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 a method of streaming, whereas others were not. Using British National Child Development data, we construct a single score of civic engagement and evaluate the effect on adult civic engagement of attending homogeneous-ability classes versus nonhomogeneous-ability classes and being in high-, average- or low-ability classes when enrolled in streamed schools. 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 (nonstreamed schools). Moreover, among children who attended streamed schools, a lower attitude toward civic engagement was observed among low-ability students. Thus, streaming appears to be detrimental to social capital development, especially for low-ability individuals.

Keywords: social capital, education, skills

JEL classification: A13, C31, I26

1. Introduction

"Social capital refers to connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, page 19). Social capital development embraces various different sectors of society: individuals' participation in politics, civic participation, participation in religious bodies, workplace connections and informal social connections such as card games, bowling leagues, ball games, picnics and parties.

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.

Following 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 homogeneous 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). In contrast, 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. Indeed, the study has two different aims. The first aim is to analyze whether a more (less) inclusive school environment during childhood aids in the development of adult civic engagement. The second aim is to study how classroom ability, when children are enrolled in streamed primary schools, affects adult civic engagement. For the purpose of the first objective, we specify an empirical model, which we call "streaming and civic engagement," where the type of primary school—either streamed or not streamed—influences adult civic engagement. In this specification, we take account of possible endogeneity problems of the explicative variable. For the purpose of the second aim, we model adult civic engagement for only the students who attended streamed schools, and we include among the regressors class-ability dummies that capture the ability level of the class of enrollment. We call this model "class ability and civic engagement." When dealing with the empirical specification, we run a Heckman (1979) model that takes into account selection into a streamed school.

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 point and for each participation category—are collapsed into a quantitative score using the Rasch model (Rasch, 1960, 1961). The score is calculated for each of the years of observation on the same group of individuals. This approach allows us to find evidence of the effects of childhood social capital exposure on the development of social capital over the course of life.

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 first model and discusses the results of the related estimates; Section 5 reports and discusses the results of the second model.

2. The data and definition of variables

[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.

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. To investigate the impact of streaming during primary school on civic engagement during adulthood, we draw information from the 5th, 6th, and 8th sweeps.

At this point, it is worth describing the issue of data attrition[2]. As already discussed in the literature, the NCDS presents some attrition from wave to wave[3]. In our specific case, this attrition is expressed when we compare the distribution of individual characteristics in adulthood with the same characteristics during childhood. Then, this attrition may be relevant cases in which it affected the distribution of individuals, which is related to the type of school attended (streamed versus not streamed) and the ability level of the attended class. In this respect, we observe that our adult sample includes a slightly higher proportion of individuals who attended a streamed school (34.8% of the sample) than in the child sample (32.3%). Moreover, individuals who attended streamed schools and were grouped into low-ability classes are 23.6% in the adult sample compared to 30.3% in the sample of children. The opposite occurs among high-ability individuals grouped into high-ability classes: in this case, they account for 47.8% of the individuals in the adult subsample of "streamed children"

[2] Other issues possibly affecting our study are social desirability and misreporting, i.e., the possibility of incurring response bias as individuals try to socially comply. In principle, given low civic and political participation, individuals are more likely to underreport their civic engagement, especially in cases of sensitive activities, such as those linked to political engagement. However, while we cannot exclude that civic engagement is underrepresented, we note that the decreasing trend in civic and political participation over the analyzed period is common across many analyzed dimensions (political and nonpolitical engagement), as it will be shown in Section 3.

[3] 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.

compared to 40% in the same subsample when they are children. Regarding average-ability individuals, the proportion in the two years is rather similar: 29.7% when adult and 28.5% when children. This point will be taken into account when discussing the results of the estimated models.

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 score calculated using the Rasch model (Rasch, 1960, 1961), which is the most popular item response model. [4] 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[5] (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 construct a dichotomous variable—which we call "streamed school"—assuming a value of 1 if the individual attended a primary school that applied streaming and a value of zero otherwise. Then, for individuals who attended streamed schools, we construct different dummies: a first dummy, called "low ability," assumes a value of one for individuals who were enrolled in low-ability classes; the dummy "average ability" assumes a value of one for enrollment in medium-ability classes; the dummy "high ability" assumes a value of one for high-ability class students. "Streamed school" and the dummies for different class-ability levels are used in the two different models we will discuss in Sections 4 and 5. The 1965 sweep contains information obtained when cohort members were 7 years old and, thus, it provides interesting information for the identification of individuals who attend schools that adopt streaming. The need for instrumenting the variable "streamed school" 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

[4] Standardizing the score would not change the results; it would simply imply a rescaling of the estimated coefficients. Thus, we decided not to standardize the score.
[5] 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.

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 "streamed school" in the model of civic engagement. To address this problem, we instrument the variable using the average number of children who attended "streamed" schools in the region of reference, excluding the individual himself. We call this variable "propensity to streaming."

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[6]. Finally, we control for region-specific effects (Wales being the base category).

Studies on the efficacy of teaching stress the importance of school-based social capital in determining student achievement. Social relationships among students, parents, and teachers within the school environment are important for teacher efficacy: good-quality teaching is a process that involves not only teachers but also students and parents in cooperation and support (Hoover-Dempsey *et al.*, 2002, Belfi *et al.*, 2015). *A fortiori*, we believe that these types of school-based relationships can influence the development of social capital and affect adult civic engagement. Thus, we include among the regressors a variable that is available in the NCDS—in the Educational Assessment, Section on parent-school contacts—and that detects whether the school organizes any social function for parents.

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

[6] 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.

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, 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, by type of school (streamed and not streamed) and by the ability-class that the individual attended when aged eleven. The table includes t-statistics (and relative p-values) for the tests of significant difference between mean values.

The upper part of the table includes mean values (and standard deviations) of the civic engagement score distinguished by type of attended school—either streamed or not streamed. The values show that civic engagement has essentially declined with aging, independently of the type of school attended. Moreover, the mean values reveal that individuals who attended streamed schools have a civic engagement score that is slightly lower than the score for individuals who did not attend streamed schools. However, the difference is slightly statistically significant (at the 8% value) only when individuals are 42. In the lower part of the table, we show the descriptive statistics of civic engagement by level of ability for only those individuals who attended streamed schools. From an ability-class perspective, it emerges that individuals who have attended high-ability classes show the highest civic engagement score, followed by individuals who have attended average-ability classes. Individuals who have attended low-ability classes show the lowest civic-political engagement score. Tests on the difference between mean values are extremely significant. This represents a preliminary indication that class composition matters for adult civic engagement.

Table 2. Civic-engagement score by streamed/nonstreamed school and class ability

		Age 33		Age 42		Age 51	
		Mean	Std dev.	Mean	Std dev.	Mean	Std dev.
Nonstreamed school		-4.426	0.522	-4.420	0.536	-4.502	0.453
Streamed school		-4.430	0.530	-4.442	0.509	-4.512	0.474
T-test	T-statistic	0.246		1.754		1.116	
	P-value	0.806		0.080		0.265	
Streamed school: Low-ability class		-4.532	0.413	-4.557	0.419	-4.603	0.385
Streamed school: Average-ability class		-4.463	0.490	-4.447	0.497	-4.536	0.434
Streamed school: High-ability class		-4.359	0.592	-4.383	0.547	-4.452	0.527
T-test (Low vs Average-High)	T-statistic	4.450		5.246		4.443	
	P-value	0.000		0.000		0.000	
T-test (High vs Average-Low)	T-statistic	-5.301		-4.653		-4.996	

P-value	0.000		0.000		0.000	
Average score	-4.427	0.525	-4.428	0.527	-4.505	0.460

Source: our elaboration on NCDS data

Descriptive statistics of control variables included in the empirical models are provided in Appendix B. Table B.1 summarizes descriptive statistics for the whole dataset employed in the model "streaming and civic engagement," while Table B.2 provides information for the subsample of individuals who attended streamed schools and who enter the model "class ability and civic engagement." For every analyzed year, we report mean and standard deviation; statistics of non-time-varying covariates are, obviously, homogeneous across sweeps. According to the reported statistics for the whole sample (Table B.1), 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 increased between age 33 and age 42 and decreased to 16% at age 51, 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. Social function practices were quite widespread across the schools attended when young, accounting for 53% of the sample. Individuals living in the South-East region (including London) constituted 32.7% of the sample when 33 years old and slightly less at age 51; the others were distributed in the remaining regions, with frequencies ranging from 4.9% (East-Anglia) to 10.8% (North-West). Looking at the instrumental variable, we note that the average regional propensity to enroll children at schools was 34.8%.

Table B.2 reports statistics of the control variables used in the model "class ability and civic engagement" for the subsample of individuals who attended streamed schools. In particular, we note that 36.2% of sampled individuals benefited from mothers' reading during childhood, and 20.4% 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, 18.8% lived in the South-East region (including London), i.e., 13.8% less than the value observed during adulthood; this suggests this region has been strongly attractive for the surveyed individuals during the analyzed period.

4. Heterogeneous versus homogeneous classrooms and adult civic engagement

In this section, we present the results of the model "streaming and civic engagement" that aims at studying adult civic engagement in relation to the attendance of a heterogeneous (not streamed) or a homogeneous (streamed) class in primary school. At this stage of the analysis, we focus only on the effect of attending a more or less inclusive school on the development of social capital. Thus, we postpone to the next section the analysis of the relationship between the class-ability level and adult civic engagement in adulthood.

We employ the variable "streamed school," the dichotomous variable discussed in Section 2, that assumes a value of one if the individual attended a streamed school and a value of zero if not. Then, the impact of the type of school (streamed/not streamed) 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 "streamed school" variable in the civic engagement equation. The bivariate model with a recursive structure has the advantage of allowing easy handling of potential endogeneity by implementing a full-estimation approach, where two equations (the type of school equation—streamed versus not streamed—and the civic engagement equation) are simultaneously estimated. In fact, the type of school attended during childhood by the individuals may be endogenous in the civic engagement equation because of an omitted variable problem. More precisely, the parents'

choice of enrolling their children in schools applying streaming versus not, and then the attendance of heterogeneous- or homogeneous-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.

The main equation models the "civic engagement score" during adulthood and includes the (endogenous) "streamed school" 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 type of school equation, whose dependent variable is "streamed school," models the probability of attending a streamed school versus a nonstreamed school.

The specification we implement to estimate the type of school equation is derived from a latent continuous variable (y_{1i}^*) that is related to a vector of explanatory variables z and an instrumental variable, q, which has been introduced for identification purposes. Subscript i indexes individuals. The latent continuous variable (y_{1i}^*) is represented by a standard linear model that can be written as follows:

$$y_{1i}^* = z_i{}'\alpha + \delta q_i + v_i, \qquad (1)$$

where α is a vector of parameters associated with z, δ is a parameter associated with the instrument q, and υ is an error term drawn from a standardized normal distribution. In our case, we employ a single instrument, the variable "propensity to streaming," that measures the average number of children who attended "streamed" schools in the region of reference, excluding the individual himself. This instrument represents a kind of geographical availability of posts in streamed schools, and its geographical variation allows us to identify the model (Card, 2001). A criticism of the instrument could be raised because it also includes a component related to the demand side of the "market" for streamed schools; more precisely, it incorporates some extent of residents' preferences toward more or less inclusive schools. The objection could be that residents' preferences on types of schools could

also affect directly, and not only indirectly, future generations' attitude toward civic engagement. However, we think that school residents' preferences directly affect only the schooling decisions of the parents of the children and indirectly, through parents' schooling choices, the development of social capital of future generations. We believe that this assumption is plausible due to the intergenerational and relational gaps that exist between school residents' preferences and civic engagement of future generations.

Although y_{1i}^* is unobserved, y_1 would be observed and is related to y_{1i}^* by the following relationship:

$$y_{1i} = \begin{cases} 1 & \text{if } y_{1i}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}. \tag{2}$$

The probability of attending a streamed school for an individual *i* may be written as

$$\Pr(y_{1i} = 1 | z_i, q_i) = \Pr(v_i \geq -z_i'\alpha - \delta q_i) = \Phi(z_i'\alpha + \delta q_i) \tag{3}$$

where Φ is the cumulative distribution function of a standard normal distribution.

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

The bivariate model with a recursive structure allows the dichotomous dependent choice in the type of school 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 dichotomous endogenous variable y_{1i}, while *u* is the error term:

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

where γ is the parameter associated with the dichotomous 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 error terms 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[7], which produces consistent and fully efficient estimates (Reize 2001). Finally, the model allows the error terms of both equations to be correlated. Accordingly, we estimate the correlation term ρ that measures the correlation between the residual of the type of school equation and that of the civic-political engagement equation (see Filippini *et al*., 2018, for details).

In Table 3, we list the estimation results of the civic engagement equation. Estimation results of the type of school equation are shown in Table B.3 in the appendix. These results reveal that cohort members enrolled in streamed schools—meaning homogeneous-ability classes—experience a lower propensity toward civic engagement than cohort members enrolled in nonstreamed schools, where ability is heterogeneous. Indeed, the influence of streaming on civic engagement is statistically significant in two of the three years observed: when individuals are aged 42 and when they are aged 51. The coefficient is statistically significant at the 10% level when individuals are 51 and at the 5% level when they are 42. The lack of significance of streaming when individuals are 33 is in line with a general lower significance of all estimated coefficients when individuals are this age than when they are older. In light of these results, our analysis suggests that class composition during primary education influences later civic engagement. Cohort members who attended homogeneous-ability classes show a lower propensity toward civic engagement during adulthood than cohort members who attended nonstreamed schools.

Table 3. The model "streaming and civic engagement": estimation results of the full estimation model's main equation

	Age 33		Age 42		Age 51	
	Coeff.	Robust s.e.	Coeff.	Robust s.e.	Coeff.	Robust s.e.

[7] 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 probit models.

Streamed school	-0.029	0.117		-0.124	0.061	**	-0.097	0.057	*
Female	0.109	0.019	***	0.070	0.017	***	0.014	0.015	
Married	0.004	0.019		0.033	0.019	*	0.054	0.013	***
Inactive				base-category					
Domestic work	0.070	0.062		-0.018	0.054		0.012	0.040	
Unemployed	-0.027	0.066		-0.070	0.070		-0.073	0.046	
Self-employed	0.026	0.061		-0.091	0.049	*	-0.012	0.034	
Part-time employed	0.071	0.062		-0.007	0.048		-0.026	0.033	
Full-time employed	-0.036	0.058		-0.112	0.045	**	-0.054	0.030	*
Poor health status	-0.025	0.068		-0.011	0.046		-0.073	0.026	***
No education				base-category					
Education NVQ1	0.062	0.025	**	0.079	0.023	***	0.031	0.018	*
Education NVQ2	0.141	0.023	***	0.166	0.020	***	0.112	0.017	***
Education NVQ3	0.230	0.028	***	0.237	0.026	***	0.187	0.022	***
Education NVQ4	0.273	0.029	***	0.300	0.026	***	0.227	0.022	***
Education NVQ5-6	0.468	0.033	***	0.539	0.032	***	0.467	0.029	***
Social functions at school	0.018	0.014		0.035	0.014	**	0.011	0.012	
North	-0.070	0.040	*	-0.088	0.040	**	-0.070	0.033	**
North-West	-0.065	0.037	*	-0.077	0.040	*	-0.101	0.031	***
Yorkshire	-0.054	0.038		-0.089	0.040	**	-0.082	0.031	***
West-Midlands	-0.059	0.037		-0.082	0.039	**	-0.011	0.033	
East-Midlands	-0.045	0.040		-0.055	0.040		-0.065	0.030	**
East-Anglia	-0.012	0.046		-0.069	0.045		-0.129	0.033	***
South-West	-0.074	0.040	*	-0.086	0.040	**	-0.035	0.033	
South-East	-0.021	0.034		-0.026	0.035		0.002	0.028	
Wales				base-category					
Constant	-4.647	0.080	***	-4.554	0.067	***	-4.611	0.047	***
Rho	0.040	0.139		0.132	0.069	*	0.130	0.074	*
Log pseudolikelihood		-6725.36			-6705.70			-6015.79	

Source: our elaboration on NCDS data. * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

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[8]. Regarding school social capital, our results show a positive and significant effect of "social functions at school" only

[8] Evidence from a subsample analysis by educational level suggests that the positive impact of education on civic engagement is stronger for individuals who attended nonstreamed schools and more mixed for others. Detailed information is available upon request.

in one of the observed years, when individuals are 42 years old. Therefore, we do not detect a particular role of school social capital in developing adult civic engagement.

Other characteristics appear to be significant in shaping civic engagement. First, we find that being female increases the civic engagement score by 0.109 at age 33, by 0.070 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.

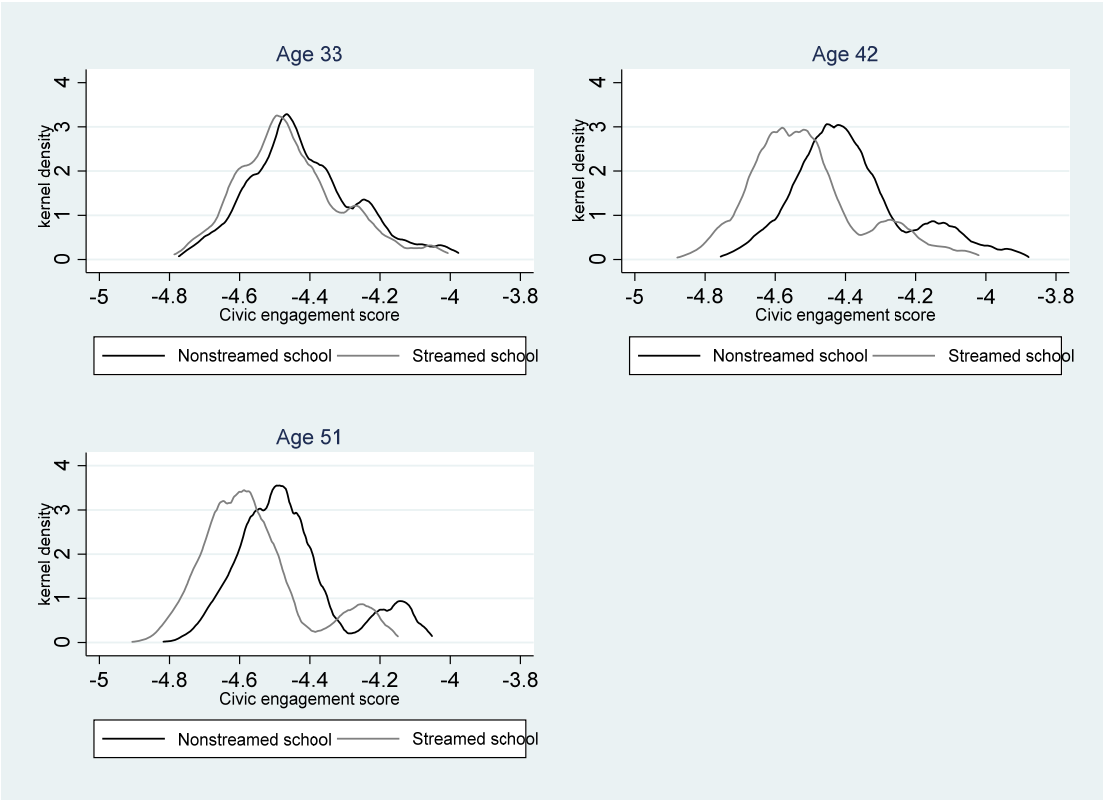
Occupational status is, potentially, a relevant predictor of civic engagement, as it may affect time allocation and the formation of networks. Our estimates partially confirm this hypothesis, indicating that the civic engagement scores of individuals in full-time employment are lower than those of inactive 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 (-0.073 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 summarize our findings on the relationship between civic engagement and type of school, we plot in Figure 1 the kernel densities of the predicted values of the civic engagement score for the streamed/nonstreamed individuals. As the figure clearly shows, attendance in streamed schools

implies a distribution of the predicted civic engagement score that is on the left of the predicted distribution of the score for the individuals who attended nonstreamed schools. This is particularly true in later in life; differences between the two groups widen with age.

Figure 1. Kernel densities of the predicted civic engagement score by type of school



Source: our elaboration on NCDS data

The results of the full model estimation include the estimated value of parameter ρ, which captures the correlation among the error terms of the two equations. A statistically significant ρ means that certain unobservables enter the error terms of both equations and a full estimation method is necessary. In our case, ρ is statistically significant when individuals are 42 and 51 years old, although with a quite low coefficient.

To conclude the discussion of our results, we briefly comment on the estimates of the instrumental variable used in the type of school equation (Table B.3 in the appendix). The results show that

"propensity to streaming" significantly affects the individual choice of a streamed/nonstreamed school. A higher average propensity to enroll in streamed schools, in the region of reference, implies a higher individual probability of choosing this type of school.

To complete our analysis, we carried out a robustness check and ran a 2SLS estimation, whose results are reported in Table B.4 in the appendix. The first part of the table shows the estimated coefficients of the main equation (civic engagement equation), while the second part lists the results of the first stage equation (type of school equation). The 2SLS method confirms the results of the full estimation method, although the coefficient of the "streamed school" variable is less significant than in the full estimation model. Regarding the issue of endogeneity, the endogeneity test (Table B.5 in the appendix) provides evidence of the existence of a "light" endogeneity problem in the estimates when the age is 42 and a significant endogeneity (at a 2.9% significant value) when the age is 51. This finding is in line with the findings of the full estimation method. Finally, both the underidentification test and the weak identification test confirm the goodness of the adopted instrument (Table B.6 in the appendix).

5. Class-ability level and adult civic engagement

In this section, we focus on the relationship between class-ability composition and adult civic engagement and we analyze the influence of peer ability on individuals' civic engagement. The analysis is carried out by implementing a two-step model.

To achieve our aim, we assign cohort members enrolled in streamed schools the ability level of the attended class—either low, average or high. Then, we define three dummy variables: a dummy "high-ability" that assumes the value of one if the individual was enrolled in a high-ability class; a dummy "average-ability" if the class-ability level was average; and a dummy "low-ability" if the class-ability level was low. Then, the main equation models the "civic engagement score" during adulthood for individuals who attended a streamed school and includes the "class ability" dummies—

except the "low-ability" dummy—on its right side. The dependent variable in the main equation is represented by the "civic engagement score," which is assumed to be continuous.

Class-ability is observed only for individuals enrolled in streamed schools. Because the parents' choice of enrolling their children either in streamed schools or in nonstreamed schools may be guided by unobservable factors, randomization may be not achieved, and the resulting partial observability possibly leads to selection bias. Therefore, we account for potential selectivity of individuals into streamed schools by using a Heckman two-step estimator (Heckman 1979)[9].

The first step of the model relates to a selection equation that models the probability of attending a streamed school versus a nonstreamed school. This equation has the same specification employed in Section 4. However, in this context, it is used to take account of an eventual bias in the selection process. For identification purposes, the model includes the variable "propensity to streaming" as a regressor.

The selection equation is derived from the latent continuous variable (y_{1i}^*) that is represented by a standard linear model that can be written as follows:

$$y_{1i}^* = z_i{}'\alpha + \delta q_i + v_i \qquad (5)$$

where α is the vector of parameters associated with the vector of explanatory variables z, δ is the parameter associated with the variable q (the variable "propensity to streaming") we introduced for identification purposes, and υ is an error term drawn from a standardized normal distribution.

Although y_{1i}^* is unobserved, y_1 (the type of school variable) is observed and is related to y_{1i}^* by the following relationship:

[9] While the full information maximum likelihood estimator exhibits better statistical properties than the limited information estimator, it involves more computational difficulties. The two-step method is generally more stable than the full estimation approach and may represent a valid alternative to the latter when convergence is problematic.

$$y_{1i} = \begin{cases} 1 \;\; if y_{1i}^{*} \geq 0 \\ 0 \text{ otherwise} \end{cases} \tag{6}$$

The probability of attending a streamed school for an individual *i* reads

$$\Pr(y_{1i} = 1 | z_i, q_i) = \Pr(v_i \geq -z_i'\alpha - \delta q_i) = \Phi(z_i'\alpha + \delta q_i) \tag{7}$$

where Φ is the cumulative distribution function of a standard normal distribution. Under the assumption that the error terms are normally distributed, the model corresponds to a standard probit specification.

Based on the first step estimates, we generate the Inverse Mills ratio term ($\hat{\lambda}$)[10] to be included in the second step (civic engagement equation) as an additional regressor to correct for potential selection bias.

Thus, the civic-engagement equation for individuals enrolled in streamed schools is related to the set of dummy variables indicating the class-ability level *c* (except the base category "low-ability), a set of control variables *x* and the Inverse Mills ratio term $\hat{\lambda}$, while η is the error term:

$$y_{2i} = c_i{}'\omega + x_i'\sigma + \theta\widehat{\lambda_i} + \eta_i \qquad \text{if } y_{1i} = 1 \tag{8}$$

where ω is a vector of parameters associated with the class-ability dummies c, σ is a vector of parameters associated with *x*, and θ is the parameter associated with the Inverse Mills ratio term. y_{2i} is assumed to be continuous, and under the assumption that the error term η is normally distributed, the model corresponds to a standard linear specification.

[10] The inverse Mills ratio term (the nonselection hazard) corresponds to the ratio between the probability density function and cumulative distribution function of the standard normal distribution: $\widehat{\lambda_i} = \varphi(z_i'\hat{\alpha} + \hat{\delta} q_i) / \Phi(z_i'\hat{\alpha} + \hat{\delta} q_i)$.

Finally, because the two-step estimator may produce inconsistent estimates of standard errors in the main equation, we correct them by implementing the bootstrap method.

Table 4. The model "class ability and civic engagement": estimation results

	Age 33			Age 42			Age 51		
Civic engagement equation	Coeff.	Bootstrapped s.e.		Coeff.	Bootstrapped s.e.		Coeff.	Bootstrapped s.e.	
Low ability class					base-category				
Average ability class	0.034	0.031		0.067	0.030	**	0.022	0.026	
High ability class	0.071	0.031	**	0.038	0.030		0.018	0.027	
Female	0.086	0.031	***	0.033	0.031		-0.014	0.029	
Married	-0.045	0.037		0.017	0.031		0.063	0.022	***
Inactive					base-category				
Domestic work	0.157	0.092	*	-0.035	0.086		-0.014	0.064	
Unemployed	0.118	0.097		0.101	0.141		-0.123	0.068	*
Self-employed	0.096	0.082		-0.149	0.085	*	-0.017	0.058	
Part-time employed	0.144	0.089		-0.042	0.089		-0.007	0.051	
Full-time employed	0.083	0.081		-0.113	0.068	*	-0.050	0.046	
Poor health status	0.009	0.107		0.017	0.084		-0.058	0.045	
No education					base-category				
Education NVQ1	0.000	0.043		0.037	0.039		-0.038	0.031	
Education NVQ2	0.085	0.041	**	0.133	0.039	***	0.074	0.034	**
Education NVQ3	0.153	0.047	***	0.180	0.046	***	0.129	0.048	***
Education NVQ4	0.206	0.047	***	0.247	0.040	***	0.189	0.043	***
Education NVQ5-6	0.323	0.060	***	0.496	0.058	***	0.447	0.060	***
Social functions at school	0.048	0.025	*	0.066	0.023	***	0.006	0.022	
North	-0.139	0.059	**	-0.111	0.057	*	-0.117	0.053	**
North-West	-0.124	0.063	**	-0.092	0.052	*	-0.102	0.051	**
Yorkshire	-0.010	0.071		-0.111	0.057	*	-0.072	0.064	
West-Midlands	-0.096	0.060		-0.151	0.060	**	-0.030	0.058	
East-Midlands	-0.088	0.069		-0.187	0.052	***	-0.101	0.055	*
East-Anglia	-0.073	0.077		-0.112	0.063	*	-0.139	0.057	**
South-West	-0.131	0.086		-0.135	0.069	*	-0.097	0.066	
South-East	-0.042	0.054		-0.039	0.050		0.002	0.051	
Wales					base-category				
Constant	-4.672	0.176	***	-4.845	0.174	***	-4.730	0.159	***
λ	0.008	0.153		0.288	0.160	*	0.121	0.139	
ρ	0.015			0.535			0.264		
σ	0.512			0.538			0.457		
Wald chi2 (24)		149.53			209.12			270.43	
P-value		0.000			0.000			0.000	

	Age 33			Age 42			Age 51		
Selection equation	AME	Delta-method s.e.		AME	Delta-method s.e.		AME	Delta-method s.e.	
Regional propensity to streaming	0.843	0.211	***	0.843	0.180	***	0.843	0.161	***

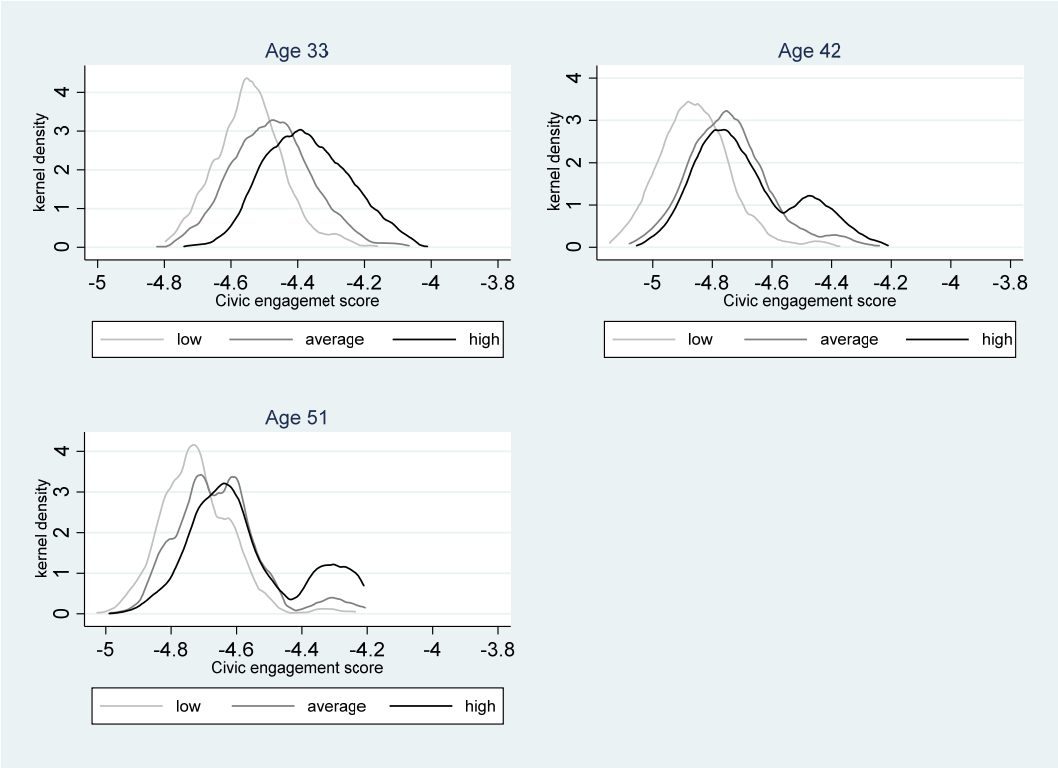
Female	-0.004	0.014		-0.004	0.014		-0.004	0.015	
Mother reads book at age 7	-0.008	0.015		-0.008	0.012		-0.008	0.015	
High father social class at age 7	-0.043	0.018	**	-0.043	0.018	**	-0.043	0.018	**
BSAG score at age 7	0.000	0.001		0.000	0.001		0.000	0.001	
North at age 7	0.010	0.038		0.010	0.036		0.010	0.034	
North-West at age 7	0.004	0.031		0.004	0.034		0.004	0.032	
East-West Riding at age 7	-0.014	0.034		-0.014	0.042		-0.014	0.035	
North Midlands at age 7	-0.001	0.036		-0.001	0.037		-0.001	0.032	
Midlands at age 7	0.004	0.033		0.004	0.032		0.004	0.033	
East at age 7	0.000	0.034		0.000	0.039		0.000	0.034	
South-East at age 7	0.005	0.029		0.005	0.031		0.005	0.031	
South at age 7	0.006	0.033		0.006	0.039		0.006	0.037	
South-West at age 7	-0.021	0.042		-0.021	0.042		-0.021	0.041	
Wales at age 7					base-category				

Source: our elaboration on NCDS data * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level. Note: AME indicates average marginal effects.

The estimation results of the civic-political engagement equation are reported in Table 4, upper part. They reveal that cohort members enrolled in homogeneous–ability classes of average and high ability experience a statistically significantly higher propensity toward civic engagement than cohort members enrolled in low-ability classes. The timing of the effect varies slightly by ability classes. In particular, being a high-ability child who attends classes with other high-ability peers has positive effects on civic engagement at the age of 33. Furthermore, average-ability students enrolled in homogeneous-ability classes have a higher propensity toward civic engagement at the age of 42. However, the magnitude of the effect is rather similar and ranges between 0.067 and 0.071. This implies that, in general, cohort members enrolled in average- and high-ability classes show a higher propensity toward civic engagement during adulthood than do low-ability students. If we combine this result to that shown in the previous model, we can draw the following conclusions: although attendance in a homogeneous-ability class has, in general, a negative effect on adult civic engagement (see the previous section), students who attend homogeneous average- and high-ability classes develop a higher attitude toward civic engagement than do low-ability students. Thus, the detrimental effect of streaming on the development of social capital is less in the case of average- and high-ability individuals. Streaming appears to socially affect low-ability students in particular.

A graphical representation of these results is shown in Figure 2. The figure plots the kernel densities of the predicted values of the civic engagement score for high-, average-, and low-ability individuals. The figure clearly shows that the distribution of the predicted score for the high-ability individuals in early adulthood (age 33) is defined on higher values than the distribution for the average-ability individuals, which is on the right of the distribution for the low-ability individuals. The differences between the high- and average-ability individuals decrease over time (at ages 42 and 51) while low-ability individuals maintain a distinct distribution on the left of the others.

Figure 2 Kernel densities of the predicted civic engagement score by class-ability level



Source: our elaboration on NCDS data

At this point, it is worth discussing the issue of data attrition and how it may affect our results. As we discussed in Section 2, our adult sample slightly overrepresents individuals who attended a streamed school and, among these, those who were grouped into high-ability classes. Because of this type of attrition, our results may assign a slightly higher significance to the high-ability group than

would be otherwise assigned. This issue would concern the estimates when individuals are 33 and the high-ability class has a significant and positive effect on civic engagement. However, we do not think that our results would change substantially in the absence of the attrition issue. In fact, the high-ability class dummy is statistically significant with a t-value equal to 2.29. Thus, without an attrition bias, its significance may slightly decrease, but it would likely never decrease below the 5% level of significance.

In this model, as in the previous one, the results confirm the strong education-social development relation already highlighted in the literature (Glaeser, 2001; Glaeser *et al.*, 2002): the higher the educational level, the higher the propensity for civic engagement. The relationship to education, however, changes over the individuals' life time 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 the highly educated. With respect to the base-category represented by individuals without any education, having an NVQ2 educational level significantly increases by 0.085 the civic-political engagement score when individuals reach age 33 and by 0.074 when individuals reach age 51. The impact increases progressively and reaches 0.323 at age 33 and 0.447 at age 51 for individuals with a NVQ5-6 educational level.

Other characteristics appear to be as significant as in the previous model in shaping civic engagement. Also in this subsample of only individuals who attended streamed schools, sex, marital status and employment status are significant at certain ages. Being female increases the civic engagement score—by 0.086—at the age of 33, and being married has a positive effect on civic engagement—equal to 0.063—at the age of 51. The civic engagement scores of individuals in full-time employment and self-employment are lower than those of inactive individuals at the age of 42. The macroregional pattern of civic engagement—in this subsample of individuals who attended streamed schools—confirms the general pattern discussed in the previous section.

To conclude the discussion of our results, we briefly comment on the estimates of the Inverse Mills ratio, $\hat{\lambda}$. The ratio is slightly significant (at the 10% level) in the only subsample at the age of 42, while there is no evidence of a selection bias in the other years of the analysis.

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 homogeneous classes of only high-, low-, and average-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).

Using this civic engagement score, we employ two different econometric models to study the following issues: first, we investigate whether individuals who attend homogeneous-ability primary school classes (streamed schools) develop a higher/lower adult civic engagement than individuals who attend nonstreamed schools. Second, we study whether, for only those individuals who attend streamed schools, different class-ability levels are responsible for the development of different levels of adult social capital.

Our results show that the practice of streaming can have social effects in the long run. Children who are grouped into homogeneous-ability classes in primary school develop, in adulthood, significantly lower civic engagement than their peers who attended nonstreamed classes. However, when focusing only on those students who attend streamed schools, the study reveals that the class ability level plays an important role in shaping adult civic engagement. Precisely, average- and high-ability children who are grouped with similar-ability children in primary school display a higher civic engagement in adulthood compared with low-ability children grouped into low-ability classes. Thus, the practice of streaming in primary school is particularly detrimental for the development of social capital when students are not particularly skilled.

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 in adulthood, in line with suggestions by Graves *et al.* (1998). Moreover, these findings provide empirical support to the literature that has demonstrated the social risks of the practice of streaming and that have suggested that single-ability groups develop subcultures or norms of behavior that are different from those of nonstreamed groups (Gamoran, 1987a; Gamoran, 1987b; Rosenbaum, 1980; Slavin, 1990; Wiatrowski *et al.*, 1982; Wilkinson *et al.*, 2000).

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APPENDIX

Appendix A. The construction of the civic-engagement score

The first step in 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). To this end, 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 $i = 1,\ldots,n$, $j = 1,\ldots,J$, and $t = 1,\ldots,T$. This model assumes that

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

where θ_{it} is interpretable as the "ability level" and ς_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 on occasion t. ς_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 $\xi_1,\ldots,\xi_k$ and corresponding probabilities $\pi_1,\ldots,\pi_k$ (Lindsay *et al.*, 1991). This approach avoids parametric assumptions as in Heckman and Singer (1984); at the same time, it allows the clustering of individuals into homogeneous classes, known as latent classes, and the prediction of the latent trait level. This prediction is the score that we use for the regression analysis. To estimate the resulting latent class Rasch model for 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
ς_1	0.000	ξ_1	-4.328	π_1	0.791
ς_2	-1.663	ξ_2	-2.089	π_2	0.203
ς_3	-0.175	ξ_3	0.083	π_3	0.006
ς_4	-1.592				
ς_5	-0.564				
ς_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 a 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). 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, the principal components 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 founded.

Appendix B.

Table B.1. Descriptive statistics: the whole sample

	Age 33		Age 42		Age 51	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Streamed school	0.348	0.477	0.348	0.477	0.348	0.477
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
Social function at school	0.531	0.499	0.531	0.499	0.531	0.499
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
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
Wales	0.058	0.234	0.059	0.236	0.061	0.239
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
South-East at age 7	0.183	0.387	0.183	0.387	0.183	0.387
South at age 7	0.074	0.262	0.074	0.262	0.074	0.262
South-West at age 7	0.075	0.263	0.075	0.263	0.075	0.263
Wales at age 7	0.060	0.238	0.060	0.238	0.060	0.238
Regional propensity to streaming	0.348	0.058	0.348	0.058	0.348	0.058
Observations	4919		4919		4919	

Source: our elaboration on NCDS data

Table B.2. Descriptive statistics: subsample of individuals who attended streamed schools

	Age 33		Age 42		Age 51	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Low-ability class	0.236	0.425	0.236	0.425	0.236	0.425
Average-ability class	0.285	0.452	0.285	0.452	0.285	0.452
High-ability class	0.478	0.500	0.478	0.500	0.478	0.500
Female	0.516	0.500	0.516	0.500	0.516	0.500
Married	0.806	0.396	0.835	0.371	0.720	0.449
Inactive	0.021	0.143	0.041	0.198	0.059	0.236
Domestic work	0.141	0.348	0.064	0.245	0.059	0.236
Unemployed	0.033	0.178	0.016	0.125	0.016	0.125
Self-employed	0.106	0.307	0.124	0.329	0.130	0.336
Part-time employed	0.152	0.359	0.194	0.396	0.164	0.370
Full-time employed	0.548	0.498	0.561	0.496	0.573	0.495
Poor health status	0.011	0.105	0.027	0.162	0.057	0.232
Less than education NVQ1	0.079	0.270	0.079	0.270	0.079	0.270
Education NVQ1	0.141	0.348	0.141	0.348	0.141	0.348
Education NVQ2	0.348	0.477	0.348	0.477	0.348	0.477
Education NVQ3	0.133	0.340	0.133	0.340	0.133	0.340
Education NVQ4	0.164	0.370	0.164	0.370	0.164	0.370
Education NVQ5-6	0.134	0.341	0.134	0.341	0.134	0.341
Social function at school	0.489	0.500	0.489	0.500	0.489	0.500
North	0.090	0.287	0.090	0.287	0.094	0.292
North-West	0.114	0.318	0.112	0.315	0.110	0.313
Yorkshire	0.095	0.293	0.096	0.295	0.095	0.293
West-Midlands	0.113	0.316	0.113	0.316	0.112	0.315
East-Midlands	0.073	0.260	0.079	0.270	0.083	0.276
East-Anglia	0.048	0.213	0.046	0.210	0.048	0.215
South-West	0.072	0.259	0.085	0.278	0.087	0.282
South-East	0.326	0.469	0.310	0.463	0.302	0.459
Wales	0.070	0.255	0.068	0.252	0.070	0.255
Mother reads books at age 7	0.362	0.481	0.362	0.481	0.362	0.481
High father social class at age 7	0.204	0.403	0.204	0.403	0.204	0.403
BSAG score at age 7	7.402	8.024	7.402	8.024	7.402	8.024
North at age 7	0.104	0.305	0.104	0.305	0.104	0.305
North-West at age 7	0.127	0.333	0.127	0.333	0.127	0.333
East-West Riding at age 7	0.076	0.266	0.076	0.266	0.076	0.266
North Midlands at age 7	0.085	0.278	0.085	0.278	0.085	0.278
Midlands at age 7	0.116	0.320	0.116	0.320	0.116	0.320
East at age 7	0.096	0.294	0.096	0.294	0.096	0.294
South-East at age 7	0.188	0.391	0.188	0.391	0.188	0.391
South at age 7	0.077	0.267	0.077	0.267	0.077	0.267
South-West at age 7	0.054	0.227	0.054	0.227	0.054	0.227
Wales at age 7	0.071	0.256	0.071	0.256	0.071	0.256
Observations	1714		1714		1714	

Source: our elaboration on NCDS data

Table B.3. The model "streaming and civic engagement": estimation results of the type of school equation

	Age 33			Age 42			Age 51		
	AME	s.e.		AME			AME		
Propensity to streaming	0.822	0.193	***	0.818	0.180	***	0.813	0.179	***
Female	-0.004	0.014		-0.004	0.014		-0.004	0.014	
Mother reads book at age 7	-0.008	0.016		-0.008	0.014		-0.011	0.015	
High father social class at age 7	-0.045	0.020	**	-0.050	0.018	***	-0.050	0.018	***
BSAG score at age 7	0.000	0.001		0.000	0.001		0.000	0.001	
North at age 7	0.011	0.035		0.007	0.035		0.008	0.035	
North-West at age 7	0.004	0.031		0.001	0.031		0.003	0.031	
East-West Riding at age 7	-0.014	0.037		-0.017	0.037		-0.015	0.036	
North Midlands at age 7	-0.001	0.034		-0.004	0.034		-0.002	0.034	
Midlands at age 7	0.006	0.032		0.008	0.032		0.008	0.032	
East at age 7	0.000	0.033		-0.001	0.033		0.000	0.033	
South-East at age 7	0.006	0.029		0.006	0.029		0.006	0.029	
South at age 7	0.007	0.035		0.006	0.035		0.006	0.035	
South-West at age 7	-0.019	0.042		-0.020	0.041		-0.021	0.041	
Wales at age 7					base-category				

Source: our elaboration on NCDS data. Note: AME indicates average marginal effects.

Table B4. The impact of streaming on adult civic engagement: 2SLS estimation results.

	Age 33			Age 42			Age 51		
	Coefficient	s.e.		Coefficient	s.e.		Coefficient	s.e.	
Streamed school	0.019	0.168		-0.199	0.158		-0.236	0.129	*
Female	0.110	0.019	***	0.066	0.018	***	0.008	0.015	
Married	0.005	0.020		0.033	0.020	*	0.053	0.015	***
Inactive					base-category				
Domestic work	0.070	0.058		-0.017	0.048		0.028	0.041	
Unemployed	-0.027	0.069		-0.071	0.072		-0.079	0.056	
Self-employed	0.027	0.059		-0.095	0.045	**	-0.008	0.035	
Part-time employed	0.072	0.058		-0.005	0.043		-0.014	0.035	
Full-time employed	-0.035	0.055		-0.115	0.041	***	-0.047	0.031	
Poor health status	-0.025	0.069		-0.015	0.048		-0.061	0.034	*
No education					base-category				
Education NVQ1	0.061	0.033	*	0.084	0.033	**	0.039	0.030	
Education NVQ2	0.141	0.029	***	0.168	0.029	***	0.117	0.026	***
Education NVQ3	0.231	0.032	***	0.236	0.033	***	0.186	0.029	***
Education NVQ4	0.273	0.032	***	0.306	0.032	***	0.235	0.029	***
Education NVQ5-6	0.468	0.033	***	0.542	0.033	***	0.471	0.029	***
Social functions at school	0.019	0.017		0.025	0.017		-0.002	0.015	
North	-0.071	0.040	*	-0.086	0.040	**	-0.062	0.036	*
North-West	-0.064	0.038	*	-0.082	0.038	**	-0.108	0.033	***
Yorkshire	-0.049	0.041		-0.093	0.039	**	-0.093	0.035	***
West-Midlands	-0.058	0.038		-0.085	0.038	**	-0.015	0.033	
East-Midlands	-0.042	0.043		-0.063	0.041		-0.078	0.035	**
East-Anglia	-0.010	0.046		-0.076	0.046	*	-0.137	0.040	***
South-West	-0.069	0.045		-0.098	0.042	**	-0.054	0.037	
South-East	-0.018	0.034		-0.032	0.034		-0.005	0.029	

Wales				base-category					
Constant	-4.668	0.108	***	-4.517	0.090	***	-4.557	0.075	***

First stage equation	AME	s.e.		AME	s.e.		AME	s.e.	
Propensity to streaming	0.770	0.177	***	0.770	0.177	***	0.770	0.177	***
Female	-0.006	0.014		-0.006	0.014		-0.006	0.014	
Mother reads book at age 7	-0.007	0.014		-0.007	0.014		-0.007	0.014	
High father social class at age 7	-0.043	0.017	***	-0.043	0.017	***	-0.043	0.017	***
BSAG score at age 7	0.000	0.001		0.000	0.001		0.000	0.001	
North at age 7	0.013	0.036		0.013	0.036		0.013	0.036	
North-West at age 7	-0.001	0.032		-0.001	0.032		-0.001	0.032	
East-West Riding at age 7	-0.020	0.036		-0.020	0.036		-0.020	0.036	
North Midlands at age 7	-0.008	0.034		-0.008	0.034		-0.008	0.034	
Midlands at age 7	0.002	0.033		0.002	0.033		0.002	0.033	
East at age 7	-0.005	0.033		-0.005	0.033		-0.005	0.033	
South-East at age 7	0.001	0.030		0.001	0.030		0.001	0.030	
South at age 7	0.000	0.035		0.000	0.035		0.000	0.035	
South-West at age 7	-0.027	0.040		-0.027	0.040		-0.027	0.040	
Wales at age 7					base-category				
Constant	0.104	0.072		0.104	0.072		0.104	0.072	

Source: our elaboration on NCDS data. Note: AME indicates average marginal effects.

Table B5. The 2SLS estimation: endogeneity test

	Age 33	Age 42	Age 51
Endogeneity test of endogenous regressors			
Hausman test	0.051	0.076	0.099
P-value	0.584	0.141	0.029

Source: our elaboration on NCDS data

Table B6. Goodness of the instrument "Regional propensity to streaming"

	Age 33	Age 42	Age 51
Underidentification test			
Kleibergen-Paap rk LM Test of rank matrix:	28.68	36.91	31.91
Chi-square (1) P-value	0.000	0.000	0.000
Weak identification test			
Cragg-Donald Wald F statistic:	25.623	33.231	28.929
Stock-Yogo weak ID test critical values:			
10% maximal IV size		16.380	
15% maximal IV size		8.960	
20% maximal IV size		6.660	
25% maximal IV size		5.530	

Source: our elaboration on NCDS data