead to a misspecification bias. As for common support, recall that table A1 in the appendix demonstrates large differences in the right-hand side variables between Roma and non-

Roma students. Those differences suggest that there may be combinations of variables in which only one of the two ethnic groups are present.

In order to check for the robustness of the result, we estimated the residual gap that corresponds to model (2) by propensity score matching. The propensity score equation is a probit model with the Roma dummy on the left-hand side and the covariates of model (2) on the right-hand side. Estimates of the model are in the Appendix table A2. Note that the purpose of the probit model is estimating the propensity score, which is the predicted probability. Our data need weighting in order to restore the unbalanced sampling design, and while weighting in probit models is not necessarily problematic for prediction, it is certainly problematic for statistical inference. While it is the weighted model that is used for estimating the propensity score, Table A2 shows unweighted estimates as well, and those are very close to the weighted ones.

Table 5 presents estimates from two matching models. The first model is a stratified matching model; it is an average of the gaps estimated within 15 intervals (a.k.a. blocks) of the propensity score. The blocks are defined in order to ensure maximum balance, and they are documented in the Appendix table A4. The second model is nearest neighbor matching with replacement. While stratified matching uses as many "control" (non-Roma) observations as possible, nearest neighbor matching uses a very narrow set in order to maximize proximity. The results from the two matching methods are very close, and they are also close to the OLS estimates presented above.

Table 5. The residual ethnic gap in mathematics and reading test scores in 8th grade. Propensity score matching estimates conditional on family background and regional variables.

	Mathematics		Reading	
	stratified	nearest neighbor	stratified	nearest neighbor
Roma – non-Roma test score gap	-0.20	-0.21	-0.13	-0.17
	[0.04]**	[0.06]**	[0.05]*	[0.07]*
Number of Roma in matched sample	647	6932	647	6932
Number of non-Roma in matched sample	647	389	647	389

Notes. Left-hand side variables are from the National Assessment of Basic Competences of Hungary, 2006; right-hand side variables are from the Hungarian Life Course Survey (waves 1 and 2). The left-hand side variables are standardized to have zero mean and standard deviation of one in the population. Detailed results are in the Appendix tables A2 and A3. Standard errors in brackets.
* significant at 5%; ** significant at 1%

Given the size of the raw gaps these results are remarkable. They can indicate that it is not ethnicity but poverty and other aspects of social disadvantage that are responsible for the gaps. However, this interpretation is not the only one: many causal mechanisms are consistent with the results. All of the right-hand side variables may be endogenous in the sense that they may be correlated with important unobservables. For example, parental education may proxy permanent income, cultural values or genetically

transmitted abilities as well. As DiNardo (2007) notes when he discusses the interpretation of the reduced-form regression results in Fryer and Levitt's (2004) paper: "there is no reason to believe that (conditional on the other nonrandomly assigned regressors) a coefficient in a kitchen sink regression reliably informs us about causation in any sense" (p. 987). In order to learn more about the mechanisms behind the test score gap, we perform additional analysis in the next section.

Home Environment and Schools

In this section we look at whether and to what extent the test score gaps may be due to Roma versus non-Roma differences in home environment, parenting practices and the kinds of schools children attend. We perform reduced-form regression analysis similar to the previous section. Contrary to the previous section, though, the selection of right-hand side variables follows prior beliefs about the potential causal mechanisms, instead of the more "kitchen-sink-type" selection of family background variables there. Of course these regressions are still very much reduced form and, as such, they do not allow for proper causal interpretation. At the same time, they can produce results that are more informative on the potential relative importance of the mechanisms.

First we look at home environment and parenting practices. Home environment in early adolescence is measured by the shortened test battery of the Early Adolescent Home Observation for Measurement of the Environment (the HOME index, see, for example Bradley et al, 2000). This short battery is the same as the one used in the NLSY79. The battery consists of 20 questions asked during the household interview and additional 9 items based on the interviewer's observations.[7] Following the standard use of the test battery, we form two scores from the answers, one measuring the degree of cognitive stimulus in the home environment and another one measuring the quality of the emotional environment. In order to allow for some non-linearities, we use the quadratic terms as well. While our HOME indices are based on information in early adolescence, they may proxy home environment and parenting in earlier childhood as well.

In order to measure parenting practices from early childhood in a more direct way, we use the frequency of bedtime stories told or read to the student during her/his pre-school years. The reason for opting for a single measure is its relative reliability. Recall that our survey takes place in adolescence, by which time early childhood parenting becomes hard to assess. For example, interviewer observations are impossible. The survey contains two questions on the frequency of bedtime stories in early childhood, one asked from the parents and one from the student. The student answered this question (along

[7] Examples from the first set are "Child has 20 children's books." or "Non-harsh discipline if child hits." Examples from the second set are "Mom spontaneously conversed with child at least twice." or "Home is reasonably clean."

with a few other questions) alone, separated from the parents. Assessment by the parents is likely to be more biased (parents may want to project a favorable image) but assessment by the students is likely to be more noisy (fewer memories). In the regressions we use the student assessments, but in some specifications we instrument them with the parents' assessments in order to reduce the bias due to the measurement error. Frequency is measured in three categories: never or very rarely, sometimes, frequently (at least three times a week).

Table A5 in the Appendix shows summary statistics of the variables by ethnicity. The emotional part of the home environment index (HOME) shows no significant differences, but the Roma cognitive index is almost one standard deviation lower than the corresponding non-Roma index. Bedtimes stories are also less frequently read or told to Roma children. Thirty per cent of Roma students report never, compared to ten per cent of non-Roma students. On the other side, only a bit more than a third of the Roma students report frequently, compared to two thirds of non-Roma students. The differences in parental assessments are even larger, which may indicate stronger bias in the answers of non-Roma parents.

Table 6 shows the estimates of the residual test score gap after controlling for home environment and parenting practices. We show results from four models. Model (1) includes the HOME indices. Model (2) includes the bedtime stories dummies (based on the assessment of the student). Model (3) includes the same bedtime stories dummies, but here they are instrumented with analogous dummies created from the parents' assessment. Model (4) includes both the HOME indices and the bedtime stories, the latter instrumented as in the third model. When interpreting the magnitudes, recall that the raw gap is -1.02 in mathematics and -0.90 in reading.

Table 6. The residual test score gap after controlling for home environment and parenting practices in early adolescence and in early childhood.

	Mathematics				Reading			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Roma – non-Roma test score gap	-0.71 [0.05]**	-0.88 [0.05]**	-0.77 [0.05]**	-0.62 [0.05]**	-0.59 [0.05]**	-0.76 [0.05]**	-0.64 [0.06]**	-0.50 [0.05]**
Early adolescence home environment	Yes			Yes	Yes			Yes
Bedtime stories in early childhood		Yes	Yes	Yes		Yes	Yes	Yes
Bedtime stories instrumented			Yes	Yes			Yes	Yes
Observations	7949	7925	7599	7599	7949	7925	7599	7599
R-squared	0.17	0.10	0.07	0.17	0.17	0.09	0.03	0.16

Notes: see after table 4.

Bedtime stories are represented by two dummy variables: never and frequently (omitted category is sometimes). The variables are based on the students' answers (when asked separately in one-on-one interview); instruments are analogous variables formed from the parents' answers to a similar question.

* significant at 5%; ** significant at 1%

The residual gaps are two thirds of the corresponding raw gaps if early adolescent home environment is controlled for, and the drop is a little bit larger in reading (30 per cent in mathematics and 35 per cent in reading). The full set of results in the Appendix table A6 show that the HOME index variables have the same effect on each test score, and it is the cognitive component that has significant (and increasing) effect on the test scores themselves. Coefficient estimates on the emotional component show statistically significant but negligible negative correlations.

If the frequency of bedtime stories in early childhood are controlled for (but nothing else), the test score gap shrinks by 12 per cent in mathematics and 18 per cent in reading. Looking at the results in the Appendix table A6 shows that, similarly to the early adolescent home measures, the coefficient estimates on the bedtime story variables are very similar across test scores. They are also large: moving from never to frequent is associated with one half of a standard deviation larger test scores. When the variables are instrumented by the parental measure, the drop in the Roma coefficient is substantially larger, 25 per cent in mathematics and 30 per cent in reading. The larger drop in the Roma coefficients, together with the larger (in absolute value) coefficients of the instrumented variables themselves are consistent with the assumption that large noise in the original variable leads to severe attenuation bias. With all likelihood, therefore, the instrumented results are closer to the true association between the frequency of bedtime stories and test scores. This leads us to model (4), in which we look at what happens if we control for our home environment and parental practice variables both in early adolescence and early childhood (with the early childhood variables instrumented for alleviate measurement error problems as in model (3)). The residual gap is almost 40 per cent smaller than the raw gap in mathematics, and it is almost 45 per cent smaller in reading.

Being regressions on non-random variables, the models cannot establish causality from home environment and parenting to test score gaps, and thus they cannot give a definitive answer to the importance of these mechanisms in the test score gap. It is possible that other factors are more important but those are correlated with these variables. Yet the results are obviously consistent with strong causal effects. They thus suggest that Roma versus non-Roma differences in home environment and parenting practices may be important in the emergence of the test score gap.

The second mechanism we look at operates through schools. Schools are likely to have strong effects on test scores in 8th grade. In part because the school choice system in Hungary, there is non-negligible segregation between primary schools (grades 1 through 8) along ethnic lines (Kertesi and Kezdi, 2010a). As a result, typical Roma and non-Roma students go to different schools. Differences in the quality of education across schools can therefore be in large part responsible for the test score gap. Roma students may receive lower quality for many reasons, including lower resources, differential teaching attitudes, or peer effects. The mechanisms through which school quality may affect test scores are beyond the scope of our analysis. Instead, we focus on overall effects: whether the fact that typical Roma and non-Roma students go to different

schools, or different classes in the same school, are in themselves related to the test score gaps.

We estimate within-school regressions and within-class differences by school fixed-effects models and class fixed-effects models. Classes are defined separately for different schools so the class fixed effects can be understood as interactions between school fixed effects and, within schools, class fixed effects. Table 7 shows the results. Again, the Roma coefficients are to be compared to the raw gaps, 1.02 in mathematics and 0.90 in reading.

Table 7. The residual test score gap within schools and within classes.

	Mathematics		Reading	
	(1)	(2)	(1)	(2)
Roma – non-Roma	-0.55	-0.46	-0.47	-0.37
test score gap	[0.06]**	[0.07]**	[0.07]**	[0.09]**
School FE	Yes		Yes	
School × class FE		Yes		Yes
Observations	7949	7949	7949	7949
R-squared	0.5	0.64	0.47	0.61

Notes: see after table 4. The R-squared of the regressions include the Fixed Effects.
* significant at 5%; ** significant at 1%

The inclusion of school fixed effects leads to a drop in the gap by almost 50 per cent both in mathematics and reading. The inclusion of class fixed effects leads to a drop by 55 per cent in mathematics and almost 60 per cent in reading. In other words, the difference between the test scores of Roma students and their non-Roma peers in the same schools is half of the overall difference. If the comparison is made not only within schools but also within classes, the difference is 40 to 45 per cent of the overall differences.

Again, the results are consistent with strong causal effects but they are far from being definitive. Here the problem is that school choice is likely to be endogenous. Families in Hungary can send their children to any school, and schools receive per-capita government financing (similar to a voucher) after each student. To the extent that families of children with higher abilities are in better positions to choose schools (or some schools are in better position to select children with higher abilities), between-school differences may reflect differences in selection as opposed to differences in educational quality. It is therefore possible that within-school ethnic differences are so much smaller than overall differences because non-Roma students in schools with many Roma students are negatively selected on ability, and Roma students in almost all-non-Roma schools are positively selected. Yet, again, the results are also consistent with strong causal role of ethnic differences in the quality of education on the test score gap.

Finally in this section, we look at estimates of the residual gap from regressions that contain both the home and parenting variables and the school or class fixed effects. Table 8 shows the estimates for the residual gap, and the full set of results is in the Appendix table A7.

Table 8. The residual test score gap within schools and within classes, and controlling for home environment, parenting practices and family background.

	Mathematics				Reading			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Roma – non-Roma	-0.41	-0.36	-0.13	-0.12	-0.31	-0.25	-0.04	-0.02
test score gap	[0.06]**	[0.07]**	[0.06]*	[0.07]	[0.07]**	[0.08]**	[0.07]	[0.08]
School FE	Yes		Yes		Yes		Yes	
School × class FE		Yes		Yes		Yes		Yes
HOME and parenting	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Family background			Yes	Yes			Yes	Yes
Observations	7925	7925	7925	7925	7925	7925	7925	7925
R-squared	0.53	0.66	0.57	0.68	0.51	0.64	0.56	0.67

Notes: see after table 4. The R-squared of the regressions include the Fixed Effects.* significant at 5%; ** significant at 1%

The combined explanatory power of home environment, parenting and school or class fixed effects is stronger than the their separate power in terms of the test score gap. When home environment, parenting and class fixed effects are all controlled for the residual gap in mathematics 40 per cent of the raw gap, and it is 34 per cent in reading. When class fixed effects are controlled for, the combined explanatory is a bit larger, leading to residual gaps of 35 per cent and 28 per cent of the corresponding raw gaps in mathematics and reading, respectively.[8]

When our original family background variables are also controlled for, the gaps basically disappear. If we look at the coefficient estimates (Appendix table A7), we see that the coefficients on the HOME indices are reduced substantially, and the coefficients on bedtime stories are also reduced a little bit. At the same time, the coefficients on the family background variables are also reduced a little bit by the inclusion of the other variables and the fixed effects. These results are hard to interpret besides the obvious notion that these variables are correlated. Running a "horse race" in a reduced form regression between home environment, parenting and school fixed effects on the one hand, and family background variables on the other hand cannot answer whether the latter affect outcomes through channels different from the former ones. Family variables may stay significant even if they operate through home environment and parenting if the latter is measured with more error than the former. In such a case the family variables can "pick up" much of the effects.

With the cautionary note on the causal interpretation and the uncertainty in what the combined regressions imply, these results are still remarkable. They are consistent with the notion that ethnic differences in home environment, parenting practices and schools

[8] Note that in these models the frequency of bedtime stories is entered in the noisy version without the rpevious instruments. Instrumenting them would likely lead to even larger reductions in the residual test score gaps. Estimating models with fixed effects and instruments for the noisy variables is on our agenda for the next version of this paper.

are very important, perhaps the most important, factors in explaining the test score gap between Roma and non-Roma 8th grader students in Hungary in 2006.

Conclusions and Further Research

This paper documents and decomposes the test score gap between Roma and non-Roma 8th graders in Hungary in 2006. The gap is practically identical to the corresponding Black – White gap in the U.S. in the early 1980's both in mathematics and reading (one standard deviation in mathematics and 0.9 standard deviation in reading). In reduced-form regressions, the gap all but disappears when a relatively small set of family background variables is controlled for. In separate analyses we show that almost half of the gap is explained by home environment and parenting practices. Similarly, half of the gap is explained by school fixed effects. The combined effect is a reduction of the gap by more than 60 per cent. Without over-interpreting the results they indicate the potential importance of ethnic differences in home environment, parenting and school quality.

Ours is the first study that documents and decomposes the Roma – non-Roma test score gap in Central and Eastern Europe. Besides the particular contribution, our results add to the knowledge about the magnitude and origins of test score gaps of ethnic minorities in general.

The paper is preliminary and incomplete. We plan to carry out a number of robustness checks, including unweighted regressions, models on the cardinal measure of test results (shown in table 3), and matching on even larger sets of covariates. We also will look at students with special education needs, a subsample that was excluded from the analysis because of missing or incompatible test scores. We also plan to look at what happens in grades above the 8th. Test scores from grade 10 can be linked to a subsample of our respondents, and we plan to assess changes in the test score gap. Our data contain some non-cognitive tests as well, such as Rosenberg's self esteem test and a short version of Rotter's test on the locus of control. We plan to document and decompose the ethnic gap in those non-cognitive test scores as well.

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Appendix Tables

Table A1. Summary statistics of the family background and regional variables, by ethnicity.

	Type of variable	Roma		Non-Roma	
		mean	std.dev	mean	std.dev
Parents' education 0-8 grades	dummy	0.65	0.48	0.09	0.29
Parents' edu vocational training	dummy	0.28	0.45	0.28	0.45
Parents' education maturity	dummy	0.07	0.26	0.37	0.48
Parents' education college	dummy	0.01	0.08	0.25	0.43
Lives with (biological) mother	dummy	0.95	0.21	0.97	0.16
Lives with (biological) father	dummy	0.76	0.43	0.71	0.45
Household size	count	5.02	1.71	4.14	1.19
Father currently employed	dummy	0.35	0.48	0.59	0.49
Fraction years father employed	fraction [0,1]	0.48	0.46	0.66	0.46
Sometime no money for food	dummy	0.22	0.41	0.04	0.20
Somet. no money for utilities	dummy	0.35	0.48	0.11	0.31
Log number of books	log of counts	3.30	1.30	5.26	1.33
Was not on family holiday	dummy	0.78	0.41	0.40	0.49
Apartment looks poor	dummy	0.34	0.47	0.07	0.25
Log of apt. sqm/residents	log of m^2/ capita	2.76	0.47	3.08	0.41
Neighborhood poor	dummy	0.53	0.50	0.09	0.29
Female	dummy	0.50	0.50	0.49	0.50
Birth weight	grams	2.95	0.59	3.27	0.56
Region: Central	dummy	0.08	0.27	0.22	0.42
Region: Central-West	dummy	0.05	0.23	0.12	0.33
Region: West	dummy	0.07	0.26	0.13	0.33
Region: Southwest	dummy	0.24	0.42	0.11	0.32
Region: North	dummy	0.30	0.46	0.11	0.31
Region: East	dummy	0.17	0.38	0.16	0.37
Region: South	dummy	0.09	0.28	0.14	0.35
Budapest	dummy	0.06	0.23	0.13	0.34
Large city	dummy	0.08	0.27	0.17	0.38
Small town	dummy	0.30	0.46	0.36	0.48
Village	dummy	0.56	0.50	0.33	0.47
Number of observations		654		7295	

Table A2. Detailed results of the reduced form family background regressions.

	Mathematics				Reading		
	(1)	(2)	(3)		(1)	(2)	(3)
Roma	-1.02	-0.19	-0.19	-0.90	-0.09	-0.09	-0.08
	[0.05]**	[0.05]**	[0.05]**	[0.05]**	[0.05]	[0.05]	[0.05]
Parents' education 0-8 grades		-0.11	-0.11		-0.12	-0.12	-0.10
		[0.04]**	[0.04]*		[0.04]**	[0.04]**	[0.04]*
Parents' education maturity		0.30	0.29		0.24	0.24	0.20
		[0.03]**	[0.03]**		[0.03]**	[0.03]**	[0.03]**
Parents' education college		0.66	0.64		0.57	0.55	0.45
		[0.04]**	[0.04]**		[0.03]**	[0.04]**	[0.04]**
Lives with (biological) mother		0.10	0.11		0.10	0.12	0.08
		[0.07]	[0.07]		[0.06]	[0.06]*	[0.06]
Lives with (biological) father		-0.17	-0.15		-0.21	-0.19	-0.18
		[0.06]**	[0.06]**		[0.06]**	[0.06]**	[0.06]**
Female		-0.14	-0.14		0.39	0.39	-0.04
		[0.02]**	[0.02]**		[0.02]**	[0.02]**	[0.01]**
Birth weight		0.10	0.10		0.03	0.03	0.00
		[0.02]**	[0.02]**		[0.02]	[0.02]	[0.04]
Household size		-0.03	-0.02		-0.05	-0.04	0.25
		[0.01]**	[0.01]		[0.01]**	[0.01]**	[0.07]**
Father currently employed		-0.02	-0.02		0.01	0.00	-0.10
		[0.05]	[0.05]		[0.04]	[0.04]	[0.05]*
Fract. years father employed		0.25	0.25		0.25	0.25	-0.07
		[0.07]**	[0.07]**		[0.07]**	[0.07]**	[0.03]*
Sometime no money for food		-0.11	-0.10		-0.10	-0.09	0.13
		[0.05]*	[0.05]*		[0.05]	[0.05]	[0.01]**
Somet. no money for utilities		-0.04	-0.05		-0.06	-0.08	-0.03
		[0.04]	[0.04]		[0.03]	[0.03]*	[0.03]
Log number of books		0.15	0.14		0.17	0.16	0.02
		[0.01]**	[0.01]**		[0.01]**	[0.01]**	[0.04]
Was not on family holiday		-0.08	-0.07		-0.08	-0.06	0.03
		[0.03]**	[0.03]*		[0.03]**	[0.03]*	[0.03]
Apartment looks poor		-0.09	-0.08		-0.02	-0.01	-0.05
		[0.04]*	[0.04]		[0.04]	[0.04]	[0.04]
Log of apt. sqm/residents		0.03	0.08		0.01	0.05	0.38
		[0.03]	[0.03]*		[0.03]	[0.03]	[0.02]**
Neighborhood poor		-0.04	-0.04		-0.05	-0.05	0.03
		[0.04]	[0.04]		[0.04]	[0.04]	[0.02]
Region: Central			-0.08			-0.02	0.00
			[0.05]			[0.04]	[0.04]
Region: Central-West			-0.05			-0.08	-0.10
			[0.05]			[0.04]	[0.04]*
Region: West			0.00			-0.02	-0.07
			[0.05]			[0.04]	[0.04]
Region: Southwest			0.05			0.06	0.05
			[0.05]			[0.04]	[0.04]
Region: North			-0.07			-0.11	-0.12
			[0.05]			[0.04]**	[0.04]**
Region: East			-0.02			-0.03	-0.04
			[0.04]			[0.04]	[0.04]
Budapest			0.21			0.14	0.10
			[0.05]**			[0.05]**	[0.05]*
Large city			0.16			0.14	0.13
			[0.04]**			[0.03]**	[0.03]**
Small town			0.04			0.05	0.05
			[0.03]			[0.03]	[0.03]
Constant	0.06	-1.30	-1.52	0.04	-1.23	-1.44	-1.38
	[0.01]**	[0.16]**	[0.17]**	[0.01]**	[0.14]**	[0.15]**	[0.15]**
Observations	7949	7949	7949	7949	7949	7949	7949
R-squared	0.06	0.28	0.28	0.05	0.3	0.3	0.32

Notes: see below table … * significant at 5%; ** significant at 1%

Table A3. Propensity score probit results for Table.
Dependent variable: Roma

	Weighted	Unweighted
Parents' education 0-8 grades	0.85	0.78
	[0.02]**	[0.07]**
Parents' education maturity	-0.32	-0.38
	[0.03]**	[0.09]**
Parents' education college	-0.78	-0.77
	[0.06]**	[0.19]**
Lives with (biological) mother	-0.06	-0.04
	[0.04]	[0.14]
Lives with (biological) father	0.68	0.75
	[0.03]**	[0.10]**
Female	-0.13	-0.06
	[0.02]**	[0.06]
Birth weight	-0.17	-0.11
	[0.01]**	[0.04]*
Household size	0.12	0.13
	[0.01]**	[0.02]**
Father currently employed	0.18	-0.03
	[0.03]**	[0.09]
Fract. years father employed	-0.55	-0.42
	[0.04]**	[0.12]**
Sometime no money for food	0.25	0.14
	[0.03]**	[0.09]
Somet. no money for utilities	0.21	0.23
	[0.02]**	[0.07]**
Log number of books	-0.26	-0.27
	[0.01]**	[0.02]**
Was not on family holiday	-0.03	0
	[0.02]	[0.07]
Apartment looks poor	0	-0.09
	[0.02]	[0.08]
Log of apt. sqm/residents	-0.03	0
	[0.02]	[0.08]
Neighborhood poor	0.51	0.48
	[0.02]**	[0.07]**
Region: Central	-0.2	-0.21
	[0.05]**	[0.15]
Region: Central-West	0	-0.03
	[0.04]	[0.13]
Region: West	0.15	0.26
	[0.04]**	[0.13]*
Region: Southwest	0.64	0.63
	[0.03]**	[0.11]**
Region: North	0.78	0.78
	[0.03]**	[0.10]**
Region: East	-0.15	-0.11
	[0.03]**	[0.10]
Budapest	0.66	0.76
	[0.06]**	[0.17]**
Large city	-0.08	-0.03
	[0.03]*	[0.10]
Small town	0.08	0.1
	[0.02]**	[0.06]
Constant	-0.98	-1.33
	[0.12]**	[0.38]**
Observations	91333	7949

Maximum likelihood standard errors in brackets. * significant at 5%; ** significant at 1%

Table A4. Block statistics for the stratified propensity score matching estimates of table .

Infemum of pscore in block	Number of non-Roma	Number of Roma	Total number
0	2,135	3	2,138
.003125	831	7	838
.00625	847	12	859
.0125	855	19	874
.025	711	22	733
.05	604	38	642
.1	427	72	499
.2	232	68	300
.3	100	67	167
.4	72	61	133
.5	53	71	124
.6	30	73	103
.7	21	58	79
.8	10	49	59
.9	4	27	31
Total	6,932	647	7,579

Table A5. Summary statistics of the home environment variables, by ethnicity.

	Type of variable	Roma		Non-Roma	
		mean	std.dev	mean	std.dev
HOME index, emotional	cont's	-0.07	0.99	0.04	1.00
HOME index, emot, squared	cont's	0.98	1.22	1.00	1.27
HOME index, cognitive	cont's	-0.69	0.98	0.22	0.93
HOME index, cog, squared	cont's	1.44	1.89	0.91	1.14
Never bedtime stories in childhood (assessed by student)	dummy	0.30	0.46	0.10	0.30
Frequent bedtime stories in childhood (assessed by student)	dummy	0.37	0.48	0.66	0.47
Never bedtime stories in childhood (assessed by parents)	dummy	0.33	0.47	0.09	0.28
Frequent bedtime stories in childhood (assessed by parents)	dummy	0.45	0.50	0.75	0.43

Table A6. Detailed results of the home environment regressions.

	m (OLS)	m (OLS)	m (IV)	m (IV)	o (OLS)	o (OLS)	o (IV)	o (IV)
R	-0.71	-0.88	-0.77	-0.62	-0.59	-0.76	-0.64	-0.50
	[0.05]**	[0.05]**	[0.05]**	[0.05]**	[0.05]**	[0.05]**	[0.06]**	[0.05]**
HOME index, emotional	-0.04			-0.06	-0.03			-0.05
	[0.01]**			[0.01]**	[0.01]**			[0.01]**
HOME index, emot, squared	0.01			0.01	0			0.00
	[0.01]			[0.01]	[0.01]			[0.01]
HOME index, cognitive	0.37			0.31	0.37			0.30
	[0.01]**			[0.02]**	[0.01]**			[0.02]**
HOME index, cog, squared	0.05			0.05	0.05			0.05
	[0.01]**			[0.01]**	[0.01]**			[0.01]**
Never bedtime stories in childhood		-0.18	-0.35	-0.35		-0.19	-0.03	-0.02
		[0.04]**	[0.28]	[0.28]		[0.04]**	[0.28]	[0.27]
Frequent bedtime stories in childhood		0.34	0.62	0.28		0.36	0.92	0.58
		[0.03]**	[0.16]**	[0.16]		[0.03]**	[0.16]**	[0.16]**
Constant	-0.08	-0.15	-0.32	-0.22	-0.09	-0.17	-0.56	-0.45
	[0.02]**	[0.03]**	[0.14]*	[0.13]	[0.02]**	[0.02]**	[0.13]**	[0.13]**
Observations	7949	7925	7599	7599	7949	7925	7599	7599
R-squared	0.17	0.1	0.07	0.17	0.17	0.09	0.03	0.16

Notes: see below table … Standard errors in brackets are robust to heteroskedasticity
* significant at 5%; ** significant at 1%

Table A7. Detailed results of the regressions with school fixed-effects or class fixed-effects

	mathematics				reading			
	school FE	class FE	school FE	class FE	school FE	class FE	schoo l FE	class FE
R	-0.41	-0.36	-0.13	-0.12	-0.31	-0.25	-0.04	-0.02
	[0.06]**	[0.07]**	[0.06]*	[0.07]	[0.07]**	[0.08]**	[0.07]	[0.08]
HOME index, emotional	-0.04	-0.04	-0.04	-0.04	-0.04	-0.02	-0.04	-0.03
	[0.02]*	[0.02]	[0.02]*	[0.02]	[0.02]*	[0.02]	[0.02]*	[0.02]
HOME index, emot, squared	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0	0
	[0.01]	[0.02]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
HOME index, cognitive	0.23	0.18	0.09	0.07	0.25	0.2	0.11	0.1
	[0.02]**	[0.02]**	[0.02]**	[0.02]**	[0.02]**	[0.02]**	[0.02]**	[0.02]**
HOME index, cog, squared	0.03	0.02	0.02	0.01	0.04	0.03	0.03	0.02
	[0.01]**	[0.01]	[0.01]*	[0.01]	[0.01]**	[0.01]*	[0.01]**	[0.01]
Never bedtime stories	-0.07	-0.02	-0.02	0.02	-0.06	-0.03	-0.03	0
	[0.05]	[0.06]	[0.05]	[0.05]	[0.05]	[0.06]	[0.05]	[0.06]
Frequent bedtime stories	0.15	0.13	0.10	0.08	0.17	0.16	0.11	0.11
	[0.03]**	[0.04]**	[0.03]**	[0.04]*	[0.03]**	[0.04]**	[0.03]**	[0.04]**
Parents' education 0-8 grades			-0.08	-0.1			-0.1	-0.12
			[0.05]	[0.05]			[0.05]*	[0.06]*
Parents' education maturity			0.21	0.17			0.16	0.12
			[0.04]**	[0.04]**			[0.03]**	[0.04]**
Parents' education college			0.41	0.34			0.33	0.24
			[0.05]**	[0.06]**			[0.05]**	[0.06]**
Lives with (biological) mother			0.04	0.06			0.01	0.03
			[0.08]	[0.10]			[0.07]	[0.08]
Lives with (biological) father			-0.21	-0.23			-0.2	-0.24
			[0.06]**	[0.07]**			[0.07]**	[0.08]**
Female			-0.15	-0.14			0.36	0.38
			[0.03]**	[0.03]**			[0.03]**	[0.03]**
Birth Weight			0.08	0.07			0.03	0.04
			[0.02]**	[0.03]**			[0.02]	[0.03]
Household size			-0.02	-0.02			-0.03	-0.03
			[0.01]	[0.02]			[0.01]*	[0.02]*
Father currently employed			-0.02	-0.05			0.02	-0.02
			[0.06]	[0.07]			[0.05]	[0.06]
Fract. years father employed			0.31	0.35			0.23	0.32
			[0.09]**	[0.10]**			[0.09]*	[0.11]**
Sometime no money for food			-0.07	-0.04			-0.02	0.03
			[0.06]	[0.07]			[0.07]	[0.07]
Somet. no money for utilities			0	-0.02			-0.07	-0.07
			[0.05]	[0.05]			[0.04]	[0.05]
Log number of books			0.08	0.08			0.11	0.11
			[0.01]**	[0.02]**			[0.01]**	[0.01]**
Was not on family holiday			-0.04	-0.02			-0.03	0.01
			[0.03]	[0.04]			[0.03]	[0.04]
Apartment looks poor			-0.01	0.05			0.06	0.1
			[0.05]	[0.06]			[0.06]	[0.07]
Log of apt. sqm/residents			0.02	0.01			-0.01	-0.04
			[0.04]	[0.05]			[0.04]	[0.05]
Neighborhood poor			-0.08	-0.08			-0.08	-0.06
			[0.05]	[0.06]			[0.05]	[0.06]
Constant	-0.13	-0.1	-0.87	-0.82	-0.17	-0.15	-0.95	-0.87
	[0.03]**	[0.04]**	[0.20]**	[0.24]**	[0.03]**	[0.04]**	[0.19]**	[0.23]**
Observations	7925	7925	7925	7925	7925	7925	7925	7925
R-squared	0.53	0.66	0.57	0.68	0.51	0.64	0.56	0.67

Notes: see below table … Standard errors in brackets are robust to heteroskedasticity.
The R-squared of the regressions include the Fixed Effects.
* significant at 5%; ** significant at 1%