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High School Exit Examinations and State-Level Completion and GED Rates, 1973-2000*

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ABSTRACT

We investigate the extent to which high school exit examinations are associated with state-level high school completion rates in the United States. To do so, we estimate a series of state and year fixed effects models using a new measure of state-level high school completion rates and archival information about states' high school exit examinations between 1973 and 2000. We find that high school exit examinations --- particularly more difficult examinations that have recently been implemented in some states --- are associated with lower high school completion rates and higher rates of General Educational Development (GED) test taking. Furthermore, we find that the association between high school exit examinations and high school completion is stronger in states with more race/ethnic minorities and higher poverty rates.

Until the late 1970s most high school students in the United States needed only to pass a series of courses to satisfy state high school graduation requirements. By 2003 high school students in 19 states were also required to pass state-mandated high school exit examinations. The details of states' exit examination practices vary, but in general students are given a test in 9th or 10th grade that assesses their mastery of 8th or 9th grade-level curricular materials (although sometimes the standards are higher). If they fail, students can generally retake exit examinations several times before their scheduled graduation date. Pass rates --- reported at the state, school district, and school level --- are highly publicized, and there are often serious consequences for teachers, principals, and school administrators whose students do not pass at high rates.

Whether these policies have serious positive or negative consequences for students is still an open empirical question. Critics of high school exit examination policies contend that these policies reduce rates of high school completion, particularly for race/ethnic minorities and for economically disadvantaged students (e.g., National Board on Educational Testing and Public Policy 2000). In this paper we consider the extent to which high school exit examinations are associated with students' chances of completing high school. We find that such policies <u>are</u> associated with lower rates of high school completion and higher rates of General Educational Development (GED) test taking, but these findings should only be considered in conjunction with other findings about the potential positive consequences of high school exit examinations.

HIGH SCHOOL EXIT EXAMINATIONS IN THE UNITED STATES, 1973-2000

The policy shift toward exit examinations in the U.S. has been driven by the widespread sentiment that holders of high school diplomas frequently lack basic academic skills and that low standards, watered down curriculum, and "social promotion" are responsible for a lack of job skills and college preparedness among high school graduates (Bond and King 1995; Gordon 2000; Heubert 2000; Jaegar 1982; Reardon and Galindo 2002). This sentiment was reinforced by unfavorable Cold War-era comparisons of U.S. students' achievement in core curricular areas to the achievement of

students in other countries, and it was crystallized in *A Nation at Risk* (National Commission on Excellence in Education 1983: 1). This report began with the assertions that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation" and that "more and more young people emerge from high school ready neither for college nor for work." It concluded by recommending (among other things) that "standardized tests of achievement … should be administered at major transition points from one level of schooling to another and particularly from high school to college or work."

Indeed many states implemented such policies beginning with graduating classes in the early 1980s. The top panel of Figure 1 shows the graduating classes for which states first mandated high school exit examination policies. For the graduating class of 1979 only one state (New York) had a high school exit examination. This figure grew to 14 in 1990 and to 18 in 2000; it is sure to continue to grow as other states' planned exit examination policies take effect (American Federation of Teachers 1999; Center on Education Policy 2002; Center on Education Policy 2003; National Research Council 2001). Note that Figure 1 is based on our archival research, but is supported by evidence from a variety of sources (Bond and King 1995; Catterall 1989; Catterall 1990; Center on Education Policy 2004; Jacob 2001; National Governors Association Center For Best Practices 1998; U.S. Department of Education 2003a).

Until about 1990 states' high school exit examinations typically consisted of multiple-choice measures of minimum competencies in the basic skills of reading, writing, and arithmetic. There were calls for tests of higher-order, more complex skills, but the basic skills were more clearly defined and relatively easier to test (Bond and King 1995; Linn 1995). However, beginning in the early 1990s --- and particularly after a 1991 Department of Labor Report (The Secretary's Commission on Achieving Necessary Skills (SCANS) 1991) --- some states moved to more challenging tests that were aligned with higher curriculum standards (American Federation of Teachers 1997; National Research Council 1999); these states are shown in the top panel of Figure 1.

HIGH SCHOOL EXIT EXAMINATIONS AND HIGH SCHOOL COMPLETION

Theoretically, it makes sense that high school exit examinations should lead to lower rates of high school completion. Unless every student has mastered basic academic skills, then surely some students will be prevented from obtaining diplomas by virtue of having to demonstrate their mastery of those skills on an exit examination. This logical issue aside, there are concerns about the consequences of these policies for students' educational motivations. Madaus and Clarke (2001), for example, argue that "some students immediately dismiss the examination because they feel they lack the ability to do what is necessary to pass" (pp. 97) and that "students who may not be motivated to pursue examination success … are likely to become alienated from both the examinations and the whole educational project" (pp. 99).

On the other hand, there are a number of reasons to suppose that high school exit examinations have relatively little consequence for high school completion. First, most states' tests may simply be too easy to pose a real threat to students' chances of completing high school. For instance, a June 1999 report by the Ohio Department of Education (1999) showed that in the fall of 1990 only 33 percent 9th graders passed that states' 9th grade proficiency test; 9th graders in the fall of 1990 --- ostensibly members of the graduating class of 1994 --- were the first cohort required to pass that test as a prerequisite for graduation. Although two students in three initially failed the 9th grade proficiency test that year, 97 percent had passed by the spring of 1994 (when they were scheduled to graduate). That figure rose to 99 percent for subsequent cohorts.

Second, if they matter for high school completion, exit examinations likely matter primarily for the small subset of students whose chances of graduating are low, but not so low that graduating is impossible. Students who are practically certain to graduate --- or not to graduate --- will likely not be affected by additional requirements like exit examinations. If exit examinations only really matter for a small subset of students, then it is conceivable that teachers and schools successfully focus their energies and resources on helping this group of student pass exit examinations.

A third reason that exit examinations might not matter for high school completion has to do with the consequences of exit examination pass rates for teachers, schools, and school administrators. High school exit examinations are "high stakes" tests for students, but they are also highly consequential for the people who are supposed to educate them. Teachers, schools, and administrators face strong external motivation to raise pass rates on high school exit (and other) examinations; in the era of No Child Left Behind, salaries, job security, and even local control of schools often rest in part on test results. At the same time, states have historically allowed exemptions from exit examination requirements for students with learning disabilities or with limited English language proficiency --- and they have typically left individual decisions about student exemptions to local administrators and teachers. Consequently, it is reasonable to suppose that some teachers and administrators disproportionately exempt those students who are likely to be most affected by high school exit examination requirements. To give a sense of the potential magnitude of this issue, **AUTHOR** and **CO-AUTHOR A** (2004) recently estimated that during the 1990s only about 80% of students eligible to take Florida's high school exit examination actually did so.

PRIOR RESEARCH

At first glance there appears to be powerful support for the assertion that high school exit examinations are independently associated with rates of high school completion. Completion rates (however measured) are simply much lower in states with exit examinations. For example, for the graduating class of 2000 the median state high school completion rate (as defined below) was 73% for states with no exit examination but only 61% in states with exit examinations; in fact, the inter-quartile ranges of the two distributions only slightly overlap.

However, it is not the case that a random subset of states has elected to implement high school exit examinations. As shown in the bottom panel of Figure 1, states with high school exit examination requirements are principally located in the southern and southeastern United States. Many of these states have long been among the most economically disadvantaged in the nation,

many have traditionally fared poorly on national assessments of achievement, and many contain high proportions of race/ethnic minorities and/or urban residents. Given these factors, it is not surprising that states that require high school exit examinations have lower high school completion rates. Consequently, it is incumbent upon researchers to take into account the geographic, demographic, socioeconomic, and academic characteristics of states and their students in order to understand the independent association between high school exit examinations and rates of high school completion.

Early efforts to understand this association often required readers to make strong and often unwarranted assumptions or contained important methodological or data-related problems (Archer and Dresden 1987; Catterall 1989; Coates and Wilson-Sadberry 1994; Griffin and Heidorn 1996; Kreitzer, Madaus, and Haney 1989). Beyond their methodological shortcomings, all of this early research focused on the types of exit examinations administered before the mid-1990s when some states moved toward assessing more rigorous standards in their high school exit examinations. Most recent, methodologically sound analyses of the association between high school exit examinations and high school completion have relied on data from the National Educational Longitudinal Study of 1988 (NELS-88) --- a detailed national longitudinal study of a large sample of students who were enrolled in 8th grade in spring 1988. Researchers using NELS-88 data have found effects of 8th-to-9th grade promotion examinations on early high school dropout (Reardon 1996; Reardon and Galindo 2002), but have failed to find effects of high school exit examinations on high school completion, dropout, or GED completion rates (Jacob 2001; Lillard and DeCicca 2001; Muller 1998; Muller and Schiller 2000; Warren and Edwards 2004) except perhaps among low-achieving students (Bishop, Mane, and Bishop 2001; Bishop et al. 2001; Jacob 2001). While analyses of NELS-88 data have been instructive, they tell us nothing about the association between exit examinations and high school completion in cohorts that should have graduated after (or even before) 1992.

Bishop and colleagues used a variety of sources of data from the early 1990s to investigate the association between high school exit examination policies and high school enrollment,

completion and dropout. Their analyses of NELS-88 data reflect the findings reviewed above: They report no effects of exit examination policies on rate of high school dropout or completion, except among students with relatively low grade point averages (Bishop, Mane, and Bishop 2001; Bishop et al. 2001). In other analyses Bishop and colleagues find no impact of exit examination policies on the percentage of 17 year olds who are enrolled in secondary school or on the percentage of 17 year olds who are high school graduates (Bishop et al. 2001; Bishop, Moriarty, and Mane 2000), both as measured in the early 1990s. In only one report (Bishop, Mane, and Bishop 2001) do the authors consider dropout rates for cohorts beyond the graduating class of 1992, and here their analyses are limited to just 41 states.

AUTHOR and **CO-AUTHOR A** (2004) used more recent data to ask whether high school exit examinations are associated with high school dropout and/or race/ethnic and socioeconomic inequalities in high school dropout in Florida and Texas. Using data from the 1968 through 2000 October Current Population Surveys (CPS), they first considered the classes of 1971 through 2000 and used as their outcome variable a measure of whether students left school without obtaining a diploma or GED. They next considered the classes of 1991 through 2000 and used as their outcome variable a measure that classifies GED recipients as dropouts. In neither case did **AUTHOR** and **CO-AUTHOR A** (2004) find evidence that high school exit examinations increase dropout rates or exacerbate inequalities in dropout rates. However, their analyses are limited to two states; although these states' exit examination policies are perhaps among the most litigated and highly publicized, it is not obvious whether **AUTHOR** and **CO-AUTHOR A**'s (2004) results are generalizable to other states. What is more, for reasons described below and in the Appendix, their reliance on CPS-based dropout measures raises questions about the validity of their findings even in Texas and Florida.

Other researchers have also used more recent data to investigate the association between high school exit examinations and high school completion. Their analyses are based on annual state-

reported data on enrollments and completion counts.[1] Using this information, these researchers have estimated state-level high school graduation rates by dividing the number of completers in a particular year by the number of 9th graders three years earlier (Greene and Winters 2004; Haney 2000), the number of 8th graders four years earlier (Haney et al. 2004), or the total enrollment in secondary schools (Amrein and Berliner 2002). After combining these outcome measures with information about which states had mandatory high school exit examinations,[2] these researchers reach conflicting results. In their analyses of data from the 1990s Amrein and Berliner (2002: 47) concluded that "high school graduation exams increase dropout rates, decrease high school graduation rates, and increase the rates by which students enroll in GED programs." On the other hand, recent work by Carnoy and Loeb (2002) --- who use a conceptually similar measure --- suggests that students in "high accountability" states in the 1990s do not experience lower completion rates. Greene and Winters (2004) reached similar conclusions.

As described in more detail elsewhere, all of this recent work shares serious methodological shortcomings (Carnoy, Loeb, and Smith 2001; Toenjes and Dworkin 2002). First, the state-level completion rate measures used in these analyses are conceptually and technically flawed, and are empirically biased (often quite severely) by grade retention and particularly inter-state migration (see the Appendix for details). For example, the graduation rate measure developed by Greene and Winters (2002) and subsequently used by those authors (2004) to model the impact of high school exit examinations on state-level graduation rates between 1991 and 2001 is seriously biased by

[1] This data is collected and disseminated by the National Center of Education Statistics as part of the Common Core of Data.

[2] Unfortunately, the accuracy of information about states' high school exit examination policies has been suspect in at least two of these highly publicized (but never peer reviewed) reports (Amrein and Berliner 2002; Greene and Winters 2004).

interstate student migration and by retention in the ninth grade (Warren 2004), despite Greene and Winters' (2002) clams to the contrary.[3] Second, with the exception of the work by Carnoy and Loeb (2002) and Greene and Winters (2004), none of this research statistically accounts for factors that may induce spuriousness in the observed bivariate association between states' exit examination policies and their high school completion rates. As noted above, states with high school exit examinations also tend to have higher poverty rates, higher proportions of minority students, and lower levels of academic achievement. Indeed these states had lower high school completion rates prior to the implementation of any high school exit examinations in the United States. Analyses like those presented by Amrein and Berliner (2002) or Haney and colleagues (2000; 2004) tell us nothing about whether high school exit examinations are associated with high school completion rates net of these covariates.

In the end there are essentially two main sources of information about the independent association between high school exit examinations and high school completion. First, there is reasonably sound information from analyses of data from NELS-88 --- which can tell us nothing about what has happened to more recent graduating classes as high school exit examinations have become more challenging. Second, there is information from analyses of more recent data on high school completions and enrollments --- but this work often has a variety of serious methodological shortcomings. In the present paper we employ a conceptually and technically improved measure of states' high school completion rates (described in detail in the Appendix) and multivariate regression techniques to understand the independent association between high school exit examinations and high school completion between 1973 and 2000. We also ask whether the association between high

[3] Beyond these problems in Greene and Winters' (2004) dependent variable, these authors also grossly misclassify states with respect to whether and when exit examination policies were implemented. That is, there are also serious problems with their key independent variable.

school exit examinations and high school completion varies by states' demographic and/or socioeconomic characteristics.

DATA AND MEASURES

In the next sections we describe our measures of states' high school completion rates, states' high school exit examination policies, and other key covariates. Throughout, our unit of analysis is state-years --- constructed by cross-classifying 50 states and the District of Columbia by the 28 years between 1973 and 2000 to yield 1,428 state-years. Note that "years" refer to graduating classes, not to calendar years. For example, when we say that North Carolina had a high school exit examination in 2000, we mean that the graduating class of 2000 was subject to the exit examination requirement in that state.

High School Exit Examinations

For each state and in each year we have gathered information about whether high school students were required to pass one or more examinations as a pre-requisite for graduation. In some state-years students were required to take --- but not necessarily pass --- examinations, and in other state-years students received non-standard diplomas (but diplomas nonetheless) if they did not pass the mandated examination. In neither case is receipt of formal diplomas contingent on passage of exit examinations, so we do not count these state-years as having high school exit examinations.

Information about whether particular states made passage of an exit examination a high school graduation requirement is available from published sources for a limited number of years (e.g., American Federation of Teachers 1997; Bond and King 1995; Center on Education Policy 2004; Jacob 2001; National Research Council 1999; U.S. Department of Education 2003a), and with highly varying degrees of accuracy. The bulk of our information about high school exit examination requirements --- and about the attributes of those exit examinations --- was derived from state education agency web sites, scrutiny of contemporaneous newspaper articles, and personal communications with officials in state education agencies.

Our most basic measure expresses whether or not passage of a high school exit examination was a requirement for obtaining a diploma. However, it is reasonable to suspect that "easier" exit examinations have fewer consequences for high school completion than "more difficult" exit examinations. Based on information about the grade level of proficiency to which exit examinations were aligned, we have crudely classified states' exit examinations as either "minimum competency" examinations or "more difficult" examinations. Briefly, if any component of an exit examination assessed mastery of any curricular material that is first presented to students during the high school years --- 9th grade and beyond --- we classify the exit examination as "more difficult." All other examinations are classified as "minimum competency." For example, Florida's exit examination prior to 1996 required mastery of 8th grade-level curriculum, whereas examinations administered since 1996 have required mastery of 10th grade-level curriculum. The former examinations are classified as "minimum competency," while the latter are classified as "more difficult."

High school students in New York in the graduating class if 1979 were the first to face a high school exit examination requirement for graduation. As shown in the top panel of Figure 1, the number of states with high school exit examinations has increased steadily (despite the termination of this requirement in Hawaii and, for a time, in Virginia); in all, 18 states mandated high school exit examinations for the graduating class of 2000. Only six states --- Florida, New Jersey, New Mexico, New York, South Carolina, and Texas --- had "more difficult" exit examinations in 2000; no state had a "more difficult" examination prior to 1990. Of the 1,428 state-years in our analyses, 261 had any high school exit examination and 43 of those had "more difficult" examinations.

State-Level High School Completion and GED Rates

We use three conceptually distinct measures of high school completion in our analyses. As we will demonstrate below, this gives us leverage to better understand the consequences of high school exit examinations for whether --- and how --- young people obtain high school credentials. The first measure is based on October Current Population Survey (CPS) data and represents the state-

level percentage of 16 to 19 year olds in a particular calendar year that are not enrolled in school and that have obtained neither a diploma nor a General Educational Development (GED) certificate. This is a status dropout measure that conceptually treats high school diplomas and GED certificates as equivalent outcomes. The second measure, developed by **AUTHOR** (2004) and described in detail in the Appendix, is based on Common Core Data (CCD) and represents the cohort-specific, state-level percentage of incoming public school 9th graders who complete high school. This measure does not count GED recipients as high school completers, and approximates longitudinal completion rates. The third measure is based on data from the GED Testing Service of the American Council on Education (ACE), and represents the state-level percentage of 16 to 19 year olds in a particular year who take the GED examination. In the Appendix we describe the CPS and CCD data in more detail; below we briefly describe our technique for constructing these three measures.

As described in the Appendix, CPS-based state-level high school dropout rates have serious conceptual and technical problems. However, the ubiquity of their use at both the state and national levels leads us to include a CPS-based dropout measure in our analyses. We construct a status dropout rate for each state-year that represents the percentage of 16 to 19 year olds in a state in a particular calendar year that are not enrolled in school and that have obtained neither a diploma nor a GED. Unlike commonly reported status dropout rates that are based on 16 to 24 year olds, we restrict our measure to 16 to 19 year olds to minimize biases induced by state-to-state migration. To improve the reliability of our measure, we construct three year moving averages. In the end our measure parallels that used by the Annie E. Casey Foundation in its annual *Kids Count* report (Annie E. Casey Foundation 2004).[4] As reported in the first row of Table 1, our CPS dropout rate ranges from 1.5% in Connecticut in 1995 to 21.2% in North Carolina in 1977. The mean dropout rate across state-years is highest (10.4%) in state-years with "minimum competency" exit examinations.

[4] Except that they use data from the CPS Outgoing Rotation Groups.

The National Center for Education Statistics (NCES) produces a CCD-based four-year high school completion rate using counts of high school dropouts and completers in each state and in each academic year Beyond conceptual and technical problems with this measure (Warren 2004), the NCES-recommended four-year completion measure is only available for 36 states and the District of Columbia in 2000, and is not available at all prior to 1996. A number of researchers have proposed alternate CCD-based state-level high school completion rates that are based on a comparison of the number of high school completers --- not counting GED recipients --- in one year to the number of students enrolled in some prior years (e.g., Greene and Winters 2002; Haney et al. 2004; Swanson 2003). Such measures have the virtue of being available for all states and the District of Columbia and for a sufficient number of academic years. Unfortunately, as described in detail in the Appendix, these measures are conceptually and technically flawed and empirically biased in serious ways (also see Kaufman 2001; Pallas 1990).

In our analyses we use the "Estimated Completion Rate" (ECR), a new CCD-based state-level high school completion rate developed by **AUTHOR** (2004) and described in the Appendix. This measure represents the percentage of incoming 9th graders in each state and in each academic year who go on to complete high school --- except via GED completion. The measure is based on a comparison of the number of high school completers in one academic year to the number of enrolled 9th graders three academic years earlier after accounting for inter-state migration of students and grade retention. **AUTHOR** (2004) demonstrates in a series of simulations that this measure produces valid, largely unbiased estimates of state-level high school completion rates. As reported in the second row of Table 1, the ECR ranges from a low of 50.4% in South Carolina in 2000 to 103.4% in Hawaii in 1987; the estimate for Hawaii in 1987 is the only state-year estimate of the 1,428 estimates to exceed 100%. The mean completion rate across state-years is highest (77.3%) in state-years with no exit examination and lowest (64.4%) in states with "more difficult" exit examinations.

Finally, the GED Testing Service of the American Council on Education produces annual

reports (e.g., American Council on Education 2002) of the number of individuals who take the GED examination and of the number who receive GED certificates. These counts are reported by state, and in recent years they are also cross-classified by age. Unfortunately, state-level counts of GED certification are available by state and age beginning only in 1989, and are not available for some states even in recent years. Consequently, our measure begins with counts of the number of 16 to 19 year olds in each state and in each calendar year who took the GED examination; this information is available beginning in 1980, and is available annually for all states. By combining these counts with estimates of the total number of 16 to 19 year olds living in each state in each calendar year between 1980 and 2000 (U.S. Bureau of the Census 2001a; U.S. Bureau of the Census 2001b), we compute the percentage of 16 to 19 year olds in each state and in each calendar year who took the GED examination.[5] As reported in the third row of Table 1, the percentage of 16 to 19 year olds taking the GED ranges from 0.3% in various state-years to 5.0% in Alaska in 1980. The mean rate across state-years is lowest (1.9%) in state-years with no exit examination and highest (2.6%) in states with "more difficult" exit examinations.

Time-Varying Covariates

Although we are principally interested in the association between high school exit examinations and high school dropout and completion, we also include a series of time-varying covariates in our models to reduce the possibility that observed associations are spurious. As described below, we employ fixed effects models that completely account for (1) variables that

[5] The estimated number of 16 to 19 year olds in each state in each year of the 1990s is based on projections; the Census Bureau has yet to published updated estimates based on 2000 U.S. Census data. For present purposes, we compared our estimates for 2000 to the total population of 16 to 19 year olds in each state in the 2000 U.S. Census. We then adjusted the projected figures for the 1990s such that the trend line ended up at the figure derived from the 2000 U.S. Census.

remain constant over time but vary across states (e.g., geography, historical legacies, and structures of state education agencies) and (2) variables that are constant across states but vary over time (e.g., national education and economic policies, advances in education technology, and international competition and conflict). This means that the only covariates that could induce spuriousness in associations between high school exit examination policies and high school dropout or completion rates are those that vary both across states and over time. That is, we must account for variables that (1) vary across states and over time, (2) are associated with states' decisions to implement exit examination policies, and (3) are associated with high school completion and dropout rates. Table 1 presents these time-varying covariates, and indicates the source of information for each.

First, we include a series of state education policy variables (other than state exit examination policies). Per pupil total education expenditures are expressed in constant 2000 dollars. To ease interpretation, we express this measure in hundreds of dollars. Pupil-Teacher ratios are computed by dividing the number of secondary school teachers in particular state-years by the CCD-reported number of 9^{th} through 12^{th} graders in that state and in that year. Based on recent evidence that course graduation requirements affect dropout rates (Lillard and DeCicca 2001) we include a measure of the number of Carnegie units that states require students to complete in order to graduate. Because some states have not always mandated course graduation requirements, we include in our multivariate models a dummy variable that indicates whether state-years do not have state course graduation requirements; in those cases, the value of the Carnegie Unit variable is set to zero. We also include a measure of states' maximum compulsory age of school attendance. As shown in Table 1, course graduation requirements and compulsory ages of school attendance are highest in states with "more difficult" exit examinations and lowest in states with no exit examinations.

We also include a measure that is designed to account for high-stakes accountability policies in the primary grades. Such policies --- which might include grade promotion exams or stringent anti-"social promotion" regulations --- probably matter for high school completion mainly to the

extent that they cause students to repeat grades in school; being made to repeat grades in school is a key predictor of high school dropout. Although we are unable to measure these primary grade accountability policies directly, we are able to control for the central mechanism that likely links primary grade accountability policy to rates of high school completion. By controlling for the amount of primary grade retention that occurs in particular state-years, we are (largely) eliminating the possibility that our multivariate results are biased by the omission of covariates representing primary grade accountability policies. To estimate primary grade retention rates we compare the mean ages of fall 2nd graders to the mean ages of fall 8th graders six years later in the October CPS. The longer it takes, on average, for students to move from grade 2 to grade 8, the higher the rate of primary grade retention.

Second, we include a series of measures of states' economic circumstances. Based on data from the March CPS we include states-year specific measures of the percentage of employed 18 to 64 year olds who are working in agriculture and who are working in manufacturing or construction. Using data from the U.S. Census Bureau we include annual state poverty rates, which are highest in states with "more difficult" exit examinations and lowest in states with no exit examinations. Finally, using data from the U.S. Bureau of Labor Statistics we include measures of per capita income (expressed in hundreds of constant 2000 dollars) and unemployment rates.

Third, we include measures of states' race/ethnic compositions. Based on data from the March CPS we construct state-year specific measures of the percentage of 14 to 21 year olds who are non-Hispanic Black and of the percentage of 14 to 21 year olds who are Hispanic. As described in Table 1, these percentages are highest in states with "more difficult" exit examinations and lowest in states with no exit examinations.

RESEARCH DESIGN

We are interested in estimating the association between high school exit examination policies and high school completion and GED test taking rates --- all of which vary across states and over

time. For each of our three outcome measures --- CPS-based status dropout rates, **AUTHOR**'s (2004) CCD-based high school completed rates, and rates of GED test-taking --- we employ state and year fixed effects models which can be written as:

$$Y_{it} = \alpha + \beta Exit\ Exam\ Policy_{it} + \sum_{1}^{n} \lambda_n X_{nit} + \sum_{1}^{i-1} State_i + \sum_{1}^{t-1} Year_t + \varepsilon_{it} \quad (1)$$

where Y_{it} represents the outcome variable in state i in year t; β expresses the association between the outcome and exit examination policies that vary over state and year; α is a constant; n indexes the several time-varying covariates X described above; λ_n represents the coefficients for these n covariates; $State_i$ and $Year_t$ are state and year fixed effects, respectively, and ε_{it} is a disturbance term. The state fixed effects in Equation 1 conceptually account for all aspects of states that remain constant over time but vary across states. The year fixed effects conceptually account for all aspects of years that are constant across states but vary over time. This technique is built on the recognition that it is impossible to explicitly measure all aspects of particular states or of particular years that might bias our estimate of the association between high school exit examination policies and our outcomes. To estimate the model in Equation 1 we use the least-squares dummy-variable approach, in which dummy variables are introduced for each of i-1 states and for each of t-1 years.

RESULTS

High School Exit Examinations and High School Completion

Model 1 in Table 2 reports the results of models that include no time-varying covariates. The first two columns have as their dependent variable CPS-based status dropout rates for 16 to 19 year olds. The final two columns have as their dependent variable CCD-based high school completion rates as computed by **AUTHOR** (2004). For each outcome, we first estimate a model that includes a measure of whether states mandated passage of <u>any</u> high school exit examination. We then estimate a model that includes measures of whether states mandated passage of "minimum competency" exit examinations or "more difficult" exit examinations. The results of Model 1 suggest that there is no

association between exit examination policies and CPS-based status dropout rates, even before including time-varying covariates in the model. However, we observe statistically significant associations between exit examination policies and **AUTHOR**'s (2004) CCD-based high school completion rates. Before adjusting for time-varying covariates, high school completion rates are about 1.5 percentage points lower in states with any high school exit examination, 1.3 percentage points lower in states with "minimum competency" exit examinations, and almost 2.5 percentage points lower in states with "more difficult" exit examinations.

Next, Model 2 in Table 2 adds the time-varying covariates described above. Many of the education policy variables and the indicators of states' economic conditions are significantly associated with CPS-based status dropout rates. Measures of per pupil expenditures and of states' economic conditions are significantly associated with **AUTHOR**'s (2004) CCD-based high school completion rates. The addition of these time-varying covariates to the model change the magnitude of the coefficients for high school exit examination policies, but the general results remain the same. All else constant, high school exit examination policies are not associated with CPS-based status dropout rates, but they are associated with **AUTHOR**'s (2004) CCD-based high school completion rates. After adjusting for these time-varying covariates, high school completion rates are about 0.6 percentage points lower in states with "minimum competency" exit examinations and about 2.8 percentage points lower in states with "more difficult" exit examinations.

Why might we observe discrepant results across these two seemingly similar outcomes? That is, why do high school exit examinations appear to matter for rates of high school completion but not for rates of high school dropout? Part of the answer may lie in the technical and conceptual weaknesses of the CPS-based status dropout measures; these are described in the Appendix. However, we suspect that the discrepant results are partly driven by the way that GED recipients are treated by these two measures. The CPS-based status dropout measure explicitly classifies GED recipients as non-dropouts, while **AUTHOR**'s (2004) CCD-based high school completion measure

explicitly treats GED recipients as non-completers. If this difference in the treatment of GED recipients accounts for the discrepant findings, then we would expect to find that exit examination policies are significantly (and positively) associated with the rate at which students take the GED.

High School Exit Examinations and Rates of GED Test Taking

The first two columns of Table 3 present results from models with the rate of GED test taking among 16 to 19 year olds as the dependent variable. Because this measure is unavailable prior to 1980, our analyses are initially restricted to the 1,071 state-years between 1980 and 2000. Data on the number of GED test takers is unavailable for 6 state-years, so these analyses are ultimately based on 1,065 observations. For the sake of comparability, Table 3 also includes models with CPS-based status dropout rates and CCD-based high school completion rates as dependent variables after restricting the data to these same 1,065 cases.

The rate at which 16 to 19 year olds attempt the GED is statistically significantly higher in states with any high school exit examination; this association appears to be driven by states with "more difficult" exit examinations. Rates of GED test taking among 16 to 19 year olds is 0.21 percentage points higher --- or about a quarter of a standard deviation higher --- in states with "more difficult" high school exit examinations. The results in Table 3 for models using CPS-based status dropout rates and CCD-based high school completion rates as dependent variables parallel those in Table 2. Together these results imply that high school exit examinations --- particularly "more difficult" exit examinations --- are associated with lower rates of high school completion and higher rates of GED test taking.

Alternate Model Specifications

We next ask whether our results are robust to the assumptions of the linear regression model. After performing a series of regression diagnostics and making necessary corrections, we re-estimated the model with CCD-based completion rates as the dependent variable; the results of this model are presented in the first column of Table 4. First, we dropped cases whose standardized

residuals were greater than 2.5 in absolute value; this affected 30 state-years in our analyses of CCD based completion rates. Second, we considered leverage and Cook's D values to identify overly influential observations. This led us to identify 6 overly influential state-years; however, each of the 6 also had standardized residuals in excess of 2.5 in absolute value. After deleting these 30 state-years, the assumptions of linearity, normality, and homoskedasticity appear to have been met. Finally, after examining tolerance values we decided to drop several covariates in order to avoid problems associated with multicollinearity.

The first column of results in Table 4 show that our findings about the association between exit examination policies and rates of high school completion remain unchanged after making these modifications to model specification. In other analyses, the results of which are not shown, we confirm that our findings about the association between high school exit examination policies and rates of GED test taking also remain unchanged after making similar changes to model specification.

Differential Associations by Socioeconomic and Demographic Attributes of States

As noted above there is concern that the consequences of high school exit examinations for rates of high school completion are more severe for race/ethnic minority students and for students from disadvantaged socioeconomic backgrounds. To consider this possibility we re-estimated our model of CCD-based high school completion rates after adding interaction terms between states' high school exit examination policies and poverty rates (in the second column of results in Table 4) and between states' high school exit examination policies and race/ethnic compositions (in the third column of results in Table 4). For ease of interpretation we only consider whether any high school exit examination was required in particular state-years; that is, we ignore distinctions between "minimum competency" and "more difficult" exit examinations.

The second column of results in Table 4 supports the hypothesis that high school exit examinations are especially consequential as poverty rates increase. Although the coefficient for the high school exit examination covariate is positive and statistically significant, the combination of this

main effect and the (statistically significant) interaction term suggest that once poverty rates reach about 11 percent high school exit examinations have negative consequences for high school completion rates. Likewise, the results in the third column of Table 4 support the hypothesis that high school exit examinations are especially consequential in states with more race/ethnic minorities. To summarize these results, high school exit examinations are associated with lower rates of high school completion; the strength of this negative association increases as poverty rates increase and as the composition of states come to include greater shares of race/ethnic minorities.

Consistency with Prior Results

The results presented thus far appear to sharply contradict prior evidence about the association between high school exit examinations and high school completion. First, as noted above, **AUTHOR** and **CO-AUTHOR A** (2004) found that exit examinations in Texas and Florida have <u>not</u> increased dropout or GED acquisition rates in those states in recent years. As described in the Appendix, there are numerous problems associated with CPS-based measures of dropout and of GED receipt. We would also note that **AUTHOR** and **CO-AUTHOR A**'s (2004) research design --- separate time-series analyses of two states --- puts them in a weaker methodological position to detect the sort of results that we have presented. In any case, the results presented in Table 2 that use CPS-based status dropout measures show no association between high school exit examination policies and high school dropout. We suspect that **AUTHOR** and **CO-AUTHOR A**'s (2004) null findings are an artifact of the weaknesses of their dependent variable.

Second, we argued above that the most methodologically sound nationwide evidence about the association between high school exit examinations and high school completion has come from analyses of data from NELS-88. Observers using NELS-88 data (or data from even earlier cohorts) have consistently found no significant relationships between exit examination policies and high school dropout or GED completion rates (Jacob 2001; Lillard and DeCicca 2001; Muller and Schiller 2000; Warren and Edwards 2004). How do we reconcile these findings with our own

results? The final two columns of results in Table 4 restrict our sample of state-years to the period 1973 to 1992 --- that is, the data stop at the point that the NELS-88 cohort should have graduated from high school. Because there were so few "more difficult" exit examination in this period, we estimate the association between our outcomes and whether states had any exit examination requirement. As shown in Table 4, we find no significant associations between high school exit examination policies and either CCD-based high school completion rates or rates of GED test-taking when we restrict our data in this manner; beyond their lack of statistical significance, the point estimates for these associations are much smaller in magnitude compared to those based on data for 1973 through 2000. We conclude that high school exit examinations are associated with lower rates of high school completion and higher rates of GED test taking, but we suggest that these associations did not emerge until some time after 1992. That is, the consequences of high school exit examinations have changed in important ways since the NELS-88 cohort moved through the secondary education system.

PRIVATE SCHOOLS

The CCD-based high school completion rate measure that we employ --- **AUTHOR**'s (2004) Estimated Completion Rate (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 for our analyses if there have been substantial changes over time in private high school enrollments or completions. This is particularly true if changes in private school enrollments or completions have occurred unevenly across socioeconomic or demographic groups or across geographic areas. For example, if exit examination policies have prompted a move toward higher rates of private school attendance among non-Hispanic white and/or socioeconomically advantaged students in states with those policies, then this may partly account for the association between high school exit examination policies and high school completion rates.

To assess the extent to which changes in private school enrollments and completions account for our observation that state high school exit examinations are associated with lower rates of high school completion, Figure 2 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.

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. If trends in private school enrollment or graduation are driving our empirical findings then we would expect to find increasing rates of private school enrollments and graduations in the southern U.S. and among non-Hispanic White and socioioeconomically advantaged students. Because rates of private schooling have remained remarkably stable since at least the late 1970s, we are confident that our results are not driven by large scale movement of students from public to private schools.

DISCUSSION

Critics of high school exit examination policies contend that these policies reduce rates of

high school completion, particularly for race/ethnic minorities and for economically disadvantaged students. In this paper we document the extent to which high school exit examinations are associated with rates of high school completion and we consider the extent to which this association varies by states' poverty levels and demographic characteristics. We find that high school exit examinations are associated with lower rates of high school completion and higher rates of General Educational Development (GED) test taking. After adjusting for an array of time-varying covariates, high school completion rates are about 1.3 percentage points lower in states with "minimum competency" exit examinations and about 2.4 percentage points lower in states with "more difficult" exit examinations. We also find that the negative association between high school exit examinations and rates of high school completion is more pronounced when poverty rates are high and when states have higher proportions of race/ethnic minority students. Although a few percentage points may seem small in magnitude, the fact that nearly half of American high school students now face high school exit examination requirements means that a single percentage point translates into many thousands of individual young people each year.

Previous researchers have approached these same questions with limited data and/or methodology. Methodologically sound analyses of data from NELS-88 have shown quite clearly that high school exit examinations were not associated with high school dropout or GED certification for the graduating class of 1992. We replicate these results in our (very different) analyses, but go on to show that the same results do not hold for post-1992 cohorts. Less methodologically sophisticated analyses of more recent data (e.g., Amrein and Berliner 2002) also tend to conclude that high school exit examinations reduce high school completion rates, but the validity of such results is highly questionable. We offer the present analyses as the first that consider the entire modern history of high school exit examinations (at least through 2000), the first that use a conceptually and technically sound measure of state-level high school completion rates, and the first to consider both high school completion and GED test taking as outcomes in analyses of multiple cohorts of students.

Nonetheless, our analyses are not without limitations, and our results should be considered a starting point for future work. First, we have only considered a few rudimentary characteristics of states' high school exit examination policies --- whether they exist, and (if they exist) how difficult the test is supposed to be. We should certainly like to consider more rigorous measures of test difficulty and content, including information about the curricular areas covered, the breadth and depth of mastery of that material that is required to pass, and the percentage of students who pass the test (both on the initial test administration and cumulatively). All of these things may well matter for high school completion, since easy tests are unlikely to deter as many students from completing high school as more difficult tests. Beyond the content coverage and difficulty level of examinations, we can imagine that other characteristics of exit examinations might also matter for high school completion. These include, but are not limited to, the levels of financial and other resources that schools and teachers receive to help students prepare for exit examinations and to provide remediation for students who initially fail the exit examination; the leniency and degree of local control of policies for exempting some students from the exit examination requirement; and the year and semester in high school in which exit examinations are administered (which may practically serve as a proxy for how many times students can realistically re-take exit examinations).

A second obvious limitation of our analyses is that we do not have sufficient data on high school completion for graduating classes beyond 2000. Our analyses demonstrate that the association between high school exit examinations and high school completion changed after 1992; it may well have changed again after 2000. A third limitation is that we are only able to model rates of GED test taking, not rates of GED certificate receipt. This is not a problem which is readily solved. Data on GED test taking or certification by age and state can only come from the CPS or from the GED Testing Service. CPS data on GED certification have known problems, not the least of which is that no information is available at all until relatively recently. The GED Testing Service does not provide state-by-age counts of GED certification until recently, and then only for some states.

Looking beyond these limitations, the conclusion that high school exit examinations are associated with lower rates of high school completion is likely to be interpreted by some as evidence that such programs should be abandoned or substantially modified. We think this is premature and encourage readers to base judgments about whether to abandon or modify these policies on the weight of the evidence concerning both the potential problems with high school exit examinations and the potential benefits of those policies. Are high school exit examinations associated with lower rates of high school completion? We believe that they are. But are high school exit examinations also associated with other problems --- like teacher "burnout" or an excessive narrowing of the curriculum to which students are exposed? The evidence to date suggests that high stakes testing policies may inhibit "authentic" teaching and lead teachers to "teach to the test" (e.g., Madaus and Clarke 2001; McNeil 2000; Wideen et al. 1997), but our reading of the literature is that substantially more research needs to be done in this area. On the positive side, are high school exit examinations associated with (their intended) positive outcomes, like higher rates of student achievement, improved college preparedness, and greater workforce productivity? Recent evidence suggests that high school exit examinations may have these desirable consequences (Bishop and Mane 2001; Bishop, Mane, and Bishop 2001; Bishop et al. 2001; Carnoy and Loeb 2002; Jacob 2001; Raymond and Hanushek 2003), but again the research literature is thin and much more work needs to be done. It is only when we have sound answers to these sorts of questions that informed policy decisions can be made about whether the costs of high school exit examinations are outweighed by their benefits.

APPENDIX

In this appendix we 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. A more detailed and complete presentation of this material is available elsewhere (Warren 2004).

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). 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.

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.

There are a number of conceptual and technical problems with CPS-derived state-level measures of rates of high school dropout and completion. 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). 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. Beyond these three issues, some observers have expressed concern about coverage bias in the CPS, which by design does not sample from the institutionalized population of the United States.

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 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. Using these data, NCES also reports a 4-year high school completion rate as:

$$\text{NCES} = \frac{\text{H.S. Completers}_{\text{Spring of Academic Year X}}}{\left(\begin{array}{c}\text{H.S. Completers}_{\text{Spring of Academic Year X}} + \text{Dropouts from Grade 9}_{\text{Academic Year X+3}} + \\ \text{Dropouts from Grade 10}_{\text{Academic Year X+2}} + \text{Dropouts from Grade 11}_{\text{Academic Year X+1}} + \\ \text{Dropouts from Grade 12}_{\text{Academic Year X}}\end{array}\right)} \qquad \text{(A1)}$$

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 2003b: 2), but they are also not counted as dropouts. That is, GED recipients appear in neither the numerator nor the denominator of Equation A1. It is thus 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 is 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 A1; 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:

$$BCR = \frac{\text{High School Completers}_{\text{Spring of Academic Year X}}}{9^{th}\ \text{Grade Enrollment}_{\text{Fall of Academic Year X-3}}} . \qquad \text{(A2)}$$

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 several 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. 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.

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

Others have recognized 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 issued by public schools in each state by an estimate of the number of students at risk of receiving those diplomas. Specifically, the Adjusted Completion Rate is:

$$\text{ACR} = \frac{\text{Regular High School Diploma Recipients}_{\text{Spring of Academic Year X}}}{\left(\text{"Smoothed" } 9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}}\right) \times \left(\text{Migration Adjustment}\right)} \quad \text{(A3)}$$

where

$$\text{"Smoothed" } 9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}} = \frac{\left(\begin{array}{l} 8^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-4}} + \\ 9^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}} + \\ 10^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-2}} \end{array}\right)}{3} \quad \text{(A4)}$$

and

$$\text{Migration Adjustment} = 1 + \left(\frac{\left(\left(\text{Total } 9^{\text{th}} \text{-} 12^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X}} \right) - \left(\text{Total } 9^{\text{th}} \text{-} 12^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}} \right) \right)}{\text{Total } 9^{\text{th}} \text{-} 12^{\text{th}} \text{ Grade Enrollment}_{\text{Fall of Academic Year X-3}}} \right). \quad \text{(A5)}$$

"Smoothing" the 9th grade enrollments is designed to minimize 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 discussed below, even though "Greene's Method" is an effort to adjust for the two major problems in completion rates like the BCR, 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."

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

Swanson (2003) 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:

$$\text{CPI} = \left(\frac{\text{Diplomas}_{\text{Acad. Year X}}}{\text{E}^{\text{Grade 12}}_{\text{Acad. Year X}}} \right) \times \left(\frac{\text{E}^{\text{Grade 12}}_{\text{Acad. Year X+1}}}{\text{E}^{\text{Grade 11}}_{\text{Acad. Year X}}} \right) \times \left(\frac{\text{E}^{\text{Grade 11}}_{\text{Acad. Year X+1}}}{\text{E}^{\text{Grade 10}}_{\text{Acad. Year X}}} \right) \times \left(\frac{\text{E}^{\text{Grade 10}}_{\text{Acad. Year X+1}}}{\text{E}^{\text{Grade 19}}_{\text{Acad. Year X}}} \right) \quad \text{(A6)}$$

where $\text{E}^{\text{Grade12}}_{\text{Acad.Year X}}$ 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 his). 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 described below, the CPI is systematically biased except when there is no net student migration between geographic units.

Evaluating Measures Based on Common Core Data

AUTHOR (2004) 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. All of his 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 an academic year and then follows that and subsequent cohorts of students over ten academic years under a variety of assumptions about cohort sizes, net migration, and grade retention.

In the first simulation the size of the incoming 8th grade cohort increases by 2% annually; there is no net migration, no students are ever retained in grade, and (as always) all students complete high school. Under this scenario, each of the CCD-based completion rates described above 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), then the ACR equals the true rate times $(1+X)^3$.

In the second simulation 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 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 yield completion rates that equal the true rate times $(1+Y)^4$. Despite the "migration adjustment" detailed in Equation A5, Greene and Winter's (2002) ACR shares exactly the same migration-related bias as the BCR.

In the final simulation 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. Here, each of the CCD-based measures of overall high school completion rates described above is downwardly biased when any 9th graders are retained --- even though all incoming 9th graders end up completing high school.[6] This is because each measure (with the exception of the CPI) 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.

AUTHOR's (2004) simulations demonstrate 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

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

graders, and rates of grade retention remain stable over time and across states. What is more, as described below these alternate measures yield substantively different results in empirical analyses.

A New Method for Measuring States' High School Completion Rates

AUTHOR (2004) goes on to describe a new CCD-based measure of high school completion rates --- labeled Estimated Completion Rates (ECR) --- that can presently be computed for the graduating classes of 1973 to 2000. 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.

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

$$ECR = \frac{\text{High School Completers}_{\text{Spring of Academic Year X}}}{9^{th}\text{ Grade Enrollment}_{\text{Fall of Acad. Year X-3}} \times 9^{th}\text{ Grade Retention Adjustment} \times \text{Migration Adjustment}} \quad . \quad \text{(A7)}$$

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 actually at risk of completing high school in the spring of academic year X. 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 **AUTHOR** (2004) selects students who were enrolled in public schools in one of the 50 states or the District of Columbia. The 9th grade retention adjustment to the denominator in Equation A7 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. **AUTHOR** (2004) begins 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, he assumes that the growth in the proportion of students who are overage for grade is due to 9th grade retention. These estimates are subject to random error, but the degree of bias in this measure is likely small; even with some degree of random error, these estimates of grade retention are preferable to either ignoring grade retention altogether or to employing demonstrably biased estimates of grade retention. To improve the reliability of these estimates, **AUTHOR** (2004) computes four year moving averages.

The adjustment for migration in the denominator of Equation A7 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 2002) 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, **AUTHOR** (2004) again computes four year moving averages. In his discussion he notes that his estimated migration rates are probably slightly biased toward zero in most cases and that high rates of international in-migration exert modest downward biases on estimated completion rates.

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.

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, 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, 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

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

Does the Choice of Measure Drive Substantive Results?

AUTHOR (2004) demonstrates that 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 he

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. As in our analyses, **AUTHOR** (2004) estimated a series of state and year fixed-effects models in which the 1,428 state-years between 1973 and 2000 were his units of analysis. His 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 A1 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 A1 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.

REFERENCES

American Council on Education. 2002. *Who Took the GED? GED 2001 Statistical Report*. Washington, D.C.: GED Testing Service, American Council on Education.

American Federation of Teachers. 1997. *Making Standards Matter 1997: An Annual Fifty-State Report on Efforts to Raise Academic Standards*. Washington, D.C.: American Federation of Teachers.

—. 1999. *Making Standards Matter 1999*. Washington, D.C.: American Federation of Teachers.

Amrein, Audrey L. and David C. Berliner. 2002. "An Analysis of Some Unintended and Negative Consequences of High-Stakes Testing." EPSL-0211-125-EPRU. Tempe, AZ: Educational Policy Research Unit, Education Policy Studies Laboratory, Arizona State University.

Annie E. Casey Foundation. 2004. *Kids Count 2003 Data Book*. Baltimore, MD: Annie E. Casey Foundation.

Archer, Edith L. and Judith H. Dresden. 1987. "A New Kind of Dropout: The Effect of Minimum Competency Testing on High School Graduation in Texas." *Education and Urban Society* 19:269-279.

Bishop, John H. and Ferran Mane. 2001. "The Impacts of Minimum Competency Exam Graduation Requirements on College Attendance and Early Labor Market Success of Disadvantaged Students." Pp. 51-84 in *Raising Standards or Raising Barriers? Inequality and High-Stakes Testing in Public Education*, edited by G. Orfield and M. L. Kornhaber. New York: The Century Foundation Press.

Bishop, John H., Ferran Mane, and Michael Bishop. 2001. "Is Standards-Based Reform Working? ... and For Whom?" Working Paper 01-11. Ithaca, NY: Center for Advanced Human Resource Studies, School of Industrial and Labor Relations, Cornell University.

Bishop, John H., Ferran Mane, Michael Bishop, and Joan Y. Moriarty. 2001. "The Role of End-of-Course Exams and Minimum Competency Exams in Standards-Based Reforms." Pp. 267-345 in *Brookings Papers in Educational Policy 2001*, edited by D. Ravitch. Washington, D.C.: Brookings Institution.

Bishop, John H., Joan Y. Moriarty, and Ferran Mane. 2000. "Diplomas for Learning, Not Seat Time: The Impacts of New York Regents Examinations." *Economics of Education Review* 19:333-349.

Bond, Linda A. and Diane King. 1995. *State High School Graduation Testing: Status and Recommendations*. Oak Brook, IL: North Central Regional Educational Laboratory.

Carnoy, Martin and Susanna Loeb. 2002. "Does External Accountability Affect Student Outcomes? A Cross-State Analysis." *Educational Evaluation and Policy Analysis* 24:305-331.

Carnoy, Martin, Susanna Loeb, and Tiffany L. Smith. 2001. "Do Higher State Test Scores in Texas Make for Better High School Outcomes?" Paper presented at the conference "Dropouts in America: How Severe is the Problem? What Do We Know About Intervention and Prevention?" at the Harvard Graduate School of Education, January 13, 2001.

Catterall, James S. 1989. "Standards and School Dropouts: A National Study of Tests Required for High School Graduation." *American Journal of Education* 98:1-34.

—. 1990. "A Reform Cooled-Out: Competency Tests Required for High School Graduation." UCLA Center for Research on Evaluation, Standards, and Student Testing, CSE Technical Report 320. Los Angeles.

Center on Education Policy. 2002. *State High School Exit Exams: A Baseline Report*. Washington, D.C.: Center on Education Policy.

—. 2003. *State High School Exit Exams: Put to the Test*. Washington, D.C.: Center on Education Policy.

—. 2004. *State High School Exit Exams: A Maturing Reform*. Washington, D.C.: Center on Education Policy.

Chaplin, Duncan. 2002. "Tassels on the Cheap." *Education Next* 2:24-29.

Coates, Rodney D. and Karen R. Wilson-Sadberry. 1994. "Minimum Competency Testing: Assessing the Effects of Assessment." *Sociological Focus* 27:173-185.

Gordon, Beverly M. 2000. "On High Stakes Testing." in *Divison G News*, vol. Fall. Washington, D.C.: American Educational Research Association.

Greene, Jay P. 2002. *High School Graduation Rates in the United States*. New York: Center for Civic Innovation, Manhattan Institute.

Greene, Jay P. and Greg Forster. 2003. *Public High School Graduation and College Readiness Rates in the United States*. New York: Center for Civic Innovation, Manhattan Institute.

Greene, Jay P. and Marcus A. Winters. 2002. *High School Graduation Rates in the United States*. New York: Center for Civic Innovation, Manhattan Institute.

—. 2004. *Pushed Out or Pulled Up? Exit Exams and Dropout Rates in Public High Schools*. New York: Center for Civic Innovation, Manhattan Institute.

Griffin, Bryan W. and Mark H. Heidorn. 1996. "An Examination of the Relationship Between Minimum Competency Test Performance and Dropping Out of High School." *Educational Evaluation and Policy Analysis* 18:243-252.

Haney, Walt. 2000. "The Myth of the Texas Miracle in Education." *Education Policy Analysis Archives* 8:11 (http://epaa.asu.edu/epaa/v8n41/, retrieved 7/24/2002).

—. 2001. "Revisiting the Myth of the Texas Miracle in Education: Lessons about Dropout Research and Dropout Prevention." Paper presented at the conference "Dropouts in America: How Severe is the Problem? What Do We Know About Intervention and Prevention?" at the Harvard Graduate School of Education, January 13, 2001.

Haney, Walt, George Madaus, Lisa Abrams, Anne Wheelock, Jing Miao, and Ilena Gruia. 2004. *The Education Pipeline in the United States, 1970-2000*. Chestnut Hill, MA: National Board on Educational Testing and Public Policy, Boston College.

Heubert, Jay P. 2000. "Graduation and promotion testing: Potential benefits and risks for minority students, English-language learners, and students with disabilities." *Poverty and Race* 9:1-2, 5-7.

Jacob, Brian. 2001. "Getting Tough? The Impact of High School Graduation Exams." *Educational Evaluation and Policy Analysis* 23:99-121.

Jaegar, R. M. 1982. "The Final Hurdle: Minimum Competeny Achievement Testing." Pp. 223-246 in *The Rise and Fall of National Test Scores*, edited by G. R. Austin and H. Garber. New York: Academic Press.

Kaufman, Phillip. 2001. "The National Dropout Data Collection System: Assessing Consistency." Paper presented at the Harvard Civil Rights Project, January 13, 2001. Available on the web at: http://www.law.harvard.edu/civilrights/publications/dropout/kaufman.html.

Kreitzer, A. E., G. F. Madaus, and W. Haney. 1989. "Competency Testing and Dropouts." Pp. 129-152 in *Dropouts from School: Issues, Dilemmas, and Solutions*, edited by L. Weis, E. Farrar, and H. G. Petrie. Albany, NY: State University of New York Press.

Lillard, Dean R. and Philip P. DeCicca. 2001. "Higher Standards, More Dropouts? Evidence Within and Across Time." *Economics of Education Review* 20:459-473.

Linn, Robert. 1995. "Assessment-based Reforms: Challenges to Educational Measurement." Educational Testing Service Policy Information Center, William H. Angoff Memorial Lecture Series, Number 1. Princeton, NJ.

Madaus, George F. and Marguerite Clarke. 2001. "The Adverse Impact of High-Stakes Testing on Minority Students: Evidence from One Hundred Years of Test Data." Pp. 85-106 in *Raising Standards or Raising Barriers? Inequality and High Stakes Testing in Public Education*, edited by G. Orfield and M. L. Kornhaber. New York: The Century Foundation Press.

McNeil, Linda M. 2000. "Creating New Inequalities: Contradictions of Reform." *Phi Delta Kappan* 81:728-734.

Muller, Chandra. 1998. "The Minimum Competency Exam Requirement, Teachers' and Students' Expectations and Academic Performance." *Social Psychology of Education* 2:199-216.

Muller, Chandra and Kathryn S. Schiller. 2000. "Leveling the Playing Field? Students' Educational Attainment and States' Performance Testing." *Sociology of Education* 73:196-218.

National Board on Educational Testing and Public Policy. 2000. *High Stakes Testing and High School Completion*. Marguerite Clarke, Walter Haney, and George Madaus, eds. Chestnut Hill, MA: National Board on Educational Testing and Public Policy.

National Commission on Excellence in Education. 1983. *A Nation at Risk: The Imperative for Educational Reform*. Washington, D.C.: U.S. Department of Education.

National Governors Association Center For Best Practices. 1998. *High School Exit Exams: Setting High Expectations*. Washington, D.C.: NGA Center for Best Practices.

National Research Council. 1999. *High Stakes: Testing for Tracking, Promotion, and Graduation*. Committee on Appropriate Test Use, Jay P. Heubert and Robert M. Hauser, eds., Board on Testing and Assessment, National Research Council. Washington, D.C.: National Academy Press.

—. 2001. *Understanding Dropouts: Statistics, Strategies, and High-Stakes Testing*. Committee on Educational Excellence and Testing Equity. Alexandra Beatty, Ulric Neisser, William T. Trent, and Jay P. Heubert, Editors. Board on Testing and Assessment, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, D.C.: National Academic Press.

Ohio Department of Education. 1999. "Ohio Ninth-Grade Proficiency Tests: Highlights of March/May 1999 Results for Grades 8-12, Class of '98." Downloaded from http://ode000.ode.state.oh.us/www/ims/proficiency/9th_prof_mar99_highlight.txt on October 25, 2004. Columbus, OH: Ohio Department of Education.

Pallas, Aaron M. 1990. "Conceptual and Measurement Issues in the Study of School Dropouts." in *Research in the Sociology of Education and Socialization*, vol. 8, edited by R. G. C. a. K. Namboodiri: JAI Press.

Raymond, Margaret E. and Eric A. Hanushek. 2003. "High-Stakes Research." *Education Next* 3:48-55.

Reardon, Sean F. 1996. "Eighth Grade Minimum Competency Testing and Early High School Dropout Patterns." Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, April 1996.

Reardon, Sean F. and Claudia Galindo. 2002. "Do High-Stakes Tests Affect students' Decisions to Drop Out of School? Evidence from NELS." Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA, April 2002.

Swanson, Christopher B. 2003. *Keeping Count and Losing Count: Calculating Graduation Rates for All Students under NCLB Accountability*. Washington, D.C.: The Urban Institute, Education Policy Center.

The Secretary's Commission on Achieving Necessary Skills (SCANS). 1991. "What Work Requires of School: A SCANS Report for America 2000." U.S. Department of Labor, Washington, D.C.

Toenjes, Laurence A. and A. Gary Dworkin. 2002. "Are Increasing Test Scores in Texas Really a Myth, or is Haney's Myth a Myth?" *Education Policy Analysis Archives* 10:17 (http://epaa.asu.edu/epaa/v10n17/, retrieved 7/24/2002).

U.S. Bureau of the Census. 2001a. "Population Estimates: 1990 to 1999 Annual Time Series of State Population Estimates By Single Year of Age and Sex." Accessed February 24, 2004. Last Updated December 26, 2001. Available at http://eire.census.gov/popest/archives/state/st-99-10.php. Washington, D.C.: Population Division, U.S. Bureau of the Census.

—. 2001b. "Population Estimates: Historical Annual Time Series of State Population Estimates and Demographic Components of Change 1980 to 1990, by Single Year of Age and Sex." Accessed February 24, 2004. Last Updated December 26, 2001. Available at

http://eire.census.gov/popest/archives/state/st_stiag.php. Washington, D.C.: Population Division, U.S. Bureau of the Census.

—. 2002. "Intercensal Estimates of the Resident Population of States." Accessed February 24, 2004. Last Updated January 2, 2002. Available at http://eire.census.gov/popest/archives/pre1980/e7080sta.txt. Washington, D.C.: Population Distribution Branch, U.S. Bureau of the Census.

U.S. Department of Education. 2000. *A Recommended Approach to Providing High School Dropout and Completion Rates at the State Level*. NCES 2000-305, by Marianne Winglee, David Marker, Allison Henderson, Beth Aronstamm Young, and Lee Hoffman. Washington, D.C.: National Center for Education Statistics.

—. 2002a. *Public High School Dropouts and Completers From the Common Core of Data: School Years 1991-92 through 1997-98*. NCES 2002-317. Washington, D.C.: National Center for Education Statistics.

—. 2002b. *Public High School Dropouts and Completers from the Common Core of Data: School Years 1998-99 and 1999-2000*. NCES 2002-382, by Beth Young. Washington, D.C.: National Center for Education Statistics.

—. 2003a. *Digest of Education Statistics, 2002*. NCES 2003-060, by Thomas D. Snyder and Charlene M. Hoffman. Washington, D.C.: National Center for Education Statistics.

—. 2003b. *Public High School Dropouts and Completers From the Common Core of Data: School Year 2000–01*. NCES 2004–310, by Beth Young. Washington, D.C.: National Center for Education Statistics.

Warren, John Robert. 2004. "State-Level High School Completion Rates: Concepts, Measures, and Trends." Manuscript currently under external peer review. Minneapolis, MN: Department of Sociology, University of Minnesota.

Warren, John Robert and Melanie R. Edwards. 2004. "High School Exit Examinations and High School Completion: Evidence from the Early 1990s." Manuscript currently under external peer review. Minneapolis, MN: Department of Sociology, University of Minnesota.

Warren, John Robert and Krista N. Jenkins. 2004. "High School Exit Examinations and High School Dropout in Texas and Florida, 1971 - 2000." Manuscript currently under external peer review. Minneapolis, MN: Department of Sociology, University of Minnesota.

Wideen, Marvin F., Thomas O'Shea, Ivy Pye, and George Ivany. 1997. "High-Stakes Testing and the Teaching of Science." *Canadian Journal of Education* 22:428-444.

Winfield, L. F. 1991. "Characteristics of Middle Grades Schools Implementing Minimum Competency Testing Programs." *Research in Middle Level Education* 15:31-44.

Table 1. Source and Description of Dependent and Independent Variables

	Source	Minimum		Maximum		No High School Exit Examination (n=1,168)[a]		Minimum Competency Examination (n=217)[a]		"More Difficult" Examination (n=43)[a]	
						Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Dependent Variables											
% Age 16 to 19 Who Are Dropouts	October Current Population Surveys (CPS; 3 Yr Moving Average)	1.5	CT in '95	21.2	NC in '77	10.0	(3.7)	10.4	(3.1)	9.8	(2.7)
Estimated Completion Rate	Common Core of Data (CCD), Calculated as per Warren (2004)	50.4	SC in '00	103.4	HI in '87	77.3	(8.1)	69.6	(8.6)	64.4	(9.6)
% Age 16 to 19 Taking the GED, 1980-2000	American Council on Education (ACE); U.S. Census Bureau	0.3	Various	5.0	AK in '81	1.9	(0.8)	2.0	(0.6)	2.6	(1.0)
Time-Varying Covariates											
Per Pupil Expenditures (in 100s of 2000 Dollars)	National Center for Education Statistics (4 Yr Moving Average)	21.8	MS in '73	115.8	AK in '88	49.0	(15.9)	54.3	(15.1)	59.5	(19.3)
Pupil-Teacher Ratios in Secondary Schools	National Center for Education Statistics (4 Yr Moving Average)	7.3	MA in '00	26.3	MI in '86	13.2	(3.0)	13.1	(2.2)	14.1	(3.3)
Difference in Mean Ages of 2nd and 8th Graders	October Current Population Surveys (4 Yr Moving Average)	5.7	IN in '97	6.7	WV in '80	6.1	(0.1)	6.1	(0.1)	6.1	(0.1)
Carnegie Units Required for Graduation	National Center for Education Statistics	12.0	Various	24.0	Various	18.3	(2.6)	20.5	(2.0)	22.0	(1.5)
Compulsory Age of School Attendance	National Center for Education Statistics	13.0	Various	18.0	Various	16.4	(0.8)	16.5	(0.8)	16.8	(0.8)
% of Employed Adults in Agriculture	March Current Population Surveys (4 Yr Moving Average)	0.0	DC in '77	16.8	SD in '81	4.2	(3.1)	2.1	(0.9)	2.4	(1.0)
% of Employed Adults in Manufacturing	March Current Population Surveys (4 Yr Moving Average)	5.7	DC in '99	44.5	NC in '73	25.5	(7.6)	23.7	(7.2)	22.1	(7.0)
Poverty Rate (% People Poor)	March Current Population Surveys	2.9	CT in '89	31.6	MS in '73	13.6	(4.4)	13.9	(4.1)	15.8	(4.7)
Per Capita Income (in 100s of 2000 Dollars)	U.S. Bureau of Economic Analysis (4 Yr Moving Average)	118.2	MS in '74	377.6	CT in '00	205.8	(43.7)	233.2	(38.5)	234.2	(47.0)
Unemployment Rate (% Unemployed)	U.S. Bureau of Labor Statistics	2.7	NE in '93	15.0	WV in '85	6.4	(2.0)	6.1	(1.5)	6.0	(0.9)
% Non-Hispanic Black, Age 14 to 21	March Current Population Surveys (4 Yr Moving Average)	0.0	Various	91.2	DC in '75	11.3	(14.9)	24.2	(11.8)	18.4	(13.6)
% Hispanic, Age 14 to 21	March Current Population Surveys (4 Yr Moving Average)	0.0	Various	46.2	NM in '98	5.4	(7.9)	5.6	(7.0)	22.9	(16.4)

Note : Sample includes 1,428 state-years created by cross-classifying the 50 states and the District of Columbia by the 28 years between 1973 and 2000. See text for a description of dependent and independent variables. Observations are not weighted.

[a] Sample sizes pertain to analyses that include data from 1973 through 2000. Models predicting the percentage of 16 to 19 year olds taking the GED are restricted to 1980 through 2000.

Table 2. Fixed Effects Models of the Association Between High School Exit Examination Policies and High School Completion, 1973-2000

	% Age 16 to 19 Who Are Dropouts (CPS-Based)		% Age 16 to 19 Who Are Dropouts (CPS-Based)		Estimated Completion Rate (CCD-Based)		Estimated Completion Rate (CCD-Based)	
	b	b/se	b	b/se	b	b/se	b	b/se
Model 1: *State and Year Fixed Effects, No Time-Varying Covariates*								
Exit Exam: None (Omitted Category)		---		---		---		---
Exit Exam: Any Exit Exam Required	-0.05	-0.23		---	-1.52	-3.82 **		---
Exit Exam: Minimum Competency		---	-0.03	-0.11		---	-1.30	-3.06 **
Exit Exam: More Difficult		---	-0.15	-0.36		---	-2.44	-3.36 **
Model 2: *State and Year Fixed Effects with Time-Varying Covariates*								
Exit Exam: None (Omitted Category)		---		---		---		---
Exit Exam: Any Exit Exam Required	-0.14	-0.62		---	-1.05	-2.53 *		---
Exit Exam: Minimum Competency		---	-0.10	-0.42		---	-0.57	-1.28
Exit Exam: More Difficult		---	-0.28	-0.69		---	-2.78	-3.84 **
Per Pupil Expenditures (in 100s of 2000 Dollars)	-0.05	-3.32 **	-0.05	-3.28 **	0.19	6.39 **	0.19	6.61 **
Pupil-Teacher Ratios in Secondary Schools	0.08	2.00 *	0.08	2.02 *	0.05	0.69	0.06	0.90
Difference in Mean Ages of 2nd and 8th Graders	2.11	3.82 **	2.12	3.83 **	-0.05	-0.05	0.11	0.11
Carnegie Units Required for Graduation	-0.01	-0.23	-0.01	-0.19	0.00	0.05	0.02	0.30
State Has No Carnegie Unit Requirements	0.56	0.78	0.58	0.81	-0.44	-0.34	-0.17	-0.14
Compulsory Age of School Attendance	-0.39	-3.02 **	-0.39	-3.02 **	0.39	1.68	0.39	1.67
% of Employed Adults in Agriculture	-0.11	-1.82	-0.11	-1.80	-0.08	-0.74	-0.07	-0.62
% of Employed Adults in Manufacturing	0.04	1.38	0.04	1.40	-0.16	-2.83 **	-0.15	-2.72 **
Poverty Rate (% People Poor)	0.10	3.17 **	0.10	3.16 **	-0.20	-3.36 **	-0.20	-3.43 **
Per Capita Income (in 100s of 2000 Dollars)	0.02	3.39 **	0.02	3.36 **	-0.03	-2.67 **	-0.03	-2.87 **
Unemployment Rate (% Unemployed)	-0.25	-4.82 **	-0.25	-4.78 **	0.12	1.24	0.13	1.43
% Non-Hispanic Black, Age 14 to 21	-0.02	-0.74	-0.02	-0.79	-0.17	-3.79 **	-0.19	-4.22 **
% Hispanic, Age 14 to 21	0.04	1.86	0.05	1.90	0.00	0.07	0.03	0.59

Note : Sample includes 1,428 state-years created by cross-classifying the 50 states and the District of Columbia by the 28 years between 1973 and 2000. See text for a description of dependent and independent variables.

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

Table 3. Fixed Effects Models of the Association Between High School Exit Examination Policies and GED Test Taking and High School Completion, 1980-2000

	% Age 16 to 19 Taking the GED (ACE-Based)		% Age 16 to 19 Taking the GED (ACE-Based)		% Age 16 to 19 Who Are Dropouts (CPS-Based)		% Age 16 to 19 Who Are Dropouts (CPS-Based)		Estimated Completion Rate (CCD-Based)		Estimated Completion Rate (CCD-Based)	
	b	b/se	b	b/se	b	b/se	b	b/se	b	b/se	b	b/se
Exit Exam: None (Omitted Category)	---		---		---		---		---		---	
Exit Exam: Any Exit Exam Required	0.10	2.06 *	---		0.50	1.72	---		-1.50	-3.09 **	---	
Exit Exam: Minimum Competency	---		0.06	1.11	---		0.42	1.34	---		-1.08	-2.05 *
Exit Exam: More Difficult	---		0.21	2.87 **	---		0.71	1.58	---		-2.68	-3.54 **
Per Pupil Expenditures (in 100s of 2000 Dollars)	-0.01	-2.15 *	-0.01	-2.22 *	-0.07	-3.55 **	-0.08	-3.57 **	0.15	4.32 **	0.16	4.39 **
Pupil-Teacher Ratios in Secondary Schools	0.02	2.28 *	0.02	2.18 *	0.01	0.15	0.01	0.12	0.24	3.06 **	0.25	3.15 **
Difference in Mean Ages of 2nd and 8th Graders	-0.20	-1.96	-0.21	-2.04 *	1.50	2.43 *	1.48	2.40 *	1.17	1.12	1.26	1.21
Carnegie Units Required for Graduation	-0.01	-0.80	-0.01	-0.89	-0.05	-0.97	-0.05	-1.00	-0.07	-0.75	-0.06	-0.66
State Has No Carnegie Unit Requirements	0.27	1.62	0.25	1.54	-0.83	-0.83	-0.85	-0.85	-0.20	-0.12	-0.07	-0.04
Compulsory Age of School Attendance	0.00	-0.08	0.00	-0.05	-0.58	-3.39 **	-0.58	-3.39 **	0.40	1.38	0.39	1.36
% of Employed Adults in Agriculture	0.00	-0.11	0.00	-0.17	-0.23	-2.43 *	-0.23	-2.45 *	-0.20	-1.27	-0.19	-1.20
% of Employed Adults in Manufacturing	0.02	2.75 **	0.02	2.80 **	0.04	0.80	0.04	0.81	-0.27	-3.60 **	-0.27	-3.65 **
Poverty Rate (% People Poor)	0.00	-0.17	0.00	-0.12	0.05	1.42	0.06	1.43	-0.04	-0.68	-0.05	-0.73
Per Capita Income (in 100s of 2000 Dollars)	0.00	3.42 **	0.01	3.51 **	0.04	4.11 **	0.04	4.13 **	-0.01	-0.46	-0.01	-0.55
Unemployment Rate (% Unemployed)	0.00	0.13	0.00	-0.03	-0.18	-2.27 *	-0.18	-2.31 *	-0.03	-0.23	-0.01	-0.07
% Non-Hispanic Black, Age 14 to 21	-0.02	-2.21 *	-0.01	-1.76	0.01	0.31	0.02	0.43	-0.15	-2.11 *	-0.18	-2.47 *
% Hispanic, Age 14 to 21	-0.02	-3.37 **	-0.03	-3.50 **	0.04	0.99	0.04	0.94	0.28	3.84 **	0.29	3.98 **

Note : For this table, the sample initially includes 1,071 state-years created by cross-classifying the 50 states and the District of Columbia by the 21 years between 1980 and 2000. Because data are missing for 6 state-years, these analyses are ultimately based on 1,065 observations. See text for a description of dependent and independent variables.
* = $p < 0.05$; ** = $p < 0.01$

Table 4. Alternate Specifications of Models of the Associations Between High School Exit Examination Policies and GED Test Taking and High School Completion

	Estimated Completion Rate[a] 1973 - 2000 (CCD-Based)		Estimated Completion Rate 1973 - 2000 (CCD-Based)		Estimated Completion Rate 1973 - 2000 (CCD-Based)		Estimated Completion Rate 1973 - 1992 (CCD-Based)		% Age 16 to 19 Taking the GED 1980 - 1992 (ACE-Based)	
	b	b/se	b	b/se	b	b/se	b	b/se	b	b/se
Exit Exam: None (Omitted Category)	---		---		---		---		---	
Exit Exam: Any Exit Exam Required	---		2.93	2.54 *	3.22	3.01 **	-0.28	-0.59	0.02	0.42
Exit Exam: Minimum Competency	-1.15	-3.08 **	---		---		---		---	
Exit Exam: More Difficult	-2.66	-4.21 **	---		---		---		---	
Per Pupil Expenditures (in 100s of 2000 Dollars)	0.17	8.46 **	0.18	6.16 **	0.19	6.74 **	0.11	3.30 **	-0.02	-3.68 **
Pupil-Teacher Ratios in Secondary Schools	-0.01	-0.11	0.07	0.99	0.07	0.97	-0.16	-1.75	0.01	1.15
Difference in Mean Ages of 2nd and 8th Graders	-0.87	-0.97	-0.21	-0.22	0.10	0.11	-3.08	-2.63 **	-0.16	-1.28
Carnegie Units Required for Graduation	---		-0.01	-0.08	0.06	0.87	0.01	0.19	0.00	0.50
State Has No Carnegie Unit Requirements	---		-0.38	-0.30	0.45	0.35	0.21	0.16	0.47	2.72 **
Compulsory Age of School Attendance	0.03	0.16	0.46	2.00 *	0.37	1.60	-0.43	-1.46	-0.03	-0.66
% of Employed Adults in Agriculture	---		-0.07	-0.68	-0.01	-0.12	-0.19	-1.73	0.00	-0.22
% of Employed Adults in Manufacturing	---		-0.14	-2.47 *	-0.12	-2.10 *	-0.19	-3.02 **	-0.01	-1.04
Poverty Rate (% People Poor)	-0.12	-2.28 *	-0.17	-2.84 **	-0.20	-3.37 **	-0.37	-4.95 **	0.00	-0.41
Per Capita Income (in 100s of 2000 Dollars)	---		-0.03	-2.93 **	-0.04	-3.28 **	-0.09	-6.49 **	0.01	3.59 **
Unemployment Rate (% Unemployed)	0.39	4.86 **	0.16	1.67	0.22	2.25 *	-0.21	-2.12 *	0.02	1.00
% Non-Hispanic Black, Age 14 to 21	---		-0.17	-3.93 **	-0.18	-3.92 **	-0.04	-0.85	0.00	0.08
% Hispanic, Age 14 to 21	---		0.01	0.24	0.09	1.97 *	-0.14	-2.82 **	0.01	0.51
Exit Exam by Poverty Rate Interaction	---		-0.27	-3.69 **	---		---		---	
Exit Exam by % Non-Hispanic Black Interaction	---		---		-0.10	-3.02 **	---		---	
Exit Exam by % Hispanic Interaction	---		---		-0.21	-5.87 **	---		---	

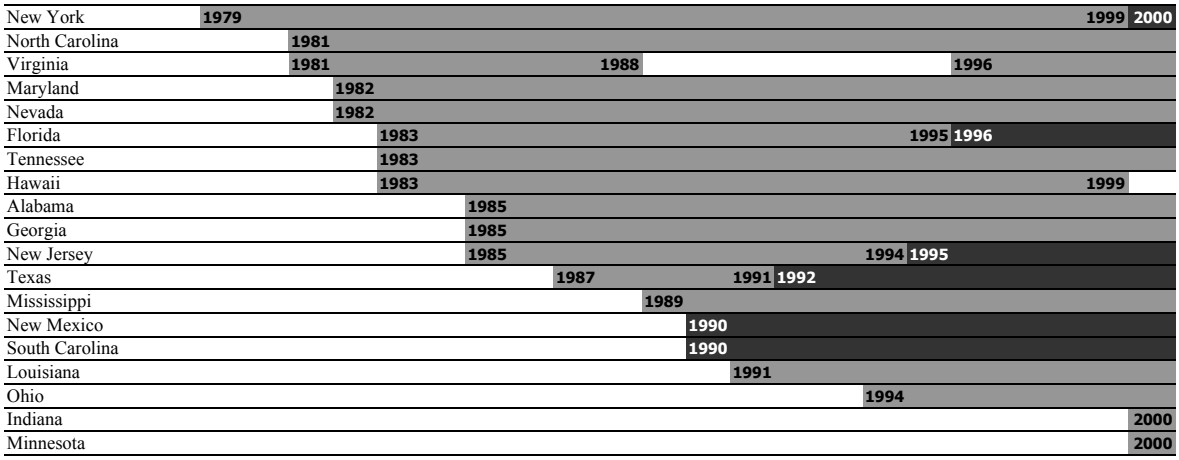
Note : Sample begins with 1,428 state-years created by cross-classifying the 50 states and the District of Columbia by the 28 years between 1973 and 2000. See text for a description of dependent and independent variables.

[a] In this model 30 outliying or overly influential cases have been dropped and the indicated time-varying covariates have been omitted because of multicollinearity. See text for details.

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

Figure 1. High School Exit Examination Policies in the United States

A. Timeline of State High School Exit Examiantion Policies



	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Number of States with Exit Examinations	1	1	3	5	8	8	11	11	12	12	12	14	15	15	15	16	16	17	17	17	17	18

"Minimum Competency" High School Exit Examination
"More Difficult" High School Exit Examination

Note : Years represent graduating classes

B. States with High School Exit Examinations for the Graduating Class of 2000

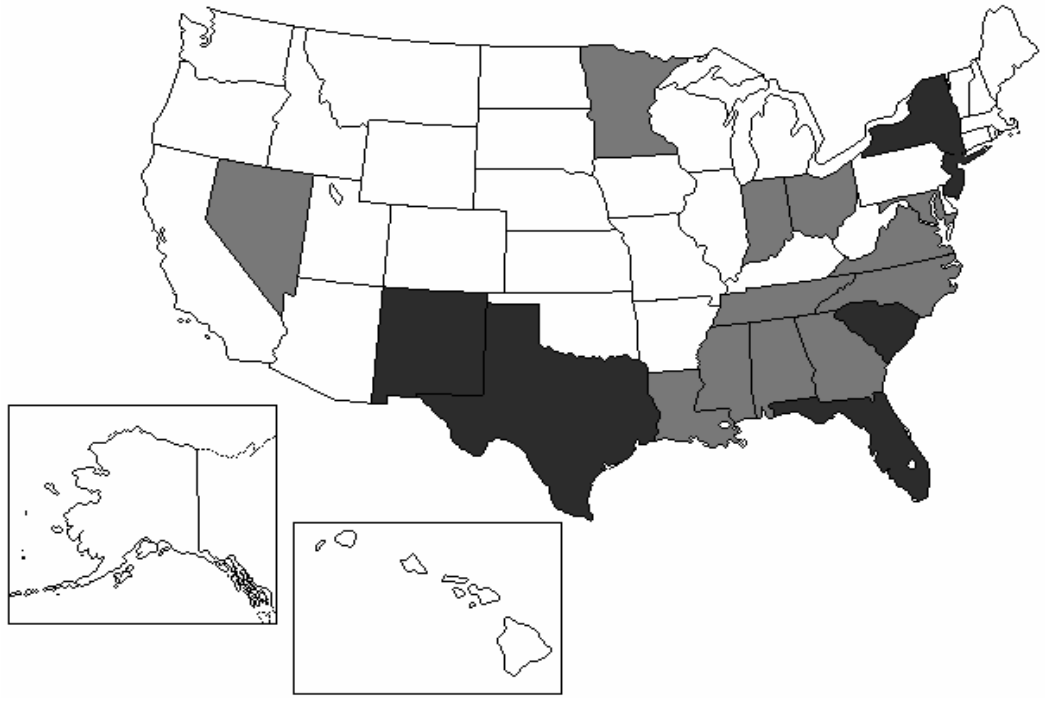
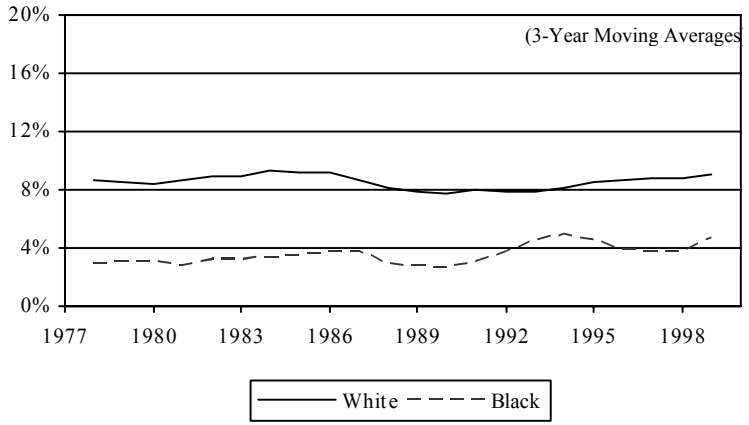
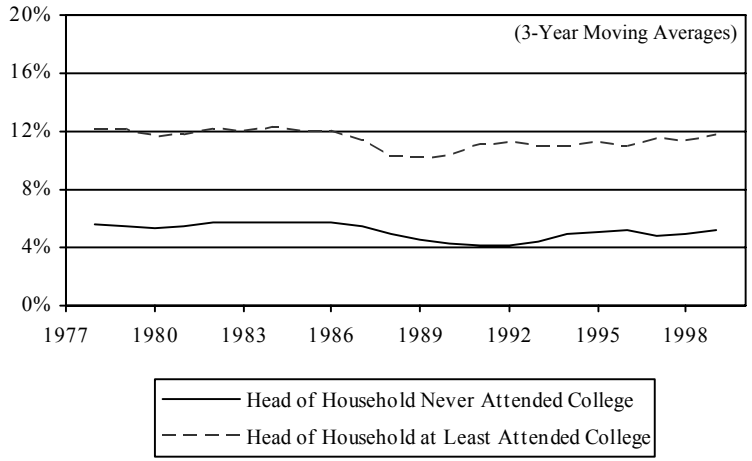


Figure 2. Private School Enrollment Among 9th to 12th Graders, 1977 to 2000

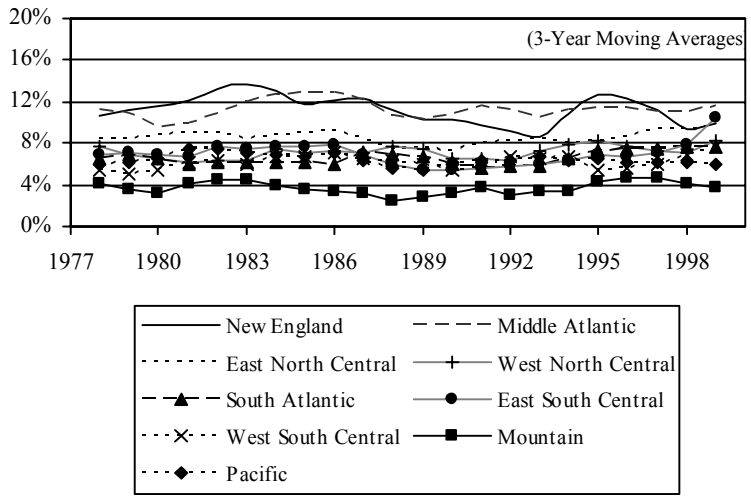
A. Percentage Enrolled in Private Schools, by Rac



B. Percentage Enrolled in Private Schools, by Parent's Educatio



C. Percentage Enrolled in Private Schools, by Regio



D. Percentage of High School Graduates from Private Schools, by Regio