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Abstract

Despite the growing prominence of theoretical analysis of inequality of opportunity over the past twenty years, empirical work towards the normative evaluation of real-world policies has been minimal. This paper seeks to address this issue. It proposes a normative framework to model the influence of educational policy on health outcomes, grounded in Roemer's model of equality of opportunity. We apply this model to the National Child Development Study (NCDS) cohort, who, since their schooling lay within the transition period of the comprehensive education reform in England and Wales, attended different types of secondary school. We use this reform in two ways: first, to evaluate the health outcomes of different educational policies under different normative principles; second, to simulate counterfactual distributions of health outcomes by neutralising the different channels through which early life circumstances influence health. Evidence on the comparative performance of the two educational systems is mixed, suggesting that the opportunity-enhancing effects of the comprehensive reform were, at best, modest in terms of adult health. For some of the health outcomes considered, this leads to a convergence between the policy recommendations made by the two ethical principles of equality of opportunity and utilitarianism, while for others, the two principles diverge in their evaluation.

JEL codes: I12, I28, C21

Keywords: Health; Education; Inequality of opportunity; NCDS

1. Introduction

In recent years, a number of important developments have paved the way towards a theory of the distributive implications of holding individuals partly responsible for their achievements. As emphasised by Fleurbaey (2008; 3), a key objective of this theory is to define an array of ethical criteria against which concrete policy interventions can be evaluated. Despite this call for greater use of the equality of opportunity framework in the normative evaluation of real-world policies, very little empirical work of this kind has been done.

Education and health have been the focus of a growing number of empirical applications of the inequality of opportunity framework. For example, Betts and Roemer (2003) and Waltenberg and Vandenberghe (2007) determine the hypothetical reallocations of educational expenditure required to equalise opportunities for educational attainment, in the USA and Brazil, respectively. While insightful in their own right, these contributions do not assess whether concrete policy interventions can be deemed to enhance equality of opportunity in practice. The same can be said of the recent applied research on inequality of opportunity in health. For example, Trannoy *et al.* (2010) and Rosa Dias (2009) provide evidence on the size and determinants of illegitimate health inequalities; while this evidence permits broad policy implications to be inferred, it is too general to inform concrete healthcare interventions.

To the best of our knowledge, the only recent contribution that explicitly sheds light on the evolution of inequality of opportunity in the context of a real policy intervention is Figueroa *et al.* (2012). It evaluates the effects of a widely known conditional cash transfer programme in Mexico, *Oportunidades*, on children's nutrition and health outcomes. The measured effects, however, capture only the short-run health consequences of the programme. Moreover, this normative appraisal is restricted to the individuals targeted by *Oportunidades*, which, despite being a large conditional cash transfer, affects a minority of the Mexican population. In contrast, the focus of this paper is not on immediate policy effects, but rather on a normative appraisal of the long-run outcomes associated with a major UK educational reform, whose explicit objective was to reduce inequality of opportunity and which profoundly transformed secondary education in the UK.

Education and health have long been recognised as complementary dimensions of human development and the importance of education as an input in the health production function is well established. First, contributions such as Lleras-Muney (2005), Arendt (2005; 2008), Albouy and Lequien (2009), Oreopoulos (2006), Silles (2009), Jürges et al. (2011), Van Kippersluis *et al.* (2011) and Cutler and Lleras-Muney (2008, 2010) show that length of schooling affects positively health and longevity in the long run. Second, a more recent strand of research has shown that both the type and quality of schooling have a positive long-run impact on health and lifestyle. Johnson (2010) shows that the end of racial segregation in US secondary schools in the 1950s had positive long-lasting effects on the average health outcomes of black Americans. Jones *et al.* (2011) corroborate the existence of a long-term positive association between type of schooling and average health outcomes, using UK data.

Taken as a whole, this body of international evidence suggests that schooling affects health outcomes through a number of different channels: it influences lifestyle formation, levels of health literacy and access to a higher social position in adulthood, which in turn affects health. Education is also likely to affect individuals' time and risk preferences, which can have a profound effect on health-related behaviours and outcomes. Thus, in policy circles, education policy is often believed to be the "silver bullet" for improving population health and advancing health inequalities. We propose a normative theoretical framework for the association between educational policy and health outcomes, grounded in Roemer's (2002) model of inequality of opportunity, and apply it to data from the UK comprehensive education reform, which had explicit egalitarian objectives. This reform, introduced in the early 1960s, sought to enhance equality of opportunity in society by abolishing the early segregation of pupils into different secondary school types (academically oriented or otherwise). We offer three innovations.

First, we model separate pathways through which circumstances affect opportunity in health later in life, either directly or through their impact on educational attainment. This is a general human development model that can be used to analyse the complementarity between education policy and health. In order to illustrate this model we apply it to data from a large UK cohort study, the National Child Development Study (NCDS). This

empirical application allows us to simulate counterfactual distributions of health brought about by the neutralisation of each of these pathways, and discuss whether the relative importance of these pathways differs across educational policy regimes.

Second, we exploit the comprehensive education reform to analyse the potential for educational policy to equalise opportunities in health. The secondary school years of the NCDS cohort members lay within the transition period of one of the most wide-ranging educational reforms in the UK: the replacement of the early tracking system of secondary education in place since the end of the Second World War by a unified mixed-ability secondary schooling system. The fact that only some members of the sample were exposed to the new system allows us compare the inequality of opportunity in health associated with distinct educational policy regimes.

Third, we evaluate and compare the health outcomes associated with each of these policy regimes under the different normative perspectives of utilitarianism and the equality of opportunity principle. This complements earlier theoretical work on this theme, such as Fleurbaey (2008), by relating such normative principles to empirical evidence on a major policy intervention.

Our results indicate the presence of inequality of opportunity under both policy regimes. They also suggest that the opportunity-enhancing effect of the comprehensive reform was, at best, modest, given that it is simultaneously associated with improvements in some health outcomes deterioration in others, for the worst-off groups in society. This leads the policy recommendations made on the basis of the ethical principles of equality of opportunity and utilitarianism to converge in terms of some of the health outcomes considered, but to diverge in terms of others.

2. Theoretical framework

2.1 Inequality of opportunity in the context of health

The Roemer model (1998, 2002) partitions all factors influencing individual attainment into a category of effort factors, for which individuals should be held partly responsible and circumstance factors, which, being beyond individual control, are a source of

inequitable differences in outcomes. Importantly, it is explicitly recognised that effort is shaped by circumstances. The Roemer model defines social types *(t)* consisting of individuals who share the same set of circumstances. The set of observed individual circumstances allows the specification of these social types from the data. Since the *distribution* of effort within each type is itself a characteristic of the type, and not of any individual, it is itself a circumstance. Thus, an individual should not be penalized because his low effort is in part the consequence of his belonging to a type whose members expend low effort in general.

In order for the degree of effort expended by individuals of different types to be comparable, Roemer (1998) proposes the definition of quantiles (π) of the distribution of effort (for example, proxied by the number of cigarettes smoked per day) within each type: two individuals are deemed to have exerted the same degree of effort if they sit at the same quantile of their type's distribution of effort. Using the quantile measure of effort seeks to purge the effect of circumstances on the distribution of effort.

When effort is observed, the quantile measure is directly applicable. However, if effort is unobservable, an additional assumption is required: by assuming that the average outcome, health in this case, is monotonically increasing in effort. Then, effort becomes the residual determinant of health once types are fixed; therefore, those who sit at the π^{th} quantile of the outcome distribution also sit, on average, at the π^{th} quantile of the distribution of effort within their type. Equality of opportunity holds if all those who exert the same degree effort achieve the same health status, independent of their circumstances. In other words, there is full nullification of the effect of circumstances, leaving untouched the differences in outcome that are caused solely by effort. Denoting by $F^t(h)$ the cumulative distribution function of health, conditional on type, this would require: $F^t(h) = F(h)$ for all *t*.

Full equality of opportunity is rarely attained. More typically, we find that – if the types can be intuitively ranked according to degree of disadvantage – then there will be first-order stochastic dominance among the type-specific distributions of the outcome (here, health status); that is, as proposed by Lefranc *et al* (2006), the distribution function of

health status of more advantaged types will first-order stochastically dominate the distribution function of less advantaged types, holding policy fixed.

2.2 Circumstances, education and health: a normative framework

Figure 1 shows three hypothetical pathways through which circumstances affect health. First, circumstances affect educational attainment, which, in turn, has an effect both on lifestyle and socioeconomic status in adulthood. Both instances of this relationship are in accord with the economic and epidemiological literature: Cutler and Lleras-Muney (2008, 2010) show that educational attainment affects lifestyle choices and socioeconomic status later in life; the literature on the socioeconomic determinants of health finds an association between lifestyle, socioeconomic group and health status (for example Marmot *et al.* (2001)). Second, circumstances may have an impact on lifestyle and socioeconomic class by channels other than education. For example, Balia and Jones (2008) show that one of the determinants of cigarette smoking in adulthood is parental smoking status. Third, there is also evidence that circumstances may affect health in adulthood directly, through mechanisms that do not necessarily impact on lifestyle and socioeconomic class. As shown in Cutler and Lleras-Muney (2008) a number of, often unobserved, factors can be amalgamated in this category, such as genetic predispositions, and parental and social influences that influence time preferences and attitudes towards risk in the long run.

Insert Figure 1 here

2.3 Policy evaluation

The reform examined in this paper was aimed at reducing inequality of opportunity by improving the quality of schooling available to children from disadvantaged backgrounds. It should be made clear that this reform has been previously evaluated in terms of its average direct impact on educational attainment (see e.g., Kerkchoff *et al.,* 1996; Jesson, 2000; Galindo-Rueda and Vignoles, 2005), subsequent labour market outcomes (Dearden *et al.,* 2002) and long-term health outcomes (Jones *et al*., 2011). Our goal is not to re-evaluate this reform in terms of its average impact; it is rather to compare the normative evaluation of the distribution of health outcomes associated with each of the policy regimes (the old one that the reform aimed to abolish, and the new one brought about by

it) under the different normative perspectives of utilitarianism and the equality of opportunity.

We begin by measuring and characterising inequality of opportunity in health under each of the two policy regimes. In addition to comparing median health outcomes, we estimate the magnitude of inequality of opportunity under each policy regime using the dissimilarity measure proposed in Paes de Barros (2008), and widely used in the recent applied literature. This measure, often denoted D-index, quantifies the dissimilarity of probability of an outcome of interest for types defined by circumstance characteristics (p_t), compared with the average probability of that outcome occurring in the population as a whole $(\overline{p})$. As explained in Paes de Barros et al. (2008) in order to implement this approach we first estimate the expected probability of the outcome of interest (using a probit model) and then the following absolute inequality measure is computed: $D = \frac{1}{2\overline{p}} \sum_{1}^{T} \beta_t \left| p_t - \overline{p} \right|$. This measure is scale invariant and has been interpreted in the literature as the fraction of all available opportunities that need to be reassigned from better-off types to worse-off types in order to achieve equality of opportunity.

In addition, in line with Lefranc et al. (2006), we further characterise the opportunity-enhancing potential of the reform by testing if the distribution function of the most disadvantaged individuals under the new policy first-order stochastically dominates the distribution of the most disadvantaged individuals under the old policy. Because the distribution of health outcomes of a type is taken to be the measure of the opportunities for health available to members of the type, if one distribution first-order stochastic dominates a second, this means that the opportunities for health of the population associated with the first distribution are unambiguously better than are those opportunities for the population associated with the second distribution. (In particular, first-order stochastic dominance is obviously a stronger indication of better opportunities than ordering opportunities by some statistic, such as the means, of the distributions.)

From a practical perspective, first order stochastic dominance (FOSD) has the advantage of allowing welfare comparisons that are independent of the scale of the outcome variable. This is particularly useful in the case of ordinal outcomes, such as self-assessed health.

Moreover, FOSD conditions are statistically testable. We use the test procedure recently proposed by Yalonetzky (2013) for the specific case of discrete and ordinal outcomes[1].

Finally, we conduct a normative evaluation of the distribution of outcomes associated with the policy regimes under the perspectives of utilitarianism and equality of opportunity. Let educational policy regimes be denoted by *r*. By indexing the distribution functions according to policy regime one is able to compute families of functions $\left\{F_r^t(h)\right\}$. The equality-of-opportunity ethic prescribes choosing the policy that makes the distribution function of the most disadvantaged type as favourable as possible. However, there is no unique way of doing this. If the *cdf*s of different types do not intersect, and denoting the most disadvantaged type as type 1, the problem is to:

$$\max_r \int \left(1 - F_r^1(h)\right) dh \quad . \tag{2}$$

More generally, in the absence of first-order stochastic dominance, when the distribution functions across types intersect, it is necessary to find the left-hand envelope of the outcome distributions of all types and to compute the area above it. If the *cdf* of the most disadvantaged type FOS dominates the *cdf* of that type in a policy shift, this means that, irrespective of our definition of making the distribution of that type 'as good as possible', the shift will unambiguously be evaluated as an opportunity enhancement. This is the sense in which FOSD is a strong test for equality of opportunity and the comparison of means is a weak one. For a fuller discussion, see Roemer (2002, 2012)[2].

The most popular way of evaluating social policies is inspired by *utilitarianism,* where the objective is to maximize the average value of the outcome in question over the population. (For example, a population's average life expectancy, being a social average, is a utilitarian statistic.) Utilitarianism, as is well known, shows no particular interest in distribution - individuals are simply taken to be vessels into which 'utility' is poured, with the sole object

[1] For a more extensive application of stochastic dominance tests in the context of opportunity-enhancing policy interventions see Figueroa et al. (2012).

[2] Note that, since the degree of equality-of-opportunity is given by the area above the left-hand envelope of the CDFs, then within the equality of opportunity framework, what happens to the most advantaged type is of no consequence as such. This explains our focus on the least advantaged children, who were also those whose opportunities the reform tried to improve.

of maximizing the sum total poured into all the vessels. Utilitarianism is a *consequentialist* view: one can evaluate which of two regimes or policies is better by knowing solely the utility possibilities sets generated under the regimes - in this case, the society-wide vectors of health outcomes. In contrast, the equality-of-opportunity approach is non-consequentialist: one cannot pass judgement on which of two regimes/policies is better solely by knowing the vector of population outcomes, for one needs also to know *non-health information*, namely, the *types* of the individuals. Only then can one construct the type-specific outcome distributions necessary to evaluate different policies. Another way of putting this is that utilitarianism, applied to this problem, has no concern with how health outcomes are generated, and the degree to which persons might be in part responsible for those outcomes, while opportunity-egalitarianism must know these things. It matters whether a person's low health outcome is due to low effort or disadvantaged circumstances in the opportunity-egalitarian view.

As explained above, our goal is to compare, in practice, the normative evaluation of the distributions of health outcomes associated with the different policy regimes, under the ethical principles of equality-of-opportunity and utilitarianism. Let us consider, for example, the outcome self-assessed health, measured on a five-point scale: excellent health; good health; fair health; poor health and very poor health. Denoting by type 1 the most disadvantaged type, the equality-of-opportunity principle chooses the policy that solves: $\max_r \sum_{h=1}^{5}(1-F_r^1(h))$. As noted above, when the SAH *cdf*s of the different types cross, one must instead find the left envelope of the *cdf*s and choose the policy that maximises the area above it. When the *cdf*s of the different types do not cross, this procedure only requires finding the highest *cdf* and selecting the policy regime that maximises the area above it[3]. In contrast, the utilitarian rule prescribes as a policy objective $\max_r \sum_{t=1} \sum_{h=1}^{5} g^t(1-F_r^t(h))$, where g^t denotes the fraction of individuals of type *t* in the population. This is simply the average health outcome in the population. The same rationale can be applied to all the health outcomes considered in the paper.

[3] Under different policy regimes the left-hand envelope may change, so the most disadvantaged, at a given percentile, may change types. Nevertheless, within the equality-of-opportunity framework this does not matter. Our measure of equality-of-opportunity indicates how well the most unfairly treated are doing (i.e. those who comprise the left-hand envelope), irrespective of their identity. It does not matter who they are *per se*.

2.4 Counterfactual analysis

Define T social types, S educational attainment levels, J socioeconomic occupational groups in adulthood and L lifestyles. Let $n^t(s)$ be the number of individuals of type t who attain educational level s. Because each individual is in one of J socioeconomic groups, one can define $g^{s,t}(l,j)$ the fraction of people of type t with educational level s, who attain the lifestyle-socioeconomic group pair (l,j). Similarly, let $F^{l,j,t}(h)$ be the *cdf* of health of the group of individuals in type t that has lifestyle level l and socioeconomic group j; thus, $F^{l,j,t}(h)$ is the fraction of this group's members whose health status is less or equal to h. Finally, denote by n^t the number of people in type t and by N the total number of people. Then, the *cdf* of health in type t is given by:

$$F^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j,t}(h)\sum_{s} g^{s,t}(l,j)n^t(s) \qquad (1)$$

To confirm that this makes sense, observe that $\sum_{s} g^{s,t}(l,j)n^t(s)$ is the total number of people in type t who attain lifestyle-socioeconomic group (l,j). Therefore, the number of people of the group (l,j,t) whose health is less or equal than h is simply $F^{l,j,t}(h)\sum_{s} g^{s,t}(l,j)n^t(s)$. Now, sum this over (l,j) giving the total number of people in type t who have health worse than or equal to h; finally divide by n^t to obtain the fraction and therefore the *cdf*.

The purpose of breaking down the definition of the *cdf,* as in (1), is to quantify the importance of the pathways by which type affects health. Let us designate by the *educational path* the effect of type on educational attainment (which partly determines (l,j), hence impacting on health). In the model, this is exclusively represented by the function $n^t(s)$. There is also a *non-educational path* of the effect of type on health: even after educational attainment is determined, type continues to affect (l,j); this is represented by the function $g^{s,t}(.)$. In addition to these two channels, type also affects health in adulthood directly,

through a *residual path* that does not operate through (l, j). This scheme can be used to simulate counterfactual distributions, brought about by silencing, in turn, the *educational*, the *non-educational* and the *residual* paths.

Counterfactual 1

Define the fraction of each level of attainment in the entire population by:

$$\hat{f}(s) = \sum_t \frac{n^t}{N} \frac{n^t(s)}{n^t} = \frac{1}{N} \sum_t n^t(s)$$

Substituting $\hat{f}(s)$ in (1), one obtains the counterfactual distribution for each type:

$$\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j) \hat{f}(s) \qquad (3)$$

We may calculate these distribution functions for each policy regime. These functions silence the *educational path* of the influence of type on health; they replace the type-specific effect of type on schooling with simply the fraction of individuals in the population at large who achieve schooling *s*. Thus, the distributions $\left\{\hat{F}_r^t(h)\right\}$ differ across *t* solely due to the *non- educational* and *residual* paths of the impact of type on health.

Counterfactual 2

Next, define $g^{s\cdot}(l, j)$ as the fraction of the entire population of educational level *s* who attain (l, j): $g^{s\cdot}(l,j) = \sum_t \frac{n^t}{N} g^{s,t}(l,j)$. By replacing $g^{s,t}\left(l, j\right)$ by $g^{s\cdot}(l, j)$ one silences the *non-educational path*, thus obtaining the counterfactual distribution:

$$\tilde{F}^t(h) = \frac{1}{n^t} \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s\cdot}(l,j) n^t(s) \qquad (4)$$

This counterfactual distribution neutralizes the *non- educational* effect of type on health, and can be calculated for each policy regime.

Counterfactual 3

Finally, let $F^{l,j}(.)$ be the *cdf* of health of the group of individuals, in the population at large, who adopt lifestyle level *l* and belong to socioeconomic group *j*. By replacing the type-

specific $F^{l,j,t}(.)$ by $F^{l,j}(.)$ one neutralises the *residual path*, therefore obtaining the counterfactual distribution:

$$\ddot{F}^{t}(h) = \frac{1}{n^{t}} \sum_{l,j} F^{l,j}(h) \sum_{s} g^{s,t}(l,j) n^{t}(s)$$

This neutralizes the *residual path* of the effect of type on health, leaving the other two paths unaffected.

3. Data

The NCDS follows a cohort of nearly 17,000 individuals born in Great Britain in the week of 3rd March 1958. Seven waves of interviews are used here: when cohort members were aged 7, 11, 16, 23, 33, 42 and 46 years old. The study compiles in-depth information on the cohort-members' childhood and parental background. It records cognitive ability and social development in childhood and adolescence, type of schools attended and overall educational achievement. It also includes measures of social and occupational status in adulthood, and detailed information on lifestyles and health outcomes in adulthood. The data in the NCDS can be related to our normative framework as described below.

Policy (r)

The educational experience of members of the NCDS cohort has important and distinct features. This is mainly due to the fact that the cohort's secondary schooling lay within a transition period of the comprehensive schooling reform, implemented in England and Wales[4].

Between the end of the Second World War and the 1960s, the schooling system in England and Wales separated the more and less accomplished pupils into different educational tracks according to their performance in an exam taken at age 11, the "Eleven Plus" exam. Students who performed well in this exam were offered the possibility of attending at a grammar school. Grammar schools were academically oriented state schools that provided

[4] Data on Scotland are not used: the Scottish educational system of the 1960s and 1970s was structurally very different from the one experienced by all the other NCDS cohort-members, and comprehensive schooling was introduced earlier, preventing a legitimate comparison of types of school, educational qualifications and outcomes.

teaching for the entire age range 11-18, including a sixth form for Advanced level ("A-level") studies, and prepared pupils to go on to higher education. Pupils whose examination score did not permit entry into a grammar school went to secondary modern schools, which were also state schools, but less academically oriented and covered the ages 11-16 or, in a small minority of cases, vocational schools aimed at providing training and technical apprenticeships.

By the late 1950s this early tracking system became increasingly criticised for being unfair to pupils from disadvantaged backgrounds, thereby perpetuating inequality of opportunity in society. Since the early 1960s the Labour Party explicitly endorsed these criticisms but the Conservative party largely supported the selective system of education. Thus, in 1965 a Labour government gave the first impetus towards the reform of the educational system. This reform progressively replaced the selective educational system (both grammar and secondary modern schools) by unified mixed-ability secondary schools system named "comprehensive schools".

At the local level, the implementation of the reform was staggered, following a call by the central administration for Local Education Authorities (LEA) to submit plans to turn selective schools (both grammar and secondary moderns) into comprehensive ones. In general, LEAs controlled by the Labour Party responded to this call promptly, while many Conservative LEAs resisted it. In the economic literature, political affiliation of the constituency where individuals lived at age 11 has been shown to be a key determinant of the educational system attended by Jesson (2000) and Galindo-Rueda and Vignones (2005) both of which use data from the NCDS.

As shown in Figure 2, nearly 40 per cent of the state schools students in the NCDS cohort were not affected directly by the comprehensive reform and attended the selective system of state-funded education.[5] Just over half of the cohort was affected by the reform and attended comprehensive schools. Also, a small minority of the NCDS cohort (about 7 per cent of the total) went to private fee-paying schools, independent of the state schools

[5] In a few cases, pupils whose grades were sufficient transferred to grammar schools or sixth form colleges to complete their A-levels.

educational systems and reforms; these individuals were therefore dropped from our sample.

INSERT FIGURE 2 AROUND HERE

Childhood circumstances (t)

The NCDS allows us to trace the socioeconomic background of the parents of each cohort member; this has been shown to be a key determinant of health in adulthood in various studies, such as Case *et al.* (2005), Lindeboom *et al.* (2009), Rosa Dias (2009) and Tubeuf et al. (2012).

The NCDS is also rich in measures of cognitive ability prior to secondary schooling. Scores of ability tests taken at ages 7 and 11 are available on a series of cognitive dimensions: mathematics, reading, copying designs and general ability. Since test scores are highly correlated, hence leading to multicollinearity in econometric models, we follow Galindo-Rueda and Vignoles (2005) and use principal-components analysis to construct a single measure of cognitive ability based on the first principal component. We also follow Jones *et al.* (2011) in using as a proxy for individuals' cognitive ability their relative rank in the distribution of cognitive ability of their peers at age 7, which pre-dates the comprehensive education reform. Jones *et al.* (2011) exploit the natural dividing line in the population drawn by the reform: the line separating those who experienced, or would have experienced in the absence of the reform, a grammar school education from those who attended, or would have attended, secondary modern schools. They show that among those who went to selective schools there is a clear threshold, around the 60^{th} percentile of ability scores, separating those who went to secondary moderns from those who went to grammar schools. We draw on these findings to categorise individuals' cognitive ability as higher (top 40 per cent) or lower (bottom 60 per cent), within the context of the reform; this allows us to keep the number of social types used in the analysis tractable.

Finally, the data also include information about the socioeconomic characteristics of the cohort-members' immediate social milieu. Pischke and Manning (2006) show that, especially for the NCDS cohort, the political control of a given area by the Labour or the

Conservative party is strongly correlated with the socioeconomic composition of individuals' close social environment. Conservative areas tend to be relatively better-off: on average, the prevalence of homeowners, professional and managerial workers is substantially higher in Conservative areas than in Labour ones. Also unemployment rates tend to be higher in Labour areas than in Conservative ones[6]. Given the practical need to keep the dimensionality of the circumstance space tractable, we have included information on the political party that controlled each cohort-member's parliamentary constituency immediately before the reform as a proxy for the socioeconomic characteristics of the individuals' local environment during childhood.

Our definition of types is thus based on these three broad categories of circumstance: parental socioeconomic status, cognitive ability, and political tone of a cohort-member's local area before the introduction of the reform. A typology comprising twelve types is defined, corresponding to the Cartesian product of the following sets of circumstances[7]:

$$\{\text{parental socioeconomic background (3 groups)}\}\times\{\text{cognitive ability at age 7 (top 40\% vs bottom 60\%)}\}\times$$
$$\times\{\text{political control of the constituency pre-reform (Labour vs Conservative)}\}$$

Educational attainment (s)

The NCDS includes information on the educational attainment and qualifications awarded to cohort members: no formal qualifications; Certificates of Secondary Education (CSE), O-levels, A-levels and university degree or equivalent[8] [9].

Socioeconomic status in adulthood (j)

Although information on the cohort-members income in adulthood is available there is substantial non-response. Several papers advocate using occupational categories as a proxy

[6] Despite these differences, there are no significant discrepancies in observed childhood health outcomes between Conservative and Labour areas.

[7] Although these circumstances encompass a wide range of the factors known to influence health outcomes in adulthood, we cannot claim that they capture the entirety of influences beyond individual control. In this application, however, working with more than twelve types proved to be impractical, for cell sizes quickly collapse to zero as the number of types increases. The inequality attributable to our social types should thus be seen as a lower bound for the *true* inequality of opportunities in health.

[8] CSEs and O-level (Ordinary levels) were secondary education qualifications corresponding, typically, to 11 years of education in total; CSEs were academically less demanding than O-levels. A-levels (Advanced levels) are a qualification which typically corresponds to 13 years of education. Completion of A-levels is ordinarily a prerequisite for university admission.

[9] Jones et al (2010) further disaggregate this information into thirteen categories, ordered according to the grades obtained and number of passes. This is not done here, since that would greatly increase the dimensionality of the model, reducing cell size, and making the empirical implementation intractable.

for socioeconomic status (see for example, Case *et al.* (2005)). We follow this approach, and define four categories: manual unskilled/long-term unemployed workers; manual skilled jobs; non-manual occupations; professional and managerial positions.

Lifestyle (l)

Lifestyle in adulthood is proxied by a binary variable for whether cohort-members are cigarette smokers at age 46, i.e. in 2004. In that year in the UK the prevalence of cigarette smoking amongst the age group the NCDS cohort-members belong to was approximately 28 per cent: prevalence of smoking was at its highest amongst individuals who were between 20 and 24 years of age and remained fairly constant up until age 50, after which it declined markedly. It then dropped even further for individuals aged 60 and older[10]. This overall pattern in cigarette smoking was relatively persistent in the UK throughout the three decades prior to 2004, both for males and females. In the NCDS, cigarette smoking is clearly the most significant sole predictor of mortality and morbidity and susceptible of being affected by educational factors, such as the schooling reform.

Although the NCDS includes self-reported information on other health-related behaviours (weekly consumption of vegetables, fruits and a series of alcoholic beverages) this information is only available for a considerably smaller number of individuals in our data. Moreover, these health-related behaviours been shown to be much poorer predictors of health in adulthood in earlier work on the NCDS (see Rosa Dias, 2009 and references therein).

Health outcomes (h)

In order to characterise the health of NCDS cohort members we use a range of health outcomes. The first is self-assessed health (SAH) at age 46, measured on a five-point scale: excellent, good, fair, poor and very poor health. SAH is widely used in health economics and has been shown to predict mortality and deterioration of health even after controlling for the objective medical assessment of health status[11]. We also use a more specific

[10] A richer characterization of cigarette smoking in the UK in the context of socioeconomic inequalities can be found in Balia and Jones (2011).

[11] It should be noted that it is possible that the evaluation of SAH by individuals of different countries, or different social groups within a country, may be systematically affected by expectations, aspirations, social and cultural norms. This type of reporting heterogeneity has been extensively examined in the literature using *anchoring vignettes*: these are descriptions of hypothetical, but objectively defined health statuses, used to anchor and make comparable SAH valuations by different survey respondents. Vignettes are however not

measure of health in adulthood: the prevalence of self-reported long-standing illness or disability at age 46. Information on the particular medical condition associated with it is available and classified according to the International Classification of Diseases (ICD-10). Finally, we complement our portrayal of the cohort-members' health status using detailed information about their mental health in adulthood: NCDS respondents answer a series of questions from the Cornell Medical Index Questionnaire, each targeting a particular mental ailment; the number of positive answers given at age 42 has been treated as a malaise score in earlier literature, such as Carneiro *et al.* (2007). For ease of interpretation, since we are analysing inequality of opportunity in health, not in illness, we have inverted the malaise score and categorized a cohort member according to the quintile of its distribution at which they sit: the higher the quintile, the better is mental health.

4. Results

4.1 Policy reform and inequality of opportunity

In order to evaluate the health outcomes associated with the two policy regimes (selective and comprehensive education) according to the equality of opportunity and utilitarian normative principles, one needs to ensure first that the distribution of types is balanced between the two policy regimes. This requires pruning the data, which we do using propensity-score matching. We first estimate the propensity-score of each individual attending the comprehensive system, given his ability level. Then, for all types, we match each individual exposed to one of the policy regimes with his nearest neighbour exposed to the other one (one-to-one propensity-score matching) without replacement. Distances between the propensity-scores of different individuals are calculated according to the Mahalanobis metric and common (propensity-score) support is imposed. Observations that lie outside this common support are subsequently dropped. In our data the number of off-support observations is relatively small (707 out of a total of 5740); in general, these are individuals with atypically high (or low) values of ability and parental socioeconomic status. Table 1(a) below shows, for our sample, the mean values of select characteristics before and after pruning the data using propensity-score matching. In general, the imbalances in these characteristics are modest before matching and reduced further after

available in the NCDS and this issue is only tangentially related to our analyses, since we consider a other health outcomes in addition to SAH. For an application of the vignettes methodology to the analysis of health inequalities see Bago d'Uva et al (2008).

matching. Table 1(b) shows the prevalence of each of the twelve types in our sample, after carrying-out this matching procedure: within each of the types, an equal number of cohort members attended the selective and the comprehensive system.

INSERT TABLE 1(A) AROUND HERE

INSERT TABLE 1(B) AROUND HERE

All twelve types have the same median SAH (good health), irrespective of the policy regime. This is unsurprising given that education is just one of several factors affecting adult health, and also that the UK is an affluent country, that ranks highly in most international comparisons of human development. In order to quantify the overall inequality of opportunity in health, and educational attainment, taking into account all types (for both policy regimes) we use the dissimilarity indices proposed in Paes de Barros et al. (2008). These are shown in Table 2.

INSERT TABLE 2 AROUND HERE

To compute the D-index, we dichotomise the SAH variable using good health as the threshold, as is typical in the health economics literature. However, we do not dichotomise the educational attainment variable: the policy reform has the potential to affect attainment in secondary and post-secondary education. We are thus interested in measuring inequality of opportunity across all levels of secondary and higher education qualifications.

We mentioned above that the comprehensive education reform explicitly attempted to reduce inequality of opportunity in education. Yet, Table 2 shows that inequality of opportunity in educational qualifications is only mildly lower amongst the individuals exposed to the reform than amongst those who were not exposed to it. Since the impact of the reform on educational outcomes is one of the postulated channels of its potential effect on health, it is thus unsurprising that, as shown in Table 2, the differences in measured inequality of opportunity in health between policy regimes are also small.

Following Paes de Barros et al. (2008) we also examine the profiles of inequality of opportunity in health and educational qualifications, i.e the way outcome probabilities vary along each given circumstance. This is done by recalculating the D-index and allowing one circumstance to vary at a time, while holding the values of all others constant. The results are displayed in Tables 3(a) and 3(b), respectively for the selective and comprehensive systems. The measures in the tables indicate the fraction of available opportunities that would need to be reassigned from better-off types to worse-off ones in order to achieve equality of opportunity, if only one circumstance were considered at a time. Tables 3(a) and 3(b) show that the profiles of inequality of opportunity are markedly different for health and education outcomes. For example, differences in ability appear to be much more important in the case of educational qualifications than in the case of health. Interestingly, however, the inequality-of-opportunity profiles do not vary significantly across policy regimes, for both health and educational outcomes.

INSERT TABLES 3(A) AND 3(B) HERE

As mentioned in Section 2.3, in order to analyse the opportunity-enhancing potential of the reform we examine whether the health distribution function of the most disadvantaged type under the policy change shows FOSD. We present in an appendix the distribution functions of SAH for all 12 types (Tables 7 and 8) for both policy regimes. As these tables are difficult to absorb, we here present the graphs of several pairs of these *cdf*s to illustrate the association between circumstances, educational system and health opportunity. In our data, health is measured on a five-point scale, and so each *cdf* consists of five ordered pairs (health outcome and cumulative percentage). Although these *cdf*s are step functions, in the figures below we present them using linear interpolation between the five ordered pairs of points, as this makes for easier visualization. We next compare various pairs of distribution functions to observe circumstance and policy effects.

In Figure 3, we observe the association between parental socioeconomic group and self-assessed health at age 46. The graphs suggest that there is a noticeable effect of this circumstance on health opportunity. Also, Labour areas appear to be more unequal than Conservative ones.

In Figure 4 we present the left-hand envelope of *cdf*s under the two policy regimes. As discussed above, we consider the policy transition opportunity-enhancing if, for the most disadvantaged in society, the outcome distribution associated with the comprehensive system FOSD the one associated with the selective system. We assess this using the stochastic dominance test recently proposed by Yalonetzky (2013). An attractive feature of this test is that it extends the tests procedures developed by Anderson (1996) for continuous outcomes to the case of discrete ordinal outcomes, such as our SAH variable. Yalonetzky (2013) proposes a particularly strict, and clear, rejection rule. Let us consider two SAH *cdf*s, $F^A(h)$ and $F^B(h)$ and denote their difference by $\Delta F(h)$. Rejection of the null hypothesis (homogeneity) requires two simultaneous conditions: $\Delta F(h) \geq 0$ (or $\Delta F(h) \leq 0$), i.e. no curve-crossing; Z_k more extreme than $Z^*, \forall k \in [1,4]$, in the case of our SAH variable, where Z* denotes the relevant one-tailed critical value of the standard normal distribution[12]. As shown in Figure 4 the curves clearly cross, hence first of the two conditions does not hold and therefore we fail to reject the null hypothesis of homogeneity. The transition from the selective system to the comprehensive one cannot be considered unambiguously opportunity enhancing, in terms of SAH in adulthood (age 46).

For another health outcome, the absence of chronic illness, we also observe the presence of inequality of opportunity. This indicator value takes the value 1 if the cohort member is free from chronic conditions at age 46 and 0 otherwise. As shown in Table 4, the cohort-members from the least advantaged type are far more likely to be chronically ill or disabled by age 46 than individuals from the most privileged backgrounds. Moreover, the move towards the comprehensive system cannot be considered opportunity-enhancing and is even associated with a mild increase in the probability of chronic illness for the most disadvantaged type. Finally, also in the case of mental health at age 42 the comprehensive system is even associated with a small reduction of the average value of the mental health index for individuals of the least advantaged type, in other words, with a worsening of mental health[13]. In brief, despite being aimed at promoting inequality of opportunity, the

[12] It has been shown that this test is bounded and consistent (for details see Yalonetzky, 2013 – p.141, 142).

[13] Our data set and empirical strategy are not designed to provide information on the reasons behind the positive association between exposure to the comprehensive system and the prevalence of long-standing illness and of mental conditions. However, we could posit that by streaming individuals into different educational/career pathways early on, the selective system potentially alleviates anxiety associated with being

policy reform cannot be said to be opportunity enhancing in terms of a comprehensive range of health outcomes.

INSERT TABLE 4 HERE

4.2 Normative evaluation of educational systems: equality of opportunity *vs* utilitarianism

The approach described in Section 2.3 allows us to quantify the normative evaluation of the distribution of health outcomes associated with each policy regime. Table 5 compares the evaluation of the selective and comprehensive educational systems under the equality-of-opportunity and utilitarian principles. The numbers on the equality-of-opportunity row of Table 5 correspond, for each policy regime, to the value of the area above the left envelope of the *cdf*s of the different types. In contrast, the numbers for the utilitarian criterion in Table 5 correspond to the weighted average of the area above the *cdf* of each of the types.

INSERT TABLE 5 AROUND HERE

When the outcome under consideration is SAH, both the equal-opportunity and the utilitarian rules favour the comprehensive system. The reasons for this are, however, distinct: while the opportunity-enhancement principle favours this policy regime due to its association with better SAH for the worst-off types, the utilitarian ethic prefers the comprehensive system because it maximises average SAH over all individuals.

The two normative principles diverge, however, when other outcomes are considered, such as mental health and the absence of chronic illness and disability. As seen above, for these outcomes the policy reform is associated with a mild deterioration of the health status of the worst-off type; this leads the equality of opportunity rule to favour the selective system. But despite this deterioration of the health outcomes of the worst-off, the comprehensive system maximises the average of these health outcomes over all types,

a relatively disadvantaged type in a mixed pool of pupils. Our mixed findings may relate to the fact that despite being self-reported, long-standing illness and mental illness (measured using the Cornell questionnaire) are typically considered more objective than SAH.

hence the utilitarian rule is indifferent between policy regimes in the case of chronic illness and disability, and favours the comprehensive educational system in the case of mental health.

Although the observed differences here are small, it is noteworthy that different normative principles evaluate the educational policy shift differently, at least in the cases of absence of long standing illness and mental health.

4.3 Simulation results and counterfactual analysis

As explained in Section 2.4, we simulate three counterfactual scenarios. These are described schematically in Figure 5. Counterfactual 1 neutralises the educational pathway of type, which partly determines (l, j) and hence health; counterfactual 2 neutralises the non-educational pathway and counterfactual 3, the residual path. We construct these counterfactual scenarios for all the health outcomes described above: SAH, absence of chronic illness and mental health.

INSERT FIGURE 5 AROUND HERE

Table 6 displays the actual and counterfactual probabilities of reporting chronic illness and disability at age 46 for the most disadvantaged type (lowest social and ability groups, living in Labour areas) under each of the policy regimes. The actual probabilities are higher than those simulated in the counterfactual distributions given that each of these neutralises, in turn, one of the transmission mechanisms of disadvantageous circumstances in early life.

INSERT TABLE 6 AROUND HERE

These patterns of inequality of opportunity are also discernable when we examine the distribution functions of SAH for all the types under the two counterfactual scenarios, shown in Tables 7 and 8 (presented in the Appendix). The actual *cdf*s of the most disadvantaged types are systematically first order stochastically (FOS) dominated by their respective counterfactuals 1 and 2. The opposite happens with the most advantaged types, which tend not to be FOS dominated by these counterfactuals: for such types, these counterfactual scenarios are largely the result of the neutralisation of positive

circumstantial influences. Counterfactual 3, tends to be more dissimilar to actual distributions than counterfactuals 1 and 2; this is unsurprising, for it amalgamates a heterogeneous set mechanisms through which the influence of type is passed to SAH. It also exhibits patterns that are substantially different from those of the other two counterfactual scenarios, for counterfactual 3 does not systematically FOSD actual distributions for the most disadvantaged types. This pattern holds for counterfactual 3 across all health outcomes.

The results for mental health, shown in Tables 11, 12 and 13 (presented in the Appendix), corroborate the stylised patterns discerned in the case of SAH: counterfactual scenarios 1 and 2 systematically FOSD actual distributions of mental health for the worst-off types, and do not dominate them for the well-off types. This is, however, only partly corroborated in the case of chronic illness and disability (Tables 8, 9 and 10, presented in the Appendix): for type 7 (lowest social and ability groups, living in Conservative areas) counterfactual scenarios do not FOSD the actual distributions; also, for individuals from type 6 (high social and ability groups, living in Labour areas) exposed to the comprehensive system, all the three counterfactuals FOSD their actual distribution of absence of chronic illness and disability.

It could be postulated that the exposure to different educational systems could, in principle, affect these patterns: exposure to the reform might change not only individuals' opportunity sets in terms of health outcomes but also the channels through which education affects health. However, our results do not indicate the existence of such systematic differences between the two educational systems. Furthermore, the relative importance of the educational and non-educational channels, does not exhibit systematic patterns either within or between educational systems. Nevertheless, the results in Tables 8, 9 and 10 suggest that, for absence of chronic illness and disability, Counterfactual 1 (neutralisation of the education-related channel) tends to FOSD Counterfactual 2 for low ability types (seven times out of eight). Despite the large body of literature emphasising the importance of an early life cognitive and social development, this result is reassuring for the potential of educational policy for advancing equality of opportunity in health. Even for the most disadvantaged pupils, improved opportunities for educational attainment may translate into increased opportunities at least for some health outcomes, later in life.

5. Conclusions

We propose a normative framework for evaluating complementary policy interventions and apply it to data from a major educational reform in the UK: the comprehensive schooling reform. The results show relatively modest variation in a wide range of health outcomes across policy regimes. However, they do provide clear evidence of inequality of opportunity in health. Different initial circumstances shape health outcomes later in life through different channels. Some operate through the educational system, affecting socioeconomic status and lifestyle in adulthood, which, in turn, affects health. Some others also affect health through socioeconomic status and lifestyle choices, but are external to the educational system. Others, still, affect health directly, through a number of mechanisms that do not influence socioeconomic status and lifestyle in adulthood. Since they amalgamate a heterogeneous set of observed and unobserved factors, these last channels tend to be the strongest. However, we are not able to identify clear patterns in the relative importance of the two other channels. When the outcome under consideration is absence of chronic illness and disability, the channel that operates through education seems to outweigh the non-educational one, for individuals of low cognitive ability. This result can be seen as supportive of the opportunity-enhancing potential of education.

Evidence regarding the comparative performance of the two educational systems is mixed in terms of health outcomes, since it is associated[14] with both increases and deterioration in our different health outcomes. Thus, the opportunity-enhancing effects of the comprehensive reform on health were, at best, very modest.

This type of mixed evidence is also reflected in the normative evaluations of the policy according to the ethical principles of equality of opportunity and utilitarianism. Because of its emphasis on outcomes for the worst-off types, equality of opportunity favours the comprehensive system when the outcome of interest is SAH. However, since comprehensive education ceases to outperform the selective one for the least advantaged

[14] Our results should be interpreted as statistical associations, since our empirical strategy and data do not allow us to rule out the possibility of unobservable factors affecting the relationship between schooling and health.

types when health outcomes are measured in terms of mental health and absence of chronic illness and disability, in terms of these outcomes the equality of opportunity rule favours the selective system. On the contrary, the utilitarian evaluation always favours the comprehensive educational system, given that it is always associated with a higher average of the three health outcomes over all types.

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Figure 1: Conceptual framework

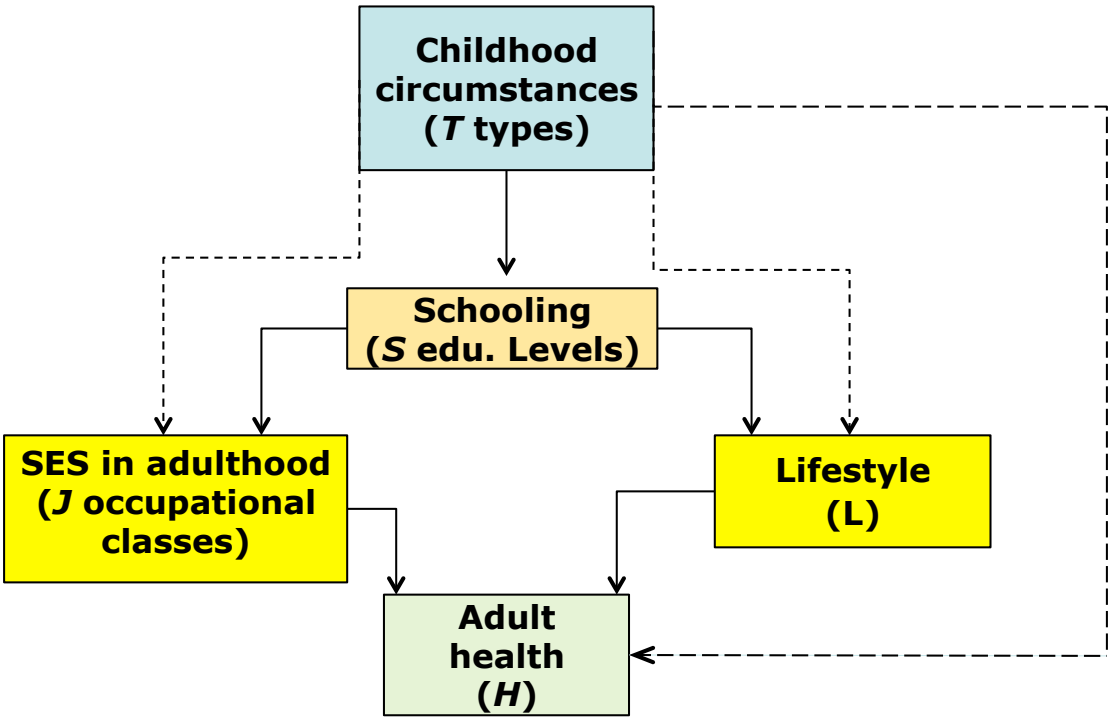
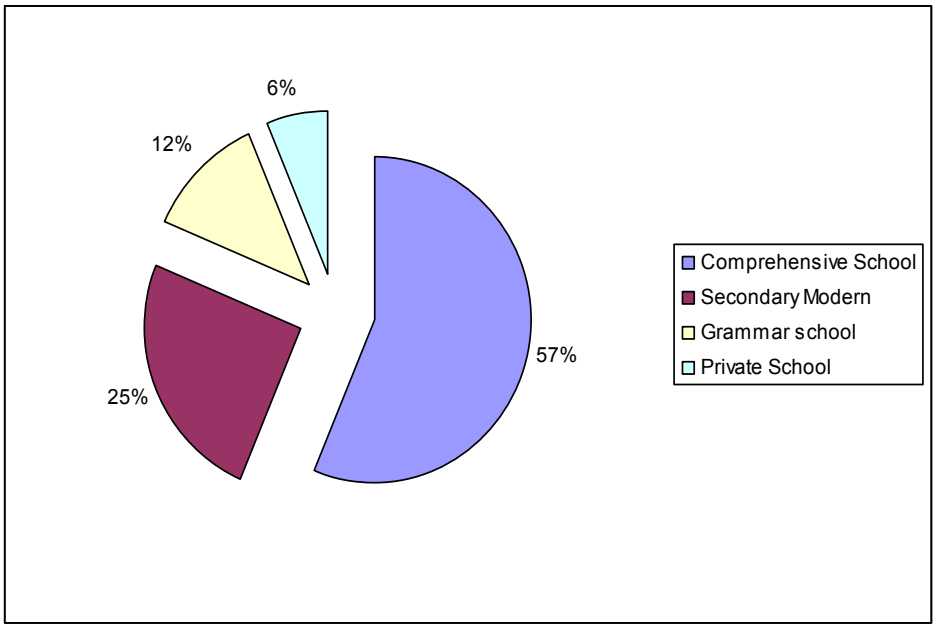


Figure 2: NCDS cohort-members by type of school and educational system (age 16)



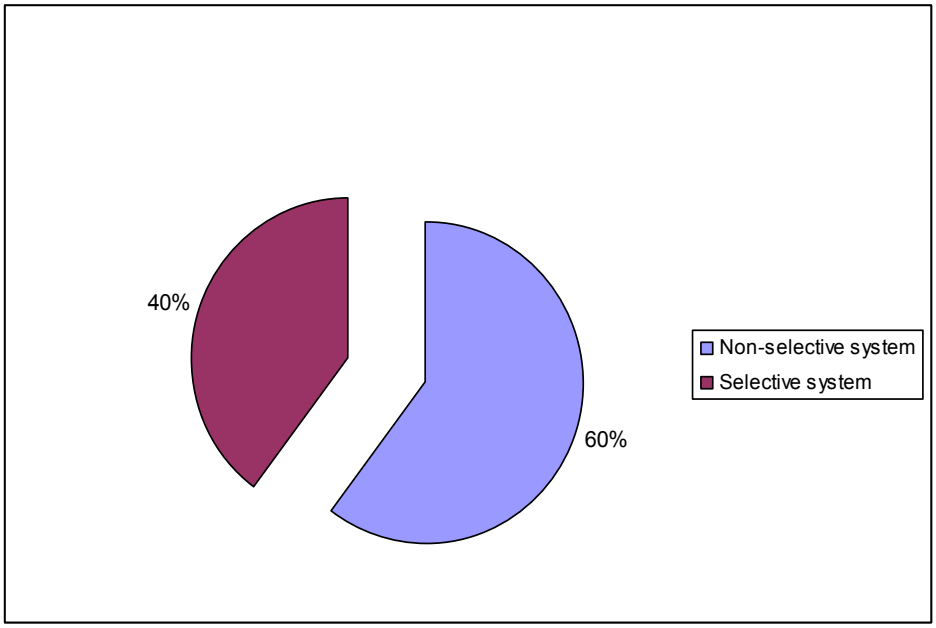
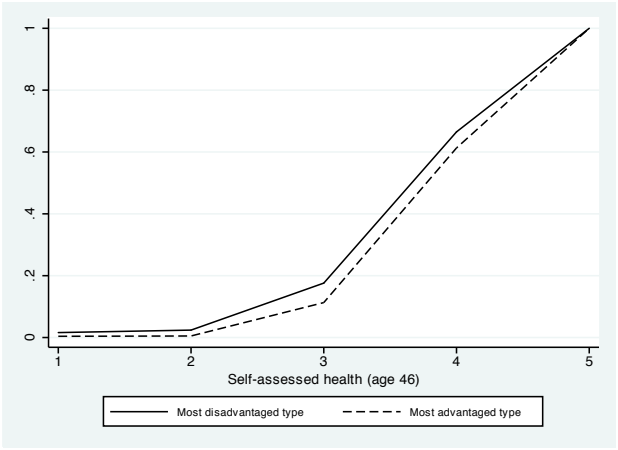


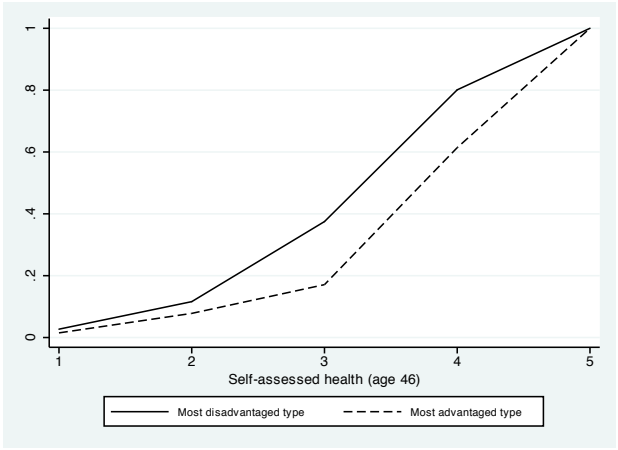
Figure 3: Distributions of SAH for the most and the least advantaged types

Selective educational system

Conservative areas

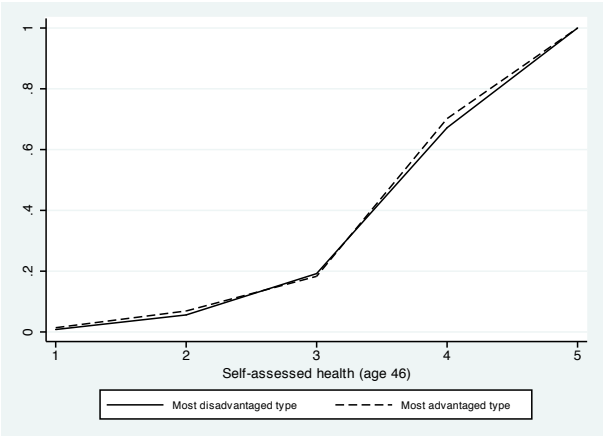


Labour areas



Comprehensive educational system

Conservative areas



Labour areas

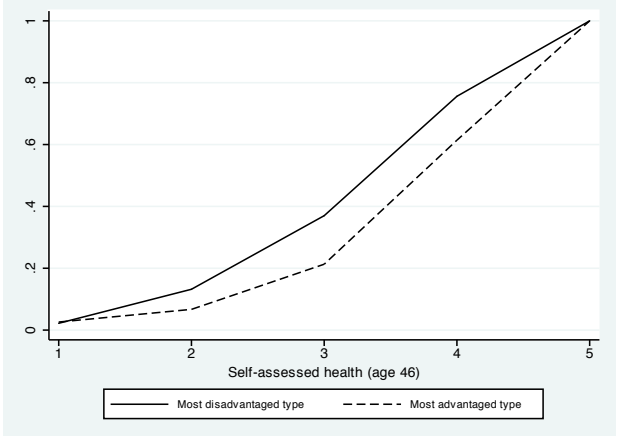


Figure 4: Most disadvantaged individuals (left-hand envelope) by educational system

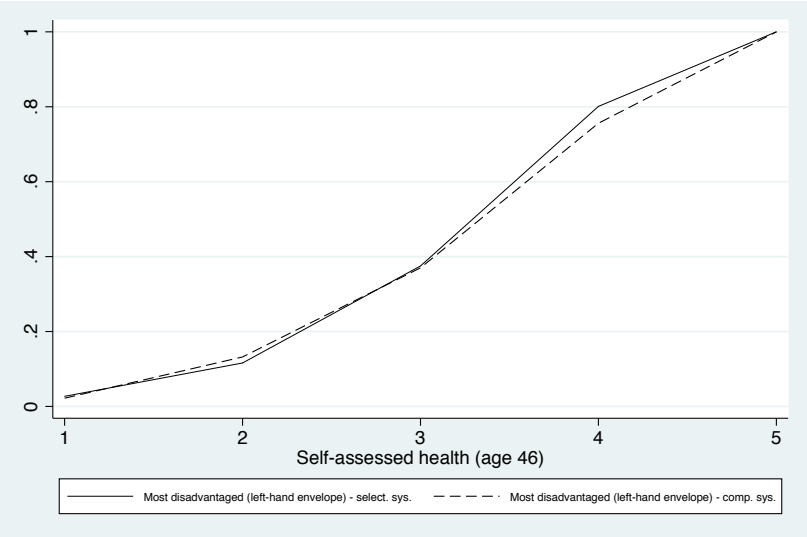
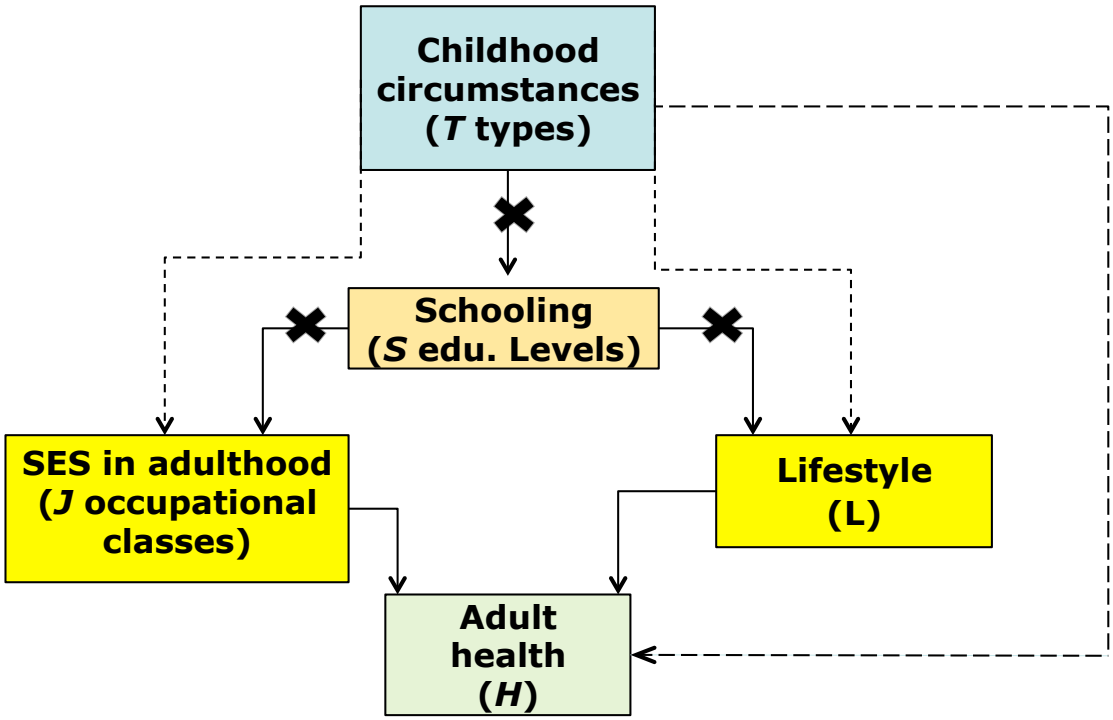
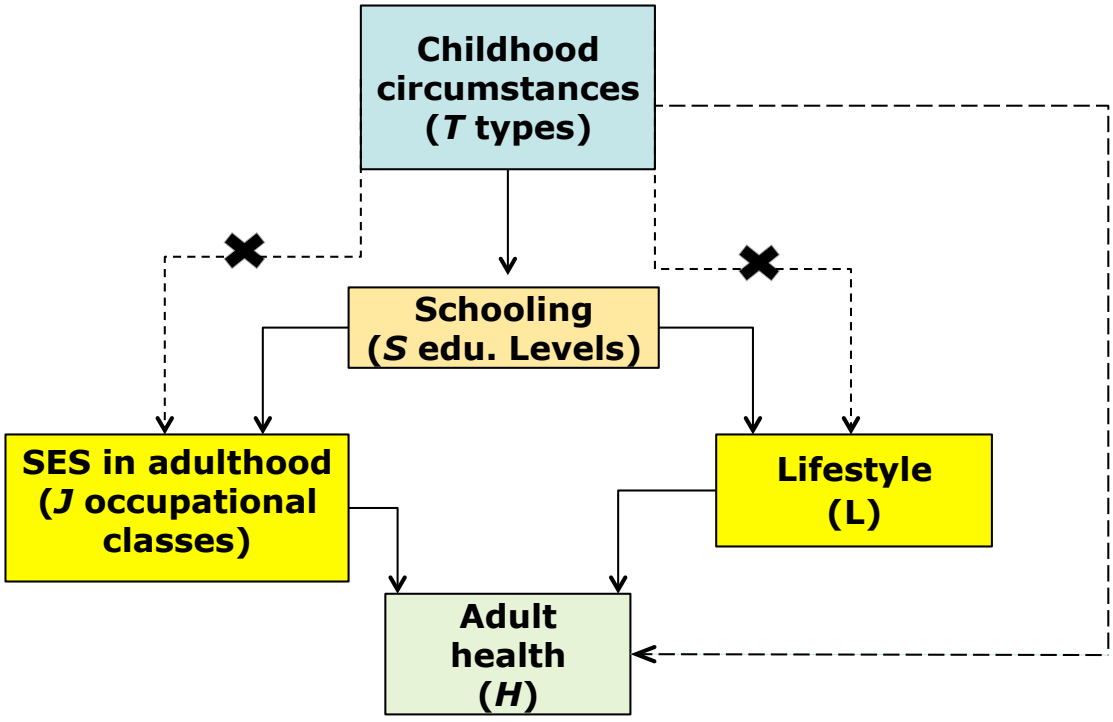


Figure 5: Counterfactual simulations

Counterfactual 1: neutralising the *educational path*



Counterfactual 2: neutralising the *non-educational path*



Counterfactual 3: neutralising the *residual path*

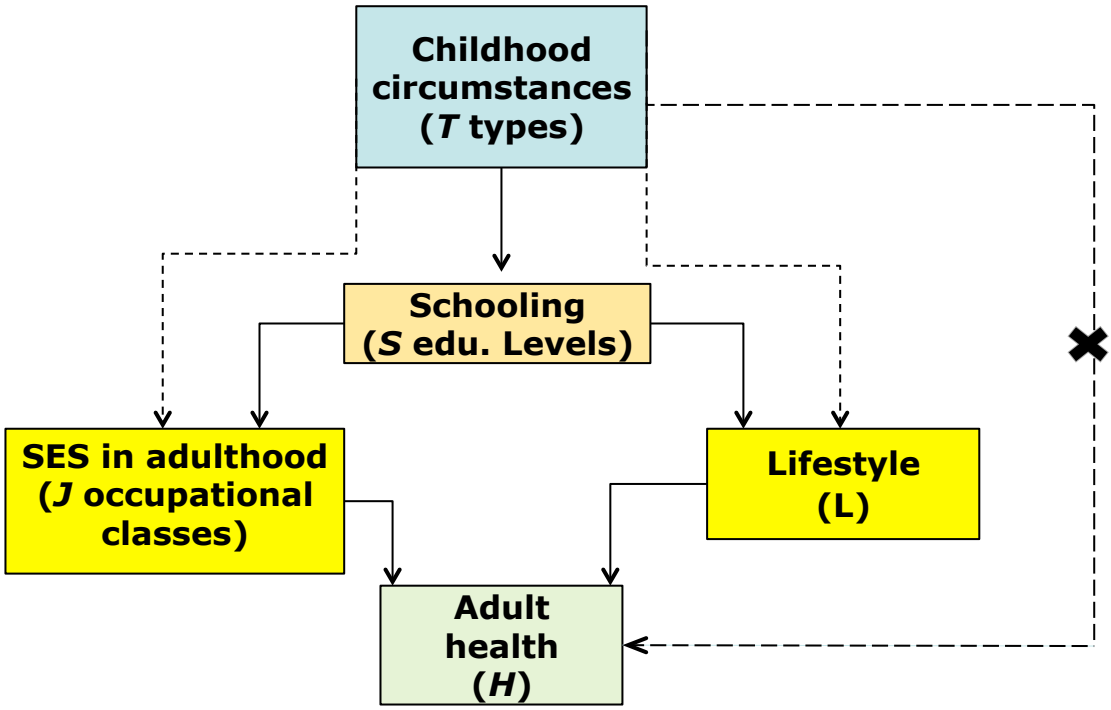


Table 1(a): Comprehensive and selective educational systems: mean values of select characteristics before and after pruning the data using propensity-score matching

	Before matching		After matching	
	Selective Sys.	Comp. Sys.	Selective Sys.	Comp. Sys.
Parental and local SES				
Parental SES: high	**0.30**	**0.24**	**0.28**	**0.28**
Parental SES: middle	0.50	0.54	0.52	0.52
% unemployed in local area	4.39	4.44	4.47	4.31
% professional in local area	13.2	11.7	13.0	12.3
% unskilled in local area	6.35	7.15	6.52	6.87
% home owners	51.4	47.4	51.1	48.8
Childhood health				
Morbidity index, age 7	1.70	1.72	1.70	1.72
Hospitalisations, up until age7	0.34	0.34	0.34	0.33
Diabetes in the family	0.20	0.22	0.21	0.22
Schooling (pre-reform)				
Cog. ability, age 7	**0.32**	**0.15**	**0.17**	**0.18**
Class size, primary school	35.2	35.8	35.3	35.8
Unhappy at school, age 7	0.05	0.05	0.05	0.05
Parents want child to stay after minimum school leaving age	0.77	0.77	0.76	0.79

Table 1(b): Type composition of the sample

Type	Frequency	Percentage	95% CI
1 (low parental SES / low ability/ Labour)	362	**7.08**	**[6.39, 7.81]**
2 (low parental SES / high ability/ Labour)	230	**4.50**	**[3.94, 5.10]**
3 (middle parental SES / low ability/ Labour)	870	**17.02**	**[15.9, 18.0]**
4 (middle parental SES / high ability/ Labour)	704	**13.77**	**[12.8, 14.7]**
5 (high parental SES / low ability/ Labour)	350	**6.85**	**[6.16, 7.57]**
6 (high parental SES / high ability/ Labour)	384	**7.51**	**[6.86, 8.26]**
7 (low parental SES / low ability/Conservative)	250	**4.89**	**[4.31, 5.51]**
8 (low parental SES / high ability/Conservative)	140	**2.74**	**[2.30, 3.22]**
9 (middle parental SES / low ability/Conservative)	686	**13.42**	**[12.4, 14.3]**
10 (middle parental SES / high ability/Conservative)	428	**8.37**	**[7.62, 9.16]**
11 (high parental SES / low ability/Conservative)	304	**5.95**	**[5.31, 6.63]**
12 (high parental SES / high ability/Conservative)	404	**7.90**	**[7.17, 8.67]**
Total	5,112	**100.00**	

Table 2: Inequality of opportunity: dissimilarity indices for the probability of reporting good or excellent health (age 46) and different levels of educational qualifications

Self-assessed health		Educational qualifications		
Selective	Comprehensive		Selective	Comprehensive
0.10	0.08	Threshold		
		O-Levels	0.24	0.23
		A-Levels	0.10	0.07
		Higher education	0.06	0.04

Table 3(a): Selective system - dissimilarity indices for the probability of reporting good or excellent health (age 46) and different levels of educational qualifications, by circumstance

Self-assessed health			Educational qualifications			
Parental SES	Ability	Cons. area		Parental SES	Ability	Cons. area
0.05	0.08	0.06	Threshold			
			O-Levels	0.13	0.21	0.11
			A-Levels	0.06	0.10	0.01
			Higher education	0.03	0.06	0.005

Table 3(b): Comprehensive system - dissimilarity indices for the probability of reporting good or excellent health (age 46) and different levels of educational qualifications, by circumstance

Self-assessed health			Educational qualifications			
Parental SES	Ability	Cons. area		Parental SES	Ability	Cons. area
0.05	0.05	0.07	Threshold			
			O-Levels	0.12	0.20	0.11
			A-Levels	0.04	0.07	0.009
			Higher education	0.02	0.04	0.003

Table 4: Probability of chronic illness and disability (age 46) for the most and the least advantaged types

	Type 1 (most disadvantaged)	95% CI	Type 12 (most advantaged)	95% CI
Selective system	0.44	[0.36, 0.51]	0.21	[0.15,0.25]
Comp. system	0.44	[0.36, 0.51]	0.31	[0.23, 0.37]

Table 5: Evaluation of educational systems under alternative normative rules

Self-assessed health (age 46)

Rule	Selective education system	Comprehensive education system	Difference
Eq. of opportunity	3.664	3.711	-0.047***
Utilitarianism	3.983	4.019	-0.036***

Absence of chronic illness and disability (age 46)

Rule	Selective education system	Comprehensive education system	Difference
Eq. of opportunity	0.558	0.547	0.011**
Utilitarianism	0.665	0.666	- 0.0005

Mental health (age 42)

Rule	Selective education system	Comprehensive education system	Difference
Eq. of opportunity	2.957	2.737	0.22***
Utilitarianism	3.131	3.151	- 0.02**

***p < 0.01; ** p <0. 05 (bootstrapped standard errors)

Table 6: Actual and counterfactual probability of chronic illness and disability (age 46) for the most disadvantaged type (lowest social and ability group who live in Labour districts)

Pr. Chronic illness	Actual	Counterfactual 1 (no educational path)	Counterfactual 2 (no non-educational path)	Counterfactual 3 (no residual path)
Selective system	0.441	0.422	0.423	0.374
Comprehensive system	0.447	0.424	0.438	0.357

Appendix (not for publication)

Table 7 – Selective educational system: actual SAH distribution and counterfactual scenarios

Actual empirical distributions

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

Health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
V. poor	.027	.008	.027	.005	.034	.015	.016	.028	.026	.014	013	.004
Poor	.116	.069	.124	.053	.085	.078	.024	.071	.084	.032	.046	.005
Fair	.375	.269	.303	.221	.188	.171	.176	.257	.230	.154	.256	.113
Good	.801	.765	.717	.710	.714	.614	.665	.685	.720	.635	.657	.613
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j)\hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
V. poor	.022	.008	.027	.006	.036	.013	.015	.027	.025	.014	.012	.004
Poor	.098	.069	.123	.056	.088	.090	.023	.071	.083	.032	.043	.004
Fair	.357	.270	.294	.225	.191	.185	.171	.261	.230	.152	.253	.113
Good	.796	.766	.708	.715	.716	.628	.657	.685	.719	.643	.657	.618
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

Table 7 (cont.) – Selective educational system: actual SAH distribution and counterfactual scenarios

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j,t}(h)\sum_{s} g^{s,\cdot}(l,j)n^t(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
	Type 1: Low Fasc.	Type 2: Low Fasc.	Type 3: Middle Fasc.	Type 4: Middle Fasc.	Type 5: High Fasc.	Type 6: High Fasc.	Type 7: Low Fasc.	Type 8: Low Fasc.	Type 9: Middle Fasc.	Type 10: Middle Fasc.	Type 11: High Fasc.	Type 12: High Fasc.
Health	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**
V. poor	.021	.005	.027	.006	.046	.017	.014	.022	.023	.017	.012	.008
Poor	.097	.063	.124	.056	.103	.079	.021	.070	.079	.037	.054	.007
Fair	.346	.260	.307	.227	.213	.174	.171	.258	.225	.157	.284	.123
Good	.787	.766	.716	.710	.740	.617	.660	.677	.713	.649	.662	.621
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j}(h)\sum_{s} g^{s,t}(l,j)n^t(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
	Type 1: Low Fasc.	Type 2: Low Fasc.	Type 3: Middle Fasc.	Type 4: Middle Fasc.	Type 5: High Fasc.	Type 6: High Fasc.	Type 7: Low Fasc.	Type 8: Low Fasc.	Type 9: Middle Fasc.	Type 10: Middle Fasc.	Type 11: High Fasc.	Type 12: High Fasc.
Health	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**
V. poor	.028	.019	.021	.016	.016	.014	.023	.018	.020	.015	.015	.013
Poor	.095	.074	.079	.066	.065	.061	.084	.070	.077	.063	.063	.057
Fair	.278	.237	.241	.218	.218	.211	.256	.223	.242	.212	.215	.203
Good	.730	.703	.704	.687	.681	.675	.719	.696	.702	.681	.684	.673
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

Table 8 – Comprehensive educational system: actual SAH distribution and counterfactual scenarios

Actual empirical distributions.

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

Health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
V. poor	.022	.008	.022	.022	.028	.026	.008	0.00	.020	.004	.006	.014
Poor	.132	.113	.094	.059	.068	.067	.056	.042	.055	.032	.032	.069
Fair	.370	.321	.275	.196	.188	.213	.192	.242	.204	.135	.203	.183
Good	.756	.721	.687	.616	.588	.614	.672	.642	.723	.621	.638	.702
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j)\hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
V. poor	.019	.008	.020	.023	.028	.028	.008	0.00	.019	.005	.006	.014
Poor	.115	.113	.089	.060	.068	.067	.056	.042	.055	.038	.032	.070
Fair	.346	.321	.268	.199	.188	.222	.192	.239	.202	.146	.208	.186
Good	.753	.722	.679	.623	.589	.628	.671	.644	.716	.637	.648	.704
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

Table 8 (cont.) – Comprehensive educational system: actual SAH distribution and counterfactual scenarios

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j,t}(h)\sum_{s} g^{s,\cdot}(l,j)n^t(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
Health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
V. poor	.020	.008	.020	.022	.034	.025	.008	.000	.019	.006	.005	.012
Poor	.126	.111	.088	.058	.076	.064	.055	.042	.053	.040	.030	.073
Fair	.364	.321	.264	.195	.197	.203	.189	.239	.200	.150	.213	.186
Good	.764	.716	.677	.615	.592	.589	.670	.621	.718	.639	.652	.702
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j}(h)\sum_{s} g^{s,t}(l,j)n^t(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
Health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
V. poor	.022	.018	.021	.017	.016	.012	.021	.018	.019	.014	.016	.014
Poor	.080	.070	.079	.068	.065	.054	.079	.073	.074	.061	.064	.059
Fair	.247	.227	.244	.221	.215	.193	.243	.227	.233	.206	.214	.205
Good	.693	.671	.686	.662	.659	.635	.686	.664	.676	.647	.659	.647
V. Good	1	1	1	1	1	1	1	1	1	1	1	1

Table 9 – Absence of chronic illness and disability (full sample): actual distribution and counterfactual scenarios

Actual cumulative pr.:

	Labour (types 1 to 6)						**Conservative (types 7 to 12)**					
	Type 1: Low Fasc. Low ability	**Type 2: Low Fasc. High ability**	**Type 3: Middle Fasc. Low ability**	**Type 4: Middle Fasc. High ability**	**Type 5: High Fasc. Low ability**	**Type 6: High Fasc. High ability**	**Type 7: Low Fasc. Low ability**	**Type 8: Low Fasc. High ability**	**Type 9: Middle Fasc. Low ability**	**Type 10: Middle Fasc. High ability**	**Type 11: High Fasc. Low ability**	**Type 12: High Fasc. High ability**
Ch.I.	.444	.430	.377	.336	.328	.344	.320	.300	.343	.296	.342	.259
	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j)\hat{f}(s)$

	Labour (types 1 to 6)						**Conservative (types 7 to 12)**					
	Type 1: Low Fasc. Low ability	**Type 2: Low Fasc. High ability**	**Type 3: Middle Fasc. Low ability**	**Type 4: Middle Fasc. High ability**	**Type 5: High Fasc. Low ability**	**Type 6: High Fasc. High ability**	**Type 7: Low Fasc. Low ability**	**Type 8: Low Fasc. High ability**	**Type 9: Middle Fasc. Low ability**	**Type 10: Middle Fasc. High ability**	**Type 11: High Fasc. Low ability**	**Type 12: High Fasc. High ability**
Ch.I.	.424	.431	.369	.339	.329	.349	.325	.300	.338	.300	.344	.264
	1	1	1	1	1	1	1	1	1	1	1	1

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t} \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,}(l,j) n^t(s)$

	Labour (types 1 to 6)						**Conservative (types 7 to 12)**					
	Type 1: Low Fasc. Low ability	**Type 2: Low Fasc. High ability**	**Type 3: Middle Fasc. Low ability**	**Type 4: Middle Fasc. High ability**	**Type 5: High Fasc. Low ability**	**Type 6: High Fasc. High ability**	**Type 7: Low Fasc. Low ability**	**Type 8: Low Fasc. High ability**	**Type 9: Middle Fasc. Low ability**	**Type 10: Middle Fasc. High ability**	**Type 11: High Fasc. Low ability**	**Type 12: High Fasc. High ability**
Ch.I.	.429	.442	.369	.338	.335	.349	.320	.298	.340	.303	.357	.265
	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^{.t}} \sum_{l,j} F^{l,j}(h) \sum_s g^{s,t}(l,j) n^t(s)$

	Labour (types 1 to 6)						**Conservative (types 7 to 12)**					
	Type 1: Low Fasc. Low ability	**Type 2: Low Fasc. High ability**	**Type 3: Middle Fasc. Low ability**	**Type 4: Middle Fasc. High ability**	**Type 5: High Fasc. Low ability**	**Type 6: High Fasc. High ability**	**Type 7: Low Fasc. Low ability**	**Type 8: Low Fasc. High ability**	**Type 9: Middle Fasc. Low ability**	**Type 10: Middle Fasc. High ability**	**Type 11: High Fasc. Low ability**	**Type 12: High Fasc. High ability**
Ch.I.	.366	.344	.358	.340	.339	.327	.358	.343	.353	.332	.337	.327
	1	1	1	1	1	1	1	1	1	1	1	1

Table 9 – Absence of chronic illness: selective educational system

Actual cumulative pr.:

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.441	.408	.411	.329	.342	.300	.296	.328	.360	.285	.375	.212
	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j) \hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.422	.409	.405	.332	.345	.312	.306	.331	.355	.284	.375	.203
	1	1	1	1	1	1	1	1	1	1	1	1

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t} \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,\cdot}(l,j) n^t(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.423	.424	.406	.333	.355	.297	.309	.333	.359	.294	.389	.223
	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^{\cdot}} \sum_{l,j} F^{l,j}(h) \sum_s g^{s,t}(l,j) n^t(s)$

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.374	.347	.357	.337	.338	.333	.359	.340	.355	.334	.334	.325
	1	1	1	1	1	1	1	1	1	1	1	1

Table 10 - Absence of chronic illness: comprehensive educational system

Actual cumulative pr.:

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.447	.452	.342	.343	.314	.388	.344	.271	.325	.308	.309	.306
	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j) \hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.424	.454	.333	.346	.314	.385	.340	.269	.322	.316	.313	.314
	1	1	1	1	1	1	1	1	1	1	1	1

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t} \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,\cdot}(l,j) n^t(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.438	.461	.332	.339	.318	.369	.341	.267	.325	.321	.323	.306
	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^{\cdot}} \sum_{l,j} F^{l,j}(h) \sum_s g^{s,t}(l,j) n^t(s)$

	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
Ch.I.	.357	.342	.359	.343	.340	.320	.356	.348	.350	.331	.341	.330
	1	1	1	1	1	1	1	1	1	1	1	1

Table 11 - Absence of mental illness (full sample - dist. quintiles) - actual distribution and counterfactual scenarios

Actual empirical distributions:

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.239	.150	.199	.156	.172	.138	.159	.160	.182	.161	.145	.097
2nd qt.	.442	.419	.434	.365	.374	.361	.371	.407	.402	.341	.354	.313
3rd qt.	.572	.518	.537	.496	.500	.474	.506	.561	.518	.478	.466	.455
4th qt.	.807	.794	.814	.778	.807	.778	.759	.845	.808	.758	.812	.780
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j)\hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.224	.150	.193	.157	.171	.146	.152	.160	.178	.166	.146	.102
2nd qt.	.432	.420	.429	.368	.373	.367	.363	.408	.400	.345	.355	.321
3rd qt.	.564	.519	.531	.499	.498	.474	.498	.563	.515	.482	.467	.464
4th qt.	.803	.794	.814	.778	.806	.775	.759	.846	.807	.758	.812	.783
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Table 11 (cont.) - Absence of mental illness (full sample - dist. quintiles) - actual distribution and counterfactual scenarios

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^{t}(h) = \frac{1}{n^{t}} \sum_{l,j} F^{l,j,t}(h) \sum_{s} g^{s,}(l,j) n^{t}(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
	Type 1:	**Type 2:**	**Type 3:**	**Type 4:**	**Type 5:**	**Type 6:**	**Type 7:**	**Type 8:**	**Type 9:**	**Type 10:**	**Type 11:**	**Type 12:**
Mental	**Low Fasc.**	**Low Fasc.**	**Middle Fasc.**	**Middle Fasc.**	**High Fasc.**	**High Fasc.**	**Low Fasc.**	**Low Fasc.**	**Middle Fasc.**	**Middle Fasc.**	**High Fasc.**	**High Fasc.**
health	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**
1st qt.	.217	.152	.194	.160	.180	.145	.148	.167	.176	.164	.156	.111
2nd qt.	.427	.423	.429	.371	.387	.370	.356	.413	.397	.346	.365	.331
3rd qt.	.562	.518	.531	.503	.513	.479	.493	.568	.513	.485	.476	.472
4th qt.	.800	.796	.813	.780	.815	.779	.756	.849	.803	.764	.821	.785
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^{t}(h) = \frac{1}{n^{t}} \sum_{l,j} F^{l,j}(h) \sum_{s} g^{s,t}(l,j) n^{t}(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
	Type 1:	**Type 2:**	**Type 3:**	**Type 4:**	**Type 5:**	**Type 6:**	**Type 7:**	**Type 8:**	**Type 9:**	**Type 10:**	**Type 11:**	**Type 12:**
Mental	**Low Fasc.**	**Low Fasc.**	**Middle Fasc.**	**Middle Fasc.**	**High Fasc.**	**High Fasc.**	**Low Fasc.**	**Low Fasc.**	**Middle Fasc.**	**Middle Fasc.**	**High Fasc.**	**High Fasc.**
health	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**	**Low ability**	**High ability**
1st qt.	.195	.167	.181	.161	.161	.148	.185	.165	.177	.156	.159	.149
2nd qt.	.414	.384	.399	.377	.378	.364	.403	.382	.395	.373	.376	.366
3rd qt.	.534	.506	.520	.499	.500	.487	.524	.504	.516	.495	.499	.489
4th qt.	.806	.794	.799	.791	.792	.788	.800	.792	.797	.789	.790	.789
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Table 12- Absence of mental illness (dist. quintiles) - selective educational system

Empirical distributions:

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.228	.117	.214	.175	.152	.129	.156	.146	.217	.169	.151	.097
2nd qt.	.423	.375	.426	.375	.334	.308	.362	.329	.422	.360	.393	.328
3rd qt.	.550	.507	.531	.512	.463	.433	.531	.500	.542	.512	.496	.462
4th qt.	.809	.757	.815	.773	.798	.792	.800	.792	.833	.779	.836	.800
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j)\hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.211	.117	.204	.177	.153	.139	.146	.145	.215	.171	.151	.109
2nd qt.	.418	.376	.417	.379	.335	.319	.350	.327	.423	.362	.393	.340
3rd qt.	.543	.508	.521	.515	.464	.438	.523	.498	.543	.514	.496	.472
4th qt.	.810	.758	.816	.773	.797	.786	.800	.792	.831	.779	.836	.800
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Table 12 (cont.) - Absence of mental illness (dist. quintiles) - selective educational system

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j,t}(h)\sum_{s} g^{s,}(l,j)n^t(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.199	.127	.208	.181	.161	.133	.142	.163	.207	.172	.159	.102
2nd qt.	.416	.383	.421	.381	.352	.314	.343	.356	.416	.365	.410	.338
3rd qt.	.540	.513	.525	.521	.493	.437	.522	.516	.537	.528	.506	.472
4th qt.	.806	.766	.814	.773	.820	.787	.800	.797	.827	.799	.843	.805
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^{\cdot}}\sum_{l,j} F^{l,j}(h)\sum_{s} g^{s,t}(l,j)n^t(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.208	.168	.187	.165	.162	.159	.191	.167	.186	.164	.164	.151
2nd qt.	.418	.375	.393	.369	.368	.366	.398	.370	.393	.368	.370	.357
3rd qt.	.544	.503	.521	.498	.497	.494	.526	.500	.520	.496	.500	.487
4th qt.	.815	.799	.806	.797	.797	.797	.808	.797	.806	.797	.798	.794
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Table 13 - Absence of mental illness (dist. quintiles) - comprehensive educational system

Empirical distributions:

Labour (types 1 to 6) ⟺ **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.250	.183	.184	.136	.192	.147	.162	.175	.146	.152	.139	.097
2nd qt.	.461	.463	.442	.356	.413	.414	.381	.487	.381	.322	.315	.297
3rd qt.	.593	.529	.542	.480	.536	.516	.481	.625	.493	.444	.436	.448
4th qt.	.805	.830	.814	.782	.817	.764	.718	.900	.782	.737	.787	.760
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

First counterfactual (neutralisation of the educational path): $\hat{F}^t(h) = \sum_{l,j} F^{l,j,t}(h) \sum_s g^{s,t}(l,j)\hat{f}(s)$

Labour (types 1 to 6) **Conservative (types 7 to 12)**

Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.238	.184	.182	.137	.189	.154	.158	.175	.142	.158	.141	.100
2nd qt.	.448	.464	.438	.357	.410	.416	.375	.488	.376	.326	.316	.301
3rd qt.	.585	.530	.539	.482	.534	.511	.468	.624	.487	.448	.439	.453
4th qt.	.800	.832	.813	.783	.816	.765	.714	.900	.782	.737	.788	.763
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Table 13 (cont.) - Absence of mental illness (dist. quintiles) - comprehensive educational system

Second counterfactual (neutralisation of the non-educational path): $\tilde{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j,t}(h)\sum_{s} g^{s,\cdot}(l,j)n^t(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.232	.173	.180	.139	.197	.149	.157	.172	.142	.164	.154	.113
2nd qt.	.442	.459	.439	.359	.427	.399	.374	.486	.377	.331	.336	.327
3rd qt.	.581	.521	.538	.485	.546	.505	.467	.619	.489	.454	.456	.474
4th qt.	.796	.829	.809	.783	.821	.780	.715	.901	.778	.740	.806	.771
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1

Third counterfactual (neutralisation of the residual path): $\ddot{F}^t(h) = \frac{1}{n^t}\sum_{l,j} F^{l,j}(h)\sum_{s} g^{s,t}(l,j)n^t(s)$

	Labour (types 1 to 6)						Conservative (types 7 to 12)					
Mental health	Type 1: Low Fasc. Low ability	Type 2: Low Fasc. High ability	Type 3: Middle Fasc. Low ability	Type 4: Middle Fasc. High ability	Type 5: High Fasc. Low ability	Type 6: High Fasc. High ability	Type 7: Low Fasc. Low ability	Type 8: Low Fasc. High ability	Type 9: Middle Fasc. Low ability	Type 10: Middle Fasc. High ability	Type 11: High Fasc. Low ability	Type 12: High Fasc. High ability
1st qt.	.181	.165	.176	.156	.159	.137	.179	.164	.168	.149	.153	.145
2nd qt.	.410	.393	.405	.385	.388	.364	.409	.393	.397	.378	.382	.373
3rd qt.	.526	.508	.520	.500	.504	.480	.524	.509	.512	.494	.498	.489
4th qt.	.796	.789	.793	.785	.786	.779	.794	.788	.789	.782	.781	.783
5th qt.	1	1	1	1	1	1	1	1	1	1	1	1