Evaluating Economic and Social Interventions that Increase College Enrollment

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Abstract:

This paper combines ideas from several branches of the social sciences into an economic model of college enrollment, following recent theoretical work by Akerlof and Kranton (2002). Basic to the model are notions of "fitting in," social status, and investments in human capital during high school. After using the NELS data and maximum likelihood estimation to uncover the behavioral parameters of the model, I predict the effects of "economic" and "social" policy interventions. I find that policies implemented during high school are often too late to reduce disparities in college enrollments; the exceptions are policies that shape adolescents' social environments.

INTRODUCTION

The importance of the high school years for many individuals cannot be overemphasized. During this time, adolescents make some of the most significant choices in their lives and develop their sense of self and their place in the world. Decisions of whether or not to date, have sex, drink alcohol, take drugs, and work hard in school have all been shown to have substantial long-run effects on life trajectories (Teachman 2003, Upchurch 2002, Chaplin and Hannaway 1996). Choices teenagers make influence many outcomes, including whether they drop out of school, go to college, establish a particular career, and earn a given amount of income.

These important choices are also being made at an age when peers and peer pressure are of paramount importance. In particular, social status and "fitting in" with peers are central during adolescence (Tarrant et al. 2001, Brown 1982).[1] In an effort to navigate through their tumultuous social environments, adolescents choose an *identity* for themselves (Erikson 1968, Schwartz 2005). Their identity is a proclamation both to themselves and to others of "who they are" and "where they fit in" their social environment. The most basic part of adolescent identity is an individual's *social category*. Adolescents naturally fit into some broad social categories—male/female, white/minority. They also are members of more narrowly defined social categories—"nerd," "jock," "burnout," "preppy." While fashions and behaviors vary across geographic space and time, the adolescent need to signal "who they are" remains constant. Indeed, Akerlof and Kranton (2000, p. 717) argue that choice of identity could be considered the most important "economic" decision adolescents make because it is fundamental to behavior and has ramifications for many outcomes later in life.

[1]Tarrant et al. (2001) report that susceptibility to peer pressure peaks between the ages of 12-16 years. Brown (1982) reports that over a third of the college students he surveyed listed peer pressure as one of the most difficult hardships during high school. In the nationally representative data set used in this paper, sixty percent of 10th graders report visiting with friends at a local hangout once a week or every day. Seventy percent of 10th graders report talking on the phone with the same frequency. Almost seventy-five percent report that it is very important to have strong friendships. Over seventy percent report they go to school because it is a place to meet friends. Only twenty-two percent report that it is very important to have lots of money in their life.

Despite the importance of peers and social status in the life of the typical adolescent, few economic models of adolescent decision-making take these factors into account. In fact many models focus almost entirely on the role of future income. Recently this focus on income has begun to change. Akerlof and Kranton (2002) provide an empirically tractable model of adolescent decision-making that integrates a sociological view of education into the framework of utility maximization. In this model, "A student's primary motivation is his or her identity and the quality of school depends on how students fit in a school's social setting" (Akerlof and Kranton 2002, p. 1167). With this shift in focus, Akerlof and Kranton present a richer theory of students and schools by including the concepts of social status and "fitting in" into an expanded model of human capital accumulation.

This paper utilizes this "identity model" and the National Education Longitudinal Study (NELS) data set to achieve two main goals. First, after outlining and extending the identity model, the model is estimated using the NELS data in order to examine one of the principal decisions of late adolescence: college enrollment. Second, the estimated utility parameters are then used to predict the behavioral effects of several education policies on college enrollment decisions, including increasing high school graduation requirements and changing the social environment in schools. My evaluation of social *and* economic educational policies highlights the broad use of this model in suggesting alternative education reforms, and it represents the first empirical use of the model in the literature. My results indicate that some suggestions to increase college enrollment, such as increasing academic standards during high school, are "too late" and would likely *increase* the racial gap in enrollments. In contrast, efforts to increase the social status of students who choose the college preparatory curricula could dramatically shift minority groups into these curricular paths. Further, targeted policies that affect economic and social variables for adolescents could substantially close minority enrollment gaps.

College Enrollment: Facts, Methodological Approaches, and an Integrated Framework

Economists have long been interested in explaining why students go to college. This interest stems in part from the desire to develop policies that encourage more students to enroll in college. While there have been large increases in college enrollment across most socioeconomic groups over the last several decades, there continue to be differences in college access, participation, and completion. The gender gap in college participation has decreased since the 1970s and recently reversed, so that by 2003, 51 percent of young women had entered and/or completed college compared to 41 percent of young men (NCES 2005). The racial gap in college enrollment has shown no such decline, however. In 1974, young whites had a 38 percent participation rate in college compared to 26 percent of blacks and 22 percent of Hispanics. By 2003, the white-Hispanic gap had increased to 26 percentage points from 16 percentage points in 1974. The white-black gap also shows no signs of decreasing (NCES 2005).[2]

Many policies designed to encourage college enrollment have been based on the premise that college enrollment rates, especially for African Americans and Hispanics, are relatively low because college is too expensive. Some policies focus on the fact that many students are academically unprepared for college or have inadequate information about college. To counter the problems of accessibility, there has been an expansion of scholarship and loan programs funded by the federal government, by state governments, or by individual colleges and universities. To address the problems of inadequate preparation, high schools have raised their graduation and course requirements. Many schools have also introduced pre-college informational programs.

Given the persistence of low college enrollment among some groups despite these policies, it is worthwhile to look beyond problems of inadequate financial resources and low academic standards. One way to examine this question is to combine some of the conceptual approaches used in different social science disciplines into a unified framework.

[2] The point-estimate of the gap has increased, although this increase is not statistically significant. The complete time series of enrollment rates can be found in the Appendix.

In the economics literature, the standard approach for determining an individual's optimal level of education is the human capital model (Becker 1964, Willis and Rosen 1979). The basic premise is that individuals weigh the costs and benefits of continuing their education and choose to end their education when the costs exceed the benefits. Both costs (e.g. tuition, opportunity cost of not working) and benefits (future income) are primarily monetary. It is thus not surprising that the policy interventions suggested by the human capital approach focus primarily on offering tuition and aid policies, alleviating credit constraints in financing college, and increasing information about the returns to college.[3] Recently some economists have indicated that income-maximizing models of educational attainment should be broadened. For example, Heckman et al. (2005, p.127) suggest that one explanation for economists' inability to resolve why so many students do not attend college is "the failure of the income maximizing concept, rather than the utility maximizing concept, to represent schooling decisions." They suggest psychic costs and distaste for schooling as concepts worthy of inclusion in utility models.

Other social scientists interested in understanding individual choices to attend or not attend college focus on social, environmental, and developmental determinants of college enrollment. Coleman (1990, p. 128), a leading sociologist studying education, stated, "The educational resources provided by a child's fellow students are more important for his achievement than are the resources provided by the school board." Many sociologists and anthropologists also emphasize the impact of social status on the development of aspirations for college (McDonough 1997). Non-economists tend to suggest policies to increase college enrollment that focus on the social environment of schools. These policies include reducing social and racial segregation, using communal schools, and encouraging a sense of community in schools (Coleman 1990, Ma 2003, Wynne and Ryan 1997).

On the theoretical side, much work has been done specifying models of how individuals make education decisions, but most models are far too complex

[3] Long (2004) suggests that tuition policies had little relevance in the 1990's for enrolling in college but did influence the choice of which college to attend. Avery and Kane (2004) discuss the reasons for the mixed results of research examining the effects of tuition policies. See Kane (1994) for estimates of rates of return by race. See Dynarski (2004) for current research on merit aid.

to be taken directly to available data (Babcock 2004, Bernheim 1994).[4] Only recently have several economists tried to integrate both economic and "social" factors into a single theoretical model of educational decision making (Akerlof and Kranton 2002).[5] These authors develop an 'identity model'—a simple, estimable model of educational attainment that includes key social concepts suggested by a wide range of educational researchers.[6] In the model, adolescents are assumed to be driven by the desire to fit in, seek social status, *and* invest in human capital.[7] Their model is a more general model of adolescent decision-making, with a human capital model as a special case.

This paper utilizes the "identity model" of educational attainment and the NELS data set to examine the social *and* economic determinants of college enrollment. A richer model is potentially important because it will allow me to investigate an expanded range of potential policy interventions that may influence adolescents' decisions to attend college.

IDENTITY MODEL OUTLINE, EXTENSION, AND DISCUSSION

The conceptual antecedents of the identity model used in this paper come from various branches of the social sciences. The economic concepts used in the framework are based on the standard human capital accumulation literature (Becker 1964). Students weigh the costs and benefits of additional schooling and

[4]One exception to the lack of sociological concepts in empirical economic models is the work of Brock and Durlauf (2001a, 2001b) who present an estimable model of social interactions that is derived from utility maximizing behavior. There are two drawbacks of the Brock-Durlauf model. First, there is limited development of the choice of social group in their social interactions model. Second, some of the important social concepts from educational researchers (e.g. status, social norms) are subsumed in a "black box" social effect. Cooper (2002) also makes these points. Also see Tao and Winship (2001) for additional critiques of the Brock-Durlauf framework and Durlauf (2001) for a response.

[5]There are several antecedents to incorporating 'social' concepts in economic models. Bernheim (1994) provides an economic model with conformity as an equilibrium outcome. Social norms have been the subject of much theoretical work (e.g. Akerlof 1980, Moffitt 1983). Status has been the subject of some work in labor economics (Frank 1985).

[6] Akerlof and Kranton (2002) argue that while the concepts of identity and social category are not well known in some disciplines, they are as basic to sociology and the sociology of education as supply and demand are to economics. Also see Akerlof and Kranton (2000) for an overview of the importance of identity in economic models and Akerlof and Kranton (2005) for the model applied to organizations and worker motivation.

[7] It is important to note that the identity model allows, *but does not assume*, the presence of a variety of social and psychological effects on college enrollment.

attend school until the costs overtake the benefits. "Productive" academic standards raise the costs of effort for students but also increase the future returns from effort,[8] and the benefits and costs will be heterogeneous across student characteristics (e.g. ability). In the past many economic models only considered the effort/leisure tradeoff (Costrell 1994) or focused on compensating differentials (Willis and Rosen 1979) as reasons that students do not pursue higher educational attainment. In this paper I include "fitting in" with peers and "social status" as additional elements that influence the decisions made by high school students. A number of studies show that fitting in also indirectly affects adolescents' decisions to attend college through their high school effort choices and social group choice (Friedkin and Thomas 1997, Barber et al. 2001). The tradeoff inherent in choosing to fit in and preparing for college is illustrated by Eder et al. (1995, p. 87):

> "There are maybe four or five of us students who have chosen not to be losers," Charles says. "We've decided we want to go to college and do as much as we can for ourselves and our community. And if it means we are going to be lonely, we're going to do what we have to do."

The second concept of primary importance in examining educational choices of adolescents is the social status that comes with membership in certain groups within schools. Kinney (1993) notes that "students typically rank the diverse groups in terms of prestige, and groups' positions in the school social structure denotes their members' relative peer status or 'popularity.'" Several other studies point out that an individuals social status affects their aspirations for attending college (e.g. McDonough 1997, Hossler et a. 1999, and Coleman et al.1966).[9]

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[8] "Productive standards" refer to standards that are inputs into the human capital production function for students. Standards do not have to be productive to be effective, however. In Costrell (1994), standards in the form of graduation requirements are used as a screening device for employers, and thus do not enter into the production function. In this paper, standards (e.g. math requirement for graduation) are assumed to be productive, which is consistent with evidence presented in Meyer (1999).

[9] Recently some economists have begun examining social status within high schools and achievement. In an analysis of "acting white," Fryer and Torelli (2005) make an important contribution in measuring popularity based on friendship nominations in the Add Health data set. While their empirical exercises have clear theoretical motivations (see Austen-Smith and Fryer Forthcoming), they do not attempt to estimate utility parameters. Among their results, they find a non-linear achievement-popularity link as black students age and also find the "acting white" effect to be more salient in public schools and schools in which the percentage of blacks is less than twenty

My identity model incorporates social status and fitting in with peers in high school in addition to human capital accumulation. The model considers two choices facing high school students: how hard to work in school and what social group to join. Examples of social categories could include "jocks" or "nerds" or school-created groups, such as those students on the college preparation track. In my model, I assume that through their choices of effort and choice of social group, individuals derive utility in three ways: pecuniary returns from effort in school (human capital accumulation), social returns from identity, and psychological returns from meeting their parent's expectations. The component reflecting parental influences is an addition to the model as presented in Akerlof and Kranton (2002). The addition of parental expectations follows much research on the intergenerational transmission of human capital as well as descriptive work in the social sciences (e.g. Cabrera and La Nasa 2001).[10]

Utility can thus be written as a function of human capital (H), identity (I), and meeting parental expectations (E):

$$U_i(H_i, I_i, E_i) \tag{1}$$

The concept of identity stems from the social returns adolescents receive from being associated with a particular group. Adolescents choose their social group based on the status of the group and how they would fit in with the group based on their characteristics and behaviors. Formally, social utility is given by the following sub-utility function that follows the notation of Akerlof and Kranton (2002):

$$I(e_i, c_i; \varepsilon_i, \psi) \tag{2}$$

Identity is assumed to be a function of the individual's chosen effort in school, e_i, individual characteristics, ε_i, and the attributes of his social category, c_i. The attributes of the social category are exogenously given by a set of prescriptions, ψ, which defines the ideal behavior and characteristics for each category. As an illustration, consider a group of high school "burnouts." The prescriptions (attributes) for this group might be behavior norms of drug use and classroom disruption, with "ideal" behaviors including

[10] Coleman (1990, 1966) also focuses on the importance of family background for academic outcomes. The inclusion of parental expectations also decreases the endogeneity bias of school effects on achievement due to parents choosing the individual's school.

getting detention twice a month and getting drunk on the weekends.[11] Prescriptions vary by group and can promote bad grades, low effort, and risky behaviors. For example, Bishop et al. (2003) report that middle school students take specific actions to avoid being labeled a "suck-up":

--"avoiding eye contact with teachers"
--"not handing in homework early for extra credit"
--"not raising one's hand in class too frequently"
--"talking or passing notes to friends during class"

Schools can also attempt to influence student behavior by supplying a vision of an "ideal student." Prescriptions for ideal student behaviors can take the form of curriculum and disciplinary standards that are set by the school administration, with different standards for different groups.[12] For example, a high school can set course requirements for graduation as well as other requirements for students on the college preparation or vocational tracks. These requirements are used as prescriptions for the ideal behavior of each group. Students segment themselves into these school-created social categories in order to match their own characteristics and behaviors, achieve status within schools, and learn different sets of skills.

I closely follow Akerlof and Kranton's parameterization of the identity sub-utility function:

$$I_g - t(s_g - a_i) - \frac{1}{2}(e_i - N_g)^2 \qquad (3)$$

where I_g is the category-specific utility gain through membership in category g (status), s_g is the standard in the category, a_i is the individual's ability, e_i is the chosen effort level, and N_g is the social norm of effort. The parameter t is a measure of how difficult it is for students with different characteristics to fit into a group.

This formulation of utility captures the two main components of identity: social status and "fitting in." Social status (I_g) is awarded to all individuals in group g and can

[11] These behaviors are "ideal" based on the exogenous norms set by the group, not in a utility-maximizing or social planner sense.
[12] In many cases, state school boards regulate minimum curriculum standards, although local educators are able to raise standards above this minimum. In the case of "burnouts" or other groups that rebel against school standards, the relevant internal standard for the group can be difficult to measure with available data. This difficulty and a proposed solution will be discussed further in the empirical section below.

be interpreted as the "external" social rewards from being in a group. These social rewards are external in that the individual's own view of what the social status conferred to his group "should be" are irrelevant in determining his social status. For example, a "nerd" might think that it is "cool" to be a nerd, but all other students in a school may confer low social status to the nerd group. Status is also assumed to be exogenously determined. The assumption implies that an individual's choice of social group has no effect on the social status of the group. This formulation assumes that there is agreement on the ranking of relative status among social groups in a particular high school.[13]

"Fitting in" in this framework is determined by how an individual's characteristics *and* behaviors conform to group standards and norms. The $-t(s_g - a_i)$ term in the utility function captures the notion that an individual loses "social utility" by having different characteristics than other members of his group. In particular, an individual loses social utility by having an ability level that is lower than the group standard (s_g). The social utility loss is scaled by the level of difficulty for individuals with dissimilar abilities to "fit in" the group (t). Additionally, an individual can choose behaviors that do not "fit in" with his group. This is captured by the $-\frac{1}{2}(e_i - N_g)^2$ term. The larger the difference of the individual's effort choice with the effort norm in the group, the larger the individual's loss in social utility.

The concepts of status and "fitting in" lead to an important tradeoff when choosing group membership. Individuals who choose category *g* gain the I_g utility flow but are penalized if they do not choose the same effort level as the group (social norm) and/or do not meet the standard. An adolescent will not choose membership in higher-status groups if he would not fit in with the group's prescriptions for behavior and/or ideal characteristics. For example, assume that being on the college preparation track is the category with the highest status within a school. Even if all students aspire to be on the college prep track, some students choose other categories because the losses from not

[13] Shavo (2005) also assumes that the relative ranking of status among groups is exogenous. This assumption is in contrast with recent work by Oxoby (2004). In Oxoby's paper, individuals choose the status levels of various activities in part to conform with their own strengths as a way to decrease the cognitive dissonance that comes from not pursuing activities deemed by society to be high status. Endogenous group status is outside the scope of the current paper and should be examined in future work.

fitting into the group (based on effort and individual characteristics) are larger than the status gained from being in the group. Examples of this kind of behavior were reported in an ethnographic study by Lee et al. (2000);

> A senior at a large rural high school in the non-college program states, "I see these guys in the library every day writing and researching…If I were in their English class, I would be in there too…I would like to be more like them, but I know I am not as smart or I don't learn as fast as they do…I know these guys move a lot quicker. So I would like to be with them, but I am not as smart as them."

Notice that if identity was the sole argument in the individual's utility function, all individuals within each category would choose the same effort level because there is no cost of effort for identity. Individuals would choose categories based only on weighing the utility gain from group membership (status) and the loss from not fitting the standard and norm. This would represent an environment where effort and group membership choices are made for purely social reasons.

The second part of the utility function contains the returns from human capital accumulation. Human capital production is a function of effort, the school standard for the group, and individual ability. The school standard is assumed to positively affect marketable skills.

$$H(e_i, s_g, a_i) \tag{4}$$

Following Akerlof and Kranton (2002), a simple form of the production function is:

$$e_i(s_g + a_i) - \frac{1}{2}e_i^2 \tag{5}$$

The first term implies effort and school standards are complements in achievement, and effort and ability are complements in achievement. The returns from additional effort are greater for those with greater ability and those who meet high standards. The second terms reflects that effort is costly, and the marginal cost of effort is increasing in effort.

The final component for utility is also the simplest. Individuals want to please their parents. This component is an extension of the model outlined in Akerlof and Kranton (2002), where no parental influences were considered. The assumption follows a large literature on the importance of the home environment on student achievement (Coleman 1966, Fryer and Levitt 2005, Heckman 2005, Kelly 2004). In addition parental

influence on education outcomes also follows much research on the intergenerational transmission of human capital (e.g. Cabrera and La Nasa 2001, Coleman 1966, 1990). In particular, an adolescent's psychological sub utility function is assumed to be a function of effort and parental expectations of effort.

$$E(e_i, P_i) \tag{6}$$

The specific form of psychological utility is assumed to be:

$$-\frac{1}{2}(e_i - P_i)^2 \tag{7}$$

The negative sign indicates that this is a "conformist" utility function, which implies that an individual receives disutility from not aligning his effort with his parent's expectations (either high or low).

The three components of adolescent utility—human capital accumulation, identity, and parental influence—are weighed differently by different adolescents. I operationalize these mental trade-offs by incorporating utility weights for each component of the utility function:

$$U = \rho H(\cdot) + \theta I(\cdot) + \delta E(\cdot) \tag{8}$$

where ρ, θ, and δ are the relative importance of each component of utility. Using the functional form assumptions outlined above, the utility function can be written as:

$$U = \rho[e_i(s_g + a_i) - \frac{1}{2}(e_i - a_i)^2] + \theta[I_g - t(s_g - a_i) - \frac{1}{2}(e_i - N_g)^2] - \frac{\delta}{2}(e_i - P_i)^2 \tag{9}$$

Individuals with high values of θ will be more likely to choose their effort level to conform to their group, whereas individuals with high values of ρ will choose their effort level to maximize the returns to human capital regardless of whether they fit in to a social group. A negative δ would indicate a non-conformist ("rebellious") utility form with respect to parent's expectations.

METHODOLOGY

The first goal of this paper is to estimate the parameters of the utility function (9). This is accomplished by solving the model and using the first order condition for effort, the individual's indirect utility, and making distributional assumptions to formulate and maximize a likelihood function. Taking the membership in a social category as given for

now, we can ask what variables determine the effort level of an individual. Rearranging the first order condition with respect to effort gives the optimal effort:[14]

$$e^* = \rho s_g + \rho a + \theta N_g + \delta P \qquad (10)$$

Thus, effort is dependent on the standard for the social group, the individual's ability, the social norm of effort in the individual's social category, and parental expectations of effort. Using this model, policies to change an individual's effort level in high school could focus on changing the social norm and/or standards for the individual's social group. Additionally, policies that affect ability, such as early education interventions, would also be predicted to increase effort in high school.[15] This model expands the type of potential interventions that could be considered to affect how hard students work in high school. In traditional human capital models, social norms of effort would play no direct role, thus there would be no room for policy interventions that seek to change these norms. [16] Of course, optimal effort (equation 10) is only half the story for the identity model, because the individual's social category is also endogenous.

When the social category and effort are allowed to be jointly determined, the individual's decision is more complex. The individual knows what his effort would be if he were to join each group, since it is given by the above first order condition (10). In order to choose his category, the individual compares the indirect utility received for each social category. An individual who chooses category *g* receives utility of the following form:

$$V_g = \frac{e_g^{*2} - \theta N_g^{\,2} - \delta P^2}{2} + \theta(I_g - t(s_g - a)) \qquad (11)$$

where the optimal effort, e_g^*, is given by equation (10). Indirect utility varies across social categories by the status (I_g), social norm of effort (N_g) and the optimal effort

[14] I follow Akerlof and Kranton (2002) and assume that the utility weights (ρ, θ, δ) sum to 1.

[15] Heckman (2005) discusses the importance of such early education policies.

[16] It should be emphasized that the social environment can play a role in human capital models. For example, the ability of students to acquire human capital can be reduced if their classrooms include disruptive students, or if their teachers must allocate most of their time to deal with classmates with special needs. While this paper does not suggest that the human capital model of education attainment be scrapped, it does offer a complementary approach that is able to incorporate different reasons for educational choices in the utility functions of adolescents, including the desire to fit in and be popular. A direct test that compares the predictive power of the two models is beyond the scope of this paper but represents an important area of future research.

level, which is a function of the standard and social norm from (10).[17] Knowing his own ability and parental expectations, the individual chooses among social categories to maximize his utility. With three group choices, this maximization problem can be written as: $\max[V_1(e_1^*), V_2(e_2^*), V_3(e_3^*)]$ (12)

where the starred values denote the optimal values from the effort equation (10).[18]

Given this formulation, an expanded set of policy interventions can be examined within this framework, including changing the social norms or standards within schools, changing the social status of belonging in a group within a school, and changing the difficulty of "fitting in." There are also two margins to consider when evaluating policy interventions. Individuals can respond to education policies by changing their behaviors in several ways—changing effort, changing social group, or changing both.[19]

Data

In order to estimate the model described above, I use the National Education Longitudinal Study (NELS). The NELS is a nationally representative sample of high school students in the U.S. sponsored by the National Center for Education Statistics and carried out by the Bureau of the Census. The base year (1988) survey was a rich study with questionnaires administered to students, teachers, parents, and school officials. Sampling was done first at the school level and then at the student level within schools.[20] There have been four follow-up surveys that revisited most[21] of the sample in 1990, 1992, 1994, and 2000.

Individual, parental, and school official data for various years of the panel are linked together and used in the analysis. The sample size starts at 10,358 observations but shrinks after several constraints are placed on the data. First, those students who

[17] Following Akerlof and Kranton (2002), when the individual's ability, a_i, is above or equal to the standard, the term $t(s_g - a_i)$ drops out of the indirect utility. This reflects the assumption that individuals who have characteristics that exceed the standard for the group receive no social disutility.

[18] One important limitation to this approach is that the residential decisions of parents are not included in the model. This limitation of the conceptual and empirical models should be considered when examining the results.

[19] A graphical demonstration of the key features of the identity model are included in the appendix.

[20] The sample was of 1,000 schools (800 public and 200 private) and began with 25,000 randomly selected eighth graders.

[21] For example, 14,000 students were interviewed in the 1994 survey

move between the 10th and 12th grade (1,601 individuals) are dropped because the only school-official data available are for the 10th grade year. Individual, family, and school characteristics are then combined. School level variables (standards, norms, racial composition) are missing from almost 3,000 individuals.[22] School-level demographic data was computed by using the sample average within each school.[23] I impute data for family income, mother's education and savings in order to maximize the available sample of 6,250 observations.[24] Summary statistics are provided in Table 1. In the next section, I explain how I use the NELS data to estimate the model set out earlier in the paper.

Empirical Approach

One of the main goals of this paper is to examine the determinants of college enrollment. In order to accomplish this, an explicit link between effort in high school and college enrollment must be made. For simplicity, I assume that the production function for college enrollment is a linear function of effort and individual characteristics, X. Based on these assumptions the college enrollment equation is

$$College = e^{*} + X\beta + \varepsilon \equiv \rho s_g + \rho a + \theta N_g + \delta P + X\beta + \varepsilon \qquad (13)$$

where college is a binary outcome of whether the individual enrolled in any college within two years of completing high school. Equation (13) only relates the effort choice to the outcome of college. Since individuals are assumed to make social group choices that affect their effort choice in the identity model, the empirical model must be expanded to capture this choice.

In order to proceed, the relevant number of social categories must be known. Following most of the literature on categories within high schools, I assume that students choose among three categories[25]: the college preparation track, the general curriculum

[22] It appears that school-level data was not linked with anyone in each of multiple schools in the sample. So it is less a problem of losing data for individuals within schools as much as losing data for those students in schools that were not linked. The correlates of not reporting data are considered in the appendix.

[23] Hoxby (1999) and Gaviria and Raphael (2001) also use sample averages for school level data. Hoxby emphasizes that estimates using this data will be unbiased but imprecise (with large standard errors) because of the classical measurement error introduced.

[24] Dropping missing data would decrease the sample size to 4,500

[25] The assumption of three groups is consistent with much work in other social sciences (e.g. Brantlinger 1991). For example, Cohen (1979) identifies three subcultures using a factor analysis of self-reported data: academic, fun, and delinquent.

track, and the remedial and vocational track. This assumption is made for several reasons but should be viewed as a first approximation to the more numerous divisions among social groups in schools.[26]

There are several empirical facts and feasibility arguments for selecting curricular tracks. First, individuals in each group are likely to spend the majority of their school day with each other since they are in the same classes.[27] Second, there are data considerations when choosing the relevant social groups for empirical work. A greater number of groups would require a greater number of identifiable standards and norms in the data. Third, the emphasis on curricular groups also sidesteps the problem of multiple group-memberships. Fourth, there is likely to be relatively little measurement error in the data on curricular track assignments.[28] Finally, there is compelling evidence in the experimental psychological literature that even individuals in artificial groups (e.g. curricular groups) assume behavioral strategies that allow differentiation between their group and other artificial groups (see Palmonari et al. 1990 and Shayo 2005 for cites in the psychological and experimental economic literatures).[29]

Members of each group face different standards and norms. Once the assumption is made that curricular groups are important social groups within schools, it is necessary to be able to quantify the standards and norms across groups within a school. In the case of standards, I assume schools reveal ideal student behavior by setting graduation

[26] In addition, the focus on school-created groups (tracks) rather than more social groups (e.g. nerds) follows the discussion by Akerlof and Kranton (2002) of schools as institutions that implement social goals—in this case by allowing students to make decisions about their curricular track and setting standards and enforcing norms of effort for each track. This focus also follows Eckert (1989) who states that the school is "the single institution that dominates the life of the adolescent age group." According to Friedkin and Thomas (1997), tracks also represent "structures of social positions shaped by the curricular organizations and the cultural, socioeconomic, and demographic conditions of the communities in which they are located."

[27] Hallinan and Sorensen (1985) argue that the assignment to the same instructional group increases opportunities for student interaction, underscores student similarities, and produces new similarities. These factors foster friendships. Kubitschek and Hallinan (1998) suggest that track placements affect friendship choices by encouraging more interaction within tracks, by causing a greater similarity among students within tracks, and because tracks are generally recognized status hierarchy among students.

[28] When other definitions of social groups are used in the literature, there is reliance of self-identification into groups by individuals. For example, the self-reported answer to the question, "Do you consider yourself to be popular?" might be used to separate individuals. Additionally, many researchers pick the relevant traits in an ad-hoc fashion when separating social groups. For example, if an individual is enrolled in AP English, he is considered to be a "nerd." Both ways of separating individuals into groups likely add significant measurement error into the analysis.

[29] This framework could be extended to more groups and could use information of sport and extra curricular activities or more 'social' labels (e.g. nerds, jocks, leading crowd) to distinguish categories.

requirements and offering advanced placement (AP) courses. In the case of norms, I assume schools reveal the ideal behavior for students by determining the school environment and level of encouragement in the school. These assumptions follow the discussion in Akerlof and Kranton (2002) of schools as institutions with social goals. The authors state that schools not only impart skills and knowledge, but also an image of ideal students in terms of characteristics and behaviors. While Akerlof and Kranton specifically discuss school rituals (e.g. pep rallies, home room announcements) as important aspects of school ideals, also important are the academic prescriptions of ideal students that are conveyed by the school to the students.[30]

After making the assumptions regarding norms and standards in schools, three items in the model require specification. An average of each individual's 8th grade test scores is used as a proxy for ability. An individual's mother's education level is used as a proxy of parental expectations of college enrollment for the student.[31] Finally, the *t* parameter in equation (9), which is a measure of how difficult it is for students with different characteristics to fit into a group, requires an empirical counterpart. The percentage of students who move across curriculums during the school day is used to proxy for this parameter.[32] For reference, Appendix Table A3 describes each parameter in the model and the data source for each parameter.

With these assumptions, data from the NELS can be used to estimate group choice by each individual. The indirect utility from choosing group *g* (from equation 11) is:

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[30] Academic prescriptions are assumed to be revealed in self-reported answers by school administrators and teachers to several questions described below. The full questions are listed in the appendix. Hoxby (1999) uses a similar strategy when creating an index for the strictness of the academic environment. She uses school administrator's subjective assessment of the degree to which students place a priority on learning.

[31] In additional analysis, I also use parental savings for college as a measure of parental expectations. The results are not sensitive to using this variable rather than mother's education level. Hossler (1999) finds parental savings to be an effective measure of parental expectations. While parental expectations of child educational attainment are asked in the NELS, the answers seem to be very imprecise measures of actual expectations. For example, in the 8th grade interview, less than 11 percent of parents report expecting their child to only graduate from high school.

[32] This variable is the best available measure for the t-parameter in the NELS and represents the school administrator's estimate of the percentage of students who move across curricular tracks during the course of a typical school day. In using this measure, I assume that the reason that few students move across tracks in a given school is because it is socially difficult to do so. Clearly, administrative barriers could also be an important determinant of this measure. Fortunately, the results in the paper do not appear to be sensitive to using this measure versus estimating a global t-parameter for all students. Using this measure is useful because it allows school-level heterogeneity to be included in the t-parameter.

$$V_{ig} = \frac{e_i^{*2} - \theta N_g^{\ 2} - \delta P_i^{\ 2}}{2} + \theta(I_g - t(s_g - a_i)) \qquad (14)$$

with the individual choosing V_{ia} if $V_{ia} > V_{ib}$ for all $a \neq b$.

In practice, the indirect utility gained from choosing group *g* is augmented with individual characteristics that predict group choice (gender, income) and an independently and identically distributed (i.i.d.) extreme value taste shock[33]:

$$\tilde{V}_{ig} + \eta_{ig} = V_{ig} + Z_i\gamma + \eta_{ig} \qquad (15)$$

This distributional assumption allows the group choice to be estimated using conditional logit techniques (McFadden 1974).[34] However, the independence assumption introduces the well known independence of irrelevant alternatives (IIA) problem. As a practical matter, IIA is problematic when the alternatives are similar to one another (Hoff and Duncan 1988).[35] The probability of choosing group 1 becomes:

$$\Pr(G = 1) = \frac{\exp(\tilde{V}_1)}{\sum_{j=1}^{J} \exp(\tilde{V}_j)} \qquad (16)$$

for choice of groups 1…J. The probability of attending college (conditional on group choice) can be calculated by using equation (12) and assuming the college-level error is distributed normally:

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[33] A weakness of the empirical model is that the errors terms in equation 15 (the curricular track choice equation) and equation 17 (the college enrollment choice equation) are assumed to be uncorrelated. Since there are likely unobserved characteristics of the individuals that influence both of these educational decisions (e.g. student motivation), this specification does not entirely capture the interrelated nature of these two decisions. One consequence of the assumption of uncorrelated errors is that the results could be biased for the sets of variables (e.g. social variables, parental variables, or human capital variables) that are correlated with the unmeasured characteristics of the individuals. For example, if parental expectations are positively correlated with an unmeasured characteristic such as student motivation, then the estimation results would ascribe a larger effect for parental expectations on the two choices of curricular track and college enrollment than the "true effect". This assumption is made for tractability of the estimation routine and the results should be viewed with this caveat in mind.

[34] Conditional logit is distinct from multinomial logit analysis in that it uses data on characteristics of the alternatives rather than (or in addition to) the characteristics of the individuals (Hoffman and Duncan 1988). Following Hoffman and Duncan, since I include both characteristics of alternatives *and* individuals, the model used is sometimes considered a mixed logit model. In the present analysis, the choice-specific variables include standards and norms characteristics. See Hoffman and Duncan (1988) and Long (2004) for further discussions.

[35] An alternative to using multinomial logit is multinomial probit (MNP), which allows correlations in unobservables between choices. The main problem with MNP is the substantial increase in computational cost.

$$\Pr(College = 1 \mid G = j) = \Phi(e_j^* + X\beta) \tag{17}$$

where Φ is the cumulative distribution function of the standard normal distribution. With these formulations, the likelihood an individual attends college is given by:

$$\Pr(College = 1) = \sum_1^J \Pr(College = 1 \mid G = j) * \Pr(G = j) \equiv C \tag{18}$$

Likewise, the probability of not attending college is:

$$\Pr(College = 0) = \sum_1^J \Pr(College = 0 \mid G = j) * \Pr(G = j) \equiv NC \tag{19}$$

The log-likelihood for the sample is thus:

$$\ell = \sum_{i=1}^{I} college_i * \log(C_i) + (1 - college_i) * \log(NC_i) \tag{20}$$

with *i* indexing individuals. Equation (20) is estimated using full information maximum likelihood (FIML). Further explanation can be found in the appendix.

RESULTS OF ESTIMATION OF IDENTITY MODEL

During estimation, ρ, θ, and δ are constrained to sum to one. A similar assumption is made in the theoretical model in Akerlof and Kranton (2002). The consequence of this assumption is that the utility weights are only identified up to scale for the full sample.[36] Fortunately, this assumption still allows comparisons of the estimated parameters across groups, since the estimated parameters have the same scale across groups. For example, an estimate of the social parameter (θ) of 0.25 for the full sample does not imply that social returns represent 25 percent of the decision to enroll in college. If, however, the sample is divided and estimated separately by group, comparisons can be made across groups. For example, an estimated male social parameter of 0.20 and a female social parameter of 0.30 implies that females emphasize social returns more than males. Therefore, I estimate the model separately for groups based on race and gender so that comparisons of the utility parameters can be made.

[36] The problem lies in determining the "proper" scale for the independent variables. For example, should test scores be measured in units of 1 or 10? Clearly the measurement scale has implications for the estimated parameters—for example, in the case of test scores the units for test scores will affect the magnitude of the estimated coefficient for ρ.

Estimation Results by Race

Table 2 presents results by race with standard errors presented in parenthesis below the coefficients.[37] The utility parameters are presented in the first set of rows. Because of the lower sample sizes for black and Hispanic students, the standard errors are larger for these groups. All point estimates are statistically different from zero, indicating that human capital, parental influences, *and* social influences are important factors in the adolescent's group and college decisions. Several of the racial differences are also measured with enough precision to distinguish statistically. A Wald test rejects that the coefficients for white and Hispanic students are the same. However, the small sample sizes for black and Hispanic students do not allow me to reject that their utility coefficients are the same. Examining the point estimates across groups, whites and blacks are predicted to place relatively more importance on parental expectations and more importance on social concerns than Hispanic students. Interestingly, Hispanic students are predicted to emphasize economic returns more than white and black students.

The next set of rows show the results for the estimated utility gains from status for the groups. Status is the I_g term in the social utility function from equation (3):

$$I_g - t(s_g - a_i) - \frac{1}{2}(e_i - N_g)^2$$

It represents the identify payoff from social status by being a member of group *g* for individual *i*. The status coefficients are estimated relative to the general track group, as only differences in status (a group-level constant) are identified in conditional logit models. Interestingly, the vocational group is estimated to have the *highest* social status. The utility gain from social status from being in the vocational group is particularly large for minority students. This finding is consistent with the literature on the "burden of acting white" that reports that minority students receive social sanctions from their classmates if they invest in human capital (Fordham and Ogbu 1986, Austen-Smith and Fryer 2005). This result also indicates that policies that reduce the social status of the

[37] As the constraint on ρ, θ, and δ (sum to one) is imposed through embedding a logistic function inside the likelihood function, the standard errors for these parameters need to be calculated using formulas found in Kmenta (1997). Full derivations are found in the appendix.

"non-college" groups in schools (or, equivalently, increases the social status of the college track) could lead to higher educational attainment for minority groups in particular. This hypothesis will be examined further in the simulations that follow.

Finally, while there are many tests for model mis-specification in conditional logit models, there are fewer established tests for assessing predicted versus observed behaviors. Ben-Akiva and Lerman (1985, pp. 207-216) suggest an examination of the predicted and observed behaviors by strata based on individual characteristics (e.g. income). I follow this suggestion and find that the model fits the observed data to a considerable degree.[38] The final parameter reported in the table, σ, refers to the estimate of the standard deviation of the error term in the college equation (13) for each group.

Estimation Results by Gender

There is ample evidence from the social sciences that males and females face differing levels of peer pressure as they age (Brown 1982, Roeser et al. 2001, Fletcher 2005). As early as elementary school, male and female peer cultures have distinctive concerns, and different factors appear to influence peer status. For example, girls have been found to gain status through family background, appearance, and having more freedom at home, while boys gained status through athletic ability, being "cool," and being tough. (Eder et al. 1995, p.14) Some of these differences are found in the estimates in Table 3. Similar to the results for race, the parameters are measured very precisely, and there is evidence that social concerns are important for the college choices of females and males. Although the point estimates are not statistically different across groups, there are several interesting differences in the estimated coefficients. Conforming to traditional stereotypes, males are estimated to place higher weight on the economic returns to effort and group choices (ρ), while females place more importance on the social returns (θ). This result is consistent with Brown (1982), who finds peer pressure to be stronger for females. Additionally, males are estimated to gain more social status through membership in the vocational track than females, which is also consistent with traditional views of gender differences in schools.

[38] Results for the sample of black students stratified by income are presented in the appendix. Additional results available from the author.

The results from this section show the importance of considering richer models of adolescent decision-making in examining college enrollment. First, there appear to be substantial differences across racial groups in the importance of economic factors, social factors, and parental influence in determining effort and social group outcomes. This finding has implications for targeting policies at each group and will be explored in more detail in the policy analysis section of the paper. Second, the results provide evidence that many groups consider the college track to have low social status within high schools. This can be seen by examining the estimates of the college group social status in Tables 2 and 3; Hispanic, white, female, and male students all have negative estimated social status coefficients relative to the general track category. Additionally, the non-academic (vocational) track is estimated to be the group with the highest status for all racial and gender groups. In particular, minority and male students appear to receive high social status from membership in the non-academic track. This finding is consistent with the literature on "acting white" (Fordham and Ogbu 1986, Austen-Smith and Fryer 2005) and represents an important area for policy suggestions in order to combat the low rates of college enrollment for these groups.

POLICY ANALYSIS: CHANGES IN HIGH SCHOOL STANDARDS AND SOCIAL ENVIRONMENT

A benefit of estimating a model of college enrollment that is derived from utility-maximizing behavior is the ability to use the model to simulate the impacts of alternative educational policies on individual choices. The simulations take as given the estimated utility parameters presented in the previous section and predict the effects from changes in policy relevant variables in the model. As equations (10) and (13) show, college enrollment is related to several characteristics of the school environment that school officials can change, namely standards (e.g. graduation requirements), effort norms (the level of effort that is expected from students), as well as the social status afforded to each group.[39]

[39] Before examining specific policies, one limitation of the conceptual and empirical frameworks should be noted. In the present analysis, individuals are not allowed to choose to drop out of high school when faced with a demanding or unappealing school environment. This simplification probably matters most for the vocation group, who are most likely to be at-risk of dropping out. This simplification is made because the focus of the paper is on the college enrollment choices of adolescents—who are all high school graduates in the data because drop outs are not eligible for college admission. So, the predicted effects of educational

The first policy I examine is increasing school academic standards. In the identity model, the trade-off from the student's viewpoint from raising standards contains aspects of the views from sociology as well as those from economic analysis. From an economic perspective, the identity model allows standards to increase the rewards to effort and ability. From the perspective of other educational researchers, one important and unique aspect in the identity model is that an increase in standards creates an additional tension for students. A student deciding whether or not to meet the new standard has to consider his own ability and characteristics that would help him meet the new standard *and* realize that any change in his effort may alienate him from his social group's effort norms. If increases in standards do not increase norms in schools, students may decide not to increase effort to meet the new standards *even if they have the academic ability* because of the expected social sanctions. [40]

While raising graduation requirements is a straightforward intervention, it is more difficult to conceptualize ways of increasing norms of effort and changing social status of groups within schools. Research on interventions that change the environment of schools is in its infancy (Maehr and Midgley 1991). Broad suggestions include encouraging student participation in school activities, deciding what kinds of activities will be recognized and rewarded,[41] and establishing codes of conduct within schools (Maehr and Midgley 1991, Wynne and Ryan 1997). One example of this approach is reported in Bishop et al. 2004:

> "The cool kids in our school are kids who work hard, because we as adults have made sure that to be 'in' you have to work hard. We have an extensive system of rewards and consequences that every teacher in every grade administers the exact same way. The consistency from classroom to classroom and across grade levels is the key, and it has helped us to establish that culture of hard work. We are all working together and have been successful because, to be frank, we haven't allowed kids, who in the past may have gotten away with not doing any work or who may have put

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policies on the rates of college enrollment presented in this paper should not be used to access the more general effects of educational policies with differing goals, such as decreasing high school dropout rates.

[40] Future work will extend the identity model to allow for dynamics in the decision process. Additionally, it would be worthwhile to examine how explicit links between standards and norms would affect the predictions of the current model.

[41] In attempting to change the social status of groups, the types of activities that are valued by the schools could be changed. For example, many schools have pep rallies for the football team but no similar event for academic achievement.

> other kids down for being nerdy or too studious, the opportunities to become 'cool' or 'in.' Our discipline is firm: if you don't work hard you don't get to sit with your friends at lunch, go on field trips, participate in gym class, attend special event, etc. and we, the adults, are all on the same page with this. It's hard to set the norms when you are not the one participating. On the flip side, if you do work hard, then you will be rewarded in fun ways—pizza parties, skating trips, things like that. So, to have fun and fit in, kids must adapt, they must work hard."
>
> Dean of Students at a KIPP Academy

An alternative approach is suggested by Bishop et al. (2003), who state that students view the popular/leading crowds as the source of school-wide norms.[42] This suggests that targeted interventions directed to the popular crowds within high schools might be a successful way to change norms of behavior. In future work, I will develop more concrete examples of interventions that increase social norms. In this paper, I examine the effects on social group composition and college enrollment of "generic" increases in social norms and changes in social status afforded to groups within schools.

Five policy interventions are considered in this paper. As discussed earlier, these policies are predicted to have differential effects on students of different races. Results for racial groups are presented in Table 4 below.[43] As most models of educational attainment do not consider the choice of social group in schools, there has been little empirical research on the effects of policies on this margin; few, if any, studies attempt to predict the effects of school policies on curricular track choice. The identity model explicitly models this choice and is able to predict movements between tracks from policy changes. Since the policies can only affect effort and social group within this framework, the results of the policy interventions are shown for both aggregate college enrollment changes and group compositional changes. The final column shows the black-white and Hispanic-white gap in college enrollment.

The effects of a standard deviation increase in the standards (graduation requirements) for groups within high schools and a standard deviation increase in the social norms (ideal effort) are predicted in the first two rows. The results show moderate group and college choice changes for all racial groups. While increasing standards

[42] See Bishop et al. 2003 for a theoretical examination of norm formation

[43] Results by gender are not as relevant since most suggested policies do not intervene on individuals based on gender. Results available from the author upon request.

appears efficacious for increasing college enrollment (increasing enrollment by 3 (black), 4 (Hispanic), and 4 (white) percentage points), the policy actually increases the black-white gap in enrollment. The racial gap persists in part because minority students have lower test scores and parental education than whites upon entering high school. Since increasing standards during high school does nothing to combat these deficiencies, raising standards is predicted to increase the racial gap. Increases in social norms show similar results. Partly because of the lower importance of social returns from their choices (lower θ), this policy produces lower gains for Hispanics and widens the racial enrollment gap even more than increases in standards. The predictions from both of these policies are consistent with Heckman's (2005) argument that many types of policy interventions are implemented too late in the lives of individuals to be effective.

The third policy intervention involves decreasing the utility gain from the status of membership in the vocational group to zero. Consistent with research on the importance of not "acting white," particularly in the black community, this policy is predicted to be quite effective for black students. An intervention that shifts the social acceptability of college-oriented group membership is predicted to substantially change the choices black adolescents make regarding curricular choices—increasing membership in the college preparation track from 27 percent to 44 percent. This intervention increases predicted college enrollment by four percentage points to 53 percent and reduces the black-white gap from 10 to 8 percentage points. Hispanics, again due partly to their lower estimated value of the social motives of their choices, reap only a small benefit from this policy. The Hispanic college group increases from 28 percent to 37 percent, college enrollment increases marginally from 43 percent to 45 percent, but the racial gap with white students remains almost unchanged.

Family income is increased by $1,000 in the fourth policy simulation.[44] The results are quite consistent with Cameron and Heckman (1999), who predict a six percentage point enrollment effect per $1,000 reduction in tuition. This suggests that liquidity constraints play a modest role in college enrollment. The results also suggest that Hispanics would be the most effective target for reductions in tuition.

[44] The interpretation of this intervention is that families receive an unexpected increase in permanent income when students are in 8th grade. This intervention does not allow income to affect ability before 8th grade.

The fifth intervention increases parental expectations by one standard deviation. While this intervention is quite effective in increasing college enrollment for white and black students (by 10 percentage points each), it does not decrease the racial gap in enrollment. This intervention is less effective for Hispanic students because parental influence (δ) is estimated to be of less importance than for black and white students. However, the predicted increase in college enrollment of five percentage points from this policy is quite successful when we consider that Hispanic college enrollments have only increased by six percentage points during the last thirty years (NCES 2005).
While the results reported in the table assume that the intervention is performed on all students in the population, some interventions could be targeted to black or Hispanic populations. For example, a targeted intervention only on black students that increases parental expectations is predicted to close the black-white enrollment gap entirely. Additionally, a targeted intervention on black students that increases the social status of membership in the college track is predicted to decrease the black-white enrollment gap by almost 50 percent. These predications are in stark contrast to recent results by Krueger et al. (2005), who suggest that the black-white college enrollment gap is unlikely to disappear in the next 25 years. Krueger et al. focus only on test score changes, whereas the present interventions focus on the social environment within high schools and how it influences college choice.

DISCUSSION

The basic results from this paper suggest that adolescents make important decisions based on economic factors, parental influences, and social factors. The specific choices examined are how hard to work in school and which curricular path to choose. These choices in turn have a substantial impact on college enrollment. There are several caveats to consider when viewing the results. Two of the most important are the potential endogeneity of the school and the sensitivity of the results to the assumptions made in the paper.

First, if parents know the attributes of schools (norms, standards, etc.) and peer groups within schools, they may be able to use residential mobility to influence the choices of their children. This paper does not directly model mobility choices. The

concern with the endogeneity of school in the present context is a little different than in the standard models of human capital accumulation. In standard models, it may be sensible to assume that parents know the differences across schools in expenditures and 'quality' and how these differences translate into economic returns from investment in human capital by their child. These parental choices would cause examinations of the relationship between school attributes and student outcomes to be biased. In the case of social returns, however, the assumption of perfect information for parents might be less credible. In particular, parents would need to be able to forecast how their child will "fit in" groups at each school in addition to having information about school quality along more traditional dimensions. This is not to say that the endogeneity of the choice of schools is irrelevant, as observable school quality is likely to be correlated with unobservable (to the parent) social returns across schools. The potential endogeneity of school environment should be kept in mind when viewing the results and will be the subject of future work.

Second, in order to arrive at the results of this paper, several assumptions were made—specifically, the functional form of utility, the unobserved distributions of idiosyncratic utility shocks, and the relationship between the college enrollment production function and effort in high school. Although most empirical research that estimates models of individual behavior requires a set of assumptions, the results can only be as convincing as the assumptions used to attain them.

CONCLUSION

In this paper, I outline, extend, and estimate an 'identity model' of college enrollment. This model attempts to capture several aspects of adolescent decision-making previously neglected in traditional economic analysis. While traditional economic models are generally able to answer *whether* certain policies increase or decrease college enrollment, they are less equipped to answer the question of *why*. This paper contributes to the latter goal by outlining and estimating a formal model of college enrollment that includes aspects central to the lives of adolescents: fitting in with peers and concerns with social status. This model is able to incorporate decisions teenagers make about how hard to work on academic pursuits and social group membership.

Additionally, this paper represents one of the first attempts to evaluate both "social" and "economic" education policies within a framework of individual utility maximization. The model is used to evaluate and compare the effects of several policies across racial groups. In particular, I predict the effects of raising academic standards in high school, changing social norms of effort in high school, and changing the social status of groups within schools.

My results indicate that the relative importance of economic, sociological, and psychological factors differs across racial groups. Knowledge of these differences could be important for targeting policies to increase minority college enrollment. There is also evidence that changing the social environment of schools for minority students could be effective in increasing college enrollment. Additionally, many interventions that wait until individuals are in high school are "too late" to remedy accumulated disadvantage for minority groups and decrease racial gaps in college enrollment (Heckman 2005). Clearly, more work is required to test the robustness of the predictions reported in this paper to changes in model specification, econometric technique, and several fundamental assumptions. Several extensions are also possible with this model, including an examination of type (e.g. public, private, two-year, four-year) of college attended in as well as success in college. Considering a more dynamic decision-making process would also be a valuable addition. This is all left for future work.

Table 1
Summary Statistics
NELS

Variable	Mean	Std. Dev.	Min	Max
Outcome				
College Enrollment	0.57	0.50	0	1
Individual Characteristics				
Male	0.46	0.50	0	1
Savings (8th)	0.52	0.46	0	1
White	0.74	0.44	0	1
Black	0.08	0.27	0	1
Hispanic	0.10	0.30	0	1
Family Income (000s)	43.53	35.08	2	200
Mother's Education	13.79	2.27	11	20
Testscore (8th)	0.54	0.13	0.33	1
College Group	0.33	0.47	0	1
General Group	0.30	0.46	0	1
Vocational Group	0.37	0.48	0	1
Move (8th-10th)	0.10	0.30	0	1
School Level Characteristics				
Average Score	53.95	8.40	34	100
Average Income	44.43	22.93	2	200
Norms				
Teacher Wants Students To Do Well	0.30	0.46	0	1
Students Do Homework	0.44	0.50	0	1
Sports Not Predominant	0.79	0.41	0	1
Students Encouraged	0.51	0.50	0	1
Percentage in AP Classes	0.11	0.15	0	1
Standards				
Math Requirement	2.48	0.61	0	4
Science Requirement	2.20	0.59	0	4
AP Classes Available	4.37	4.14	0	15
t Parameter				
Move Across Curriculum	0.29	0.26	0	1

Table 2
Estimates by Race

Utility Parameters	**Econ (ρ)**	**Social (θ)**	**Psych (δ)**
Black	0.22	0.12	0.66
	(0.05)	(0.03)	(0.06)
Hispanic	0.40	0.11	0.50
	(0.08)	(0.04)	(0.10)
White	0.23	0.14	0.63
	(0.02)	(0.02)	(0.03)
Status (I_g)	**College Group**	**General Group**	**Voc Group**
Black	1.08		11.37
	(1.82)		(3.99)
Hispanic	-4.44	Omitted	8.21
	(0.62)	Group	(4.11)
White	-1.07		3.18
	(0.56)		(0.92)
	Black	Hispanic	White
Log Likelihood	826.53	1031.14	7582.32
Obs	515	624	4623
σ	0.26	0.38	0.23
	(0.04)	(0.06)	(0.01)

Table 3
Estimates by Gender

Utility Parameters	**Econ (ρ)**	**Social (θ)**	**Psych (δ)**
Males	0.25	0.13	0.61
	(0.03)	(0.05)	(0.07)
Females	0.23	0.14	0.63
	(0.02)	(0.03)	(0.03)
Status (I_g)	**College Group**	**General Group**	**Voc Group**
Males	0.16		6.33
	(0.66)	Omitted	(3.19)
Females	-1.28	Category	3.58
	(0.63)		(1.08)
	Males	Females	
Log Likelihood	4755.86	5473.47	
Obs	2889	3361	
σ	0.27	0.22	
	(0.01)	0.01	

Table 4
Predicted Effects of Policy Interventions by Race

	Policy Effects **Black**	College Group	General Group	Voc Group	College	Total Black White Gap (Percentage Points)
	Baseline	0.27	0.20	0.52	0.49	-10
1	Increase Standards	0.28	0.21	0.52	0.52	-11
2	Increase Social Norms	0.28	0.21	0.52	0.52	-11
3	Voc Status = 0	0.44	0.33	0.23	0.53	-8
4	Increase Income	0.30	0.22	0.48	0.52	-10
5	Increase Expectations	0.27	0.20	0.52	0.59	-10
	Hispanic	College Group	General Group	Voc Group	College	Hispanic White Gap
	Baseline	0.28	0.28	0.43	0.43	-16
1	Increase Standards	0.29	0.29	0.41	0.47	-16
2	Increase Social Norms	0.29	0.29	0.42	0.45	-18
3	Voc Status = 0	0.37	0.38	0.25	0.45	-16
4	Increase Income	0.32	0.30	0.38	0.48	-14
5	Increase Expectations	0.28	0.28	0.43	0.48	-21
	White	College Group	General Group	Voc Group	College	
	Baseline	0.35	0.32	0.33	0.59	
1	Increase Standards	0.36	0.32	0.32	0.63	
2	Increase Social Norms	0.36	0.32	0.32	0.63	
3	Voc Status = 0	0.39	0.36	0.25	0.61	
4	Increase Income	0.35	0.33	0.32	0.62	
5	Increase Expectations	0.34	0.32	0.34	0.69	

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