EDUCATION POLICY ANALYSIS ARCHIVES

A peer-reviewed scholarly journal

Volume 16 Number 11 June 4, 2008 ISSN 1068–2341

Using Administrative Data to Estimate Graduation Rates: Challenges, Proposed Solutions and their Pitfalls

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Citation: Roy, J., & Mishel, L. (2008). Using administrative data to estimate graduation rates: Challenges, Proposed solutions and their pitfalls. *Education Policy Analysis Archives, 16*(11). Retrieved [date] from http://epaa.asu.edu/epaa/v16n11/.

Abstract
In recent years there has been a renewed interest in understanding the levels and trends in high school graduation in the U.S. A big and influential literature has argued that the "true" high school graduation rate remains at an unsatisfactory level, and that the graduation rates for minorities (Blacks and Hispanics) are alarmingly low. In this paper we take a closer look at the different measures of high school graduation which have recently been proposed and which yield such low estimates of graduation rates. We argue that the nature of the variables in the Common Core of Data, the dataset maintained by the U.S. Department of Education that is the main source for all of the new measures, requires caution in calculating graduation rates, and the adjustments that have been proposed often impart significant downward bias to the estimates.
Keywords: High school graduation; measurement; Common Core of Data

El uso de datos administrativos para estimar tasas de graduación: Desafíos, soluciones propuestas y sus peligros

Resumen
En los últimos años ha habido un renovado interés en la comprensión de los niveles y tendencias de la graduación de la escuela secundaria en los EE.UU. Una gran e influyente literatura ha argumentado que la "verdadera" tasa de graduación escolar se mantiene en un nivel insatisfactorio, y que las tasas de graduación de las minorías (negros e hispanos) son alarmantemente bajas. En este trabajo se examina con mayor atención los indicadores de graduación de escuelas secundarias que recientemente se han propuesto, que dan por resultado esas estimaciones de las tasas de graduación excesivamente bajas. Nosotros sostenemos que la naturaleza de las variables en la Base Central de Datos (Common Core of Data), desarrollada por Departamento de Educación de los EE.UU. que es la principal fuente para todas las nuevas medidas, demandan cautela en el cálculo de las tasas de graduación, ya que las adaptaciones que se han propuesto, ha menudo implican un importante sesgo para reducir las estimaciones de graduación.
Palabras clave: graduación de la escuela secundaria; de medición; base común de datos.

High school graduation remains one of the most significant and basic indicators of educational attainment. In a world where more educated workers earn significantly higher wages, it is also an important indicator of future earnings and other labor market outcomes. In recent years there has been a renewed interest in understanding the levels and trends in high school graduation in the U.S. In particular, a big and influential literature has argued that the true high school graduation rate in the U.S. remains at an unsatisfactory level and that the graduation rates for minorities (Blacks and Hispanics) are alarmingly low. These studies include Greene (2001), Greene and Forster (2003), Greene and Winters (2005, 2006), Swanson (2003, 2004), and Education Week (2006, 2008)—see Appendix Table A-1, which summarizes these estimates. In earlier work (Mishel and Roy, 2006), we had examined data from diverse sources—including school and district administrative data from the U.S. Department of Education, longitudinal surveys which follow individual students over time, household surveys and the decennial census—and found this claim (particularly, the assertion that Blacks and Hispanics have only a 50% chance of graduating from high school with a regular diploma) to be seriously inaccurate. In this paper we take a closer look at the different measures of high school graduation which have recently been proposed and which yield such low estimates of graduation rates. We argue that researchers and policymakers must remain cautious in using variables in the Common Core of Data (CCD), the dataset maintained by the U.S. Department of Education that is the main source for all of the new measures;[1] the adjustments that have been proposed to adjust for its flaws often impart significant downward bias to the estimates.

The rest of the paper is broadly divided into two parts. In the next section, we analyze the nature of the variables recorded in the Common Core of Data (CCD), emphasizing the particular

`[1] The CCD is a statistical database maintained by the National Center for Education Statistics (NCES), an arm of the U.S. Department of Education.

features that make it imperative for researchers to be careful when calculating graduation rates. This is more so when one wants to compare graduation rates across states or over time. In the following section, we critically examine the most influential and popular graduation rate measures that have been proposed recently. We argue that when the new studies adjust CCD data to account for size of the entering ninth grade class and population growth during high school years, the new measures still impart significant downward bias to the estimates; the bias is much worse for Black and Hispanic graduation rates. We also briefly discuss two recent studies, Warren and Halpern-Manners (2007) and Heckman and LaFontaine (2007), which address discrepancies in estimated graduation rates from different sources. Two appendices provide supplements to this analysis. Appendix A lists estimates of graduation rates from recent studies which mostly or wholly rely on CCD data. Appendix B discusses whether the population adjustments used in Greene and Winters (2006), to account for differential migration or population growth across states and school districts, are reasonable and valid.

Challenges of CCD Data

The enrollment and diploma counts in the Common Core of Data are the only data available at the state and local (school and school district) levels, so it is not surprising that researchers have tried to compute graduation rates with these data. We believe there are important limitations to any computation of graduation rates using the CCD, setting aside any question of the quality and completeness of the data. *This is because the CCD does not measure high school graduation rates of entering ninth graders.* Consequently, researchers must estimate graduation rates by constructing what they describe as cohort graduation rates based on enrollment and diploma data for particular years. (These measures are different from longitudinal rates that would be calculated from tracking individual students through school.)

CCD's Limits

There are several data limitations that frustrate this effort, including an inability to distinguish between on-time diplomas and late diplomas, difficulty in approximating the true size of entering ninth grade cohorts, difficulty in estimating transfers in and out of school districts, and number and types of exit options including definition of regular diplomas which differ from state to state, making a straightforward comparison problematic and possibly misleading. We discuss these in more detail below.

Diploma counts and cohorts. It is not generally understood that the diploma counts in the CCD include all diplomas, on-time or not, even though some people refer to the rates calculated using the CCD as on-time rates. Unless very specific assumptions are made about the distribution of diplomas among on-time graduates and late graduates, whose veracity has to be checked by data from independent sources, it is not possible to compute 4-year or 5-year or even 6-year graduation rates using diploma data from the CCD. This is particularly problematic as there are trends in high school graduation rates, and static assumptions using diploma data from a particular year and a different survey are likely to be incomplete.

Entering ninth graders. Researchers generally acknowledge that the graduation rate should reflect how many *entering* ninth graders complete high school with a diploma. Unfortunately, the CCD does not report *entering ninth graders*; rather, it reports *ninth grade enrollment*, including students who are repeating 9th grade (that is, who entered 9th grade the prior year or even earlier).

This is an important distinction because there is substantial retention of students, particularly minorities, in 9th grade and sometimes in 10th grade. We find that for the nation as a whole, there are 12–13% more students in 9th grade in public schools than in the 8th grade in the previous year; for Blacks and Hispanics the rate is more like 25%. Since retention is larger for some demographic groups, and in some states compared to others, the method for accounting for retention—or not doing so—can greatly affect racial comparisons and state comparisons.

This can be clearly seen in Table 1, which shows 9th grade enrollment in 2003–04 as a percentage of the previous year's (2002–03) 8th grade enrollment, disaggregated by race. For almost all state-race pairs, 9th grade enrollment in 2003–04 is well above the previous year's 8th grade enrollment. The underlying reason is grade retention at the 9th grade, which particularly affects minorities.[2] For the nation as a whole, there were 22% more Blacks and 23% more Hispanics in 9th grade in 2003–04 compared to the corresponding 8th grade enrollment in the previous year.[3] The percentages vary widely across states—e.g., while in states like Mississippi and Utah the bulge is smaller and similar across racial groups, in Nebraska, New York, and Wisconsin, 9th grade enrollments for both Blacks and Hispanics are more than 30% higher than the previous year's 8th grade enrollment.

Table 1
Ninth-grade enrollment in public schools in 2003–04 compared to 8th grade enrollment in public schools in 2002–03, by state (%)

State	White	Black	Hispanic	Asian
Alaska	107	100	106	103
Alabama	106	113	120	118
Arkansas	102	104	112	120
Arizona	122	127	121	128
California	104	114	117	109
Colorado	106	122	119	108
Connecticut	103	121	127	110
Delaware	110	111	111	111
Florida	120	137	129	122
Georgia	111	123	131	111
Hawaii	117	115	116	119
Iowa	107	123	124	108

[2] Two other possible explanations have often been advanced for this heaping of students at the 9th grade (the 9th grade "bulge"). One is population growth, as migration of students from one state to another between the 8th and the 9th grades can increase the populations in some states. However, this is unlikely to explain the bulge at the national level, where the only increase can come through net international migration. While net immigration is an important factor in overall population growth, most of it is concentrated among the Hispanic population, and recent immigrants are much less likely to enroll in schools and thereby be included in enrollment counts. The second explanation is the transfer of students from private to public schools between the 8th and 9th grades. It is true that private schools educate a significantly lower percentage of the population in the high school grades compared to the middle school grades. It is also true that the importance and spread of private schools is different in different states, which may account for some of the difference in 9th grade bulge across states. However, as the analysis below shows, the private-to-public school transfer can only explain a small part of the bulge. Most of the bulge is concentrated among the Blacks and the Hispanics, for whom the issue of transfer from private to public schools is much less important than it is for White students.

[3] This table excludes Washington, D.C., as enrollment data for 2003–04 were not available.

State	White	Black	Hispanic	Asian
Idaho	105	98	108	116
Illinois	106	123	117	109
Indiana	105	117	118	109
Kansas	104	109	127	106
Kentucky	112	119	132	105
Louisiana	107	85	109	104
Massachusetts	103	125	124	108
Maryland	108	125	131	111
Maine	98	112	106	98
Michigan	109	132	119	108
Minnesota	103	110	114	102
Missouri	106	114	116	112
Mississippi	104	107	108	106
Montana	105	116	107	99
North Carolina	110	123	134	113
North Dakota	103	99	125	87
Nebraska	106	144	131	112
New Hampshire	105	114	115	103
New Jersey	101	117	121	105
New Mexico	108	112	118	117
Nevada	112	123	130	125
New York	105	139	142	131
Ohio	108	127	124	113
Oklahoma	104	115	118	105
Oregon	103	106	114	106
Pennsylvania	106	123	128	119
Rhode Island	107	122	124	112
South Carolina	115	127	144	124
South Dakota	102	100	115	104
Tennessee	110	117	136	116
Texas	110	125	128	112
Utah	101	101	105	104
Virginia	110	124	129	115
Vermont	103	105	121	100
Washington	109	117	122	112
Wisconsin	111	134	135	109
West Virginia	108	114	120	110
Wyoming	103	103	116	105
United States	108	122	123	113

This table excludes Washington DC, as enrollment data for 2003–04 were not available. Source: Common Core of Data, National Center for Education Statistics.

In the presence of grade retention, and in particular when the extent of grade retention differs significantly across states, graduation rates using CCD enrollment numbers, which fail to distinguish between entering ninth-graders and repeating ninth-graders will be biased. For example, states with a stricter retention policy will appear to push many of their students out of school even when their true graduation rates might be much higher.

Moreover, the trends in grade retention can often change from year to year, affecting comparisons not only across states but across years as well. Figure 1 is taken from Mishel and Roy (2006) and shows that since 1988 there has been a steady increase in the overall size of the 9th grade as compared to previous year's 8th grade. The trends are different for different racial groups—with the white rate slightly inching up, while the Black and Hispanic rates slightly decline in recent years after reaching a plateau of 25%.

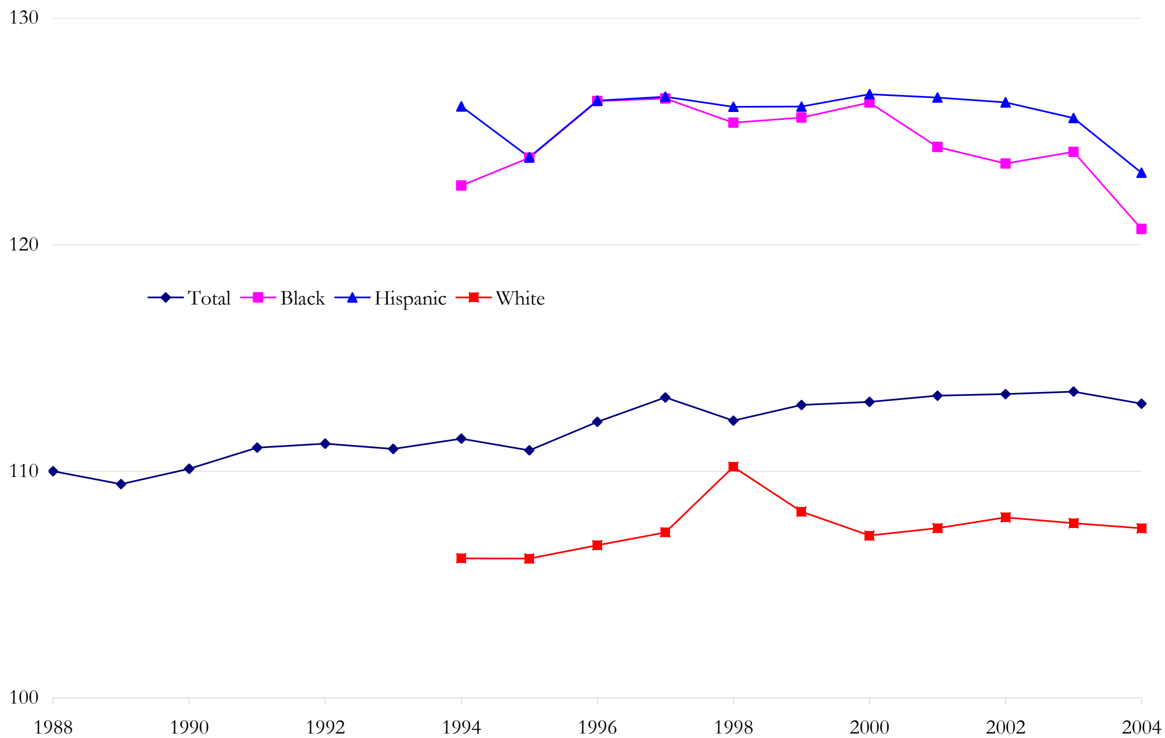

Figure 1. Ratio of 9th grade enrollment to previous year's 8th grade enrollment, 1988–2004
Source: Authors' calculations from CCD database. 100 = a one-to-one ratio. Greater than 100 indicates more 9th than 8th graders. The figures for individual races pertain only to the 40 states for which we have continuous data over this period, and are available only from 1992–93 onwards. The figure for Total includes all 50 states.

Transfers. The diploma counts reported in the CCD include diplomas that are earned by students who transferred into a school, district, or state. Consequently, graduation rates can be distorted in areas where there are substantial increases or decreases in the student population. Since the CCD only contains data on total enrollment by grade (and breakdown by race/ethnicity and gender), it is not possible to separate transfers from other enrollment changes (e.g., out-transfers distinguished from those who have dropped out). Some computations using the CCD do not account for this, while others do (e.g., Warren, 2005). The results of adjusting for transfers in and transfers out are problematic; however, making no adjustment may be equally problematic, particularly for some urban school districts where student mobility rates are extremely high.

Number and Types of Exit Options. Each state defines what it means to complete high school including graduating with a diploma, and that definition can change over time, frustrating the need to have as consistent a definition as possible. As Guy et al. (1999) show, the number and types of exit options available in each state differ significantly from state to state. This heterogeneity is particularly true for special education students, who may or may not have exit options based on occupational diplomas, IEPs, or diplomas based on attendance, in addition to a standard diploma.

This heterogeneity is partly reflected in the fact that several states have different categories of completion as reported in the CCD. The CCD groups all completers in three categories—*diploma recipients*, *high school equivalency recipients*, and *other high school completers*.[4] The first category (diploma recipients) form the data used by all CCD-based studies of high school graduation rates, including those by Greene (2001), Greene and Forster (2003), Greene and Winters (2005, 2006), Swanson (2003, 2004), Warren (2005) and by the National Center for Education Statistics itself (Seastrom, Hoffman, Chapman, & Stillwell, 2005, 2007). The second category is supposed to contain GEDs and similar equivalency documents, but Department of Education officials believe these data are not very reliable. The third category is supposed to contain those with certificates of completion or attendance. The cross-state heterogeneity is significant—in states like Georgia, Oregon, and Alabama, the share of the third category is more than 9% of all completers, while in states like California, Illinois, and Massachusetts, there are no completers in this category. In the absence of information about the nature of these completion options, and how well they approximate a regular high school diploma, estimates of graduation rates in these states might be biased and are not reliable bases for measures to be compared with other states.

Reliability of CCD counts on enrollment. Greene and Winters (2006) argue that enrollment and diploma counts as reported in CCD are quite reliable:

> CCD establishes standards and procedures for states to collect and report enrollment and diploma data. If states do not meet those standards or follow those procedures, their data are not reported…. It should not be difficult for states to track enrollment and diplomas. Enrollment counts are based on schools taking attendance, which schools are very good at doing. One reason schools are likely to keep accurate attendance is that enrollment counts are the basis for school funding by state and federal governments. Further, because attendance determines how much money state and federal governments allot to schools, these higher levels of government are inclined to check and ensure the accuracy of attendance figures.

However, though the NCES strives for an accurate and uniform count of enrollments and diplomas, and the CCD data are believed to be generally reliable, there has not been any independent estimate of veracity of these data. Dorn (2006) has highlighted problems with CCD enrollment counts in Detroit, and it is likely that such problem persists in many other schools and districts too. This is particularly important as CCD data are used to estimate graduation rates not only for big cities and states, but also for smaller school districts—it is not uncommon to find in CCD data significant jumps in enrollment and/or diplomas from year to year.

Table 2 and Table 3 show some suggestive evidence about the instability of graduation rates calculated using CCD enrollment and diploma counts. Table 2 calculates the graduation rates for

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[4] The definitions of these are as follows, obtained from the website of the Common Core of Data (CCD), NCES, U.S. Department of Education. *Total Diploma Recipients*—This is the total number of students in a state who received a diploma during the previous school year and subsequent summer school. *Total HS Equivalency Recip*ients—This is the number of students in a state ages 19 or younger who received a formal document certifying that an individual met the state requirements for high school graduation equivalency. *Total Other HS Completers*—This is the number of students in a state who received a certificate of attendance or other certificate of completion, in lieu of a diploma during the previous school year and subsequent summer.

Detroit City School District using the Swanson CPI index, following Dorn (2006). As is evident, there was a dramatic decline in graduation rate not only from 2001–02 to 2002–03 (from 74% to 22%), which could be ignored as faulty data, but also from 2003–04 to 2004–05, when the graduation rate jumped from 25% to 38%.

Table 2
CPI Graduation Rates in Detroit City School District
(includes all public schools in Detroit except charter schools)

Measure	2001–02	2002–03	2003–04	2004–05	2005–06
8th grade enrollment	9,975	12,048	12,357	11,860	10,513
9th grade enrollment	14,494	20,025	17,837	16,832	15,690
10th grade enrollment	9,291	11,275	9,899	9,326	9,820
11th grade enrollment	6,355	7,795	7,421	6,581	7,365
12th grade enrollment	4,618	6,020	5,244	5,604	5,352
Diplomas issued	5,540	5,975	4,975	5,673	
Swanson CPI	74.2%	21.7%	24.9%	37.9%	

Source: Authors' calculations using data from CCD.

Table 3 shows that there is a lot of similar year-to-year instability even for graduation rates calculated at the state level. Here we use estimates of graduation rates reported in Haney et al (2004), who use the simple 8th-grade-to-graduation rate measure (termed the Basic Completion Rate or BCR-8 by Warren (2005))—the table shows states where graduation rates jumped by 5% or more across consecutive years.[5] It is important to note that these fluctuations are not due to exogenous adjustments or assumptions imposed by researchers, but rather due to the data reported in CCD itself. If the CCD were indeed a most reliable count of enrollments and diplomas, then it would be unlikely to see this much instability in the data, particularly when they are aggregated at the state level. Some of the jumps have occurred in big states like Ohio and Texas. (The district level graduation rates would show even more volatility.)

Phelps (2005) discusses in detail the issue of enrollment counts as reported by school districts and stored in the CCD. He makes the distinction between student membership, enrollments and attendance, and argues that researchers wishing to construct valid graduation rates using data from the CCD should be aware of the subtle differences among these categories. He also notes how migration of students is not consistent across different states and school districts and has the potential to impart significant bias to measured graduation rates.

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[5] BCR-8 is simply the number of diploma recipients in the spring of year *t+5* divided by enrollment in 8th grade in the fall of year *t*. For example, the graduation rate for the Class of 1996 (1995–96) is the number of diplomas earned by summer of 1996 divided by 8th grade enrollment in 1991–92.

Table 3
Instability in CCD graduation rates across states: Increases or declines in graduation rates by at least 5% across consecutive years

State	First year	Graduation Rate Year 1	Year 2	Year 3
Arizona	1989–1990	76%	82%	
Arizona	1992–1993	81%	75%	68%
Connecticut	1998–1999	79%	85%	
Hawaii	1989–1990	96%	85%	
Kentucky	1993–1994	83%	78%	75%
Louisiana	1991–1992	59%	64%	
Massachusetts	1988–1989	79%	85%	
Minnesota	1996–1997	81%	87%	
Mississippi	1988–1989	60%	66%	
Nevada	1988–1989	73%	79%	
Nevada	1995–1996	68%	76%	
New Jersey	1996–1997	90%	82%	
New Jersey	1998–1999	83%	91%	
New Mexico	1996–1997	72%	66%	
Ohio	1994–1995	83%	78%	
Oregon	1994–1995	76%	70%	
South Carolina	1988–1989	70%	64%	
South Dakota	1998–1999	75%	80%	
Tennessee	1995–1996	71%	66%	62%
Texas	1990–1991	74%	69%	
Vermont	1988–1989	76%	85%	77%
Wyoming	1999–2000	78%	73%	

Source: Authors' calculations from data reported in Haney et al. (2004), Table 4. The graduation rates reported are simple eighth-grade-to-diploma rates (termed the Basic Completion Rate or BCR-8 by Warren, 2005).

Diploma definitions. Not only does each state have different numbers and types of exit options, every state has its own definition for a regular diploma (see the NCES report of the Task Force on Graduation, Completion, and Dropout Indicators, 2005, and the report *Diploma Counts*; Education Week, 2006). According to data collected by the Education Commission of the States and reported by Education Week, state requirements for obtaining a standard diploma for the 2005–06 school year range from a low of 13 total credits in California, Wisconsin, and Wyoming to a high of 24 total credits in Alabama, Florida, South Carolina, and West Virginia (Lloyd, 2006). In nine states, students who want a standard diploma has to earn 23–24 credits, while six states only require 13–16 credits. A few other states, including Massachusetts, leave the number of required credits as an option for local school boards.

Moreover, states often change the requirements for diplomas, as New York did recently: Requirements for earning a local diploma went up from 20.5 credits to 22 credits. None of these changes will be reflected in the CCD data that the recent studies—particularly those by Swanson and Greene and his coauthors—use for comparing graduation rates across states and over time. Without the additional adjustments that none of the studies referred to above makes, one cannot conduct either a state-by-state or a year-by-year comparison with the existing CCD data, particularly if the goal is to judge student or school performance.

The pitfalls in comparing across states using CCD-based graduation rates can be illustrated using Table 4. We show two pairs of states—Arkansas and Georgia, and North and South Carolina. Arkansas and Georgia are both southern states, as are North and South Carolina. However, the graduation rates calculated by Swanson and Greene, show large differences in graduation states between these pairs of states. For example, while Arkansas has an overall graduation rate of 72%, Georgia's rate is only 56%—a difference of 16% (Swanson, 2003, 2004). The Greene method yields a similarly large difference—74% graduation rate in Arkansas compared to 56% in Georgia (Greene and Winters, 2006). These differences persist across racial groups—the Swanson CPI shows a 18% gap in graduation rates for Blacks (64% versus 46%), while the Greene method yields an even larger 21% gap (69% versus 48%). The picture is basically the same if we compare North and South Carolinas—the former has a graduation rate of 66% (Swanson CPI) compared to 53% for the latter. The difference is even larger for the Greene method, 69% against 54%.

However, the difference between these pairs of states is minimal when it comes to 4th and 8th grade reading and math performance in the National Assessment of Educational Progress (NAEP) data. As Table 4 shows, the average scale scores of students in Georgia and Arkansas are very similar in these national tests, despite the supposedly higher attainment in Arkansas—for Black students, Georgia performs better than Arkansas. (Hispanic students in Arkansas perform better than those in Georgia, but Hispanic students form a negligible portion of the student population in Arkansas.) It is difficult to reconcile a 18–21% gap in graduation rates for Blacks between Arkansas and Georgia when Blacks in Georgia score significantly higher than their counterparts in Arkansas in reading and mathematics at both the 4th and 8th grades. The simplest explanation is that Greene's and Swanson's measures are unreliable indicators of the relative performance of Black students in Arkansas vis-à-vis Georgia.[6] In fact, most of the difference can be explained by the difference in the types of exit options available in either state—e.g., how Georgia's CCD report categorizes 9% of all completers in the "Other High School Completers" category (i.e., these students are not included in the regular diploma counts).[7]

Outside the South, while students in Massachusetts score at the top nationally—for example, in 2007 the NAEP 8th grade scores (average scale score) for Massachusetts is 298 in mathematics and 273 in reading, both being the highest in the nation—in terms of graduation the state is ranked far below by recent studies. Greene and Winters rank it 28th in the nation (Class of 2003) and 21st in the nation (Class of 2002), while Warren ranks it 17th (Class of 2002) and Swanson (2004) ranks it 26th (Class of 2001).

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[6] Graduation rate measures might still be meaningful if properly calculated and under certain circumstances for *within-state* comparisons; however, as things currently stand, they are not of much use if we want to compare graduation rates across states.

[7] There does not seem to be a noticeable difference in the number of credits required in each state to earn a standard diploma (Lloyd, 2006).

Table 4

NAEP performance of neighboring Southern states with different graduation rates as calculated by Greene and Swanson

	Arkansas	**Georgia**	**NC**	**SC**
Racial Composition (% of enrollment, Class of 2003)				
Asian	0.8	2.5	2.0	1.1
Hispanic	2.2	6.2	6.0	2.7
Black	23.0	38.2	31.3	41.5
White	73.5	53.0	59.2	54.5
Swanson graduation rates, CPI, Class of 2003				
All	71.8	56.3	66.2	52.5
Asian	—	75.3	77.6	—
Hispanic	—	39.5	52.9	—
Black	64.3	45.9	57.7	—
White	74.8	63.1	71.3	—
Greene graduation rates, Class of 2003				
All	74	56	69	54
Asian	—	—	—	—
Hispanic	—	—	—	—
Black	69	48	62	—
White	77	64	76	—
NAEP Performance in 2005—All				
4th grade reading	217	214	217	213
4th grade mathematics	236	234	241	238
8th grade reading	258	257	258	257
8th grade mathematics	272	272	282	281
NAEP Performance in 2005—Hispanic				
4th grade reading	212	203	204	215
4th grade mathematics	229	229	234	236
8th grade reading	250	247	248	—
8th grade mathematics	266	258	265	269
NAEP Performance in 2005—Black				
4th grade reading	194	199	200	197
4th grade mathematics	214	221	225	223
8th grade reading	236	241	240	242
8th grade mathematics	243	255	263	263
NAEP Performance in 2005—White				
4th grade reading	225	226	227	225
4th grade mathematics	242	243	250	250
8th grade reading	266	268	267	267
8th grade mathematics	281	284	292	294

Cells with — had insufficient data for reliable estimates. Source: The NAEP numbers are obtained from the website of The Nation's Report Card, National Center for Education Statistics (http://nces.ed.gov/nationsreportcard/). The Greene graduation rates are from Greene and Winters (2006), while the Swanson graduation rates (CPI) are from Education Week (2006).

CCD as Census?

The CCD collects data on every public school and public school district in the country. However, this fact alone does not make it particularly suitable for calculating graduation rates. The problem is that the CCD does not track individual students over time, as explained above. The best one could do to calculate graduation rates using the CCD data is to compare the number of diplomas in a particular year, such as 2006, over the number of entering 9th graders in the fall of 2002. This is problematic in part because we cannot track students who drop out or join between the 9th grade and graduation—that is, we cannot account for leavers and joiners. This is particularly important if we are to calculate graduation rates at the state and school district levels, as low-income minority youths—whose graduation rates are of the greatest concern—also have the highest rates of mobility. Beyond the issue of mobility, the CCD data only has grade-specific enrollments, which does not allow a researcher to know the number of entering 9th graders. Estimating the number of first-time 9th graders based on 9th grade enrollments—or even a smoothed average of 8th, 9th, and 10th grade enrollments as Greene and Winters have done—is problematic because of significant grade retentions in the 9th grade. The major point here is that having a larger sample, or "census," on enrollment and diploma counts does not necessarily provide accurate graduation rates because the CCD is not designed to do so.

In earlier work, we argue that because of these limitations of the CCD data, graduation rates constructed using CCD data should be benchmarked against those obtained from more reliable sources (Mishel and Roy, 2006). Longitudinal studies such as the National Educational Longitudinal Study (NELS) conducted by the U.S. Department of Education and the National Longitudinal Surveys (NLSY) conducted by the U.S. Department of Labor do not suffer from either of these problems. For example, the NELS began with students in their 8th grade, and then followed them over the next 12 years. This data set gives us the correct rates of high school graduation, including rates of on-time completion and completion via alternative methods like the GED. (The data set also allows us to link the problem of non-completion to the respective families' socioeconomic status and other family and school indicators.) The issue of grade retention or the transferring of schools does not affect the NELS results. This is the same for other national longitudinal surveys such as the NLSY. Because these surveys have samples that allow them to minimize sampling error and measure what is desired, graduation rates using the CCD should at least be benchmarked to these longitudinal surveys.

A true student census would require a national student identifier system, so that we could track every student from his or her entering of 9th grade until he or she graduates or drops out. The NELS:88 is the big, representative sample version of this idea—for its sample, it does exactly what we would do for the universe if it were possible. In statistical terms, saying the CCD is preferred over the NELS because it is a "census" is to overvalue reducing sampling error while ignoring much worse non-sampling errors.

Finally, labeling the CCD as a census overlooks the fact that there is only slight quality control and checking of the data provided by school districts to their states and by the states to NCES. Whether the questionnaire is completed as NCES expects and is done so consistently across districts and states and over time is not known because there are no audits done of school district respondents. In contrast, the national longitudinal study data are very carefully compiled.

In general, the CCD data do not provide the measure that we seek: the graduation rate of entering 9th graders, either on time or eventual/final. These problems do not invalidate the use of the CCD, but acknowledging them is important. The CCD is certainly not a data set that can be described as a longitudinal record of students. At best, each year of the CCD contains a census of enrollment and diplomas, but these are only some of the ingredients in a graduation formula that reflects many choices to address the limitations of the CCD.

Other Issues

There are some definitional differences between the administrative and the other data, but these differences do not explain the large gaps between various estimated graduation rates with regular diplomas. For instance, the household-based and longitudinal data include both private and public schools, while the CCD data is for public schools alone. Since private schools only comprise about 10% of enrollment, even a 20% private-school advantage in graduation would create an upward bias in longitudinal and household completion rates of 2%. Furthermore, any such bias would affect the completion rates primarily of white students.[8] The longitudinal and household-based data also reflect educational attainment eight to thirteen years after what would be a four-year on-time completion year. In contrast, the CCD probably reflects the receipt of regular diplomas of students who have been enrolled in school that same year. Thus, one difference between the two types of data is that the CCD probably doesn't capture high school completion past the ages of 18 or 19. Using the NLSY79 data as a guide, we found that later completion among blacks and Hispanics boosts graduation by 3% and among whites about 1% (Mishel and Roy, 2006). Again, this still leaves a nontrivial gap between the CCD-based measures and all of the other sources of data.

It is difficult to assess what can be causing these gaps, because there is very little documentation and assessment of the CCD data that we could locate, especially since the measures are not necessarily consistent across states. This lack of information is a prudent researcher or policymaker must be cautious about conclusions when discussing the characteristics of the CCD. This lack of information about the CCD has also left us puzzled why analysts give such great confidence in their calculations using the CCD data.[9]

Recently-Proposed and Popular Measures of Graduation Rates

Swanson's Cumulative Promotion Index (CPI)

One of the most popular new measures of graduation rates has been proposed by Swanson (2003, 2004). This synthetic measure compares the enrollment of students in grade $n+1$ in year $t+1$ to the enrollment of students in grade n in year t (and diplomas in spring of year $t+1$ to 12th graders in fall of year t) and then calculates CPI as the product of these grade-to-grade (or 12th-to-diploma) ratios. He calls the measure the Cumulative Promotion Index (CPI), which has been used by many organizations, including the Education Week in its annual Diploma Counts issues. Unlike other methods, Swanson's CPI purports to calculate on-time graduation rates. However, the CPI does not adjust for grade retention. As a result, Swanson's CPI depends on the size of the 9th grade bulge.

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[8] As discussed elsewhere, minorities are much less likely to be in private schools than whites. While 14% of Whites attend private schools at the elementary level, the figures for Blacks and Hispanics are both about 5%. The respective figures at the high school level are 10% for Whites, 3% for Blacks and 4% for Hispanics.

[9] Kaufman, Kwon, Klein, & Chapman (2000) discusses the accuracy and comparability of estimates from the CCD and the CPS. See also Kaufman's chapter in Orfield (2004) for more information about the CCD.

This can be seen in Table 5, where we calculate the CPI both using the 9th grade and the 8th grade. That is, we calculate the usual Swanson CPI and also extend it down to the 8th grade by multiplying it with the 8th-grade-to-9th-grade progression ratio.[10]

Table 5
Swanson CPI, 2003, based on 9th grade and extended to 8th *grade*

	48-state CPI		Published 50-state
	9th grade start	8th grade start	CPI (9th grade)
Group	(1)	(2)	(3)
Whites	77.6	83.4	76.2
Blacks	53.8	65.3	51.6
Hispanics	58.9	72.5	55.6
Asians/Pacific Islanders	86.2	97.1	77.0

Source: Swanson's (published) figures in column (3) are taken from Education Week (2006). These are slightly different from the numbers in column (1) calculated by the authors due to data availability for jurisdictions.[11]

As is evident by comparing columns (1) and (2), extending the Swanson CPI to the 8th grade results in a significant increase in the graduation rates. The increases are particularly large for the minorities, going from 54% to 65% for Blacks and from 59% to 73% for Hispanics. This contradictory result highlights one important problem with the Swanson CPI. Note that if it were indeed an accurate measure of *on-time* graduation rates, the 8th grade CPI would have to be smaller than the 9th grade CPI.[12] The fact that the 8th grade CPI in Table 5 is consistently higher than the 9th grade CPI—theoretically an impossible result—highlights an important practical problem with the Swanson measure.

The answer lies in the fact that the Swanson CPI does not take account of pervasive grade retentions in high school grades, particularly retention in the 9th grade (the 9th grade bulge). Swanson's failure to deal with grade retention makes the CPI an unsatisfactory measure of either on-time or eventual graduation. Moreover, different states and school districts have different policies regarding grade retention. As a result, a naïve application of the Swanson CPI without accounting for retention would confound differences in retention policy with differences in graduation rates and would be a unreliable measure to use for accountability purposes.[13]

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[10] The Swanson CPI is composed of four grade-to-grade progression ratios—one between the 9th and 10th grades, one between the 10th and 11th grades, one between the 11th and 12th grades, and the last one between the 12th grade and graduation. This synthetic product can be easily extended to the 8th grade by including the progression ratio between the 8th and 9th grades.

[11] The calculations in the first and second columns include 48 states. Enrollment data are missing for Washington DC in 2003–04. Diploma data for 2002–03 are missing from New Hampshire and South Carolina.

[12] All students who graduated within 5 years since the beginning of their 8th grade should be included in the on-time 8th-grade-to-graduation rate. However, some people who did not graduate in 5 years beginning in 8th grade but did graduate in 4 years beginning in 9th grade—e.g. 8th-grade repeaters who then completed high school in 4 years—will be included *only* in the on-time 9th-grade-to-graduation rate, thus making it greater than the on-time 8th-grade-to-graduation rate.

[13] Swanson acknowledges that grade retention is a potential problem. His response is that "the CPI graduation rate estimate, though not perfect, was the least susceptible to bias caused by the 9th grade enrollment bulge" (Orfield et al., 2004, p. 10). He further adds that "However, it should be noted that an enrollment bulge caused the CPI and all other measures examined to *underestimate*, not overestimate, the

Averaging grade enrollments to estimate entering ninth graders

Greene et al. Another popular set of graduation rates has been published by Jay Greene and his coauthors (see Greene, 2002, Greene and Forster, 2003, Greene and Winters, 2005, Greene and Winters, 2006). Unlike Swanson, Greene and his co-authors calculate a final or eventual completion rate, rather than a four-year on-time rate.[14] Greene's initial measure released in November 2001 (revised in April 2002) compared diplomas to the eight grade enrollment four years earlier. As such, the resulting graduation rates are not distorted by retention rates during high school, including the ninth grade bulge. However, in later studies (Greene and Forster, 2003, Greene and Winters, 2005, Greene and Winters, 2006), Greene moved away from using 8th grade enrollment as the base. Greene and his coauthors currently acknowledge that retention of students at the 9th grade requires adjustments to the CCD enrollment count of 9th graders to produce an estimate of *first-time (entering)* 9th graders. The two main components of the (current) Greene method are—first, averaging over the enrollments in the 8th, 9th and 10th grades (for a particular cohort) to estimate the size of the *entering* 9th grade for this cohort and second, inflating this estimate of entering 9th graders by growth in population during the cohort's high school years to arrive at the final number for the projected graduating cohort—the number of students who could possibly graduate with this particular cohort or class.

We show below that averaging the 8th, 9th and 10th grade enrollments for a particular cohort is unlikely to yield the correct estimate of entering 9th graders and that the bias is particularly large for minorities. Because this averaging is also advocated by recent NCES studies (e.g., Seastrom et al., 2005, 2007) and the draft regulations allowing states to use this type of measure as an interim substitute for longitudinal measures, it is important to explore this feature of Greene's research. The population adjustments in the Greene and Winters (2006) method can also be inaccurate. At the national level the net increase in the cohort size can only come from net international immigration during high school years, but we know little about who these people are, whether they enroll in U.S. schools after they immigrate, and whether educational attainment subsequent to enrollment reflects the performance of U.S. high schools or is more influenced by their educational experience in their native countries. Further, as shown in an appendix, due to a use of population estimates benchmarked to different census years, the population adjustments as reported in Greene and Winters (2006) are overstated and results in an underestimation of graduation rates, particularly for minorities.

Seastrom et al. Researchers at the National Center for Education Statistics, an arm of the U.S. Department of Education, have borrowed Greene's averaging method and proposed the Averaged Freshman Graduation Rate (AFGR) (see Seastrom et al., 2005, 2007). This is similar to the Greene and Winters graduation rate in that it uses the average of 8th, 9th and 10th grade enrollments for a particular cohort as the best estimate for that cohort's number of entering 9th

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actual graduation rate. Therefore, this suggests that all measures are currently overestimating graduation rates, and actual rates would likely prove even lower" (emphasis added).

[14] Greene mentions this issue in his paper, but there is still a popular perception that the Greene method yields a four-year completion rate. For example, the National School Board Association's Center for Public Education notes in its website that "Many recent high-profile reports on high school graduation are based on *four-year estimates*, most notably, the Manhattan Institute's methodology which calculates *on-time graduation* at about 70 percent (Greene, 2003)" (Center for Public Education, 2006; emphasis added). Similarly, Sara Mead at the Education Sector writes in a recent report, "Research by the Manhattan Institute found that only about 65 percent of boys who start high school graduate *four years later*, compared with 72 percent of girls" (Mead, 2006, p. 10; emphasis added).

graders. The AFGR is obtained by dividing the number of diplomas issued in a year by this smoothed cohort enrollment. However, unlike Greene, the NCES studies do not have any additional population adjustments, so the AFGR graduation rates are higher.[15]

For example, for the 2002–03 school year, the averaged freshman graduation rate (AFGR) for public schools is 73.9%, obtained by dividing the number of public school diploma recipients for that school year (2,719,947) by the *average* of the 8th-grade public school enrollment for 1998–99 (3,529,963), 9th-grade public school enrollment for 1999–2000 (3,986,992), and 10th-grade public school enrollment for 2000–01 (3,529,652) (Seastrom et al, 2007). For the 2003–04 school year, the AFGR for the 48 reporting states[16] and the District of Columbia, similarly calculated, is 75.0%.

Gaps between 8th grade and averaged enrollments. Both the Greene studies and the NCES studies use the average of enrollments in 8th, 9th, and 10th grades as a proxy for the size of the entering 9th grade class. However, though this mitigates the 9th grade bulge problem in graduation rate calculations, averaging does not eliminate the problem. The averaged estimate of cohort size still falls short of the true cohort size, the size of *entering* 9th graders. One can see the difficulty by comparing the national public 8th grade enrollment in one year to the averaged enrollments (following Greene et al. and Seastrom et al.) over that year and the following two years. The respective averaged enrollments for the classes of 2003 and 2004 were 3,682,202 and 3,396,916, more than 4% higher than the first year's 8th grade enrollment (3,529,963 and 3,261,969, respectively). There are only two ways that the national public school enrollment could grow between the 8th and 9th grades for a particular cohort—if there were a significant net in-migration at the national level or if there were a significant influx of people from private elementary and middle schools to public high schools.[17] Below we show that neither of these two factors can explain the increase in public school enrollment between the 8th and 9th grades as hypothesized by both the Greene and the NCES studies.

Private schools and 9th grade enrollment. While it is true that private schools serve proportionately more students at the primary level than the secondary level, the differences are not large in comparison to public school enrollment (see Table 6). Results from the 1999–2000 Private School Universe Survey conducted by the NCES show that 1999–2000 private school enrollment in 8th and 9th grades was 369,579 and 336,224, respectively.[18] Even if the private-school enrollment difference is accounted for entirely by private-school students moving into public schools, such transfers would increase public 9th grade enrollment by less than 1% compared to previous year's 8th grade enrollment.

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[15] The published NCES studies referred to above do not separately calculate graduation rates by race, though this is possible from the CCD data.

[16] The diploma counts for Wisconsin and New York were missing.

[17] Dropping out between the 8th and 9th grades will lead to an underestimate of the graduation rate, as compared to net influx of students in public schools at grade 9 which will lead to overestimates. Because we focus on the ways in which the graduation measures developed in recent studies are underestimates of the true graduation rate, we omit a discussion here of the issue of dropping out between 8th and 9th grades.

[18] See Broughman and Colaciello (2001), Table 11, page 15. These numbers include students in other than regular programs, e.g. students in special education and alternative programs, and those in a special program emphasis. Restricting analysis to regular elementary/secondary enrollment results in numbers of 347,156 and 309,096, respectively.

Table 6
Enrollment below college for people 3 to 24 years old, by control of school, sex, race, and Hispanic origin, 2004

	Elementary enrollment		High school enrollment	
	% Public	% Private	% Public	% Private
All Races	90	10	92	8
Black, non-Hispanic	95	5	97	3
Hispanic (of any race)	95	5	96	4
White, non-Hispanic	86	14	90	10

Source: U.S. Census Bureau, Current Population Survey, October 2004

Given that 8th grade public school enrollment in 1998–99 was 3,529,963, the best estimate of 9th grade enrollment in 1999–2000 would be 3,529,963 plus transfers from private schools, plus net international immigration. The last one is most likely to be minimal at a national level—certainly less than 1%—and heavily concentrated among the Hispanic population.[19] Assuming that the entire decline in enrollment between the 8th and 9th grades in private schools is accounted for by transfers to public schools, this will imply that the best estimate of public 9th grade enrollment in 1999–2000 is 3,529,963 + (369,579–336,224) or 3,529,963 + 33,355 = 3,563,318.[20] The averaged freshman cohort size estimated in the NCES study for this cohort is 3.3% higher (3,682,202). If we divide the number of diplomas in 2002–03 (2,719,947) by our estimate of entering 9th graders, rather than the averaged cohort size as in the NCES study, the graduation rate increases to 76.3%. This is about 10% higher than the two-thirds rate portrayed in recent studies including the Task Force of the National Governors' Association (2005).

How does that difference grow or shrink when looking at population subgroups? The NCES study does not break down graduation rates by race. However, Blacks and Hispanics are much less likely to attend private schools and much more likely to be retained in the 9th grade, so estimating the size of their entering classes by averaging over 8th, 9th, and 10th grade enrollments is likely to exaggerate the true cohort size more than for the general population. For the Class of 2003, a simple 8th grade-to-diploma graduation rate (BCR-8; see Haney et al. 2004) is higher for Blacks and Hispanics than the AFGR (Seastrom et al., 2005, 2007). The differences are about 1.5% for non-Hispanic Whites but 5% for non-Hispanic Blacks and 7% for Hispanics. Separate calculations by race and ethnicity are important, because private school enrollment is notably smaller for Black and Hispanic populations compared to White. For example, private school attendance for Black students is 5% at the elementary level and 3% at the high school level. Even if we assume that the decline in enrollment at the high school level is entirely accounted for by net transfers to public schools, this will imply that the size of the entering 9th grade class for Black students at public schools is only 2% more than the 8th grade Black enrollment in public schools in the previous year.[21] For Hispanics, the increase is even lower, around 1%.

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19 Calculations from the PUMS micro-data for 2000 American Community Survey show that about 65%—or two-thirds—of those who immigrated to the U.S. at ages 13 and 14 were Hispanics. In contrast, the percentage of Hispanics among the native-born population was less than 10%.

20 Since the Private School Universe Survey has only cross-section results for a particular year, the enrollment numbers in grades 8 and 9 used here—369,579 and 336,224, respectively—refer to successive cohorts rather than the same cohort. However, it is unlikely that the size of the cohort would have changed significantly between these two years.

21 Of all Black students in 8th grade, 95% are in public schools and 5% are in private schools. When this cohort moves on to 9th grade (high school), the 95% of students already in public schools are joined by

Further, most of the difference between the two measures for Whites can be explained in terms of net transfer from private schools to public schools between the 8th and 9th grades, but little of the gap for Black and Hispanic students can be explained in this way. Table 7 disaggregates enrollment and graduation estimates at the elementary and secondary level by school type for each race. The table calculates three different graduation measures: Seastrom et al.'s (2005, 2007) AFGR (using the average of the cohort year's 8th, 9th, and 10th grade enrollments), Haney et al.'s (2004) 8th-grade-to-diploma measure (unadjusted for transfers or other population changes, as discussed below), and a ratio of diplomas to an adjusted 8th grade enrollment, assuming that the entire difference between 8th and 9th grade private-school enrollment moves into public schools as part of the cohort's entering 9th grade enrollment.

The first three rows show the total enrollments in 8th, 9th, and 10th grades for the years in which this cohort would have been in these respective grades. The next row is the average of these three enrollments—the estimate of first-time or entering 9th graders used by Greene's team and NCES. The fifth row is the estimated percentage of students who could theoretically be net transfers from private to public schools, calculated using Census Bureau data in the same was as described for national data. The row below that is the theoretical maximum 9th grade entering cohort using private-to-public transfers. The next row is the number of diplomas reported for 2002–03. The last three rows calculate different graduate measures—the Adjusted Freshman Graduation Rate (Seastrom et al., 2005, 2007), the diploma-to-8th-grade-enrollment ratio (Haney et al., 2004), and the Haney measure after adjusting for the theoretical maximum of private to public transfers.

Table 7
Calculation of BCR-8, AFGR, and adjusted BCR-8 for the class of 2003

Measure	Whites	Blacks	Hispanics
8th graders in 1998–99	2,133,502	515,071	442,535
9th graders in 1999–2000	2,287,117	649,807	560,348
10th graders in 2000–01	2,103,388	509,543	463,360
Average of 8th–10th graders	2,174,669	558,140	488,748
Maximum net transfers from private to public schools between 8th and 9th grades (as % of 8th grade public school enrollment)	4.65%	2.11%	1.05%
8th grade public school enrollment augmented by complete net transfers	2,232,735	525,915	447,193
Diplomas in 2002–03	1,727,896	331,337	311,977
AFGR (Seastrom et al.)	79%	59%	64%
Unadjusted 8th-to-diploma ratio (Haney et al.)	81%	64%	70%
Adjusted-8th-to-diploma ratio	77%	63%	70%

Source: Common Core of Data, NCES. This table includes 45 states and Washington DC. In 2003–04, these states accounted for more than 93% of total 8th grade enrollment in the country. (Enrollment data are missing for Arizona, Idaho and New Jersey. Diploma data for 2002–03 are missing from New Hampshire and South Carolina.)

As one would expect from the lowest cohort estimate, the Haney measure yields the highest graduation rates. However, the ratio after adjusting for potential private-to-public transfers yields

another 2% who (net) transfer from private to public schools. The increase in the public school cohort size between the 8th and 9th grades is about 2%.

rates very close to the unadjusted ratio for Blacks and Hispanics. The AFGR, on the other hand, gives significantly lower graduation rates—a 5% difference for Black students and a 7% difference for Hispanics. While international migration might affect Hispanic measures, it is unlikely to affect the same measure for Black students. Since the main motivation for using an averaged measure instead of 8th grade enrollment is the transfer of students from private to public schools, this analysis suggests that the averaged enrollment is susceptible to differential bias by population subgroup. The divergence of the measures strongly suggests that averaging 8th, 9th, and 10th grade enrollments is a misleading proxy for the number of entering 9th graders.

In other words, the maximum net transfers from private to public schools increases the size of the entering 9th grade class by 1–2% at best for Black and Hispanic students. On the other hand, averaging the 8th, 9th, and 10th grade enrollments gives estimates of entering 9th grade class which exceed the corresponding 8th grade class by more than 8% higher for Black students and more than 10% higher for Hispanics. Since net international immigration is likely to be much less than 1%, averaging 8th, 9th and 10th grade enrollments is an inappropriate proxy for the size of the entering 9th graders—it leads to graduation rates which are biased downwards, particularly so for Black and Hispanic students. Using what is arguably the best proxy for the size of the entering 9th grade class—8th grade enrollment in public schools in the previous year augmented by estimates of net transfers from public to private schools, the CCD-based enrollment and diploma numbers yield a graduation rate of about 77–80% for whites, 63–65% for blacks and 69–71% for Hispanics. Note that the graduation rates for the minorities are 15–20% higher than the commonly-cited 50% figure.

8th-grade-to-diploma rates

Haney et al. Other researchers in the field have proposed their own measures. One of the simplest measures has been proposed by Haney et al (2004)—this is the total number of diplomas issued in year *t+5* divided by the number of 8th graders in year *t*. In other words, this is a 8th-grade-to-diploma graduation rate, without any additional adjustments that Greene or NCES proposes. Perhaps not surprisingly, this 8th-grade-to-diploma measure—called Basic Completion Rate or BCR-8 by Warren (2005)—is often the one closest to graduation rate estimates from other sources.[22]

Warren. One of the most recent methods of calculating graduation rates is the Estimated Completion Rate or ECR by Warren (2005). The two defining characteristics of the ECR are its use of 8th grade enrollment as the best predictor of next year's entering 9th graders, and its adjustment of the size of the entering 9th graders by a migration adjustment similar to Greene's. Based on actual retention and grade-repetition data from Massachusetts, North Carolina, and Texas, Warren argues that the best predictor of *entering* ninth graders in public schools in year *t+1* is the number of eighth graders in public schools in year *t*.[23] He adjusts this number for migration by comparing "the total population of 17-year-olds—the modal age of fall twelfth graders—in a state on July 1 of one

[22] Miao and Haney (2004) surveyed the most important measures of graduation used at the time and concluded that there was "no evidence that the conceptually more complex methods yield more accurate or valid graduation rate estimates than the simpler methods."

[23] Warren has a brief discussion of the potential sources of bias from using 8th grade enrollment without any further adjustments. In particular, he notes that grade retention in the 8th grade might impart a downward bias while transfers from private schools to public schools between 8th and 9th grades might impart an upward bias to the estimates. However, in findings similar to ours, he argues that analysis of 2000 census data indicates that in only 9 U.S. states did the percentage of 5th–8th graders attending private schools differ from the percentage of 9th–12th graders attending private school by as much as 2%, suggesting that the second effect is likely to be small.

year to the total population of 13-year-olds—the modal age of fall eighth graders—in that state on July 1 four years earlier." The ECR shows a graduation rate of 71.9% in 2000, 71.1% in 2001 and 72.2% in 2002.[24]

As mentioned earlier, a net increase in the cohort size at the national level can only come from net international immigration during high school years. However, we know little about who these people are, whether they at all enroll in U.S. schools after they immigrate, and if they do enroll, whether their subsequent educational attainment reflects the performance of U.S. high schools or is more influenced by their educational experience in their native countries. In calculations using census micro-data (PUMS data) from the 2000 decennial census, we found that recent immigrants coming to the U.S. have much lower levels of educational attainment, and it is unlikely that most of them ever attend U.S. high schools. As a result of differential attainment, adjustments based on the population of 17 year olds are problematic, as it will include many of these recent immigrants.[25]

Warren (2005) argues that the ECR is validated by the fact that the ECR comes close to the on-time graduation rate obtained from the NELS. For the class of 1992 the NELS gives an on-time completion rate of about 79.6% for public school students.[26] The ECR, on the other hand, shows a graduation rate of 78.4% without the migration adjustment. However, this comparison is incorrect for at least two reasons. First, to make the ECR comparable to the NELS, one has to exclude not only the migrants from the denominator, as Warren does, but also *the number of diplomas going to the migrants from the numerator.* We do not think there is a way of estimating teen migrants' diplomas from the published CCD statistics. If one only takes out migrants from the denominator but not the diplomas going to the migrants from the numerator, one overestimates graduation rate.[27] Second, the NELS graduation rate (79.6%) to which Warren compares ECR is based on a comparison of the number of entering 9th graders to the number of diplomas awarded three years hence *to this cohort*. But the appropriate comparison is to the 83% graduation rate the NELS reports for 2000, when diplomas awarded in the years past normal senior year are included.[28] This more closely matches the ECR which is calculated to include *all diplomas awarded in a particular*

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[24] Warren does not compute the ECR for specific racial or ethnic groups.

[25] Most net immigration into the U.S. is concentrated among people in their late teens and early twenties. Warren admits that his measure counts international in-migrants who come to the U.S. between ages 13 and 17—but never enroll in high school—as non-completers, but argues that this exerts only modest downward bias on the ECR, most notably in states with high levels of international in-migration.

[26] Different researchers come to slightly different figures for the *on-time* graduation rate of the NELS cohort. Warren's own calculations (for public school students only) put it at 79.6%. Adelman (2006, Table L1) argues that it is 78.3%. Heckman and LaFontaine (2007) argues that it is 77.3%.

[27] Our calculations using the 2000 census micro-data (IPUMS), not reported, suggest that not many of these in-migrants will complete high school in the U.S. It is unlikely that many of them will even attend one. So the extent of bias may not be large. However, given that Warren's migration adjustment for this cohort is about 5.6%—implying that the size of this cohort increased by 5.6% between the 8th and 12th grades—this may still bias the calculated graduation rate upwards to some extent.

[28] Studies by the NCES (Adelman, 2006; National Center for Education Statistics, 2004) show that 83% of 1988 8th graders in the NELS had completed high school with a regular diploma by 2000, though Heckman and LaFontaine (2007) argue that that actual figure is about 79.7%. These numbers are higher than Warren's estimate of 78.4%, which itself is possibly slightly overestimated due to inclusion of diplomas obtained by immigrants who came to the country after age 13 (or 8th grade). The NELS figure includes both public and private school students, but because private schools enroll less than 10% of all high school students the bias on that account is likely to be minimal, less than 1%. In addition, as Warren points out (page 18), the ECR comes closest to the NELS figure—the CPI is 71.2% in 1992, an apparent underestimate of about 9–12%.

year relative to the number of entering 9th graders three years ago.[29] Since in any given year there will be some diplomas awarded to students who have taken more than four years to complete, the ECR is not an on-time graduation rate.

Recent Recalculations

Thus far, we have discussed proposed measures that use one main data stream. However, the use of multiple sources is important. In our earlier work (Mishel & Roy), we compared the various graduation rates (Swanson, Greene, Haney, and Warren) computed with school enrollment data to the results from three longitudinal studies which are based on the same school-based data but track individual students. Our earlier work compared these school-based rates to those of a study that tracks Chicago students and shows graduation rates from 1996 to 2004. From these comparisons we argued that the conventional measures not only understate graduation rates but that they are also mistaken in establishing trends: the longitudinal data shows steady progress (up to 8%) but the conventional measures show no progress. We also compared graduation rates based on longitudinal data of New York City students against the conventional measures. We find that the new conventional measures yield graduation rates that are 10% lower than the longitudinal measures. Finally, we compared the more popular published measures with the longitudinal rates published by the state of Florida using the cohorts graduating in 2002 and 2003. These graduation rates are at least ten to 15% higher than the graduation rates produced by the conventional school enrollment-based measures.[30] That is, the computations that underlie the new conventional wisdom are seriously inaccurate. While there can be minor quibbles about the exact definitions of graduation used by these different places and the reliability of the data used, we concluded in part from these comparisons that the recently-proposed CCD-based measures are poor proxies for tracking graduation rates, falling significantly short of replicating the underlying picture. Two important recent papers reanalyzing graduation rates and attempting to reconcile different measures. We discuss them below.

Warren and Halpern-Manners (2007)

In a recent paper, Warren and Halpern-Manners (2007) address the discrepancy in estimates of graduation rates calculated from the Current Population Survey (CPS) and CCD. One of the motivations for this is that in earlier work (Mishel & Roy, 2006), we had pointed out that CCD-based estimates (with adjustments) yield much lower graduation rates than most other sources, including the CPS. Warren and Halpern-Manners use the status drop-out rates for 16–24 year olds

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29 The exact formula for the ECR is

$$ECR = \frac{\text{High School Completers}_{\text{Spring of Academic Year x}}}{\text{Estimated \# of First - time 9th graders}_{\text{Fall of Academic Year x-3}} * \textit{Migration Adjustment}}$$

30 In terms of individual measures, the 9th-grade-to-diploma and the CPI perform the worst, with more than 15% differences for all groups except Hispanics, for which the difference is still around 10%. Of the three recent measures proposed, Warren's ECR does the best, but even here the differences are in general around 10% except for non-Hispanic Blacks. The simple 8th-grade-to-diploma measure is the one closest to the five-year cohort-graduation rate (but still about 3.0% too low) but seems an inappropriate proxy since it significantly overstates the Hispanic graduation rate (by about 7.5%) and understates the non-Hispanic white rate (by about 9.0%). For the detailed comparisons, see Table B-1 from Mishel and Roy (2006).

from the CPS to eventually construct a measure of completion rate similar to those calculated from CCD data. They argue that most of the difference between their CPS-based measure and the CCD graduation rate is due to the fact that some CPS respondents report that their children are enrolled in (the latter years of) high school when they are not enrolled at all. They provide some suggestive evidence from the NELS longitudinal survey that sometimes parents whose children have dropped out of high school still report that their children are enrolled.

It is important to note that the CPS measure that Warren and Halpern-Manners use is somewhat different from the one we used in our 2006 study (Mishel & Roy, 2006). Since the CCD based estimates yield a *completion* rate rather than a dropout rate, we compared the former with estimates of *high school completion* from the CPS. The particular measure we used is the educational attainment of the 25–29 year old population—one's high school education is essentially over by the time he or she is 25 years old—which yield a final completion rate, comparable with those from the CCD.[31] Note that the CPS measure of completion that we use is similar to the one used by Heckman and LaFontaine (2007), who use educational attainment (high school completion) data for both the 20–24 and 25–29 age groups, and from both the March and October CPS supplements, restricting the sample to those who ever attended school.

Second, while Warren and Halpern-Manners make a valid point that parents' misstatements about their children's enrollment status might bias CPS dropout rates downward, the CPS measure we use—high school completion status of current 25–29 year olds—is unlikely to be biased by misstatements about "being at school." As discussed below, Heckman and LaFontaine (2007) agree with Warren and Halpern-Manners that the discrepancy between CPS and CCD-based graduation rates is mostly concentrated in one category (students who enroll in 12th grade, but drop out before getting a diploma), but they argue that this is more due to the particular survey design in CPS rather than willful misreporting by parents. In particular, they argue that the above discrepancy is due to proxy response bias. [32] In personal communication, Heckman and LaFontaine write that "though sometimes the proxies are unable to make fine distinctions (such as 12th grade, no diploma vs. HS graduate) in general they do get it right". They further argue that "as far as misreporting [is concerned], it is clear from NELS and NLSY data that people do respond honestly to questions. The number of discrepancies between self-reports and administrative transcript reports are small." So it is likely that misreporting regarding *high school completion status* in the CPS, when the question is directed at people aged 25–29 years old who have been out of high school for a while, will be small and the bias minimal.

Because they are not directly comparable, dropout data from the CPS can not be matched as such against graduation data from the CPS. A closer measure is the one about high school completion status of people at a certain age that both we and Heckman and LaFontaine (2007) use. After appropriate adjustments, CPS-based estimates of graduation are much closer to CCD-based estimates, as shown by both Mishel and Roy (2006) and Heckman and LaFontaine, though some differences remain, particularly for minorities.

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[31] There are other issues of comparability—the CPS surveys include all students, whether they attended public or private schools, whereas CCD data only pertain to public school students. Second, the CPS surveys consider GED recipients as high school completers,- we have to net out the number of GED recipients from total completers to get an estimate of regular diploma holders, comparable to CCD.

[32] Proxy response bias refers to the fact that in the CPS surveys, unlike many other surveys like the Census or the American Community Survey (ACS), one person responds for the entire household. Heckman and LaFontaine note that this discrepancy is not present in estimates from the Census and the ACS.

Heckman and LaFontaine (2007)

In a recent paper, Heckman and LaFontaine (2007) pursue the same issues we did in earlier work (Mishel & Roy, 2006), with a methodological approach similar to ours. In that work, we showed that the conventional wisdom about high school graduation is seriously inaccurate. We had analyzed data from every important source we could identify, including CCD data which form the main basis for the current conventional wisdom, longitudinal surveys which follow individual students over time and individual level micro-data from the 2000 census and the Current Population Survey. In all cases we developed estimates of the graduation rate with regular diplomas, excluding GEDs. Heckman and LaFontaine they take this approach one step further. They provide estimates of graduation rates from earlier censuses (1970, 1980 and 1990), add a few additional surveys which provide estimates of high school graduation (the NLS68 and Add Health), and attempt to reconcile the divergence in earlier studies.

Heckman and LaFontaine (2007) agree with our harsh assessment of the high profile computations of high school graduation rates using CCD data. In particular, they agree with our consequences about the large and growing 9th grade bulge—the fact that an increasing number of students are being retained in the 9th grade (that is, these students repeat grade 9). They agree that the bulge makes any estimates of graduation rates problematic when the measure relies on 9th grade enrollment from the CCD. They concur with us and with Walt Haney that the best estimate of graduation rate using CCD data is obtained by comparing the number of diplomas with the number of students in 8th grade 5 years earlier—the 8th-grade-to-graduation rate. Heckman and LaFontaine note that other "widely-used estimators that condition on 9th grade enrollment greatly underestimate graduation rates" and that "estimated *minority* graduation rates miss the mark *completely*" (p. 18; emphasis added). None of the recent studies which claim that minorities have only a 50% chance of graduating from high school use the 8th-grade-to-graduation measure as their graduation rate. There are potential problems with using 8th-grade-to-graduation ratio, such as the transfer of students from private schools to public schools, but our assessment has been that such biases are very small on a national level.[33] Note, however, that as shown in Mishel and Roy (2006), even this 8th-grade-to-graduation measure sometimes yields graduation rates for minorities very different than those from other sources.[34]

Conclusion

Understanding the level and trends in high school graduation in the U.S. is crucial to a proper understanding of educational attainment in the country and the challenges we face as we prepare our workforce for the 21st century. A number of recent studies have asserted that only two-thirds of all students in the U.S. graduate—and that blacks and Hispanics have only a 50% chance of graduating with a regular high school diploma. This claim is based on grade-specific enrollment and

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[33] Since private-to-public transfers may differ geographically, however, this is worth considering for comparison in specific circumstances.

[34] The major difference between Mishel and Roy (2006) and Heckman and LaFontaine (2007) is in delineation of the long-run trends in high graduation. While we argue in our book that there have been significant improvements in high school graduation over the last 30–40 years, particularly for minorities (though the progress stalled for black men in the 1990s), Heckman and LaFontaine argue that high school graduation has been declining over the past 40 years and that the racial gaps in graduation have not converged.

diploma data published by the U.S. Department of Education. However, because these enrollment and diploma numbers do not yield a direct graduation rate, researchers have used different adjustments to construct one using these data. We show in this paper that these adjustments often impart significant downward bias to the measures of graduation rates and portray an incorrect picture of true high school graduation.[35]

In previous research (Mishel & Roy, 2006) we examined a range of data sources which contain information on high school graduation, including the decennial census, household surveys, longitudinal surveys which track individual students as they progress through high school (and verify their progress against actual transcripts). Based on the most reliable data sources, we find that more than 80% of high school students graduate with a regular diploma and that the graduation rates for minorities lie somewhere between two-thirds and three-fourths—about 70%. Furthermore, of the one-quarter of black students who drop out, about half eventually earn a GED (general education development), which qualifies them for entry into post-secondary institutions and the military. We also find that there has a significant progress over the last 25 years in improving minority graduation rates and closing the Black-White and the Hispanic-White gaps in high school completion.

The importance of a high school diploma cannot be underestimated. However, we want to create a better understanding of the true challenges we face and help lead the way to better targeted solutions for continuing to close the remaining gaps. There are significant problems to be addressed—the minority graduation rates are still low, and there are significant gaps in completion between whites and Asians on the one hand and blacks and Hispanics on the other. In some inner cities such as Chicago, Black males have only a 40% chance of completing high school with a regular diploma. However, we believe that unless we know the true picture we are unlikely to correctly address these problems. The new graduation rate measures that use CCD data along with other adjustments can often yield misleading estimates and should be used with caution.

References

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Washington, DC: U.S. Department of Education. Retrieved March 20, 2008, from http://www.ed.gov/rschstat/research/pubs/toolboxrevisit/index.html.

Broughman, S. P., & Colaciello, L. A. (2001). *Private school universe survey, 1999–2000*. Washington, DC: U.S. Department of Education, National Center for Education Statistics, NCES 2001–330, Washington, DC.

Center for Public Education. (2006, June 22). The straight story on high school graduation rates. Washington, DC: National School Board Association. Retrieved June 1, 2008, from http://www.centerforpubliceducation.org/site/c.kjJXJ5MPIwE/b.1809841/k.CB45/The_straight_story_on_high_school_graduation_rates.htm.

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[35] Heckman and LaFontaine (2007) come to the same conclusion. They argue that while the "correct" measure of graduation rate using CCD enrollment and diploma data—the 8th-grade-to-diploma rate or Basic Completion Rate—yield estimates similar to those from all other sources (census, longitudinal surveys, household surveys, etc.), using additional adjustments to the CCD give misleading results. In particular, they argue that widely-used estimators (like the CPI) that condition on 9th grade enrollment (instead of 8th grade) greatly underestimate graduation rates, noting that "estimated *minority* graduation rates miss the mark completely" (page 18, see also Figure VIII).

Dorn, S. (2006, June 21). Ed Week grad rates: GIGO for Detroit [blog entry]. Retrieved March 20, 2008, from http://www.shermandorn.com/mt/archives/000545.html.

Education Week. (2006, June 22). *Diplomas count: An essential guide to graduation policy and rates*. Washington, DC: Editorial Projects in Education. Retrieved March 20, 2008, from http://www.edweek.org/ew/toc/2006/06/22/index.html.

Education Week. (2008, January 10). *Quality counts 2008: Tapping into teaching*. Washington, DC: Editorial Projects in Education. Retrieved March 20, 2008, from http://www.edweek.org/ew/toc/2008/01/10/index.html.

Greene, J. P. (2002). *High school graduation rates in the United States* (rev. ed.). New York: Manhattan Institute for Policy Research. Retrieved March 20, 2008, from http://www.manhattan-institute.org/html/cr_baeo.htm.

Greene, J. P., & Forster, G. (2003). *Public high school graduation and college readiness rates in the United States*. Education Working Paper 3. New York: Manhattan Institute for Policy Research. Retrieved March 20, 2008, from http://www.manhattan-institute.org/pdf/ewp_03.pdf.

Greene, J. P., & Winters, M. (2005). *Public high school graduation and college-readiness rates: 1991–2002*. New York: Manhattan Institute for Policy Research. Retrieved March 20, 2008, from http://www.manhattan-institute.org/html/ewp_08.htm.

Greene, J. P., & Winters, M. (2006). *Leaving boys behind: Public high school graduation rates*. New York: Manhattan Institute for Policy Research. Retrieved March 20, 2008, from http://www.manhattan-institute.org/html/cr_48.htm.

Guy, B., Shin, H., Lee, S. Y., & Thurlow, M. L. (1999). *State graduation requirements for students with and without disabilities*. Technical Report No. 24,. Minneapolis: University of Minnesota, National Center on Educational Outcomes. Retrieved June 29, 2006, from http://education.umn.edu/NCEO/OnlinePubs/Technical24.html.

Haney, W., Madaus, G., Abrams, L., Wheelock, A., Miao, J., & Gruia, I. (2004). *The education pipeline in the United States, 1970–2000*. Boston: National Board on Educational Testing and Public Policy. Retrieved March 20, 2008, from http://www.bc.edu/research/nbetpp/statements/nbr3.pdf.

Heckman, J. J., & LaFontaine, P. A. (2007). *The American high school graduation rate: Trends and levels*. NBER Working Paper 13670. Cambridge, MA: National Bureau of Economic Research.

Kaufman, P., Kwon, J. Y., Klein, S. & Chapman, C. D. (2000). *Dropout rates in the United States: 1999*. Washington, DC: National Center for Education Statistics. Retrieved March 20, 2008, from http://nces.ed.gov/pubs2001/2001022.pdf.

Lloyd, S. C. (2006, June 22). A road map to state graduation policies. *Education Week*. Retrieved June 22, 2006, from http://www.edweek.org/ew/articles/2006/06/22/41s_trends.h25.html

Mead, Sara. (2006, June). *The truth about boys and girls*. Washington, DC: Education Sector. Retrieved March 20, 2008, from http://www.educationsector.org/usr_doc/ESO_BoysAndGirls.pdf.

Miao, J., & Haney, W. (2004). High school graduation rates: Alternative methods and implications. *Education Policy Analysis Archives, 12*(55). Retrieved March 20, 2008, from http://epaa.asu.edu/epaa/v12n55/v12n55.pdf.

Mishel, L., & Roy, J. (2006). *Rethinking high school graduation rates and trends*. Washington, DC: Economic Policy Institute.

National Center for Education Statistics. (2004, November). *Educational attainment of high school dropouts 8 years later.* Issue Brief NCES 2005–026. Washington, DC: Author. Retrieved June 1, 2008, from http://nces.ed.gov/pubs2005/2005026.pdf.

National Governors Association. (2005). *Graduation counts: A report of the National Governors Association Task Force on State High School Graduation Data*. Washington, DC: Author.

Orfield, G. (Ed.). (2004). *Dropouts in America: Confronting the graduation rate crisis*. Cambridge, MA: Harvard Education Press.

Orfield, G., Losen, D., Wald, J., & Swanson, C. (2004). *Losing our future: How minority youth are being left behind by the graduation rate crisis*. Cambridge, MA: The Civil Rights Project at Harvard University. Retrieved June 1, 2008, from http://www.urban.org/UploadedPDF/410936_LosingOurFuture.pdf.

Phelps, R. P. (2005). A review of Greene (2002), *High school graduation rates in the United States*. *Practical Assessment, Research and Evaluation, 10* (15). Retrieved March 20, 2008, from http://pareonline.net/pdf/v10n15.pdf.

Seastrom, M., Hoffman, L., Chapman, C., & Stillwell, R. (2005). *The averaged freshman graduation rate for public high schools from the Common Core of Data: School years 2001–02 and 2002–03*. NCES 2006–601. Washington, DC: National Center for Education Statistics. Retrieved March 20, 2008, from http://nces.ed.gov/pubs2006/2006601.pdf

Seastrom, M., Hoffman, L., Chapman, C. and Stillwell, R. (2007). *The averaged freshman graduation rate for public high schools from the Common Core of Data: School years 2002–03 and 2003–04*. NCES 2006–606rev. Washington, DC: National Center for Education Statistics. Retrieved March 20, 2008, from http://nces.ed.gov/pubs2006/2006606rev.pdf

Sum, A., et al. (2003). *The hidden crisis in the high school dropout problems of young adults in the U.S.: Recent trends in overall school dropout rates and gender differences in dropout behavior.* Washington, DC: Business Roundtable. Retrieved March 20, 2008, from http://www.businessroundtable.org/pdf/914.pdf.

Swanson, C. (2003). *Keeping count and losing count: Calculating graduation rates for all students under NCLB accountability*. Washington, DC: The Urban Institute.

Swanson, C. (2004). *Who graduates? Who doesn't? A statistical portrait of public high school graduation, class of 2001*. Washington, D.C.: The Urban Institute. Retrieved March 20, 2008, from http://www.urban.org/UploadedPDF/410934_WhoGraduates.pdf.

Warren, J. R. (2005). State-level high school completion rates: Concepts, measures, and trends. *Education Policy Analysis Archives, 13*(51). Retrieved March 20, 2008, from http://epaa.asu.edu/epaa/v13n51/.

Warren, J. R., & Halpern-Manners, A. (2007). Is the glass emptying or filling up? Reconciling divergent trends in high school completion and dropout. *Educational Researcher, 36*(6), 335–343.

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Appendix A

Graduation Rate Estimates from Recent Studies

Table A-1
U.S. high school graduation rates with a regular diploma, recent high school classes

Study	Grad Year	Graduation Rates with a Regular Diploma				
		All	Black	Hispanic	Asian	White
Greene (2001)	1998	71.0	56.0	54.0	—	78.0
Greene & Forster (2003)	2001	70.0	51.0	52.0	79.0	72.0
Swanson (2004)	2001	68.0	50.2	53.2	76.8	74.9
Greene & Winters (2005)	2002	71.0	56.0	52.0	—	78.0
Warren (2005)	2002	72.2	—	—	—	—
Greene & Winters (2006)	2003	70.0	55.0	53.0	72.0	78.0
Education Week (2006)	2003	69.6	51.6	55.6	77.0	76.2
Education Week (2008)	2004	69.9	—	—	—	—

Both the Education Week studies use the method proposed by Chris Swanson (see Swanson 2003, 2004) called the Cumulative Promotion Index or CPI.

Appendix B

Are the population adjustments in Greene and Winters (2006) reasonable and accurate?

Greene and Winters (2006) argue that because the size of a cohort changes from the time this cohort enters the 9th grade to the time the students belonging to this cohort are in the 12th grade, the calculated graduation rates should take account of this. They inflate their *estimate* of entering 9th graders by the increase in the population during these three years, proxying the increase by the difference between the number of 17 years old in 2002 and the number of 14 years old in 1999.

Because these years span 2000, the year of the decennial census, these estimates of the number of 14 year olds in 1999 and 17 year olds in 2000 are not directly comparable. The estimates of 14 years olds in 1999 are benchmarked to the 1990 census, while the estimates of 17 year olds in 2002 are benchmarked to the 2000 census. This creates a problem—mostly because in the 2000 census the Census Bureau found many more people than it expected to find—as is easily seen in the following table.

Table B-1
Differences in population cohort growth from 14 to 15, due to change in benchmarking from 1990 census to 2000 census

	% growth, cohort size between ages 14 and 15				
Year that cohort was aged 14	Total	White	Black	Hispanic	Asian
1995	1.2	0.4	2.3	3.4	2.7
1996	1.3	0.5	2.4	3.5	2.6
1997	1.2	0.5	2.3	3.2	2.3
1998	1.2	0.4	2.3	3.3	2.5
1999	5.8	1.9	7.4	15.5	17.7
2000	0.5	0.1	0.3	1.9	2.4
2001	0.5	0.1	0.3	1.8	2.3

Source: Authors' calculations from the Census Bureau and data provided by Jay Greene.

This table shows the discrepancy between benchmarking to the 1990 census and benchmarking to the 2000 census, as evidenced by the experience of the cohort aged 14 years in 1999. The 14-year old population for this cohort was benchmarked to the 1990 census, while the 15-year old population is benchmarked to the 2000 census. While the average change in cohort size between ages 14 and 15 is close to 1% for all earlier and later cohorts, for the cohort aged 14 years old in 1999 this jumps up to 6%—primarily because for this cohort the number of 14 years old and the number of 15 years old are coming from different sources. (For all the other cohorts, the numbers come from the same basic source and are comparable.) The bias is much larger for the minorities, particularly the Hispanics and the Asians, though it is also significant for the Blacks. This spike in population adjustment significantly affects the calculation of graduation rates, as the following table shows.

Table B-2
Effect of population adjustments on Greene's graduation rates, class of 2003

	Population Changes		Graduation Rates			Difference	
Group	Change (Greene)	Net of 2000 spike	Unad-justed	Adjusted (Greene)	Adjusted (Roy & Mishel)	Greene	Roy & Mishel
White	2%	0%	79%	78%	79%	-2%	0%
Black	8%	1%	59%	55%	58%	-4%	-1%
Hispanic	21%	6%	64%	53%	60%	-11%	-4%
Asian	25%	7%	90%	72%	84%	-18%	-6%
All	7%	2%	75%	70%	73%	-5%	-1%

In this table we assume that the true population change between 1999 and 2000 for the cohort aged 14 years old in 1999 is best approximated by taking the average of the corresponding changes for the previous cohort (cohort aged 14 years old in 1998) and the succeeding cohort (cohort aged 14 years old in 2000). Under this reasonable assumption, the graduation rates calculated by Greene's method increases to 73% overall, and to 60% for Hispanics and 58% for Blacks.[36] The graduation rate for Asians jumps to 84% and is higher than that of Whites at 79%.

An alternative adjustment for population growth—where we assume that the population change between 1999 and 2000 for the cohort aged 14 years old in 1999 is close to the average for this cohort between ages 15 and 16 (2000 to 2001) and between ages 16 and 17 (2001 to 2002)—gives similar but slightly higher graduation rates. The overall graduation rate is 74% by this method, with the Black rate at 59%.

[36] See Table B-1 for these rates of growth. Note that for Hispanics and Blacks in particular the rates of growth in cohort size were somewhat smaller in the post-1999 period, though the differences are small. (The rates for Asians are mostly unchanged.)

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