Would More Compulsory Schooling Help Disadvantaged Youth? Evidence From Recent Changes to School-Leaving Laws

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Abstract: Dropout rates in the United States have fallen little since the 1970s, and today remain disproportionately high among blacks, Hispanics, and children from low-income families. Many states have considered raising the minimum school leaving age as a means to improve these outcomes. The decision to do so is complicated, because it involves predicting costs and benefits for all individuals. Several states have already raised the school leaving age above 16, although often with exceptions. This paper uses these recent changes in order to estimate the effects of further compulsory schooling. The results suggest that more restrictive laws reduced dropout rates, increased college enrollment, and improved career outcomes. Some caution is warranted, since focusing on recent law changes leads to higher imprecision. However, generally, the consistent findings in previous studies suggest that compulsory high school at later ages can benefit disadvantaged youth.

I thank the Annie E. Casey Foundation for generous financial support. Sue Dynarski, Jon Gruber, Thom Spielhofer, and Josh Angrist, provided many useful comments, as did participants at the 2007 Allied Social Sciences Association meetings, and at the Disadvantaged Youth conference in Amelia Island, Florida. The findings and conclusions presented in this report are my own.

Introduction

High school dropout rates have changed little over the last thirty years. In the early 1970s, 17 percent of American youths aged 18 to 24 and not in high school had not completed their degree. This figure (from the National Center for Education Statistics {NCES}, [2005]) fell slowly until it reached 14 percent by 1990, and has since leveled off. Dropout rates are higher among Blacks and substantially higher among Hispanics. Non-completion is also related to family income: during the twelve months leading up to the end of October 2001, high school students living in low-income families dropped out of school at a rate six times higher than their peers from high-income families (NCES [2005]).

Policy makers and administrators often grapple with finding ways to reduce the number of dropouts; some consider lowering class-size, making schools more competitive, making the curriculum easier, or targeting at-risk students at an earlier age. Another option recently considered by several States is raising the minimum school leaving age. The compulsory school leaving age restricts the minimum length of time students must spend in school before having the legal option to exit the school system. Laws that determine this age have been in place for many decades (in some cases more than one hundred years), and have been periodically updated.

Some of the best evidence, which suggests that, on average, high school dropouts benefit,from continued schooling comes from historical changes to compulsory school laws. Previous studies have consistently documented that individuals who are compelled to stay in school also experience large gains to their adult social-economic outcomes. Using very different methodologies, Angrist and Krueger (1991) and Acemoglu and

Angrist (2001) estimated that annual adult earnings in the U.S. are about 10 percent higher for students compelled to stay in school one year longer. In the U.K., Harmon and Walker (1995) found approximately 14 percent higher earnings amongst those individuals who were encouraged to remain in school. In Canada, I found similar gains using provincial law changes between 1915 and 1970. Other studies have found that additional years of compulsory schooling lowers the likelihood of committing crime (Lochner and Moretti [2004]), and of dying young (Lleras-Muney [2005]), while also reducing the chance of teen pregnancy (Black, Devereux, and Salvanes [2004]).

However, these earlier reports, which examine the effects of raising the minimum school leaving age to 14, 15, or 16 years old, were written many decades ago, often prior to the 1950s. The circumstances that affected dropout decisions in this bygone era are markedly different than the circumstances affecting dropout decisions today. The demand for skilled workers has since increased, and gains from additional education attainment may also have increased. Conversely, more students today graduate from high school and obtain post secondary education than did students in the 1950's. Today's dropouts mostly come from relatively poor families. According to the 2000 census, 73 percent of dropouts who were under the age of 20 and who lived at home had parents with household income below the 25^{th} percentile, as compared to 55 percent of dropouts from the 1960 census. It is not clear whether encouraging these individuals to remain in school beyond 16 years of age would generate the same effects as found in earlier studies.

Many states have discussed raising the school leaving age to 17 or 18, which could, effectively, make high school completion compulsory. In fact, 29 states have

already increased the minimum school leaving age above 16, although often with exceptions.

This paper uses these recent changes to the school leaving age to explore the potential for compulsory schooling to serve as an effective policy, which would improve current social-economic outcomes, especially for today's disadvantaged youth. The purpose of this paper is to present new evidence, and to discuss considering whether or not to support such policies. Support for or against compulsory school laws is often presented without theoretical or empirical foundation; past studies only indicate that compulsory school laws appear to have been effective in generating adult gains for would-be-dropouts many decades ago.

The next section of this paper focuses on whether these recent changes and experiences had any impact on increasing school enrolment and attainment. Section II describes the recent law changes in the U.S. In Section III, I estimate whether changing the school leaving age above 16 encourages some students to drop out later, to graduate, or even decide to enrol in post-secondary education. As the reader will learn in coming sections,,many of the law changes included exceptions, and were either poorly enforced, or had little punishment for non-compliance. Recent increases to the school leaving age had a small but significant impact on raising both school completion rates and post-secondary school attendance.

The second part of this paper estimates the subsequent impact on earnings and on other labor market outcomes for the small fraction of individuals who are affected by these laws. In Section IV, I discuss the methodology for estimating these effects, and Section V presents the results. Notably, the results reveal findings similar to more historic

studies. I estimate that raising the school leaving age to 17 or 18 would indeed significantly improve earnings and employment opportunities for affected individuals early in their careers.

Section VI provides some general policy discussion on the costs and benefits, for which should be accounted when considering compulsory schooling policies. In section VII, I conclude that when taken together with the previous consistent evidence, the overall results suggest that raising the school leaving age above 16 likely would increase wealth and employment outcomes for the typical affected student. If states are serious about lowering dropout rates through compulsory schooling, one recommendation is that they better enforce these laws, while also promoting their potential benefits to administrators, parents, and students. Although allowing for exceptions is probably a necessity, greater initial enforcement may help to establish an attitude of acceptance amongst youth towards staying in school. Compulsory school laws work better through the threat of enforcement, rather than through actual enforcement. Youth might also find high school a more attractive option were it to offer more course selection (such as vocational, trade, or college courses), a change already implemented in Canada and being considered in the UK.

II. Recent Changes to Compulsory Schooling Laws in the U.S.

Many states in the U.S. have a minimum school leaving age of 17 or 18; NCES' annual Education Digest lists these age laws. Figure 1A shows the minimum school

leaving age between 1970 and 2005 for states with a minimum school leaving age set above 16 at least once during this period (and for the District of Columbia), while Figure 1B shows this statistic for the remainder of the states.[1] Several states, such as Rhode Island, Florida, and Nebraska, have upgraded their compulsory school laws only in the past few years. However, others, such as Oklahoma, Oregon, and Utah, have had a minimum leaving age set above 16 for more than two decades now.

A few states have raised and then lowered the leaving age, thus creating a strange pattern, which suggests that there is something more is going on. A closer look at the legislation reveals that there is, indeed, much more involved in compulsory school laws than just a specific age range within which individuals must remain in school: there are exceptions if a student works, exemptions with parental consent, and various degrees of enforcement and repercussions for non-compliance. Table 1 lists some of these exceptions and exemptions for states with school leaving laws above 16 in 2005. This information comes directly from the States' Statutes or Codes. The descriptions do not capture the full details of the law, but rather provide a sense of the intricacies involved in compulsory schooling policy.

In several states, students can leave earlier than the set minimum school leaving age if they work instead of attending high school. In other cases, students can leave with parental consent. Kansas allows individuals to drop out before the recorded minimum age if, after a counseling session, both student and parent sign a disclaimer; in signing, each party, thus acknowledges that they have read and understand a list of both academic skills

[1] Hawaii and Alaska are left out of this paper's analysis to since their demographics and economies differ significantly from the other states. However, results are similar when including them in the regressions.

that a student who drops out may have not yet acquired, as well as a list of average earnings differences between dropouts and graduates.[2]

Some students disengage and drop out illegally, either because compulsory schooling policies are not well enforced, or because punishment for habitual truancy is not severe enough a deterrant. Administrators may be reluctant to pursue court action, especially in cases where students are disruptive in class and do not appear interested in school because they would rather be rid of disruptive students. In virtually every state, the primary action when a student begins to disengage from school (through absenteeism) is for administrators to notify a parent or guardian of the truancy, and to advise the parent to encourage the child to attend. Some states require parents to pay fines, and they may even face imprisonment if their child regularly skips school. Children themselves can be punished via termination of driving privileges (see Burke [2005]), performing community service, or attending a juvenile detention facility.

In practice, only a fraction of habitually truant students are disciplined by the state. In Tennessee, for example, most attendance officers believe that their caseload is too large, and report that they face difficulty contacting truant students' families (Palmisano and Potts [2004]). The state provides only general guidelines to determine

[2] Interestingly, the Kansas State Department of Education (2005) suggests administrators use the following information in the counseling session:

Level of Education Completed	Lifetime Earnings	Median Weekly Earnings in 2003	Unemployment Rate in 2003
Not a high school grad.	$993,466	$396	8.8%
High School grad.	1,298,316	554	5.5
Some college	1,462,379	622	5.2
Associate degree	1,527,582	672	4.0
Bachelor's degree	2,173,417	900	3.3
Master's degree	2,312,426	1,064	2.9
Doctorate	2,907,904	1,307	1.7
Professional	3,013,000	1,349	2.1

habitual truancy, and schools have little financial incentive to improve attendance. Kelly (2006) conducted a review of habitual truancy trends across the United States and, more specifically, for the state of Idaho. About half (48.0 percent) of the states do not hold any agency responsible for reporting habitual truancy. Only four out of thirty-seven districts in Idaho had explicit procedures for tracking students from year to year, and about 59 percent of administrators surveyed reported that they had tried to contact students who failed to enroll for a new school year, while 29 percent reported treating the occurrence without action. Interview participants in Kelly's study generally expressed frustration at their inability to track students when youths seemingly disappeared from classes. When students were declared habitually truant (generally declared when a student fails to maintain 90 percent attendance within a given semester), 55 percent of Idaho districts reported them directly to law enforcement, and 36 percent reported them first to the local Board of Trustees. Only 46 percent of administrators said that the actions taken to address truancy were successful.

If the minimum school leaving age affects at least some would-be dropouts, we should expect to observe more 16 and 17 year olds attending school in states which have school leaving ages of 17 or 18, respectively, as compared to states with a leaving age of 16. In states that provide no exceptions to a leaving age of 18, we should observe virtually all 16 and 17 year-olds attending high school. To confirm this, Table 2 presents the fraction of 16, 17, and 18 year-olds who attended school during the academic years from 2000 to 2005, categorized by the minimum leaving age faced at age 16.[3]

[3] These proportions are calculated from responses in the 2000 to 2005 outgoing rotation files of the Current Population Survey, excluding the months of June, July and August, and using population weights. I matched the state school leaving ages to the year in which an individual was 16 in their current state of residence. The data appendix provides additional details.

Indeed, most 16 year-olds *are* attending school, regardless of the minimum school leaving age in the state in which they reside. The fraction of students in school at age 16 is approximately the same across states with different school leaving ages. Contrary to what we would expect, the fraction of 17 year-olds in school does not spike up for youths in states with a school leaving age of 18: 6.1 percent of 17 year-olds in states with a leaving age of 18 have dropped out, compared to 7.7 percent in states with a leaving age of 16. Table 2 also presents education attainment measures for 20 to 24 year-olds. There are no substantial differences in the dropout rate or post-secondary attainment rate across states with different leaving ages.

One reason for this similarity may be that states which tend to have more restrictive compulsory schooling laws also have more students who dropout, thus limiting our ability to observe the effects of these age limits (I address this issue in Section III). The finding that many students leave before the legally mandated age suggests that exceptions, exemptions, and lack of enforcement of these laws weaken their effectiveness at keeping youths in school. Kelly (2006) provides additional estimates suggesting that many students leave before the compulsory schooling age. Of the 49.4 million compulsory school-aged children estimated in the United States for 2003, 3.3 percent of them were unaccounted for in school records, and could not be verified as either officially attending or not attending.

III. The effect of raising the school leaving age on school enrollment and attainment

This section presents a more systematic analysis of the effects of recent changes in school leaving ages on U.S. school enrollment and attainment. The appendix provides details of the data. The analysis uses both the monthly outgoing rotation files of the Current Population Survey (CPS) between 1979 and 2005, and the American Community Surveys (ACS) between 2000 and 2005. In order to focus on recent changes to compulsory schooling laws, the baseline sample is limited to those aged 20 to 29. Individuals are matched to the state's school leaving age faced at age 16 using their state of residence (for the CPS sample) or state of birth (for the ACS sample).[4]

The main regression model to estimate the effects of raising the school leaving age above 16 is as follows:

$$(1) \qquad EDUC_{iscy} = \gamma(DROPAGE_{sc} > 16) + \delta_s + \delta_c + \delta_y + \delta_{iscy} \qquad ,$$

where $EDUC_{iscy}$ is a measure of education attainment measure for individual i, in state or from state s, born in year c, surveyed in year y. The variable $DROPAGE_{sc} > 16$ is equal to one if the individual faced a school leaving age above 16 when he or she was 16 years old in state s. The variable equals zero otherwise, and e_{iscy} is the error term. The regression includes fixed effects for state of residence (CPS) or birth (ACS), birth cohort, and survey year. These variables control for perennial differences in state education attainment that do not vary over time, as well as national trends in education attainment,

[4] I include immigrants that arrived before age 17 in the ACS and all immigrants in the CPS, since most 20 to 29 year-old immigrants faced compulsory schooling laws in the U.S. The results are similar excluding them, and are available upon request.

which do vary over time. I also examine the results with linear birth cohort trends for each state.[5]

The variable of interest, γ, is the average effect of facing a school leaving age above 16 on educational attainment. Table 3A shows estimates of γ under alternative specifications using the CPS sample of 20 to 29 year-olds who were 16 years old between 1970 and 2001. Table 3B shows the same estimates using the ACS sample of 20 to 29 year-olds who were 16 years old between 1987 and 2001. The appendix tables show similar results with alternative sample specifications.

The second column of Table 3A replaces the state fixed effects in Equation (1) with nine region fixed effects. In this case, the identification of the compulsory schooling effects comes not only from changes in the school leaving laws, but also from state-to-state variation in the leaving age, within a region. I estimate that, on average, raising the school leaving age above 16 increases an individual's years of schooling by 0.13 years. Replacing region with state fixed effects in Column 3 controls for average differences in attainment across states over the entire period. This specification (Equation 1) does not significantly change the estimated effect. Finally, in Column 4, I add state-specific linear cohort trends to examine the possibility that the results are driven by state differences in overall education attainment trends. This cautious specification makes the estimation of the compulsory schooling law effect more difficult, since some of the trends may absorb some of the effects. Under this specification, however, we still identify a similar effect – 0.11 more years of schooling – from higher school leaving laws. Columns 5 through 7

[5] The data are first aggregated into cell means at the state, cohort, survey year, gender, and race level, and weighted by cell population size. The standard-errors reported cluster for state*cohort-specific heteroskedasticity using the Huber-White methodology. Standard errors from clustering only by state are larger, but the first stage and second stage estimates remain statistically significant at the 10 percent p-value criteria for most of the school attainment and labor market outcome variables.

show analogous results of regressing school attainment upon the actual school leaving age faced at age 16. The coefficient suggests that raising the school leaving age by one increases average years of schooling by approximately 0.07 years. This is about half of the average effect estimated for raising the school leaving age in earlier years, between 1915 and 1980 (Oreopoulos [2007]).

The second and third columns show the same results, except with high school completion and post-secondary school enrollment as outcome variables. The results also indicate that raising the school leaving age above 16 decreases the dropout rate, while also increasing the rate of college or university entrance. According to the main specification in Column 3, raising the school leaving age above 16 decreases the fraction of 20 to 24 year-olds who have less education than a high school degree by 1.3 percentage points. Although compulsory schooling laws do not mandate post-secondary education, I also find that raising the school leaving age above 16 increases the fraction of youths who obtain at least some college or university education. One theory consistent with this finding is that some individuals who are encouraged to stay longer in high school become more interested in post-secondary education, or perhaps that they view higher education as less daunting an obstacle than when they were younger.[6] The analogous estimates in Table 3B using the ACS data are similar, yet less precise.

Table 4 explores whether the estimated effects of raising the minimum school leaving age are weaker in states which allow exemptions or small punishments. The results are mixed. Column 2 shows the estimated effects of raising the compulsory

[6] The other set of results in the first three columns use the actual school leaving age as the dependent variable (16, 17, or 18) instead of the dummy variable indicating a school leaving age above 16 for the main specification. The results are similar and imply greater school attainment effects for states that raised their school leaving age to 18 instead of 17.

schooling age above 16 in states that allow for early exit with a working permit or parental consent, as compared to states that do not allow early exit. The results indicate that states with exemptions are not associated with weaker school attainment effects of raising the school leaving age. In fact, these results show the impact on school attainment from raising the age minimum. Conversely, Column 3 shows the estimated effects of raising the compulsory schooling age above 16 for states that associate truancy with a misdemeanor charge or with no punishment at all. The estimated effects are smaller and statistically insignificant from zero when compared to other states. Taken together, the impact of weaker laws on raising the school leaving age is unclear. On balance, the results suggest that raising the school leaving age when truancy is associated with weaker punishment is (you're missing something here) associated with truancy is less effective (this sentence doesn't make sense as is).

Notable with regards to these findings is the fact that the effects are small, given that a strict interpretation of the law would imply that virtually no teenager should be allowed to leave school before the age of 16. The other notable finding is that more restrictive compulsory schooling laws also appear to increase post-secondary school attainment. This is not the case with earlier studies (e.g. Acemoglu and Angrist [2001]). The option of post-secondary schooling may seem more plausible from the standpoint of a high school graduate, as compared to from the perspective of a high school dropout.

IV. Methodology for estimating the effect of raising the school leaving age on subsequent employment and wages, among those affected by the law change

This section briefly describes the methodology for estimating the effects of compulsory schooling from raising the school leaving age above 16 on unemployment, earnings, and other labor market outcomes.

Consider the same regression model in equation (1), but using unemployment status as the dependent variable:

$$(2) \qquad UNEMP_{iscy} = \lambda(DROPAGE_{sc} > 16) + u_s + u_c + u_y + u_{iscy} \quad ,$$

where $UNEMP_{iscy}$ is equal to one if individual i (now older), living in state s, born in year c, surveyed in year y is unemployed, zero otherwise. Equation (2) is known as the reduced form equation. The coefficient λ captures the average effect of raising the school leaving age above 16 on the unemployment rate for <u>everyone</u> in the sample. Of course, not everyone is affected by the change in the law. Instead, what we want to estimate is the impact of an increase in the dropout age for those who end up taking one additional year of schooling. For example, suppose that the increase in the dropout age means that 50 percent of the population takes one more year of school ($\gamma = 0.50$). We can estimate the impact of raising the school leaving age on those 50 percent by dividing λ by 0.50. If an increase in the dropout age increases total number of school years by 0.50, and an increase in the dropout age decreases average unemployment by 0.02, then we can deduce that the effect of taking one more year of compulsory schooling thus decreases average unemployment by 0.04 (0.02 / 0.50), or λ / γ.

Therefore, to estimate the effect of one more year of compulsory schooling (by raising the school leaving age above 16), we simply rescale our estimate in (2) by the

estimated increase in school years in (1). Another way of looking at this is to suppose that raising the school leaving age caused everyone to take one more year of school. Then our estimate in (2) would give us exactly the effect of one more year of school on the likelihood of being unemployed ($\lambda / 1$).

For this approach to work, changes in the school leaving age must be unrelated to changes in state demographic or institutional characteristics, which also affect school attainment. Also, if raising the school leaving age does not affect an individual's education attainment (e.g. a student intends to graduate, whether the dropout age is 16 or 18,), raising the age also does not affect her unemployment rate. An alternate way to describe this instrumental variables method is in two stages: in the first stage, we estimate education attainment differences caused only from changes in the school leaving age (the first stage is Equation [1]). In the second stage, we estimate:

$$(3) \qquad UNEMP_{iscy} = \beta EDUC\_HAT_{scy} + \nu_s + \nu_c + \nu_y + \nu_{iscy} \quad ,$$

where $EDUC\_HAT_{sc}$ is an individual's predicted education based on the first stage. The coefficient β is the average effect from one year of education, caused by a change in the compulsory school leaving age. It is equivalent to λ / γ .

V. The effect of compulsory schooling on subsequent employment and wages

Using the instrumental variables methodology discussed in Section IV, Tables 5A and 5B show estimates for the effects of a year of compulsory schooling on early career

outcome,. The top panels show the reduced form results of the average effects of a higher school leaving age on the labor market outcomes for the entire sample, whether or not affected by laws. The bottom panels show the estimated average effects of only those affected by these laws (those compelled to stay in school). The sample in Table 5A includes all 20 to 29 year-olds in the CPS who were 16 between the years 1970 and 2001. Table 5B uses a similar sample, but from the ACS.[7]

Column 2 shows the results using region fixed effects instead of state fixed effects. This specification lets us estimate the effects of compulsory schooling using cross-section variation in state laws, but requires the assumption that this within-region variation is not related to other factors, which could explain education or labor market outcome differences. Table 5A indicates that an additional year of compulsory schooling (caused by increasing the school leaving age above 16) lowers the likelihood of unemployment by 2.2 percentage points.[8] The effect upon the likelihood of working at all for this age group is large, but is imprecisely estimated.

Column 3 shows results that include state fixed effects, so that identification of the effects of compulsory schooling comes only from changes in the minimum school leaving age. A year of compulsory schooling due to these law changes decreases the probability of being unemployed by 2.5 percentage points, and decreases the probability of not working by 3.7 percentage points. Since some individuals affected by the law changes may still be in school (at the post-secondary level), I measure the effect of compulsory schooling on weekly earnings only for those in the sample who are working

[7] The first three columns use the dummy variable for whether an individual faced a school leaving above 16 as the instrument. The last three columns use the actual dropout age faced as the instrument.

[8] Unemployment is defined as not working and looking for work.

at least 25 hours per week. tThe return to compulsory schooling on weekly earnings is 5.5 percent using an indicator for whether an individual faced a dropout age above 16 as an instrument, and 10.8 percent using the actual dropout age faced as an instrument. These estimates are not as precise as in earlier studies, but, overall, the actual coefficients are quite similar.

Column 4 shows results of estimating the model which allows for underlying linear birth cohort trends for each state. This specification makes more likely the assumption required for causal interpretation of the results,,but does so at the expense of potentially absorbing variation driven by the school leaving ages, and thus making the estimates less precise. Nevertheless, with this model, the estimates for the effects of compulsory schooling on unemployment and not working are similar to those in Column 3, and the effects on weekly earnings are greater. Columns 5 to 7 show similar estimates using the actual dropout age faced by individuals at age 16 as the instrumental variable in Equation 1.

Using the ACS in Table 5B, the estimated effects are consistent with the CPS results. While the estimates are less precise, the results suggest significant reductions in the likelihood of ending up unemployed, below the poverty line, or on welfare as a result of additional compulsory schooling. The ACS results also hint at higher income effects and a reduction in the likelihood of working in a low-skilled occupation.[9]

Finally, the baseline estimates for the effects of compulsory schooling on overall education attainment and labor market outcomes are shown in Appendix Tables A1 and

[9] Individuals are defined as working in low skilled occupations if they are categorized as operatives, service workers, or laborers in the ACS using the 1950 occupation classification (codes between 600 and 920). The ACS also defines individuals with poverty status as those in families with total incomes below the Census poverty line, adjusted for family size.

A2, under alternative sample specifications. Table A1 indicates that increases in the minimum school leaving age had almost identical effects for males and females. Hispanics appear to be the most influenced by recent changes to the school leaving age. The effects on non-Hispanics are considerably smaller, but this may be because non-Hispanics are more likely to repeat than advance a grade with compulsory schooling.[10] The racial and ethnic results are less precise compared to those from using the full-sample. Table A2 shows results for different age groups and over different periods. The results are not sensitive to the inclusion of 30-39 year-olds, who were affected by earlier law changes. Comparing cohorts affected between 1970 and 1985 and those affected between 1986 and 2001, the estimated impacts of raising the school leaving age above 16 are also similar

VI. Should we really force kids to stay in school?

The decision to raise (or even to lower) the school leaving age is complicated, because it involves predicting costs and benefits for all individuals. Some students may not gain much from staying in school, and may decide (correctly) that it is better for them to leave. Compelling them to stay would lower lifetime welfare. Many critics of compulsory schooling believe that most dropouts fall into this category. One often mentioned rationale is that public schools do not provide enough accommodation for or stimulation of students who are struggling (e.g. Gato [2005]). Keeping such children in school may also disrupt the learning and enjoyment of the rest of their classmates.

[10] The variable "years of schooling" would be a better measure for estimating the effects of compulsory schooling than education attainment because some students may spend an additional year in school without advancing a grade.

Others may benefit from compulsory schooling because they underestimate or downplay anticipated future gains. Adolescents who are predisposed to this kind of myopic behavior may want to leave while they are struggling within school, but will later regret their decision to drop out (as suggested by Spear, [2000] and discussed by Laibson [(1997])). Compulsory schooling is also sometimes motivated by indirect benefits that may incur because of positive externalities from raising the overall education attainment. In general, firms may become more productive overall by reorganizing around a more educated workforce (eg. Moretti, [2004]). Crime rates may fall (e.g. Lochner and Moretti, [2004]3), and more people may become more civically engaged as a result (e.g. Dee, [2005], Milligan, Moretti, and Oreopoulos, [2005]).

We cannot forecast with certainty who would gain from such a policy change. At the least, this study and earlier ones suggest that previous changes to the school leaving age improved labor market outcomes for individuals on average. If we convert estimated annual earnings gains into lifetime gains, we see that a year of compulsory schooling increased lifetime wealth by an average of about 10 percent, including the revenue lost as a result of not working during school.[11] The increase is large because benefits accrue over decades, whereas attendance costs last only one year. Even for individuals who detest school, 'sticking it out' an extra year would translate into a 10 percent increase in lifetime wealth – a substantial increase in consumption. My own interpretation of this evidence is that the typical person affected by a previous increase in the school leaving age experienced notable improvements to lifetime well-being. Since estimated gains from compulsory schooling have changed little over time (even with successively higher

[11] See Oreopoulos (2007) for more details about converting annual returns to compulsory schooling estimates to lifetime returns.

minimum leaving ages), it seems appropriate to expect similar gains from increases to the school leaving age in other states that have not yet raised their school leaving age above 16, or from increases in the enforcement of existing laws.

As we have discussed in previous sections, a state can compel students to attend school, but they cannot, however, force students to learn. This invites the question: If the estimates on the labor market benefits of compulsory schooling are correct, what events specifically take place in the classroom which lead to these benefits? One possibility is that at least some amount of learning occurs while attending class. Another explanation is that social skills or other non-cognitive skills are developed in students simply vis-a-vis their involvement in a learning environment. Criminal and delinquent activity may also be avoided and averted when youths spend more time in school. Unfortunately, the main channels by which students benefit from compulsory schooling are not well understood. Oreopoulos (2007) finds that students with more compulsory schooling were less likely to be working in manual labor. Krashinsky (2006) finds that requiring an additional year of high school before entering college improved students' first-year college performance. Both results provide more direct evidence that school attendance improved ability than from simply looking at earnings.

Compulsory schooling laws are difficult to enforce. No one finds attractive the threat of imposing fines, community service, or even jail time so as to ensure that uninterested youth attend class. Even if disengaged youth benefit from school, forcing them to stay may generate negative psychological costs. Ideally, these laws exist theoretically, thus, helping to establish social norms without actually having to be enforced. Peer pressure may reinforce youths' desire to stay in school, so that fewer

students leave early because less of their peers are exiting early.[12] The fact that few students leave (or even attempt to leave) school before age 16 may, for example, reflect a social norm which these laws helped to establish. Introducing more restrictive compulsory schooling laws initially may require tougher enforcement in order to establish new expectations about when students can leave.

Making additional schooling options available may encourage would-be dropouts to want to stay in school longer. Students often lose the will to stay in school if they think that they are unlikely to graduate. Providing struggling students with additional and alternative means by which to graduate may encourage students to complete their program. While raising the school leaving age to 18, for example, the Canadian province of Ontario adopted the approach of expanding vocational and co-operative programs. The province also allowed students to earn credit by participating in apprenticeship training, and by taking college courses.[13] Together, both compulsory schooling and expanded educational choice may be more effective in helping struggling students than either one taken alone. Compulsory schooling may help short-sighted youth realize potential gains from staying in school, while additional course options may make compulsory schooling more tolerable for those students who already exhibit an aversion to school.

VI. Conclusion

[12] As Katz (1977) puts it, "Compulsory school attendance laws today codify an existing social norm or standard – that young people should be in school rather than at home, on the streets, or at work, at least for most of the year…As long as attendance remains the chief avenue to schooling credentials and schooling credentials remain prerequisites to most jobs, social compulsion will remain a more dominant underpinning to school attendance than legal rules."

[13] The United Kingdom similarly proposed that employers should not be allowed to hire 16 and 17 year-olds without offering some sort of additional training.

This paper uses recent experiences in raising the school leaving age to 17 and 18 in order to assess whether such policies can increase school attainment, and can improve career outcomes. The results suggest that recent and more restrictive compulsory schooling laws reduced dropout rates, increased college enrollment, and improved several social economic indicators. Some caution is warranted, because focusing on more recent law changes leads to less precision, and the results appear to be driven mostly from Hispanics (born in the U.S.) obtaining more schooling. However, the overall estimated effects are quite consistent with previous studies and suggest that compulsory high school at later ages *can* benefit disadvantaged youth.

States that increased the school leaving age above 16 witnessed an increase in average years of schooling for 20-29 year-olds by approximately 0.13 years, while high school dropout rates fell by about 1.4 percentage points. Raising the age limit also increased post-secondary school attendance by about 1.5 percent, even though post-secondary school is not compulsory. This finding perhaps indicates that would-be dropouts reconsider post-secondary options after they complete, or come close to completing, a high school degree.

Among students who were affected by the more restrictive laws, I estimate that additional compulsory schooling significantly improved their early career outcomes by lowering (on average) the likelihood of unemployment, and by increasing earnings. Furthermore, these individuals were less likely to fall below the poverty line, and were also less likely to receive welfare.

Exceptions, leniency, and weak consequences for truancy substantially weakened the effectiveness of these laws of increasing school attainment. Exceptions may be

desirable, since some students would clearly not benefit from staying in school. The results in this paper do not determine whether those students for whom exceptions were made exhibit gains from being forced to stay. While allowing exceptions is probably necessary, the results point to the need for more resolve in cases where students begin to display signs that they are disengaging from high school.

Ideally, compulsory schooling laws would need only exist 'on the books' if students wouldn't want to leave unless their friends leave, and most students accept the established norm not to leave before the minimum possible age; in a cyclical pattern of peer influence, students who stay would encourage struggling students to do likewise, thus virtually eliminating drop outs before graduation Greater initial enforcement may help establish an acceptance amongst youth that they are expected to stay in school, therefore limiting the need to enforce such laws in the future. Students may also find it easier to accept staying if schools would offer more curriculum choice (such as trait-based training), as some governments have already done (for example, in the province of Ontario, Canada).

Overall, the results presented in this paper speak in favor of supporting an increase of the school leaving age to 17 or 18. Raising the school leaving age may offer an effective and affordable means to increase education attainment among the least educated, thus improving these individuals' subsequent employment circumstances and earnings potential.

Data Appendix

The Current Population Survey (CPS) is a large, nationally representative dataset, which tracks school attainment and labor force outcomes monthly for more than 25 years. The CPS records an individual's state of residence, which is used in this paper to predict the minimum school leaving age faced at 16 years of age. Since an individual may have moved before the age of 16, the paper also estimates effects using American Community Survey (ACS) data, which contain information on state of birth. The ACS data is smaller, but it records several additional labor market outcome variables not included in the CPS.

The National Bureau of Economic Research's extracts of the CPS outgoing rotation files cover the period between 1979 and 2005. Administered by the U.S. Bureau of Labor Statistics, the CPS collects monthly household data regarding employment and labor markets for approximately 30,000 nationally representative individuals aged 16 and older each month. It is the source that is used to calculate the unemployment rate in the United States. The extract contains variables related to employment, such as hours worked, earnings, industry, occupation, education, and unionization. The extracts also contain many background variables: age, sex, race, ethnicity, geographic location.

Every household that enters the CPS is interviewed each month for four months, after which they are ignored for eight months, and then are interviewed once again for four more months. In a given month, there are about 120,000 individuals sampled, but only one fourth of the sample exit the survey and therefore are not interviewed the following month. Typical weekly hours/earning questions are asked only of households during their fourth and eigth interviews. Data from these outgoing interviews are

combined for every year between 1979 and 2005 to create the extract, for a total sample size of more than 8.6 million.[14] To examine recent compulsory school law changes, the base dataset includes only 16 to 29 year-olds who were aged 16 between the years 1970 and 2001. This restriction reduces the sample size to approximately 1.8 million.

Some of the variable definitions change from survey to survey, and were adjusted in order to make year to year comparisons consistent. The years of schooling variable is the highest grade completed, plus the number of years of post-secondary schooling. This variable is recorded in every CPS survey from 1979 to 1992 (the gradeat variable), and is capped at 17. Following Acemoglu and Angrist (2001), I combine this variable with the education categorical variable from the 1992 survey onwards (grade92) by assigning imputed years of schooling to each category for males and females, and using the imputation method in Park (1994). A high school dropout is defined as an individual who has completed less than 12 years of schooling; an individual with some college education is defined as one who has completed more than 12 years of schooling. An individual in school is defined as an individual reporting in the CPS as being enrolled in high school or college in the previous week (excluding surveys taken in the months between June and August). This variable is only available from the CPS since 1984, and only for individuals aged 24 or under.

I use the NBER extract's imputed weekly earnings (earnwke), which is actual weekly earnings among those who report it, and reported hourly earnings multiplied by hours worked per week for individuals who report earnings in hours. Definitions of

[14] Individuals in these files are interviewed twice, so the combined dataset contains two observations for almost all individuals one year apart. The analysis adjusts for heteroskedasticity from having the same individual in the dataset twice by first aggregating the entire dataset into cells by survey year, birth cohort, gender, and region, and uses Huber-White standard errors clustered at the cohort-region level.

unemployment (not working but looking for work) and not working come directly from the imputed labor force participation measures of the CPS (ftpt79, ftpt89, ftpt94).

The 2000 - 2005 American Community Surveys were extracted from the IPUMS-USA website (http://usa.ipums.org/usa/). The ACS is administered by the U.S. Census Bureau, and replaces the long form in the decennial census. It is an ongoing, nationally representative survey, which included approximately 400,000 persons in 2000, 1.1 million persons between 2001 and 2004, and 2.9 million persons in 2005. As with the more recent education attainment variable in the CPS, the ACS survey records the highest grade or level of schooling completed. Years of schooling was computed using the highest grade completed for high school dropouts, and imputed years of schooling using the method in Park (1994) for high school graduates. The combined ACS sample includes U.S.-born and immigrants who arrived in the country before age 17.

The minimum school leaving age data come from various years of the National Center for Education Statistic's (NCES's) Education Digest. Individuals in the CPS were matched according to the minimum school leaving age they would have faced at age 16, and assume that an individual's high school state was the same as her current state of residence. The CPS does not record state of birth. Individuals in the ACS were matched according to their state of birth, or according to state of residence in the case of immigrants.

Much of the main analysis in this paper uses the data collapsed into cell means, aggregated by survey year, birth cohort, state of residence, gender, and race. All regressions and tabulations use either non-institutional population weights (weight) or

‘working weights’, which reflect the population of individuals working at least 25 hours per week.

References

Acemoglu, Daren and Joshua Angrist. "How Large Are Human Capital Externalities? Evidence from Compulsory Schooling Laws," NBER Macroannual, 2001, pp. 9-59.

Angrist, Joshua D., and Alan Krueger. "Does Compulsory School Attendance Affect Schooling and Earnings?" Quarterly Journal of Economics, Vol. 106, No. 4, pp. 979, 1014, 1991.

Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes, "Fast Times at Ridgemont High? The Effect of Compulsory Schooling Laws on Teenage Births, " NBER Working Paper #10911, November 2004.

Burke, Molly, "Sanctions on Driving Privileges," StateNotes: Accountability/Sanctions, Education Commission of the States, March 2005.

Dee, Thomas. "Are There Civic Returns to Education?", Journal of Public Economics 88 (9), August 2004, pages 1697-1720.

Gato, John Taylor, "Dumbing Us Down: The Hidden Curriculum of Compulsory Schooling," New Society Publishers, 2005.

Harmon, Colm, and Ian Walker. "Estimates of the Economic Return to Schooling for the United Kingdom," American Economic Review, December 1995, pp. 1278-86.

Kansas State Department of Education, "Compulsory Attendance Requirements for a child 16 or 17 years of age," memo to Superintendents, High School Principals and Counselors, from Dal M. Dennis, Deputy Commissioner of Education, and Veryl D. Peter, Director, School Finance, March 2, 2005.

Katz, M. S., "Compulsion and the Discourse of Compulsory School Attendance," Educational Theory, vol. 27, no. 3, 1977 pp. 179-85.

Kelly (2006) "Educational Neglect & Compulsory Schooling in Idaho: 13,954 Reasons to Take Action 2004 – 2005," Center for School Improvement and Policy Studies, Boise State University working paper.

Krashinsky, Harry, "How Would One Extra Year of High School Affect Academic Performance in University? Evidence from a Unique Policy Change," mimeo, 2006.

Laibson, David. "Golden Eggs and Hyperbolic Discounting," Quarterly Journal of Economics, Vol. 112(2), 1997, pp. 443-77.

Lleras-Muney, Adriana. "The Relationship Between Education and Adult Mortality in the United States," Review of Economic Studies, Vol. 72, No. 1, 2005, pp. 189-221.

Lochner, Lance, and Enrico Moretti. “The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports,” American Economic Review, Vol. 94(1), 2004, pp. 155-89.

Milligan, Kevin, Enrico Moretti, and Philip Oreopoulos, “Does Education Improve Citizenship? Evidence from the U.S. and the U.K.” Journal of Public Economics**,** Vol. 88, No. 9-10, p. 1667 – 1695.

Moretti, Enrico. “Estimating the Social Return to Higher Education: Evidence From Longitudinal and Repeated Cross-Sectional Data,” Journal of Econometrics 121(1-2), 2004, pp. 175-212.

National Center for Education Statistics, “The Condition of Education,” 2003, available at: http://nces.ed.gov/

Oreopoulos, Philip. “Do Dropouts Drop Out Too Soon? Wealth, Health, and Happiness from Compulsory Schooling,” Journal of Public Economics, forthcoming, 2007..

Palmisano, Alisa, and Kim Potts, “Teaching to empty desks: The effects of truancy in Tennessee schools,” report from the Tennessee Office of Education Accountability, January 2004.

Spear, L.P. “The adolescent brain and age-related behavioral manifestations,” Neuroscience and Biobehavioral Reviews, 24 (2000), pp. 417-463.

Figure 1A
States with Minimum School Leaving Age Greater than 16
At Least Once Between 1970 – 2003

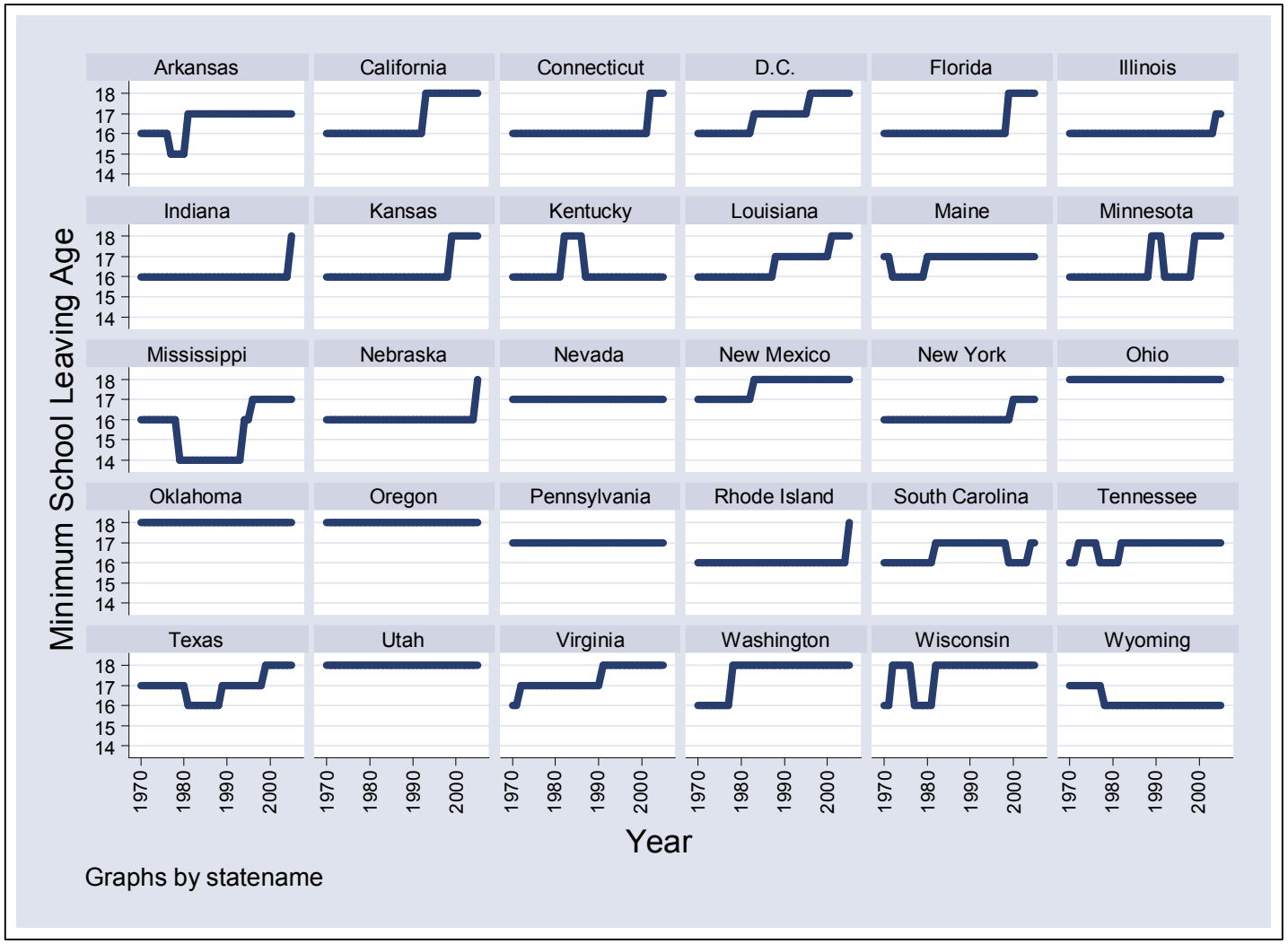


Figure 1B
States with Minimum School Leaving Age 16 or Less
1970 – 2003

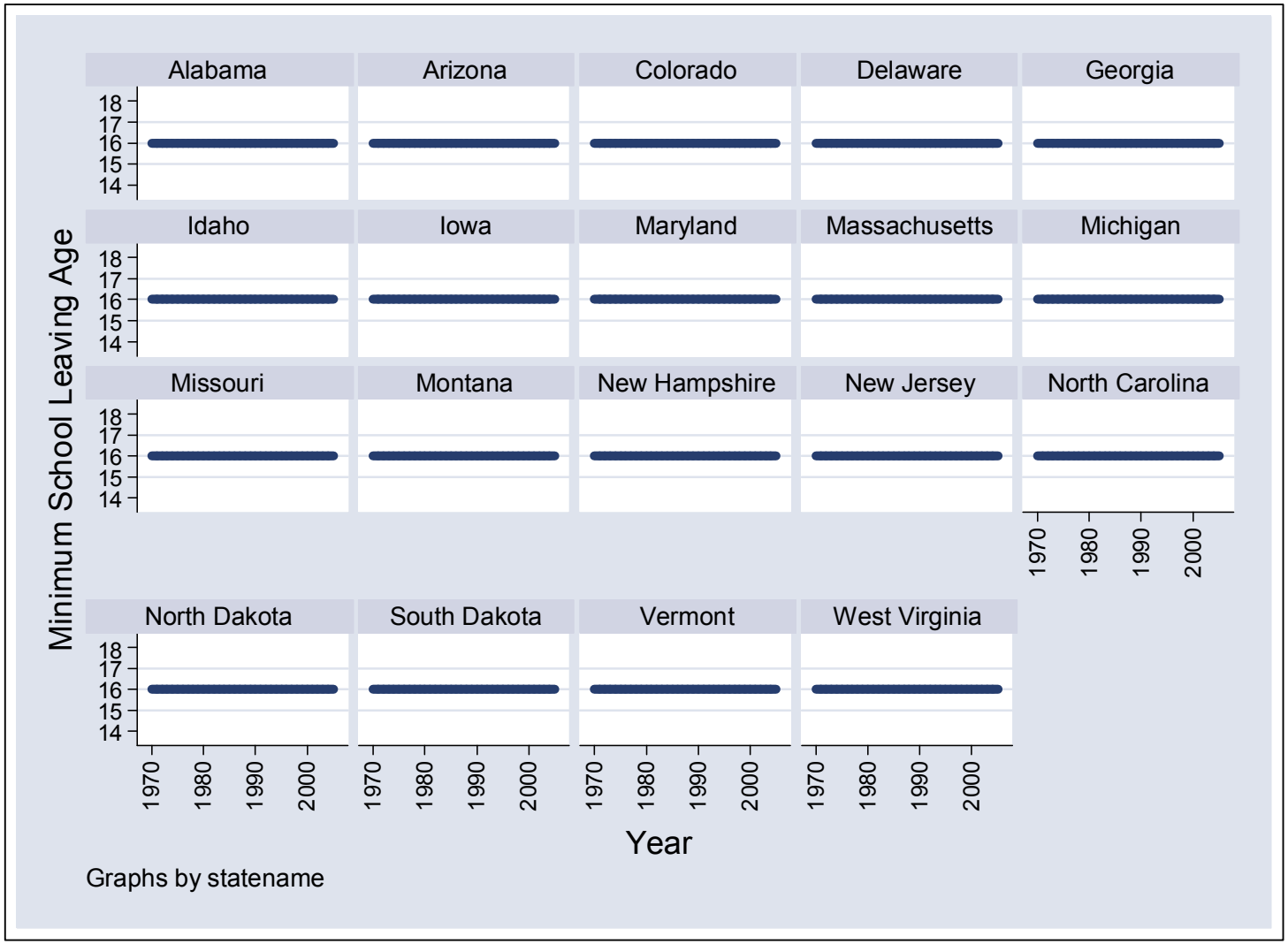
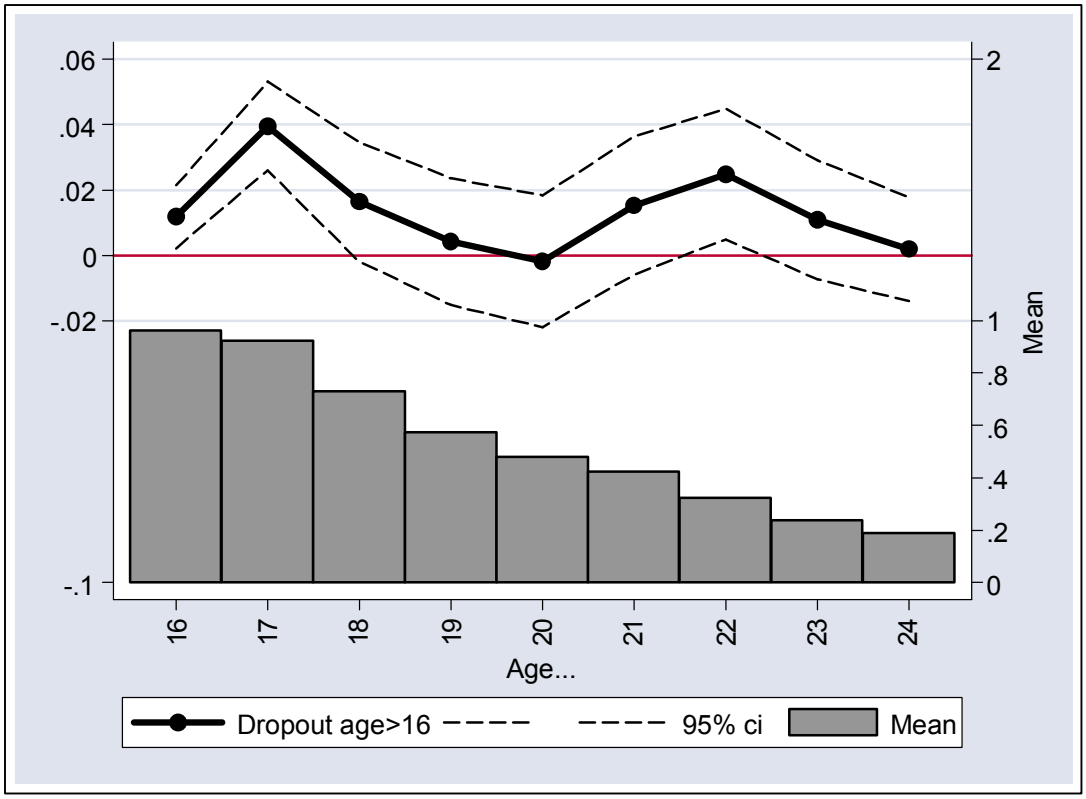
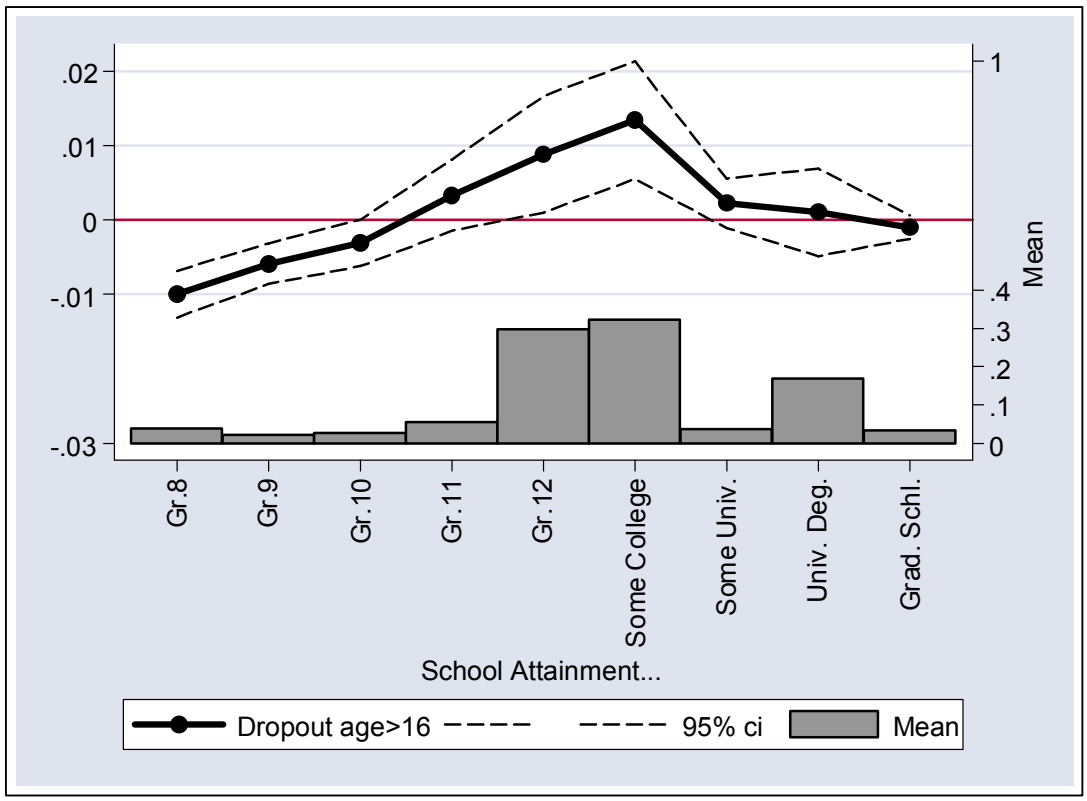


Figure 2
Estimated Effects of Minimum School Leaving Age Above 16 on School Enrollment
2000 to 2003 Current Population Surveys, Excluding June, July, and August



Note: Each black dot on top half of the figure represents a separate regression by age category. An indicator variable for whether in school was regressed on whether an individual faced a dropout age above 16 in their state of residence when they were 16 years-old, plus 9 region fixed effects. The estimated coefficients for the effects of facing a higher dropout age are reported here for each age group. The dotted lines outline the 95 percent confidence interval. The bars in the bottom half of the figure indicate the fraction of sample in each age group in school.

Figure 2
Estimated Effects of Minimum School Leaving Age Above 16 on Grade Attainment
2000 to 2003 Current Population Surveys, 20 to 24 Years-Olds



Note: An indicator variable for the school attainment indicated along the x-axis was regressed on whether an individual 20 to 24 years-old in the 2000 to 2003 CPS faced a dropout age above 16 in their state of residence when they were 16, plus 9 region fixed effects. The estimated coefficients for the effects of facing a higher dropout age are reported here for school attainment level. The dotted lines outline the 95 percent confidence interval. The bars in the bottom half of the figure indicate the fraction of sample in each education level.

Table 1
2005 Compulsory School Law Legislation
for States with Minimum School Leaving Ages Greater Than 16

State	School Leaving Age	Punishment for Habitual Truancy	Major Exemptions
Arkansas	17	up to $500 (for parent)	16+ and in adult ed. 10 hrs a week
California	18	community service (for student and/or parent) juvenile dilinquent school (student) parent education, $1,000 fine	work permit
Connetictut	18	social and rehabilitation service (parent and/or child)	16+ and parent's consent or work permit
District of Columbi	18	parent subject to community service, fine or imprisonment	17+, part-time school if working
Illinois	17	community service (for child) graduation incentives program misdemeanor (parents and/or child)	workiing
Indianna	18	ineligible for driver's license misdemeanor (parents and/or child)	16+ and student, parent, and principal agree to withdrawl
Kansas	18	social and rehabilitation service (parent and/or child)	parent consent and signing of disclaimer that child lacks skills and earnings will be lower
Louisiana	18	up to $250, or 30 days imprisonment	17+ and parent consent
Maine	17	none mentioned	15+, parent consent, part-time school, and working
Minnesota	18	misdemeanor (parents and/or child)	16+ and parental consent
Mississipi	17	misdemeanor (parent), foster care (child)	none
Nebraska	18	misdemeanor (parents and/or child)	16+ and parent consent or need to work
Nevada	17	advisory board meeting misdemeanor (parent), foster care (child)	distant from school or need to work or 14+ and working
New Mexico	18	ineligible for driver's license social and rehabilitation service (child) misdemeanor (parent)	17+ and working
New York	17	fine or imprisonment	16+ and working
Ohio	18	misdemeanor (parents and/or child)	work permit
Oaklahoma	18	misdemeanor (parents and/or child)	16+, principal and parent consent
Oregon	18	notice to parent	16+, parent consent, and working
Pennsylvania	17	misdemeanor (parents and/or child)	none
Rhode Island	18	fine or imprisonment	16+ and parent consent
South Carolina	17	fine or imprisonment	need to work
Tennessee	17	misdemeanor (parents and/or child) truency school	none
Texas	18	misdemeanor (parents and/or child) truency school	none
Utah	18	misdemeanor (parents and/or child) truency school	16+ and working
Virginia	18	misdemeanor (parents and/or child)	parent consent
Wahsington	18	misdemeanor (parents and/or child) social and rehabilitation service (parent and/or child)	16+ and working
Wisconsin	18	fine or imprisonment	none

Table 2
School Attainment by School Leaving Age Faced at Age 16
2000 - 2005

	School Leaving Age Faced at Age 16		
	16	17	18
Fraction of 16 Year Olds In School During School Year	96.6	96.3	97.1
Fraction of 17 Year Olds In School During School Year	92.3	92.4	93.9
Fraction of 18 Year Olds In School During School Year	75.4	75.2	74.8
Fraction of 20-24 Year Olds with High School Degree or some Post-secondary	88.9	87.2	89.6
Fraction of 20-24 Year Olds with Some PS	54.7	52.6	55.4

Notes: Data are from the NBER's extracts of the Merged Outgoing Rotation Files of the Current Population Survey. The years included for this table are for 2000 to 2005. The "In School" variable is equal to one if individual is coded as being enrolled part-time or full-time in school the week of the survey.

Table 3A
The Effects of Recent Compulsory Schooling Laws on School Attainment
Ages 20-29
Year at Age 16 between 1970 to 2001
Current Population Survey Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Regression Coefficient (standard error in parethesis)			
Dependent Variable:	Mean [std. dev.]	Dummy for Faced Dropout Age > 16 at Age 16			Dropout Age Faced at Age 16		
Years of Schooling	13.0 [2.4]	0.128 [0.0197]***	0.124 [0.0198]***	0.109 [0.0276]***	0.065 [0.0093]***	0.072 [0.0130]***	0.066 [0.0158]***
Never Completed High School	0.134 [0.340]	-0.017 [0.0029]***	-0.013 [0.0027]***	-0.018 [0.0038]***	-0.015 [0.0012]***	-0.006 [0.0018]***	-0.011 [0.0022]***
Some College	0.489 [0.500]	0.009 [0.0033]***	0.015 [0.0035]***	0.019 [0.0047]***	-0.004 [0.0019]**	0.007 [0.0022]***	0.011 [0.0027]***
Cell Size Observations		44946	44946	44946	44946	44946	44946
Region Fixed Effects		Yes	No	No	Yes	No	No
State Fixed Effects		No	Yes	Yes	No	Yes	Yes
Cohort Fixed Effects		Yes	Yes	No	Yes	Yes	No
Survey Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Cohort*State Linear Trend		No	No	Yes	No	No	Yes

Notes: Data are from the NBER's extracts of the 1979 - 2005 Merged Outgoing Rotation Files of the Current Population Survey and collapsed into cell means by year of birth, state of residence, age, race, and gender (regressions are weighted by cell population size).. All regressions include year of birth fixed effects, and region or state fixed effects where indicated. The sample includes 20 - 29 year olds who were aged 16 between 1970 and 2001. Standard errors are clustered by state and year of birth.

Table 3B
The Effects of Recent Compulsory Schooling Laws on School Attainment
Ages 20-29
Year at Age 16 between 1987 to 2001
American Community Survey Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Regression Coefficient (standard error in parethesis)					
Dependent Variable:	Mean [std. dev.]	Dummy for Faced Dropout Age > 16 at Age 16			Dropout Age Faced at Age 16		
Years of Schooling	13.4 [2.4]	0.09 [0.0240]***	0.0878 [0.0341]**	0.0045 [0.0504]	0.0548 [0.0105]***	0.0651 [0.0142]***	0.0234 [0.0215]
Never Completed High School	0.123 [0.329]	-0.0117 [0.0038]***	-0.0124 [0.0043]***	0.0002 [0.0042]	-0.0146 [0.0013]***	-0.0078 [0.0019]***	-0.0028 [0.0021]
Some College	0.576 [0.494]	0.0105 [0.0039]***	0.0014 [0.0049]	-0.0031 [0.0067]	0.0016 [0.0022]	0.003 [0.0021]	0.0027 [0.0027]
Cell Size Observations		64948	64948	64948	64948	64948	64948
Region Fixed Effects		Yes	No	No	Yes	No	No
State Fixed Effects		No	Yes	Yes	No	Yes	Yes
Cohort Fixed Effects		Yes	Yes	No	Yes	Yes	No
Survey Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Cohort*State Linear Trend		No	No	Yes	No	No	Yes

Notes: Data are from the 2000 - 2005 American Community Surveys and collapsed into cell means by year of birth, state of residence, age, race, and gender (regressions are weighted by cell population size).. All regressions include year of birth fixed effects, and region or state fixed effects where indicated. The sample includes 20 - 29 year olds who were aged 16 between 1987 and 2001. Standard errors are clustered by state and year of birth.

Table 4
Differences in Compulsory Schooling Law Effects on Total Years of Schooling Completed by Exceptions to Law and Time

Data: Current Population Surveys				
	Differences by States with Law Exemptions and Small Punishments			
Dropout Age Above 16	0.1239 [0.0198]***	0.0841 [0.0207]***	0.1323 [0.0208]***	0.0841 [0.0207]***
Can Leave Earlier with Parental Consent or Work Permit		0.0796 [0.0380]**		0.1037 [0.0403]**
Misdemeanor or No Punishment			-0.126 [0.0499]**	-0.1785 [0.0570]***
Cell Size Observations	44946	44946	44946	44946
Data: American Community Surveys				
	Differences by States with Law Exemptions and Small Punishments			
Dropout Age Above 16	0.0878 [0.0341]**	0.0455 [0.0664]	0.0897 [0.0347]***	0.045 [0.0665]
Can Leave Earlier with Parental Consent or Work Permit		0.0565 [0.0787]		0.0602 [0.0793]
Misdemeanor or No Punishment			-0.1021 [0.0664]	-0.1197 [0.0686]*
Cell Size Observations	64948	64948	64948	64948

Notes: Data are from the 1979 - 2005 Merged Outgoing Rotation Files of the Current Population Survey and the 2000 - 2005 American Community Surveys. Data are collapsed into cell means by year of birth, state of residence, age, race, and gender (regressions are weighted by cell population size). All regressions include year of birth and state fixed effects (state of residence for CPS and state of birth for ACS). The sample includes 20 - 29 year olds who were aged 16 between 1970 and 2001 in the CPS and between 1987 and 2001 in the ACS. Standard errors are clustered by state and year of birth.

Table 5A
Reduced Form and IV Regressions of Labor Market Outcomes and Compulsory Schooling
Ages 20-29, Year at Age 16 between 1970 and 2001
Current Population Survey Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Reduced Form Coefficient					
Dependent Variable	**Mean: Full Sample [std. dev.]**	**Dummy for Faced Dropout Age > 16 at Age 16**			**Dropout Age Faced at Age 16**		
Unemployed	0.066	-0.0028	-0.0045	-0.0069	-0.0014	-0.0018	-0.0038
	[0.249]	[0.0010]***	[0.0012]***	[0.0013]***	[0.0005]***	[0.0007]**	[0.0008]***
Not Working	0.199	-0.0159	-0.0063	-0.0032	-0.0078	-0.0027	-0.0004
	[0.400]	[0.0020]***	[0.0023]***	[0.0030]	[0.0010]***	[0.0014]*	[0.0017]
Log Weekly Earnings for	9.7	0.0093	0.0133	0.0235	0.0108	0.0039	0.0128
those working >25 hrs / week	[0.583]	[0.0052]*	[0.0065]**	[0.0060]***	[0.0046]**	[0.0039]	[0.0034]***
		Total Years of Schooling Coefficient, Instrumented by Compulsory Schooling Law					
Dependent Variable	**Mean: Dropout Sample [std. dev.]**	**Instrument: Dropout Age > 16 at Age 16**			**Instrument: Dropout Age Faced at Age 16**		
Unemployed	0.117	-0.0222	-0.036	-0.0631	-0.0219	-0.0252	-0.0583
	[0.322]	[0.0083]***	[0.0103]***	[0.0173]***	[0.0074]***	[0.0100]**	[0.0163]***
Not Working	0.329	-0.1246	-0.0507	-0.0289	-0.1217	-0.0372	-0.0057
	[0.470]	[0.0228]***	[0.0189]***	[0.0262]	[0.0215]***	[0.0198]*	[0.0256]
Log Weekly Earnings for	9.4	0.0722	0.1077	0.2152	0.1114	0.0547	0.1959
those working >25 hrs / week	[0.525]	[0.0391]*	[0.0551]*	[0.0708]***	[0.0427]***	[0.0547]	[0.0633]***
Cell Size Observations		44946	44946	44946	44946	44946	44946
Region Fixed Effects		Yes	No	No	Yes	No	No
State Fixed Effects		No	Yes	Yes	No	Yes	Yes
Cohort Fixed Effects		Yes	Yes	No	Yes	Yes	No
Survey Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Cohort*State Linear Trend		No	No	Yes	No	No	Yes

Notes: The top panel shows reduced form results from regressing total years of schooling on the dropout age faced at age 16. Data are from the 1979 - 2005 Merged Outgoing Rotation Files of the Current Population Survey and collapsed into cell means by year of birth, state of residence, age, race, and gender (regressions are weighted by cell population size). All regressions include year of birth fixed effects, and region or state fixed effects where indicated. The sample includes 20 - 29 year olds who were aged 16 between 1970 and 2001. Standard errors are clustered by state and year of birth.

Table 5B
Reduced Form and IV Regressions of Labor Market Outcomes and Compulsory Schooling
Ages 20-29, Year at Age 16 between 1987 and 2001
American Community Survey Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Reduced Form Coefficient			
Dependent Variable	**Mean: Full Sample [std. dev.]**	**Dummy for Faced Dropout Age > 16 at Age 16**			**Dropout Age Faced at Age 16**		
Unemployed	0.094	-0.0050	-0.0052	-0.0051	-0.0064	-0.0015	-0.0019
	[0.292]	[0.0021]**	[0.0027]*	[0.0038]	[0.0008]***	[0.0015]	[0.0023]
Not Working	0.265	-0.0068	-0.0102	0.0003	-0.0088	-0.0049	0.0003
	[0.441]	[0.0034]**	[0.0048]**	[0.0073]	[0.0014]***	[0.0019]**	[0.0036]
Log Weekly Earnings for	9.892	0.0069	-0.0072	0.0159	0.0016	0.0053	0.0005
those working >25 hrs / week	[0.76]	[0.0062]	[0.0122]	[0.0282]	[0.0029]	[0.0044]	[0.0132]
Log Family Income	10.541	0.0006	0.0373	0.0029	-0.0025	0.0201	0.0068
	[1.04]	[0.0092]	[0.0106]***	[0.0148]	[0.0046]	[0.0054]***	[0.0085]
In 'low skilled job' for	0.284	-0.0056	-0.0145	0.0046	-0.0004	-0.0102	0.0017
those working >25 hrs / week	[0.451]	[0.0025]**	[0.0049]***	[0.0085]	[0.0014]	[0.0023]***	[0.0042]
Below Poverty Line	0.153	-0.0029	-0.0071	-0.0002	-0.0044	-0.0037	-0.0013
	[0.360]	[0.0025]	[0.0033]**	[0.0046]	[0.0011]***	[0.0015]**	[0.0019]
On Welfare	0.020	-0.0013	-0.0049	0.0000	-0.0003	-0.0023	-0.0017
	[0.139]	[0.0009]	[0.0013]***	[0.0016]	[0.0004]	[0.0007]***	[0.0008]**
		Total Years of Schooling Coefficient, Instrumented by Compulsory Schooling Law					
Dependent Variable	**Mean: Dropout Sample [std. dev.]**	**Instrument: Dropout Age Faced at Age 16**			**Instrument: Dropout Age > 16 at Age 16**		
Unemployed	0.218	-0.0522	-0.0541	-3.5366	-0.1196	-0.0218	-0.0809
	[0.413]	[0.0194]***	[0.0267]**	[127.8186]	[0.0254]***	[0.0219]	[0.0883]
Not Working	0.446	-0.0754	-0.1167	0.0699	-0.1601	-0.075	0.014
	[0.497]	[0.0320]**	[0.0901]	[0.0445]	[0.0351]***	[0.0395]*	[0.1615]
Log Weekly Earnings for	9.687	0.1205	-0.3066	-0.0269	0.0719	0.1573	0.0131
those working >25 hrs / week	[0.70]	[0.0932]	[0.8596]	[1.0599]	[0.1190]	[0.1074]	[1.6746]
Log Family Income	10.201	0.0063	0.4185	-0.0683	-0.0436	0.3069	0.2838
	[1.07]	[0.1015]	[0.1580]***	[1.2696]	[0.0846]	[0.0918]***	[0.5434]
In 'low skilled job' for	0.524	-0.0983	-0.6311	-0.1536	-0.0172	-0.3058	-0.2295
those working >25 hrs / week	[0.499]	[0.0393]**	[0.7139]	[0.1840]	[0.0592]	[0.0918]***	[0.5245]
Below Poverty Line	0.284	-0.0321	-0.0806	-0.048	-0.0799	-0.0563	-0.0572
	[0.451]	[0.0242]	[0.0321]**	[0.0344]	[0.0193]***	[0.0218]***	[0.0758]
On Welfare	0.054	-0.0142	-0.0554	0.0094	-0.0053	-0.0357	-0.072
	[0.226]	[0.0088]	[0.0204]***	[0.0146]	[0.0070]	[0.0111]***	[0.0817]
Cell Size Observations		64948	64948	64948	64948	64948	64948
Region Fixed Effects		Yes	No	No	Yes	No	No
State Fixed Effects		No	Yes	Yes	No	Yes	Yes
Cohort Fixed Effects		Yes	Yes	No	Yes	Yes	No
Survey Year Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes
Cohort*State Linear Trend		No	No	Yes	No	No	Yes

Notes: The top panel shows reduced form results from regressing total years of schooling on the dropout age faced at age 16. Data are from the 2000 - 2005 American Community Surveys and collapsed into cell means by year of birth, state of residence, age, race, and gender (regressions are weighted by cell population size). All regressions include year of birth fixed effects, and region or state fixed effects where indicated. The sample includes 20 - 29 year olds who were aged 16 between 1987 and 2001. Standard errors are clustered by state and year of birth

Table A1
Compulsory Schooling Effects by Sex and Race

	(1)	(2)	(3)	(4)	(5)	(6)
	Effect of Facing Dropout Age > 16 on Total Years of Schooling					
Dependent Variable:	**Full Sample**	**Males**	**Females**	**Non-Blacks/Hispanics**	**Blacks**	**Hispanics**
Total Years of Schooling (CPS Data)	0.1239 [0.0198]***	0.1299 [0.0234]***	0.1201 [0.0228]***	0.0201 [0.0135]	-0.0045 [0.0240]	0.3426 [0.0893]***
Total Years of Schooling (ACS Data)	0.0878 [0.0341]**	0.078 [0.0402]*	0.0925 [0.0411]**	0.0334 [0.0240]	0.0125 [0.0425]	0.1934 [0.0664]***
	Estimated Effect of Year of Schooling on Labor Market Outcomes					
Dependent Variable:	**Full Sample**	**Males**	**Females**	**Non-Blacks**	**Blacks**	**Hispanics**
Unemployed (CPS Data)	-0.036 [0.0103]***	-0.0337 [0.0140]**	-0.0392 [0.0127]***	-0.1655 [0.1226]	0.288 [1.8791]	-0.0051 [0.0066]
Not Working (CPS Data)	-0.0507 [0.0189]***	-0.0059 [0.0189]	-0.0897 [0.0270]***	-0.1974 [0.1904]	0.6941 [4.1150]	0.0043 [0.0141]
Log Weekly Earnings for those working >25 hrs / week (CPS Data)	0.1077 [0.0551]*	0.1265 [0.0586]**	0.0819 [0.0583]	1.1213 [2.3969]	2.8053 [11.1700]	0.0681 [0.0311]**
Unemployed (ACS Data)	-0.0541 [0.0267]**	-0.0469 [0.0420]	-0.0625 [0.0442]	-0.1079 [0.1472]	-0.1837 [0.2273]	-0.0378 [0.0281]
Not Working (ACS Data)	-0.1167 [0.0901]	-0.087 [0.0782]	-0.1305 [0.1155]	0.6109 [0.4666]	0.1722 [1.0567]	0.0103 [0.0411]
Log Weekly Earnings for those working >25 hrs / week	-0.3066 [0.8596]	-0.304 [0.9293]	-0.3509 [0.9054]	-0.4771 [0.3597]	0.5451 [1.8557]	-0.3051 [0.2263]
Log Family Income (ACS Data)	0.4185 [0.1580]***	0.4528 [0.2552]*	0.4242 [0.1796]**	0.3368 [0.5463]	2.2126 [4.5061]	0.1981 [0.0981]**
In 'low skilled job' for those working >25 hrs / week	-0.6311 [0.7139]	-1.0171 [1.8516]	-0.3923 [0.3705]	-0.6056 [0.4220]	0.5514 [2.1140]	-0.1427 [0.0663]**
Below Poverty Line (ACS Data)	-0.0806 [0.0321]**	-0.068 [0.0490]	-0.1041 [0.0468]**	-0.0713 [0.1299]	-0.3011 [1.0800]	-0.0184 [0.0346]
On Welfare (ACS Data)	-0.0554 [0.0204]***	-0.0092 [0.0104]	-0.1042 [0.0415]**	-0.0986 [0.1213]	-0.1098 [0.4745]	-0.0325 [0.0162]**

Notes: The top panel shows 'First Stage' results form regressing total years of schooling on the dropout age faced at age 16. Data are from the 2000 - 2005 American Community Surveys and collapsed into cell means by year of birth, state of residence, age, race, hispanic status, and gender (regressions are weighted by cell population size). All regressions include year of birth fixed effects and state fixed effects. Standard errors are clustered by state and year of birth. The second panel shows instrumental variable estimates of labor market outcomes regressed on total years of schooling, with schooling instrumented by the dropout age faced at age 16.

Table A2
Sensitivity Analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	Effect of Facing Dropout Age > 16 on Total Years of Schooling					
Dependent Variable:						
Total Years of Schooling (CPS Data)	0.1239 [0.0198]***	0.1221 [0.0202]***	0.1203 [0.0162]***	0.1157 [0.0205]***	0.1995 [0.0382]***	0.129051 [0.020]***
Cell Size Observations	44946	23309	75239	25084	21578	44946
Total Years of Schooling (ACS Data)	0.0878 [0.0341]**	0.0906 [0.0359]**	0.0717 [0.0229]***	NA	NA	0.0863 [0.0337]**
Cell Size Observations	64948	10290	131,167	NA	NA	64948
	Estimated Effect of Year of Schooling on Labor Market Outcomes					
Dependent Variable:						
Unemployed (CPS Data)	-0.036 [0.0103]***	-0.0297 [0.0126]**	-0.026 [0.0063]***	-0.0944 [0.0191]***	-0.0183 [0.0110]*	-0.0345 [0.0101]***
Not Working (CPS Data)	-0.0507 [0.0189]***	-0.0236 [0.0185]	-0.0447 [0.0143]***	-0.0747 [0.0217]***	-0.0159 [0.0265]	-0.0522 [0.0189]***
Log Weekly Earnings for those working >25 hrs / week (CPS Data)	0.1077 [0.0551]*	0.0847 [0.0568]	0.1452 [0.0468]***	0.1659 [0.0640]***	0.1277 [0.0603]**	0.1121 [0.0550]**
Unemployed (ACS Data)	-0.0541 [0.0267]**	-0.0701 [0.0333]**	-0.0219 [0.0264]	NA	NA	-0.0555 [0.0269]**
Not Working (ACS Data)	-0.1167 [0.0901]	-0.0634 [0.0907]	-0.1322 [0.0757]*	NA	NA	0.1151 [0.0897]
Log Weekly Earnings for those working >25 hrs / week	-0.3066 [0.8596]	-0.0225 [0.6498]	-27.3351 [1,567.6844]	NA	NA	-0.2876 [0.7670]
Log Family Income (ACS Data)	0.4185 [0.1580]***	0.4552 [0.1759]***	0.3521 [0.1286]***	NA	NA	0.4097 [0.1568]***
In 'low skilled job' for those working >25 hrs / week	-0.6311 [0.7139]	-0.534 [0.7187]	8.6247 [130.0150]	NA	NA	-0.5497 [0.5595]
Below Poverty Line (ACS Data)	-0.0806 [0.0321]**	-0.0981 [0.0382]**	-0.0671 [0.0280]**	NA	NA	-0.082 [0.0324]**
On Welfare (ACS Data)	-0.0554 [0.0204]***	-0.0563 [0.0217]***	-0.0493 [0.0160]***	NA	NA	-0.0533 [0.0200]***
Age	20-29	20-24	20-39	20-29	20-29	20-29
Years at Age 16	1970 - 2000	1970 - 2000	1970 - 2000	1970 - 1985	1985 - 2000	1985 - 2000
Cluster Group	State / Cohort	State / Cohort	State / Cohort	State / Cohort	State / Cohort	State / Cohort
Ignore Transient Law Changes?	No	No	No	No	No	Yes

Notes: The top panel shows 'First Stage' results form regressing total years of schooling on the dropout age faced at age 16. Data are from the 1979 - 2005 CPS and 2000 - 2005 ACS and collapsed into cell means by year of birth, state of residence, age, race, and gender (regressions are weighted by cell population size). All regressions include year of birth fixed effects and state fixed effects. The second panel shows instrumental variable estimates of labor market outcomes regressed on total years of schooling, with schooling instrumented by the dropout age faced at age 16. The bottom of the table indicates the variation of the sample and standard error cluster group used.