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State-Level High School Completion Rates: Concepts, Measures, and Trends*

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ABSTRACT

I review state-level measures of high school completion rates, and describe and validate a new measure that reports these rates for 1973 through 2000. Existing measures based on Current Population Surveys are conceptually imperfect and statistically unreliable. Measures based on Common Core Data (CCD) *dropout* information are unavailable for many states and have different conceptual weaknesses. Existing measures based on CCD *enrollment* and *completion* data are systematically biased by migration, changes in cohort size, and grade retention. The new CCD-based measure described here is considerably less biased, performs differently in empirical analyses, and gives a different picture of the dropout situation across states and over time. Since the early 1970s the rate at which incoming 9th graders have completed high school has fallen consistently. In 2000, about two thirds of students who might have completed high school actually did so.

State-Level High School Completion Rates: Concepts, Measures, and Trends

Each fall, and in every state, a new cohort of students enters high school for the first time. A few years later a portion of each cohort successfully completes high school and the rest does not. At first glance, the task of quantifying the proportion of entering students in each state who go on to complete high school seems straightforward. Years of effort by academic and government researchers has proven otherwise.

There are at least three compelling reasons to develop, analyze, and disseminate state-level high school completion rates. The first is that high school completion is extremely important both socially and economically for students and for the states in which they reside. Consequently, it is inherently worth asking how successful students are in each state at reaching this critical educational milestone. Second, as part of the provisions of the 2002 No Child Left Behind legislation states must meet annual yearly progress (AYP) goals. For secondary education, states' definitions of AYP are mandated to include "graduation rates for public secondary school students (defined as the percentage of students who graduate from secondary school with a regular diploma in the standard number of years)" [Sec 1111(b)(2)(D)(i)]. Third, researchers who are interested in the impact of state education policy initiatives—such as the implementation of mandatory high school exit examinations or changes in course requirements for high school graduation—need reliable and valid state-level high school completion rates in order to come to sound conclusions.

In this paper I review and critique existing measures of state-level high school completion rates and describe a new measure that reports state-level high school completion rates for 1973 through 2000. This new measure is more conceptually sound and less empirically biased than existing measures, performs differently in empirical analyses, and yields a different picture of differences across states and over time in state-level high school completion rates.

CONCEPTUAL AND TECHNICAL GOALS

My goal is to develop a state-level measure of the rate at which incoming 9th grade students complete public high school; I do not count holders of General Educational Development (GED) certificates as high school completers. This conceptualization ignores high school dropout/completion that occurs before or long after the high school years and it also ignores private high school completers.[1] The state-level high school completion measure that I create is thus *not* a measure of the proportion of people who eventually earn any secondary education credential; it is a measure of the rate at which people succeed in completing public high school.[2]

Following Hauser (1997: 159), there are several desirable technical properties of any good measure of the rate of high school completion. Three are particularly relevant here. First, such measures should have face validity. For example, if every student in a particular incoming cohort in a particular state goes on to complete high school then the high school completion rate for that cohort in that state should equal 100%. As I will demonstrate, widely-used measures of state-level high school completion rates fail to meet this basic standard. Second, such measures should "be consistent with a reasonable understanding of the process or processes that it purports to measure" and "should pertain to a well-defined population and set of events." For present purposes, a good measure of state-level high school completion rates should pertain to specific cohorts of incoming students

[1] Below I discuss the implications of ignoring private high school completers. Briefly, patterns of public high school completion over time and across states as portrayed by the measure developed in this paper would not be meaningfully different were I to include private school completers.

[2] The measure that I create is not a four-year high school completion rate measure. It is a measure of the rate at which incoming 9th grade students complete public high school, regardless of how long it takes them to do so. This means that my measure does not squarely meet the AYP definition described above, which requires a measure of four year completion rates.

(e.g., students who first entered the 9th grade in 1988) and should adequately account for such issues as migration, changes over time in the size of incoming cohorts, mortality, and grade retention. Finally, such measures should be statistically reliable: Good measures of state-level high school completion rates should be based on enough observations to allow statistically sound comparisons across states and across cohorts of the rate at which incoming students complete high school.

CURRENT MEASURES

Existing measures of annual state-level high school completion and dropout rates come from one of only two sources of data: the Current Population Surveys (CPS) and the Common Core of Data (CCD).[3] The CPS is a monthly survey of more than 50,000 households, and is conducted by the Bureau of the Census for the Bureau of Labor Statistics. Households are selected in such a way that it is possible to make generalizations about the nation as a whole, and in recent years about individual states and other specific geographic areas. Individuals in the CPS are broadly representative of the civilian, non-institutionalized population of the United States. In addition to the basic demographic and labor force questions that are included in each monthly CPS survey, questions on selected topics are included in most months. Since 1968 the October CPS has obtained basic monthly data as well as information about school enrollment—including current enrollment status, public versus private school enrollment, grade attending if enrolled, most recent year of enrollment, enrollment status in the preceding October, grade of enrollment in the preceding October, and high school completion status. In recent years the October CPS has also ascertained whether high school completers earned diplomas or GED certificates.

[3] State-level high school completion and dropout rates can also be computed from decennial census data—but only for every tenth year—and shortly from the American Community Survey. I am referring to data that allows *annual* state-level estimates.

The Common Core of Data, compiled by the National Center for Education Statistics (NCES), is the federal government's primary database on public elementary and secondary education. Each year the CCD survey collects information about all public elementary and secondary schools from local and state education agencies. One component of the CCD—the State Nonfiscal Survey—provides basic, annual information on public elementary and secondary school students and staff for each state and the District of Columbia. CCD data from the State Nonfiscal Survey includes counts of the number of students enrolled in each grade in the fall of each academic year and the number of students who earned regular diplomas, who earned other diplomas, and who completed high school in some other manner in the spring of each academic year. Although the State Nonfiscal Survey has collected counts of public school dropouts since the 1991-1992 academic year, as described below many states have not provided this information or have provided it in a manner inconsistent with the standard CCD definition of dropout (U.S. Department of Education 2000).

Measures Based On CPS Data

Published national estimates of high school completion and dropout have historically been based on CPS data. CPS-derived event dropout rates report the percentage of students in a given age range who leave school each year without first obtaining a diploma or GED. For example, 4.8% of 15 to 24 year olds who were enrolled in high school in October 1999 left school by October of 2000 without obtaining a diploma or GED. CPS-derived status dropout rates report the percentage of people within an age range—typically ages 16 to 24—who are not enrolled in school and who have not obtained a diploma or GED. In October 2000, about 10.9% of 16 to 24 year olds were not enrolled in school and did not have a diploma or GED (U.S. Department of Education 2001a).

For present purposes there are a number of conceptual and technical problems with CPS-derived measures of high school dropout and completion, particularly when computed at the state level. First and foremost, the sample sizes for some states are not large enough to produce reliable estimates of rates of high school completion or dropout (Kaufman 2001; U.S. Department of Education 2000). Even when data are aggregated across years—for example, in the Annie E. Casey Foundation's *Kids Count* (2004) measure—the standard errors of estimates for some states are frequently so large that it is difficult to make comparisons across states or over time. What is more, by aggregating across years the resulting measure no longer pertains to specific cohorts of incoming students; this is a serious problem for researchers interested in the effects of state education policy reforms that typically take effect for specific cohorts of students.

Second, until 1987 it was not possible to distinguish high school completers from GED recipients; since 1988 October CPS respondents who recently completed high school have been asked whether they obtained a diploma or GED, but there are concerns about the quality of the resulting data (Chaplin 2002; Kaufman 2001). Third, as noted by Greene (2002: 7), "[status] dropout statistics derived from the Current Population Survey are based on young people who live in an area but who may not have gone to high school in that area." To the extent that young people move from state to state, CPS-based state-level high school dropout rates—particularly status dropout rates based on 16 to 24 year olds—may be of questionable validity.[4] Fourth, some observers have expressed concern about coverage bias in the CPS, particularly for race/ethnic minorities. The CPS is representative of the civilian, non-institutionalized population of the United States, and so young people who are incarcerated or in the military are not represented. To the extent that these populations differ from the rest of the population with respect to frequency and method of high school completion, there is the potential for bias in estimates. Finally, substantial changes over time in CPS questionnaire design, administration, and survey items have made year-to-year comparisons difficult (Hauser 1997; Kaufman 2001). For these reasons, the state-level high school completion rate measure that I construct is

[4] In computing its CPS-based status dropout measure, the Annie E. Casey foundation limits the CPS sample to 16 to 19 year olds, partially alleviating this problem.

based primarily on CCD data, not on CPS data. However, as described below I use supplementary information from the CPS to overcome some of the limitations of CCD-based measures.

In the sections that follow I describe existing techniques for estimating state-level high school completion rates using CCD data. Each technique has serious conceptual shortcomings for my purposes, and below I demonstrate that each technique also yields systematically biased estimates.

Measures Based on Common Core Data I: NCES Completion Rate (NCES)

Since the early 1990s NCES has asked state education agencies to report the number of students who drop out in each year; state-level dropout rates have been part of the CCD beginning with the 1992-1993 data collection (U.S. Department of Education 2002b) which asked about the 1991-1992 academic year. On October 1 of each year the NCES asks states to define as a dropout any student who (1) was enrolled at any point during the previous academic year, (2) was not enrolled at the beginning of the current academic year, and (3) has not graduated or completed an approved education program (e.g., obtained a GED). Students are not counted as dropouts if they died, are absent from school for reasons of health or temporary suspension, or if they transfer to another jurisdiction. NCES then computes annual event dropout rates by dividing the number of 9th through 12th grade dropouts by the total 9th through 12th grade enrollment as of October 1. Using these dropout data, NCES also reports a 4-year high school completion rate as:

$$\text{NCES} = \frac{\text{H.S. Completers}_{\text{Spring of Academic Year X}}}{\begin{pmatrix} \text{H.S. Completers}_{\text{Spring of Academic Year X}} + \\ \text{Dropouts from Grade 9}_{\text{Academic Year X-3}} + \\ \text{Dropouts from Grade 10}_{\text{Academic Year X-2}} + \\ \text{Dropouts from Grade 11}_{\text{Academic Year X-1}} + \\ \text{Dropouts from Grade 12}_{\text{Academic Year X}} \end{pmatrix}}. \qquad (1)$$

Under this formulation, high school completers include students who receive regular diplomas, students who receive other diplomas, and students who complete high school in some other manner. However, regular diploma recipients comprise almost 99% of all high school completers (U.S. Department of Education 2002a). A key conceptual problem with this measure pertains to the treatment of students who leave school and obtain GEDs. Recipients of GEDs are not counted as high school completers as long as they obtain their GED from a state- or district-approved program (U.S. Department of Education 2003: 2), but they are also not counted as dropouts. That is, GED recipients appear in neither the numerator nor the denominator of Equation 1. It is thus conceptually possible for a state in which a large fraction of students drop out of school to obtain GEDs to have a high school completion rate of 100%. A second conceptual problem stems from the fact that many students drop out of school in one academic year, only to re-enroll in subsequent years. It is possible, then, for some students to be counted as dropouts more than once in the denominator of Equation 1; it is also possible for students who are counted as dropouts in the denominator to also be counted as high school completers in the numerator.

Beyond these conceptual problems, NCES dropout and high school completion measures have serious practical limitations. First, event dropout rates are available beginning only with academic year 1991-1992 (U.S. Department of Education 2002a), and so completion rates are available beginning only in 1995-1996, making analyses of historical trends difficult. Second, many states do not report dropout in a manner that corresponds with the NCES dropout definition. As a result, for academic year 1999-2000 dropout rates are available for only 36 states and the D.C. and high school completion rates are available for only 32 states (U.S. Department of Education 2002b).

Measures Based on Common Core Data II: Basic Completion Rate (BCR)

As described above, CCD data include (1) counts of the number of public school students who are enrolled in each grade at the beginning of each academic year and (2) counts of the number of public school students who complete high school each spring. Using these two sets of figures, it is intuitively appealing to compute a Basic Completion Rate (BCR) by simply comparing the number of enrolled public school 9th graders in the fall of one academic year to the number of high school completers three academic years later, when that cohort of 9th graders should have graduated. If we do so, the Basic Completion Rate is:

$$BCR = \frac{\text{High School Completers}_{\text{Spring of Academic Year X}}}{9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}}} \qquad (2)$$

Indeed Haney (2000; 2001) has used exactly such a measure in highly publicized and much-cited recent work on the impact of high school exit examinations on rates of high school completion. The BCR is purportedly a measure of the overall high school completion rate, not a measure of the four-year high school completion rate. However, the BCR has at least four problems, each of which induces systematic bias in estimated state-level completion rates.

The first problem with the BCR has to do with migration. Students who appear as 9th graders in a state in the fall of academic year X may move to another state before the spring of academic year X+3; they may be replaced by (a smaller or larger number of) students who are counted among the number of high school completers in the spring of academic year X+3 but who lived in another state in the fall of academic year X. A second problem with the BCR has to do with grade retention. If we are interested in the number of incoming 9th graders who go on to complete high school, then measures like the BCR are problematic to the extent that the denominator includes 9th graders who are enrolled in the 9th grade in more than one academic year; essentially, such measures count retained 9th graders in the denominator for more than one year but in the numerator a maximum of one time. As I will demonstrate below, each of these first two issues call into question the validity of the BCR as a measure of high school completion rates. In recent work, Haney and colleagues (2004) have tried to overcome the grade retention problem by using the number of 8th graders enrolled in academic year X-4 as the denominator for the BCR. Since fewer students are made to repeat 8th grade than are made to repeat 9th grade, this partially alleviates the grade retention bias; however, the longer time horizon exacerbates the migration bias. A third problem with the BCR has to do with mortality: Students who die before they complete high school are counted as dropouts. A fourth problem has to do with students who are in un-graded (frequently special education) programs and who might be counted as high school completers in the numerator but not as 9th graders in the denominator. Because less than 0.2% of young people die during the modal ages of high school enrollment (Arias 2002) and because the percentage of students in un-graded programs in any given state is also usually very low—typically about 2% in 1986-1987 and about 1% in 1999-2000—I overlook these issues in this paper.

Measures Based on Common Core Data III: Adjusted Completion Rate (ACR)

I am not the first to recognize the potential consequences of migration and grade retention for CCD-based state-level high school completion rates. Greene and Winters (2002) and Greene and Forster (2003) constructed state-level high school completion rates—not four-year completion rates—for 2000 and 2001, respectively, by dividing the number of regular diplomas—not the total number of high school completers—issued by public schools in each state by an estimate of the number students at risk of receiving those diplomas. Specifically, the Adjusted Completion Rate

$$\text{ACR} = \frac{\text{Regular High School Diploma Recipients}_{\text{Spring of Academic Year X}}}{\left(\text{"Smoothed" } 9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}}\right) \times \left(\text{Migration Adjustment}\right)} \tag{3}$$

where

$$\text{"Smoothed" } 9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}} = \frac{\begin{pmatrix} 8^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-4}} + \\ 9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}} + \\ 10^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-2}} \end{pmatrix}}{3} \tag{4}$$

and

$$\text{Migration Adjustment} = 1 + \left(\frac{\left(\left(\text{Total } 9^{\text{th}} \text{ -}12^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X}} \right) - \left(\text{Total } 9^{\text{th}} \text{ -}12^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}} \right) \right)}{\text{Total } 9^{\text{th}} \text{ -}12^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}}} \right). \quad (5)$$

"Smoothing" the 9^{th} grade enrollments is designed to minimize the bias introduced by grade retention, while the migration adjustment is designed to account for bias introduced by net migration between academic years X-3 and X. As I will show below, these adjustments produce valid state-level completion rates only under very specific (and relatively unlikely) demographic circumstances. Although "Greene's Method" is an effort to adjust for the two major problems in completion rates like the BCR, as I show below the details of the ACR actually produce less valid results than the BCR under most circumstances.

What is more, because states differ among themselves and over time with respect to whether and how they differentiate between "regular diplomas," "other diplomas," and "other high school completers," Greene and colleagues introduce a serious new form of bias by restricting the numerator to "regular diplomas." For example, in the CCD data the number of regular diplomas issued in California rose from 259,071 in 1996 to 311,818 in 1997—apparently reflecting a dramatic one year change in the number of high school completers. However, the total number of high school completers in California rose from 304,038 in 1996 to only 311,818 in 1997—reflecting much less change. This is because the CCD data report that 44,967 "other diplomas" were issued in California in 1996, while none were issued in California in 1997. It is clear that this is a change in classification, not a change in reality. In producing our own state-level completion rates we follow NCES and other researchers by combining these categories of completers (and by continuing to exclude GED recipients from the category of high school completers).

Measures Based on Common Core Data IV: Cumulative Promotion Index (CPI)

Swanson (2003) recently proposed a new method for calculating state-level four-year high school completion rates which "approximates the probability that a student entering the 9th grade will complete high school on time with a regular diploma. It does this by representing high school graduation rate [sic] as a stepwise process composed of three grade-to-grade promotion transitions (9 to 10, 10 to 11, and 11to 12) in addition to the ultimate high school graduation event (grade 12 to diploma)" (Pg. 14). Specifically, the Cumulative Promotion Index is:

$$CPI = \left(\frac{\text{Diplomas}_{\text{Acad. Year X}}}{E^{\text{Grade 12}}_{\text{Acad. Year X}}}\right) \times \left(\frac{E^{\text{Grade 12}}_{\text{Acad. Year X+1}}}{E^{\text{Grade 11}}_{\text{Acad. Year X}}}\right) \times \left(\frac{E^{\text{Grade 11}}_{\text{Acad. Year X+1}}}{E^{\text{Grade 10}}_{\text{Acad. Year X}}}\right) \times \left(\frac{E^{\text{Grade 10}}_{\text{Acad. Year X+1}}}{E^{\text{Grade 19}}_{\text{Acad. Year X}}}\right) \quad (6)$$

where $E^{\text{Grade12}}_{\text{Acad. Year X}}$ equals the number of 12th graders enrolled in the fall of academic year X. The author notes that this approach "estimates the likelihood of a 9th grader from a particular district completing high school with a regular diploma in four years *given the conditions in that district during the [given] school year*" (emphasis theirs). Swanson (2003) argues that this measure has the virtues of being timely and reflective of current education system performance because it requires data from only two academic years. As I will demonstrate below, the CPI is systematically biased except when there is no net student migration between geographic units. What is more, the CPI shares with the ACR the technical weakness of including only regular diploma recipients in the numerator; in his defense, Swanson's (2003) includes only regular diploma recipients in his four-year high school completion rate because this is what is required under the AYP provisions of No Child Left Behind.

EVALUATING MEASURES BASED ON COMMON CORE DATA

Table 1 presents a series of simulations of enrollment counts, high school completer counts, and high school completion rates in one geographic area over ten academic years. I include the BCR with 8th grade enrollments in the denominator, the BCR with 9th grade enrollment in the denominator, the ACR, the CPI, and the new Estimated Completion Rate (ECR) that I describe below. For demonstration purposes, all simulations stipulate that every single student completes high school. By design, then, valid measures of overall high school completion rates should report a 100% completion rate for every academic year; four-year completion rate measures like the CPI may be less than 100% in the presence of grade retention (which would delay students' graduation). The simulations differ with respect to assumptions about (1) changes over time in the numbers of incoming 8th graders, (2) net migration rates, and (3) grade retention rates. Each simulation begins with 1,000 students entering the 8th grade for the first time in the fall of the 1994-1995 academic year and follows that and subsequent cohorts of students over ten academic years under a variety of assumptions about cohort sizes, net migration, and grade retention.

Panel A of Table 1 simulates a situation in which the size of the incoming 8th grade cohort increases by 2% annually, from 1,000 in 1994-1995 to 1,020 in 1995-1996 and so forth; there is no net migration, no students are ever retained in grade, and (as always) all students complete high school. Given these parameters, all of the 1,000 students who enter 8th grade in the fall of 1994 progress to the 9th grade in the fall of 1995, to the 10th grade in the fall of 1996, to the 11th grade in the fall of 1997, and to the 12th grade in the fall of 1998, and all 1,000 receive regular diplomas in the spring of 1999. The incoming cohort of 8th graders in fall 1995 enjoys similar success, such that all 1,020 obtain regular diplomas in spring 2000. As reported at the bottom of the panel, each of the CCD-based completion rates correctly reports a 100% high school completion rate—except for Greene and Winter's (2002) ACR. The ACR equals 106% under these conditions. In general, if the annual proportional change in the size of 8th grade cohorts equals X (e.g., 0.02 in Panel A), then the ACR equals the true rate times $(1+X)^3$.

Panel B of Table 1 simulates a situation in which the net migration rate equals +1% at each grade level, such that the number of students in each grade and in each year grows by 1% during the course of the academic year because more students move into the state (either from another state or from abroad) than leave it. Here there is no annual change in the size of incoming cohorts of 8th graders, and no students are ever retained in grade. Under this scenario, each of the CCD-based high school completion rates described above is biased; the BCR with the number of 8th graders in the denominator yields a 105% completion rate, while the other measures each yield a 104% completion rate. In general, if the annual net migration rate is expressed as proportion Y, then the ACR, the CPI, and the BCR with 9th grade enrollments in the denominator yield completion rates that equal the true rate times $(1+Y)^4$. Interestingly, despite the "migration adjustment" detailed in Equation 5 Greene and Winter's (2002) ACR shares the same migration-related bias as the BCR. The simulation in Panel C is the same as the simulation in Panel B except that the net migration rate is now -1%. Here each of the CCD-based high school completion rates is downwardly biased.

The simulations in Panels A, B, and C of Table 1 make two general points about the role of migration and changes in cohort size in biasing these several state-level high school completion rate measures. First, whether these rates are biased upward or downward depends heavily on net migration rates. If more students move into a state than leave it between 8th grade and 12th grade, then these completion rates are overstated. If more students leave a state than move into it, then these completion rates are underestimated. Second, Greene and Winter's (2002) ACR—but not the BCR or CPI—is also biased by changes over time in the size of incoming cohorts of 8th graders.

Panel D of Table 1 presents a simulation in which the percentage of 9th graders made to repeat the 9th grade begins at 3% and then rises over time. Here there is no annual change in the size of incoming cohorts of 8th graders, there is no net migration, and (as always) every student completes high school. Although 1,000 students enter the 9th grade for the first time in each academic year, not all of them move on to the 10th grade in the succeeding academic year. Consequently, the observed number of 9th graders in each year is higher than the number of new, incoming 9th graders in that year. Except for the BCR that uses 8th grade enrollments in the denominator, each of the CCD-based measures of overall high school complete rates described above is downwardly biased when any 9th graders are retained—even though all incoming 9th graders end up completing high school.[5] This is because each measure (with one exception) counts retained students in their denominator twice (once in the year in which they first entered the 9th grade and once in the following year) but in their numerator only once. In general, the ACR and the BCR with 8th grade enrollments in the denominator are downwardly biased when any students are made to repeat the 8th grade. The ACR and the BCR with 9th grade enrollments in the denominator are downwardly biased when any students are made to repeat the 9th grade, and the ACR is downwardly biased when any students are made to repeat the 10th grade. The fact that more students repeat 9th grade than any other high school grade—combined with recent claims that rates of 9th grade retention are increasing (Haney et al. 2004)—is troubling, since retention in the 9th grade has the most deleterious consequences for the validity of the ACR and the BCR with 9th grade enrollments in the denominator.

The simulations in Table 1 make the point that CCD-based high school completion rates like those reviewed above are biased except when there is no grade retention, when there is no net migration, and when cohort sizes remain stable. The direction and magnitude of systematic bias in the BCR, ACR, and CPI depend on the configuration of demographic and grade retention patterns in particular states in particular years. Beyond misrepresenting the absolute rates of high school completion, this means that these measures also misrepresent differences across states and trends over time in high school completion rates—unless net migration, the size of incoming cohorts of 8th graders, and rates of grade retention (particularly in the 9th grade) remain stable over time and across states. What is more, as I will show below these alternate measures produce substantively different results in empirical analyses.

[5] The CPI—again, a *four-year* measure of completion rates—is not biased in this way.

A NEW METHOD FOR MEASURING STATES' HIGH SCHOOL COMPLETION RATES

In this section I describe a new CCD-based measure of high school complete rates—labeled Estimated Completion Rates (ECR)—that can presently be computed for the graduating classes of 1973 to 2000; revised completion counts for spring 2001 and beyond are not yet available in the CCD. As shown in Table 1, this new measure produces unbiased estimates of the rate of high school completion regardless of changes over time in incoming cohort sizes, migration patterns, or grade retention rates. After describing the construction of this new measure I employ it for the purposes of comparing high school completion rates across states and over time.

The ECR conceptually represents the proportion of incoming public school 9th graders in a particular state and in a particular year who go on to complete high school (except via GED certification). The ECR is computed as

$$\text{ECR} = \frac{\text{High School Completers}_{\text{Spring of Academic Year X}}}{9^{\text{th}}\text{ Grade Enrollment}_{\text{Fall of Acad. Year X-3}} \times 9^{\text{th}}\text{ Grade Retention Adjustment} \times \text{Migration Adjustment}} \quad . \quad (7)$$

The ECR is essentially the BCR with adjustments to the denominator to account for retention in the 9th grade and for migration. The goal of these adjustments is to cause the denominator to represent the number of individuals in the cohort who are at risk of completing high school in the spring of academic year X. Ninth graders in state Z in the fall of academic year X-3 who are made to repeat the 9th grade or who move to a different state are not at risk of completing high school in state Z in the spring of academic year X. Conversely, the population of students at risk of completing high school in state Z in the spring of academic year X includes in-migrants who were not counted among the 9th graders in state Z in the fall of academic year X-3.

For reasons described above, the numerator in Equation 7 is the total number of public high school completers (excluding GED recipients), regardless of whether completers earned regular diplomas, earned "other diplomas," or completed high school in some other way. Again, historically about 99% of completers have earned regular diplomas. The denominator begins with the number of public school 9th graders enrolled in the fall of academic year X-3, but adjusts this figure in two ways to account for retention in the 9th grade and for migration.

The adjustment for retention in the 9th grade is based on the estimated percentage of 9th graders in a particular state in the fall of a particular year that is in 9th grade for the first time. These estimates are derived from 1968 through 1996 data from the October CPS. Using these data I select students who were enrolled in public schools in one of the 50 states or the District of Columbia.[6]

The 9th grade retention adjustment to the denominator in Equation 7 is based on a comparison of the age distribution of 8th graders in one October to the age distribution of 9th graders in the following October. In the fall of an academic year, the vast majority of 8th and 9th graders are 13 and 14 years old, respectively. I begin by defining students as overage for grade if they are 14 or older in 8th grade or 15 or older in 9th grade. After computing the proportion of 8th and 9th graders who are overage for grade in each October, I assume that the growth in the proportion of students who are overage for grade is due to grade retention. For example, in California in 1968 I observe that 16.4% of 8th graders were overage for grade. In 1969, however, 19.7% of California 9th graders were overage for grade. I thus estimate that 19.7 – 16.4 = 3.3% of California 9th graders are repeating the 9th grade, or that 96.7% of all 9th graders in California in 1969 were in 9th grade for the first time. This estimate is subject to random error, but as I describe below the degree of bias in this measure is likely small; even with some degree of random error, this estimate of grade retention is preferable to either ignoring grade retention altogether or to employing demonstrably biased estimates of grade retention.

[6] Throughout, I employ CPS-provided sampling weights that account for the probability of selection in to the CPS sample and that adjust for non-response U.S. Bureau of the Census. 2002a. *Current Population Survey, October 2000: School Enrollment Supplement File*. Technical Documentation CPS-01. Washington, D.C.: U.S. Bureau of the Census..

In order to minimize the degree of random error in these estimates of 9th grade retention (which are based on CPS data which have small sample sizes in some states in some years) I have taken three additional steps in constructing the 9th grade retention adjustment to the denominator in Equation 7. First, I have constrained grade retention rates to be 0 or greater; small sample sizes occasionally yielded negative estimates. Second, I have aggregated some smaller states into geographically proximate state groups.[7] This step has the consequence of forcing 9th grade retention rates to be equal across some states, but it has the advantage of yielding more reliable estimates. Third, I have used five year moving averages to smooth grade retention rates over time; again, the goal is to produce more reliable estimates. In practice, this means that the estimated 9th grade retention rate for California in 1969 is equal to an average of that estimated rate for 1969 through 1973. Although I use 1968 through 2000 October CPS data, 9th grade retention rates can only be calculated beginning in 1969 (because I do not observe the age distribution of 8th graders in 1967). Because academic year 1999-2000 is the last year in which I observe numbers of high school completers, I only need 9th grade retention rates through 1996 (although because I use five year moving averages the rates for 1996 require data from 1996 through 2000).

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[7] There are 18 state groups: (1) Connecticut, Massachusetts, Maine, New Hampshire, Vermont, and Rhode Island; (2) New York; (3) New Jersey; (4) Pennsylvania; (5) Ohio; (6) Indiana and Illinois; (7) Michigan and Wisconsin; (8) Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, and Nebraska; (9) The District of Columbia, Delaware, Maryland, Virginia, and West Virginia; (10) South Carolina, North Carolina, and Georgia; (11) Florida; (12) Kentucky and Tennessee; (13) Alabama and Mississippi; (14) Texas; (15) Arkansas, Lousiana, and Oklahoma; (16) Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada; (17) California; (18) Washington, Oregon, Alaska, and Hawaii.

These estimates of 9th grade retention are imperfect in at least two respects. First, they ignore migration. If the proportion of students who are overage for 8th grade in state Z in academic year X differs from the proportion of students who are overage for 9th grade in that state one year later, this difference may in part be attributable to selective migration. For this problem to seriously bias these estimates, however, there would need to be strong relationships between students' ages and their propensity to migrate, such that overage-for-grade students are much more (or less) likely to migrate than their younger classmates. The second potential problem with these estimates has to do with dropout. If students who are overage for 8th grade drop out of school before being counted among the population of overage for 9th grade students the following year, then estimated 9th grade retention rates are downwardly biased. The October CPS data show that more than 98% of all 14 years olds and more than 98% of all 15 years olds have been enrolled in school in any particular year since 1968; these figures fall to about 95% for 16 year olds and about 88% for 17 year olds. Because the vast majority of overage for 8th grade students are 14 and the vast majority of overage for 9th grade students are 15, the magnitude of this bias in 9th grade retention rates is very likely small.

I have taken one additional step to investigate the validity of these measures of 9th grade retention. Since 1988 the October CPS has included a measure of the grade in which students were enrolled in the previous October. Since the October CPS also includes a measure of the grade in which students are currently enrolled it is possible to use these data to estimate the proportion of enrolled, public school 9th graders in each state and in each year (since 1988) who were attending the 9th grade for the first time in that year. For example, according to the October CPS there were 484,372 students in 9th grade in California in 2000. However, 9,299 of these students were also enrolled in 9th grade in the preceding October. Rates of 9th grade retention derived as such are similar to the rates described above, both in terms of the absolute proportions of students retained in 9th grade and in states' relative grade retention rates. This gives some assurance that the basic estimation scheme for 9th grade retention rates yields credible results.

The adjustment for migration in the denominator of Equation 7 is based on a comparison of the total population of 17 year olds in a state on July 1 of a particular year to the total population of 14 year olds in that state on July 1 three years earlier. These estimates are derived from published, annual state-by-age population estimates produced by the Population Division of the U.S. Bureau of the Census (U.S. Bureau of the Census 2001a; U.S. Bureau of the Census 2001b; U.S. Bureau of the Census 2002b) which are readily available for all years between 1970 and 2000. For example, there were 385,531 people age 14 in California in 1970. In that state in 1973 there were 389,109 people age 17—a 0.9% net increase. To improve the reliability of these estimates, I computed four year moving averages. The net migration estimate for California in 1980 thus represents the point estimates for 1980 through 1983.[8] Again, these migration estimates are subject to random error; however, as I describe below they are largely unbiased. In any case, these estimates are certainly preferable to either ignoring migration or to using demonstrably biased estimates of migration.

Because I am using population estimates from 1970 through 2000, I am unable to compute migration estimates for 1969 through 1972. For these years, I have imputed values based on models (estimated separately for each state) of trends in migration rates between 1973 and 1977. This technical issue aside, there are three potential problems with this technique for estimating migration rates. The first issue is that these migration estimates pertain to the net change in the population size of <u>all</u> 14 year olds over the ensuing three years—not to net change in the population size of all 14 year olds

[8] Although I refer to these as estimates of net migration, these figures actually represent the influence of both net migration and mortality; indeed only migration and mortality can lead to differences between the numbers of 14 year olds in a state in one year and the numbers of 17 year olds in that state 3 years later.

students. However, as described above more than 98% of 14 year olds are enrolled in school; consequently, the empirical biases resulting from this conceptual issue are likely trivial. The second issue is that these estimates cover only three years of migration between ages 14 and 17. Surely there is some migration among high school students between ages 17 and 18, and this migration is missed in my estimates. Although it is possible to use the Census Bureau's population figures to estimate migration between ages 14 and 18, these estimates would capture a great deal of inter-state migration among 18 year olds who are moving for the purpose of attending college out of state. Consequently, my estimated migration rates are likely a bit conservative (although the direction of bias depends on whether net migration is positive or negative within states). The third issue is that this technique counts international in-migrants who come to the U.S. between ages 14 and 17—but never enroll in high school—as non-completers. As I discuss in detail below, this exerts modest downward bias on estimated completion rates, particularly in states with high levels of international in-migration. In the end, however, this small degree of bias is certainly preferable to the considerable bias introduced by ignoring migration altogether as most previous measures have done.

Above and beyond the technical issues involved in calculating the 9th grade retention and migration adjustments, a potential technical weakness of the ECR more generally concerns its treatment of students who are made to repeat any high school grade other than grade 9. Students enrolled in the 9th grade in academic year X-3 who are made to repeat one grade during high school are not at risk of completing high school in the spring of academic year X—but they may still complete high school in academic year X+1. Consequently, the ECR may seem like a downwardly biased estimator of high school completion rates. However, consider the fact that students enrolled in the 9th grade in academic year X-3 who are made to repeat one grade during high school are at risk of completing high school in the spring of academic year X+1. What this means is that as long as grade retention rates remain stable—regardless of their absolute levels—the ECR is unbiased. What is more, because of the 9th grade retention adjustment the ECR is not biased by changes in 9th grade retention rates ---- only by changes in retention rates in grades 10 through 12. Simulations (not shown, but available upon request) demonstrate that *extreme single-year changes* in the rate at which 10th through 12th graders are retained produce *very modest* downward bias in the ECR. For example, if we assume that 5% of all 10th, 11th, and 12th graders are retained in academic year X, and that the retention rate rises by 0.5% annually in each grade—such that 5.5% of all 10th, 11th, and 12th graders are retained in academic year X+1, 6% of all 10th, 11th, and 12th graders are retained in academic year X+2, and so forth—the ECR is downwardly biased by about 2%. In short, extreme annual changes in grade retention rates in grades 10 through 12—but not extreme grade retention rates themselves—produce modest downward biases in the ECR.

THE ECR: AN EXAMPLE

To illustrate the computation of the ECR in practice, consider that there were 70,811 students in 9th grade in Massachusetts in 1996 and that there were 52,950 high school completers in that state in 2000 (all according to CCD data). The BCR in this case would equal

$$\text{BCR} = \frac{\text{High School Completers}_{\text{Spring of Academic Year 1999-2000}}}{9^{\text{th}}\ \text{Grade Enrollment}_{\text{Fall of Academic Year 1996-1997}}} = \frac{52{,}950}{70{,}811} = 74.8\%.$$

However, I estimate that 5.3% of Massachusetts 9th graders in the fall of 1996 were repeating that grade, such that only 70,811 x 0.947 = 67,058 were newly enrolled 9th graders. Moreover, the population of 17 year olds in Massachusetts in 1999 was 2.3% larger than the population of 14 year olds in that state in 1996. Consequently, I estimate that 67,058 x 1.023 = 68,600 individuals were actually at risk of completing high school in Massachusetts in the spring of 2000. The ECR thus equals

$$\text{ECR} = \frac{52{,}950}{70{,}811 \times 0.947 \times 1.023} = 77.2\%.$$

VALIDATING THE ECR

Although the ECR is designed to produce valid estimates of state-level high school completion rates, it is worth asking how national estimates derived from the ECR compare to high school completion rates derived from longitudinal surveys of students—surveys in which we actually observe the percentage of students who complete high school among those at risk of doing so. For example, the National Educational Longitudinal Study of 1988 (NELS-88) is a longitudinal study of more than 25,000 students who were 8th graders in the spring of 1988 (U.S. Department of Education 2002c). If we restrict the NELS-88 sample to public school students who were included in the 1994 follow-up survey,[9] we find that 75.4% of respondents completed high school (except via GED certification) in 1992 (which is to say, within four academic years).[10] For the graduating class of 1992 the ECR equals 73.7%. However, because the migration component of the ECR—which equals +3.8% in 1992—reflects patterns of international migration that are *not* captured in NELS-88,[11] a more reasonable comparison would be to the ECR without including the migration component. For 1992, the ECR without including the migration component equals 76.5%. That is, if we compare conceptually similar rates we observe that the NELS-88 figure and the modified ECR differ by about one percentage point; none of the other measures described above so closely approximate the experience of the NELS-88 cohort.

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[9] Specifically, if G10CTRL equals 1 and F4UNI2E is between 1 and 4. All analyses of the NELS-88 data are performed after weighting the data by F4PNLWT.

[10] Students are counted as completers if they obtained some diploma in 1992, such that F4UNI2E equals 1 and YRRECY equals 1992.

[11] In-migrants who came to the U.S. after 1988 were not eligible to be counted among NELS-88 high school completers

STATE-LEVEL HIGH SCHOOL COMPLETION RATES, 1973-2000

Table 2 reports the ECR by state and year of high school completion. As demonstrated in Table 1 the ECR is a conceptually unbiased estimate of the percentage of incoming public school 9th graders in a particular state and in a particular year who complete high school. Figure 1 depicts national high school completion rates as reflected by the BCR and by the ECR for the graduating classes of 1973 through 2000. Both estimators show that the high school completion rate in the United States declined in the late 1970s, remained stable during the 1980s and early 1990s, and declined again beginning in the early 1990s. Whereas more than three fourths of students completed high school in 1973, only two thirds did so in 2000. The ECR is 1.4 percentage points higher than the BCR in 1973, but 1.5 percentage points lower by 2000. While one or two percentage points may seem substantively trivial, keep in mind that more than three and half million students are in the denominator nationwide each year. One percentage point in these rates is a difference of about 35,000 young people nationwide. This means that in 2000 the BCR and ECR estimates of the number of non-completers differed by about 50,000 students nationwide.

The fact that the ECR is first higher and then lower than the BCR over time in the U.S. reflects a trend toward high net in-migration in the United States. For any particular state in any particular year, whether the ECR yields substantially higher or lower estimates than the BCR (or other measures) is a largely a function of how much 9th grade retention and net migration those states experience. For states with low 9th grade retention rates and low net migration the ECR is virtually equivalent to the BCR (and to other measures). However, in states with high rates of 9th grade retention and/or high levels of net migration the ECR can produce very different estimates. For example, Figure 2 plots the BCR and the ECR for Nevada for the graduating classes of 1973 through 2000. Because Nevada has experienced very high rates of net in-migration annually—the population of 17 year olds is often more than 8% larger than the population of 14 year olds three years earlier—the

ECR is usually five percentage points higher than the BCR (and occasionally as many as nine percentage points higher). In contrast, New York experienced moderate net out-migration until about 1980 and has experienced moderate net in-migration ever since then. The consequence, as shown in Figure 3, is that the ECR was sometimes more than five percentage points higher than the BCR in the late 1970s, whereas the two measures differ relatively little thereafter (because net in-migration is approximately off-set by 9th grade retention after the early 1980s).

The point that the ECR can sometimes portray a very different picture about individual states' high school completion rates is made more dramatically by comparing states' relative rankings on the BCR and the ECR. The X-axis of Figure 4 arrays states according to their ranking on the ECR for the graduating class of 2000, where 1 represents the highest completion rate in 2000 (in New Jersey) and 51 represents the lowest completion rate (in South Carolina). The states' postal abbreviations are arrayed on the Y-axis according to the difference in relative rankings between the ECR and the BCR. For example, whereas Rhode Island ranked 32nd on the BCR in 2000, it ranked 15th on the ECR in that year—a difference of 17. How are states like Rhode Island, New Hampshire, Idaho, Connecticut, and Virginia doing relative to other states with respect to high school completion rates? The answer depends a great deal on one's choice of measure.

Figure 5 depicts the ECR for each state for the graduating class of 2000. South Carolina, Georgia, Arizona, Louisiana, and Florida had the lowest public high school completion rates in 2000—all below 57%—while New Jersey, Minnesota, Connecticut, North Dakota, and Nebraska had the highest rates—all above 81%. Figure 1 above showed a modest but steady decline in the ECR over time in the U.S. as a whole, and this trend holds in most individual states as well. Figure 6 demonstrates that high school completion rates declined in 46 states between 1973 and 2000, but that the size of the decline varied tremendously across states. Most states saw a decline in high school completion rates of between 5 and 15 percentage points, but South Dakota saw declines of more than

20 percentage points while Arkansas, the District of Columbia, New Jersey, Mississippi, and Virginia saw positive trends.

THE ECR AND PRIVATE SCHOOL ENROLLMENTS AND COMPLETIONS

The ECR represents the percentage of incoming public school 9th graders in a particular state and in a particular year who complete public high school. The exclusion of enrolled private school students and graduates from the ECR could be problematic if there have been substantial changes over time in private high school enrollments and/or completions. This is particularly true if changes in private school enrollments and/or completions have occurred unevenly across socioeconomic and/or demographic groups or across geographic areas. For example, if racial inequalities in private school attendance and/or enrollment have widened over time, then the apparent decline in the ECR (and other public high school completion rates) over time may not be a reflection of real change in students' chances of completing public school.

To assess the extent to which changes in private school enrollments and completions are driving trends in the ECR, Figure 7 depicts trends in the percentage of 9th through 12th graders who are enrolled in private schools by race (Panel A), household head's education (Panel B), and region (Panel C) and trends by geographic region in the percentage of high school completers who graduated from private schools (Panel D). Data for Panels A, B, and C are derived from October CPS data for 1977 through 2000; estimates are based on weighted data, and reflect three-year moving averages. Data for Panel D come from CCD counts of public school completers and counts of private school completers from various years of the Private School Universe Survey which is conducted periodically by the National Center for Education Statistics (U.S. Department of Education 2001b).

About 8% of high school students are enrolled in private schools. This figure has not changed perceptibly since at least 1977. Whites, students whose household head attended at least some college, and students in the New England and Middle Atlantic states are more likely than their peers to attend private high schools; none of these disparities in rates of private school attendance have changed perceptibly since at least 1977. Finally, as depicted in Panel D, there are notable regional differences in the rate at which high school completers graduate from private schools. However, neither the overall percentage of completers graduating from private schools nor regional differences in that percentage have changed since at least 1980. There are likely many factors behind changes over time and differences across states in high school completion rates, but changes in private school enrollments and completions likely play a small role.

THE ECR AND INTERNATIONAL IN-MIGRATION

The migration adjustment to the denominator in Equation 7 conceptually represents the net change in the size of a given cohort between ages 14 and 17; such changes can only be the result of migration and mortality. We begin with *n* 14 year olds in a particular state in a particular year. Over the next three years, some of the *n* die, some of the *n* leave the state, and individuals not counted among the original *n* move from outside of the state—either from other states or from abroad. A potential with this approach to adjusting for migration concerns young people who move to the U.S. from abroad between the ages of 14 and 17 but who do not enroll in public school. These students inflate the denominator of Equation 7, and thus reduce the ECR. However, if these young people never enter the public education system in the U.S. then the ECR may unfairly understate the public high school completion rate, especially in states that experience high levels of immigration. The size of this problem is an empirical question that is addressed in Table 3.

Columns 1 through 4 of Table 3 are based on data for 14 to 17 year olds from the 2000 U.S. Census 5% PUMS file. Column 1 reports the total number of 14 to 17 year olds in each state as of the 2000 enumeration. Column 2 reports the number of 14 to 17 year olds who were born outside of the U.S.—about 8.4% of all 14 to 17 year olds nationwide—and Column 3 reports the number of 14 to 17 year olds who were born outside of the U.S. <u>and who came to the U.S. after age 13</u>. About

17.8% of foreign born 14 to 17 year olds came to the U.S. after age 13. However, Column 4 shows that the vast majority of these young recent immigrants—about 76.9%—were enrolled in school in 2000. Nonetheless, in 2000 there were more than 75,000 people between the ages of 14 and 17 who immigrated after age 13 and who were not enrolled in school. If we assume that none of these young immigrants were ever enrolled in U.S. public schools, and remove them from the migration adjustment to the denominator in Equation 7, the ECR changes from 66.6% nationwide (Column 5) to 67.9% nationwide (Column 6)—an increase of 1.3 percentage points. The ECR understates the public school completion rate by less than 1 percentage point for most states, but by more than 2 percentage points in 8 states—all of which experience high levels of international immigration. The figures in Table 3 can only be reliably computed for 2000, and should serve as a cautionary note: The ECR modestly understates high school completion rates in states with many international immigrants who come to the U.S. between ages 14 and 17 and who do not enroll in school.

DOES THE CHOICE OF MEASURE DRIVE SUBSTANTIVE RESULTS?

As demonstrated above, conclusions about states' absolute and relative high school completion rates differ depending on how states' high school completion rates are measured. Beyond these descriptive differences, it is worth considering whether different state-level measures of high school completion perform differently in typical empirical analyses. To address this issue I have estimated models of the effect of (1) state-level poverty rates and (2) states' high school exit examination policies on state-level high school completion rates using alternate measures of the dependent variable. Our data on annual state-level poverty rates are derived from U.S. Census Bureau data, and our information about whether states required students in particular graduating classes to pass an exit examination as a prerequisite for obtaining a high school diploma is derived from recent archival work by Warren and colleagues at the University of Minnesota (e.g., Warren, Jenkins, and Kulick 2004). Briefly, we estimate a series of state and year fixed-effects models in which the 1,428 state-years between 1973 and 2000 are our units of analyses. Our models include state and year fixed effects plus one time-varying covariate: either state-level poverty rates or states' high school exit examination policy. These analyses are by no means complete; they are simply designed to investigate whether substantive conclusions depend on how states' high school completion rates are operationalized.

Table 4 reports the results of these models. The models in each column use a different measure of state-level high school completion rates: a CPS status dropout rate, the BCR, the ACR, the CPI, and the ECR. Model A includes state-level poverty rates as the only time-varying covariate, and Model B includes states' high school exit examination policies as the only time-varying covariate. The results of Model A show that state poverty rates are related to high school dropout or completion rates—except when the ECR is used to measure states' high school completion rates. Although the BCR, ACR, CPI, and ECR are in the same metric (ranging from 0 to 100), the point estimates differ considerably depending on how the dependent variable is measured. The results of Model B show that high school exit examinations are associated with higher dropout rates and lower high school completion rates—except when the ACR is the measure of high school completion rates. Again, the magnitude of the estimated effect of high school exit examinations also varies across outcome measures. In general, the results in Table 4 suggest that substantive results may depend in important ways on how state-level high school completion rates are measured. This highlights the importance of utilizing a measure that is conceptually sound and empirically unbiased.

DISCUSSION

In this paper I reviewed and critiqued existing state-level measures of high school completion that use CPS or CCD data. Measures based on the CPS are conceptually inappropriate for present purposes and are typically statistically unreliable because of small sample sizes in many states. Measures based on Common Core Data (CCD) <u>dropout</u> information are unavailable for many states and have their own conceptual weakness. As shown in a series of simulations, existing measures based on CCD enrollment and completion data are systematically biased by migration, by changes in cohort size, and (except for the CPI) by grade retention. The BCR, ACR, and CPI misrepresent absolute rates of high school completion, states' relative standing with respect to high school completion rates, and trends over time in rates of high school completion.

After critiquing existing CCD-based measures I went on to describe a new measure—labeled an Estimated Completion Rate (ECR)—that uses these data to produce state-level high school completion rates for 1973 through 2000. The ECR conceptually represents the percentage of incoming public school 9th graders in a particular state and in a particular year who complete high school. This measure is not influenced by changes over time in incoming cohort sizes, uses information from the U.S. Census Bureau to estimate states' net migration rates, and uses information from October CPS data to account for grade retention. While the ECR conceptually overcomes the systematic biases in other CCD-based high school completion rates that are produced by changes in cohort size, migration, and 9th grade retention, its empirical accuracy hinges on the validity of the migration and 9th grade retention adjustments (and, of course, on the quality of the CCD data themselves). However, as described above the ECR does a good job of approximating high school completion rates observed in longitudinal studies like the National Educational Longitudinal Study of 1988. There is certainly some degree of random error in the ECR estimates, but systematic biases in the ECR are far less than the systematic biases in alternate measures. Because different measures paint very different pictures of states' absolute and relative high school completion rates, and because (as shown in Table 4) the choice of measure of states' high school completion rates can drive substantive empirical results in important ways, it is important for researchers to utilize a measure of state-level high school completion rates that is conceptually sound and empirically unbiased. I argue that the ECR is the best choice in this regard.

While the ECR does a better job of accounting for sources of systematic bias that plague other measures that use the CCD, the ECR is certainly limited in a number of respects and will not be useful for all purposes. Because the ECR is a measure of the overall high school completion rate (not of the four-year completion rate) and because I do not restrict the numerator to regular diploma recipients, the ECR is not in line with the guidelines for measuring AYP in No Child Left Behind. What is more, in this paper I have not computed the ECR separately by race/ethnicity (or even gender) because the CCD data do not contain race/ethnic-group specific completion counts for some states and because of the difficulties involved in producing valid and reliable group-specific migration and 9th grade retention adjustments. For similar reasons I have not computed the ECR at geographic levels below the state, despite the need for local-level measures presented by the annual yearly progress requirements of the 2002 No Child Left Behind legislation. As described above, the ECR modestly understates high school completion rates in states with high levels of international in-migration. Finally, the ECR categorically treats GED recipients as individuals who have not completed high school. For many purposes this is a virtue of the ECR, but for other purposes it may be seen as a weakness. It is conceivable that the ECR could be amended to include GED recipients in the numerator using data from the GED Testing Service,[12] although it would be difficult to know which year GED recipients should be counted in the numerator of that revised ECR.

The ECR—like other CCD-based measures of high school completion—shows a disquieting trend: Since at least the early 1970s the rate at which incoming 9th graders have gone on to complete high school in a timely fashion has declined steadily. In 8 states the high school completion rate declined by more than 15%; it increased in only four states and the District of Columbia. In the year 2000, only about two of every three public school students who might have completed high school actually did so. Any number of factors may account for this trend, including (but not limited to)

[12] CCD data on numbers of GED recipients varies in quality from state to state and over time.

changes in the demographic composition of students, increases in GED certification rates, and/or changes in a wide variety of education policies. In any case, careful investigation of this trend requires a conceptually sound and empirically valid measure of high school completion.

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Table 1. Various High School Completion Rates Under Different Assumptions: A Simulation

A. *Cohort Sizes Increase by 2% Annually (No Net Migration, No Grade Retention, No Dropout)*

	1994-95	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**
No. of Incoming 8th Graders	1,000	1,020	1,040	1,061	1,082	1,104	1,126	1,149	1,172	1,195
Fall Enrollment, **Grade 8**	1,000	1,020	1,040	1,061	1,082	1,104	1,126	1,149	1,172	1,195
Fall Enrollment, **Grade 9**		1,000	1,020	1,040	1,061	1,082	1,104	1,126	1,149	1,172
Fall Enrollment, **Grade 10**			1,000	1,020	1,040	1,061	1,082	1,104	1,126	1,149
Fall Enrollment, **Grade 11**				1,000	1,020	1,040	1,061	1,082	1,104	1,126
Fall Enrollment, **Grade 12**					1,000	1,020	1,040	1,061	1,082	1,104
Number of High School Completers in Spring					1,000	1,020	1,040	1,061	1,082	1,104
BCR-9 (e.g., Haney 2000)					a	100%	100%	100%	100%	100%
BCR-8 (e.g., Haney et al. 2004)					a	100%	100%	100%	100%	100%
ACR (e.g., Greene 2003)					a	a	a	a	106%	106%
CPI (e.g., Swanson 2003)					a	100%	100%	100%	100%	a
ECR (Current Paper)					a	100%	100%	100%	100%	100%

B. *Net Migration Rate of +1% Annually at Each Grade Level (No Change in Cohort Size, No Grade Retention, No Dropout)*

	1994-95	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**
No. of Incoming 8th Graders	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Fall Enrollment, **Grade 8**	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Fall Enrollment, **Grade 9**		1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010	1,010
Fall Enrollment, **Grade 10**			1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020
Fall Enrollment, **Grade 11**				1,030	1,030	1,030	1,030	1,030	1,030	1,030
Fall Enrollment, **Grade 12**					1,041	1,041	1,041	1,041	1,041	1,041
Number of High School Completers in Spring					1,051	1,051	1,051	1,051	1,051	1,051
BCR-8 (e.g., Haney et al. 2004)					a	105%	105%	105%	105%	105%
BCR-9 (e.g., Haney 2000)					a	104%	104%	104%	104%	104%
ACR (e.g., Greene 2003)					a	a	a	a	104%	104%
CPI (e.g., Swanson 2003)					a	104%	104%	104%	104%	a
ECR (Current Paper)					a	100%	100%	100%	100%	100%

a Completion rate cannot be computed for this academic year given the data in this table.

Table 1 (continued). Various High School Completion Rates Under Different Assumptions: A Simulation

C. *Net Migration Rate of -1% Annually at Each Grade Level (No Change in Cohort Size, No Grade Retention, No Dropout)*

	1994-95	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**
No. of Incoming 8th Graders	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Fall Enrollment, **Grade 8**	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Fall Enrollment, **Grade 9**		990	990	990	990	990	990	990	990	990
Fall Enrollment, **Grade 10**			980	980	980	980	980	980	980	980
Fall Enrollment, **Grade 11**				970	970	970	970	970	970	970
Fall Enrollment, **Grade 12**					961	961	961	961	961	961
Number of High School Completers in Spring					951	951	951	951	951	951
BCR-8 (e.g., Haney et al. 2004)					a	95%	95%	95%	95%	95%
BCR-9 (e.g., Haney 2000)					a	96%	96%	96%	96%	96%
ACR (e.g., Greene 2003)					a	a	a	a	96%	96%
CPI (e.g., Swanson 2003)					a	96%	96%	96%	96%	a
ECR (Current Paper)					a	100%	100%	100%	100%	100%

D. *% of 9th Graders Retained Begins at 3%, Rises 3% Annually (No Change in Cohort Size, No Net Migration, No Dropout)*

	1994-95	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**
No. of Incoming 8th Graders	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Fall Enrollment, **Grade 8**	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Fall Enrollment, **Grade 9**		1,000	1,031	1,033	1,034	1,035	1,036	1,037	1,038	1,039
Fall Enrollment, **Grade 10**			969	998	999	999	999	999	999	999
Fall Enrollment, **Grade 11**				969	998	999	999	999	999	999
Fall Enrollment, **Grade 12**					969	998	999	999	999	999
Number of High School Completers in Spring					969	998	999	999	999	999
BCR-8 (e.g., Haney et al. 2004)					a	100%	100%	100%	100%	100%
BCR-9 (e.g., Haney 2000)					a	97%	97%	97%	97%	96%
ACR (e.g., Greene 2003)					a	a	a	a	99%	99%
CPI (e.g., Swanson 2003)					a	97%	96%	96%	96%	a
ECR (Current Paper)					a	100%	100%	100%	100%	100%

a Completion rate cannot be computed for this academic year given the data in this table.

Table 2. High School Completion Rates (ECR), by State and Graduating Class

	1973	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
US Total	77.9%	77.1%	76.1%	76.3%	75.7%	74.9%	73.6%	73.0%	73.7%	73.9%	74.9%	74.4%	73.7%	73.9%
Alabama	68.1%	70.2%	69.8%	70.7%	72.2%	70.3%	70.0%	68.1%	70.2%	70.2%	70.7%	66.5%	64.0%	67.5%
Alaska	63.4%	65.8%	63.0%	61.4%	68.6%	68.8%	67.5%	71.1%	76.9%	80.6%	86.5%	87.3%	72.8%	74.9%
Arizona	65.7%	64.9%	62.5%	62.8%	65.9%	75.1%	73.2%	69.4%	69.9%	72.7%	63.1%	67.0%	66.9%	64.7%
Arkansas	65.3%	66.4%	74.1%	68.1%	71.9%	74.9%	76.8%	76.2%	79.3%	79.6%	78.0%	77.0%	78.8%	79.2%
California	82.1%	79.7%	79.9%	79.2%	76.2%	73.6%	68.9%	68.1%	68.5%	68.8%	73.3%	71.3%	68.9%	67.8%
Colorado	80.6%	80.4%	77.3%	76.8%	76.8%	78.1%	80.1%	78.9%	79.5%	78.8%	79.6%	79.0%	75.0%	74.2%
Connecticut	87.8%	85.9%	87.3%	80.8%	75.8%	75.1%	73.6%	75.3%	75.3%	77.4%	76.0%	82.3%	84.6%	91.2%
Delaware	77.0%	76.4%	76.0%	75.3%	74.8%	74.2%	72.7%	73.9%	75.1%	76.8%	83.9%	83.4%	82.1%	73.3%
Dist. of Columbia	56.1%	58.0%	58.3%	58.2%	62.3%	57.5%	56.2%	53.1%	57.0%	62.6%	65.3%	62.2%	60.1%	61.2%
Florida	64.4%	57.6%	64.2%	70.1%	66.7%	66.9%	64.7%	66.4%	64.2%	64.5%	66.5%	64.6%	62.7%	64.1%
Georgia	62.8%	62.7%	63.9%	65.3%	65.8%	64.6%	63.7%	61.5%	63.0%	65.5%	67.0%	68.1%	66.9%	67.1%
Hawaii	79.1%	81.2%	80.0%	81.0%	83.3%	80.5%	83.9%	83.3%	83.7%	86.9%	83.6%	87.5%	87.8%	85.9%
Idaho	82.6%	82.1%	78.5%	73.6%	77.1%	77.6%	78.4%	77.5%	79.3%	80.6%	81.0%	80.2%	81.2%	81.4%
Illinois	78.8%	79.9%	76.8%	79.0%	75.7%	73.9%	73.2%	73.8%	76.1%	76.9%	79.5%	78.8%	79.5%	80.5%
Indiana	80.3%	78.3%	76.2%	80.2%	78.4%	76.9%	77.3%	76.7%	78.1%	78.8%	80.8%	80.1%	80.4%	78.9%
Iowa	93.8%	91.1%	88.9%	88.4%	86.2%	87.1%	86.7%	87.0%	88.9%	90.6%	93.6%	92.7%	92.9%	91.5%
Kansas	87.6%	84.9%	81.9%	81.7%	81.8%	81.8%	83.2%	81.4%	82.2%	83.1%	85.1%	86.2%	85.4%	86.5%
Kentucky	70.3%	69.5%	68.7%	67.6%	66.8%	66.8%	65.3%	66.0%	67.5%	67.3%	67.4%	72.5%	72.2%	72.9%
Louisiana	71.2%	72.3%	71.6%	69.2%	69.9%	69.0%	68.3%	66.4%	67.0%	58.3%	57.3%	57.4%	60.3%	62.0%
Maine	81.5%	79.3%	79.7%	79.1%	77.7%	75.2%	73.7%	74.9%	74.9%	76.2%	79.9%	80.4%	83.6%	80.8%
Maryland	80.9%	79.5%	78.9%	78.2%	78.0%	77.1%	76.4%	77.6%	77.0%	76.8%	79.0%	81.0%	81.4%	79.0%
Massachusetts	86.7%	89.5%	85.8%	85.2%	78.7%	81.0%	78.9%	78.1%	81.7%	83.1%	81.7%	76.9%	80.5%	78.8%
Michigan	85.7%	88.1%	81.0%	76.6%	79.9%	77.7%	76.4%	73.4%	74.7%	75.8%	76.9%	77.1%	77.9%	78.7%
Minnesota	97.0%	95.8%	94.3%	92.6%	90.7%	89.0%	87.6%	86.8%	89.7%	91.6%	93.4%	98.1%	90.4%	90.7%
Mississippi	57.6%	60.7%	62.6%	62.4%	63.1%	62.7%	61.8%	61.3%	64.6%	66.0%	66.8%	65.4%	64.7%	64.8%
Missouri	77.8%	80.8%	77.5%	77.7%	75.0%	74.8%	76.0%	74.6%	75.2%	77.0%	78.6%	79.5%	79.3%	78.8%
Montana	77.1%	87.8%	84.8%	83.7%	88.5%	81.9%	83.6%	84.1%	85.9%	88.1%	87.6%	87.1%	86.9%	86.3%
Nebraska	92.3%	88.7%	86.2%	85.8%	85.9%	87.1%	85.1%	85.8%	85.1%	87.8%	88.6%	89.9%	89.4%	90.2%
Nevada	70.2%	71.6%	70.5%	69.9%	67.8%	68.0%	66.8%	67.0%	71.8%	69.9%	68.7%	71.5%	71.1%	76.3%
New Hampshire	82.9%	79.7%	82.9%	77.7%	80.1%	80.2%	82.0%	81.9%	80.9%	84.6%	79.7%	79.6%	81.2%	78.1%
New Jersey	85.9%	84.8%	82.1%	83.7%	83.7%	82.1%	82.3%	79.9%	79.9%	84.9%	85.9%	83.1%	82.9%	81.3%
New Mexico	77.8%	77.3%	78.8%	76.2%	73.9%	74.0%	74.9%	75.0%	75.1%	75.1%	73.5%	73.7%	73.8%	72.4%
New York	78.7%	76.8%	75.3%	76.1%	77.0%	76.8%	75.9%	76.5%	75.7%	73.7%	71.0%	68.3%	68.5%	70.1%
North Carolina	67.6%	66.5%	67.7%	69.2%	68.2%	68.0%	67.6%	66.5%	66.4%	68.5%	71.5%	74.2%	74.1%	73.9%
North Dakota	90.8%	89.8%	87.3%	88.3%	86.2%	88.6%	85.6%	84.9%	89.5%	93.1%	93.9%	94.3%	92.2%	90.9%
Ohio	86.4%	84.0%	83.0%	83.8%	83.4%	82.3%	80.7%	79.9%	81.3%	79.5%	82.5%	85.1%	84.5%	84.8%
Oklahoma	78.7%	76.9%	75.5%	77.8%	76.8%	78.8%	78.3%	77.1%	79.6%	80.0%	77.8%	76.5%	75.9%	73.6%
Oregon	82.3%	80.4%	79.6%	80.4%	78.2%	75.3%	74.7%	72.3%	72.7%	71.6%	71.9%	75.8%	75.0%	75.6%
Pennsylvania	89.8%	89.9%	87.6%	87.7%	87.7%	84.4%	82.6%	80.4%	80.3%	79.5%	80.4%	82.5%	82.2%	82.9%
Rhode Island	82.4%	79.9%	75.5%	73.3%	74.1%	75.5%	76.6%	77.7%	77.6%	80.0%	79.6%	76.8%	77.1%	77.2%
South Carolina	65.1%	68.6%	67.1%	67.4%	68.0%	68.1%	65.2%	67.5%	66.3%	64.1%	67.1%	68.9%	66.2%	68.0%
South Dakota	95.1%	91.7%	90.3%	87.0%	86.7%	86.4%	85.2%	85.0%	86.7%	88.3%	90.1%	91.8%	89.9%	87.2%
Tennessee	73.2%	69.4%	67.8%	69.1%	69.2%	68.4%	67.0%	71.1%	67.2%	69.3%	64.5%	68.0%	67.4%	69.3%
Texas	68.3%	68.8%	68.3%	70.7%	71.5%	71.6%	68.5%	69.6%	68.2%	68.2%	68.5%	66.9%	65.1%	64.3%
Utah	85.1%	82.7%	80.0%	81.6%	81.1%	82.5%	79.4%	79.3%	82.0%	82.0%	83.8%	84.6%	82.2%	81.5%
Vermont	93.0%	84.5%	85.7%	84.0%	84.9%	85.7%	82.4%	84.0%	79.1%	83.7%	81.0%	84.1%	86.4%	86.8%
Virginia	71.2%	70.6%	71.1%	71.8%	72.7%	72.1%	71.8%	71.8%	73.8%	75.3%	76.0%	77.2%	75.2%	75.9%
Washington	88.4%	86.3%	84.4%	84.3%	83.0%	80.6%	77.7%	75.5%	76.9%	75.5%	71.1%	75.9%	75.8%	76.0%
West Virginia	76.1%	75.7%	73.2%	74.1%	74.1%	74.2%	72.6%	73.0%	74.9%	75.5%	78.5%	80.5%	79.8%	78.4%
Wisconsin	91.1%	89.1%	88.4%	87.2%	86.8%	86.1%	84.3%	83.0%	84.4%	86.2%	86.9%	86.3%	86.5%	87.3%
Wyoming	88.1%	85.4%	82.3%	83.8%	81.2%	80.9%	77.5%	77.4%	78.8%	77.3%	79.4%	77.8%	77.3%	77.5%

Note: The ECR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3, with adjustments to the denominator to account for net migration and 9th grade retention. See text for details.

Table 2 (continued). High School Completion Rates (ECR), by State and Graduating Class

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
US Total	74.2%	73.9%	72.8%	73.5%	72.9%	73.7%	72.6%	71.3%	69.6%	68.1%	67.4%	66.6%	66.5%	66.6%
Alabama	70.8%	75.9%	69.2%	69.4%	69.0%	68.5%	65.9%	64.8%	63.4%	60.9%	59.4%	60.9%	58.1%	59.9%
Alaska	69.3%	68.5%	66.5%	75.8%	84.3%	87.2%	83.1%	74.7%	69.7%	63.7%	61.3%	63.0%	65.2%	59.5%
Arizona	64.8%	61.4%	63.4%	66.2%	67.4%	68.9%	68.0%	65.3%	60.1%	54.8%	58.2%	57.0%	56.6%	56.2%
Arkansas	78.9%	79.2%	83.8%	81.7%	83.1%	84.0%	84.7%	82.4%	85.9%	73.7%	68.3%	76.6%	71.3%	80.4%
California	69.1%	66.9%	63.8%	71.6%	72.0%	72.6%	73.1%	76.0%	74.8%	76.0%	75.9%	67.6%	67.5%	67.6%
Colorado	73.9%	76.1%	77.0%	75.7%	77.2%	78.0%	76.3%	74.3%	71.2%	68.4%	68.0%	66.7%	65.4%	65.0%
Connecticut	79.9%	85.1%	86.8%	76.5%	80.0%	85.3%	86.2%	85.7%	81.3%	79.6%	79.3%	77.7%	76.0%	82.8%
Delaware	79.8%	77.6%	79.1%	78.8%	73.5%	74.6%	74.7%	70.2%	69.2%	68.7%	66.6%	67.8%	64.2%	58.4%
Dist. of Columbia	58.2%	57.9%	55.1%	61.1%	59.1%	65.3%	70.8%	71.3%	67.6%	59.1%	60.1%	62.8%	56.2%	58.5%
Florida	62.9%	60.5%	59.0%	59.7%	59.9%	66.9%	64.5%	64.5%	64.7%	62.9%	60.3%	59.6%	57.5%	56.6%
Georgia	67.5%	63.9%	61.6%	61.8%	61.9%	63.1%	62.4%	60.0%	60.0%	58.1%	56.2%	54.5%	53.9%	53.0%
Hawaii	103.4%	99.7%	95.7%	91.8%	83.6%	85.3%	80.9%	79.7%	79.9%	78.7%	66.8%	66.4%	65.5%	65.9%
Idaho	80.7%	79.2%	81.1%	82.1%	82.4%	82.2%	81.0%	75.6%	74.3%	73.3%	72.4%	72.4%	72.9%	72.8%
Illinois	80.4%	82.8%	84.3%	82.3%	82.8%	84.5%	81.0%	77.9%	74.8%	74.1%	75.0%	76.1%	75.3%	71.5%
Indiana	82.1%	87.8%	82.3%	81.4%	80.4%	82.1%	77.2%	71.8%	69.1%	67.8%	67.5%	68.5%	69.2%	69.0%
Iowa	91.2%	91.1%	91.6%	91.9%	88.3%	88.7%	87.0%	85.0%	82.9%	82.3%	82.7%	81.5%	80.5%	81.2%
Kansas	86.1%	84.1%	84.4%	83.8%	81.7%	80.6%	79.5%	76.5%	74.1%	72.2%	71.0%	70.0%	71.1%	71.0%
Kentucky	72.7%	74.7%	73.7%	73.2%	73.3%	73.7%	73.6%	74.2%	67.8%	64.5%	63.3%	63.9%	63.5%	64.2%
Louisiana	73.7%	72.3%	62.6%	62.3%	58.0%	56.7%	60.5%	60.5%	58.9%	56.8%	54.2%	54.6%	54.7%	56.5%
Maine	86.4%	86.2%	84.6%	83.0%	84.1%	88.2%	81.1%	79.3%	78.7%	78.0%	75.3%	80.8%	77.5%	80.1%
Maryland	76.8%	75.8%	73.0%	73.1%	75.0%	76.9%	76.9%	75.6%	75.8%	75.3%	73.5%	73.0%	74.9%	73.6%
Massachusetts	78.3%	77.6%	79.7%	81.9%	78.4%	83.8%	83.1%	84.4%	81.9%	80.7%	79.4%	77.8%	76.6%	77.2%
Michigan	75.5%	84.8%	81.8%	78.9%	74.0%	75.4%	71.3%	71.4%	69.8%	71.0%	70.7%	73.3%	73.7%	71.4%
Minnesota	90.6%	90.4%	89.7%	90.0%	88.1%	88.1%	86.9%	84.9%	83.9%	82.7%	76.2%	82.8%	84.2%	83.7%
Mississippi	67.1%	70.1%	67.4%	72.6%	68.9%	67.7%	68.9%	66.3%	62.5%	55.7%	58.1%	56.5%	57.7%	58.7%
Missouri	77.9%	76.7%	75.3%	74.8%	73.6%	74.1%	72.8%	71.6%	70.3%	68.7%	68.8%	69.6%	70.6%	71.7%
Montana	83.8%	86.0%	87.6%	86.6%	88.2%	87.6%	85.9%	81.6%	81.6%	77.6%	75.8%	75.0%	74.5%	74.5%
Nebraska	89.1%	87.9%	89.4%	88.7%	88.7%	88.7%	87.3%	84.5%	81.8%	80.3%	79.8%	81.8%	84.7%	81.9%
Nevada	77.6%	70.6%	72.3%	77.0%	74.7%	70.5%	64.7%	63.8%	64.0%	67.1%	69.8%	66.5%	68.9%	68.5%
New Hampshire	75.9%	78.6%	75.2%	72.8%	74.5%	80.1%	81.9%	84.0%	80.6%	80.1%	78.9%	77.6%	76.1%	78.4%
New Jersey	80.4%	82.4%	81.3%	81.1%	85.0%	88.1%	86.4%	88.0%	86.3%	86.3%	88.7%	81.4%	81.3%	87.1%
New Mexico	71.6%	73.4%	71.8%	69.5%	70.9%	69.4%	68.3%	65.4%	62.6%	60.9%	55.9%	56.0%	58.3%	60.6%
New York	69.5%	69.4%	70.3%	69.4%	68.0%	69.6%	68.4%	65.6%	64.6%	64.8%	64.4%	62.5%	63.2%	62.0%
North Carolina	74.5%	71.9%	71.7%	70.1%	68.9%	68.2%	68.5%	66.7%	68.2%	65.0%	63.5%	61.2%	60.5%	57.9%
North Dakota	90.8%	91.7%	93.8%	95.2%	93.0%	93.1%	89.8%	88.2%	85.2%	85.8%	83.7%	82.3%	81.8%	82.1%
Ohio	82.8%	82.0%	79.9%	78.3%	76.6%	74.8%	76.4%	75.8%	73.2%	67.6%	69.5%	71.9%	68.2%	71.0%
Oklahoma	75.1%	76.0%	78.5%	82.1%	80.4%	80.9%	80.3%	78.3%	75.7%	72.7%	71.2%	71.4%	72.8%	74.3%
Oregon	78.2%	78.5%	80.4%	80.7%	79.7%	81.7%	80.7%	79.6%	76.3%	74.2%	73.6%	73.2%	74.4%	74.1%
Pennsylvania	83.1%	82.8%	81.0%	81.2%	79.4%	81.5%	80.8%	77.5%	74.9%	74.7%	74.6%	74.6%	76.9%	77.7%
Rhode Island	75.4%	73.3%	74.9%	70.5%	72.8%	80.8%	80.0%	79.3%	78.5%	76.8%	76.0%	74.3%	73.0%	75.2%
South Carolina	71.5%	66.8%	66.2%	65.6%	66.9%	62.7%	64.9%	62.4%	59.2%	57.8%	55.1%	53.9%	53.2%	50.4%
South Dakota	88.8%	87.8%	88.4%	87.9%	85.5%	88.5%	92.1%	90.9%	85.0%	84.5%	79.3%	73.0%	69.7%	72.1%
Tennessee	70.4%	71.6%	72.2%	70.9%	69.7%	70.9%	69.6%	64.0%	64.0%	63.1%	59.3%	57.2%	57.4%	58.2%
Texas	63.8%	63.4%	65.2%	66.3%	69.5%	65.0%	63.7%	61.2%	60.1%	58.7%	59.5%	60.4%	59.5%	61.1%
Utah	82.0%	82.0%	82.9%	83.7%	83.9%	85.5%	82.3%	80.0%	79.2%	78.2%	76.9%	76.5%	78.6%	80.2%
Vermont	87.2%	87.3%	87.5%	96.7%	84.3%	92.3%	99.0%	95.0%	95.9%	95.3%	84.6%	81.3%	80.6%	80.0%
Virginia	77.8%	75.4%	75.3%	76.3%	76.2%	76.1%	76.4%	73.4%	73.2%	75.6%	76.0%	73.2%	73.8%	71.6%
Washington	79.8%	78.8%	75.1%	76.1%	72.0%	75.4%	74.1%	74.3%	72.3%	70.7%	69.0%	69.7%	70.8%	69.6%
West Virginia	80.4%	80.7%	81.3%	84.8%	85.2%	86.1%	84.8%	80.9%	77.4%	75.3%	73.6%	74.8%	76.8%	74.1%
Wisconsin	85.5%	85.7%	85.0%	87.4%	84.0%	83.3%	83.2%	81.1%	80.1%	79.8%	79.1%	80.0%	79.4%	79.1%
Wyoming	82.1%	83.7%	84.5%	88.0%	91.2%	90.8%	87.8%	84.8%	77.2%	76.0%	74.3%	74.3%	74.0%	73.1%

Note: The ECR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3, with adjustments to the denominator to account for net migration and 9th grade retention. See text for details.

Table 3. Estimated Completion Rate in 2000, by State, Before and After Accounting for International In-Migrants Who Are Not Enrolled in School

	Column 1.	Column 2.	Column 3.	Column 4.	Column 5.	Column 6.	Column 7.
	Number of 14 to 17 Year Olds in 2000 U.S. Census	Of Those in Column 1, Number Born Outside of U.S.	Of Those in Column 2, Number Who Immigrated After Age 13	Of Those in Column 3, Number Not Enrolled in School	Estimated Completion Rate (ORIGINAL)	Estimated Completion Rate (REVISED)	Net Change in Estimated Completion Rate
	15,946,388	1,338,955	238,132	76,532	66.6%	67.9%	1.3%
Alabama	253,093	5,509	1,164	552	59.9%	60.4%	0.5%
Alaska	41,622	2,533	292	44	59.5%	59.8%	0.2%
Arizona	284,064	35,074	6,224	2,989	56.2%	58.8%	2.6%
Arkansas	157,565	4,444	1,020	427	80.4%	81.4%	0.9%
California	1,930,631	360,093	55,933	18,192	67.6%	70.4%	2.8%
Colorado	242,323	20,449	4,843	2,243	65.0%	67.5%	2.5%
Connecticut	177,932	13,962	3,114	755	82.8%	84.4%	1.7%
Delaware	40,476	2,674	420	193	58.4%	59.4%	1.1%
Dist. of Columbia	22,805	2,374	579	205	58.5%	61.1%	2.5%
Florida	806,698	99,228	18,880	4,587	56.6%	58.0%	1.4%
Georgia	460,730	30,460	7,845	3,790	53.0%	54.6%	1.6%
Hawaii	64,623	6,824	754	116	65.9%	66.3%	0.5%
Idaho	86,263	4,106	709	235	72.8%	73.6%	0.8%
Illinois	700,451	61,113	11,989	4,299	71.5%	73.5%	2.0%
Indiana	354,242	9,256	2,068	681	69.0%	69.5%	0.6%
Iowa	173,795	5,401	1,111	311	81.2%	81.8%	0.6%
Kansas	164,218	7,726	1,631	699	71.0%	72.3%	1.2%
Kentucky	228,591	4,558	796	322	64.2%	64.5%	0.4%
Louisiana	285,975	5,269	945	37	56.5%	56.5%	0.0%
Maine	74,009	2,297	316	8	80.1%	80.2%	0.0%
Maryland	293,686	22,606	4,206	871	73.6%	74.6%	1.0%
Massachusetts	324,145	27,559	4,430	564	77.2%	77.8%	0.6%
Michigan	576,219	21,953	3,896	900	71.4%	71.9%	0.5%
Minnesota	301,247	17,664	3,007	581	83.7%	84.4%	0.7%
Mississippi	175,114	2,265	452	240	58.7%	59.0%	0.3%
Missouri	329,118	9,052	2,017	290	71.7%	72.0%	0.3%
Montana	58,347	1,335	271	51	74.5%	74.8%	0.3%
Nebraska	108,098	4,267	1,006	245	81.9%	82.7%	0.8%
Nevada	103,425	13,425	2,327	1,083	68.5%	72.0%	3.5%
New Hampshire	71,427	2,288	577	70	78.4%	78.7%	0.4%
New Jersey	435,971	54,906	8,134	2,023	87.1%	89.2%	2.1%
New Mexico	117,867	7,644	1,311	407	60.6%	61.5%	0.8%
New York	1,017,912	144,823	21,741	4,628	62.0%	63.2%	1.2%
North Carolina	415,293	21,989	5,458	2,700	57.9%	59.4%	1.5%
North Dakota	42,460	807	91	0	82.1%	82.1%	0.0%
Ohio	653,261	14,174	2,284	523	71.0%	71.3%	0.2%
Oklahoma	206,923	7,655	1,995	1,025	74.3%	75.8%	1.5%
Oregon	194,014	14,898	3,152	923	74.1%	75.7%	1.5%
Pennsylvania	671,264	22,423	3,393	408	77.7%	77.9%	0.2%
Rhode Island	55,507	4,814	674	202	75.2%	76.6%	1.4%
South Carolina	223,920	6,135	1,360	389	50.4%	50.7%	0.3%
South Dakota	48,929	1,296	364	14	72.1%	72.2%	0.1%
Tennessee	309,196	9,643	2,102	682	58.2%	58.7%	0.5%
Texas	1,290,076	139,405	28,578	12,864	61.1%	63.5%	2.3%
Utah	162,862	9,012	2,218	747	80.2%	81.7%	1.5%
Vermont	35,698	950	91	16	80.0%	80.2%	0.2%
Virginia	381,632	28,381	5,126	1,391	71.6%	72.7%	1.1%
Washington	343,314	32,474	5,191	1,426	69.6%	70.8%	1.2%
West Virginia	97,163	974	143	0	74.1%	74.1%	0.0%
Wisconsin	320,181	10,366	1,815	584	79.1%	79.7%	0.6%
Wyoming	32,013	422	89	0	73.1%	73.1%	0.0%

Note: Data in Columns 1 through 4 are derived from the 2000 U.S. Census 5% PUMS file, and are weighted.

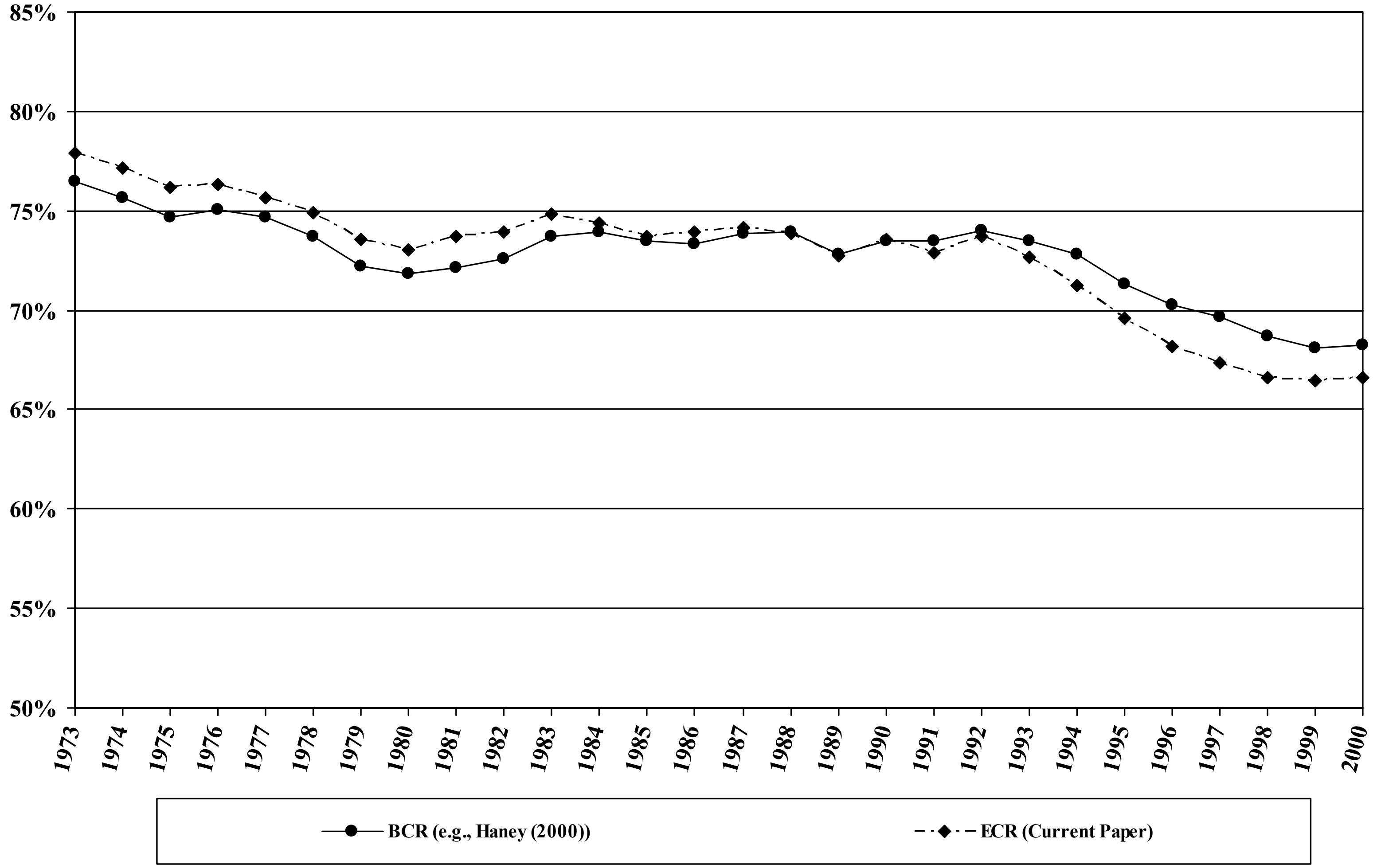
Table 4. State and Year Fixed-Effects Models of High School Dropout/Completion Rates, 1973-2000

	CPS Status Dropout Rate			**BCR-9** (e.g., Haney 2000)			**ACR** (e.g., Greene 2003)			**CPI** (e.g., Swanson 2003)			**ECR** (Current Paper)		
	b	(s.e.)		b	(s.e.)		b	(s.e.)		b	(s.e.)		b	(s.e.)	
Model A. ***Fixed-Effects Model with ANNUAL STATE POVERTY RATE as Time-Varying Covariate***															
Estimated Effect of State Poverty Rate	0.088	(0.031)	**	-0.137	(0.045)	**	-0.138	(0.054)	*	-0.233	(0.071)	**	-0.053	(0.055)	
Model B. ***Fixed-Effects Model with HIGH SCHOOL EXIT EXAMINATION POLICY as Time-Varying Covariate***															
Estimated Effect of High School Exit Examination	-0.051	(0.224)		-2.010	(0.321)	**	0.311	(0.395)		-2.049	(0.518)	**	-1.518	(0.398)	**

Note : Models include state and year fixed effects in additon to the named time-varying covariate.

* = p <0.05; ** = p < 0.01

Figure 1. High School Completion Rates in the United States, Graduating Classes of 1973-2000



Note: The BCR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3. The ECR adjusts the denominator to account for net migration and 9th grade retention. See text for details.

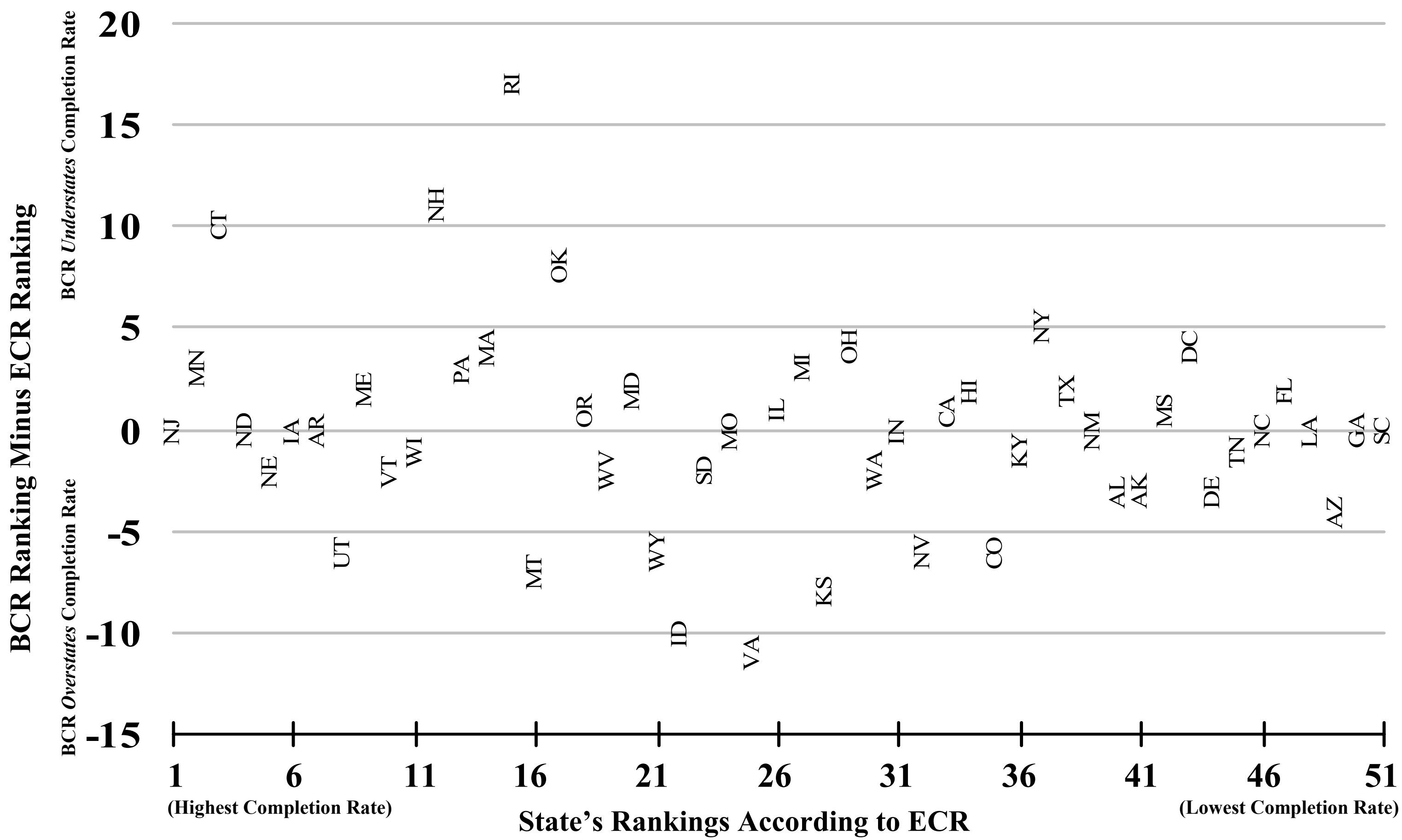
Figure 2. High School Completion Rates in Nevada, Graduating Classes of 1973-2000

Note: The BCR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3. The ECR adjusts the denominator to account for net migration and 9th grade retention. See text for details.

Figure 3. High School Completion Rates in New York, Graduating Classes of 1973-2000

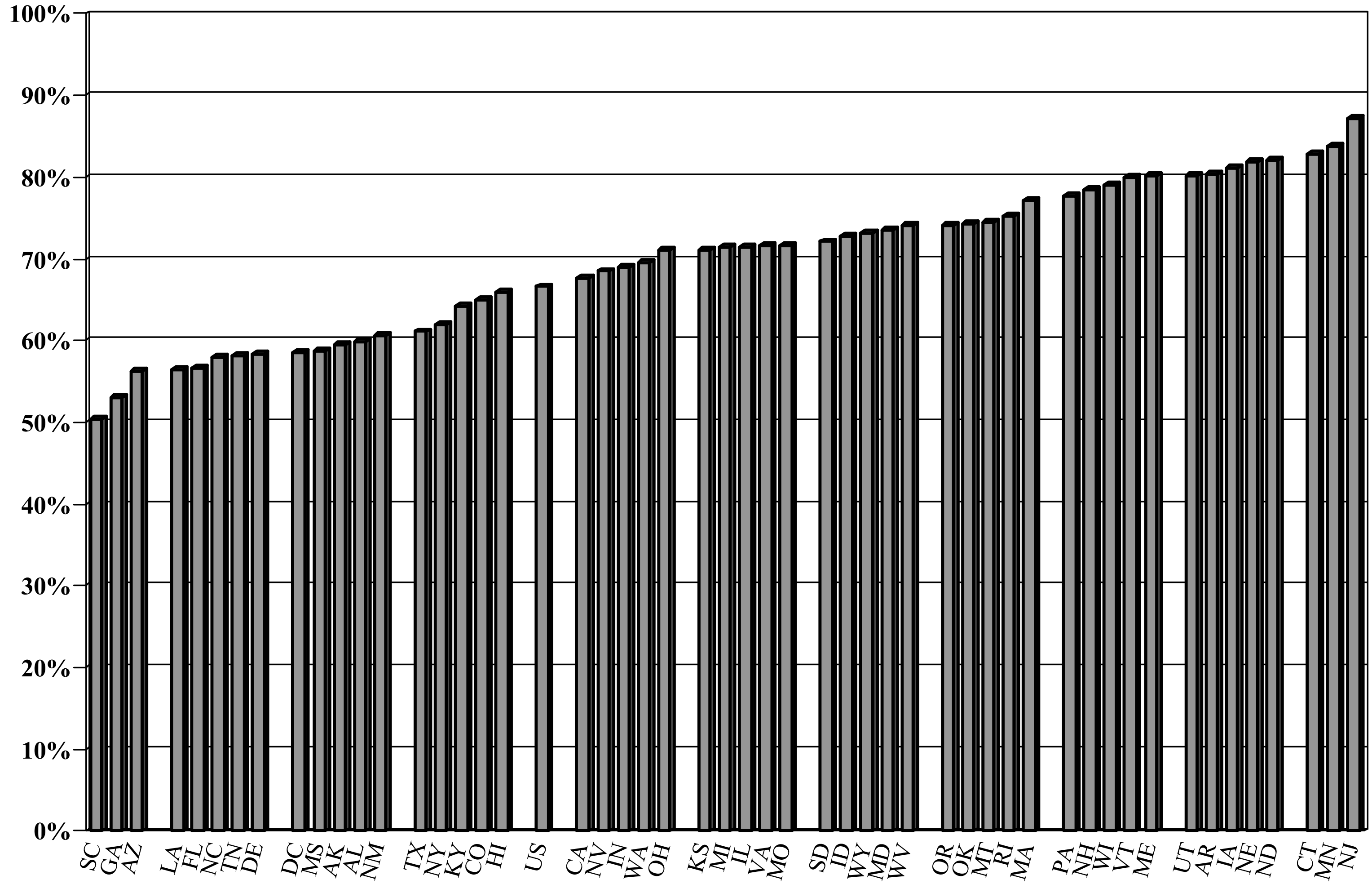
Note: The BCR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3. The ECR adjusts the denominator to account for net migration and 9th grade retention. See text for details.

Figure 4. State Rankings on High School Completion Rate Measures, 2000



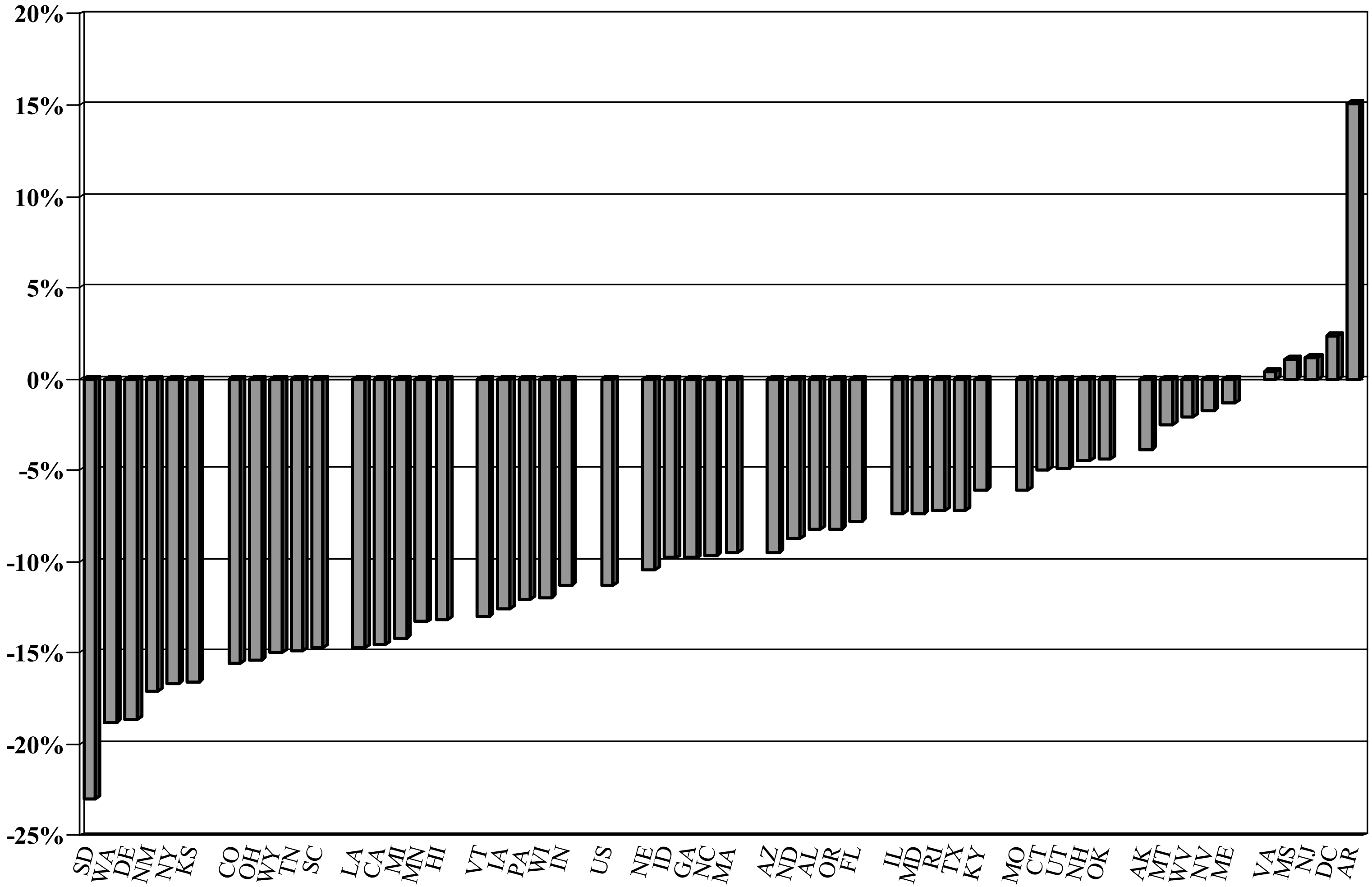
Note: The BCR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3. The ECR adjusts the denominator to account for net migration and 9th grade retention. See text for details.

Figure 5. High School Completion Rates (ECR), by State, 2000



Note: The ECR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3, with adjustments to the denominator to account for net migration and 9th grade retention. See text for details.

Figure 6. Changes in High School Graduation Rates (ECR) Between 1973 and 2000, by State



Note: The ECR equals the number of high school completers (not including GED recipients) in spring of academic year X divided by the number of 9th graders in fall of academic year X-3, with adjustments to the denominator to account for net migration and 9th grade retention. See text for details.

Figure 7. Private School Enrollment Among 9th to 12th Graders, 1977 to 2000