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Abstract

We study the development of social capital through adult civic engagement, in relation to social capital exposure having occurred during childhood based on experiences outside the family at primary school. We assume that the types of classmates in attendance at a child's school would have influenced her/his social capital. To identify the types of classmates, we take advantage of the heterogeneity in the ability levels of British primary-school classes during the 1960s. At that time, some schools were practicing the method of streaming, whereas others were not. Using the British National Child Development data, we construct a single score of civic engagement and run a full-estimation model of individual civic engagement as a function of her/his class's ability-level. Our results show that children who were grouped in homogeneous-ability classes developed a lower interest in civic engagement than their peers who attended mixed-ability classes. This finding is particularly significant for low-ability individuals. Thus, streaming appears to be detrimental to social capital development.

Keywords	social capital; education; skills.

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Civic engagement decreases with the age, regardless of the class-ability composition

Streaming according to students' ability levels can have social effects in the long run

Homogenous grouping of low-ability children lowers their civic engagement in the long-run

High-ability and nonstreamed students show similar civic engagement in adulthood

Single-ability groups develop norms of behavior that are different from nonstreamed groups

Primary-school class composition and the development of social capital

Abstract

We study the development of social capital through adult civic engagement, in relation to social capital exposure having occurred during childhood based on experiences outside the family at primary school. We assume that the types of classmates in attendance at a child's school would have influenced her/his social capital. To identify the types of classmates, we take advantage of the heterogeneity in the ability levels of British primary-school classes during the 1960s. At that time, some schools were practicing the method of streaming, whereas others were not. Using the British National Child Development data, we construct a single score of civic engagement and run a full-estimation model of individual civic engagement as a function of her/his class's ability-level. Our results show that children who were grouped in homogeneous-ability classes developed a lower interest in civic engagement than their peers who attended mixed-ability classes. This finding is particularly significant for low-ability individuals. Thus, streaming appears to be detrimental to social capital development.

Keywords: social capital, education, skills

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1. Introduction

Civic engagement is an important form of social capital development. A strong and active civil society is important for the consolidation of democracy by broadening the participants' senses of self and enhancing their "taste" for collective benefits (Putnam, 1995; Putnam, 2000). Moreover, through the development of social capital, civic engagement can influence different aspects of societies: their economic performance (see Sobel, 2002 for a critical analysis of the literature), judicial efficiency (LaPorta *et al.*, 1997), government quality (Knack and Keefer, 1997), and cooperation and solidarity (Putnam, 1993).

Given the relevance of civic engagement in the development of social capital and its consequent effect on different economic and social aspects of society, it is important to study the factors that can influence its expansion. Empirical analysis of the factors that affect social capital development is still underdeveloped. The literature mainly emphasizes the role played by education in determining adult civic engagement and social capital development. Most of the contributing literature agrees on the positive correlation between schooling and social capital development. In their seminal book, Almond and Verba (1963, p. 304) showed a high correlation between education and civic engagement (in particular, organizational membership). Helliwell and Putnam (1999) showed that schooling is associated with more time devoted to volunteering and civic organizations. More recently, Alesina and Giuliano (2011) found that education is the most important determinant of political participation. However, they found that family ties inversely explain political participation: individuals with strong family ties are consistently less interested in political participation and the likelihood of successful democratic revolutions. From a theoretical point of view, Glaeser *et al.* (2007) elucidated the correlation between education and democracy and modeled the relationship between schooling and civic participation. In their model, schooling teaches people to interact with others and increases the benefits of civic participation, including voting and organizing. Then, it raises participation. A criticism regarding the role played by education in shaping adult civic engagement was raised by Schnittker and Behrman (2012). They showed that despite a positive correlation between schooling

and civic engagement, the causal effect of the first on the second is insignificant empirically when social and genetic endowments are included in the analyses. Thus, the positive relationship between schooling and civic engagement would depend on unobserved confounding factors that, if included in the analyses, would reduce and eventually extinguish the correlation.

A different approach to the analysis of factors that determine adult civic engagement is provided by the developmental approach of social psychology (Boyce, 1985). This approach supports the idea that adult social responsibility has developmental roots and is determined well before schooling is complete. The contributions to this branch of science find evidence that a child's earliest experiences in the context of her/his family shape and determine future mutual interactive social support as an adult. Graves *et al.* (1998) identified specific factors from the early family context, such as family involvement in church and parental loss, that influence the development and maintenance of social support later in life, measured by the individual's number of organizational memberships. In her articulated analysis, Rossi (2001) found several qualities associated with early family life that contribute to the developmental trajectory of adults who manifest high levels of social responsibility. By observing time devoted to volunteer work, financial contributions made to organizations, and number of meetings of religious, sport, or social groups and unions, Rossi (2001) found that families of origin with high educational attainment, religious commitment, and capacity for sociability and generosity to others influence the commitment of children upon their becoming adults to the social worlds in which they participate and to which they provide services.

Despite these contributions, several questions need yet to be answered in relation to the complex process of social development that implies an articulated interaction between maturation, experience, and social circumstances across life (Graves *et al.*, 1998). Graves *et al.* (1998) underlined how a child's experiences outside the family—in relation to peers or other figures of primary attachment—may have an important role in shaping social responsibility into adulthood.

Taking advice from Graves *et al.* (1998), in this article, we try to contribute to this branch of research by studying the development of adult civic engagement in relation to social capital exposure

during childhood. In particular, we focus on childhood social capital exposure outside the family—namely, at the primary school. Indeed, children spend much of their time at school, and we believe that social capital exposure at school can be as relevant as social capital experienced inside the family with regard to social capital development. Thus, we assume that the type of social capital the child is exposed to is influenced not only by the type of family—as sustained by Coleman (1988)—but also by the type of peers she/he meets early in school.

To identify the types of peers that children attend during the primary-school years, we were helped by the various practices used by British schools for grouping students into classes during the 1960s—the decade of our interest for measuring social capital exposure of our sample's individuals when they were young. During that decade, some schools were practicing the method of streaming, which groups pupils into classes according to an overall assessment of their general abilities, while other schools were not using it. Among the schools that were using the method of streaming, some of them were assigning students to homogenous classes of high-, low-, or medium-ability students alone, whereas others were implementing mixed-ability groupings.

The practice of streaming has been largely studied in relation to student achievement, unfortunately without finding much consensus over the nature and size of compositional and peer effects (see Epple and Romano, 2011, Thrupp *et al.*, 2002, and Wilkinson *et al.*, 2000 for a review of the literature). On the contrary, across years of much debate on the practice of streaming, many scholars have pointed out the social risks of implementing streaming and have suggested that uniform-ability streamed groups develop subcultures or norms of behavior that are different from nonstreamed groups or mixed-ability groups. Streaming can remove the advantages of peers with different abilities assisting each other and can often institutionalize students into a similar stream throughout their school experience. It then reduces cooperative learning, which has been shown to have positive effects on social outcomes, such as attitudes and helping behaviors toward classmates or workmates and the acceptance of those who are 'different' (see Wilkinson *et al.*, 2000 for a review of the literature). Streaming may influence low-track students' social problems, have negative social

effects (Gamoran, 1987a; Gamoran, 1987b; Slavin, 1990; Wiatrowski *et al.*, 1982) and, from a broader perspective, encourage the development of elite and underclass groups in society (Rosenbaum, 1980). Thus, if there is a developmental root for adult social responsibility, different grouping practices experienced during primary school may have long-term consequences and affect social behavior and responsibility into adulthood.

In light of this evidence, this study tries to evaluate whether different experiences of ability grouping at primary school can explain variations in adult civic engagement. The dataset we employ is the British National Child Development Study (NCDS). The National Child Development Study (NCDS)[1] is an excellent source of data for this analysis, as it provides information on the type of primary school attended by cohort members (streamed versus not streamed) and, in cases of streaming, on the ability class (high, medium, and low) to which the individual was assigned. In addition, NCDS provides information on the civic engagement of cohort-members during adulthood. In this respect, we use information from the 5th, 6th, and 8th sweeps of NCDS, when individuals were aged 33, 42, and 51, respectively. Civic engagement is defined according to membership in political parties; environmental, charity, and voluntary associations; women's organizations; school and parents' associations; resident associations; and voting in the most recent general elections (Putnam, 2000). The binary responses provided by every individual—at each time occasion and for each participation category—are collapsed into a standardized quantitative score using the Rasch model (Rasch, 1960, 1961). Then, the individual's civic engagement score is studied in relation to the ability composition of the individual's primary-school class—our main explicative variable—and other covariates that capture individual and family characteristics. The analysis is carried out for each of the years of observation, on the same group of individuals. This allows us to find evidence of the effects of childhood social capital exposure on the development of social capital over the course of

[1] NCDS collects information on individuals born from March 3-9, 1958, in England, Wales and Scotland, selecting data from the Perinatal Mortality Survey. In addition to information from 1958, NCDS sweeps were performed in 1965, 1969, 1974, 1981, 1991, 1999-2000, 2004-2005 and 2008-2009.

life. The ability composition of each individual's primary-school class is summarized by a categorical variable that assumes different values according to the ability mix—high, medium, and low—of the class attended. The reference group is the nonstreamed class.

When dealing with the model, we take account of possible endogeneity problems of the main explicative variable and run a full estimation model wherein the variable related to the class ability composition is instrumented using territorial measures of children's average ability and attendance at streamed schools.

The article is organized as follows: Section 2 describes the data and the construction of our variables of interest; Section 3 discusses some first descriptive evidence on adult civic engagement and its relationship with social capital at the primary school; Section 4 presents the empirical model; Section 5 reports and discusses the results.

2. The data and definition of variables

The study uses information from the National Child Development Study (NCDS). The NCDS is a cohort study that follows all UK births during the week of 3-9 March 1958. The main aim of the study is to improve our understanding of the factors that affect human development over the entire lifespan. The NCDS has its origin in the Perinatal Mortality Survey (PMS), which collected information on a cohort of approximately 17,000 children. Later, the PMS became the NCDS and has gathered information on the same individuals at different times in their lives (in the following years: 1965, 1969, 1974, 1981, 1991, 1999-2000, 2004-2005 and 2008-2009). The available data have been reduced considerably since 1991, to approximately 9800 observations in the latest sweeps[2]. To investigate the impact of streaming during primary school on civic engagement during adulthood, we draw information from the 5th, 6th, and 8th sweeps.

[2] Selection and attrition bias problems in the NCDS data have been investigated in several papers. Among others, Dearden et al. (1997) show that attrition in the NCDS has tended to weed out individuals with lower ability and lower educational qualifications, whereas Hawkes and Plewis (2006) have found that attrition and non-response issues can be associated with only a few significant predictors.

Our measure of civic engagement is constructed using cohort-member information when individuals were 33, 42, and 51 years old. At these ages, the questionnaire asks individuals whether they are members of organizations such as political parties, environmental charity groups, charity/voluntary groups, women's groups and institutes, parent-school organizations, and tenant/resident associations. In addition, individuals are asked whether they voted in the last general elections. These forms of civic engagement are mostly traditional forms of civic participation (Putnam, 1995, 2000). Voting is the simplest act of citizenship, with political party membership being a measure of direct engagement in politics; participation in charity/voluntary groups (often church-related groups), school-service groups such as parent-school organizations, women's groups/institutes, and tenant/resident associations are traditional forms of civic participation and represent particularly productive forms of social capital. These types of associational memberships increase social capital (Putnam, 1995). Regarding environmental charity groups, available data do not allow us to disentangle whether these associations are related to local environmental associations rather than nationwide environmental organizations, or both. As Putnam (1995) points out, membership in nationwide environmental organizations may be not so effective in the development of social capital. These "new mass-membership organizations" have a great political importance, but they are different from traditional associations. Indeed, membership in these nationwide organizations often consists only of financing the organization's activity without actively taking part in the association. We are aware that if the data include these types of associations, we may underestimate the effect of the covariates on social capital formation.

The dataset's original information on voting, political participation and civic participation consists of binary variables—one for each of the above-described activities—that assume a value of one if the individual is member of any association/voted in the last general election, and a value of zero if not. Then, we collapse this information into a single standardized score calculated using the Rasch model (Rasch, 1960, 1961), which is the most popular item response model. The Rasch model aims at summarizing a number of variables into a single variable, and it is explicitly tailored to address

binary variables (details in Appendix A). We will call this score the "civic engagement score". This score is the variable of interest we use to study civic engagement.

To recover all needed information on streaming and other variables to include in our regressions, we use five sweeps of the NCDS database. The 1969 sweep, conducted when cohort-members were 11 years old, includes retrospective information that allows us to identify whether an individual attended a primary school that applied streaming[3] (variable n861) and allows us to distinguish among cohort-members who attended a streamed school according to ability classification—high, average, or low ability (using variable n862). Then, we constructed the variable "class ability" as a categorical variable assuming the value of one for individuals who were enrolled in low-ability classes, a value of two for enrollment in medium-ability classes, and a value of three for high-ability class students. The variable assumes the value of zero for individuals who attend nonstreamed schools. These last schools' classes group individuals randomly; thus, their abilities are heterogeneous.

The 1965 sweep contains information obtained when cohort-members were 7 years old. Some of the variables of this sweep are useful for identifying mechanisms that lead individuals to attend schools that adopt streaming and, in such cases, to be placed into different ability classes. Particularly, some variables drawn from the 1965 NCDS sweep are used as instruments in the econometric analysis.

The need for instrumenting our "class ability" variable arises from the fact that, *in primis*, a child's enrollment in a streamed school is the result of a decision by the school principal—who decides whether to adopt the method of streaming in the school he manages—and the views of the child's parents, who guide the choice of school. At the same time, parents' views may affect cohort-members' views and their civic engagement in adulthood. Because we do not have any information on parents' views, the omission of this information may generate an endogeneity problem of the variable "class ability" in the model of civic engagement. In addition to that, once cohort-members

[3] Streaming indicates the practice of grouping students in classes with other students with comparable skills or needs. See the Plowden Report (1967, chapter 20.3) for more details.

have been enrolled in a school that adopts streaming based on ability, the allocation to different ability-classes is possibly guided by individual unobserved factors, including cognitive and noncognitive abilities and familial background, which may contribute to explaining sociopolitical participation later in life. This may also result in endogeneity problems. To address such problems, we instrumented the variable "class ability" with two instruments. The first is the average number of children who attended "streamed" schools in the region of reference, excluding the individual himself. The second measures the average ability level of the children who lived in the region of reference, excluding the child himself.

The existing literature has proven the role of education as a determinant factor for social capital formation. Therefore, we include five dummy variables (no education being the base category) that capture the effects of NVQ1, NVQ2, NVQ3, NVQ4, and (the highest) NVQ5-6 levels[4]. Finally, we control for region-specific effects (Wales being the base category).

With the aim of accounting for observable heterogeneity in civic-engagement, we include a number of control variables. These include a dummy for females and a dummy for being married. We also control for labor market status to capture the hypothesis that time devoted to sociopolitical participation can be negatively correlated with time allocated to work and then be smaller in case of full-time employment ("inactive" being the base-category). An additional dummy is included to control for poor health status.

3. Some descriptive evidence on civic engagement, class ability, and individual characteristics

The outcome of interest in our analysis is civic-political engagement during adulthood. NCDS data provides information on involvement in civic-political activities through several binary variables,

[4] National Vocational Qualifications (NVQs) were work-based awards in England, Wales, and North Ireland. NVQ at level 1 is broadly equivalent to 3-4 GCSEs at grades D-G, NVQ2 to 4-5 GCSEs at grades A-C, NVQ3 to A levels, NVQ4 to a higher education certificate, and NVQ5/6 to a higher education diploma and degree. In terms of ISCED-97, NVQ1 and NVQ2 corresponds to ISCED level 2, with pre-vocational and vocational qualifications, respectively. NVQ3 corresponds to ISCED level 3, and NVQ4/5/6 is equivalent to ISCED levels 5 and 6.

which we have summarized in the "civic engagement score", which is a continuous-type indicator determined by applying the Rasch model.

Because we use a cohort study and focus on the same individuals at different points in time, we observe outcomes and covariates as they evolve with individuals' age. In particular, we note that the aging process has been accompanied by a decrease in every dimension of civic-political participation here considered, with the exception of membership in resident associations (Table 1). In particular, the political party membership decreased from 2.2% to 1.6%; the participation to environmental, charity, and voluntary associations declined from 11.4% to 8.1%; individuals engaged in women's organizations decreased from 2.2% to 1%; and the engagement in parents/school associations declined from 8.5% to 4.4% in the analyzed timespan. Conversely, the participation in resident associations increased from 2.6% to 4.8%. Finally, the percentage of individuals who voted in the last general elections decreased from 79.9% in 1991 to 73.6% in 2009.

Table 1. Civic-engagement indicators

	Age 33		Age 42		Age 51	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Political parties	0.022	0.146	0.021	0.142	0.016	0.125
Environmental, charity, voluntary assoc.	0.114	0.317	0.114	0.318	0.081	0.272
Women's organizations	0.022	0.147	0.015	0.121	0.010	0.097
Parent/School associations	0.085	0.279	0.086	0.280	0.044	0.205
Resident associations	0.026	0.158	0.028	0.164	0.048	0.213
Voted in last general elections	0.799	0.401	0.798	0.401	0.736	0.441
Observations	4919		4919		4919	

Source: our elaboration on NCDS data

Table 2 reports the average values of the "civic engagement score"; statistics are reported by individual's age and by the ability-class that the individual attended when aged eleven. Evidence is consistent with that shown in Table 1, which illustrates how civic engagement has essentially declined with aging, such that the average score decreased from -4.427 to -4.505. The decreasing pattern is confirmed when the analysis accounts for class ability-level. The civic engagement indicators, in fact,

decreased with age regardless of the type of ability-class attended by individuals. From an aging perspective, the decrease in the civic engagement score was slightly greater for those having attended a high-ability class than for other groups. From an ability-class perspective, it emerges that individuals having attended high-ability classes show the highest civic engagement score, followed by individuals having attended nonstreamed schools, while those having attended low-ability classes show the lowest civic-political engagement score. This represents a preliminary indication that class composition matters for adult civic engagement.

Table 2. Civic-engagement score by class ability

	Age 33	Age 42	Age 51
Nonstreamed school	-4.426	-4.420	-4.502
Streamed school: Low-ability class	-4.532	-4.557	-4.603
Streamed school: Average-ability class	-4.463	-4.447	-4.536
Streamed school: High-ability class	-4.359	-4.383	-4.452
Average score	-4.427	-4.428	-4.505

Source: our elaboration on NCDS data

Descriptive statistics of control variables included in the model are provided in the Appendix B (Table B.1). For every analyzed year, we report mean and standard deviation; statistics of nontime varying covariates are, obviously, homogenous across sweeps. According to the reported statistics, females represented almost 53% of the analyzed sample, whereas married individuals represented 82% of the sample in 1991, 83.5% in 2000, and 72% in 2009, suggesting there was an increase in divorces and widowhood as the age of individuals increased. The inactivity rate has increased from 1.8% to 6% in the analyzed period, and both involvement in domestic activities and unemployment decreased, resulting in an overall increase in the employment rate along the life-cycle profile. In particular, our statistics reveal that self-employment increased from 11.4% to 13.6%, part-time employment remained stable at 16%, and full-time employment increased from 53.8% to 56.9%. Looking at educational achievements, individuals with a NVQ2 level predominated over the others, representing 34.8% of sampled individuals, whereas the remaining individuals were quite equally

distributed among other educational levels. Individuals living in the South-East region (including London) constituted 32.8% of the sample; the others were distributed in the remaining regions, with frequencies ranging from 4.9% (East-Anglia) to 10.8% (North-West).

Table B.1 also reports statistics of the control variables used for estimating the "class ability" variable. In particular, we note that 37.2% of sampled individuals benefited from mothers' reading during childhood, and 22.6% of them had a father belonging to the high social class. The mean value of the social maladjustment indicator (the BSAG score) was 7.4. When individuals were aged seven, 18.3% lived in the South-East region (including London), i.e., 14.5% less than the value observed during adulthood; this suggests this region has been strongly attractive for the surveyed individuals during the analyzed period. Finally, looking at the instrumental variables, we note the average regional propensity to enroll children at schools applying streaming was 34.8%, while the regional math score and regional reading score were, on average, 5.5 and 24.3, respectively.

4. Empirical strategy

The impact of the ability level of the class attended during childhood on adult civic engagement is analyzed by estimating a bivariate model with a recursive structure (Maddala, 1986), which accounts for the potential endogeneity of the "class ability" variable in the civic engagement equation.

Alternatively, one might account for suspected endogeneity by implementing a more standard two-stage least square (2SLS) approach, to be applied in two separate steps. The first step would have assessed the impact of attending a school that adopts streaming (versus attending a school that does not use streaming) on civic engagement propensity. The second step, by focusing on the subsample of streamed schools, would have assessed, in turn, the impact of attending a high-ability class (versus being allocated to average- and low-ability classes) and the impact of attending a low-ability class (versus being allocated to average- and high-ability classes) on civic engagement. The endogenous variables, in turn, streaming school and ability-classes, would have taken a binary form, and related equations would have been estimated by linear probability models. The 2SLS approach, however,

would not allow us to directly compare the impact of having attended a nonstreamed school versus having attended a homogenous-ability class (low-ability, average-ability and high-ability) on adult civic engagement.

Thus, the advantage of using the bivariate model with a recursive structure is twofold. First, it allows modeling of ability-class as a multinomial variable (where class-items are nonstreamed, low-ability, average-ability, and high-ability); moreover, it allows for a comprehensive comparison of the ability-class effect on civic engagement. Second, it allows easy handling of potential endogeneity by implementing a full-estimation approach, where two equations (the ability-class equation and the civic engagement equation) are simultaneously estimated.

The ability level of classes attended during childhood by the individuals may be endogenous in the civic engagement equation because of an omitted variable problem. First, the parents' choice of enrolling their children in schools applying streaming versus not, and then the attendance of heterogeneous- or homogenous-ability classes, may be guided by unobservable family background variables (e.g., family values and/or cultural background), which may also affect the individual propensity toward civic engagement during adulthood. Second, the assignment to different ability classes in schools applying streaming was possibly guided by confounding factors (e.g., cognitive and noncognitive abilities), which may also affect the individual's civic engagement during adulthood.

The ability-class equation models the probability of being assigned to one of the four types of ability-class. We assume it follows a multinomial distribution, which means that individuals were allowed to choose among alternatives that are not inherently ordered. Thus, differently from other categorical outcomes, like the ordered one, the multinomial specification avoids *a priori* assumptions about the level of an individual's utility associated with each choice.

The main equation, instead, models the "civic engagement score" during adulthood and includes the (endogenous) "class-ability" variable on its right side. The dependent variable in the main equation is represented by the civic engagement score, and it is assumed to be continuous.

The specification we implement to estimate the class-ability equation is derived from a latent continuous variable (y_{1ij}^{*}) that is related to a vector of explanatory variables z and a vector of instrumental variables, q, which has been introduced for identification purposes. Subscripts i and j index individuals and multinomial outcomes respectively. The latent continuous variable (y_{1ij}^{*}) is represented by a standard linear model that can be written as follows:

$$y_{1ij}^{*} = z_{ij}'\alpha_j + q_{ij}'\delta_j + v_{ij}, \quad (1)$$

where α is a vector of parameters associated with z, δ is a set of parameters associated with the set of instruments q, and υ is an error term drawn from a standardized normal distribution. Although y_{1ij}^{*} is unobserved, y_1 would be observed and is related to y_{1ij}^{*} by the following relationship:

$$y_{1i} = \begin{cases} j & \text{if } y_{1ij}^{*} = \max\left(y_{1i1}^{*}, y_{1i2}^{*}, y_{1i3}^{*}, y_{1i4}^{*}\right) \\ 0 & \text{otherwise} \end{cases}. \quad (2)$$

The probability of choosing the category j may be written as

$$\Pr(y_{1i} = j | z_i, q_i) = \Pr\left(y_{1ij}^{*} > y_{1i1}^{*}, \ldots, y_{1ij}^{*} > y_{1i4}^{*}\right) =$$

$$= \Pr\left((v_{ij} - v_{i1}) > z_i'(\alpha_1 - \alpha_j) + q_i'(\delta_1 - \delta_j), \ldots, (v_{ij} - v_{i4}) > z_i'(\alpha_4 - \alpha_j) + q_i'(\delta_4 - \delta_j)\right). \quad (3)$$

Under the assumption that the residuals are normally distributed, the model corresponds to a standard multinomial probit specification.

The bivariate model with a recursive structure allows the multinomial dependent choice in the class-ability equation to be an endogenous regressor in the civic-engagement equation (Filippini et al.

2018). Thus, the civic-engagement equation is related to a set of explanatory variables *x* and to the multinomial endogenous variable y_{1i}, while *u* is the error term:

$$y_{2i} = \gamma y_{1i} + x_i'\beta + u_i, \quad (4)$$

where γ is a set of parameters associated with the multinomial endogenous variable y_{1i}, and β is a vector of parameters associated with *x*. y_{2i} is assumed to be continuous and under the assumption that the residuals are normally distributed, and the model corresponds to a standard linear specification. Both equations are estimated simultaneously by using the full-information maximum likelihood method[5], which produce consistent and fully efficient estimates (Reize 2001).

Finally, the model allows the error terms of both equations to be correlated. Accordingly, we also estimated three correlation terms, ρ_{uv2}, ρ_{uv3}, and ρ_{uv4}, that measure the correlation between the residuals of the class-ability equation and those of the civic-political engagement equation (see Filippini *et al*., 2018, for details).

5. Results

The impact of class composition on adult civic-political engagement is estimated by using a bivariate model with a recursive structure. Compared with other methods, such as the two-stage least square model, the main advantage of using the mentioned approach relies in the possibility of accounting for a multinomial endogenous variable, which allows us to model, at the same time, the impact of being enrolled in a homogenous-ability class, i.e., a high-ability class, average-ability class, or low-ability class, relative to being enrolled in a school not applying streaming (mixed-ability class). The approach

[5] The model is estimated using the routine "*cmp*" written in STATA by Roodman (2011). Among other advantages, it allows adoption of both the seemingly unrelated and instrumental variable approaches and considers equations with different kinds of response variables in the spectrum of generalized linear models with Gaussian error distribution, including linear and multinomial probit models.

we use, therefore, accounts for endogeneity and allows for direct comparison across ability-class effects.

The estimation results of the civic-political engagement equation are reported in Table 3. They reveal that cohort members enrolled in homogenous–ability classes experience, with differences by the type of class, a lower propensity toward civic engagement than cohort members enrolled in heterogeneous-ability classes (nonstreamed schools). Indeed, the magnitude of the effect varies by ability-classes, and the estimated coefficients are sometimes not statistically significant.

In particular, cohort members enrolled in low-ability classes show the lowest propensity toward civic engagement during adulthood. With reference to the base-category, i.e., the cohort members enrolled in heterogeneous-ability classes, having attended low-ability classes decreases by 0.244 the score summarizing the propensity toward civic engagement when individuals reached 33 years of age. The negative impact persists in later ages, but it does not change monotonically: the estimated coefficient equals -0.276 when individuals reached age 42 and equals -0.196 when individuals reached age 51. All estimated coefficients are statistically significant at the 1% level. Having been enrolled in schools applying streaming and having been assigned to an average-ability class decreases the propensity toward civic engagement during adulthood. The negative impact, however, is smaller than the effect we found for cohort members assigned to low-ability classes. Specifically, the estimated coefficient is -0.101 when cohort-members were 33 years of age, but this is not statistically significant. The negative impact increases to -0.115 when cohort-members are 42 years old and to -0.129 when individuals reach age 51. Both estimates are statistically significant. Finally, when looking at cohort-members enrolled in schools applying streaming and assigned to high-ability classes, we find that the estimated coefficients are not statistically significant. This suggests that there are negligible differences in adult civic engagement between cohort members enrolled in heterogeneous-ability classes and those enrolled in high-ability classes.

In sum, the evidence emerging from our analysis suggests that class composition during primary education matters for later civic engagement. Cohort members who attended homogenous ability-

classes show a lower propensity toward civic engagement during adulthood than cohort members who attended non-streamed schools. The negative impact, however, is stronger for cohort-members enrolled in low-ability classes than for those enrolled in average-ability classes, whereas the negative impact tends to disappear for cohort-members who attended high-ability classes.

Overall, these findings support the hypothesis that a child's experiences outside the family, and particularly the type of peers the individual meets early at school, play an important role in shaping civic responsibility when adults, in line with suggestions by Graves *et al.* (1998).

Our analysis controls for observable heterogeneity by including a number of factors that may affect civic engagement during adulthood. These include gender, marital status, labor market status, health status, education, and region of residence. An important finding of our analysis is the role played by human capital in shaping civic engagement. Indeed, our estimates confirm the strong education-social development relation already highlighted in previous literature (Glaeser, 2001; Glaeser *et al.*, 2002). Our analysis finds evidence of a monotonic relationship between education and civic engagement: the higher the educational level, the higher the propensity for civic engagement. The relationship to education, however, changes over the individuals' lifecycle, since it follows a slightly inverted U pattern in the observed age-span for every educational group. In addition, by comparing individuals in early and late adulthood (i.e., when they are 33 and 51 years old, respectively), we note that the propensity toward civic engagement slightly decreases for all educational groups, except that for highly educated. In particular, with respect to the base-category represented by individuals without any education, having a NVQ1 educational level increases by 0.056 the civic-political engagement score when individuals reach age 33 and by 0.026 (not statistically significant) when individuals reach age 51. The impact increases progressively and reaches 0.446 at age 33 and 0.456 at age 51 for individuals having a NVQ5-6 educational level.

Other characteristics appear to be significant in shaping civic engagement. First, we find that being female increases the civic engagement score by 0.10 at age 33, by 0.063 at age 42, and by 0.015 (not statistically significant) at age 51. This suggests that females are more likely to be involved in

civic-political activities than males in early adulthood, but the effect disappears at a later age. Similarly, being married increases civic engagement, especially during late adulthood. The importance of controlling for gender and marital status is supported by, among others, the results of Clark and Del Bono (2016) in their study of the long-term effects of attending an elite school.

Occupational status is, potentially, a relevant predictor of civic engagement, as it may affect time allocation and the formation of networks. Our estimates partially confirm this hypothesis, indicating that the civic engagement scores of individuals in full-time employment are lower than those of inactive individuals, especially at older ages. Other subcategories, however, show very few significant differences with respect to the base category. Our estimates also suggest, in line with expectations, that individuals experiencing poor health status have a lower propensity for civic engagement at age 51 (-0.072 in terms of civic-political engagement score).

The controls for the macroregions indicate that the highest levels of civic and political participation during adulthood are observed in Wales (the base category) and in the South-East region (which includes London). This result highlights the importance of urbanization for social involvement. Other macroregions show lower civic-political engagement than the base category. In particular, individuals living in the northern regions (North, North-West, and Yorkshire) show lower civic engagement during adulthood; civic-engagement propensity in East-Anglia is significantly lower with respect to Wales when individuals reached age 51.

To conclude the discussion of our results, we briefly comment on the estimates of the class-ability equation (Tables B.2-B.4). The results show that the socioeconomic conditions of the family of origin significantly explain enrollments in different ability-classes. In particular, the father's social class when the child is 7 years old significantly reduces enrollments in low-ability and average-ability classes, whereas nonsignificant differences emerge between high-ability class and heterogeneous-ability class. Mothers' behavior is also relevant for class enrollment, as we find that cohort-members who benefit from mother's reading during childhood are less likely to be enrolled in low-ability classes.

Table 3. Estimation results: Civic-engagement equation

	Age 33			Age 42			Age 51		
	Coefficient	Robust s.e.		Coefficient	Robust s.e.		Coefficient	Robust s.e.	
Nonstreamed school					base-category				
Low-ability class	-0.244	0.053	***	-0.276	0.056	***	-0.196	0.051	***
Average-ability class	-0.101	0.076		-0.115	0.060	*	-0.129	0.048	***
High-ability class	-0.008	0.053		-0.052	0.087		-0.059	0.045	
Female	0.100	0.019	***	0.063	0.017	***	0.010	0.015	
Married	0.004	0.018		0.032	0.019	*	0.052	0.013	***
Inactive					base-category				
Domestic work	0.064	0.062		-0.022	0.053		0.015	0.040	
Unemployed	-0.030	0.066		-0.066	0.070		-0.071	0.046	
Self-employed	0.020	0.061		-0.094	0.048	**	-0.012	0.034	
Part-time employed	0.066	0.062		-0.008	0.047		-0.024	0.033	
Full-time employed	-0.043	0.058		-0.115	0.045	***	-0.053	0.030	*
Poor health status	-0.019	0.068		-0.009	0.046		-0.072	0.026	***
No education					base-category				
Education NVQ1	0.056	0.025	**	0.070	0.023	***	0.026	0.018	
Education NVQ2	0.130	0.023	***	0.155	0.021	***	0.105	0.017	***
Education NVQ3	0.214	0.028	***	0.225	0.027	***	0.178	0.022	***
Education NVQ4	0.257	0.029	***	0.288	0.027	***	0.217	0.022	***
Education NVQ5-6	0.446	0.034	***	0.526	0.033	***	0.456	0.029	***
North	-0.075	0.040	*	-0.090	0.041	**	-0.076	0.033	**
North-West	-0.075	0.038	**	-0.083	0.040	**	-0.108	0.031	***
Yorkshire	-0.062	0.037	*	-0.092	0.040	**	-0.085	0.031	***
West-Midlands	-0.064	0.037	*	-0.084	0.039	**	-0.015	0.033	
East-Midlands	-0.055	0.040		-0.056	0.040		-0.070	0.030	**
East-Anglia	-0.019	0.046		-0.067	0.045		-0.131	0.033	***
South-West	-0.080	0.038	**	-0.084	0.040	**	-0.038	0.033	
South-East	-0.025	0.034		-0.026	0.036		0.000	0.028	
Wales					base-category				
Constant	-4.587	0.069	***	-4.519	0.065	***	-4.587	0.044	***
Observations	4919			4919			4919		

Source: our elaboration on NCDS data. Note: *p < .10, **p < .05, ***p < .01.

The BSAG score, which diagnoses the extent of behavioral disturbances in children at school, negatively affects enrollment in high-ability classes and increases the chance of being enrolled in

low-ability classes. Being female increases the probability of being enrolled in high-ability classes, whereas region heterogeneity in class enrollment is relatively small.

Finally, we note that two instruments we introduced for identification purposes, i.e., regional propensity to streaming and regional reading tests, significantly affect the class of enrollment.

6. Conclusions

In this article, we study the development of social capital through adult civic engagement in relation to social capital exposure during childhood. Specifically, we focus on childhood social capital exposure outside the family—at the primary school—and we assume that the type of social capital the child is exposed to is influenced by the types of classmates she/he attends at school. To identify the types of classmates, we take advantage of the heterogeneity in the ability level of British primary-school classes during the 1960s. In these years, some schools were practicing the method of streaming, which groups pupils into classes according to an overall assessment of their general abilities, whereas other schools were not using it. When using the method of streaming, schools were assigning students to homogenous classes of only high-, low-, and medium-ability students.

The dataset we employ is the British National Child Development Study (NCDS). The NCDS (NCDS) is an excellent source of data for this analysis, as it provides information on the type of primary school attended by cohort-members (streamed or not streamed) and, in cases of streaming, on the ability class (high, average, and low) to which the individual was assigned. In addition, the NCDS provides information on civic and political participation of cohort-members during adulthood together with other individual and family information of relevance for the analysis. We observe civic and political engagement at different points of the individual's life: when 33, 42, and 51 years old. At each observed age, we summarize the dataset information on membership in political parties, environmental, charity and voluntary associations, women's organizations, school-parent associations, resident associations, and voting in the most recent general elections into a single score of civic engagement using the Rasch quantitative score (Rasch, 1960, 1961).

A first description of the individual adult civic engagement score in relation to the ability composition of the attended class at the primary school predicts two different facts. First, civic engagement decreases with the age, regardless of the class-ability composition. Second, attendance at a primary school that groups students according to their abilities reduces individual civic engagement during adulthood in case of low- and medium ability levels. We tested these first descriptive results through an econometric model of the civic engagement score as a function of a single categorical variable that assumes different values for each of the types of classes: nonstreamed class, low-ability class, medium-ability class, and high-ability class. Due to endogeneity reasons, we use a full-estimation method where the variable for the class ability level is instrumented by covariates that affect the type of class the individual attended but not civic engagement during adulthood.

Our results show that the practice of streaming according to students' ability levels can have social effects in the long run. However, the effect depends on the child ability level. Low-ability children who are grouped in homogeneous-ability classes at the primary school develop, in adulthood, significantly lower civic engagement than their peers who attended nonstreamed classes. On the other hand, the negative effect on civic engagement of attending a streamed class relative to a nonstreamed class is less pronounced in the case of primary-school students of a medium ability level. The effect is completely insignificant in the case of high-ability students. Thus, the practice of streaming at the primary school is particularly detrimental for the development of social capital when students are not particularly skilled. Our results provide the empirical support to the literature that has pointed out the social risks of the practice of streaming and that have suggested that the single-ability groups develop subcultures or norms of behavior that are different from nonstreamed groups (Gamoran, 1987a; Gamoran, 1987b; Rosenbaum, 1980; Slavin, 1990; Wiatrowski *et al.*, 1982; Wilkinson *et al.*, 2000).

References

Almond, G. and Verba, S. (1963) *The Civic Culture*: *Political Attitudes and Democracy in Five Nations*, Princeton, Princeton University Press.

Alesina, A. and Giuliano, P. (2011) 'Family Ties and Political Participation', *Journal of the European Economic Association*, **9**, 817-839.

Bartolucci, F., Bacci, S. and Gnaldi, M. (2014) 'MultiLCIRT: An R Package for Multidimensional Latent Class-Item Response Models', *Computational Statistics & Data Analysis*, **71**, 971-985.

Bartolucci, F., Bacci, S. and Gnaldi, M. (2015) *Statistical Analysis of Questionnaires: A Unified Approach Based on Stata and R*, London, Chapman and Hall/CRC Press.

Boyce, W. T. (1985) 'Social Support, Family Relations, and Children'. In Cohen, S. and Syme, S.L.(eds.) *Social Support and Health,* Orlando, FL, Academic Press, pp. 151-173.

Clark, D. and Del Bono, E. (2016) 'The Long-Run Effects of Attending an Elite school: Evidence from the United Kingdom', *American Economic Journal: Applied Economics*, **8**, 150-176.

Coleman, J.S. (1988) 'Social Capital in the Creation of Human Capital', *American Journal of Sociology*, **94**, S95-S120.

Dearden, L., Machin, S. and Reed, H. (1997) 'Intergenerational Mobility in Britain', *The Economic Journal*, **107**, 47–66.

Dempster, A.P., Laird, N.M. and Rubin, D.B. (1977) 'Maximum Likelihood from Incomplete Data via the EM Algorithm', *Journal of the Royal Statistical Society: Series B*, **39**, 1-38.

Epple, D. and Romano, R.E. (2011) 'Peer Effects in Education: A Survey of the Theory and Evidence', *Handbook of Social Economics*, **1**, 1053-1163.

Filippini, M., Greene, W.H., Kumar, N. and Martinez-Cruz, A.L. (2018) 'A note on the Different Interpretation of the Correlation Parameters in the Bivariate Probit and the Recursive Bivariate Probit', *Economics Letters*, **167**, 104-107.

Gamoran, A. (1987a) 'The Stratification of High School Learning Opportunities', *Sociology of Education*, **60**, 135-55.

Gamoran, A. (1987b) 'Organization, Instruction, and the Effects of Ability Grouping: Comment on Slavin's "Best-Evidence Synthesis"', *Review of Educational Research*, **57**, 341-345.

Glaeser, L.E. (2001) 'The Formation of Social Capital'. In Helliwell, J.F. (eds) *The Contribution of Human and Social Capital to Sustained Economic Growth and Well-Being: International Symposium Report*. Paris, Human Resources Development Canada and OECD, accessed at www.oecd.org/innovation/research/1824983.pdf

Glaeser, E.L., Laibson, D. and Sacerdote, B. (2002) 'An Economic Approach to Social Capital', *The Economic Journal*, **112**, F437-F458.

Glaeser, E.L., Giacomo, A., Ponzetto, M. and Shleifer, A. (2007) 'Why Does Democracy Need Education?', *Journal of Economic Growth*, **12**, 77–99.

Graves, P.L., Wang, N., Mead, L.A., Johnson, J.V. and Klag, M.J. (1998) 'Youthful Precursors of Midlife Social Support', *Journal of Personality and Social Psychology*, **74**, 1329-1336.

Hambleton, R.K. and Swaminathan, H. (1985) *Item Response Theory: Principles and Applications*, Boston, Kluwer Nijhoff.

Hawkes, D. and Plewis, I. (2006) 'Modelling Non-Response in the National Child Development Study', *Journal of the Royal Statistical Society: Series A*, **169**, 479–491.

Helliwell, J.F. and Putnam, R.D. (1999) *Education and Social Capital*, NBER Working Paper No. 7121, Cambridge, MA, National Bureau of Economic Research.

Lindsay, B., Clogg, C. and Greco, J. (1991) 'Semiparametric Estimation in the Rasch Model and Related Exponential Response Models, Including a Simple Latent Class Model for Item Analysis', *Journal of the American Statistical Association*, **86**, 96-107.

Knack, S. and Keefer, P. (1997) 'Does Social Capital Have and Economic Payoff? A Cross-Country Investigation', *The Quarterly Journal of Economics*, **112**, 1252-1288.

LaPorta, R., Lopez-deSalanes, F., Shleifer, A. and Vishny, R. (1997) 'Trust in Large Organizations', *American Economic Review Papers and Proceedings*, **87**, 333-338.

Maddala, G.S. (1986) *Limited-dependent and Qualitative Variables in Econometrics Vol. 3*, Cambridge, MA, Cambridge University Press.

Plowden Report (1967) *Children and their Primary Schools*. *A Report of the Central Advisory Council for Education (England)*, London, United Kingdom, Department of Education and Science.

Putnam, R.D. (1993) *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton, NJ, Princeton University Press.

Putnam, R.D. (1995) 'Bowling Alone: America's Declining Social Capital', *Journal of Democracy*, **1**, 65-78.

Putnam, R.D. (2000) *Bowling Alone*, New York, NY, Simon and Schuster Paperbacks.

Rasch, G. (1960) *Probabilistic Models for Some Intelligence and Attainment Tests*, Copenhagen, Denmark, Danish Institute for Educational Research.

Rasch, G. (1961) 'On General Laws and the Meaning of Measurement in Psychology', *Proceedings of the IV Berkeley Symposium on Mathematical Statistics and Probability*, Berkeley, California.

Reize, F. (2001) *FIML Estimation of a Bivariate Probit Selection Rule: an Application on Firm Growth and Subsidization*, ZEW Discussion Paper 01/13, Mannheim, Leibniz Centre for European Economic Research.

Roodman, D. (2011) 'Fitting Fully Observed Recursive Mixed-process Models with cmp', *Stata Journal*, **11**, 159-206.

Rosenbaum, J. E. (1980) 'Track Misperceptions and Frustrated College Plans: An Analysis of the Effects of Tracks and Track Perceptions in the National Longitudinal Survey', *Sociology of Education*, **53**, 74-88.

Rossi, A.S. (2001) 'Developmental Roots of Adult Social Responsibility'. In Rossi, A.S. (ed) *Caring and Doing for Others: Social Responsibility in the Domains of Family, Work, and Community*, Chicago, IL, University of Chicago, pp. 227-320.

Schnittker, J. and Behrman, J.R. (2012) 'Learning To Do Well or Learning To Do Good? Estimating the Effects of Schooling on Civic Engagement, Social Cohesion, and Labor Market Outcomes in the Presence of Endowments', *Social Science Research*, **41**, 306-320.

Schwarz, G. (1978) 'Estimating the Dimension of a Model', *Annals of Statistics*, **6**, 461-464.

Slavin, R.E. (1987) 'Ability Grouping and Student Achievement in Elementary Schools: A Best-evidence Synthesis', *Review of Educational Research*, **57**, 293-336.

Slavin, R.E. (1990) 'Achievement Effects of Ability Ggrouping in Secondary Schools: A Best-evidence Synthesis', *Review of Educational Research*, **60**, 417-499.

Sobel, J. (2002) 'Can We Trust Social Capital?', *Journal of Economic Literature*, **40**, 139-154.

Thrupp, M., Lauder, H.and Robinson, T. (2002) 'School Composition and Peer Effects', *International Journal of Educational Research*, **37**, 483-504.

Wiatrowski, M. D., Hansell, S., Massey, C. R. and Wilson, D. L. (1982) 'Curriculum Tracking and Delinquency', *American Sociological Review*, 47, 151-160.

Wilkinson, I.A.G., Hattie, J.A., Parr, J.M., Townsend, M.A.R., Fung, I., Ussher, C., Thrupp, M., Lauder, H. and Robinson, T. (2000) *Influence of Peer Effects on Learning Outcomes: A Review of the Literature. Final Report to the Ministry of Education*, Auckland, New Zealand, University of Auckland Uniservices.

APPENDIX

Appendix A. The construction of the civic-engagement score

The first step of the analysis is related to collapsing the binary responses provided by every individual for each question on civic-political engagement (item) into a single quantitative score, the civic-engagement score (year by year). For this, we use the Rasch model (Rasch, 1960, 1961), which is the most popular item response model (Hambleton and Swaminathanan, 1984; Bartolucci *et al.*, 2015). In summary, let Y_{ijt} be the binary response provided by individual i at occasion t to item of type j, with $i = 1,...,n$, $j = 1,...,J$, and $t = 1,...,T$. This model assumes that

$$\log \frac{p(Y_{ijt} = 1 | \theta_{it})}{p(Y_{ijt} = 0 | \theta_{it})} = \theta_{it} - \beta_j , \qquad (A.1)$$

where θ_{it} is interpretable as the "ability level", and β_j is interpretable as the "difficulty level" of item j. These definitions are typical of the educational context, where the Rasch model finds one of its main applications. In our specific context, there are $J = 6$ items: political participation; environmental, charity and voluntary associations; women's organizations; school-parent associations; resident associations; and voting in the most recent general elections. Then, θ_{it} is interpretable as the propensity for civic engagement of individual i at occasion t. On the other hand, β_j is an intercept that accounts for the general tendency of a certain behavior.

Regarding the distribution of θ_{it}, we assume a discrete distribution with an arbitrary number k of support points denoted by $\xi_1,...,\xi_k$ and corresponding probabilities $\pi_1,..., \pi_k$ (Lindsay *et al*., 1991). This avoids parametric assumptions as in Heckman and Singer (1984); at the same time, it allows the clustering of individuals into homogenous classes, known as latent classes, and predicting the latent trait level. This prediction is the score that we use for the regression analysis. To estimate the resulting latent class Rasch model to the observed data, we use the expectation maximization algorithm by Dempster *et al*. (1977), implemented in the R package MultiLCIRT; Bartolucci *et al.* (2014). Moreover, to select the number of latent classes, we rely on the Bayesian Information Criterion

(Schwarz, 1978) that is commonly used for this purpose. This criterion leads to selecting $k = 3$ classes; the corresponding parameter estimates are reported in the following table.

Table A.1. Parameter estimates under the Rasch model with $k = 3$ latent classes

Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
β_1	0.000	ξ_1	-4.328	π_1	0.791
β_2	-1.663	ξ_2	-2.089	π_2	0.203
β_3	-0.175	ξ_3	0.083	π_3	0.006
β_4	-1.592				
β_5	-0.564				
β_6	-5.338				

Source: our elaboration on NCDS data

Based on these estimates, we obtain the prediction of θ_{it}, denoted by $\widehat{\theta}_{it}$, by an a posteriori expected value for every individual and time occasion.

It is important to explain why we rely on the Rasch model instead of performing a more traditional analysis, such as one based on principal components. The key point is that in our application, the response variables are binary, and the Rasch model is explicitly tailored to address variables of this type, particularly when they measure some latent trait, that is, an individual characteristic that is not directly observable. In fact, the Rasch model is the most well-known item response theory model and is very popular when analyzing data derived from the administration of a questionnaire (Bartolucci *et al.*, 2015). On the other hand, the method of principal components is suited to the analysis of continuous response variables, with the aim of summarizing a large number of variables into one or a few variables. In fact, that method is based on a decomposition of the variance-covariance matrix between the response variables, the use of which is controversial with binary variables. Moreover, it does not rely on specific assumptions related to the measurement of latent traits. Obviously, we are not conjecturing that the results of our overall analysis would be dramatically different, at the first step, if we were to use a more common method of summarizing the response variables; nevertheless, we prefer to rely on a method that is better principled.

Appendix B.

Table B.1. Descriptive statistics

	Age 33		Age 42		Age 51	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Nonstreamed school	0.652	0.477	0.652	0.477	0.652	0.477
Streamed school: Low-ability class	0.082	0.275	0.082	0.275	0.082	0.275
Streamed school: Average-ability class	0.099	0.299	0.099	0.299	0.099	0.299
Streamed school: High-ability class	0.167	0.373	0.167	0.373	0.167	0.373
Female	0.527	0.499	0.527	0.499	0.527	0.499
Married	0.820	0.384	0.835	0.371	0.720	0.449
Inactive	0.018	0.135	0.040	0.197	0.060	0.237
Domestic work	0.140	0.347	0.064	0.246	0.054	0.226
Unemployed	0.027	0.163	0.014	0.119	0.018	0.133
Self-employed	0.114	0.318	0.129	0.335	0.136	0.343
Part-time employed	0.162	0.369	0.190	0.392	0.162	0.369
Full-time employed	0.538	0.499	0.561	0.496	0.569	0.495
Poor health status	0.012	0.107	0.028	0.164	0.052	0.222
Less than education NVQ1	0.081	0.272	0.081	0.272	0.081	0.272
Education NVQ1	0.132	0.339	0.132	0.339	0.132	0.339
Education NVQ2	0.348	0.476	0.348	0.476	0.348	0.476
Education NVQ3	0.144	0.351	0.144	0.351	0.144	0.351
Education NVQ4	0.157	0.364	0.157	0.364	0.157	0.364
Education NVQ5-6	0.138	0.345	0.138	0.345	0.138	0.345
North	0.073	0.261	0.074	0.262	0.074	0.262
North-West	0.108	0.311	0.108	0.311	0.108	0.310
Yorkshire	0.100	0.301	0.101	0.301	0.102	0.303
West-Midlands	0.105	0.307	0.104	0.306	0.104	0.305
East-Midlands	0.082	0.274	0.086	0.280	0.089	0.285
Wales	0.058	0.234	0.059	0.236	0.061	0.239
East-Anglia	0.049	0.215	0.048	0.215	0.050	0.218
South-West	0.097	0.296	0.106	0.308	0.110	0.313
South-East	0.327	0.469	0.314	0.464	0.302	0.459
Mother reads books at age 7	0.372	0.484	0.372	0.484	0.372	0.484
High father social class at age 7	0.226	0.418	0.226	0.418	0.226	0.418
BSAG score at age 7	7.431	8.092	7.431	8.092	7.431	8.092
North at age 7	0.085	0.279	0.085	0.279	0.085	0.279
North-West at age 7	0.121	0.326	0.121	0.326	0.121	0.326
East-West Riding at age 7	0.094	0.292	0.094	0.292	0.094	0.292
North Midlands at age 7	0.089	0.285	0.089	0.285	0.089	0.285
Midlands at age 7	0.106	0.308	0.106	0.308	0.106	0.308
East at age 7	0.099	0.298	0.099	0.298	0.099	0.298
Wales at age 7	0.060	0.238	0.060	0.238	0.060	0.238
South-West at age 7	0.075	0.263	0.075	0.263	0.075	0.263
South at age 7	0.074	0.262	0.074	0.262	0.074	0.262
South-East at age 7	0.183	0.387	0.183	0.387	0.183	0.387
Regional propensity to streaming	0.348	0.058	0.348	0.058	0.348	0.058
Regional math score	5.456	0.234	5.456	0.234	5.456	0.234
Regional reading score	24.354	0.988	24.354	0.988	24.354	0.988

Source: our elaboration on NCDS data

Table B.2. Ability-class equation at age 33

	Low-ability class			Average-ability class			High-ability class		
	AME	r.s.e.		AME	r.s.e.		AME	r.s.e.	
Regional propensity to streaming	0.162	0.151		0.269	0.067	***	0.165	0.234	
Regional math score	0.030	0.049		-0.049	0.055		-0.041	0.073	
Regional reading score	-0.025	0.015	*	0.014	0.021		-0.055	0.028	**
Female	0.038	0.032		-0.039	0.032		0.083	0.044	*
Mother reads books at age 7	-0.022	0.009	**	-0.012	0.011		0.014	0.013	
High father social class at age 7	-0.068	0.013	***	-0.032	0.013	**	0.003	0.016	
BSAG score at age 7	0.004	0.000	***	0.000	0.001		-0.008	0.001	***
North at age 7	0.017	0.024		-0.044	0.026	*	0.076	0.037	**
North-West at age 7	-0.024	0.023		-0.026	0.025		0.038	0.034	
East-West Riding at age 7	-0.036	0.047		-0.016	0.056		-0.095	0.073	
North Midlands at age 7	-0.016	0.036		-0.058	0.044		0.000	0.056	
Midlands at age 7	-0.018	0.036		-0.021	0.040		-0.010	0.054	
East at age 7	0.015	0.038		-0.046	0.042		-0.024	0.058	
South-East at age 7	0.006	0.023		-0.038	0.026		0.020	0.036	
South at age 7	0.011	0.037		0.002	0.043		-0.075	0.058	
South-West at age 7	-0.022	0.037		-0.010	0.045		-0.091	0.054	*
Wales at age 7	base-category								

Source: our elaboration on NCDS data. Note: *p < .10, **p < .05, ***p < .01.

Table B.3. Ability-class equation at age 42

	Low-ability class			Average -ability class			High-ability class		
	AME	r.s.e.		AME	r.s.e.		AME	r.s.e.	
Regional propensity to streaming	0.192	0.149		0.291	0.076	***	0.176	0.231	
Regional math score	0.035	0.049		-0.047	0.054		-0.038	0.072	
Regional reading score	-0.022	0.012	*	0.016	0.021		-0.054	0.028	*
Female	0.034	0.031		-0.041	0.032		0.082	0.044	*
Mother reads books at age 7	-0.020	0.009	**	-0.010	0.010		0.015	0.013	
High father social class at age 7	-0.071	0.013	***	-0.034	0.013	***	0.003	0.017	
BSAG score at age 7	0.004	0.000	***	0.000	0.001		-0.008	0.001	***
North at age 7	0.012	0.024		-0.047	0.026	*	0.075	0.037	**
North-West at age 7	-0.024	0.023		-0.026	0.025		0.038	0.034	
East-West Riding at age 7	-0.031	0.047		-0.013	0.055		-0.093	0.073	
North Midlands at age 7	-0.013	0.036		-0.057	0.043		0.002	0.056	
Midlands at age 7	-0.013	0.035		-0.018	0.040		-0.008	0.054	
East at age 7	0.018	0.038		-0.043	0.041		-0.022	0.058	
South-East at age 7	0.008	0.023		-0.037	0.022	*	0.021	0.036	
South at age 7	0.013	0.037		0.003	0.042		-0.074	0.058	
South-West at age 7	-0.018	0.037		-0.006	0.045		-0.089	0.060	
Wales at age 7	base-category								

Source: our elaboration on NCDS data. Note: *p < .10, **p < .05, ***p < .01.

Table B.4. Ability-class equation at age 51

	Low-ability class			Average-ability class			High-ability class		
	AME	r.s.e.		AME	r.s.e.		AME	r.s.e.	
Regional propensity to streaming	0.170	0.151		0.269	0.074	***	0.164	0.232	
Regional math score	0.036	0.049		-0.052	0.054		-0.042	0.073	
Regional reading score	-0.025	0.014	*	0.012	0.021		-0.056	0.028	**
Female	0.039	0.031		-0.037	0.032		0.083	0.044	*
Mother reads books at age 7	-0.021	0.009	**	-0.012	0.010		0.013	0.013	
High father social class at age 7	-0.069	0.013	***	-0.034	0.013	***	0.002	0.016	
BSAG score at age 7	0.004	0.000	***	0.000	0.001		-0.008	0.001	***
North at age 7	0.015	0.024		-0.046	0.026	*	0.076	0.037	**
North-West at age 7	-0.024	0.023		-0.027	0.024		0.038	0.034	
East-West Riding at age 7	-0.033	0.047		-0.020	0.055		-0.097	0.073	
North Midlands at age 7	-0.014	0.036		-0.061	0.043		-0.001	0.057	
Midlands at age 7	-0.013	0.036		-0.022	0.040		-0.010	0.054	
East at age 7	0.019	0.038		-0.048	0.041		-0.024	0.059	
South-East at age 7	0.007	0.023		-0.040	0.024	*	0.020	0.036	
South at age 7	0.013	0.037		-0.001	0.042		-0.076	0.058	
South-West at age 7	-0.021	0.037		-0.012	0.045		-0.093	0.051	*
Wales at age 7	base-category								

Source: our elaboration on NCDS data. Note: *p < .10, **p < .05, ***p < .01.

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