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U.S High School Graduation Rates: Patterns and Explanations *

1. Introduction

"We have one of the highest high school dropout rates of any industrialized nation. . . .
. . . . And dropping out of high school is no longer an option. It's not just quitting on yourself, it's
quitting on your country – and this country needs and values the talents of every American."

President Barack Obama, State of the Union Speech to the U.S. Congress, February 24, 2009

During the first 70 years of the 20th century, the high school graduation rate of teenagers in the

U.S. rose from six percent to almost 80 percent.[1] A result of this remarkable trend was that by the

late 1960s, the high school graduation rate in the U.S. ranked first among OECD countries.[2] The

increase in the proportion of the labor force that had graduated from high school was an important

part of the human capital creation that fueled economic growth and produced rising incomes during

the 20th century.

Over the last 40 years the high school graduation in the U.S. has stagnated. In contrast, the

secondary school graduation rate in many other OECD countries increased markedly during this

period. A consequence is that in 2008 the high school graduation rate in the United States ranked

[1] Claudia Goldin and Lawrence Katz (2008) estimate the U.S. high school graduation rate in 1970 to be 77 percent. James J.
Heckman and Paul A. LaFontaine (2010) estimate the figure to be 81 percent. (See Table A.7 in the Supplemental Appendix
to their 2010 paper.
[2] As reported in *Education at a Glance 2007*, as of 2005, the high school graduation rate among 25-64 year olds was higher
in the U.S. than in other OECD countries.

19th among 28 OECD countries.[3] Given the importance of educational attainments and skills of workers in determining labor market earnings for individuals and the economic growth rate for countries (Eric A. Hanushek and Ludger Woessman 2008), it is important to understand the reasons for the stagnation of the high school graduation rate in the U.S. and the evidence on the consequences of efforts to increase it. Consistent with this theme, this paper addresses the following four questions:

1. What are the patterns in U.S. high school graduation rates over the last 40 years?

2. What are the explanations for these patterns?

3. What are promising strategies for increasing the high school graduation?

4. Why haven't policy evaluations been more useful in guiding efforts to increase the high school graduation rate?

The paper is organized in six subsequent sections. Section 2 clarifies methodological issues concerning the measurement of high school graduation rates. Section 3 describes patterns in the high school graduation rates of different groups in the United States. Section 4 describes economic models of teenagers' decisions about whether to remain in high school. Section 5 examines the evidence bearing on explanations for the patterns in high school graduation rates. Section 6 summarizes evidence on the effectiveness of policy interventions aimed at increasing high school completion rates. Section 7 reviews the answers to the four questions addressed in the paper.

2. Methodological Issues

In this section, I describe briefly three methods used to estimate high school graduation rates in the United States and the strengths and limitations of each. I explain that estimates of high school graduation rates are sensitive to methodological choices, in part because of differences in the coverage of the data sets used in implementing different methods. I then explain why estimates of

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[3] See *Education at a Glance 2010: OECD Indicators*, Table A2.1.

the high school graduation rate based on any of these three methods are extremely sensitive to classification of recipients of the General Educational Development (GED) credential.[4]

2.1 The Status Completion Rate

The status completion rate is defined as "the percentage of individuals in a given age range who are not in high school and who have earned a high school diploma or equivalency credential, irrespective of when the credential was earned." [5] In the U.S., household surveys including the Current Population Survey (CPS), the decennial Census of Population, and the American Community Survey (ACS) have been used to estimate the status completion rate. An important strength of this estimation method is its transparency and insensitivity to the number of years that it took individuals to graduate from high school. One limitation of data based on household surveys is that one individual provides the responses to questions pertaining to all members of the household. There is some concern that some respondents may exaggerate the educational attainments of household members.

A limitation of the CPS as a data source for estimating the status completion rate is that its sampling frame includes only the non-institutionalized civilian population. Consequently, it excludes incarcerated individuals and those serving in the military. The Census of Population does include these groups and provides a basis for estimating the degree to which CPS-based estimates of the status high school completion rate are biased by the exclusion of the prison and military populations. The detailed information in the Public Use Microdata Sample (PUMS) from the decennial Census also provides a basis for estimating the extent to which CPS-based estimates of the graduation rate are biased by inclusion in the sample of immigrants who did not attend U.S. high schools.

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[4] This section was informed by the thoughtful discussion of different methods of estimating high school graduation rates presented by Lawrence Mishel and Joydeep Roy (2006).
[5] See Susan Aud, Mary Ann Fox, and Angelina KewalRamini (2010).

Of course, a limitation of using Census data in estimating status graduation rates is the infrequency of its administration. In response to this problem, the American Community Survey, which samples approximately 3 million housing units each year and which does include the military and incarcerated individuals in its sampling frame, provides data suitable for estimating the status completion rate.

2.2 The Cohort Graduation Rate

A second method of estimating high school graduation rates for the nation as a whole and for individual states makes use of the cross-sectional information on public school enrollments and number of public high school graduates that states collect from local school districts and then provide to the National Center for Education Statistics (NCES) each year. Until recently, the conventional methodology had been to divide the number of high school graduates in year t in a particular state by an estimate of the number of students enrolled in ninth grade in that state four years earlier. A strength of this methodology is that it makes use of information from the Common Core Data (CCD) that NCES has collected for many years and that, in principle, includes information on all public school students in each state.

Estimates of high school graduation rates based on the Common Core Data have several limitations. One is that the database does not include students attending private schools – roughly 11 percent of U.S. high school students. A second is that, as a result of interstate migration patterns, the number of students entering ninth grade in a particular year may not be an unbiased estimate of the number of students who could graduate from the state's public high schools four years later. A third limitation is that the number of students enrolled in the ninth grade in a particular year may not be a good estimate of the number of students who *first* enrolled in grade nine in that year. The reason is that the number of students retained in the ninth grade has increased

markedly in recent years, in part because many students do not pass the core mathematics and English courses that many states and school districts have required for promotion. In response to this problem, NCES now publishes an "Averaged Freshman Graduation Rate" (AFGR) for each state and for the nation, which is calculated as the number of high school graduates in a particular year divided by the average number of students enrolled in grades 8, 9, and 10 five, four, and three years earlier. The Cumulative Promotion Index is yet another estimate of the high school graduation rate calculated from Common Core Data.[6]

2.3 Estimates from Longitudinal Surveys

A third method of estimating high school graduation rates is to make use of information from longitudinal studies sponsored by NCES and the U.S. Department of Labor. Strengths of this approach include transparency, and the ability to follow students who change schools and those who take more than four years to complete high school. One limitation of using information from the longitudinal surveys to estimate high school graduation rates is non-random sample attrition, with individuals who drop out of school particularly likely not to respond to follow-up surveys. This results in an overestimate of the high school graduation rate. Another limitation that also results in an upward bias in estimates of the high school graduation rate is that most longitudinal surveys sponsored by NCES (including High School and Beyond (HS&B) and the Education Longitudinal Study of 2002 (ELS:2002)) first sample adolescents when they are in grade 10. Using data from the National Education Longitudinal Study of 1988 (NELS88), which followed a large sample of students who were 8th graders in 1988 to a final survey in the year 2000, Joseph Altonji and Richard Mansfield (2011) report that one-third of the survey participants who dropped out of high school did so before the administration of the first follow-up survey in the middle of grade 10.

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[6] For a description of the formula used to calculate the Cumulative Promotion Index, see http://rtr.edtrustwest.org/popup.php?title=Cumulative percent20Promotion percent20Index percent20 percent28CPI percent29&url=cpi_gradrate.html.

Consequently, these school dropouts would not have been eligible for inclusion in longitudinal studies that begin with grade 10 students.

The relatively young age at which NELS88 participants were first surveyed makes this dataset particularly valuable for estimating high school graduation rates. For that reason, we present estimates based on data from this survey as well as from two longitudinal surveys supported by the U.S. Department of Labor, The National Longitudinal Survey of Youth 1979 (NLSY79) and The National Longitudinal Survey of Youth 1997 (NLSY97). A limitation of the NLSY surveys is that the number of participants who were first sampled when they were in their early teenage years is modest. As James J. Heckman and Paul F. LaFontaine have pointed out in the on-line appendix to their 2010 paper, the NELS88 dataset also has limitations as a source of evidence on high school graduation rates. First, students who were listed by school administrators as learning disabled or physically disabled were excluded from participation in the survey. The excluded students, who were disproportionately minority males, had higher school dropout rates than students included in the NELS88 sample. Second, institutionalized individuals, including those who were incarcerated, were excluded from the group to which the final year 2000 survey was administered. Given that the overwhelming majority of the incarcerated are high school dropouts, this exclusion creates an upward bias in estimates from NELS88 of the high school graduation rate of minority males.

One other source of longitudinal information on high school outcomes for individual students consists of administrative databases developed by states. As of May 2011, every state has the capacity, in principle, to track students attending public schools in the state and to compute the percentage of students entering ninth grade in a particular year who graduate 4, 5, and 6 years later.[7] In practice, however, many students leave a public school prior to graduation without

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[7] Source: Data Quality Campaign website: http://www.dataqualitycampaign.org/build/elements/8, accessed May 27, 2011.

completing an exit interview and do not enroll in another public school in the state. Consequently, it is not known whether these students left the state, enrolled in a private school, or dropped out. As a result, estimates of graduation rates based on these longitudinal data bases are very sensitive to treatment of these missing data.

2.4 The GED

A controversial question is whether to treat recipients of the General Educational Development (GED) credential as high school graduates. The GED was introduced in 1942 as a means of providing a secondary school credential to veterans who joined the military before graduating from high school. Veterans earned this credential by achieving passing scores on an eight-hour battery of tests in five subject areas. No prior course work is required to take the GED examinations and obtain the credential. In 1947 New York was the first state to allow school dropouts who were not veterans to earn the GED credential. In 1974 California became the last state to provide school dropouts with the GED option.[8]

Whether to count GED recipients as high school graduates is controversial for three related reasons. First, average labor market outcomes for GED recipients are much closer to those of dropouts without this credential than to those of conventional high school graduates (Stephen V. Cameron & Heckman, 1993; Murnane, John B. Willett, and John H. Tyler, 2000). Second, the number of GED recipients has increased rapidly in recent decades. In 2008, 467,994 Americans obtained a GED, a figure equal to 12 percent of all high school credentials issued that year.[9] Third, African-American and Hispanic youths are especially likely to earn the GED credential instead of a conventional high school diploma. For example, among African-Americans who were in the 8th grade in 1988, 15.1 percent of those who earned a secondary school leaving credential by the age of

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[8] James J. Heckman, John E. Humphries, and Nicholas S. Mader (2010).
[9] The figure on the number of Americans passing the GED examinations in 2008 comes from the 2008 GED Testing Program Statistical Report. The 12 percent figure is reported by Heckman, Humphries, and Mader (2010).

26 did so by obtaining the GED credential.[10] For Hispanic youth in this cohort, the figure is 11.6 percent. The comparable figure for non-Hispanic white (henceforth, white) youth is 8.4 percent. Consequently, estimates of trends in the high school graduation rates of African-American and Hispanic youth are especially sensitive to treatment of the GED credential.

The National Center for Education Statistics counts GED recipients as high school completers in its reports of the status completion rate. However, it does not include GED recipients as high school graduates in its reports of the Averaged Freshman Graduation Rate for public school students.[11] This is the primary (although not the only) reason that estimates of the former figure (89.0 percent for 18-24 year-olds in October 2007) are considerably higher than estimates of the latter figure (73.2 percent for the 2005-06 school year).[12]

Given that average labor market outcomes for GED recipients are closer to those of high school dropouts lacking this credential than to conventional high school graduates, I adopt the NCES convention of defining the *high school graduation rate* as the percentage of individuals in a particular group that completed four years of high school and earned a conventional diploma. I also distinguish GED recipients from "uncredentialed" high school dropouts.

3. *Patterns in High School Graduation Rates*

In this section, I describe five striking patterns in high school graduation rates over the period from 1970 to 2009. I do this using information from two types of sources. The first consists of

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[10] These estimates are based on figures taken from Table 1 on page 14 of the 2002 report by Stephen J. Ingels, Phillip Kaufman, and Jeffrey A. Owings, which is based on data from the National Education Longitudinal Study of 1988. While these estimates could be biased as a result of limitations of the NELS88 data set described above, estimates based on the NLSY97 data set are very similar: 14.9 percent of blacks who were in their late 20s in 2008 had obtained a GED. The comparable figures for Hispanics and non-Hispanic whites are 10.2 percent and 9.3 percent respectively.

[11] A qualification to this statement is that in their annual reports to NCES of the number of high school graduates, a few states, including New Jersey, count individuals who obtain a GED through in-school programs as high school graduates, even though they had not satisfied conventional credit hour requirements.

[12] These figures are taken from (Cataldi, Laird, and KewalRamani 2009), Table 11 and Table 12 respectively. Another factor contributing to the difference between the status completion rate and the Averaged Freshman Graduation Rate is that estimation of the former figure, but not the latter figure, includes students who attended private high schools.

published reports of graduation rates. Especially valuable in this regard is Heckman and LaFontaine's 2010 paper showing that many apparent inconsistencies in the evidence on U.S. high school graduation rates can be reconciled by adoption of a uniform methodology. These authors show that differences in estimates stem primarily from differences across studies in the populations from which survey samples are drawn and from differences in the definition of a high school graduate. I supplement the evidence from published studies with analyses of data from the NLSY79, NLSY97, and 2009 American Community Survey datasets and from a dataset providing longitudinal information on school outcomes for public school students in Massachusetts.

3.1 *Stagnation of the national high school graduation rate*

As illustrated in Figure 1, after 70 years of rapid growth, the high school graduation peaked in 1970 at a level of 80.8 percent, as estimated by Heckman and LaFontaine (2010, Table 3, p. 254), using adjusted Census data.[13] These authors estimate that the high school graduation in the year 2000 was 77.1 percent. Sixty-five percent of the difference between the estimate for 1970 and that for 2000 can be explained by compositional effects. As described below, high school graduation rates are lower for black and Hispanic youths than for non-Hispanic white youths, and the percentage of 20-24 year-olds who were black or Hispanic doubled between 1970 (14.6 percent) and 2000 (30.0 percent).[14] As shown in Figure 1, estimates of high school graduation rates for 25-28 year-old Americans estimated from the NLSY79 and NLSY97 datasets, 78.6 percent in 1991 and 79.7 percent in 2008, are quite consistent with the Census-based estimates.

[Figure 1 about here]

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[13] Goldin and Katz (2008) report a peak value of 76.9 percent in 1970.
[14] These percentages, calculated from tables in the supplement to Heckman & LaFontaine (2010), include recent immigrants who did not attend school in the U.S. The figures excluding these recent immigrants are 13.8 percent in 1970 and 24.9 percent in 2000.

Figure 1 also illustrates that the Averaged Freshman Graduation Rate of public high school students for the years 1990-91 to 2007-08 has also been fairly stable at a level two to five percentage points below the Census-based and NLSY-based estimates of the high school graduation rate. More than half of the difference can be explained by the exclusion of students attending non-public high schools from the population used to estimate the AFGR. Another factor contributing to the difference is that recent immigrants who attended U.S. public high schools are included in the calculation of the AFGR, but are not included in the Census-based estimates reported by Heckman and LaFontaine (2010). This matters because, as described below, recent immigrants have relatively low high school graduation rates.

3.2 Racial/ethnic and socio-economic gaps in high school graduates rates

Analyses based on all of the major data sets show that the high school graduation rates of black youths and Hispanic youths are substantially below that of white non-Hispanic (henceforth, white) youths. For example, Heckman and LaFontaine (2010, Table 3) estimate that the black-white gap in high school graduation rates in the year 2000 was 18 percentage points and the Hispanic- white gap was almost 20 points. Their estimates also indicate a modest closing of the gaps, primarily because their estimate of the high school graduation rate for whites was almost five points lower in the year 2000 than in 1970. The magnitude of these gaps calculated from estimates of the Averaged Freshman Graduation Rate in the 2007-08 school year are quite similar: a black-white gap of 19.5 points and a Hispanic-white gap of 17.5 points.

In contrast, the sizes of the racial/ethnic gaps in high school graduation rates estimated from longitudinal datasets are substantially smaller, primarily because the estimates of the high school graduation rates of minority youth for recent years are about 10 points higher than the estimates based on Census data and Common Core data. For example, the estimates from the NLSY97 of the

high school graduation rates of white, black, and Hispanic 25-28 year-olds in 2008 are 82.8 percent, 71.2 percent, and 73.7 percent respectively. It seems likely that the estimates of high school graduation rates of black youths and Hispanic youths from longitudinal datasets are too high for reasons explained in Section 2.

While receiving less attention than race-based gaps in high school graduation rates, youths from low socio-economic status families, as measured by the incomes and educational attainments of parents, have considerably lower high school graduation rates than youths from higher socio-economic status families. For example, among students who were in the eighth grade in 1988, the high school graduation rate of those whose families were in the lowest socio-economic quartile was 64 percent, 31 percent lower than that of students whose families were in the top quartile.[15] One reason this pattern is important is that is contributes to the relatively low rate of intergenerational socio-economic mobility in the U.S. compared to those of most European countries.[16]

To illustrate the difficulty in pinning down high school graduation rates, especially for members of minority groups, I display in Table 1 estimates of high school graduation outcomes for the cohort of students who were first-time 9th graders in Massachusetts public schools in the 2003-04 school year.[17] Column 1 lists the percentage of students in this cohort who were known to have graduated from a Massachusetts public high school within six years. Column 2 lists the percentage of students known to have dropped out of high school prior to graduation, and includes those who subsequently earned the GED credential. Column 3 lists the percentage of students who were still enrolled in a Massachusetts public high school six years after their cohort entered grade 9. Column

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[15] See Table 1, p. 14 of the report by Steven J. Ingels, Thomas R. Curtin, Philip Kaufman, Martha N. Alt, and Xianglei Chen (2002) describing the educational outcomes of participants in the NELS88 longitudinal survey.{{718 Ingels, Steven .J. 2002/h}}

[16] See Anders Bjorklund and Markus Jantti (2009), Figure 20.1. {{527 Bjorklund, Anders 2009/h}}

[17] The information displayed in Table 2 is based on my analyses of a proprietary data base provided by the Massachusetts Department of Elementary and Secondary Education. This is the same data base that the Department uses to generate the information on MA high school graduation rates required under No Child Left Behind.

4 lists the percentage of students who were recorded in the state data base as having transferring out of the state public school system, either to another state or country or to a private school.[18] Column 5 lists the percentage of students who disappeared from the system but did so without an exit code indicating what happened to them. Column 6 lists the percentage of the initial 9th grade cohort for whom graduation status after 6 years is known.[19] Column 7 lists the percentage of graduates within 6 years among students with known outcomes. Column 8 lists the percentage of "on-time graduates" among students with known outcomes.

Notice that the percentages of Hispanic students and black students falling into the Transfer category (14.7 and 11.2 respectively) are much higher than the percentage of white students in this category (4.7). A consequence is that estimates of the sizes of black-white and Hispanic-white gaps in graduation rates are quite sensitive to the treatment of students in the Transfer category. If these students are included in the population used to estimate high school graduation rates (and consequently are implicitly assumed to be non-graduates, as in Column 1), the black-white and Hispanic-white gaps in six-year graduation rates are 19.9 and 29.0 percentage points respectively. If the students in the Transfer category are excluded from population used to estimate sic-year high school graduation rates, as in Column 7, the black-white and Hispanic gaps in graduation rates are considerably smaller (15.4 and 23.8 percentage points respectively).

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[18] Beginning with the 2006-07 school year, the Massachusetts Department of Elementary and Secondary Education has recorded a student who leaves one public school as transferring to another (as opposed to dropping out) only if the receiving school reports that the student had enrolled. This procedure reduces the incentive for schools to report dropouts as transfers. One reason reported dropout rates are lower in some states is that they do not follow this procedure. The Transfer category also includes the very small number of students who died within six years after entering grade 9.

[19] Status is not known for students in the Transfer category and the Missing category. The numbers in columns 1-5 do not add up to 100 for any row because they exclude a relatively small percentage of students with exit codes that do not fit into the listed categories. These include students who reached the maximum age without graduating or receiving a certificate of attainment, those not enrolled but receiving special education services, those receiving a certificate of attainment (but not a diploma), and those who were permanently expelled. Slightly more than 2% of black students and Hispanic students fall into one of these "other" categories. The comparable figure for white students is 0.6 percent.

Another variable influencing the sizes of race/ethnicity gaps in high school graduation rates is the number of years allowed for students to complete high school. The reason is that a larger percentage of minority youths than white youths take more than four years to complete high school. A comparison of the entries in Column 7 and Column 8 of Table 1 illustrates this pattern. More than 10 percent of minority youths take five or six years to graduate from high school. The comparable figure for white youths is 4.3 percent. Consequently, racial/ethnic gaps in on-time high school graduation rates for Massachusetts public school students are more than six percentage points larger than racial/ethnic gaps in six-year graduation rates.[20]

[Table 1 about here]

One other factor that influences estimates of the magnitude of the Hispanic-white gap in high school graduation rates is the treatment of recent immigrants. Among 20-24 year-olds in the U.S. in 2009, 7.5 percent were recent immigrants (defined as arriving in the U.S. between 2000 and 2009). Of these, 58.6 percent were Hispanic. The high school graduation rate in 2009 among 20-24 year olds Hispanics who were recent immigrants is less than 50 percent, considerably lower than that of 20-24 year-old Hispanics who were not recent immigrants. In contrast, the high school graduation rate of 20-24-year old recent white immigrants is 90.1 percent, a figure higher than that for whites in that age group who were not recent immigrants.[21] A consequence of this pattern is that estimates of the Hispanic-white gap in high school graduation rate are much higher if recent immigrants are included in the relevant population than if they are not. A corollary of this pattern is

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[20] The "on-time" high school graduation rate reported by the MA Department of Elementary and Secondary Education (ESE) for students in the 2007 cohort is 80.9 percent. The primary reason this figure differs slightly from that reported in Column 8 of Table 1 (79.6 percent) is a difference in the definition of the cohort. In particular, the Massachusetts Department of ESE includes in the cohort scheduled to graduate in 2007 individuals who enter Massachusetts public high schools as 10th graders during the 2004-05 school year, as 11th graders during the 2005-06 school year, or as 12th graders in the 2006-07 school year. These late entrants are excluded from our definition of the relevant cohort.
[21] Author's tabulations from the 2009 American Community Survey.

that high school graduation rates tend to be especially low in schools and school districts that serve large numbers of recent Hispanic immigrants.[22]

3.3 A growing gender gap favoring females

The high school graduation rate is higher for females than for males in each of the major racial/ethnic groups, with the gender gap especially large among African-Americans (11.3 percentage points in 2008).[23] As Goldin and Katz (2008) point out, this is not a new pattern. Throughout most of the 20th century the high school graduation rate of girls was higher than that of boys. In 1920 the gap was seven percentage points; in 1950, it was five points. Over the next 20 years the gap closed, and in 1970 the gap favoring females was one percentage point. However, the gender gap in high school graduation rates has grown since 1970 for all major racial/ethnic groups. Among whites, the growth is the result of a decline in the graduate rate for males and little change in the rate for females. In contrast, the increase in the gender gap for blacks and Hispanics stems from increases in graduation rates for females, with little change in the rate for males.[24] As Martha Bailey and Susan Dynarski (2011) point out, gender gaps in educational attainments are more difficult to explain using conventional economic models than gaps based on socio-economic status or race because males and females grow up in the same families and attend the same schools.{{821 Bailey, Martha J. 2011/h}}

3.4 C*oncentration of the dropout problem in a minority of high schools*

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[22] The high school graduation rates cited in this paragraph are author's tabulations from the 2009 American Community Survey. The rates are overestimates of the actual rates because the survey includes as high school graduates dropouts who obtain a GED and subsequently enroll in a post-secondary education or training institution.
[23] This 11.1 percentage point gap, which pertains to 25-28 year-olds in 2008, is estimated by the author using the NLSY97 dataset. As shown in Column 7 of Table 1, the comparable estimate of the gender gap in the six-year graduation rate of African-American students attending Massachusetts public high schools is strikingly similar (11.1 percentage points). Heckman & Lafontaine (2010, Table 3) provide a very similar figure (10.5 percentage points) for 20-24 year-olds in the year 2000, based on adjusted Census data.
[24] The trends in the gaps in high school graduation rates by gender within racial/ethnic groups are taken from Heckman & LaFontaine (2010, Table 3, page 254).

In 2008, half of all high school dropouts in the United States attended one of the 1746 high schools that Robert Balfanz and his colleagues (2010) have labeled "dropout factories." Their definition of this term is a high school in which the number of students enrolled in 12th grade in a particular year is less than 60 percent of the number enrolled as 9th graders three years earlier. The "dropout factories," which constitute 14 percent of the nation's 12,074 public high schools enrolling at least 300 students, overwhelmingly enroll black and Hispanic students from low-income families; the majority are located in cities, but almost one-third are in rural areas and towns, primarily in the south.[25] {{766 Balfanz, Robert 2010/h}}

3.5 Variation across states

The stagnation over the last four decades in the high school graduation rate of students attending public schools conceals significant variation among states in both levels and trends. For example, the averaged freshman graduation rate (AFGR) in 2007-2008 ranged from a low of 51.3 percent in Nevada to a high of 89.6 percent in Wisconsin. In the five years between the 2002-03 and the 2007-08 school years, the AFGR rose by at least three percentage points in 13 states, and fell by at least three points in five states.

Part of the variation among states in graduation rates and trends reflects variation in the racial/ethnic composition of high school students. For example, while a low AFGR for African-American youth in 2007-08 (60.5 percent) had a marked impact on the overall graduation rate markedly in Mississippi, a state in which almost half of public students are black, this is not the case in Wisconsin, where the AFGR for black students is also low (63.1 percent), but fewer than 10 percent of the state's students are black. Nonetheless, much of the variation among states in high school graduation rates and trends does not reflect variation in the racial/ethnic composition of

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[25] I thank Robert Balfanz for providing the number of high schools with enrollment of at least 300 students in 2008 and also information on the location of "dropout factories."

students. For example, the 2007-08 high school graduation rate for black youth was 52.6 percent in Indiana and 73.0 percent in Maryland.[26]

4. *Models of the decision to persist in high school to graduation*

Researchers from several social science disciplines have studied teenagers' decisions about whether to persist in high school to graduation. Sociologists have tended to emphasize the roles of peer groups and school cultures. Many psychologists have examined teenagers' decisions from a developmental perspective, recently enriched by evidence from neuroscience on brain development and the attraction of risk-taking during the early teenage years (c.f. Robert Steinberg, 2010). {{751 Steinberg, Laurence 2010/h}} Ethnographers from both of these disciplines have pointed out that for many youth, dropping out is a process rather than an explicit decision. They have pointed out that the process starts with irregular attendance, followed by failed courses, and eventually to the realization that the obstacles to graduation seem overwhelming. In contrast to these perspectives, economists have typically focused on factors that affect the benefits and costs teenagers face in deciding about whether to remain in school.[27]

4.1 A basic high-school focused rational investment framework

Almost all economic models posit that high school students are rational agents whose decisions about whether to stay in school for another year depend on a comparison of the expected benefits and costs. Critical variables in these models include:

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[26] All of the estimates of high school graduation rates (AFGRs) reported in this subsection were taken from Table 2 and Table 3 of the 2010 report by Robert Stillwell. The estimated AFGR for black students in Arizona in 2007-08 (76.9 percent) was even higher than the comparable rate in Maryland. However, the extraordinarily high year-to-year variation in the estimated overall AFGR for Arizona raises questions about the accuracy of the estimated AFGR for that state.

[27] See, for example, Karl I. Alexander, Doris R. Entwistle, and Carrie S. Horsey (1997), Cecilia S. Lyche (2010), and Russell Rumberger and Sun Ah Lim (2008). {{816 Lyche, Cecilia S. 2010/h}}{{818 Rumberger, Russell 2008/h}}

i.   the predicted payoff (in terms of consumption or utility, which depends on income) over a lifetime from completing another year of schooling,

ii.   the opportunity cost of continuing in school for another year,

iii. the rate of time discount (in the absence of perfect capital markets), and

iv.   the non-monitory cost of completing another year of schooling.

Papers adopting this analytical framework, which dates back to the work of Jacob Mincer (1958), include those by Philip Oreopoulos (2007) and James Heckman, Lance J. Lochner, and Petra Todd (2008). {{747 Mincer, Jacob 1958/h}}

4.2 *Extensions of the rational investment framework*

Several economists have extended the basic analytical framework in important ways. For example, Kevin Lang and Paul Ruud (1986) posit that the student's decision about whether to stay in school for another year depends on his assessment of whether doing so will result in an increase in his number of years of completed schooling. One reason it may not is that in many school systems failure to obtain passing grades in core subjects such as English and mathematics results in retention in grade. As we discuss in section 5, this extension is important in reconciling the evidence on school dropout rates with evidence from compulsory schooling studies. {{726 Lang, Kevin 1986/h}}

Another important extension is to make both the benefits and costs of completing another year of schooling depend on an individual's cognitive and socio-emotional skills. Flavio Cunha, James Heckman and Susanne Schennach (2010) do this in the context of multi-stage production functions for children's skills. In their model, skills are determined by parental environments and investments at different stages of childhood. They show that investments in the early years of childhood are

especially important to the development of skills as a result of the biology of brain development.[28]

Children in whom early investments are not made reach high school lacking the skills to do high

school work and make regular progress toward graduation. For these children, the probability that

an additional year in school will result in an increase in the number of years of completed schooling

is low, explaining why such a high percentage of students who enter high school with weak skills

drop out before graduation. One insight from the Cunha, Heckman, and Schennach model is that to

understand why a great many students, especially black and Latino students from low-income

families, do not graduate from high school, it is important to understand the factors that limit the

investments parents can make in these children during the first years of their lives. (These authors

focus on the significance of three types of liquidity constraints.) A second insight is that social

interventions made during children's early years that supplement the investments parents make in

their children will be more efficient than interventions made when children are older.

Yet another extension consists of the insight that the rational investment framework for

understanding the schooling decisions of teenagers is consistent with a market signaling model as

well as with the more conventional human capital model. For example, Julian R. Betts (1998)

shows that, in the context of his market signaling model, individuals who would have dropped out

of school before graduation benefit from a policy intervention that raises the standard for high

school graduation.[29] Building on this work, Kelly Bedard (2001) has shown that in a human capital

model, expansion of access to post-secondary education would not decrease the incentive for

marginal high school students to drop out of school. In contrast, in her market signaling model it

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[28] For an accessible explanation of the brain development evidence, see Charles A. Nelson and Margaret A. Sheridan (2011).

[29] As Kevin Lang (2007) explains, the critical question in understanding the consequences of an increase in high school graduation standards concerns the responses of students who, in the absence of an increase in effort, would have graduated under the low standards regime, but not under the high standards regime. Betts and Robert M. Costrell (2001) describe a model that contains elements of both market signaling and human capital formation. They explain that the policy challenge is to design policies that create incentives for marginal students to increase their effort levels.

would because expansion of post-secondary education dilutes the average quality of the pool of high school graduates who do not go to college. In turn, this reduces the earnings differential between high school graduates and dropouts. She presents evidence supporting the relevance of the signaling model for explaining the decisions of some teenagers to drop out of high school. {{782 Betts,Julian R. 1998/h}}{{733 Bedard,Kelly 2001/h}}

4.3 A Challenge to the rational investment framework

Notice that in the rational investment framework described above, the rate of time preference plays an important role under the realistic assumption that teenagers face credit constraints. Conventional economic models of investment decisions assume that the rate of time preference is constant. However, hyperbolic discounting, defined as individuals having a rate of time preference that declines over time, is sometimes suggested as an explanation for the apparently irrational decision of teenagers to drop out of high school and later to regret having done so. On closer examination, however, reliance on hyperbolic discounting to explain the behavior of teenagers, while consistent with recent evidence from neuroscience on the behavior of teenagers (Steinberg, 2010), really means that the rational investment framework does not work well as the basis for explaining the schooling decisions of many teenagers. This is an argument that Shane Frederick, George Loewenstein, and Ted O'Donoghue make in a paper published in this journal in 2002. If economists abandon the rational investment framework as a basis for analyzing the schooling decisions of teenagers, do they have an alternative?

Drawing heavily on insights from sociology and psychology, George Akerlof and Rachel Kranton (2000, 2002) present one alternative, which can be seen as a focus on particular non-monitory factors that influence the cost of completing another year of schooling. {{618 Akerlof, George A 2000/h;617 Akerlof, George A 2002/h}} In their model, teenagers derive utility from

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their identity at the time, that is, by how they are perceived by their social group. This, in turn, depends on the ideals of the social group and on the extent to which an individual's attributes and behaviors fit the ideals of the group. For individuals whose social group is the "nerds," devoting time and effort to acquiring the academic skills is valued by peers. For members of this group, the disutility of acquiring the academic skills needed to progress toward graduation is low. For members of the "jocks" social group, athletic prowess is the valued attribute, and the disutility from devoting time and effort to academic skill acquisition is higher. Finally, there is the group of "burnouts," for whom opposition to their particular school is valued. For members of this group, the disutility from devoting time and effort to acquiring academic skills is extremely high. Consequently, this is the group with the lowest probability that an additional year spent in school results in an increase in the number of years of completed schooling.

In Akerlof and Kranton's model, schools play an active role in determining the percentage of students who are "burnouts," and consequently are highly unlikely to devote considerable effort to the acquisition of academic skills. They do this by conveying values, either explicitly or implicitly, that students embrace, tolerate, or actively oppose. Schools with quite homogeneous student populations find it relatively easy to convey a set of values that most students accept, and thus the percentage of burnouts is low. However, with a diverse student population, any single set of values will be opposed by a significant number of students, and this burn-out group is particularly likely to either drop out of school or devote very little effort to fulfilling graduation requirements. As the authors explain, a common response to this problem has been the creation of "shopping mall" high schools, in which there is no driving set of core values. An advantage of the shopping mall school is that almost all students can find a way to identify with some piece of it. A disadvantage is that the lack of a driving mission means that for all students except for those in the "nerd" group, there

is little pressure to excel academically. For most students, this was not a major obstacle to graduation when requirements for achieving the credential were low. However, it has posed more of an obstacle in recent decades as states have responded to the weak skills of many high school graduates by increasing course completion requirements and by introducing exit examinations in core subjects that students must pass.

The Akerlof and Kranton model has implications for the effectiveness of particular uses of resources devoted to improving schooling. One is that using resources to develop a clear sense of mission that students endorse will improve academic achievement and the graduation rate. A second is that that traditional uses of resources that do not address the challenge of building a community will not make a difference. As I discuss in section 6, some of the recent evidence on the effectiveness of alternative strategies to improve high schools is consistent with the predictions of the Akerlof and Kranton model.

A second alternative to conventional economic rational choice models that is consistent with the Akerlof-Kranton model but has a somewhat different emphasis is the behavioral economics view of poverty. The relevance here is that teenagers from low-income families are vastly overrepresented among school dropouts. Marianne Bertrand, Sendhil Mullainathan, and Eldar Shafir (2004) argue that the poor are no more or less rational than more affluent individuals. However, the constraints imposed by poverty make mistakes like irregular school attendance more costly for low-income teenagers than for those whose parents have the resources and knowledge to reduce the consequences of poor decisions. This perspective leads the authors to focus attention on situational factors that may encourage good decisions. Examples might include rapid responses by school staff to student absences and the creation of small high schools of choice that allow teenagers to choose a theme-based school within which all students are expected to do the same

work and be part of a focused community. In Section 6 I describe evidence supporting the value of this perspective.

5. Explaining the Patterns

There is a vast literature describing the backgrounds of students who tend to drop out of high school. Correlated characteristics include low family income, low educational level of parents, living in a single-parent household, and minority group status.[30] There are also many papers describing behaviors and attributes of students that predict a relatively high probability of dropping out of high school. They include poor attendance and low test scores in middle school, and having repeated a grade.[31] There is also a smaller, but still substantial literature describing high schools with relatively high dropout rates.[32] Correlated predictors include high rates of teacher turnover and high rates of student suspensions. The descriptive studies do not provide causal evidence to explain the stylized facts described in section 3.

The number of studies with designs that support causal inferences is vastly smaller than the number of descriptive studies. It is these causal studies that provide the focus for this section, with each subsection focusing on one of the four factors that affect human capital investment decisions in economic models.

5.1 *The predicted payoff over a lifetime from completing another year of schooling*

As illustrated in the left panel of Figure 2, the average real wages of male school dropouts and male high school graduates followed similar paths since 1979, declining by more than 15 percent over the period from 1979 to 1993, and recovering about half of the loss over the subsequent 16

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[30] See, for example, Russell Rumberger and Sun Ah Lim (2008).
[31] See, for example, the chapters in the volume edited by Gary Orfield (2006).
[32] See, for example, Balfanz and colleagues (2010).

years.[33] During the same three decades, the average real wage of four-year male college graduates

increased by 14 percent. Inspection of the data shows that the ratio of the average real wage of

dropouts relative to that of terminal high school graduates was at its peak for males during this

period in 1980 (.80) and ranged between .75 and .79 in subsequent years. Thus, the economic

payoff to a high school diploma seems to have risen for males in recent decades, even without

taking into account the rising option value of college enrollment that was available to most high

school graduates, but typically not to school dropouts.[34] [35] As many authors have documented, the

increase in education-related wage differentials, especially during the 1980s, stems from changes in

the economy that increased the demand for particular skills during a period in which the supply of

workers possessing the relevant skills grew relatively slowly.[36]

Although the real wage trends for females are slightly different from those for males, the

trend in the payoff to high school graduation is similar, if more pronounced. As shown in the right

panel of Figure 2, the average real wage of female terminal high school graduates was remarkably

constant over the period from 1979 to 1997 and then increased by approximately 10 percent over

the subsequent 12 years. The average real wage for female dropouts declined by 10 percent over

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[33] The figures in the panels of Figure 2 are based on the author's tabulations of data from the Current Population Survey Outgoing Rotation Groups 1979-2009. The sample includes workers aged 16-64 who were in engaged in full-time full-year work, defined as at least 35 hours per week for at least 40 weeks in the year. The data are first aggregated into sex-age-education-race/ethnicity cells (two sexes, four age groups, five education groups and three race/ethnicity groups) using CPS sample weights. In the classification of race/ethnicity, note that Hispanic origin takes precedence over the racial classification where there is a conflict. The composition-adjusted mean hourly wage for each group represented in the figures is the weighted average of the relevant cells, using a fixed set of weights equivalent to the group's average employment share over the period 1979-2009.

[34] The composition-adjusted wage patterns described in this section are based on the author's tabulations of data from the Current Population Survey Outgoing Rotation Groups 1979-2009. In these tabulations, it was necessary to treat GED recipients as high school graduates. Since GED recipients earn less, on average, than demographically similar conventional high school graduates, the patterns described in the text and illustrated in the panels of Figure 2 are underestimates of the average wage differentials between school dropouts and conventional high school graduates.

[35] As documented in Patterson, Zhang, Song, and Guison-Dowdy (2010), about 40 percent of school dropouts who earned the GED credential in 2003 had enrolled in post-secondary education or training institutions by 2009. The vast majority had enrolled in programs lasting no longer than two years. By 2009 less than 12 percent of those GED-holders who had enrolled in a post-secondary education or training program had completed it.

[36] See, for example, Claudia Goldin and Lawrence Katz (2008) and the papers by David Autor, Frank Levy, and Richard Murnane (2003) and Thomas Lemieux (2008).

the years 1979 to 1995, and then recovered over the next 14 years. The net result is that the ratio of the average real wage of female dropouts to that of terminal high school graduates fell by six percentage points (from .83 to .76) over the 30-year period from 1979 to 2009.

[Figure 2 about here]

A consequence of these wage-by-education trends is that, *ceteris paribus*, economic models predict that the high school graduation rate should have increased over the last three decades. Moreover, the pattern of a declining average real wage of dropouts relative to that of terminal high school graduates is present not only for white males and females, but also for African-American males and females and for Hispanic females. This pattern is illustrated in the panels of Figure 3.[37] In a formal analysis, James Heckman, Lance Lochner, and Petra Todd (2008) reach the same conclusion, showing that the internal rate of return to high school graduation has risen in recent decades for both white youth and black youth.[38]

[Figure 3 about here]

So why hasn't the high school graduation rate increased? One possible explanation is that wage trends based on data from the Current Population Survey do not provide the relevant expected real wages for adolescents on the margin of dropping out of school. In particular, teenagers who drop out may correctly perceive that, as a result of their low cognitive skill levels or unproductive behavioral characteristics, they are unlikely to earn much more as a high school graduate than they would as a dropout. The decline in the employment-to-population (EPOP) ratios for high school dropouts aged 16 to 39 displayed in Figure 4 is consistent with this explanation. Notice that over the period 1980-2007, the EPOP ratio declined by 10 percentage points (from 0.60 to 0.50) for male

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[37] The one exception is Hispanic males for whom the relative wage of dropouts increased over the last 15 years after dropping for the previous 15.
[38] These estimates assume a constant discount rate and no psychic costs of school attendance.

dropouts and by 3 percentage points (from 0.37 to 0.34) for female dropouts.[39] A result of this

trend is that the average real wage of high school dropouts relative to that of terminal high school

graduates may be an increasingly biased indicator of the economic payoff to a high school diploma

for teenagers with weak cognitive skills.[40]

[Figure 4 about here]

Zvi Eckstein and Kenneth Wolpin (1999) present evidence from a structural model fitted

with observational data that supports this position. {{317 Eckstein, Zvi 1999/h}} They show that,

among white males who were in ninth grade in the early 1980s, those who failed to graduate from

high school had lower academic skills and lower motivation (at least for school work) than those

who did graduate. An explanation for the stagnation of the high school graduation rate consistent

with the Eckstein and Wolpin evidence is that by the early 1970s the four out of five students who

entered high school with the skills and behavioral traits to benefit from a high school diploma were

receiving one. The one in five teenagers who entered high school with very weak academic skills

and/or behavioral tendencies not attractive to employers would not benefit much from a high school

diploma, at least given the current "shopping mall" structure of most American public high schools.

Evidence that potentially challenges the Eckstein and Wolpin explanation comes from studies

showing that compulsory school laws requiring adolescents to stay in school longer than they

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[39] Figure 4 is based on CPS Outgoing Rotation Groups 1979-2009. The population sample includes all persons aged 16-39, excluding those in the military. The employment sample includes all persons aged 16-39 who reported having worked last year, excluding those in the military. Each year depicted in the figure represents a three-year moving average. In describing changes in the EPOP ratio, I used 2007 as the end-point rather than 2008 to minimize the impact of the severe recession that began at the end of 2007.

[40] As Derek Neal (2004) and Casey B. Mulligan and Yona Rubinstein (2008) have documented, trends in the labor force participation rates for females with particular educational attainments are somewhat different from those pertaining to men. They also differ by race and have changed over time. However, as with males, a consequence of trends in EPOP ratios for females is that changes over time in education-related differences in the average real wages of those who work in the formal labor market may not provide unbiased estimates of the economic payoff to high school graduation for women with weak academic skills. {{794 Neal,Derek 2004/h;770 Mulligan, Casey B 2008/h}}{{794 Neal,Derek 2004/h}}{{770 Mulligan, Casey B 2008/h}}

desired resulted in substantial increases in their lifetime earnings. For example, Joshua Angrist and Alan Krueger (1991), Daron Acemoglu and Angrist (2001), and Philip Oreopoulos (2007) found that that the labor-market payoff to adolescents in the U.S. compelled by schooling laws to obtain an additional year of schooling was approximately 10 percent. Of particular relevance, Oreopoulos (2009) took advantage of relatively recent changes in compulsory school laws in states within the U.S. to estimate the causal impact of additional schooling on subsequent labor market outcomes of adolescents constrained to remain in school longer than they desired. He found that an additional year of completed schooling lowered the probability of subsequent unemployment by 2.2 percentage points and increased weekly earnings by 10.8 percent for white youth. Thus, the evidence indicates not only that additional schooling paid off historically for adolescents on the margin of dropping out of school, but also that this has been the case in recent decades as well.[41]

One way to reconcile the Eckstein and Wolpin view with the evidence from the compulsory schooling studies is to recognize that the results of the latter studies are estimates of local average treatment effects that pertain to individuals who *completed* more years of schooling as a result of the laws. The estimates do not provide information on the benefits of remaining in school for students who do not increase their years of completed schooling even though the law compels them to remain in school for an additional year. This is the case for students who fail to pass the core courses required to progress to the next grade level. Oreopoulos (2009) documents that this pattern is especially prevalent for black youth. While laws compelling 16 year-olds to remain in school for an additional year increased the average number of years of schooling white teenagers in the U.S. complete by 0.16 years, it had no impact on the number of years of schooling black teenagers

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[41] The compulsory schooling studies based on data from the middle decades of the 20th century do not examine whether the economic returns to compulsory schooling laws differs by racial/ethnic group.

complete.[42] {{319 Oreopoulos, Philip 2009/h;323 Oreopoulos,Philip 2007/h;405 Angrist, Joshua D 1991/h;825 Acemoglu, Daron 2001/h}}

      I illustrate these patterns with data from Massachusetts. As indicated in Table 2, 21 percent of African-American students and 24 percent of Hispanic students who first entered 9th grade in a Massachusetts public high school in the 2003-4 school year repeated the grade, compared to 6 percent of white 9th graders.[43] As indicated in rows 5 through 10 of column 1 of Table 2, the percentage of repeaters in each racial/ethnic group is higher for males than for females, with the differences by gender especially large for black and Hispanic students.

      The patterns displayed in Table 2 illustrate that for substantial fractions of students who are black, Hispanic, or come from low-income urban families, enrolling in high school for an additional year does not result in an additional year of completed schooling. The results of the compulsory schooling studies do not pertain to these students. As indicated in column 2 of Table 2, only 35 percent of ninth grade repeaters in Massachusetts graduated from high school within six years.[44] Thus, for students compelled to repeat grade 9, the decision to drop out of high school may reflect a realization that further attendance is unlikely to result in a high school diploma. This pattern is consistent with the Eckstein and Wolpin view and is not challenged by the evidence from the compulsory schooling studies. As discussed in section 6, this view is also supported by evidence that early childhood interventions which improve participants' skill levels and their ability to function productively in school increase the probability that economically disadvantaged children graduate from high school.

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[42] Oreopoulos (2009), Table 3A.1, page 108.

[43] The definition of "repeated grade 9" is that the student was registered in grade 9 in the fall term after the student was initially in grade 9. Some of these students were able to move to grade 10 status by the spring term.

[44] This estimate of the six-year graduation rate is based on the population of 9th grade repeaters for whom graduation outcomes are known. An implicit assumption is that the six-year graduation rate among those grade 9 repeaters who leave the Massachusetts public school system prior to graduation (transfers) is also 35 percent.

[Table 2 about here]

As illustrated in Figure 5, racial/ethnic gaps in the probability of graduating from high

school can to a large extent be accounted for by differences across groups in family socio-economic

status, grade 8 school attendance, and grade 8 scores on a state-wide mathematics test. For example,

consider the 18.2 percentage point gap between the six-year high school graduation rates of black

students and white males who entered 9th grade in a Massachusetts public school in the 2003-04

school year. Controlling for low family-income status as indicated by eligibility for a free or

reduced price lunch reduces the magnitude of the gap in graduation rates to 12.8 percentage points.

Adding a control for grade 8 attendance reduces the gap to 11.8 points. Finally, adding a control

for the grade 8 mathematics score reduces the gap to 6.7 percentage points. Thus, the three controls

variables account for 63 percent of the gap in graduation rates between black males and white

males. Among females, the three control variables play an even larger role, accounting for 92% of

the black-white gap in six-year graduation rates. The same three control variables account for 55

percent of the 23.1 percentage point gap between the six-year graduation rates of Hispanic males

and white males, and 66 percent of the 19.3 percentage point gap between the graduation rates of

Hispanic females and white females.

[Figure 5 about here]

The pattern illustrated in Figure 5 is consistent with the argument made by Derek Neal and

William Johnson (1996) that pre-labor market factors, such as differences in school quality and

early childhood investments, are responsible for race-based gaps in average educational attainments

and labor market outcomes. An extension of this argument is that changes in the structure of the

U.S. economy in recent decades have increased the disadvantage black and Hispanic teenagers face

when entering the labor market with weak skills. However, there is also evidence that statistical

discrimination in labor markets results in less attractive labor market opportunities for black workers than for equally skilled white workers.[45] By reducing incentives to acquire strong academic skills, labor market discrimination against non-white workers may play a role in explaining racial/ethnic gaps in high school graduation rates. However, Kevin Lang and Michael Manove (2011) present evidence that statistical discrimination in labor markets leads blacks to obtain more education than whites with comparable cognitive skills.

Recent papers provide a different, but related explanation for the large gender-based gap in high school graduation rates among blacks and Hispanics. Stephane Mechoulan (2011) and Kerwin Charles and Ming Luoh (2010) document how changes in judicial policies, especially related to treatment of drug offenses, have resulted in a large increase in recent decades in the incarceration rate of minority males. These authors then present evidence on the responses of minority women, one of which is to increase educational attainments. {{789 Mechoulan,Stephane 2011/h;790 Charles, Kerwin Kofi 2010/h}}

*5.2 T**he opportunity cost of continuing in school for another year*

Taking advantage of the natural experiment created by a boom in the demand for Appalachian coal in the 1970s and a subsequent large decline in demand during the 1980s, Dan A. Black, Terra G. McKinnish, and Seth G. Sanders (2005) estimate that a 10 percent decrease in the earnings of low skilled workers increased high school enrollment rates by as much as 5-7 percent. Extrapolating from these results, economic models would predict, ceteris paribus, that the decline in the median real hourly wage of high school dropouts over the period from 1979-2009 would have increased the high school graduation rate. However, this did not occur. Moreover, EPOP rates for high school dropouts declined over this period, indicating that increased work effort in the formal

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[45] See, for example, Marianne Bertrand and Sendhil Mullainathan (2004), and Steven Rivkin (1995). For a discussion of the roles played by a changing structure of the economy and labor market discrimination in contributing to poor employment opportunities for minority workers, see the 1996 book by Harry Holzer.

labor market cannot explain why high school graduation rates have stagnated over the last four decades. {{580 Black, Dan A 2005/h}}

5.3 *The rate of time discount*

One hypothesis to explain why African-American teenagers have lower high school graduation rates than white teenagers is that, on average, they have higher rates of time discount and consequently place a lower value on the benefits from high school graduation that accrue over a lifetime. Lang and Ruud (1986) examine this hypothesis and reject it. They conclude that the difference in the average educational attainments of white youths and black youths does not stem from a difference in the average rate of time preference. Instead, they argue, it stems from a difference in the average length of time it takes for black students and white students to complete school.

5.4 *The non-monitory cost of completing another year of schooling*

African-American and Hispanic children enter high school with considerably weaker cognitive skills, on average, than those of white children. As Cunha, Heckman and Schennach (2010) have pointed out, the skill gaps stem in part from differences in parental investments, especially during the early childhood years. As Roland G. Fryer Jr. and Steven D. Levitt (2004) have shown, differences in the quality of elementary schools attended by black children and white children also contribute to skill gaps. Finally, poor quality high schools contribute to the high cost many black teenagers and Hispanic teenagers face in satisfying the requirements for a high school diploma. {{798 Fryer, Roland G, Jr 2004/h}}{{766 Balfanz, Robert 2010/h}} {{701 Cunha, Flavio 2010/h;798 Fryer, Roland G, Jr 2004/h}}

Several studies with causal identification strategies provide evidence that poor school quality, which may stem from relatively unskilled teachers, from inadequate resources, or from

troubled peer groups, contributes to the low high school graduate rate of students of color. Using

different datasets, Jonathan Guryan (2004) and Rucker Johnson (2011) show that court-ordered

school segregation plans implemented during the 1960s, 1970s, and 1980s that sent students of

color to better public schools increased their high school graduation rate. {{753 Guryan,Jonathan

2004/h;755 Johnson,Rucker C. 2011/h}}Byron Lutz (2011) shows that the termination of court-

mandated desegregation orders in school districts outside of the South resulted in a marked increase

in the school dropout rate of black youths. {{799 Lutz,Byron 2011/h}}David Deming, Justine

Hastings, Thomas Kane, and Doug Staiger (2011) show that for students living in neighborhoods in

Charlotte-Mecklenburg served by low quality public schools (the majority of whom were black or

Hispanic), the opportunity to attend a better middle school or high school increased the probability

of high school graduation by nine percentage points.{{754 Deming, David 2011/h}}. These studies

provide convincing evidence that low school quality and the consequent high cost of obtaining the

knowledge and skills needed to complete core courses and pass exit examinations are important

factors contributing to the relatively low high school graduation rate of black and Hispanic

students.{{753 Guryan,Jonathan 2004/h;755 Johnson,Rucker C. 2011/h;799 Lutz,Byron 2011/h;754

Deming, David 2011/h}}

A somewhat more difficult question to answer is whether increases in the cost of obtaining a

high school diploma explain the stagnation of the high school graduation rate during a period in

which the labor market payoff to high school graduation increased. I conclude that the evidence

supports this proposition. In essence, the argument has two parts. First, in response to concerns

that weak skills of the U.S. labor force contributed to the slow rate of economic growth in the

decades after 1973, states took a number of actions aimed at improving the skills of students

graduating from U.S. public high schools. Among the first of such actions, but by no means the

last, was the introduction by 19 states of minimum competency tests that students had to pass in order to graduate from high school. These early steps were followed by increased course requirements and more challenging exit examinations, all of which increased the cost of obtaining a high school diploma for students with weak academic preparation.

The watershed document signaling concerns about the quality of the nation's public school system was *A Nation at Risk,* published in 1983. This highly publicized report of the National Commission on Excellence in Education, a group appointed by U.S. Secretary of Education T.H. Bell, concluded that ". . . the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threats our very future as a Nation and a people. (p.5)" The Commission recommended that a condition for receipt of a high school diploma should be that students complete 4 years of English, and three years of mathematics, science, and social studies. In the years following publication of the report, many states did increase course completion requirements for high school graduation. {{73 Education,National Commission on Excellence in 1983/h}} {{73 Education,National Commission on Excellence in 1983/h}}

By the early 1990s, attempts to improve public education had morphed into the standards-based educational reform agenda, often called test-based accountability.   While details vary greatly from state to state, standards-based educational reforms typically include content standards that specify what students should know and be able to do, performance standards that specify the levels of performance students should satisfy, assessments that measure the extent to which students meet performance standards, and incentives for students and educators to meet the standards. One consequence of test-based accountability is that by the 2009-10 school year, 75 percent of all public high school students and 83 percent of all students of color in the United States had to pass at least one exit examination in order to obtain a high school diploma (Center on Education Policy 2010).

For this paper, the important question is whether these increases in high school graduation requirements reduced the high school graduation rate, and whether effects were concentrated among groups that historically have had low graduation rates. This question has proven difficult to answer for four reasons. First, the standards-based exit examinations that states introduced vary enormously in difficulty. Consequently, it is likely that the impact of their introduction varies. Second, states vary substantially in the extent to which they accompanied the introduction of exit examinations and increased course requirements with additional resources to improve instruction and to provide support for students who either failed a core course or an exit examination or whose low prior achievement put them at risk of failure. Third, in some states, including Massachusetts, specification of courses that must be passed is left to local districts, many of which have increased requirements. Consequently, state requirements do not accurately reflect graduation requirements in individual school districts. Fourth, the accuracy of available information on high school graduation rates varies among states and among data sources for reasons described in Section 2. Given these sources of variation among states, it is not surprising that the evidence bearing on the effects of state policy changes on high school graduation rates is not completely consistent, even among studies with credible identification strategies.

While not without exceptions, the pattern of evidence indicates that increases in graduation requirements do reduce high school graduation rates, with the impacts concentrated on three heavily overlapping groups: low-achieving students, students of color, and urban low-income students. For example, while studies with designs that prevented analysis of subgroups show no impact of minimum competency tests on high school graduation rate, studies by Brian Jacob (2001) and by John H. Bishop, Ferran Mane, Michael Bishop, and Joan Moriarty (2001) find that that they reduced high school graduation rates of low achieving students by 6 to 7 percent. Thomas Dee and

Jacob (2006) also report negative, albeit considerably smaller impacts of minimum competency

tests on the high school graduation rates of particular disadvantaged groups of students.{{805 Dee,

Thomas S 2006/h;30 Bishop,John H. 2001/h;826 Jacob,Brian A. 2001/h}}

The pattern is somewhat stronger, although again with some exceptions, on the impacts of more

difficult standards-based exit examinations that states have adopted during the last two decades.

Sean F. Reardon, Allison Atteberry, and Nicole Arshan use data on seven cohorts of students from

four large California school districts to examine the impacts of the introduction of the state's

standards-based exit examination. They find that the introduction of the exit examination lowered

high school graduation rates by 3.5 to 4.9 percentage points, with effects concentrated among low-

achieving students, minority students, and English language learners.{{758 Reardon, Sean F.

2010/h}} John R. Warren, Krista N. Jenkins, and Rachael B. Kulick (2006) and Dee and Jacob

(2006) report that exit exam requirements reduce high school graduation rates by about two

percentage points, with larger effects in states with more difficult examinations, and with effects

concentrated among black students and among students in districts with large percentages of

students of color. {{758 Reardon, Sean F. 2010/h;827 Warren, John R. 2006/h}}

The quality of the evidence is especially weak on the impact that increases in course completion

requirements have on high school graduation rates. One reason is that in at least some states,

school districts have subverted the intention of the policy by introducing relatively undemanding

courses. Nonetheless, Dean R. Lillard and Philip P. DeCicca (2001) estimate that a one standard

deviation increase in course graduation requirements increased the population of school dropouts in

1990 by three to seven percent.[46] {{756 Lillard, Dean R 2001/h}}

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[46] The authors use a difference-in-differences methodology to obtain their estimates. They recognize that a threat to the validity of their results is that states that increased course requirements also took other steps such as the introduction of exit examinations that may have reduced high school graduation rates.

Given the focus of this paper, I describe the evidence bearing on how increases in graduation requirements have affected high school graduation rates. However, it is important to keep in mind that states increased high graduation requirements and introduced other aspects of standards-based educational reforms in order to improve the quality of education students received and to make a high school diploma a stronger signal of skill mastery. An assessment of the benefits and costs of these controversial educational reforms goes beyond the scope of this paper, and in any case would need to be state-specific. Nonetheless, it is important to keep in mind that advocates of standards-based educational reforms can point to significant accomplishments. For example, comparisons of the transcripts of 1990 and 2009 high school graduates carried out under the auspices of the National Assessment of Educational Progress found that larger percentages of 2009 graduates from all major racial/ethnic groups completed a more rigorous curriculum than did comparable 1990 graduates, and, on average, 2009 graduates completed about 420 more hours of course work than did 1990 graduates.[47] Moreover, many advocates of better education for disadvantaged children embrace standards-based reforms, arguing that they are critical to setting high expectations for the achievement of all children. They point to schools serving high concentrations of disadvantaged students that have responded productively to the pressure of test-based accountability.[48] Thus, it is in the context of a reform approach that has altered U.S. public education in many respects that I summarize the evidence on its impact on high school graduation rates.

5.5 *The role of the GED*

Economic models posit that students' responses to increases in the cost of acquiring a high school diploma will depend on the attractiveness of alternatives. One option is to drop out of high school and to take the eight-hour battery of examinations required to earn the General Educational

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[47] See C. Nord and colleagues (2011).
[48] See, for example, Robert Balfanz and others (2010), and Ronald F. Ferguson and others (2010).

Development (GED) credential. In contrast to requirements for obtaining a high school diploma,

there are no course completion requirements for obtaining a GED. Between 1970 and 2001, the

percentage of new high school completion credentials awarded through GED certification increased

from 2 percent to more than 18 percent. In 2002, after the GED Testing Service introduced a

revised more difficult set of GED tests, the percentage dropped to 10 percent. Since then it has

climbed gain, reaching 12 percent by 2007. Moreover, the percentage of GED credentials awarded

to teenagers of high school age has also increased dramatically. Prior to 1970, very few 16-18 year-

olds in the U.S. took the GED examinations.[49] In 2009 27 percent of the 745,760 individuals who

took the GED examinations were 16-18 years-old.[50] Factors contributing to the increasing role of

the GED as a high school completion credential include reductions in the minimum age,

investments by states in GED preparation programs, the creation and expansion of programs to

prepare incarcerated individuals to take the GED examinations, and increased requirements for

receipt of a conventional high school diploma.

For this paper the critical question is whether the availability of the GED credential leads some

teenagers to drop out of school who, in the absence of the GED, would have graduated from high

school. The answer to this displacement question is not obvious even though the number of 16-18

year-olds taking the GED tests and the number obtaining the GED credential have both increased a

great deal in recent decades. It could be that all of the teenagers who took the GED examinations

would have dropped out of school in the face of increased graduation requirements even if the GED

credential had not existed or was not available to high-school aged individuals.

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[49] As Heckman, Humphries, and Mader (2010) explain, prior to 1970, the minimum age at which individuals could take the GED examinations was 20. However, exceptions to the minimum age requirement were made. This paper is also the source of the information in this paragraph on the reasons the number of GED test-takers increased in recent decades.

[50] GED Testing Service (2010), p.54.

James H. Heckman, Paul A. LaFontaine, and Pedro L. Rodriguez (2008) use evidence from two natural experiments to estimate displacement effects. The first was a 1997 mandate by the GED Testing Service that all states adopt minimum passing scores on the five GED tests that were higher than those in place in 31 states. Using a difference-in-differences estimation strategy, the authors find that increases in GED minimum score requirements reduced the dropout rate among black and Hispanic 12th graders in affected states by 4.8 and 6.2 percentage points respectively. The comparable figure for white 12th graders was 1.2 percentage points. The second natural experiment was the 1973 decision of the California legislature to make the GED available to civilians as of 1974. (Previously it had been available in California only to members of the military.) Again using a difference-in differences estimation strategy, Heckman and his co-authors find that the introduction of the GED option reduced the high school graduation rate in California by three percentage points.{{829 Heckman, James J 2008/h}}

The reason the magnitude of the displacement effect matters is that, on average, GED recipients do not fare as well in the labor market and in post-secondary education as conventional high school graduates.[51] Consequently, the GED option is not a wise choice for students who could obtain a conventional high school diploma. Heckman, Humphries, and Mader (2010) point out that the poor subsequent track record of GED recipients does not stem from weaker cognitive skills than terminal high school graduates. On average, the cognitive skills of GED recipients are about the same as those of high school graduates who do not enroll in college. Instead, the difference lies in socio-emotional skills such as motivation and persistence, skills that high school graduates demonstrate by completing course requirements and that dropouts typically lack. In this regard, Heckman and Yona Rubinstein (2001) refer to the GED as a "mixed signal," indicating to potential

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[51] See Stephen J. Cameron and Heckman, 1993; Heckman and LaFontaine, 2006; Murnane, John B. Willett, and John H. Tyler, 2000.

employers that the recipient of the credential has mastered basic cognitive skills but also is unlikely to have the socio-emotional skills that result in the regular attendance and punctuality that employers value.{{831 Cameron, Stephen V 1993/h;761 Murnane, Richard J 2000/h;760 Heckman, James J 2006/h;809 Heckman, James J 2001/h}}{{809 Heckman, James J 2001/h}}

While there is no question that, on average, GED recipients do not fare as well in the labor market and in post-secondary education as conventional high school graduates, a different question is whether the credential provides value to school dropouts who conclude that they cannot return to high school and obtain a conventional diploma. The question matters because if there are benefits to dropouts from obtaining the GED credential, they need to be weighed against displacement effects in evaluating public policies regarding the GED. Heckman and LaFontaine (2006) report that, when estimated in models that control for cognitive skills and that assume homogeneous effects of educational credentials, GED recipients do not earn more than uncredentialed dropouts. Applying a regression discontinuity identification strategy that accounts for the multiple times candidates may take the GED tests, Christopher Jepsen, Peter Mueser, and Kenneth Troske (2010) reach the same conclusion.{{797 Jepsen, Christopher 2010/h}}{{797 Jepsen, Christopher 2010/h}}

In contrast, Tyler, Murnane, and Willett (2000) find that the GED increases the earnings of low-skilled white dropouts by 10-19 percent. Their study uses social security earnings records merged with information on GED test scores and an identification strategy that takes advantage of differences in minimum GED passing scores across states to estimate the impact on the earnings of low skilled dropouts, defined as those with cognitive skills just sufficient to obtain the GED credential in low standard states, but not in high standard states. Using data from High School and Beyond, Murnane, Willett, and Tyler (2000) replicate the Cameron and Heckman (1993) finding of no effect of the GED on the earnings of recipients in a model that controls for cognitive skills and

assumes a homogenous effect. However, they also replicate the finding of a positive effect on the earnings of dropouts with low cognitive skills.

My explanation of the economic benefits of the GED credential to individuals who drop out of school at age 16 with weak cognitive skills and poor attitudes is informed by discussions with teachers of GED test preparation programs. The instructors report that many such individuals enter their programs after several years of bad labor market experiences. The participants feel they have matured and would make better workers than they were at age 16, but find it difficult to convince employers to give them a chance. They hope that the GED credential will provide a favorable signal. Tyler, Murnane, and Willett (2000) report that the credential does this for dropouts with weak skills, enabling them to increase their annual earnings from an average of $9,628 to $11,101 five years after receipt of the GED. Note that the $11,101 earnings figure is well below the poverty level for a family of three in 1995. This is consistent with the Heckman and Rubinstein view of the GED as a "mixed signal," one that replaced the unequivocally poor signal that the dropouts previously carried.

In contrast to teenagers who leave high school with very weak cognitive skills, others leave with stronger cognitive skills, but do so because they dislike school, because they are expecting a child, or for a myriad of other reasons. The modal reason they take the GED tests is to gain access to funding for post-secondary education or training. Indeed, 43 percent of GED recipients enter college or training programs within six years of obtaining the credential. However, only half of these return for the second semester, and very few complete a degree program. This explains why the GED credential provides obtain little or no economic benefit to these recipients.[52]

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[52] The source for the statistics described in this paragraph is the 2010 GED Testing Service Report, *Crossing the Bridge*, by Margaret B. Patterson, Jizhi Zhang, Wei Song, and Anne Guison-Dowdy.

In summary, the existing evidence indicates that the availability of the GED credential does lead some teenagers to drop out of school who otherwise would have persisted to graduation. As a result, its availability to teenagers has contributed to the stagnation of the high school graduation rate during a period in which the economic payoff to graduation has increased. The magnitude of this displacement effect may be reduced somewhat when the GED Testing Service introduces the planned more difficult tests that are aligned with the Common Core standards that more than 30 states have adopted.

At the same time the GED credential has provided economic benefits to dropouts who left school with weak cognitive skills and the stigma of not sticking with high school. For them, even the "mixed signal" provided by the GED credential improved their labor market outcomes. I see three complementary options for reducing the displacement effects of alternatives to a conventional high school diploma while providing meaningful second chances for students who have dropped out of school and conclude that they cannot return. One is to increase the minimum age at which individuals may take the GED tests and obtain the credential. A second is to improve high school options, a topic I discuss in the next section. A third is to provide educational alternatives for dropouts beyond normal high school completion age that provide both opportunities to develop both cognitive and socio-emotional skills and to signal acquisition of these skills. A modest percentage of GED preparation programs appear to do this. However, these programs are more expensive than the typical programs that focus on preparation for the GED tests. To my knowledge, there have been no evaluations with credible designs that have examined whether enrollment in programs that provide intensive development of cognitive and socio-emotional skills result in better labor market and post-secondary education outcomes than do programs that focus on preparation for the GED tests.

6. Increasing High School Graduation Rates: the Causal Evidence

In this section I describe policy interventions that, based on impact evaluations with credible identification strategies, either increase the high school graduation rate or reduce the dropout rate of students with particular characteristics. To keep the scope of this paper manageable, I do not consider interventions for which evaluations showed impacts on student test scores, but not on graduation or dropout rates. This decision results in the exclusion of most interventions targeted at younger children. I organize the description by the age of children for whom the interventions are relevant.

6.1 Early Childhood Interventions

As Charles A. Nelson and Margaret A. Sheridan (2011) explain, essential properties of most of the brain's architecture are established very early in life by genes and, importantly, by experiences. For this reason, policy interventions aimed at enriching the early experiences of economically disadvantaged children may be especially effective in helping them to develop the cognitive and socio-emotional skills necessary to succeed in school and in later life. Evidence from small model pre-school education programs, including Perry Preschool and the Abacaderian program, indicated positive impacts on long term outcomes including high school graduation rates.[53] However, the question remained of whether larger scale, less expensive pre-school education programs would also have long term benefits for economically disadvantaged children, including an increase in the probability of high school graduation.

The largest publically funded program in the U.S. designed to improve the health and education of very young disadvantaged children in the U.S. is Head Start. Introduced in 1965 as

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[53] For example, see Heckman, Seong Hyeok Moon, Rodrigo Pinto, Peter A. Savelyev, and Adam Yavitz (2010). For a description of problems with prior analyses of the data from these experiments and the case that the long-term benefits are concentrated on females, see Michael L. Anderson (2008). {{828 Heckman, James J 2010/h;832 Anderson, Michael L. 2008/h}}

part of the Great Society initiative, and currently serving approximately 900,000 disadvantaged children, Head Start offers a variety of services, including pre-school education and health and nutrition services. Using a creative regression-discontinuity-based identification strategy and data from the U.S. Census and from the National Education Longitudinal Study (NELS88), Jens Ludwig and Douglas L. Miller (2007) found that the offer of offer of Head Start to children living in the nation's 300 poorest counties during the first years of the program increased the probability of high school graduation by approximately three percentage points. Using data from the Panel Study of Income Dynamics pertaining to children born in the 1960s, and an estimation strategy that compared outcomes among siblings, Eliana Garces, Duncan Thomas, and Janet Currie (2002) found that participation in Head Start increased the probability of high school graduation by 20 percentage points for white children, but had no impact on this outcome for black children. A possible explanation for the differential effects by race is that black children were not able to sustain the benefits from Head Start because they attended very low quality elementary and high schools.[54]

{{487 Ludwig, Jens 2007/h;764 Garces, Eliana 2002/h;811 Cascio,Elizabeth U. 2009/h}}

Using data from the Children of the National Longitudinal Survey pertaining to children born during the 1980s and the same fixed effects identification strategy based on comparing outcomes for siblings, David Deming (2009) found that participation in Head Start increased the probability of high school graduation by 11 percentage points for males and by 13 percentage points for children of mothers with low cognitive skills.[55] A recent study by Tarjei Havnes and Magne Mogstad (2011) found results similar to those reported by Deming. These authors report that participating in subsidized child care in formal settings during the pre-school years reduced the

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[54] Differences in the quality of the schools attended by children of different races would also explain Elizabeth Cascio (2009)'s finding that the impact of the introduction of public kindergarten in states within the United States (primarily in the south) increased the high school graduation rate of white children, but not that of black children.

[55] As explained on pages 126 and 127 of Deming's 2009 paper, these estimates come from models in which GED recipients are not counted as high school graduates.

probability of dropping out of high school by 7 percentage points for children in Norway whose mothers had not graduated from high school. All of these studies provide evidence that public investment in improving education, health, and nutrition during the pre-school years is a promising strategy for increasing the probability that economically disadvantaged children graduate from high school.[56] {{800 Havnes, Tarjei 2011/h}}

6.2 Elementary Schools

In the mid-1980s, the Tennessee state legislature appropriated funding for a randomized experiment to evaluate the causal impact of class size reduction on the reading and mathematics achievement of children in the primary grades. More than 11,000 students and 1,300 teachers in 79 public schools participated in what became known as the Student/Teacher Achievement Ratio (STAR) experiment. In each participating school, children entering kindergarten in the fall of 1985 were assigned randomly to a small class with 13 to 17 children or to a regular size class with 22 to 25 students.[57] Teachers in each school were also randomly assigned to classrooms. The research design called for students to remain in their originally designated class type through third grade.

While the original design called for the experiment to end four years after participating children began kindergarten, researchers have conducted follow-up studies examining the impact of the intervention on participants' subsequent educational attainments and, most recently, on adult labor market outcomes.[58] At my request, Diane Whitmore Schanzenbach, who has played a central role in the follow-up studies, provided estimates of the intervention on high school graduation rates. She found that assignment to a small class for the first year in school increased the probability of

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[56] For a recent review of evidence on the impacts of early childhood interventions on long-term outcomes including the probability of high school graduation, see Douglas Almond and Janet Currie (2010).

[57] In fact, there were three treatments in the STAR experiment: a small class, a regular sized class with one teacher, and a regular sized class with one teacher and a full-time aide. However, since no differences in average outcomes were found between students assigned to the second and third treatments, almost all analysts have combined students in these two treatment arms.

[58] See Raj Chetty and co-authors (forthcoming).

high school graduation by nine percentage points (from a base of a 0.59) for black male children,

and by seven points (from a base of 0.60) for a heavily overlapping group, male children from low-

income families.[59] These results are particularly striking, given the racial and gender gaps in high

school graduation rates. They suggest that providing male children from minority groups or from

low-income families with a strong start in school may be a powerful lever for increasing the high

school graduation rate of these groups that have fared poorly in American schools.

While the STAR experiment is important, there is more than one interpretation of the evidence.

For example, Frederick Mosteller (1995) viewed the experiment as a test of the benefits of smaller

classes for grades K through 3. Eric Hanushek (1998) pointed out that the design of the experiment

did not permit a clear distinction between the benefits of a small class for the first year that a child

was in school and the value of a small class for multiple years of schooling.[60] Caroline Hoxby

(2000) pointed out that educators participating in the STAR experiment knew that the results would

have an impact on class size policy in Tennessee. Since teachers and administrators (as well as

parents) prefer small classes, they had strong incentives to do all that they could to demonstrate that

small primary school classes produced better outcomes for children. This led her to interpret the

experiment as a test of the benefits of small classes coupled with incentives for educators to take

advantage of the opportunities small classes provide. These different interpretations of the evidence

from the STAR experiment are relevant to the design of class size interventions. However, a

common lesson is that providing children, especially boys from economically disadvantaged

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[59] This p value associated with this point estimate is 0.091. The corresponding point estimate of the impact of assignment to a small class on the high school graduation rate of male children from low-income families is 0.07 (p=0.043). The corresponding estimates for female black children and for females from low income families were not statistically different from zero.

[60] Alan Krueger (1999) presents non-experimental evidence supporting the argument that enrollment in a small class during a child's first year in school accounts for the positive effects on the child's grade 3 test scores. However, to my knowledge, there is no evidence bearing on the question of whether the number of years a child is in a small class affects long-term outcomes such as the probability of high school graduation. For a discussion of the differences between Hanushek and Mosteller in the interpretation of the evidence from the STAR experiment, see pages 348-349 of Richard Murnane and John Willett's (2011) book.

families, with significant attention and support during their first experiences in school increases the probability that they will graduate from high school. Small classes create the potential to provide children with extra attention and to identify and cope with learning difficulties quickly. However, incentives to take advantage of the opportunities provided by small classes may also be important. {{483 Mosteller, Frederick 1995/h;484 Hanushek, Eric A. 1998/h;281 Hoxby,Caroline M. 2000/h}}

6.3 Middle Schools

Two studies have explored whether the grade configuration of schools serving children in the years before entry into high school affects the probability of high school graduation. Three grade configurations are dominant: K-8 schools, junior high schools serving students in grades 7 and 8 and sometimes 9, and middle schools serving students in grades 6-8. Using information from the Common Core of Data, Kelly Bedard and Chau Do (2005) find that moving from a system in which students change schools at the end of grade six to a system in which they change schools at the end of grade five reduced the on-time high school graduation rate by one to three percent. They argue that this reflects a detrimental effect on students who are less able academically.

Guido Schwerdt and Martin West (2011) use administrative data from the Florida public schools to examine the consequences for students of alternative grade configurations. They find that students who attended an elementary school ending in grade 5, and consequently changed schools in grade 6 and again after grade 8, had a 1.4 percentage point (14.5 percent) higher dropout rate between grades 9 and 10 than students who attended a K-8 elementary school.[61] The lesson is that moving from a school in which a particular cohort of students are the oldest to a school in which they are the youngest is a difficult experience, especially for low achieving students, and

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[61] Schwerdt and West (2011) also report that students who change schools at the end of grade 6 and again at the end of grade 8 have a slightly higher dropout rate than students who attend K-8 schools. But the difference is not statistically significant.

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increases the probability that they will leave school prior to high school graduation. Consequently, it makes sense to minimize the number of times students change schools.{{732 Bedard, Kelly 2005/h;813 Schwerdt, Guido 2011, April/h}}

6.4 High Schools

As mentioned above, Deming, Hastings, Kane, and Staiger (2011) use evidence from lotteries to show that for students living in neighborhoods in Charlotte-Mecklenburg, North Carolina served by low quality public schools (the majority of such children were black or Hispanic), the opportunity to attend a better middle school or high school increased the probability of high school graduation by nine percentage points.{{754 Deming, David 2011/h}} This is important evidence in refuting the argument that adolescence is too late in children's lives for school quality improvements to make a difference. One intriguing finding is that lottery winners did not have higher scores than lottery losers on state-mandated tests of mathematics and English language arts that students took as 10th graders. This raises the question of just what the differences were between the schools lottery winners and lottery losers attended.   Unfortunately, the design of the Charlotte-Mecklenburg natural experiment did not permit the researchers to determine whether it was better teachers or better peers or some other attribute of the schooling experience that resulted in higher high school graduation rates for the lottery winners. Evidence from a few attempts to transform high schools sheds some light on promising strategies for improving high schools, especially those serving primarily low-income, low-achieving students. {{823 Altonji, Joseph G. 2011/h}}

The Talent Development High School Model is a whole school reform approach that focuses on changing the experiences of students entering high school. Targeted at high schools serving high percentages of low-achieving minority students, Talent Development places all ninth

graders in learning communities of 100 to 125 students taught by the same four of five teachers. The schedule allows ninth graders to take double doses of mathematics and English aimed at providing the skills needed to do high school level work. Students also take a "Freshman Seminar" designed to help students develop study skills and to cope with personal adjustment issues. In this reform model, students then move to career academies, which provide both learning communities and curriculum based on career themes.

An impact evaluation conducted by the research firm MDRC using an interrupted time series approach found that Talent Development increased the rate of on-time graduation by 8 percentage points in the two earliest implementing schools (the only two schools tracked long enough to observe high school graduation rates. However, the MDRC researchers caution that the early-adopting schools received strong support from the program developers and also benefited from stable leadership, and that their results may not be representative of those of other Talent Development schools in the district (although, like the early-starting schools, the later-starting schools implementing this reform produced also positive effects on promotion rates and credits earned).[62]

A high school reform initiative carried out over the last decade in New York City also shows that high school quality makes a big difference in the probability that economically disadvantaged urban students graduate. Starting in 2002, New York City closed more than twenty large low-performing high schools and opened more than two hundred smaller schools in their place. Particular emphasis was placed on encouraging innovative approaches to educating low-

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[62] See James J. Kemple, Corinne M. Herlihy, and Thomas J. Smith (2005). Evaluations showing positive impacts on outcomes in schools in which founders provided strong support which are not replicated when the intervention is tried in other sites are common. For example, this pattern is present in the MDRC evaluations of "Project Grad" and "First Things First," two whole school reform interventions targeted at low-performing high schools. See Jason C. Snipes, Glee Ivory Holton, Fred Doolittle, and Laura Sztejnberg (2006), and Janet Quint, Howard S. Bloom, Alison Rebeck Black, and LaFleur Stephens (2005).

income urban students and providing widespread access to the more than 120 new small schools that were academically nonselective. The district invited stakeholders, including groups of teachers, school reform organizations, and entrepreneurs from other sectors to submit proposals for new schools. It introduced a competitive process to select the most promising ideas, and provided the winners with start-up funds and support for leadership development and the recruitment of strong teachers. In addition, each school was paired with at least one intermediary organization skilled in launching new schools.

The New York City initiative demonstrates that new approaches to secondary schooling are indeed possible, even in a large urban district widely viewed as excessively bureaucratic and resistant to change. Even more important, the results of an impact evaluation showed that winning the lottery to enroll in one of the small schools of choice dramatically increased the high school graduation rate of students from low-income families, two-thirds of whom were below grade level when they entered ninth grade. This included males of color, a group with an exceptionally low high school graduation rate.[63]

While considerably more research is needed to understand why New York City's small high schools of choice improved graduation rates for at-risk students, three complementary hypotheses seem promising. First, the design competition catalyzed initiative by individuals and groups that had ideas for producing schools that would better serve academically struggling students, but who rarely are given opportunities and support for developing and implementing their ideas. Second, the lottery system allowed students to choose among high school options, but each option provided a focused program of instruction that all students followed. This helped the small schools of choice to develop the positive achievement cultures that Akerlof and Kranton (2000, 2002) see as critical to effective schooling. Third, the small size of the schools and their staffing by

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[63]   The evaluation was carried out by Howard Bloom, Saskia Thompson, and Rebecca Unterman (2010).

teachers who embraced the school's mission made it possible to provide the combination of academic rigor and personal support that many economically disadvantaged, low achieving students need to persist to graduation.

Yet another promising approach to increasing high school graduation rates for students from low income families are Early College High Schools. Premises underlying this approach are that the senior year in high school is a waste of time for a great many students and that college is yet another transition that many students, especially those from low SES backgrounds, do not survive. Early college high schools are small schools, most located on college campuses, serving students in grades 9-12 or 9-13. The target audience consists of students from groups underrepresented in college, including those whose parents have low-income and/or no college education, and minority group members. Design principles include rigorous instruction designed to prepare students for college and strong personal supports for students. A random assignment evaluation of 19 Early College High Schools in North Carolina that used lotteries to determine which applicants were accepted found that the percentage of students who were still enrolled in North Carolina public schools as of grade 10 was 5 percentage points higher in the treatment group than in the control group.[64]

6.5 Why is the evidence so sparse?

Given the importance of education in contributing to economic growth and to intergenerational economic mobility, increasing the high school graduation rate in the United States is an important social objective. Yet the evidence on how to accomplish this is remarkably thin. In my view, several factors contribute to the paucity of the evidence. First, while the number of initiatives undertaken to improve the performance of U.S. schools is vast, only a relatively small number are

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[64] The evaluation results are described in a 2011 paper by Julie A. Edmunds and co-authors.

implemented in a manner that supports a defensible impact evaluation. Even rarer are evaluations that follow students long enough to assess impacts on high school graduation rates.

Second, most impact evaluations are poorly designed. Evidence comes from the What Works Clearinghouse, which was created by the Institute of Education Sciences in 2002 to evaluate evidence on the effectiveness of education programs, practices, and policies and to make its conclusions publicly available on its website. As of October 2010, the WWC had reviewed 231 studies of dropout prevention interventions. Of these, only 27 met the WWC evidence standards, with or without reservations.[65] Among evaluations of dropout prevention programs that did meet WWC evidentiary standards, most were underpowered, and consequently could not detect modest effects of interventions on graduation rates.

Third, most interventions that lend themselves to strong impact evaluations are modest and modular in nature, such as introducing an additional remedial course to improve the literacy skills of struggling ninth graders. Such interventions are relatively easy to implement because only a few teachers need to be trained and then assigned to teach groups of struggling students for an hour a day. They are also relatively easy to evaluate with a random assignment design, especially when there is excess demand for the new treatment. The problem with such modest interventions is that they do not change the daily experiences of struggling students in any fundamental way and consequently have little or no effect on graduation rates.

In contrast, ambitious interventions that seek to transform the daily experiences of all teachers and students in a high school are very difficult to implement. While the successful school-wide reform efforts may share common principles, like the importance of strong leadership and the importance of changing the school culture, the details of the intervention are typically worked out over time and tend to be somewhat idiosyncratic and difficult to replicate. The story of Brockton

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[65] Personal communication with the What Works Clearinghouse help desk (October 19, 2010).

High School, the largest public high school in Massachusetts, serving more than 4000 students, two-thirds of whom come from low-income families, illustrates this theme.

As described by Sam Dillon in the September 27, 2010 issue of the *New York Times*, Brockton High was a typical "dropout factory" in the late 1990s with a graduation rate of less than 65 percent. Moreover, the graduation rate would fall if student performance did not change because a large percentage of Brockton High 10th graders were failing the state's English language arts and mathematics examinations. Beginning with the cohort of students who entered grade 9 in September 2000, Massachusetts students needed to pass these examinations in order to obtain a high school diploma.[66]

Determined to turn the school around, a small group of teachers began meeting on Saturday mornings to devise a plan of action. At the center of the resulting reform effort was a literacy initiative, under which students engaged in writing in every class including gym, and all teachers graded student writing using a school-wide rubric. Other elements included a redesign of the teacher evaluation system and close monitoring of student progress. Undaunted by resistance from some teachers, the core group of reformers built support for their improvement plan over several years and drove out the minority of teachers who did not want to participate. The reform effort led to significant improvement in student performance on the state exit examinations and to increases in the graduation rate.

The Brockton High story is inspiring. It provides an existence proof that it is possible to dramatically improve the performance high schools serving large percentages of low-income, low achieving students. However, it does not provide a blueprint for doing so. As Robert Balfanz and his colleagues (2010) have documented, many other "dropout factories" have been unsuccessful in

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[66] For more details about the performance improvements at Brockton High School, see Ronald F. Ferguson, Sandra Hackman, Robert Hanna, and Ann Ballantine (2010).

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bringing about the type of changes that made a difference at Brockton High. Moreover, evaluating

the impact of school-wide reform efforts is difficult both because it typically takes several years to

define and implement the interventions, and because it is challenging to develop a compelling

estimate of the counterfactual outcomes.

In summary, clearly defined interventions that are relatively easy to implement and evaluate

have little or no effect on high school graduation rates because they do not alter students'

fundamental experience of school. Whole school reform efforts show more promise. However,

they are difficult to implement and sustain, and progress is not based on implementing a clear set of

instructions. Consequently, it is difficult to define what the intervention is, and consequently what

the lessons for policy are. Typically the lessons from such school-wide reforms are described in

terms of the importance of strong leadership, improving instruction, increasing support for students,

and changing the school culture. While few educators or policymakers would disagree with these

principles, they do not lend themselves to clear instructions about what educators should do.

A different, although complementary approach to increasing high school graduation rates is to

alter the conditions and incentives under which educators and students operate. Examples of

relevant policies include standards-based educational reforms, charter school legislation, and the

design competition for new small high schools that New York City introduced. Such policies seem

promising to most economists because of their attention to incentives. However, evaluating their

impacts on high school graduation rates is difficult because the standards-based educational systems

and charter school regulations vary significant across states, and consequently the impacts on

students and educators are likely to differ. Also, there is evidence of heterogeneous effects of

particular standards-based reform systems, with schools that have significant teaching capacity

improving their performance and other schools resorting to "drill and kill" instruction that may

increase scores on high stakes tests but does not prepare students well for life after graduation.[67]

Fortunately, a number of advances have made it increasingly possible to conduct credible

causal evaluations of policy changes that affect whole schools, or school districts, or in some cases,

even states. These include policy interventions that assign children to treatments on the basis of

lotteries or other well-defined criteria (such as test scores), increasing openness to evaluations in

which whole schools are randomly assigned to interventions, and improvements in electronic data

collection that reduce the cost of long-term follow-ups. Nonetheless, there is still much to be

learned about the design and implementation of policies that will result in increased graduation

rates for U.S. students, especially those from economically disadvantaged backgrounds.

7. *Summing Up*

As stated at the beginning of this paper, the high school graduation rate in the United States has

gone from first to 19th among OECD countries. The decline in position has stemmed from

stagnation in the U.S. high school graduation rate during four decades in which the graduation rate

has risen in many OECD countries. The explanation for the stagnation does not lie in a lack of

economic incentives to complete high school in the U.S. To the contrary, as a result of changes in

the structure of the economy, the economic incentives to complete high school and go on to post-

secondary education are greater today than they were in the 1970s.

The explanation for the stagnation in the U.S. high school graduation rate lies in increases in the

non-economic costs of obtaining a high school diploma that affect most heavily students with weak

academic preparation. The catalyst for increasing high school graduation requirements has been a

concern about the quality of the labor force that first arose in the mid-1970s and which has

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[67] For evidence of heterogeneous effects of test-based accountability systems, see Richard F. Elmore (2004) and Jonathan T. Supovitz (2009).

continued. The concern led states to increase course requirements for graduation and to put in place exit examinations that high school students must pass in order to obtain a diploma.

An assumption implicit in state education policies was that the quality of schooling would improve sufficiently to enable high school graduation rates to rise even as graduation requirements were stiffened. Indeed, many states increased public expenditures on public education to facilitate this improvement. However, it has proven much more difficult to improve school quality than to legislate increases in graduation requirements. One reason is that a large percentage of the economically disadvantaged students most affected by the increased graduation requirements enter school with weak cognitive and socio-emotional skills. A second is that economically disadvantaged students tend to be concentrated in a subset of the nation's schools, where peer group effects hinder the development of a positive learning environment. A third is the difficulty in attracting skilled teachers to work in schools serving high percentages of economically disadvantaged students. A fourth is that conventional comprehensive high schools do not engage the interest and effort of many teenagers, especially those who enter with weak skills. Pointing out the economic benefits of a four-year college degree has little impact on incentives for ninth graders unable to pass their required algebra course.

Increasing the high school graduation rate will require a set of complementary investments and structural changes in the education system. Investments aimed at improving the school readiness of economically disadvantaged children are critically important. So are policies to increase the quality of teaching in schools serving high concentrations of poor children so that they do not enter 9th grade lacking the skills and behaviors to do high school work. Finally, as Cecilia S. Lyche (2010) concludes in a review of factors affecting high school graduation rates in OECD countries, it seems important to create a variety of high school options for students, including ones that provide

significant experiences in workplace settings and clear connections between the skills students are asked to master and access to jobs that make use of these skills.

Analysts differ in their assessments of the promise of particular structural changes and policies to improve educational options for economically disadvantaged students – the group with an especially low high school graduation rate. Some advocate an increased role for charter schools. Others recommend the use of vouchers to stimulate a larger role for the private sector. Others see promise in standards-based educational reforms aimed at improving the accountability of traditional public schools. Yet others recommend development of more secondary education programs that have a career and technical education orientation. In my view, the evidence at this point is not clear-cut, and, in any case, the alternatives are not mutually exclusive.   However, in guiding improvement in high school education for economically disadvantaged students, I find compelling three themes from the recent New York City initiative aimed at improving high school options for economically disadvantaged students. The first is the value of creating design competitions, under which small groups of educators can develop structured programs to serve groups of interested students. The logic is that it makes sense to cultivate the energies and ideas of entrepreneurial educators who want to prepare teenagers to succeed in a changing economy. The second is to provide students with choices of programs.   The logic is that choice can help develop the type of positive learning culture that Akerlof and Kranton (2000, 2002) see as important. The third is that students should have little or no choice of curricula within programs. The rationale is that a common program-specific curriculum that is well known to students choosing high schools will make it easier for educators to engage students in the time-consuming work of building skills. Of course, the question remains as to what combination of governance policies will most effectively promote these themes.

Table 1

Category	(1) HS Graduate (within 6 years)	(2) Dropout + GED	(3) Still Enrolled	(4) Transfer	(5) Missing	(6) % with Known Outcomes	(7) HS Graduate in 6 years (% of known outcomes)	(8) HS Graduate in 4 years (%of known outcomes)
All Students	76.9	11.9	0.5	6.6	3.2	90.2	85.2	79.6
Male	74.3	13.9	0.5	7.0	3.3	89.8	82.8	75.9
Female	79.6	9.9	0.4	6.2	3.1	90.7	87.8	83.5
African-American	62.4	19.2	1.1	11.2	4.0	84.8	73.7	62.7
Asian-American	79.5	8.0	0.4	7.4	4.0	88.6	89.7	84.2
Hispanic	53.3	25.1	0.9	14.7	3.8	81.5	65.3	55.1
White	82.3	9.2	0.3	4.7	2.9	92.4	89.1	84.8
Black Female	67.7	15.0	0.9	10.7	3.8	85.5	79.1	70.8
Black Male	57.2	23.3	1.2	11.7	4.3	84.0	68.1	54.7
Asian Female	81.1	6.5	0.4	7.5	3.9	88.6	91.5	87.0
Asian Male	78.0	9.3	0.3	7.2	4.2	88.7	88.0	81.5
Hispanic Female	57.8	21.6	0.9	14.0	3.3	82.7	69.9	61.9
Hispanic Male	49.0	28.4	0.9	15.4	4.2	80.4	60.9	48.5
White Female	84.5	7.6	0.2	4.4	2.9	92.8	91.1	87.9
White Male	80.3	10.7	0.4	5.0	2.9	92.1	87.2	81.9

Source: Author's tabulations of longitudinal data provided by the Massachusetts Department of Elementary and Secondary Education. Estimates reported in this table are based on information for students who were first-time 9th graders in Massachusetts public schools 2003-04.

Table 2

		(1) % repeating Grade 9	(2) % of Grade 9 repeaters with known outcomes who graduated in 6 years
All		9.8	35.2
White		6.2	37.2
Black		21.4	37.7
Hispanic		24.2	29.0
White	Males	7.3	35.8
	Females	5.1	39.3
Black	Males	25.3	36.5
	Females	17.4	39.5
Hispanic	Males	27.1	27.7
	Females	21.2	30.6
Urban Low-Income		27.4	30.2

Source: Author's tabulations of longitudinal data provided by the Massachusetts Department of Elementary and Secondary Education. Estimates reported in this table are based on information for students who were first-time 9th graders in Massachusetts public schools 2003-04.
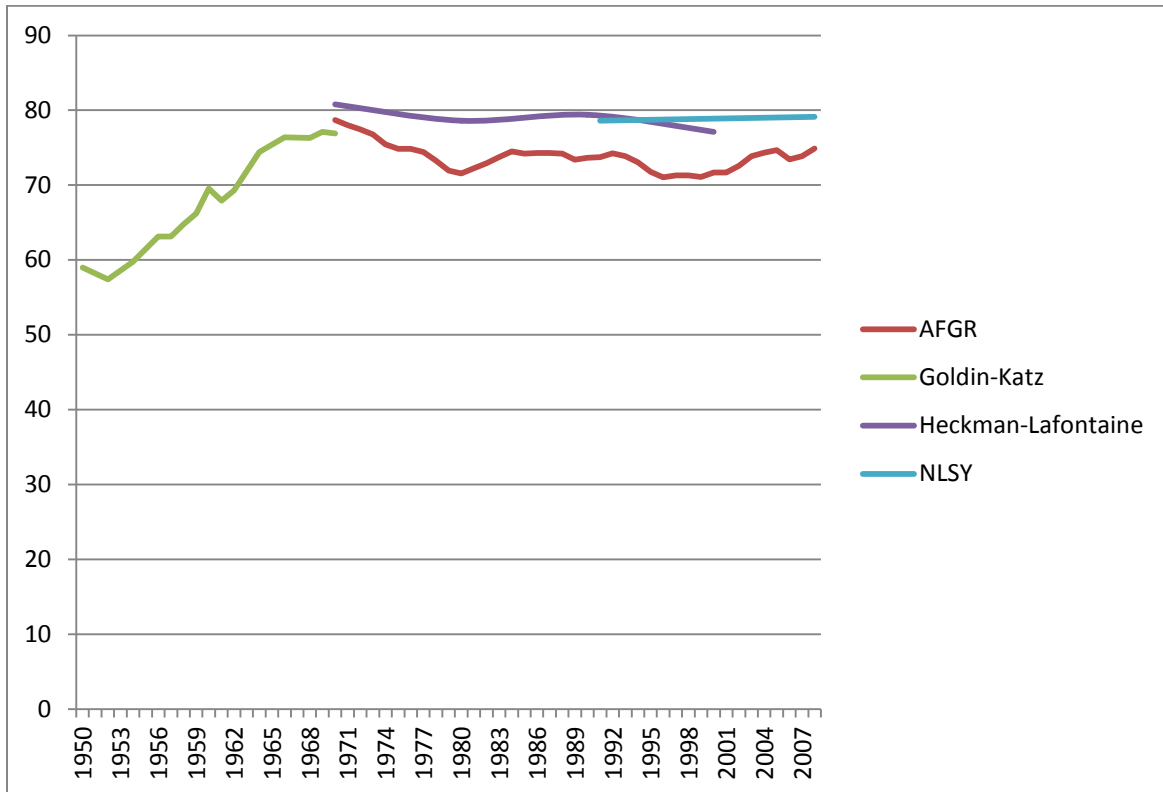
Figure 1: High School Graduation Rate for U.S., 1950-2008, as estimated by different methods using different data sets.
Sources: For 1950-1970, Golden and Katz (2008); for 1970-2000, Heckman and LaFontaine (2010); for 1991 and 2008, author's tabulations from NLSY79 and NLSY97 data. AFGR series compiled by U.S. National Center for Education Statistics.
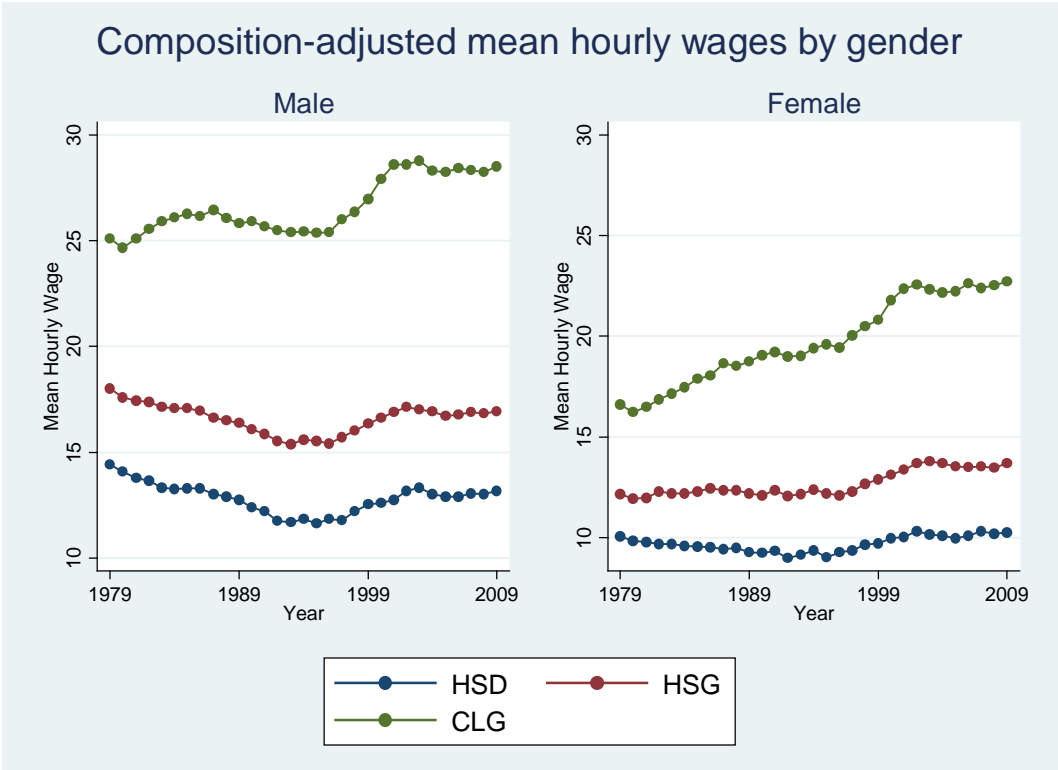
Figure 2: Real wage trends (2009 $) for high school dropouts, terminal high school graduates and 4-year college graduates (males, left panel; females, right panel).
Source: Author's tabulations from Current Population Survey MORG files.
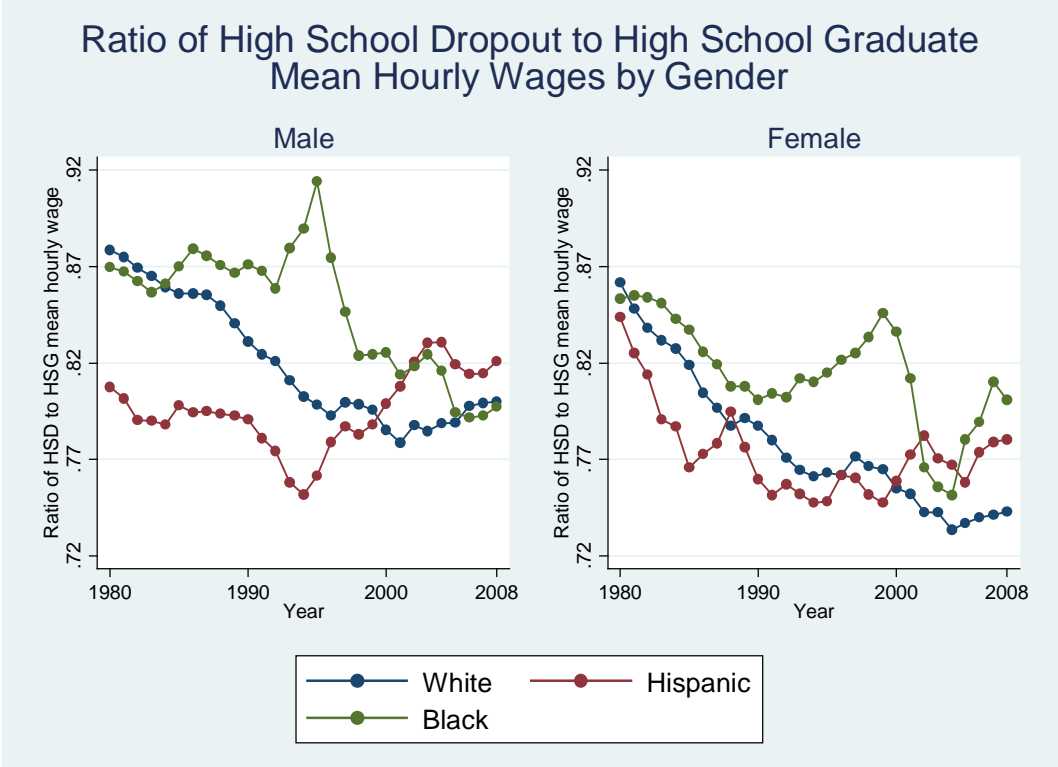
Figure 3: Trend (1980-2008) in the ratio of the average real wage of high school dropouts that that of terminal high school graduates for males (left panel) and females (right panel) by racial/ethnic group.
Source: Author's tabulations from Current Population Survey MORG files. (To reduce random variation due to small sample sizes, the real wages are expressed as 3-year moving averages.)
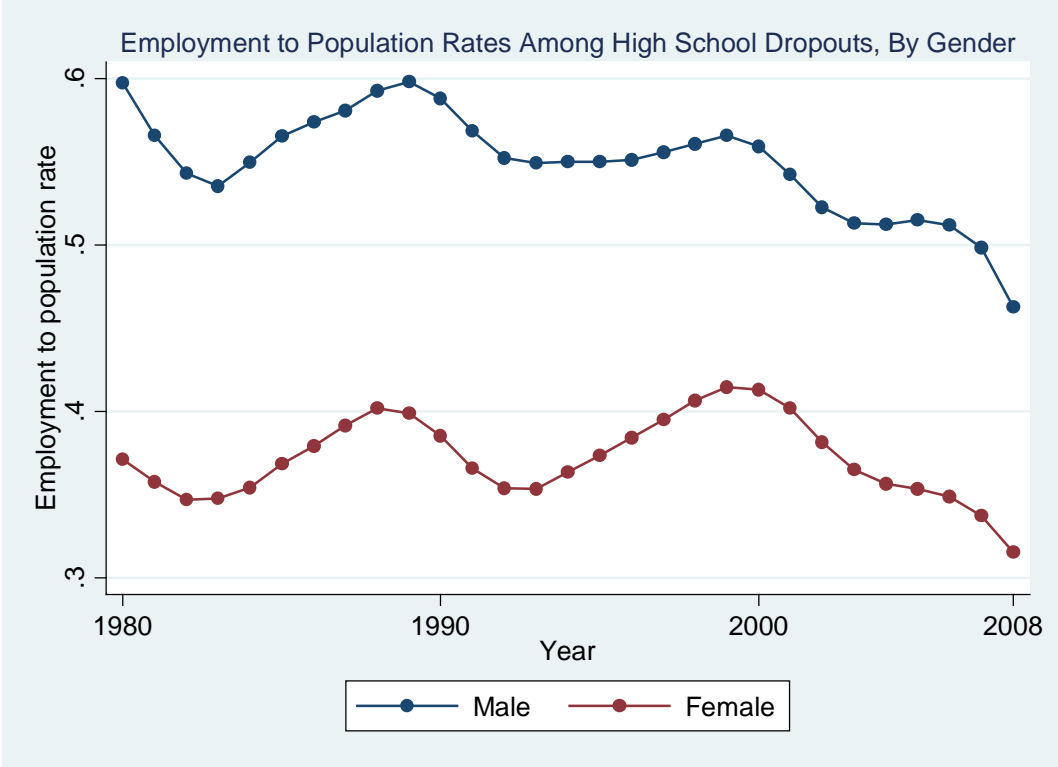
Figure 4: Trend (1980-2008) in the employment to population (EPOP) ratio for male and female school dropouts.
Source: Author's tabulations from Current Population Survey MORG files. (To reduce random variation due to small sample sizes, the EPOP ratios are expressed as 3-year moving averages.)
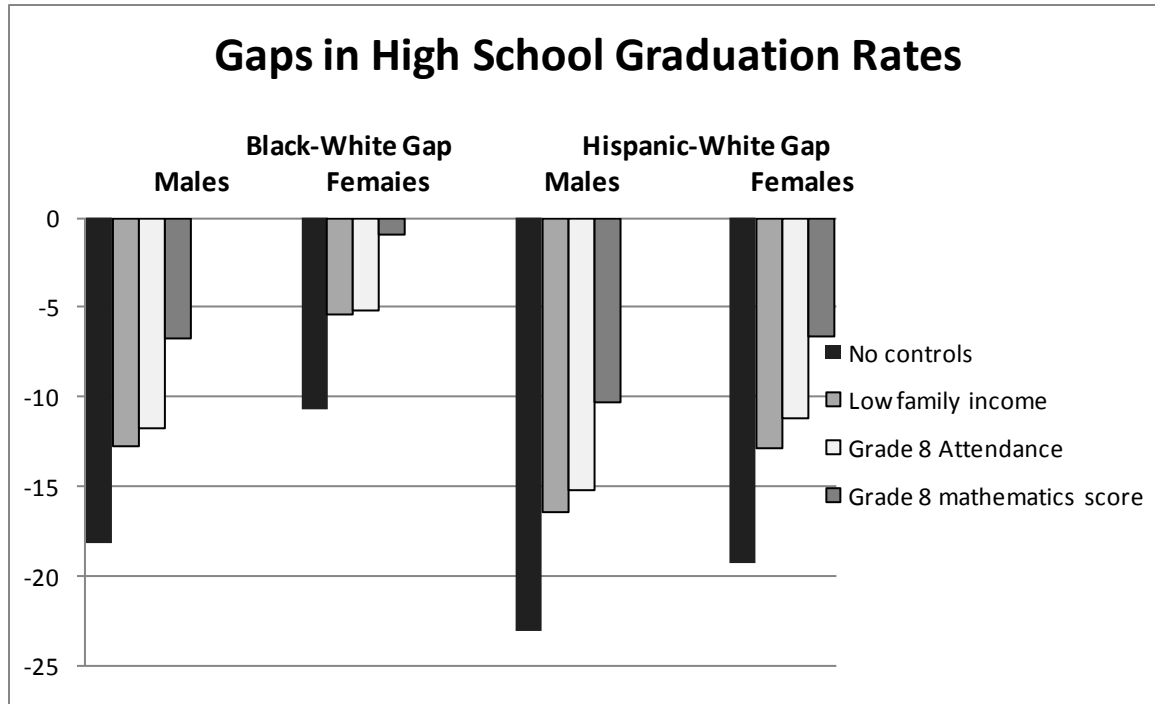
Gaps in High School Graduation Rates

Figure 5: Bar graphs based showing the extent to which the black-white and Hispanic-white gaps in high school graduation rates for males and females can be accounted for by differences in low-income status, grade 8 attendance rates, and grade 8 mathematics scores. Graphs based on the coefficients of linear probability models in which the dichotomous outcome, graduated from high school within six years of entering grade 9, was regressed, first, on a set of indicators for race/ethnicity-gender combinations. Then, sequentially, the following variables were added to the baseline model: an indicator of family low-income status when student was in grade 8, grade 8 school attendance, and score on the grade 8 state-wide standardized mathematics examination. Students who transferred from the Massachusetts public school system or for whom information on graduation status was missing were excluded from the analysis sample.

Source: Author's tabulations of data from Massachusetts Department of Elementary and Secondary Education.

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