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I. INTRODUCTION

The nation's higher education system—its colleges and universities—serve several functions. They house the nation's most highly trained research teams in the nation's most advanced facilities; they are the source of much of the nation's technological advance, irrespective of field or discipline. Their researchers are often teachers as well, and these same institutions offer training and education to the nation's youth. In this latter role, colleges and universities both create human capital and advance the nation's productivity.

Were these institutions an integral part of the nation's market system, they would sell their educational services to those families with young people who are willing to pay the most for them. And, as with boats, cars and houses, the families with both the greatest economic resources and the strongest tastes for the advanced schooling of their children would purchase these services—young people whose parents have high income and wealth and who (for whatever reason) value education would populate the nation's colleges and universities. The gains from education—higher incomes, prestigious occupations, economic, social and political status—would flow to those whose families already possess these characteristics. Colleges and universities would become instruments for the intergenerational perpetuation of riches, prestige and power.

However, historically, American universities and colleges have sought to avoid this market-oriented niche. Because of the non-marketed, external and public goods effects of college trained youth¹, third parties have also been given a stake in who becomes educated; collective action supplements private demands and choices. Moreover, higher education leaders view their institutions as more than the

¹See Haveman and Wolfe (1984) and Wolfe and Haveman (2003).

producers of services to be purchased by the highest bidder. Indeed, historically these leaders have seen the role of colleges and universities to be the identification of the highest potential and most able of the nation's youth, and the advancement of their knowledge and training. In this view, colleges and universities are institutions that produce educational services that are to be allocated according to 'merit' and not to 'market.' An extreme form of this view sees colleges and universities as merit-oriented filters, working to offset the intergenerational dynastic effect of the market, to promote intergenerational mobility by muting the intergenerational correlation of education, income and power.

Hence, while colleges and universities charge tuitions, the allocation of their services is also influenced by a variety of public interventions. Some institutions are public institutions, which receive public subsidies, and set prices and ration services to meet collective goals, often expressed through the political system. Both these public institutions and private institutions as well receive public support for student subsidies, some of which is targeted on families with low ability or willingness to pay and other becomes allocated to the students with the highest chances of success. In addition, publicly-subsidized loans are available directly to the families choosing this means to pay for the educational services of their children.

An important question concerns the extent to which colleges and universities have succeeded in their desire to promote merit, foster economic mobility, and serve youth from less advantaged families. In this paper, we first summarize the available evidence on the allocation of higher education services among students from families of high and low economic status; we emphasize the income levels of these families. The literature on this subject is extensive, and we attempt to pull together the most salient parts of it. We then present some new evidence of our own on this question. We use longitudinal information on a weighted national sample of 1200 children who were born from 1966 to 1970. These children were of college-going age in about 1990. We relate their educational transitions and outcomes to the economic position of their parents, both without and with controls for other factors that could affect these outcomes. We also take various slices through the educational process (e.g., high school graduation, college-going, college graduation) and show the characteristics of the students at each slice, emphasizing the economic

position of their families. Finally, we present the results of a simulation in which we inquire about the effects on the disparity in youth educational outcomes of an increase in economic inequality (of the sort we have recently experienced) among their parents.

II. FROM WHENCE COMETH COLLEGE STUDENTS?

A. A National View

A number of scholars and government researchers have attempted to characterize the economic backgrounds of the population of young people who have secured various levels of educational attainments—the population to whom the educational services of colleges and universities have been allocated.

In terms of both levels of schooling and trends over time, Table 1 (from Ellwood and Kane) presents a good overview. The attainment level described in the table is ‘college going’ and hence says little about total years of completed schooling or college graduation. For the earlier cohort (the class of ‘80–’82), the overall rate of college-going is 80 percent for youths from the top quartile of families (ranked by income), compared to 57 percent for youths from the bottom quartile.² Youths from the poorest families were concentrated in vocational and technical institutions, while those from the richest families tended to enroll in four-year colleges. Over the ten years shown in the table, the overall enrollment rate rose by 7 percentage points; while youths from the highest income families saw an increase of 10 percentage points, the rate of college-going increased by only 3 percentage points for youths from the lowest income families. In terms of attendance at four-year colleges, the gap between the highest and lowest income youths increased far more than the overall gap in college going. While the percent of youths from the bottom quartile of families who enrolled in four-year colleges fell slightly

²The values shown in Tables 1–4 (and 5–8, below) are ‘unconditional’ means or percentages, and therefore show overall patterns by position in the income distribution, without controlling for other variables that may also influence attainment.

(from 29 to 28 percent), that for youths from the highest income families rose substantially (from 55 to 66 percent); the gap between the two groups increased from 26 percentage points to 38 percentage points.³

These patterns are consistent with tabulations by Carnavale and Rose (2004), who analyzed detailed data from the High School and Beyond study and the National Education Longitudinal Study of 1988. They divided all colleges and universities into four quality categories, based on the Barron index, and all families into four socioeconomic status (SES) categories (based on their income, parental education, and occupation). Their results are summarized in Table 2. For the 146 top tier colleges and universities (accounting for about 10 percent of all college students), 74 percent of the entering class is from the highest SES quartile and only 3 percent from the lowest SES quartile. For the 253 colleges in the second tier (accounting for about 18 percent of all college students), the percentages are 46 (highest SES) and 7 (lowest SES). Only for community colleges is the composition of entering students by family socioeconomic status similar to the composition of all youths of college age.

Table 3 contains estimates found in the recent volume by Bowen, Kurzweil, and Tobin (2005) based on the class of 8th graders in 1988 (and, hence, who would have graduated high school by 1993). These statistics indicate that the concentration of youths from high income families in America's colleges and universities directly reflects patterns in the 'preparedness' of youths for the college education experience. The gaps in pre-college preparedness—graduated from high school, SAT taking and performance—are very large, and are reflected in college enrollment, enrollment in 'expensive' colleges, and ultimately (conditional on enrollment in a four-year college) graduation from college. Perhaps the

³Ellwood and Kane (2000) also report these gaps for students with similar mathematics test scores. For example, while 59 percent of high-income youths with test scores in the middle tertile attend a four-year college, only 33 percent of youths from the lowest income quartile (and with test scores in this range) attend these institutions.

most arresting of these gaps is that in the propensity to even take the SAT exam, that achievement test most indicative of ‘plans’ to proceed to a college or university with some merit-based selection standard.

While colleges and universities may seek to weaken the link between socioeconomic class and future life prospects, the effects of their efforts appear muted, and less effective over time. This is particularly true for four-year colleges and universities, the traditional heart of the higher education system, and the producers of what many judge to be the highest quality educational services. In sum, the allocation of higher education services (especially the highest quality of these services) is rather highly concentrated among youths from families with the highest economic status, and this concentration appears to be increasing over time.⁴

B. And, The View From The Perspective Of ‘Selective’ Colleges?

Consistent with their focus on inequalities and practices in most selective institutions, Bowen, Kurzweil, and Tobin also present statistics on 180,000 students who entered 19 ‘selective’ colleges in 1995. These statistics are summarized in Table 4. The pattern of applications to these colleges and universities is predominantly from youths from high-income families. For high school graduates from the bottom income quartile (who have taken the SAT, and who presumably have some hope of being accepted by one of these schools), the likelihood of submitting an application to one of these colleges is only about one-fifth of that of high school graduates from families whose income is in the highest quartile. Among the applicants, the admission rate for the high-income students is nearly 10 percentage points greater than that of the low-income students. Among the students at these institutions, the SAT score of those in the bottom quartile ranges is about 80–90 points below that of students from the top

⁴Over recent decades, the earnings return to college going increased substantially. It appears that youths from low-income families responded less strongly to these increased returns from higher-schooling, and (of more concern) will not reap the gains of these returns in their future careers.

income category. Having been admitted, however, the enrollment rate is higher for the low-income students, and the graduation rates are about the same.

The most revealing statistic is in the bottom row: Among the students entering and graduating from these ‘selective’ schools, earnings (after 15 years) of the students from the highest income families is more than 25 percent greater than that of the students from the lowest income families. Clearly, family economic status persists, even through the filter of the nation’s most selective colleges and universities.

III. INEQUALITY PATTERNS IN EDUCATIONAL ATTAINMENT FOR A NATIONAL SAMPLE OF YOUTHS IN THE 1966–1970 BIRTH COHORT

The gaps in higher education attainment by family income summarized in the prior sections rely on estimates of income that are somewhat difficult to interpret, and in some cases suspect. First, among the national data collected, income values are sometimes for the households in which students reside, and hence do not pertain to the parents of these children.⁵ Second, for some data sources (including that used by Bowen, Kurzweil, and Tobin in their analysis of selective colleges), the parental income values are those supplied by the students themselves in response to survey questions (often administered at the time that the SAT or other achievement exam is administered); substantial concerns with the reliability of this information have been expressed, as student impressions of parental resources may not closely reflect true values.⁶ Third, in none of the prior studies has allowance been made for the ‘income needs’ of the families of the youths being studied. It clearly matters if a student from a family with \$50,000 per year of income has none or several siblings who are also competing for family resources. Finally, and most

⁵The estimates in Table 1 (from Ellwood and Kane) reflect the efforts of these authors to measure parental family income in a consistent way across data sources (see p. 320).

⁶The level of family income reported on student aid application forms, and hence supplied by parents, is substantially greater than the income levels reported by the students themselves in response to survey questions.

important, the values for parental or family income are one-year, ‘snapshot’ (or transitory) values, and hence fail to reflect the long-term (or ‘permanent’) economic position of the family of the students.⁷

To gain a different, and more reliable, picture of inequalities in educational attainment, we have proceeded in a somewhat different way. We selected a sample of children from the Michigan Panel Survey of Income Dynamics (PSID) who were born from 1966 to 1970, and followed them from 1968, the first year of the PSID (or their year of birth, if later) until 1999. This cohort would be expected to graduate from high school in the late-1980s, and from college in the early-1990s. Only those individuals who remained in the survey until they reached age 21 are included.⁸ Educational outcomes were measured at age 25 (although to limit missing data, some respondents’ outcomes were measured as late as age 29). After omitting observations for which information on core variables is missing, we have a sample of 1,202 children. Survey weights are applied to yield a nationally representative sample of this cohort of American youths.

These data contain extensive longitudinal information on the status, characteristics, and choices of family members, family income, living arrangements, neighborhood characteristics, and background characteristics such as race, education, and location for each individual. In order to make comparisons of

⁷This distinction is also very important if one wishes to infer more than correlation between family income and higher education attainment. A number of recent studies have found that permanent household income is a significant determinant of both college attendance decisions by youths and the level of family investments in children, while transitory income is not. See Keane and Wolpin (2001), Cameron and Heckman (1998), Blau (1999), and Carneiro and Heckman (2002).

⁸Some persons observed did not respond in an intervening year but reentered the sample the following year. Such persons are included in our analysis, and the missing information filled in by averaging the data for the two years contiguous to the year of missing data. For the first and last years of the sample, this is clearly not possible, and we assign the contiguous year’s value, adjusted if appropriate using other information that is reported. Studies of the PSID find little reason for concern that attrition has reduced the representativeness of the sample. A recent study by Fitzgerald, Gottschalk, and Moffitt (1998) finds that, although “dropouts” from the PSID panel do differ systematically from those observations retained, estimates of the determinants of choices such as schooling and teen nonmarital childbearing generated from the data do not appear to be significantly affected.

individuals with different birth years, we index the time-varying data elements in each data set by age.⁹ All monetary values are expressed in 1993 dollars, using the Consumer Price Index for all items. We merged census tract (neighborhood) information describing the percentages of residents that are high school dropouts and that have low incomes from the 1970 and 1980 censuses with our PSID data. The census data are matched to the specific location of the children in our sample for each year from 1968 to 1985.¹⁰

Appendix Table 1 provides weighted and unweighted means for all variables included in our models, averaged over the 1,202 observations in our sample. Eighty five percent of our (weighted) sample of youths graduated from high school and 46 percent attended college; they have an average of 13.06 years of completed schooling. The weighted average log of family income/needs (ages 2–15) is 0.94 while the average log of family net worth (in 1984) is 9.68.

We then tabulated a variety of measures of educational attainment for each member of this sample (measured at age 25), including graduate from high school (0–1), attend college (0–1), graduate from college (0–1), and the number of years of completed schooling.¹¹ For each youth, we also calculated a value of the permanent income/needs of the family in which he/she grew up—the average real value of the family’s income divided by the national poverty line (for a family of that size) over the youth’s ages

⁹Rather than have the information defined by the year of its occurrence (say, 1968 or 1974), this time-varying information is assigned to the child by the child’s age, allowing us to compare the process of attainment across individuals with different birth years.

¹⁰The links between the neighborhood in which each family in the PSID lives and small-area (census tract) information collected in the 1970 and 1980 censuses have been (painfully and painstakingly) constructed by Michigan Survey Research Center (SRC) analysts. For the years 1968 to 1970, the 1970 census data are used in this matching; for the years 1980 to 1985, the 1980 census data are used. In most cases, this link is based on a match of the location of our observations to the relevant census tract or block numbering area (67.8 percent for 1970 and 71.5 percent for 1980). For years 1971 to 1979, a weighted combination of the 1970 and 1980 census data are used. The weights linearly reflect the distance from 1970 and 1980. For example, the matched value for 1972 equals $[(.8 \times 1970 \text{ value}) + (.2 \times 1980 \text{ value})]$.

¹¹We define a high school graduate as a person who has either completed 12 years of schooling, or who has received a General Educational Development (GED) degree. A college graduate is a person who has completed 16 or more years of schooling, and hence excludes those with a two-year college degree. A person is identified as attending college only if they have completed at least one year of college. All of these values are computed using information reported at age 25.

2–15. Similarly, we calculated the average wealth (net worth) of the family in 1984, when the youths ranged in age from 14 to 18 years.

Consider, first, the extent of educational attainment of youths from families of various levels of economic resources. Table 5 presents summary statistics of the educational attainment of youths from the bottom and the top family ‘permanent’ income/needs quartiles and the gaps between them. Table 6 presents similar results by quartiles of family wealth (measured in 1984). Both tables also show attainment statistics for the top and bottom deciles of the respective distributions. The estimates are similar between the two measures of family resources—income/needs and wealth.

While only about 22 percent of youths from the bottom quartile of families by income or wealth attended college, 71 percent of youths from families in the top quartile at least entered a college or university. The gap is nearly 50 percentage points. While 42–44 percent of the youths from the top quartile of income/needs or wealth graduated college, only 6–9 percent of youths from families in the bottom quartile were college graduates, a gap of over 35 percentage points. Transitions from attending college if a high school graduate and from graduating college having attended college are also shown. Again, substantial gaps exist between youths from the highest and lowest quartiles of family income/needs and wealth in the probability of making these transitions. The gaps between the attainment levels of youths from the top and bottom deciles of the respective distributions are even greater, suggesting a rather continuous relationship between economic status and educational attainment.

A similar pattern of extreme inequality and gaps between youths from the top and bottom quartiles of family income/needs and wealth are observed when the allocation of educational services to youths from various economic backgrounds is measured. Tables 7 and 8 show the composition of all high school graduates, college attendees, and college graduates in our cohort of youths, by family income/needs and wealth quartiles. Again, the patterns for the top and bottom deciles of the distributions are also reported.

Among high school graduates, nearly 30 percent are from the top income quartile, while about 19 percent are from the bottom quartile; at least in terms of attainment—though not necessarily in terms of

quality-adjusted attainment—the distribution of high school educational services is relatively evenly distributed among children from various economic backgrounds. The pattern for college graduates, however, is quite different. Among all college graduates in this cohort of people, one-half are from families with the income/needs in the top quarter of the nation, while only 7 percent of college graduates come from the one-quarter of families whose permanent income/needs position the lowest in the nation. Similarly, the ten percent of families in the lowest income/needs decile yield less than three percent of college grads. While the patterns by wealth are similar, the concentration of college graduates among the nation's wealthiest quartile of families is even more extreme than the concentration by income/needs—only 22 percent of college graduates come from the bottom half of families in terms of the level of assets (net worth). Stated alternatively, the nearly 80 percent of higher educational services sufficient to attain a college degree are allocated to youths from the most wealthy 50 percent of the nation's families; only 10 percent to youths from the least wealthy 25 percent of families, and only 1 percent to the least wealthy 10 percent.

IV. THE INDEPENDENT EFFECT OF FAMILY PERMANENT INCOME/NEEDS ON HIGHER EDUCATION ATTAINMENT

While these tabulations reveal substantial disparities in higher education attainments among high and low income youths, they do not indicate the effect of parental SES on attainments controlling for a variety of other factors. These other factors, such as race, parental education, family structure, might be correlated with both higher education attainment and parental income; if they are, the relationship of parental income to attainments seen in the simple cross tabulations would be exaggerated.

To obtain the independent effects of parental income on schooling attainment, we estimated a series of multi-variate statistical relationships that include both parental income/needs and a variety of other factors that are expected to be related to youth's educational attainments. We focus on family economic resources (income relative to need; wealth) and control variables found to have persistent, robust, and statistically significant relationships with educational attainment in prior research studies (see

Haveman et al., 2001).¹² These variables include race, gender, number of siblings, parental schooling, family structure, geographic moves, the percentage of neighborhood or census tract individuals who dropped out of high school, and public state university tuition and fees. Those variables whose values change over time are averages over the individual's ages 2–15.

Table 9 presents our estimates. Consider, first, the relationship of the family economic variables (family income/needs and wealth) to educational attainments.¹³ Average family income/needs over ages 2–15 is significantly associated with all of the indicators of educational attainment, although only at the 10 percent level for high school graduation. These results support other research indicating that permanent parental income is an important determinant of educational attainment. Family wealth is also significantly related to all four education measures.¹⁴

To better gauge the magnitude of the effects, the final two rows of the table show the elasticity of the education variables with respect to the family economic variables. The elasticity of educational attainment with respect to family wealth is greater than the elasticity with respect to income/needs, and is particularly large for the college graduation outcome. A one percent increase in wealth is associated with a nearly equivalent (.92) percentage increase in the probability of graduating college, while a one percent increase in family income/needs is associated with a .69 percentage increase in the college graduation probability. Part of this high wealth elasticity is due to the cumulative nature of the effect of wealth on

¹²The family income variable is measured as the logarithm of the ratio of family income in each year during the individual's ages 2–15 to that year's poverty line; these annual values are averaged over the period between ages 2 and 15. The family assets variable is the logarithm of positive family net worth in 1984; variables indicating negative or missing wealth information are also included. State public tuition/fees per full-time student is measured in 1987, when the individuals were ages 17–21, and divided by 1000.

¹³In our analysis of the effects of changing economic inequality in the next section, we focus on the effects of these family economic variables.

¹⁴The interpretation of the coefficient estimate on the wealth variable is complicated by the permanent measure of income included in the regression. Family income/needs ratio is measured during the ages 2 to 15, and thus the wealth variable captures a combination of wealth from other sources, such as inheritance, and the savings behavior of parents. Consider two families with identical initial wealth and income/needs each year but one family saves a percentage of their income while the other spends all of it; the coefficient on the wealth variable may be capturing not only the additional resources available for education, but also unobservable parental characteristics such as a low discount rate that may affect both the savings behavior of the parents and the child's education.

education. Having higher wealth increases the probability of graduating high school and the probability of attending college, both conditions necessary to graduate from college.

The incremental elasticity for any level of attainment can be found by comparing elasticities across the education levels. For example, of the .92 elasticity of college graduation with respect to wealth, .337 ($= .917 - .581$) is the elasticity of college graduation conditional on attending college, .406 ($.581 - .175$) is the elasticity of attending college conditional on graduating high school, and .175 is the elasticity of graduating from high school graduation. The elasticities show that the financial variables have a larger effect on attending and graduating college than on attending high school. A one percent increase in income increases the probability of graduating high school by only .04 percent but increases the probability of attending college by .55 percent.

The individual, family, and neighborhood characteristics are generally as expected, although some are not statistically significant. Being African-American or female significantly increases educational attainment, while moving often during childhood, having more siblings in the home, or living in a neighborhood with a high percent of high school dropouts tend to reduce education, and are usually statistically significant. Parental education generally increases education, and the effect of both variables is significant for years of schooling and college graduation.¹⁵ Controlling for these factors, the proportion of years in a single parent family is positively related to attainment, and is generally statistically significant. The state public institution tuition in 1987 is negatively associated with the indicators of educational attainment, and is statistically significant for both years of completed schooling and college attendance.

¹⁵Parental education may have a less significant effect in our specification because a permanent measure of income/needs and wealth are also included in the regression. To understand the potential overlap in the parental education, wealth and income/needs, we estimated the correlation coefficients between pairs of these variables. They are as follows: wealth and income/needs (.568); wealth and parental high school (.381); wealth and parental college (.312); income/needs and parental high school (.468); income/needs and parental college (.485).

To illustrate the effect of family income/needs and wealth on education, we use the estimates from the regressions in Table 9 to calculate the mean predicted value of the education variables for a youth in the top and the bottom income/asset quartile (holding the other variables in the model at their actual values).¹⁶ These estimates are presented in Table 10. Even after controlling for race, gender, parental education, family size and structure, and neighborhood characteristics, family income/needs and assets profoundly affect the educational chances for a youth. The predicted value of years of education for someone in the top quartile of income and assets is nearly 1.5 years higher than for someone in the lowest quartile (13.6 vs. 12.2 years). Such differences are seen at all education levels; the probability of graduating from high school is .92 for youths in the top quartile compared to .76 for those in the bottom quartile, the probability of attending college is .64 compared to .21, and the probability of graduating from college is .30 compared to .08. Holding constant all of these other characteristics, a youth from the bottom quartile of the parental income/wealth distribution has only about one-fourth the chance of graduating college as a youth from the top quartile.

V. THE IMPLICATIONS OF GROWING FAMILY INCOME INEQUALITY ON THE LEVEL AND INEQUALITY OF YOUTHS EDUCATIONAL ATTAINMENTS.

As is well known, the level of income inequality has increased substantially among US households over the last 30 years. For example, from 1973 to 1998, the Gini coefficient on family income increased from .356 to .430, or by 21 percent.¹⁷ This uneven growth in income among high and low income families is likely to have important implications for both the overall level and the distribution of educational attainments. In particular, more rapid income growth at the top of the distribution relative to

¹⁶We calculate these predicted values by replacing actual income and wealth variables with the median income within the quartile for the financial variables, keeping all other variables at their actual level. Thus the numbers tell the weighted average of predicted education for the sample when the financial variables are at the bottom and top quartile level holding constant the other characteristics of the sample.

¹⁷See Haveman et al (2001).

the bottom suggests that the related gains in educational attainment may also be concentrated among youths from high income families.

We are able to use our estimates of the response of changes in educational attainments to changes in income and wealth to explore the implications of the increase in income inequality from 1970 to 2000 for both the level and the inequality in educational attainments. To isolate the independent effect of increased income inequality from the effect of changes in the level income over time, we simulate the family income distribution of our sample so as to match the distributions in 1970 and 2000, holding constant the average level of income of the sample. This simulation asks the following question: What is the implication of a hypothesized increase in economic inequality, holding constant the overall level of income and all of the other characteristics of the population? Essentially, we hold constant the size of the income “pie”, and then measure the size of the slices (for seven percentile ranges) so as to match the actual distributions in both 1970 and 2000. Then, using the regression coefficients from Table 9, we calculate the change in (predicted) educational attainment for each individual by predicting each person’s level of educational attainment given an income value simulated to match the income distribution of, first, 1970 and then 2000.¹⁸ The results are presented in Table 11.

We estimate that the increase in family income inequality from 1970 to 2000 reduces (predicted) educational attainments for the bottom three quartiles of the family income distribution, particularly the bottom quartile. The probability of an individual in the bottom quartile graduating high school falls from .653 to .640, a 2 percent reduction. Much greater negative effects for youths from the lowest family income quartile are observed for the probability of attending college and graduating from college, both of which fall by 17 percent. For youths from the top family income quartile, there are small increases in predicted educational attainment, ranging from a 1 percent increase in the probability of attending college to a 3 percent increase in the already high probability of graduating from college. Table 11 also shows

¹⁸A detailed description of the simulation procedure is in Appendix A.

estimates of the change in family income inequality for those in the top 5 percent of the distribution. The predicted gains in educational attainment are very large for this already high achieving group—increases in the probability of attending and graduating from college of 3 percent and 7 percent, respectively.¹⁹

The overall societal effect on educational attainment of the 1970–2000 increase in income inequality is decidedly negative. Although the effect on mean years of education and the probability of graduating from high school is quite small (.5 and .7 percent reductions, respectively), this masks the larger effects that occur at important education transitions. When measured over the entire population, the percent of youths who attend college falls from 43 percent to 41 percent (or by over 4 percent), while the percent who graduate from college falls from 21 percent to 20 percent (or by 2.5 percent). We conclude that the growth of income inequality over the past three decades both decreased the overall level of educational attainment and increased the level of inequality in educational attainments between youths from high and low income families.²⁰

These estimates suggest that the increase in income inequality of the magnitude that has been experienced in the United States over the past few decades has intergenerational effects with broad social implications. In particular, our results provide evidence that such a change results in greater dispersion of educational outcomes. The increased dispersion is primarily because those at the bottom of the

¹⁹While the regression contains both income and wealth variables, our simulation reflects only the increase in income inequality. Because the increase in wealth inequality from 1970 to 2000 was in part independent from the growth in income inequality, our simulation understates the total effect of the greater inequality in financial resources.

²⁰We also simulated the differential effects on educational attainment of the actual change in the level and distribution of income in the nation from 1970 to 2000. The results of this analysis show that the positive effect on educational attainment from the increase in the level of income was greater than the negative effect of the growth in income inequality. While increases were recorded in all measures of educational attainment for all of the quartiles, the gains for those from the top quartile were substantially greater than the gains for those in the bottom quartile. For example, the actual change in income over this three decade period resulted in an estimated increase in the likelihood of graduating college for youths from the bottom quartile from .059 to .063, or by 0.4 percentage points (5.8 percent). However, this same overall economic change is estimated to have increased the probability of graduating college for youths in the top quartile from .400 to .556, or by 15.6 percentage points (39.1 percent). In other words, the positive effect on this measure of educational attainment for those in the top quartile of the income distribution was nearly 40 times that for those in the bottom quartile.

educational distribution fall further from the mean; it implies a relative loss of human capital among those who have the least of it. Given the linkage between schooling attainments and labor market success, the increase in inequality in educational attainments is also likely to be reflected in increased earnings inequality.

VI. CONCLUSION

The results of this paper confirm and extend the findings of previous literature that economic inequality results in significant education inequality. The gaps in education by income level are striking, even after controlling for other family and neighborhood effects, with someone in the top quartile of income more three times as likely to graduate from college as someone in the bottom quartile of income. In addition, the increase in inequality the past few decades has increased the inequality in education as well as lowering the overall education level. These results are more striking against the backdrop of other work presented in this paper, that lower income youths are more likely to attend community colleges or vocational schools and those that attend four-year colleges are likely to attend lower quality schools.

If the inequality in terms of education attainment had no implications beyond this, there would be basis for concern. However, higher education attainment carries important implications for future economic and other attainments later in life.

The most prominent effect of incremental higher education relates to the market earnings and income impacts of schooling. Recently, Orley Ashenfelter and his colleagues Colm Harmon and Hessel Oosterbeek presented a “meta-analysis” of earlier studies, and concluded that investments in higher education in the United States yielded 6 to 8 percent market returns for recipients. This compares favorably with returns on most other investments. Other analysts suggest an even higher return.²¹

²¹Comparing the United States to other countries, the authors find rates of return in the United States that are about 1.3 percentage points greater than in other countries (primarily the United Kingdom, the other country with several such studies). They attribute that to the large relative increase in education-related earnings in the

These market returns in the form of earnings and income are reflected in Figures 1 and 2. Figure 1 shows median household income for families headed by people with various levels of attained schooling. While the median for families with a head that had only a high school degree was about \$43,870 per year, that for households headed by a college graduate was \$78,518. The earnings effects of higher education are also striking. Figure 2 shows much the same differential, but in this case for individual earnings. Moreover, it indicates that the earnings of college graduates relative to high school graduates has increased substantially over the years since the mid-1970s.

But, the full well-being that people gain from their own schooling is only partially reflected in even the most reliable of the studies of labor market returns analyzed by Ashenfelter and his colleagues. These studies totally ignore a set of important and potentially dominant effects of additional investments in higher education. These “social and nonmarket effects” of additional schooling are large, perhaps as large as the market-based effects of education to which economists pay so much attention. If we are correct, it is misleading, at best—dangerous, at worst—to ignore these effects in debates over the optimal level of social (and public-sector) investment in schooling. A full assessment of the benefits and costs of additional investments in education must account for all of the effects of schooling, and not simply those recorded in a single market.²² Figure 3 presents a birds-eye summary of these effects.

When these large and growing longer-run earnings gains and other benefits associated with a college education are taken together with the gaps in college going and college graduation between youths from high income and low income families, it is clear that the higher education inequalities become translated into lifetime earnings, income, and overall well-being inequalities. Contrary to the oft-stated belief in the leveling effect of higher education, the nation’s colleges and universities appear to be

United States in recent decades. (For example, Ashenfelter and Rouse, 1998, find that in the United States the return to an additional year of schooling had grown from 6.2 percent in 1979 to about 10 percent in 1993.)

²²See note 1.

an integral part of the process whereby family economic status is passed along from generation to generation.

Appendix A Simulation Procedure

To simulate the change in income inequality from 1970 to 2000, we adjust the income distribution of our sample to match that of the U.S. in 1970 and in 2000. The first two columns of the Appendix Table 2 show the share of aggregate income held by each percentile range in 1970 and 2000. The 20 percent of families in the bottom quintile had 5.4 percent of total income in 1970 but only 4.3 percent in 2000; the 5 percent of families in the 95–100 percentile range had 15.6 percent of income in 1970 but 21.1 percent in 2000.

We simulate the family income distribution of our sample to match the percent of income held by each of seven income percentile ranges for 1970 and for 2000, holding constant the average income for the sample. The middle two columns of the table show what average income would have to be in each income range to have each percentile range have the appropriate percentage of income and to have average income for the sample remain at \$44,500. For example, average income for those in the bottom quartile would be \$12,000 to simulate 1970 and \$9,600 to simulate 2000.²³ Based on the actual average income for sample members whose income puts them in this bottom income quartile, an adjustment factor is calculated that makes the sample average income match the simulated average. Following the same procedure, an adjustment factor is calculated for the other six income percentile ranges and then each sample member's income is multiplied by the appropriate adjustment factor for their income range to get simulated income. The adjustment factor used is labeled "Simulated Income as % of Actual" in the table.

We then calculate the income/needs ratio using this simulated income. Average simulated income/needs ratio for each percentile range is shown in the final two columns of Appendix Table 2.

²³In contrast, the average income for the top 5 percentile increases from \$139,000 in 1970 to \$188,200 in 2000.

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Table 1
Students Who Enroll in Colleges and Universities within Twenty Months after Graduation From High School

	Total	Vocational/ Technical	Two-Year College	Four-Year College
Class of '80-'82				
Bottom Quartile	57	12	16	29
Top Quartile	80	6	19	55
Total	68	10	19	39
Class of '92				
Bottom Quartile	60	10	22	28
Top Quartile	90	5	19	66
Total	75	7	23	45

Source: Ellwood and Kane (2000); data: High School and Beyond.

Table 2
Socioeconomic Status of Entering Classes by College Selectivity

	SES Quartiles (compared to 25 percent of all youths in each quartile)		Total
	Bottom	Top	
Tier 1	3	74	100
Tier 2	7	46	100
Tier 3	10	35	100
Tier 4	16	35	100
Community Colleges	21	22	100

Source: Carnevale and Rose (2004); data: National Education Longitudinal Study of 1988 (NELS: 88).

Table 3
Percent of Students from the 1988 8th Grade Cohort

	Bottom Quartile	Top Quartile	Gap
Graduated High School	80	97	17
Took the SAT	32	68	36
SAT Score > 1200	2	15	13
Given SAT = 5-600, go to college	87	97	10
Given SAT = 5-600, attended most expensive colleges	20	52	32
Given starting a four-year college, graduation from college	44	78	34

Source: Bowen, Kurzweil, and Tobin (2005); data: National Educational Longitudinal Study (NELS).

Table 4
**Patterns of Applications, Admissions, SAT Scores, Enrollment, Graduation, and Later Earnings:
 Students Entering 19 Selective Colleges and Universities in 1995**

	Bottom Quartile	Top Quartile	Gap
Percentage of Applicants From (compared to 25 percent of all students in each quartile)	11	50	39
Percent of Applicants Admitted	34	43	9
Average SAT (entering public/entering private)	1169/1229	1259/1309	90/80
Percent of Admittees who Enrolled	44	39	-5
Percent of Entrants who Graduated	84	88	4
Earnings of 1976 FT Worker Entrants after 15 years*	\$68,000	\$86,000	\$18,000

Source: Bowen, Kurzweil, and Tobin (2005); data: Expanded College and Beyond database.

*For the 1976 entering class, for 11 of the 19 schools with 1976 data.

Table 5
**Percent of Youths in 1966–70 Birth Cohort with Various Levels of Educational Attainment, by
 Quartile of Family Average Income/Needs, ages 2–15**

	Bottom Decile	Top Decile	Bottom Quartile	Top Quartile	Gap
Graduate High School	56.8	97.7	64.1	96.1	32
Attend College	19.5	78.2	21.6	71.2	49.6
Attend College, conditional on being a high school graduate	34.3	80.0	33.8	74.1	40.3
Graduate College	6.3	49.1	5.6	42.1	36.5
Graduate College, conditional on attending college	32.3	62.8	25.9	59.1	33.2
Years of Schooling	11.2	14.6	11.8	14.2	2.4

Source: Authors' calculations; data: Michigan Panel Study of Income Dynamics (PSID).

Table 6
Percent of Youths in 1966–70 Birth Cohort with Various Levels of Educational Attainment, by Family Wealth in 1984

	Bottom Decile	Top Decile	Bottom Quartile	Top Quartile	Gap
Graduate High School	49.7	98.5	63.9	97.9	34
Attend College	12.6	74.9	24.2	73.7	49.5
Attend College, conditional on being a high school graduate	25.4	76.1	37.8	75.3	37.5
Graduate College	3.0	47.8	8.6	44.1	35.5
Graduate College, conditional on attending college	23.8	63.7	35.7	59.9	24.2
Years of Schooling	11.4	14.5	11.9	13.5	1.6

Source: Authors' calculations; data: Michigan Panel Study of Income Dynamics (PSID).

Table 7
Composition of Youths in 1966–70 Birth Cohort of Various Educational Attainment Levels by Quartile of Family Average Income/Needs, ages 2–15 (compared to 25 percent of all youths in each quartile)

	Bottom Decile	Top Decile	Bottom Quartile	Third Quartile	Second Quartile	Top Quartile	Total
High School Graduates	6.6	11.6	19.0	25.2	27.1	28.7	100
College Attendees	4.2	17.1	11.8	20.6	28.3	39.2	100
College Graduates	2.9	23.2	6.6	17.4	25.9	50.1	100

Source: Authors' calculations; data: Michigan Panel Study of Income Dynamics (PSID).

Table 8
Composition of Youths in 1966–70 Birth Cohort of Various Educational Attainment Levels by Quartile of Family Wealth in 1984

	Bottom Decile	Top Decile	Bottom Quartile	Third Quartile	Second Quartile	Top Quartile	Total
High School Graduates	5.6	11.8	18.9	26	26.5	28.7	100
College Attendees	2.7	16.5	13.2	18.8	28.3	39.8	100
College Graduates	1.4	22.7	10.2	11.6	26.7	51.5	100

Source: Authors' calculations; data: Michigan Panel Study of Income Dynamics (PSID).

Table 9
Regression Results^a

Variable	Years of Education		High School Graduate			Attend College			College Graduate		
	Parameter Estimate	Pr > t	Parameter Estimate	Pr > ChiSq	Marginal Effect	Parameter Estimate	Pr > ChiSq	Marginal Effect	Parameter Estimate	Pr > ChiSq	Marginal Effect
Intercept	11.540	<.0001	-0.001	0.998	0.000	-0.968	0.002	-0.362	-1.922	<.0001	-0.251
Log of Family Income/Needs 2-15	0.654	<.0001	<i>0.190</i>	0.092	0.041	0.617	<.0001	0.231	0.457	0.001	0.060
Log of positive wealth, 1984	0.090	<.0001	0.081	<.0001	0.017	0.064	0.000	0.024	0.060	0.028	0.008
Negative wealth, 1984	0.396	0.148	<i>0.411</i>	0.052	0.089	0.152	0.546	0.057	0.310	0.402	0.040
African American	0.313	0.014	0.293	0.008	0.063	0.274	0.010	0.103	-0.012	0.931	-0.002
Female	0.416	<.0001	0.230	0.010	0.050	0.235	0.004	0.088	0.314	0.002	0.041
Average number of siblings 2-15	-0.066	0.103	-0.033	0.328	-0.007	-0.072	0.043	-0.027	-0.068	0.162	-0.009
At least one parent grad high school	0.567	<.0001	0.522	<.0001	0.112	<i>0.206</i>	0.069	0.077	<i>0.318</i>	0.057	0.042
At least one parent attend college	0.340	0.012	0.122	0.355	0.026	0.027	0.798	0.010	0.298	0.015	0.039
Proportion years w/single parent 2-15	0.478	0.008	-0.058	0.702	-0.013	0.311	0.040	0.116	0.590	0.003	0.077
Number of location moves 2-15	-0.082	<.0001	-0.060	0.001	-0.013	-0.042	0.019	-0.016	-0.059	0.016	-0.008
Percent neighborhood dropouts 2-15	-0.026	<.0001	-0.016	0.005	-0.003	-0.019	0.000	-0.007	-0.017	0.017	-0.002
Tuition & fees per FTE Public 87	<i>-0.179</i>	0.052	0.005	0.950	0.001	-0.193	0.012	-0.072	-0.123	0.202	-0.016
Education info missing for parents	0.511	0.017	<i>0.324</i>	0.063	0.070	0.466	0.010	0.175	0.166	0.547	0.022
Wealth missing, 1984	<i>-0.430</i>	0.063	-0.144	0.420	-0.031	-0.360	0.128	-0.135	-0.838	0.088	-0.109
Elasticity of Education Variables with Respect to Financial Resource Variables											
Elasticity for Family Income ^b	0.048		0.042			0.549 (0.507)			0.685 (.136)		
Elasticity for Wealth, 1984 ^b	0.067		0.175			0.581 (0.406)			0.917 (.337)		

^a Bold indicates the coefficient estimate is significant at the 5 percent level; italics indicates significant at the 10 percent level.

^b The first number is the total elasticity and the number in parenthesis is the marginal elasticity. For example, the elasticity of family income on attend college is 0.549, of this .042 is the effect on high school graduation and .507 is the marginal elasticity on attending college conditional on high school graduation.

Table 10
Comparison of Predicted Education Values at Bottom and Top Quartile of Income and Assets

Predicted Education	Bottom Quartile	Top Quartile
Years of Education	12.192	13.607
Probability of High School Graduate	0.759	0.916
Probability of Attending College	0.208	0.637
Probability of Graduating College	0.077	0.299

Note: The predicted education values are calculated from the regressions in Table 9. Bottom and top quartile refer to the weighted median value of income/assets within the lowest and highest quartile; all other variables are kept at their actual value.

Table 11
Comparison of Predicted Values of Educational Attainment under Simulated Levels of Family Income Inequality
(Weighted, based on coefficient estimates in Table 9)

Education Level at Various Income Levels
 When Simulating Income Inequality 1970 to 2000

	All	Bottom 25%	Lower 25%	Upper 25%	Top 25%	Top 5%
Years of Education						
Simulated 1970	12.916	11.674	12.657	13.298	14.028	14.547
Simulated 2000	12.849	11.531	12.547	13.240	14.074	14.686
Change	-0.066	-0.143	-0.110	-0.058	0.045	0.139
Percent change	-0.51%	-1.23%	-0.87%	-0.44%	0.32%	0.96%
Probability of Graduating High School						
Simulated 1970	0.833	0.653	0.829	0.901	0.949	0.972
Simulated 2000	0.827	0.640	0.821	0.898	0.949	0.974
Change	-0.006	-0.013	-0.008	-0.003	0.001	0.002
Percent change	-0.70%	-2.02%	-0.94%	-0.34%	0.07%	0.22%
Probability of Attending College						
Simulated 1970	0.430	0.153	0.346	0.516	0.704	0.823
Simulated 2000	0.412	0.127	0.311	0.494	0.714	0.851
Change	-0.018	-0.027	-0.035	-0.021	0.010	0.028
percent change	-4.16%	-17.30%	-10.03%	-4.08%	1.46%	3.45%
Probability of Graduating from College						
Simulated 1970	0.205	0.046	0.129	0.235	0.409	0.544
Simulated 2000	0.200	0.039	0.115	0.224	0.421	0.580
Change	-0.005	-0.008	-0.014	-0.011	0.012	0.036
Percent change	-2.50%	-16.76%	-10.66%	-4.81%	2.92%	6.60%

Note: For this simulation, average family income was held constant and the % of income held by each income quintile was adjusted to match the percent of income held by income quintile from 1970 and 2000. Thus, this simulation reflects the change in inequality from 1970 to 2000 holding constant overall level of income.

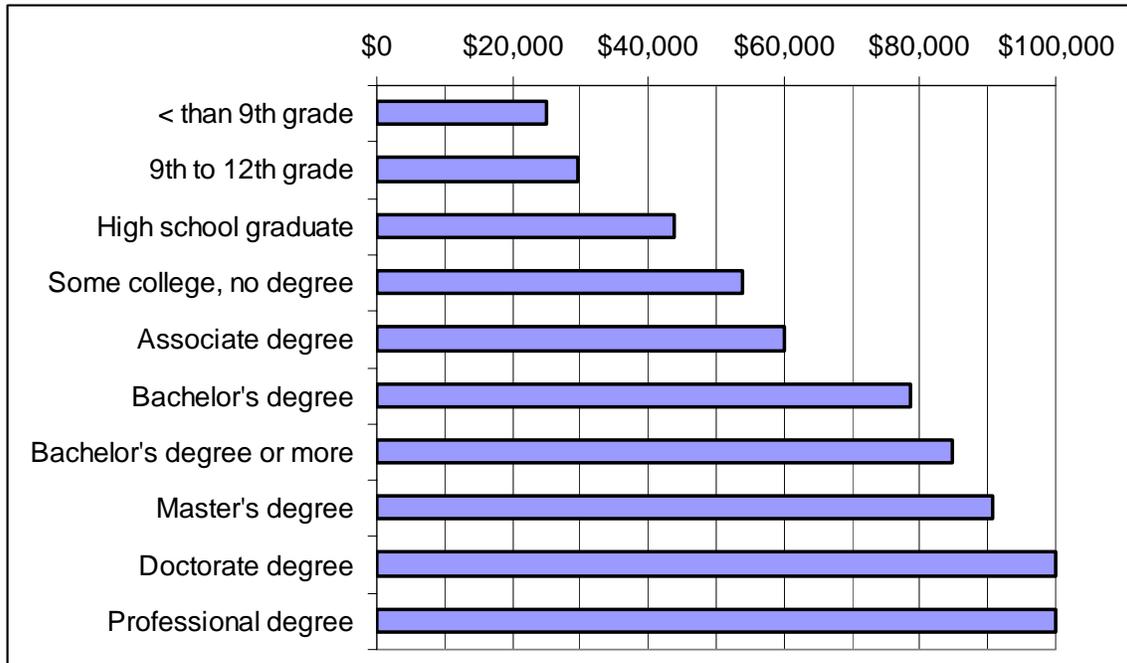
Appendix Table 1
Unweighted and Weighted Sample Means

Variable	Weighted Mean	Unweighted Mean
Education Variables		
Years of Education	13.06	12.51
High School Graduate = 1	0.848	0.760
Attend College = 1	0.460	0.347
College Graduate = 1	0.213	0.138
Income and Control Variables		
Log of Family Income/Needs 2–15	0.943	0.679
Log of positive wealth, 1984	9.680	7.621
African American	0.153	0.441
Female	0.473	0.469
Average number of siblings 2–15	1.755	2.101
At least one parent graduated high school	0.769	0.633
At least one parent attended college	0.395	0.269
Proportion years w/single parent 2–15	0.153	0.270
Number of location moves 2–15	2.518	2.831
Percent neighborhood dropouts 2–15	14.43	16.71
Negative wealth, 1984	0.039	0.052
Tuition & fees per FTE Public 87	1.631	1.592
Education info missing for parents	0.037	0.072
Wealth missing, 1984	0.006	0.108

Appendix Table 2
Simulation of Income Distribution 1970 and 2000

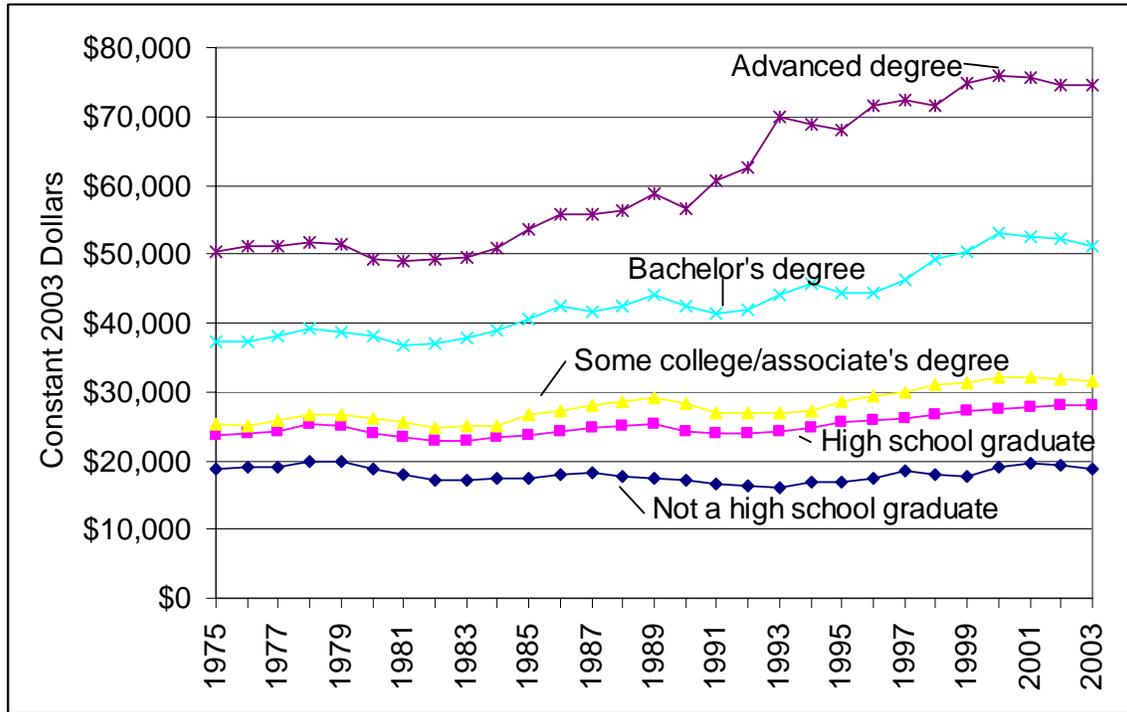
Income Percentile	U.S. Actual % of Income		Simulated Average Income		Simulated Income as % of Actual		Average Simulated Income/Needs	
	1970	2000	1970	2000	1970	2000	1970	2000
0 to 20	5.40%	4.30%	12,000	9,600	67.4%	53.9%	0.820	0.656
20 to 40	12.20%	9.80%	27,200	21,900	90.5%	72.9%	1.839	1.481
40 to 60	17.60%	15.40%	39,200	34,300	101.6%	88.9%	2.780	2.433
60 to 80	23.80%	22.70%	53,000	50,500	106.2%	101.2%	3.695	3.520
80 to 90	15.30%	15.80%	68,000	70,500	103.5%	107.3%	4.686	4.859
90 to 95	10.00%	10.70%	88,600	95,500	106.6%	114.9%	6.014	6.482
95 to 100	15.60%	21.10%	139,000	188,200	107.5%	145.5%	9.067	12.277
Total			\$44,500	\$44,500				

Figure 1
Median Annual Family Income, by Educational Attainment of Householder, 2001



Source: U.S. Census Bureau, Historical Income Tables, Table F-18
(<http://www.census.gov/hhes/income/histinc/f18.html>).

Figure 2
Mean Annual Earnings by Educational Attainment for Persons 18 Years Old and Older, 1975–2003 (Inflation-Adjusted to 2003 Dollars)



Source: U.S. Census Bureau, Current Population Study, Table A-3
(<http://www.census.gov/population/socdemo/education/tabA-3.xls>).

Figure 3

THE EFFECTS OF ADDITIONAL SCHOOLING

CATEGORY	ECONOMIC NATURE
Individual market productivity	Private; market effects.
Nonwage labor market remuneration	Private; market and nonmarket effects, e.g., fringe benefits and working conditions.
Intrafamily productivity	Private; some external effects; market and nonmarket effects, e.g., relationship between wife's schooling and husband's earnings.
Child quality: level of education and cognitive development	Private; some external effects; market and nonmarket effects, e.g., child education level and cognitive development are positively related to mother's and father's education.
Child quality: health and fertility	Private; some external effects, e.g., child health and reduced chances that daughters will give birth out of wedlock as teenagers are positively related to parents' education.
Own health	Private; modest external effects, e.g., own schooling positively affects one's health status, increases life expectancy, lowers prevalence of severe mental illness (including depression), and improves ability to deal with stressful events.
Consumer, marital and labor market efficiency	Private; some external effects; nonmarket effects, e.g., schooling leads to more efficient consumer activities; reduced costs of job search, increased regional mobility, and improved sorting in marriage market.
Attainment of desired family size	Private; e.g., contraceptive efficiency is positively related to schooling.
Charitable giving	Private and public; nonmarket effects, e.g., schooling increases donations of both time and money.
Savings	Private; some external effects, e.g., more schooling is associated with higher savings rates.
Technological change	Public; e.g., schooling is positively associated with research, development and diffusion of technology.
Social cohesion	Public; e.g., schooling is associated with increased voting, reduced alienation and social inequalities, opposition to government repression, reduced support for use of violence in protests, increased trust of others and membership in community organizations.
Self-reliance or economic independence	Private and public; e.g., more education associated with reduced dependence on transfers during prime working years.
Crime reduction	Public; e.g., schooling is associated with reduced criminal activity and a reduction in recidivism.