RESISTING EDUCATION*

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Jean-Paul Carvalho  
University of California, Irvine

Mark Koyama  
George Mason University

Abstract

Oppositional attitudes to education tend to emerge amidst rising returns to education. We show that this is a natural outcome of the interaction between economic and cultural incentives for education. When education makes individuals more receptive to mainstream culture, minority groups underinvest in education as a form of cultural resistance. Low-ability minority types do not just fail to increase educational attainment in response to a rising skill premium, but reduce education—a phenomenon we call resisting education. This amplifies income inequality. Thus technological progress, globalization and anti-discrimination policies are linked to oppositional attitudes to education.

Key words: Education; identity; inequality; cultural transmission; oppositional behavior;

JEL classification: D10; D63; D71; I24; J24; Z12; Z13

*Carvalho: Department of Economics, University of California, Irvine, 3151 Social Science Plaza, Irvine, CA 92697, jpcarv@uci.edu. Koyama: Center for Public Choice, Carow Hall, George Mason University, VA 22030, mkoyama2@gmu.edu.

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1 Introduction

Education is not only a means of acquiring human capital, but also a cultural experience which shapes one’s habits, beliefs and values. The principal idea developed in this paper is that education makes an individual more receptive to mainstream culture. Introducing an external socializing institution—the education system—and examining its effects on educational choices and inequality is a natural extension of prior work on cultural transmission by Bisin & Verdier (2000, 2001). By reinforcing mainstream culture, education generates positive externalities for those with mainstream cultural traits. For members of minority groups or subcultures, however, education threatens to undermine their cultural identity. Hence these individuals tend to underinvest in education relative to those with mainstream traits and relative to the benchmark case in which education has no effect on culture. Educational outcomes could vary by ethnicity, class and religion based on this form of cultural resistance.1

Moreover, oppositional attitudes to education among minority groups often arise in periods marked by rising returns to education. We show that this is a natural outcome of the interaction between economic and cultural incentives to acquire education. An increase in the skill premium induces some individuals to increase investment in education. This makes them more receptive to mainstream culture, causing mainstream traits to proliferate. Low-ability minority types, who benefit least from the rising skill premium, do not simply fail to follow suit and increase educational attainment. Rather they reduce education in response to the higher risk of acquiring the mainstream trait through social contact. We call this phenomenon resisting education.

Our theory provides an explanation for a number of puzzles that are difficult to reconcile with conventional models of education. In recent decades, skill-biased technological change and globalization have raised returns to education in developed economies (Berman et al. 1998, Acemoglu 2002, 2003, Autor et al. 2003, Acemoglu & Autor 2011, Autor & Dorn Forthcoming).2 At the same time, public spending on education has increased significantly

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1We view cultural resistance as one of several mechanisms, including standard economic factors such as school quality, parental education and income.

2Correcting for ability bias, the returns to an additional year of schooling are approximately 6–10 percent (Angrist & Krueger 1992, Psacharopoulos 1994, Heckman et al. 2006, Leigh & Ryan 2008).
in real terms. Yet there has not been a uniform increase in educational attainment in countries such as the United States or the United Kingdom, as both human capital and signaling theories would suggest. In particular, educational outcomes have not converged as much as expected for some minority groups (Katz & Goldin 2008). We suggest that poor educational outcomes for disadvantaged members of minority groups may be a natural consequence of rising returns to education. This has implications for income inequality. Growing inequality has been ascribed to a global increase in the skill premium since the 1980s (Katz & Murphy 1992, Juhn et al. 1993, Acemoglu 2002). By producing educational polarization, cultural incentives for resisting education amplify the effect of a rising skill premium on economic inequality.

In our theory, the poor educational performance of minority groups is not the consequence of either a ‘culture of poverty’ or discrimination. It is the product of cultural resistance. In fact, recognizing that various anti-discrimination measures serve to increase the skill premium for members of minority groups opens up a range of applications. It turns out that anti-discrimination measures such as affirmative action may make the most disadvantaged members of minority groups worse off, by threatening their cultural identity. One important case is the stigma attached to educational success—‘acting white’—in African American communities. The stigma attached to acting white emerged amidst rising returns to education among African Americans, in the wake of the civil rights movement and affirmative action (Wilson 1987). Similarly, the development of anti-education attitudes among the white working class in Britain emerged at a time when class discrimination was breaking down and people increasingly identified themselves as middle class. We provide a unified explanation for these and other seemingly disparate phenomena.

Our approach is related to the economics of identity (Akerlof & Kranton 2000, 2002, Fang & Loury 2005, Austen-Smith & Fryer 2005, Fryer 2007) and cultural transmission (Bisin & Verdier 2000, 2001, Bisin et al. 2011), as well as the literature on affirmative action (Coate & Loury 1993a,b). Akerlof & Kranton (2002) propose that minority students, whose ascriptive characteristics differ significantly from the mainstream, find it hard to fit into

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3Government expenditure on public education in the US increased from 5.1 percent of GDP in 1991 to 5.5 percent of GDP in 2008. In the UK it increased from 4.8 percent to 5.4 percent in the same period (World Development Indicators 2008).

4For a survey of the cultural transmission literature, see Bisin & Verdier (2011).
a school’s status system and may thus reject it.\textsuperscript{5} Coate & Loury (1993b) examine how affirmative action can affect stereotypes of minority groups in the presence of statistical discrimination; they show that, under certain conditions, anti-discrimination policies can reinforce self-fulfilling negative perceptions of a minority group. Austen-Smith & Fryer (2005) develop a two-audience signaling model of “acting white” in which individuals pool on lower levels of education than they otherwise would to signal favorable social traits and avoid peer group rejection.

Perhaps the paper closest in spirit to ours is Fryer (2007). Fryer assumes that an individual who invests in human capital is more likely to migrate out of a poor community. Anticipating a smaller likelihood of continuing interaction, the poor community refrains from cooperating with individuals who make large investments in human capital. This causes some individuals to limit their investment in human capital.\textsuperscript{6} Our study explores an alternative mechanism—cultural resistance—and yields several distinct predictions. Firstly, in Fryer’s model, it is an increase in mobility out of the poor community that causes some individuals to reduce their level of education. An increase in returns to education, however, would induce all individuals to increase their investment in human capital, contrary to our model. Hence we are able to link poor educational outcomes for minorities to various forms of rising skill premia, not just desegregation. Secondly, our theory has different distributional implications. In Fryer’s model, only some individuals with intermediate ability distort their education choices. In our model, all individuals with a minority trait distort their education choices and it is individuals with lower levels of ability who resist education. This means that an increase in returns to education leads to a worsening of education outcomes at the bottom, a distinct and testable prediction.

There are several other ways in which our results are stronger than those found in existing work. For example, Coate and Loury (1993) suggest that an anti-discrimination policy that increases the return to skill acquisition by minority workers (rather than requiring

\textsuperscript{5}In Akerlof & Kranton (2002) it is assumed that students who reject the school’s status system face social pressure to choose a lower level of education.

\textsuperscript{6}Eguia (2013) proposes an alternative explanation in which members of an advantaged group choose a level of discrimination to screen out low-ability members of the disadvantaged group. Since high-ability individuals generate positive externalities, the disadvantaged group penalizes high-ability coethnics for academic success to minimize outmigration. Jensen & Miller (2011) and Kondo (2012) also analyze strategic underinvestment in education to limit outmigration. Jensen & Miller (2011) provide evidence consistent with their hypothesis from a field experiment in India.
unconditionally higher levels of minority hiring) can eliminate bad outcomes. In our theory, it is precisely this sort of increase in the skill premium that induces some minority workers to reduce education and makes the worst off minority types worse off. Unlike prior work, in which underinvestment in education by minorities is one of many equilibria, resisting education occurs in every equilibrium in our model. In addition, resisting education does not emerge as a result of inefficient group norms, but is individually rational in our framework. We draw some further distinctions in Section 4.

While most extant work on underinvestment in education is based on the view that human capital acquisition favors outmigration from poor communities, clearly education also has a cultural component which individuals may resist. This is apparent in the contests between different groups over the content of public school curricula (See Lall (2008) for a discussion of this issue in India and Pakistan). One insight of ours is that the cultural content of curricula may have economic effects. As such, groups may seek to take control of the education system not only for cultural reasons, but also to improve the economic position of their members. Another paper which studies the role of cultural transmission in shaping minority identity is Sáez-Martí & Zenou (2012). Saez-Marti and Zenou examine the role of discrimination in the cultural transmission of good work habits. In contrast, we study the transmission of cultural identity which is valued in itself by individuals and has no direct economic effect. Nevertheless, we show that cultural incentives for education interact with standard economic incentives, and in surprising ways. The relationship between one’s cultural trait and economic performance is not built in to our model, it is an equilibrium phenomenon.

The remainder of the paper is structured as follows. In Section 2, we briefly motivate our central idea that education makes individuals more receptive to mainstream values. A model is introduced and analyzed in Section 3. Section 4 explores various applications of our theory and Section 5 concludes.

\footnote{Of course, cultural traits such as religious belief may have significant direct effects on economic outcomes, as shown by Barro & McCleary (2003).}
2 Motivation

2.1 Education Shapes Culture

We build on the natural assumption that education shapes one’s culture and identity. This notion is not new. When widespread public education was introduced in 19th century Europe, the express purpose of policymakers was to undermine old regional, class-based, and ethnic identities, to produce citizens who would be willing and able to contribute to the nation (Reisner 1922, Langsom 1950, Franck & Johnson 2014).\(^8\) Weber (1976) documents the case of late nineteenth century France when in the Third Republic a ‘vast program of indoctrination was plainly called for to persuade people that the fatherland extended beyond its evident limits to something vast and intangible called France’ (Weber 1976, 333). He notes that:

‘At the very start of school, children were taught that their first duty was to defend their country as soldiers … Commencement speeches recalled this sacred duty in ritual terms—our boys will defend the soil of the fatherland. The whole school program turned on expanding the theme. Gymnastics were meant “to develop in the child the idea of discipline, and prepare him … to be a good soldier and a good Frenchman” … Teachers taught or were expected to teach “not just for the love of art or science … but for the love of France”’ (Weber 1976, 334-336).\(^9\)

There is some prior work in economics on this kind of positive spillover from education. Gradstein & Justman (2002) present a theory in which education leads to economic growth by reducing the cultural distance between different groups. In work by Dixit (2009), parents invest in education in order to instill pro-social preferences in their children. Empirical evidence indicates that education reduces crime (Lochner & Moretti 2004), increases voting

\(^8\)For a discussion of the motivations of policymakers in implementing these educational reforms see Alesina & Reich (2013). The historical literature is replete with examples that emphasize this point. For instance, Kaiser William II declared that ‘it will fall upon the school in its various grades to lay the foundations of a healthy conception of political and social relations, through the cultivation of fear of God and love of country’ (quoted in Langsom 1950).

\(^9\)Revisionist historians see the early American public education system as cultivating values of conscientiousness, time-keeping, and self-discipline that were required for capitalist production (see Bowles & Gintis 1976, Katz 1976). Lott (1999) documents how totalitarian governments provide large amount of public education.
turnout and support for freedom of speech (Dee 2004) and generally improves civic engagement (Milligan et al. 2004, Glaeser et al. 2007).\(^{10}\)

What has not been fully recognized by economists is that the positive externalities associated with education are often viewed as negative externalities from the perspective of minority groups or subcultures. Socialization into the majority culture often means partial de-socialization in the minority culture, the loss of traditional values and beliefs, and the undermining of local community attachments. For example, in the new public schools of late 19th century France, uses of regional dialects were prohibited and regional histories were replaced by national history (Weber 1976, 345). Even when indoctrination is not an explicit educational goal, mainstream education socializes children in the culture of mainstream society.

2.2 Educational Attainment among Minorities in the US and UK

Katz & Goldin (2008) review the history of American leadership in providing widespread access to high school and college education. Since the 1970s, however, educational attainment and performance in the United States has stagnated, even as returns to education have increased. The performance of US students in international tests, as measured by the Program for International Student Assessment (PISA), has been ‘relatively flat over the period 1969–1999’ (Hanushek & Woessmann 2009, A4). In contrast, East Asian and northern European countries have improved their performance. In 2010 less than a third of US students achieved proficiency in mathematics compared to 58 percent in Korea and 56 percent in Finland (Peterson et al. 2011).\(^{11}\)

Katz and Goldin link the overall stagnation in education attainment to increased inequality in educational outcomes. Why have significant portions of the population failed to respond to high returns to education? Katz and Goldin argue that ‘schools are essentially failing

\(^{10}\)Acemoglu (1996), Benabou (1993, 1996) and Rauch (1993) model positive neighborhood effects in human capital accumulation while Borjas (1995) looks at how segregation can reduce educational attainment for minorities. Alesina & Reich (2013) consider the incentives rulers have to invest in indoctrinating their population.

\(^{11}\)The US was 32nd out of 65 countries participating in PISA. In reading, the US came in 17th place with 31 percent of the students proficient. This score is considerably lower than that recorded for many East Asian countries and Finland but comparable to many European countries. Also see Hanushek & Woessmann (2008).
Average reading and mathematics scores at age 17 in the US from the National Assessment of Educational Progress. Scores range from 0-500. Data: KewalRamani et al. (2007).

According to the 2010 PISA tests 50 percent of Asian Americans and 42 percent of white Americans are proficient in mathematics compared to only 11 percent of African American and 15 percent of Hispanic American students (Peterson et al. 2011). The National Assessment of Educational Progress (NAEP) reports that while reading and mathematics scores for blacks and hispanics are higher than they were in the 1970s there has been stagnation in black and hispanic test scores since the 1990s (KewalRamani et al. 2007). The average reading level at age 17 for African Americans and Hispanics in 2004 was lower than in 1988 (264 for both groups compared to 274 and 271 respectively in 1988)—and considerably less than the score for whites (which was 293). In mathematics, scores for minorities were also lower in 2004 than in 1990; the process of convergence with white scores seems to have ceased (Figure 1).

Part of the poor educational performance of minorities in the US is no doubt driven by economic factors such as school quality, parental education and income. However, one sees significant variation in educational attainment in the UK across groups, even when restricting attention to students who are eligible for free school meals (which controls for income and

12In fact, average scores for black and Hispanic 17 year olds were lower than the average score for white 13 year olds.
Table 1: Educational Performance among Poor British Students

Percentage of students eligible for free school meals with 5 or more A*-C grades at GCSEs

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White British</td>
<td>25.8</td>
</tr>
<tr>
<td>Black</td>
<td>39.1</td>
</tr>
<tr>
<td>South Asian</td>
<td>45.7</td>
</tr>
<tr>
<td>East Asian</td>
<td>68.4</td>
</tr>
</tbody>
</table>

*Source: DfE: GCSE and Equivalent Results in England, 2009/10 (2010). 5 A*-C GCSEs are typically required for students to attend university.*

Except in the UK, it is white British students (eligible for free school meals) that do poorly. Table 1 reports that among students eligible for free school meals, only 25.8 percent of ‘white’ students obtain the 5 or more A–C grades including English and Mathematics usually required to attend university, compared to 39.1 percent of black students, 45.7 percent of ‘Asian’ (South Asian) students and 68.4 percent of ‘Chinese’ (East Asian) students between 2005 and 2010. Economic factors alone cannot explain this pattern of education. Educational underperformance among poor students in the UK is driven by class, rather than race-based identity.

3 A Model of Education and Cultural Transmission

Our main departure from conventional models of education is that education not only improves earnings, but also affects the social transmission of cultural traits. To focus on this cultural mechanism, we abstract from general equilibrium effects (Fang & Norman 2006), statistical discrimination (Coate & Loury 1993b), intergenerational transfers of ability and human capital (Borjas 1992, 1995), and other factors which have been the subject of prior work.

To fix ideas, we let parents choose their children’s level of education, à la Bisin & Verdier (2000). Society is composed of a continuum of parents with unit mass. Time is continuous and denoted by $t$. In each period $t$, a parent gives birth (asexually) to one child, learns the child’s ability, chooses its level of education $e \in [0, 1]$ and then dies.

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13 Children are eligible for free school meals if their parents are in receipt of income support, unemployment benefit or other forms of income-related employment support. In 2011, 1.2 million children were known to be eligible.
Education $e$ yields an economic payoff of $f(a)e^\sigma > 0$. This is our reduced-form model of the labor market, which can be microfounded in various ways. We assume that the elasticity $\sigma \in (0, 1)$, so that the economic payoff is strictly increasing and strictly concave in $e$. We refer to the function $f(a)$ as the return to education and the parameter $a$ as an agent’s ability,\textsuperscript{14} but one can conceive of $a$ more broadly as representing any exogenous variable that affects an agent’s marginal return to education, including local school quality and ascriptive characteristics that form the basis for discrimination. Assume that $f$ is continuous, positive and strictly increasing. A child’s ability $a$ is drawn from a continuous distribution with finite mean $\alpha$ and probability measure $\mu$.\textsuperscript{15} Each agent’s ability draw is independent of her parent’s ability and the ability of other agents in her generation. The support of $\mu$ is $(0, 1)$. This formulation is consistent with a view of education as an investment in human capital and a signal of innate productivity.\textsuperscript{16}

Education also has a (direct) cost $ce$, where $c > 0$. Thus far, we have a standard model of human capital acquisition. The point of departure in our model is that education also shapes the transmission of cultural traits.

Each parent is one of two cultural types $\theta \in \{M, m\}$. Proportion $q_t$ of parents possess the mainstream trait $M$ and proportion $(1 - q_t)$ of parents possess the minority trait $m$ at the beginning of period $t$. During the period, children can acquire a different trait through the process of social transmission. Mainstream educational institutions in our model tend to make individuals more receptive to acquiring the mainstream trait via social contact. Independently of her initial cultural type, a child with education $e$ in period $t$ is matched with an $M$ type with probability $q_t$, in which case she acquires the mainstream trait $M$ with probability $e$. With probability $1 - q_t$, she is matched with a minority $m$ type, in which case she acquires the mainstream trait $M$ with probability $\frac{1}{2}e$.\textsuperscript{17}

Parents are imperfectly empathetic toward their children, as in Bisin & Verdier (2000), judging them based on their own preferences. Let us simply assume that a type $\theta$ parent receives a payoff of $\nu_\theta(M)$ if their child acquires the mainstream trait and $\nu_\theta(m)$ if their child

\textsuperscript{14}We follow Dewatripont et al. (1999) and Austen-Smith & Fryer (2005) in assuming a multiplicative relationship between ability and education/effort.

\textsuperscript{15}Qualitatively similar results can be derived for discrete distributions of $a$.

\textsuperscript{16}Mailath (1987) demonstrates that separating equilibria are differentiable when the set of types is an interval.

\textsuperscript{17}The results hold for any probability equal to $be$ such that $b < 1$. 

9
acquires the minority trait. Define \( \delta_\theta \equiv \nu_\theta(M) - \nu_\theta(m) \). We assume that \( \delta_m < 0 < \delta_M \), viz., parents prefer children to acquire their own cultural trait.

For parents with the mainstream trait, education promotes their cultural identity, while the opposite is true for parents with the minority trait. By helping to transmit the mainstream trait, education can undermine the ability of minority parents to pass on their own trait to their children.

A type \((a, \theta)\) parent is a parent with trait \(\theta\) who has a child with ability \(a\). The expected total payoff to a type \((a, \theta)\) parent from choosing education \(e\) in period \(t\) is:

\[
U(e; a, \theta, q_t) = f(a)e^\sigma - ce \\
+ [q_te + (1 - q_t)e\frac{1}{2}e]\nu_\theta(M) \\
+ [q_t(1 - e) + (1 - q_t)(1 - \frac{1}{2}e)]\nu_\theta(m).
\]

This formulation is not chosen for its realism, but to make a point. Even when the economic and cultural incentives for education are additively separable, there can be interesting interactions between the two.

At this stage, we should also note that the immediate interpretation of the model is that the minority group is an endogenous cultural group, which changes in composition during the process of cultural transmission. The model can be applied to an exogenous group (e.g. black, working class) by simply reinterpreting the set of all agents as an exogenously defined disadvantaged group. Members of this group can acquire the mainstream cultural trait or retain their minority trait based on influence from the education system and each other. The analysis could be extended in a straightforward manner by introducing interactions with the (exogenously defined) advantaged group. We can, however, generate our most important insights with the simpler specification presented in this paper.

### 3.1 The Optimal Level of Education

We can now characterize a parent’s optimal choice of education for a fixed distribution of cultural traits \(q\), given their child’s ability \(a\) and their own cultural trait \(\theta\). For a type \((a, \theta)\) parent this is given by the solution to the first-order condition:

\[
\sigma f(a)e^{\sigma - 1} = c - \frac{1}{2}e(1 + q),
\]
which implies that:

\[ e^*(a, \theta, q) = \left( \frac{\sigma f(a)}{c - \frac{1}{2} \delta \theta (1 + q)} \right)^{\frac{1}{1 - \sigma}}. \]  

(3)

For \( e^*(a, \theta, q) < 1 \), it is sufficient that \( c - \delta_M > \sigma f(a) \). This condition also guarantees that \( e^*(a, \theta, q) > 0 \). Henceforth we shall impose this condition for convenience, though our qualitative results do not depend on it.

Our first proposition characterizes how educational choices vary with an individual’s ability and cultural trait. All proofs are in the appendix.

**Proposition 1** Fix a state \( q \). For each type \( (a, \theta) \) parent, there exists a unique optimal level of education \( e^*(a, \theta, q) \) given by equation (2). Education choices are interior, \( 0 < e^*(a, \theta, q) < 1 \) for all \( a \in A, \theta \in \{M, m\} \) and \( q \in [0, 1] \).

Optimal education is:

(i) strictly increasing in an agent’s ability \( a \),

(ii) strictly increasing in \( q \) for parents with the mainstream trait \( M \),

(iii) strictly decreasing in \( q \) for parents with the minority trait \( m \),

(iv) lower for parents with the minority trait \( m \).

A few remarks are in order regarding the differences in educational choices by mainstream \( M \) and minority \( m \) types. Firstly, \( M \) type parents always choose a higher level of education because education reinforces their own cultural trait. In contrast, \( m \) type parents would like their children to acquire the \( m \) trait. Hence education imposes an additional cultural cost on minority parents, which induces them to underinvest in education relative to the benchmark case in which education does not affect the social transmission of traits (alternatively \( \delta_m = 0 \)) and relative to \( M \) types. We view this underinvestment in education as a form of cultural resistance. In addition, the prevalence of the mainstream trait \( q \) has a different effect on agents with mainstream and minority traits. An increase in \( q \) raises the risk of acquiring the \( M \) trait via social transmission. Minority parents, who want their children to retain the \( m \) trait, respond by decreasing their children’s education in order to insulate them from this. The opposite is true for mainstream parents.
3.2 The Steady-State Distribution of Cultural Traits

We are now in a position to derive the steady-state distribution of cultural traits. Recall that the probability with which an agent who has education \( e \) acquires the mainstream trait is \( q_t e + (1 - q_t) \frac{1}{2} e = \frac{1}{2} (1 + q_t) e \). Hence in the continuous-time limit the evolution of \( q \) is given by the following nonlinear differential equation:

\[
\dot{q} = (1 - q) \frac{1}{2} (1 + q) \hat{e} - q \left[ 1 - \frac{1}{2} (1 + q) \hat{e} \right] = \frac{1}{2} (1 + q) \hat{e} - q ,
\]

where \( \hat{e} \) is the average level of education defined as follows:

\[
\hat{e} \equiv \int_0^1 \left[ q e^*(a, M, q) + (1 - q) e^*(a, m, q) \right] d\mu \\
= \left\{ q \left( \frac{\sigma}{c - \frac{1}{2} \delta_M (1 + q)} \right)^{\frac{1}{1-\sigma}} + (1 - q) \left( \frac{\sigma}{c - \frac{1}{2} \delta_m (1 + q)} \right)^{\frac{1}{1-\sigma}} \right\} \int_0^1 f(a)^{\frac{1}{1-\sigma}} d\mu. \tag{5}
\]

Note that \( \hat{e} \in (0, 1) \) because \( e^*(a, \theta, q) \in (0, 1) \) for all \( a \in A, \theta \in \{M, m\} \) and \( q \in [0, 1] \) by Proposition 1.

Denote the RHS of (4) by \( h(q) \). A steady-state distribution of traits, denoted by \( q^* \), occurs where \( h(q^*) = 0 \). Recall that for \( q^* \) to be asymptotically stable, it must be that \( h'(q^*) < 0 \).

We shall henceforth focus on the subset of steady states which are asymptotically stable.

**Proposition 2** There exists a smallest and largest asymptotically stable state, denoted by \( \underline{q} \) and \( \overline{q} \) respectively. Every steady state is interior, \( 0 < q^* < 1 \).

Therefore, every steady state is a polymorphic distribution of cultural traits, in which both agents with mainstream and minority traits are present in society. Multiple steady states can exist and at least one is asymptotically stable. Examples with one and three steady states are depicted in Figure 2. When cultural transmission produces multiple steady states, a small increase in returns to education can have a large effect on educational choices.
3.3 Resisting Education

Let us now examine the effect of an increase in returns to education on the mean level of education and distribution of cultural traits. In particular, we consider a shift at some time $T$ from the function $f$ to $g$ that retains the properties of $f$ with a few key differences, the first being:

**Dominance.** $g(a) > f(a)$ for all $a \in (0, 1)$.

That is, the shift to $g$ means that everyone enjoys a higher marginal return to education.

Let the mean level of education at time $t$ be $\hat{e}_t$. We can state the following result:

**Proposition 3**  Let the process reside in an asymptotically stable steady state $q^*$ at time $T$. Suppose there is an increase in returns to education from $f$ to $g$ at time $T$, in the sense that $g$ dominates $f$. Then for all $t > T$, $q_t > q_T$ and $\hat{e}_t > \hat{e}_T$.

In other words, there is an immediate and permanent increase in the prevalence of the mainstream trait and the mean level of education after the increase in returns to education occurs.
An increase in returns to education induces a rise in the mean level of education, which in turn causes the mainstream trait to spread. Figure 3 depicts the corresponding shift in steady states. In canonical models of human capital acquisition, in which education only plays an economic role, every individual increases education in response to a rise in the skill premium. When education has both a cultural and economic role, however, a focus on average levels of education obscures surprising forms of heterogeneity in educational responses. Some types may resist the spread of the mainstream trait induced by the rise in the skill premium.

**Definition 1** (Resisting Education). Type \((a, \theta)\) resists education at time \(t > T\) if:

\[ e^*(a, \theta, q_t, g) < e^*(a, \theta, q_T, f). \]

For this part of the analysis, we shall impose an additional condition on \(f\) and \(g\):

**Bias.** \( \lim_{a \to 0} [g(a) - f(a)] = 0. \)

While everyone may enjoy a higher marginal return to education, this condition ensures that the increase is arbitrarily small for the lowest ability types. One can think of this as an
increase in the skill premium, where benefits accrue primarily to high ability workers. We can now state the following result:

**Proposition 4** Suppose there is an increase in returns to education from \( f \) to \( g \) at time \( T \), and this increase exhibits bias. For all \( t > T \), there exists a set of types with positive measure who resist education at time \( t \). This set consists exclusively of agents with the minority trait.

Hence there are always some minority types who respond to the increase in returns to education by resisting education. In contrast, all individuals with mainstream values increase education. The intuition for this result is as follows. As agents increase education, in response to the rise in returns to education from \( f \) to \( g \), the mainstream trait spreads through the population (\( q \) rises). When the increase in returns to education exhibits ‘bias’, however, there are some ability types whose benefit from the shift to \( g \) is arbitrarily small. Such agents who hold the minority trait respond to the increased risk of acquiring the mainstream trait by reducing education. In contrast, mainstream types want their children to acquire the mainstream trait. The increase in \( q \) induces them to increase education, even when they receive no economic benefit from the shift to \( g \).

We can say more about the set of agents who resist education if we replace the dominance condition with the following monotone likelihood ratio property (MLRP):

**MLRP.** If \( a > a' \), then \( f(a)/g(a) < f(a')/g(a') \).

When \( f \) and \( g \) satisfy MLRP and bias, we have the following result:

**Corollary 1** There exists a real number \( \hat{a}_t \in (0, 1] \) such that type \((a, \theta)\) resists education in period \( t \) if and only \( \theta = m \) and \( a \in (0, \hat{a}_t] \).

Hence it is the lowest ability types with the minority trait who resist education. Recall that ability in our model does not necessarily mean talent, but more broadly the ability to benefit from rising returns to education, which may vary depending on factors such as the quality of public schools and local norms of discrimination. Hence, by identifying the types
of individuals who resist education, Corollary 1 yields a further empirically testable prediction: *Individuals with the worst educational outcomes adopt even lower levels of education in response to a rise in the skill premium.*

Resisting education has natural consequences for trends in economic inequality. An increase in returns to education creates an exogenous increase in inequality. While improving average educational attainment, this also sets in motion cultural changes which lead to further polarization in educational outcomes. The original (exogenous) increase in economic inequality is thereby amplified, creating even greater inequality than in a homogeneous society with all mainstream types.

### 3.4 Opposing Education

Let us now turn our attention to the welfare implications of rising returns to education. Let $V$ denote an agent’s indirect utility.

**Definition 2** (*Opposing Education*). Type $(a, \theta)$ opposes education at time $t > T$ if:

$$V(a, \theta, q_t, g) < V(a, \theta, q_T, f).$$

When $f$ and $g$ satisfy dominance and bias, we can state the following result:

**Proposition 5** For all $t > T$, there exists a set of types with positive measure who oppose education at time $t$. This set consists exclusively of agents with the minority trait. The set of types that oppose education at time $t$ is a superset of the set of types that resist education at time $t$; it is a proper superset as long as some minority types do not resist education at time $t$.

Consider a policy which raises the return to education from $f$ to $g$. According to Proposition 5, when education affects cultural transmission, there are always some agents that would oppose this policy. The decline in welfare occurs even though all agents receive an economic benefit from the policy. There is also more opposition than one might expect. Not only
would all types who resist education oppose the policy, but so would some types who would choose a higher level of education due to the policy.

The intuition is as follows. An increase in the return to education comes at a cultural cost to minority types, because it leads to the spread of the mainstream trait via social transmission. Resisting education is a response aimed at reducing the risk of acquiring the mainstream trait by reducing one’s investment in education. Part of the cultural cost imposed by a rise in $q$, however, cannot be neutralized by reducing education. Hence there are more types that are made worse off by a policy that increases returns to education than resist this increase.

When $f$ and $g$ satisfy MLRP and bias, we have the following result:

**Corollary 2** There exists a real number $\tilde{a}_t \in (\hat{a}_t, 1]$ such that type $(a, \theta)$ opposes education in period $t$ if and only $\theta = m$ and $a \in (0, \tilde{a}_t]$.

In this case, we can conclude that the worst off individuals—low ability minority types—are made worse off by rising returns to education.

## 4 Applying the Model

Poor educational outcomes among minority groups have been to difficult to reconcile with rising returns to education driven by globalization and skill-biased technological progress. We suggest that these phenomena go hand in hand. Once we recognize that various anti-discrimination policies produce a higher skill premium for members of minority groups, a number of other applications of our model become apparent.

In this section, we discuss the puzzling emergence of oppositional attitudes to mainstream education among African Americans, following the civil rights movement and affirmative action, and the white working class in the UK, amidst the breakdown of the class system. We then briefly discuss other forms which resisting education may take, in particular collective attempts to resist education.
4.1 Civil Rights, Affirmative Action & Acting White

The stigma attached to ‘acting white’ is one of the most prominent explanations for the persistent underperformance of African American and Hispanic minorities in the US. Fryer & Torelli (2010) find that African American students with high grade point averages (above 3.48) are systematically less popular among their peers than are white students with the same grades. Austen-Smith & Fryer (2005) use a signaling model to explain this phenomenon. We add to this analysis by proposing that ‘acting white’ is part of a more general cultural response to rising returns to education, driven by the fact that education has cultural consequences.

The Civil Rights movement of the 1960s raised the returns to education for African Americans. Wilson reports that ‘the efforts of corporations to recruit college-trained blacks increased sharply between 1965 and 1970. In fact, the average number of recruitment visits of representatives of corporations to predominantly black colleges rose from 4 in 1960 to 50 in 1965, climbing to 297 in 1970’. During the 1980s, however, working class African Americans in the inner cities faced reduced economic opportunities due to deindustrialization and technological deskilling. At the same time, a largely suburban, African American middle class emerged, which continued to benefit from both diminishing levels of discrimination and from skill biased technological change (Wilson 1978a, Wacquant & Wilson 1989).

Thus, while African Americans in general stood to benefit from the ending of Jim Crow laws in the South, and other less visible forms of discrimination in the North, it was only the new black middle class that continued to experience higher wages and greater levels of educational attainment in the 1980s and 1990s. The majority of inner-city African Americans were not able to benefit from the increase in the skill premium that began in the 1980s (represented by a shift from \( f \) to \( g \) in our model). It is consistent with our theory then that sociologists

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18. [S]chools such as Clark University, Atlanta University, and Southern University, to which no visits had been made in 1960, received in 1970, 350,510, and 600 corporate representatives, respectively. The vigorous recruitment of highly educated blacks by corporations is one of the principle reasons why the proportion of black male workers in white-collar positions increased from 16 to 24 percent from 1964 to 1974 (the proportion of white males in white-collar positions remained slightly over 40 percent during this period) with the greater portion of this increase occurring in the higher level technical, professional, and administrative positions (Wilson 1978b, 17).

19. Wilson (1987) further argues that the rising affluence of the black middle class actually hurt those inner city communities that had previously relied on middle class African Americans to provide community-level public goods—an effect which would only strengthen the mechanism we identify in our theory.
and ethnographers began to detect the emergence of a distinctive culture that penalized academic achievement within inner city black communities in the 1980s.\textsuperscript{20} We suggest that the widening gap in returns to education among African Americans may have contributed to a cultural movement opposed to educational attainment.

Our model also sheds light on the effectiveness of policies designed to increase levels of educational attainment among minorities. Affirmative action acts as an increase in the skill premium for a relatively small proportion of high ability African Americans and Hispanics, by enabling them to gain places at higher ranked universities.\textsuperscript{21} An extensive academic literature studies the effect of affirmative action policies in the US both in theory and in practice.\textsuperscript{22} Proponents of affirmative action in the 1960s and 1970s saw it as a temporary measure. One Supreme Court justice who supported the legality of affirmative action in 1978 stated that “I yield to no one in my earnest hope that the time will come when an affirmative action program is unnecessary and . . . a relic of the past” and hoped that “within a decade at most, American society must and will reach a stage of maturity where acting along this line is no longer necessary” (quoted in Fang & Moro 2011, 164).

This was not to be. As apparent in Figure 1, racial differences in educational attainment (which narrowed during the 1960s and 1970s) have not shrunk since the 1980s. Our purpose here is not to assess the effectiveness of affirmative action nor to replace existing explanations for how affirmative action policies can generate adverse effects. Rather we suggest an alternative and complementary mechanism for explaining why affirmative action has not

\textsuperscript{20}The figures reported by Wacquant & Wilson (1989) for inner-city Chicago are dated, but indicative of the phenomenon we are describing. They report that a large fraction of the population in the poorest areas of Chicago had not graduated high school and of those a ‘majority of 60.5 percent in the jobless category’. They note that ‘a high school degree is a \textit{conditio sine qua non} for blacks for entering the world of work, let alone that of the middle class. Not finishing secondary education is synonymous with economic redundancy’ and that this condition describes a substantial proportion of the residents of poor black neighborhoods (Wacquant & Wilson 1989, 18).

\textsuperscript{21}Schuck, summarizing a large literature, notes that ‘even its proponents concede that only a very small fraction of the group can hope to take advantage of it. This is most obvious with selective college admission . . . but it is bound to be true as well for employment that requires special job skills or a certain level of education . . . affirmative action in admission to selective colleges and universities largely benefits students from middle-and upper-class families. This is hardly surprising, as these students are best equipped to apply to such competitive and costly schools. This pre-college advantage is then multiplied when these students, now graduates of the selective schools, go on to apply to selective professions and graduate programs and then proceed with their careers’ (Schuck 2003, 175).

been as successful as its proponents either hoped or expected. Affirmative action raises the returns to education predominantly for high ability minority types. As they increase education, the mainstream cultural trait spreads through the minority population ($q$ increases by Proposition 3). Those who benefit least from affirmative action may respond by reducing their level of education (Proposition 4). This suggests that affirmative action could further depress educational outcomes and reduce the welfare of the most disadvantaged members of the minority group (Corollary 2).

### 4.2 Other Examples of Resistance to Education

Another example of resisting education is found in white working class attitudes to education in the UK. Participation in higher education has long been seen as conflicting with traditional working class values (see Jackson & Marsden 1966). University enrollment in the UK lagged behind US levels throughout the twentieth century, as did the equivalent of high school attendance. Katz and Goldin note that ‘[b]y 1960 Great Britain was about 35 years behind the United States in the educational attainment of its high-school aged youth’ (Katz & Goldin 2008, 26). They emphasize that the British system focused on providing a high level of education to an elite (Katz & Goldin 2008, 28).

Several important developments occurred after 1980. Firstly, the returns to education increased in the UK, as elsewhere. Secondly, the traditional class system gave way as more people self-identified as middle-class. Thirdly, after 1990 there was a dramatic expansion in the number of university places. The proportion of the eligible population attending university in the UK increased from 13% in 1980 to 33% in 2000 and 39% in 2010.

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23Jackson & Marsden (1966) depict the cultural distance that existed between children who attended grammar school and those who did not in the 1960s and describe the tensions that arose between children and their parents. One mother recalls ‘Our Alfred would be doing his homework in the front room, and his father wasn’t a bit understanding. He’d make it in his way to go through that room as many times as he possibly could — to disturb him’ (Jackson & Marsden 1966, 118). Working class children who attended grammar schools in the 1950s became suddenly ‘self-conscious over accent, of their discovering that they actually had an accent’. Many children acquired middle-class ‘B.B.C.’ accents and these ‘shifts in accent too play[ed] their part in loosening ‘neighbourhood’ ties, and it was as if the process continually gathered momentum and the breach grew wider. But accent, even if changed, was still a burden and created other difficulties. That it offended the neighbors and old friends goes almost without saying (‘stuck up’, ‘speaks la-di-dah’), but this time it cut into the home and family life. Again the need was above all for ‘tact’, and there were children who became bilingual, speaking B.B.C. English at school but roughening up when they got home’ (Jackson & Marsden 1966, 114).
Standard theories of education predict that rising returns to higher education and cheaper access thereto would produce an increase in educational attainment. While average educational attainment has increased, not all communities within the UK were able to benefit equally from the increased provision of education; instead, educational outcomes have become more polarized. Children from working-class backgrounds remain heavily underrepresented, especially at elite universities.\footnote{See Harris (2010) and Browne et al. (2010, 48-49).} Moreover, this problem is particularly concentrated among particular communities, notably the white working class as Table 1 indicates.

Our theory can account for certain aspects of this otherwise puzzling development. Proposition 4 predicts that some individuals will reduce their level of educational attainment in response to an increase in returns to education because they (or their parents) wish to preserve their cultural values. Archer et al. (2003) quote a student who states her reluctance to attend university in the following terms:

> Well my boyfriend keeps on telling this to me ... once I come into university I will start acting like a uni student, I will start talking like a uni student, I’ll start reading the papers that they read, you know? [laughs] I’ll start behaving properly like one. And will you be listening to radio stations and um watching different things on TV, that I don’t watch now, you know? (Archer et al. 2003, 177)

This statement highlights the cultural threat posed by mainstream education which is central to our theory. In this case, higher education is associated with a distinctly middle-class culture which working-class individuals find alienating.\footnote{According to Archer et al. (2007): ‘[h]igher education does not appear to offer working-class young people the space to ‘feel myself’ and/or to generate value through ‘known’ mechanisms.’ (Archer et al. 2007, 232).}

Another example that illustrates our argument is the reaction of Uyghar speaking minorities to attempts by the Chinese government to reform the educational system in western China (Dwyer 2005). Beginning in the early 2000s the Chinese government began eliminating Uyghur language institutions in favor of Mandarin. For example, Uyghur language instruction was ended in 2002 at Xinjiang University on the grounds that it did not give individuals the human capital they needed to compete for jobs with Chinese speakers. Dwyer (2005) argues that these policies have induced cultural resistance because ‘language and re-
ligion are valued by most ordinary Uyghurs as central aspects of their identity... significant encroachment by a dominant Chinese culture is perceived as an attack on identity’ (Dwyer 2005, 63).

Grose (2010) provides evidence of resistance to education among Uyghar speakers. He studies a program called the Xinjiang Class which provides tuition, living expenses, insurance, and travel funds for Uyghar families to send children to attend high schools in more developed parts of China. Despite the fact that the schools chosen provide halal food and try to promote cultural integration between Han Chinese and Uyghar students, the anthropological evidence that Grose provides suggests that ‘many Uyghurs are resisting integration’ (Grose 2010, 106).

4.3 Collective Resistance to Education

Resisting education can take a variety of other forms, including collective attempts to resist mainstream education. Strict religious groups are particularly adept at organizing resistance to secular education in order to preserve their distinct beliefs and practices. Previous accounts have focused on largely on the importance minority communities attach to limiting outmigration. However, individuals also care about the cultural effects of education because of its importance in transmitting cultural values within a community. This aspect of the phenomenon is evident in the examples we consider in this section.

The Amish are acutely aware of the cultural threat to their communities posed by secular education. The Old Order Amish emerged in the United States in the second half of the nineteenth century, a period of rapid economic growth. They live by a set of rules known as the Ordnung, which varies from community to community, but everywhere involves strict dress codes for men and women, a ban on full length mirrors and limitations on the use of modern technology including a prohibition on driving motor vehicles. Because the Amish lifestyle is so drastically at odds with contemporary life in the US, members who acquire modern tastes and values are at high risk of leaving the community. The preservation by the Amish of their distinctive way of life thus depends on insulating themselves from the influence of mainstream culture. This means resisting mainstream education, which they are able to do because they ‘retain economic self-sufficiency, residential independence, and complete control of their own schools’ (Dewalt & Troxell 1989, 308).

The Amish ‘want their children to be educated in Amish schools, taught by Amishmen in
accordance with the Amish value system to prepare them for life in the separated Amish society’ (Casad 1967, 425-426). Amish parents fear that their children will acquire alien, secular values: ‘that modern education would lead Amish youth away from farm and faith, and undermine the church’ (Kraybill 1989, 2001, 131). The conflict between the Amish community and the government over education came to a head in the 1960s with some Amish parents going to jail for refusing to send their children to school. This was only resolved in 1972 when the Amish were granted the right to limit formal education to eight grades (Wisconsin v. Yoder). Since then, Amish communities have provided their own community-based education through to eighth grade, at which age members leave school and begin work as adults. The Amish strongly oppose high school education because adolescents are seen to be particularly vulnerable to outside influences and because the subjects taught at high school (literature, art, sciences, civics and politics) are seen to be inherently corrosive of Amish values (Dewalt & Troxell 1989, Waite & Crockett 1997).

To ultra-Orthodox or Haredi Jews, education is ‘the purpose of Jewish existence and at the same time a barrier against its decay’ (Heilman 1992, 171). Yet this means the study of religious texts and ‘apprenticeship into communal practices’, not a means of acquiring new knowledge (Krakowski 2008, 17). Ultra-Orthodox Judaism emerged in 19th century Europe in response to Jewish Emancipation—the gradual lifting of barriers to Jewish participation in mainstream society. Among other things, this enabled Jews to enter higher education and the professions for the first time (see Berman 2000, Carvalho & Koyama 2011). Emancipation and economic growth raised returns to education thereby producing a remarkable increase in educational attainment among Jews (Kober 1947, 211-212). Yet, the effect was not uniform (as predicted by Proposition 4). In Eastern Europe, the threat posed by secular education drove a schism between Reform, Orthodox and ultra-Orthodox Judaism (Silber 1992). The ultra-Orthodox were alarmed at what they perceived to be assimilation by German Jews and sought to voluntary isolate themselves from mainstream (secular and Christian) culture. By placing unprecedented restrictions on secular education, ‘the young were turned into haredim. They were taught to speak and write in a separate Haredi version of a Jewish language that kept outsiders at bay — Yiddish, encrusted with acronyms and insider expressions, even more than modern Hebrew. They were confirmed in their distinctive appearance and dress that made assimilation in the outside world impossible” (Heilman 1992, 171).

The Islamic revival of the last few decades, viz. the surge in Islamic piety and politics, is
another movement that is defined in opposition to mainstream (here, Western) culture (see Hunter 1988, Esposito 1999, Lapidus 2002). Over three quarters of respondents in every Muslim society covered by the 2007 Pew Global Attitudes Survey agree/strongly agree with the statement, “Our way of life needs to be protected against foreign influence” (Pew Global Attitudes Survey 2007). Educational institutions, in conjunction with mainstream media, are often blamed for making Muslims more receptive to Western culture. According to Hoffman (1995), ‘Islamic fundamentalism is a revolt of young people who are caught between a traditional past and a higher secular education with all its implications of Western intellectual impact and contact with materialistically oriented culture of the urban environment’ [p. 210]. In Egypt, for example, the Islamic revival has occurred alongside a massive expansion in state education, with recipients of the new education being at the forefront of the movement (see Binzel & Carvalho 2013).

There are a number of strategies that Muslims have adopted to acquire education, while retaining their religious values and identity. One such strategy is the development of grassroots Islamic organizations, which match religious individuals with other like-minded people, and provide their own form of religious education aimed at neutralizing the appeal of Western culture. In Egypt, Islamic groups gained control of student unions in most faculties at Cairo University and other higher educational institutions in the 1970s (Kepel 2003). In North America, Muslim student organizations can be found on most college campuses attended by Muslims.

Another response to the cultural threat of mainstream education is to build one’s own schools. This has been the approach in sub-Saharan Africa since Christian missionaries first established schools there in the 19th century. In northern Nigeria, parents continue to send their children to Koranic schools even though state education is freely provided (Csapo 1981). Izama (2013) provides evidence that Muslim underinvestment in education in sub-Saharan Africa is smaller where Muslims are able to establish their own schools. In the United King-

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26 In addition, a 2002 Gallup World Poll asks “To what extent (on a five-point scale) do you think that economic, social and cultural modernity, as experienced by Western societies, is in contradiction to our value system?” A large proportion of respondents reported a contradiction (“1” or “2”) in Jordan (84%), Lebanon (73%), Morocco (71%), Turkey (57%), Saudi Arabia (57%), Iran (54%) and Kuwait (45%) (Gallup World Poll 2002).

27 There is particular hostility to girls attending state schools: ‘General public opinion associates an educated woman with low morals: the higher the education, the lower the morals’ as parents believe that ‘Western education would open the girls’ minds to the evils and vices of modern civilisation’ (Csapo 1981, 313).
dom in 2009, there were over 120 private Muslim schools and 7 Muslim state schools (Tinker 2009). The establishment of these schools was driven by ‘concern over the lower educational attainment of some Muslim children, Bangladeshi and Pakistani boys in particular, and the belief that increased accommodation of religious and cultural differences will help address this low achievement and prevent further marginalization from taking place’ (Meer 2009, 389). In Turkey, where a secular curriculum is imposed in elementary schools, municipalities dominated by religious parties have been able to increase female educational attainment by providing Koranic study groups and refusing to uphold the ban on headscarves (Meyerson 2014). All of these strategies can be viewed both as collective forms of cultural resistance and as attempts to reduce the economically deleterious effects of resisting education.

5 Concluding Comments

Economic incentives alone cannot easily explain variation in educational outcomes by ethnicity, class and religion. Not all groups have increased their investment in education in response to the rising skill premium in recent decades. In fact, high school graduation rates in the US have remained flat in recent decades. Moreover, policies that were designed to increase educational attainment among disadvantaged minorities have had limited success. This paper has developed a unified explanation for these patterns of education.

In particular, we have studied how the cultural transmission of values shapes individual incentives to invest in education. Education transmits cultural traits that undermine minority culture. Thus to preserve their cultural identity, it can be individually rational for members of minority groups to curtail their investment in education. Most surprisingly, an increase in returns to education for high-ability individuals always induces low-ability minority types to resist education. Hence an increase in inequality caused by a rising skill premium is amplified by cultural resistance to education. A further implication of our argument is that an increase in the skill premium may generate less inequality in a culturally homogeneous society than in a multicultural one. Finally, we have applied our theory to several seemingly disparate case studies and shown that there may be common forces at work, even when resistance to education is collectively organized.

28See also Carvalho (2013) for an explanation of this phenomenon.
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Appendix

Proof of Proposition 1. The proof follows from the argument in the text and by differentiation of (3). □

Proof of Proposition 2. Because \( e \in (0, 1) \) for all \( q \in [0, 1] \), (4) is positive at \( q = 0 \) and negative at \( q = 1 \). (4) is also continuous in \( q \). By the intermediate value theorem then, there exists at least one point \( q^* \in (0, 1) \) at which \( h(q) \) cuts the horizontal axis from above. □

Proof of Proposition 3. By hypothesis \( \dot{q} = 0 \) at \( q_T = q^* \). By inspection of (5), \( \dot{e} \) increases with the shift from \( f \) to \( g \), because \( g(a) > f(a) \) for all \( a \in (0, 1) \). As (4) is strictly increasing in \( \dot{e} \), this shift lifts \( \dot{q} \) above zero, so that \( q_t \) increases. The transition to the new steady state is depicted in Figure 3. Since \( \dot{q} > 0 \) during the transition, \( q_t > q^* = q_T \) for all \( t > T \).

Let \( \dot{e}_t \) be the mean level of education at time \( t \). Note that \( \dot{q} = 0 \) at time \( T \), so \( \frac{1}{2}(1+q_T)\dot{e}_T = q_T \), or:

\[
\dot{e}_T = \frac{2q_T}{1 + q_T}.
\] (5)

By the argument above, we know that \( \dot{q} > 0 \) for \( t > T \). Therefore:

\[
\dot{e}_t > \frac{2q_t}{1 + q_t}
\]

for \( t > T \). Since \( q_t > q_T \) for all \( t > T \), \( \frac{2q_t}{1 + q_t} > \frac{2q_T}{1 + q_T} \), so that \( \dot{e}_t > \dot{e}_T \) for all \( t > T \). □

Proof of Proposition 4. By (3), \( e^*(a, \theta, q_T, f) > e^*(a, \theta, q_t, g) \) if and only if:

\[
\frac{\sigma f(a)}{c - \frac{1}{2} \delta \theta (1 + q_T)} > \frac{\sigma g(a)}{c - \frac{1}{2} \delta \theta (1 + q_t)}.
\] (6)

Rearranging:

\[
\frac{f(a)}{g(a)} > \frac{c - \frac{1}{2} \delta \theta (1 + q_T)}{c - \frac{1}{2} \delta \theta (1 + q_t)}.
\] (7)

The RHS of (7) evaluated at \( \theta = M \) is greater than one, because \( \delta_M > 0 \) and \( q_t > q_T \) for all \( t > T \) by Proposition 3. The LHS of (7) is less than one because \( g(a) > f(a) \). Hence \( M \) types never resist education.
The RHS of (7) evaluated at $\theta = m$ is less than one, because $\delta_m < 0$. Bias implies $\lim_{a \to 0} f(a)/g(a) = 1$. By continuity, there exist a value $a_t \in (0, 1)$ such that a type $(a, \theta)$ agent resists education at time $t > T$ if $\theta = m$ and $a \in (0, a_t]$. □

**Proof of Corollary 1.** Bias and MLRP together imply that dominance holds, so that Propositions 3-4 go through. By MLRP, the LHS of (7) is strictly decreasing in $a$. Taken together with the argument above, this implies that there exists some cutoff $\hat{a}_t \in (0, \hat{a}_t)$ such that (7) holds if and only if $\theta = m$ and $a \in (0, \hat{a}_t]$. □

**Proof Of Proposition 5.** Substituting (3) into (1), we can compute:

$$V(a, \theta, q, f) = f(a)\left(\frac{\sigma f(a)}{c - \frac{1}{2}\delta(1 + q)}\right)^{\frac{\sigma}{\sigma - 1}} - \left[c - \frac{1}{2}\delta(1 + q)\right]\left(\frac{\sigma f(a)}{c - \frac{1}{2}\delta(1 + q)}\right)^{\frac{1}{\sigma - 1}} + \nu(\theta)$$

$$= f(a)^{\frac{1}{\sigma - 1}}\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q)}\right)^{\frac{\sigma}{\sigma - 1}} - \sigma f(a)^{\frac{1}{\sigma - 1}}\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q)}\right)^{\frac{\sigma}{\sigma - 1}} + \nu(\theta)$$

$$= (1 - \sigma)f(a)^{\frac{1}{\sigma - 1}}\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q)}\right)^{\frac{\sigma}{\sigma - 1}} + \nu(\theta).$$

(8)

Hence $V(a, \theta, q_t, g) < V(a, \theta, q_T, f)$ if and only if:

$$(1 - \sigma)f(a)^{\frac{1}{\sigma - 1}}\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q_t)}\right)^{\frac{\sigma}{\sigma - 1}} > (1 - \sigma)g(a)^{\frac{1}{\sigma - 1}}\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q_t)}\right)^{\frac{\sigma}{\sigma - 1}}$$

$$f(a) > \frac{g(a)^{\frac{\sigma}{\sigma - 1}}\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q_t)}\right)^{\frac{\sigma}{\sigma - 1}}}{\left(\frac{\sigma}{c - \frac{1}{2}\delta(1 + q_t)}\right)^{\frac{\sigma}{\sigma - 1}}}.$$ 

(9)

This is the same as condition (7) for resisting education, except that the RHS is raised to the power of $\sigma$, where $0 < \sigma < 1$, so that it is lower than the RHS of (7). The result follows immediately. □

**Proof of Corollary 2.** The result follows immediately from the proof of corollary 1. □