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

Philip Oreopoulos

3.1 Introduction

High school dropout rates have changed little over the last thirty years. In the early 1970s, 17 percent of U.S. youths aged eighteen to twenty-four and not in high school had not completed their degree. This figure (from the National Center for Education Statistics [NCES 2003]) fell slowly to 14 percent by 1990, and has since leveled off. Dropout rates are higher among blacks and substantially higher among hispanics. Noncompletion is also related to family income. During the twelve months ending in October 2001, high school students living in low-income families dropped out of school at six times the rate of their peers from high-income families (NCES 2005).

Policymakers and administrators often grapple with finding ways to reduce the number of dropouts. Some consider lowering class size, others consider making the curriculum easier, or targeting students at risk earlier. An additional possibility, also considered recently by several states, is to raise 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 leave. Laws that determine this age have been around for many decades, in some cases more than one hundred years, and have been updated periodically.

Some of the best evidence suggesting that high school dropouts gain, on average, from staying on comes from historical changes in compulsory

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school laws. Previous studies have consistently shown that individuals compelled to stay in school also experience large gains to social-economic outcomes. For the United States, Angrist and Krueger (1991) and Acemoglu and Angrist (2001) estimated (using very different methodologies) that annual adult earnings are about 10 percent higher for students compelled to stay a year longer in school. For the United Kingdom, Harmon and Walker (1995) found about 14 percent higher earnings from school compulsion. And for Canada, I found similar gains using provincial law changes between 1915 and 1970 for would-be dropouts compelled to stay in school. Other studies have found that additional high school lowers the likelihood of committing crime (Lochner and Moretti 2004), of dying young (Lleras-Muney 2005), and lowers the chances of teen pregnancy (Black, Devereux, and Salvanes 2004).

These earlier reports, however, examine effects from raising the minimum school leaving age to fourteen, fifteen, or sixteen many decades ago, often before the 1950s. The circumstances behind dropout decisions back then were quite different than the circumstances behind dropout decisions today. The demand for skilled workers has increased, and the gains from additional education attainment may also have increased. On the other hand, more students today graduate from high school and obtain post-secondary education. Today's dropouts come from relatively poorer families. From the 2000 census, 73 percent of dropouts under twenty and living at home have parents with household income below the twenty-fifth percentile, compared to 55 percent of dropouts from the 1960 census. It is not clear whether compelling these individuals to remain in school beyond sixteen would generate the same effects found in earlier studies.

Many states have discussed raising the school leaving age to seventeen or eighteen, almost making high school completion compulsory. In fact, twenty-nine states have already increased the minimum school leaving age above sixteen, although often with exceptions.

This chapter uses these recent changes to the school leaving age to explore the potential for compulsory schooling to serve as an effective policy from improving current social-economic outcomes, especially for today's disadvantaged youths. The purpose is to present new evidence and discussion for considering whether to support such policies. Support for or against compulsory school laws often is presented without theoretical or empirical foundation. And past studies only indicate compulsory school laws appear to have been effective in generating adult gains for would-be dropouts many decades ago.

The first part of the chapter focuses on whether these recent changes and experiences had any impact on increasing school enrollment and attainment. Section 3.2 describes the recent law changes in the United States. In section 3.3, I estimate whether changes to the school leaving age above sixteen made some students drop out later, graduate, and even decide to enroll in college.

As the reader will see following, many of the law changes included exceptions, were poorly enforced, or had little punishment for noncompliance. The recent increases in the school leaving age had only a small, but still significant, impact on increasing school completion rates, as well as college attendance.

The second part of the chapter estimates the subsequent impact on earnings and on other labor market outcomes for the small fraction affected by these laws. I discuss in section 3.4 the methodology for estimating these effects. Section 3.5 presents the results. Notably, the results reveal very similar findings to the more historic studies. I estimate individuals compelled to stay in school beyond the age of sixteen experience significantly higher earnings and higher opportunities for employment in their early careers.

Finally, I conclude in section 3.6. Taken together with the consistent previous evidence, the overall results suggest raising the school leaving age above sixteen offers significant gains to earnings and employment outcomes, on average, to students that otherwise would have left sooner. One recommendation is that, if states are serious about lowering dropout rates through compulsory schooling, they need to better enforce these laws and promote their potential benefits to administrators, parents, and students. While allowing exceptions are probably necessary, greater initial enforcement may help establish an acceptance from youth to stay in school. Students may also find it easier to accept staying if schools also offer more curriculum choice (offering more trait-based training, for example), as some governments have already done. Ideally, compulsory school laws work through threat of enforcement rather than through actual enforcement.

3.2 Recent Changes to Compulsory Schooling Laws in the United States

Many states in the United States have a minimum school leaving age of seventeen or eighteen. The annual National Center for Education Statistics' (NCES') Education Digest lists these laws. Figure 3.1 shows the minimum school leaving age between 1970 and 2005 for states with a minimum school leaving age set above sixteen at least once during this period (and for the District of Columbia). Figure 3.2 shows the other states.[1] Several, like Rhode Island, Florida, and Nebraska, upgraded their compulsory school laws only in the last few years. Others like Oklahoma, Oregon, and Utah, however, have had a minimum leaving age set above sixteen for more than two decades. Figure 3.3 shows the estimated effects of minimum school leaving age above sixteen on school enrollment in the 2000 to 2003 Current Population Surveys (excluding June, July, and August). Figure 3.4 shows the estimated effects of

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

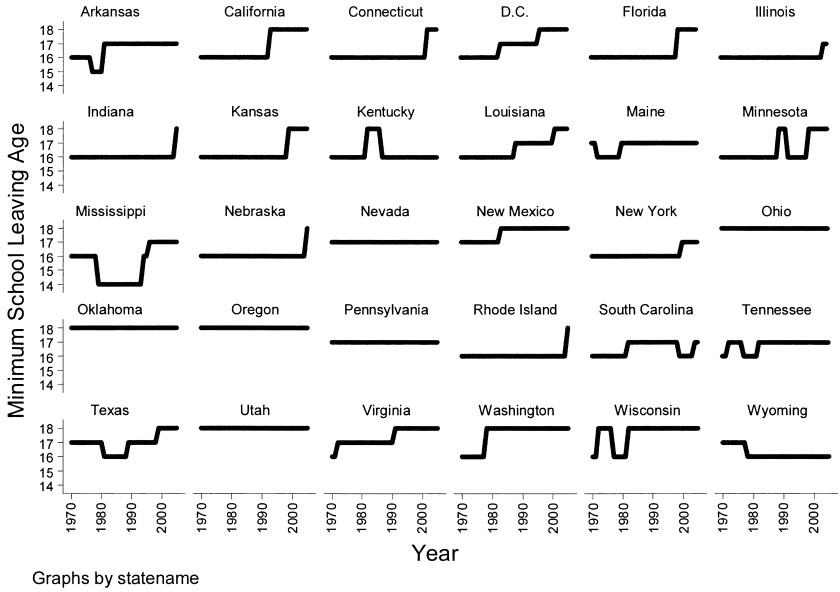

Fig. 3.1 States with minimum school leaving age greater than sixteen, at least once between 1970–2003

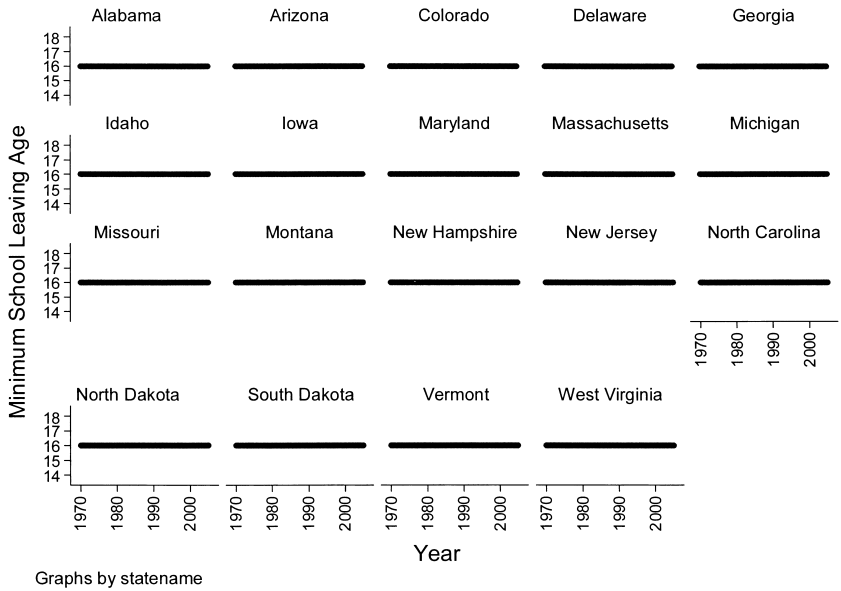

Fig. 3.2 States with minimum school leaving age sixteen or less, 1970–2003

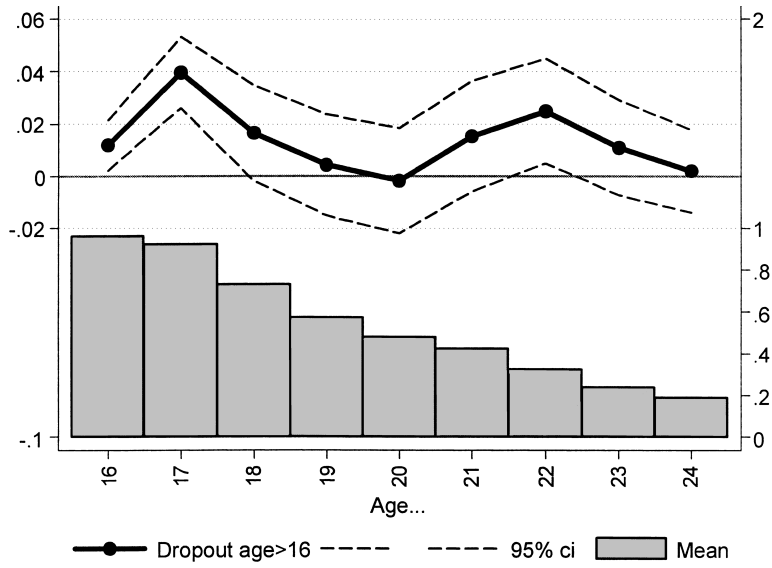

Fig. 3.3 Estimated effects of minimum school leaving age above sixteen on school enrollment 2000 to 2003 current population surveys, excluding June, July, and August

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 sixteen in their state of residence when they were sixteen years old, plus nine 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.

minimum school leaving age above sixteen on grade attainment in the 2000 to 2003 Current Population Surveys (twenty- to twenty-four-year-olds).

The strange pattern from a few states raising then lowering the leaving age hints that more is going on. A closer look at the legislation reveals that there is much more to compulsory school laws than 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 noncompliance. Table 3.1 lists some of these exceptions and exemptions for states with school leaving laws above sixteen in 2005. The 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 behind compulsory schooling policy.

In several states, students can leave earlier than the set minimum school leaving age if they work instead. In other cases, students can leave with parental consent. Kansas allows dropping out before the recorded minimum age if, after a counseling session, both student and parent sign a disclaimer

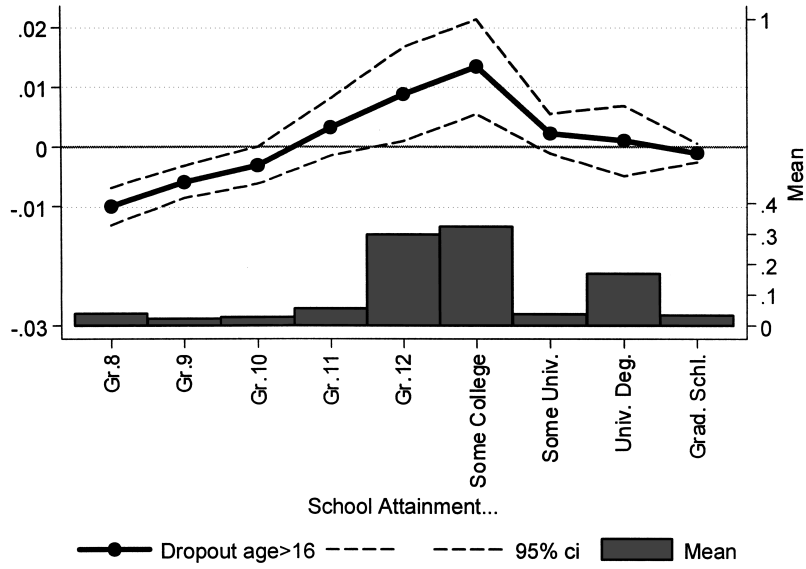

Fig. 3.4 Estimated effects of minimum school leaving age above sixteen on grade attainment 2000 to 2003 Current Population Surveys, twenty- to twenty-four-year-olds

Note: An indicator variable for the school attainment indicated along the x-axis was regressed on whether an individual twenty to twenty-four years old in the 2000 to 2003 CPS faced a dropout age above sixteen in their state of residence when they were sixteen, plus nine 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.

acknowledging a list of academic skills the student may not yet have acquired and average earnings differences between dropouts and graduates.[2]

Some students disengage and drop out illegally because compulsory schooling policies are either not well enforced, or punishment for habitual

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 (US$)	Median weekly earnings in 2003 (US$)	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

Table 3.1 **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 delinquent school (student); parent education, $1,000 fine	Work permit
Connecticut	18	Social and rehabilitation service (parent and/or child)	16+ and parent's consent or work permit
District of Columbia	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)	Working
Indiana	18	Ineligible for driver's license, misdemeanor (parents and/or child)	16+ and student, parent, and principal agree to withdrawal
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
Mississippi	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

(*continued*)

Table 3.1 (continued)

State	School leaving age	Punishment for habitual truancy	Major exemptions
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
Oklahoma	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), truancy school	None
Texas	18	Misdemeanor (parents and/or child), truancy school	None
Utah	18	Misdemeanor (parents and/or child), truancy school	16+ and working
Virginia	18	Misdemeanor (parents and/or child)	Parent consent
Washington	18	Misdemeanor (parents and/or child) social and rehabilitation service (parent and/or child)	16+ and working
Wisconsin	18	Fine or imprisonment	None

Table 3.2 **School attainment by school leaving age faced at age 16, 2000–2005**

	School leaving age faced at age 16		
	16	17	18
Fraction of sixteen-year-olds in school during school year	96.6	96.3	97.1
Fraction of seventeen-year-olds in school during school year	92.3	92.4	93.9
Fraction of eighteen-year-olds in school during school year	75.4	75.2	74.8
Fraction of twenty- to twenty-four-year-olds with high school degree or some post-secondary	88.9	87.2	89.6
Fraction of twenty- to twenty-four-year-olds with some post-secondary	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.

truancy is not severe enough to deter them. Administrators may be reluctant to pursue court action, especially in cases where students are disruptive in class and do not appear interested in school. In virtually every state, the primary action when a student begins to disengage from school (through absenteeism) is to notify a parent or guardian and counsel him or her to encourage the child to attend. Some states require parents to pay fines or even face imprisonment for a child that regularly skips school. Children themselves can face termination of driving privileges (see Burke 2005), community service, or be forced to attend 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 that they face difficulty contacting truant students' families (Palmisano and Potts 2004). Only general guidelines are provided by the state to determine habitual truancy, and schools have little financial incentive to improve attendance.

If the minimum school leaving age affects at least some would-be dropouts, we should expect to observe more sixteen- and seventeen-year-olds in school in states that have school leaving ages of seventeen or eighteen, respectively, compared to states with a leaving age of sixteen. In states that provide no exceptions to a leaving age of eighteen, we should observe virtually all sixteen- and seventeen-year-olds in school. To check this, table 3.2 presents the fraction of sixteen-, seventeen-, and eighteen-year-olds in school during the 2000 to 2005 school year, categorized by the minimum leaving age faced at age sixteen.[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 sixteen in their current state of residence. The data appendix provides additional details.

Most sixteen-year-olds are in school regardless of the minimum school leaving age they face. The fraction of students in school at age sixteen is about the same across states with different school leaving ages. The fraction of seventeen-year-olds in school does not spike up for youths in states with a school leaving age of eighteen, as we might expect to see: 6.1 percent of seventeen-year-olds in states with a leaving age of eighteen have left, compared to 7.7 percent in states with a leaving age of sixteen. Table 3.2 also presents education attainment measures for twenty- to twenty-four-year-olds. There are no substantial differences in the dropout rate or attainment rate across states with different leaving ages. One reason for this may be states that tend to have more restrictive compulsory schooling laws also have more students that tend to drop out, and this limits our ability to observe the effects of these age limits. I address this in the next section. The finding that many students leave before the legally mandated age suggests the exceptions, exemptions, and lack of enforcement of these laws weakens their effectiveness in keeping youths in school.

3.3 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 U.S. changes in school leaving ages on school enrollment and attainment. The appendix provides details of the data. The analysis uses 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. To focus on recent changes to compulsory schooling laws, the baseline sample is limited to those aged twenty to twenty-nine. Individuals are matched to the state school leaving age faced at age sixteen using 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 sixteen is the following:

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

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 sixteen when he or she was sixteen 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

4. I include immigrants that arrived before age seventeen in the ACS and all immigrants in the CPS, since most twenty- to twenty-nine-year-old immigrants faced compulsory schooling laws in the United States. The results are similar excluding them, and available on request.

attainment that do not vary over time, as well as national trends in education attainment that 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 sixteen on educational attainment. Table 3.3 shows estimates of γ under alternative specifications using the CPS sample of twenty- to twenty-nine-year-olds who were sixteen years old between 1970 and 2001. Table 3.4 shows the same estimates using the ACS sample of twenty- to twenty-nine-year-olds who were sixteen years old between 1987 and 2001. The appendix tables show similar results with alternative sample specifications.

The first column of table 3.3 replaces the state fixed effects in equation (1) with nine region fixed effects. The identification of the compulsory schooling effects in this case comes not just from changes in the school leaving laws, but also from state-to-state variation in the leaving age within a region. I estimate, on average, raising the school leaving age above sixteen increases an individual's years of schooling by 0.13 years. Replacing region with state fixed effects in column (5) 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 (6), I add state-specific linear cohort trends to examine the possibility the results are driven by state differences in overall education attainment trends. This cautious specification makes 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.

The second and third rows show the same results, but with high school completion and college enrollment as outcome variables. The results also indicate that raising the school leaving age above sixteen decreases the drop-out rate and increases college or university entrance. From the main specification in column (5), raising the school leaving age above sixteen decreases the fraction of twenty- to twenty-four-year-olds with less education than a high school degree by 1.3 percentage points. Even though compulsory schooling laws do not mandate any college education, I also find raising the school leaving age above sixteen increases the fraction of youths with at least some college or university. One story consistent with this finding is that some individuals compelled to stay longer in high school become more interested in college education or view higher education as less daunting an obstacle

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.

Table 3.3 **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**

Dependent variable	Mean (standard deviation)	Regression coefficient (standard error in parenthesis)					
		Dropout age faced at age 16			Dummy for faced dropout age > 16 at age 16		
Years of schooling	13.0	0.128	0.1239	0.1088	0.0645	0.0721	0.0655
	(2.4)	(0.0197)***	(0.0198)***	(0.0276)***	(0.0093)***	(0.0130)***	(0.0158)***
Never completed high school	0.134	–0.0165	–0.0129	–0.0181	–0.0148	–0.0064	–0.0108
	(0.340)	(0.0029)***	(0.0027)***	(0.0038)***	(0.0012)***	(0.0018)***	(0.0022)***
Some college	0.489	0.0093	0.015	0.0192	–0.0042	0.0066	0.0111
	(0.500)	(0.0033)***	(0.0035)***	(0.0047)***	(0.0019)**	(0.0022)***	(0.0027)***
Cell size observations		44,946	44,946	44,946	44,946	44,946	44,946
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 twenty- to twenty-nine-year-olds who were aged sixteen between 1970 and 2001. Standard errors are clustered by state and year of birth.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 3.4 **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**

Dependent variable	Mean (standard deviation)	Regression coefficient (standard error in parenthesis)					
		Dropout age faced at age 16			Dummy for faced dropout age > 16 at age 16		
Years of schooling	13.4	0.09	0.0878	0.0045	0.0548	0.0651	0.0234
	(2.4)	(0.0240)***	(0.0341)**	(0.0504)	(0.0105)***	(0.0142)***	(0.0215)
Never completed high school	0.123	–0.0117	–0.0124	0.0002	–0.0146	–0.0078	–0.0028
	(0.329)	(0.0038)***	(0.0043)***	(0.0042)	(0.0013)***	(0.0019)***	(0.0021)
Some college	0.576	0.0105	0.0014	–0.0031	0.0016	0.003	0.0027
	(0.494)	(0.0039)***	(0.0049)	(0.0067)	(0.0022)	(0.0021)	(0.0027)
Cell size observations		64,948	64,948	64,948	64,948	64,948	64,948
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 twenty- to twenty-nine-year-olds who were aged sixteen between 1987 and 2001. Standard errors are clustered by state and year of birth.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 3.5 **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	0.0841	0.1323	0.0841
	(0.0198)***	(0.0207)***	(0.0208)***	(0.0207)***
Can leave earlier with parental consent or work permit		0.0796		0.1037
		(0.0380)**		(0.0403)**
Misdemeanor or no punishment			–0.126	–0.1785
			(0.0499)**	(0.0570)***
Cell size observations	44,946	44,946	44,946	44,946
Data: American Community Surveys				
Differences by states with law exemptions and small punishments				
Dropout age above 16	0.0878	0.0455	0.0897	0.045
	(0.0341)**	(0.0664)	(0.0347)***	(0.0665)
Can leave earlier with parental consent or work permit		0.0565		0.0602
		(0.0787)		(0.0793)
Misdemeanor or no punishment			–0.1021	–0.1197
			(0.0664)	(0.0686)*
Cell size observations	64,948	64,948	64,948	64,948

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 twenty- to twenty-nine-year-olds who were aged sixteen 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.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

than when they were younger.[6] The analogous estimates in table 3.4 using the ACS data are similar, but less precise.

Table 3.5 explores whether the estimated effects from raising the minimum school leaving age are weaker for states that allow exemptions or small punishments. The results are mixed. Column (2) shows the estimated effects from raising the compulsory schooling age above sixteen for states that allow early exit with a working permit or parental consent, compared to states that do not allow early exit. The results indicate that states with exemptions are not associated with weaker school attainment effects from raising the

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

school leaving age. In fact, these show impact on school attainment from raising the age minimum. On the other hand, column (3) shows the estimated effects from raising the compulsory schooling age above sixteen for states that associate truancy with a misdemeanor charge or no punishment at all. The estimated effects are smaller and statistically insignificant from zero compared to other states. Taken together, the impact from weaker laws on raising the school leaving age is not clear cut.

What is notable about these findings is that the effects are small, given that the strict interpretation of the law implies virtually no teenager should be allowed to leave before age sixteen. The other notable finding is that the more restrictive compulsory schooling laws also appear to increase college attainment. This is not the case in earlier studies (e.g., Acemoglu and Angrist 2001). The option of college may seem more possible from the standpoint of a high school graduate compared to a high school dropout.

3.4 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 sixteen on unemployment, earnings, and other labor market outcomes.

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

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

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 sixteen on the unemployment rate for *everyone* in the sample. Of course, not everyone is affected by the change in law. What we want to estimate instead is the impact from an increase in the dropout age for those that end up taking one more year of school. For example, suppose the increase in the dropout age makes 50 percent of the population take 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 the effect from taking one more year of compulsory schooling decreases average unemployment by 0.04 (0.02/0.50), or λ/γ.

Thus, to estimate the effect of one more year of compulsory schooling (from raising the school leaving age above sixteen), 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 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 that also affect school attainment. Also, if raising the school leaving age does not affect an individual's education attainment (e.g., whether facing a dropout age of sixteen or eighteen, she intends to graduate), raising it also does not affect her unemployment rate. Another 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:

$$UNEMP_{iscy} = \beta EDUC\_HAT_{scy} + v_s + v_c + v_y + v_{iscy}, \quad (3)$$

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 from a change in the compulsory school leaving age. It is equivalent to λ/γ.

3.5 The Effect of Compulsory Schooling on Subsequent Employment and Wages

Tables 3.6 and 3.7 show estimates of the effects of a year of compulsory schooling on early career outcomes, using the instrumental variables methodology discussed in the last section. The top panels show the reduced form results of the average effects from facing a higher school leaving age on the labor market outcomes for the entire sample, whether affected by the laws or not. The bottom panels show the estimated average effects for just those affected by these laws (those compelled to stay in school). The sample in table 3.6 includes all twenty- to twenty-nine-year-olds in the CPS that were sixteen years old between 1970 and 2001. Table 3.7 uses a similar sample, but from the ACS.[7]

Column (1) 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 that could explain education or labor market outcome differences. Table 3.6 indicates that an additional year of compulsory schooling, caused from increasing the

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

Table 3.6 **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**

Dependent variable	Mean: full sample (standard deviation)	Reduced form coefficient					
		Dropout age faced at age 16			Dummy for faced dropout age > 16 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 those working > 25 hrs/week	9.7	0.0093	0.0133	0.0235	0.0108	0.0039	0.0128
	(0.583)	(0.0052)*	(0.0065)**	(0.0060)***	(0.0046)**	(0.0039)	(0.0034)***
	Mean: dropout sample (standard deviation)	Total years of schooling coefficient, instrumented by compulsory schooling law					
		Instrument: Dropout age faced at age 16			Instrument: Dropout age > 16 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 those working > 25 hrs/week	9.4	0.0722	0.1077	0.2152	0.1114	0.0547	0.1959
	(0.525)	(0.0391)*	(0.0551)*	(0.0708)***	(0.0427)***	(0.0547)	(0.0633)***
Cell size observations		44,946	44,946	44,946	44,946	44,946	44,946
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 sixteen. 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 twenty- to twenty-nine-year-olds who were aged sixteen between 1970 and 2001. Standard errors are clustered by state and year of birth.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 3.7 **Reduced form and IV regressions of labor market outcomes and compulsory schooling, ages 20–29, year at age sixteen between 1987 and 2001, American community survey data**

Dependent variable	Mean: full sample (standard deviation)	Reduced form coefficient					
		Dropout age faced at age 16			Dummy for faced dropout age > 16 at age 16		
Unemployed	0.094	–0.005	–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	0.0013	–0.0088	0.0049	0.0003
	(0.441)	(0.0034)**	(0.0048)**	(0.0073)	(0.0014)***	(0.0019)**	(0.0036)
Log weekly earnings for those working > 25 hrs/week	9.892	0.0069	–0.0072	0.0159	0.0016	0.0053	0.0005
	(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 those working > 25 hrs/week	0.284	–0.0056	–0.0145	0.0046	–0.0004	–0.0102	0.0017
	(0.451)	(0.0025)**	(0.0049)***	(0.0085)	(0.0014)	(0.0023)***	(0.0042)
Below poverty line	0.153	–0.0029	–0.0071	–0.0025	–0.0045	–0.0037	–0.0014
	(0.360)	(0.0025)	(0.0033)**	(0.0046)	(0.0011)***	(0.0015)**	(0.0019)
On welfare	0.020	–0.0013	–0.0049	–0.002	–0.0003	–0.0023	–0.0017
	(0.139)	(0.0009)	(0.0013)***	(0.0016)	(0.0004)	(0.0007)***	(0.0008)**
	Mean: Dropout sample (standard deviation)	Total years of schooling coefficient, instrumented by compulsory schooling law					
		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 those working > 25 hrs/week	9.687	0.1205	–0.3066	–0.0269	0.0719	0.1573	0.0131
	(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 those working > 25 hrs/week	0.524	–0.0983	–0.6311	–0.1536	–0.0172	–0.3058	–0.2295
	(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		64,948	64,948	64,948	64,948	64,948	64,948
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 sixteen. 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 twenty- to twenty-nine-year-olds who were aged sixteen between 1987 and 2001. Standard errors are clustered by state and year of birth.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

school leaving age above sixteen, lowers the likelihood of unemployment by 2.2 percentage points.[8] The effect on the likelihood of working at all for this age group is large, but imprecisely estimated.

Column (2) shows the main 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 from these law changes decreases the probability of being unemployed by 3.6 percentage points and decreases the probability of not working by 5.1 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 working at least twenty-five hours per week. The return to compulsory schooling on weekly earnings is 10.8 percent, an estimate not much different from earlier studies that use older birth cohorts.

Column (3) shows results from estimating the model that allows for underlying linear birth cohort trends for each state. This specification makes the assumption required for causal interpretation of the results more likely, but at the expense of possibly absorbing variation driven by the school leaving ages and 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 (2), and the effects on weekly earnings are greater. Columns (4) to (6) show similar estimates using the actual dropout age faced by individuals at age sixteen as the instrumental variable in equation (1).

The estimated effects using the ACS in table 3.7 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 from 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 3A.1 and 3A.2 under alternative sample specifications. Table 3A.1 indicates increases in the minimum school leaving age had almost identical effects for males and females, but little influence on blacks. An explanation for these racial differences is not readily apparent. Table 3A.2 shows results for different age groups and over different periods. The results are not sensitive to including thirty- to thirty-nine-year-olds, who were affected by earlier law changes than twenty- to twenty-nine-year-olds. The estimated

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

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.

impact from raising the school leaving age above sixteen is also similar comparing cohorts affected between 1970 and 1985 and those affected between 1986 and 2001.

3.6 Conclusion

This chapter uses recent experiences with raising the school leaving age to seventeen and eighteen to assess whether such policies can increase school attainment and 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. But the consistent findings with the previous studies are suggestive that compulsory high school at later ages can benefit disadvantaged youth.

States that increased the school leaving age above sixteen saw average years of schooling for twenty- to twenty-nine-year-olds' increase by about 0.13 years, and high school dropout rates fall by about 1.4 percentage points. Raising the age limit also increased college attendance by about 1.5 percent, even though college is not compulsory. Perhaps this finding indicates that would-be dropouts reconsider post-secondary options after getting close to, or completing, a high school degree.

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

Exceptions, leniency, and weak consequences for truancy substantially weakened the effectiveness of these laws in increasing school attainment. Exceptions may be desirable because some students would obviously not benefit from staying on. The results in this chapter do not capture whether those students for whom exceptions were made gain from being forced to stay. While allowing exceptions might be necessary, the results suggest that more resolve may be needed in cases where students begin to disengage from high school. Compulsory schooling laws could exist in the backdrop in an environment where students do not consider leaving school before the minimum possible age because virtually no one does. Greater initial enforcement may help establish an acceptance from youth to stay in school and limit the need to enforce such laws in the future. Students may also find it easier to accept staying if schools also offer more curriculum choice (offering more trait-based training, for example), as some governments have already done (for example, in the province of Ontario, Canada).

Finding large gains to individuals from compelling them to stay in school raises the question of why dropouts drop out in the first place. Why do young

persons leave school early if staying on generates attractive gains, on average, to their careers? The possibility that students cannot afford to stay in high school seems unlikely. Many dropouts do not work. Among sixteen- and seventeen-year-olds recorded in the 2000 Census as not in school, only 55 percent are in the labor force, and 90 percent still live at home with parents.

Several alternative explanations for dropout behavior exist. First, dropouts may simply abhor school. Poor classroom performance and condescending attitudes from other students and teachers may make students want to leave as soon as possible, even at the expense of forgoing large returns (Lee and Burkam 2003). Removing reasons for school distaste, in this case, could go a long way in reducing dropout rates. Second, dropouts may be myopic. Myopic students that temporarily downplay or ignore future consequences of their decisions—as considered by Laibson (1997) and O'Donoghue and Rabin (1999)—may prefer dropping out to staying on but later prefer staying on to dropping out. A third alternative is that cultural or peer pressures might dominate adolescent decision making and lead to dropout behavior. Cultural norms that devalue schooling, a lack of emotional support, or low acceptance for higher education among peers may exacerbate students' distaste for school beyond the minimum (e.g., Akerlof and Kranton 2002; Coleman 1961). A final consideration is that students may simply mispredict, underestimating the real expected benefit from staying in school longer. Students' guesses about gains from schooling are often wildly off the mark from those estimated by social scientists (e.g., Dominitz, Fischoff, and Manski 2000). Teenagers from more disadvantaged family backgrounds are more likely to predict lower gains from additional schooling than those from more affluent families—not just for high school, but higher education as well. Perhaps the main reason why students from low-income households more often drop out or fail to continue on to college is not poverty per se, or debt aversion, but a systematic tendency among this group to overestimate the costs and underestimate the benefits of education.[10]

Raising the school leaving age may offer an effective and affordable means to increase education attainment among the least educated and improve their subsequent employment circumstances and earnings potential.

Data Appendix

The Current Population Survey (CPS) is a large, nationally representative data set and tracks school attainment and labor force outcomes monthly for over twenty-five years. It records an individual's state of residence, which

10. For a more detailed discussion about the implications of these results for explaining dropout behavior, see Oreopoulos (2007).

is used in this chapter to predict the minimum school leaving age faced at sixteen years of age. Since an individual may have moved before sixteen, this chapter also estimates effects using American Community Survey (ACS) data, which contain information on state of birth. The ACS data is smaller, but 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. The CPS, administered by the U.S. Bureau of Labor Statistics, collects monthly household data about employment and labor markets for about 30,000 nationally representative individuals aged sixteen. It is the source of the 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, and geographic location.

Every household that enters the CPS is interviewed each month for four months, then ignored for eight months, then interviewed 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 are not interviewed the following month. Usual weekly hours/earning questions are asked only to households in their fourth and eighth interview. Data from these outgoing interviews are combined for every year between 1979 and 2005 to create the extract, for a total sample size over 8.6 million.[11] To examine recent compulsory school law changes, the base data set includes only sixteen- to twenty-nine-year-olds aged sixteen between 1970 and 2001. This restriction cuts the sample down to about 1.8 million.

Some of the variable definitions change from survey to survey and were adjusted to make year to year comparisons consistent. The years of schooling variable is the highest grade completed plus the number of years of college. 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 (grade 92) by assigning imputed years of schooling to each category for males and females using the imputation method in Park (1994). A high school dropout is defined as an individual with less than twelve years of schooling. An individual with some college education is defined as an individual with more than twelve years of schooling. An individual in school is defined as an individual reporting in the CPS being enrolled in high school or college in the previous week, excluding surveys

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

taken in the months between June and August. This variable is only available from the CPS since 1984 and for individuals aged twenty-four or less.

I use the NBER extract's imputed weekly earnings (earnwke), which is actual weekly earnings among those who report it, and reported hourly earnings times hours worked per week for individuals who report earnings in hours. Definitions of 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 to 2005 American Community Surveys were extracted from the Integrated Public Use Microdata System-USA (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 that 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 highest grade or highest 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 that arrived into the country before age seventeen.

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 sixteen and assuming 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 state of residence for immigrants.

Much of the main analysis in the chapter 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 noninstitutional population weights (weight) or "working weights," which reflect the population of individuals working at least twenty-five hours a week.

Table 3A.1 Compulsory schooling effects by sex and race

Dependent variable	Full sample	Males	Females	Nonblacks	Blacks
Effect of facing dropout age > 16 on total years of schooling					
Total years of schooling	0.1239	0.1299	0.1201	0.1398	–0.0039
(CPS data)	(0.0198)***	(0.0234)***	(0.0228)***	(0.0227)***	(0.0240)
Cell size observations	44,946	22,281	22,665	25,479	19,467
Total years of schooling	0.0878	0.078	0.0925	0.0955	0.0007
(ACS data)	(0.0341)**	(0.0402)*	(0.0411)**	(0.0379)**	(0.0400)
Cell size observations	64,948	32,537	32,411	44,345	20,603
Estimated effect of year of schooling on labor market outcomes					
Unemployed	–0.036	–0.0337	–0.0392	–0.0301	0.4854
(CPS data)	(0.0103)***	(0.0140)**	(0.0127)***	(0.0094)***	(3.2884)
Not working	–0.0507	–0.0059	–0.0897	–0.0487	0.284
(CPS data)	(0.0189)***	(0.0189)	(0.0270)***	(0.0172)***	(2.5668)
Log weekly earnings for those working > 25 hrs/week	0.1077	0.1265	0.0819	0.0873	–4.2359
	(0.0551)*	(0.0586)**	(0.0583)	(0.0479)*	(25.1092)
(CPS data)					
Unemployed	–0.0541	–0.0469	–0.0625	–0.0184	–0.3473
(ACS data)	(0.0267)**	(0.0420)	(0.0442)	(0.0217)	(0.4950)
Not working	–0.1167	–0.087	–0.1305	–0.1542	–0.5364
(ACS data)	(0.0901)	(0.0782)	(0.1155)	(0.0994)	(34.0168)
Log weekly earnings for those working > 25 hrs/week	–0.3066	–0.304	–0.3509	–0.4663	5.1164
	(0.8596)	(0.9293)	(0.9054)	(1.2287)	(24.7673)
Log family income	0.4185	0.4528	0.4242	0.365	0.3175
(ACS data)	(0.1580)***	(0.2552)*	(0.1796)**	(0.1586)**	(1.0084)
In "low skilled job" for those working > 25 hrs/week	–0.6311	–1.0171	–0.3923	–0.7738	–4.4497
	(0.7139)	(1.8516)	(0.3705)	(1.0202)	(235.1214)
Below poverty line	–0.0806	–0.068	–0.1041	–0.0679	–2.2975
(ACS data)	(0.0321)**	(0.0490)	(0.0468)**	(0.0356)*	(121.9384)
On welfare	–0.0554	–0.0092	–0.1042	–0.0513	0.073
(ACS data)	(0.0204)***	(0.0104)	(0.0415)**	(0.0204)**	(0.230)

Notes: The top panel shows "First Stage" results from regressing total years of schooling on the dropout age faced at age sixteen. Data are from the 2000 to 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 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 sixteen.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 3A.2 **Sensitivity analysis**

Dependent variable						
	Effect of facing dropout age > 16 on total years of schooling					
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	44,946	23,309	75,239	25,084	21,578	44,946
Total years of schooling (ACS data)	0.0878 (0.0341)**	0.0906 (0.0359)**	0.0717 (0.0229)***	n.a.	n.a.	0.0863 (0.0337)**
Cell size observations	64,948	10,290	131,167	n.a.	n.a.	64,948
	Estimated effect of year of schooling on labor market outcomes					
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)	n.a.	n.a.	–0.0555 (0.0269)**
Not working	–0.1167	–0.0634	–0.1322	n.a.	n.a.	0.1151

(ACS data)	(0.0901)	(0.0907)	(0.0757)*			(0.0897)
Log weekly earnings for those working > 25 hrs/week	–0.3066	–0.0225	–27.3351	n.a.	n.a.	–0.2876
	(0.8596)	(0.6498)	(1,567.6844)			(0.7670)
Log family income	0.4185	0.4552	0.3521	n.a.	n.a.	0.4097
(ACS data)	(0.1580)***	(0.1759)***	(0.1286)***			(0.1568)***
In "low skilled job" for those working > 25 hrs/week	–0.6311	–0.534	8.6247	n.a.	n.a.	–0.5497
	(0.7139)	(0.7187)	(130.0150)			(0.5595)
Below poverty line	–0.0806	–0.0981	–0.0671	n.a.	n.a.	–0.082
(ACS data)	(0.0321)**	(0.0382)**	(0.0280)**			(0.0324)**
On welfare	–0.0554	–0.0563	–0.0493	n.a.	n.a.	–0.0533
(ACS data)	(0.0204)***	(0.0217)***	(0.0160)***			(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 sixteen. 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 sixteen. The bottom of the table indicates the variation of the sample and standard error cluster group used.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

References

Acemoglu, D., and J. Angrist. 2001. How large are human capital externalities? Evidence from compulsory schooling laws. *NBER Macroannual*: 9–59.

Akerlof, G., and R. Kranton. 2002. Identity and schooling: Some lessons for the economics of education. *Journal of Economic Literature* 40 (4): 1167–1201.

Angrist, J. D., and A. Krueger. 1991. Does compulsory school attendance affect schooling and earnings? *Quarterly Journal of Economics* 106 (4): 979–1014.

Black, S. E., P. J. Devereux, and K. G. Salvanes. 2004. Fast times at Ridgemont High? The effect of compulsory schooling laws on teenage births. NBER Working Paper no. 10911. Cambridge, MA: National Bureau of Economic Research, November.

Burke, M. 2005. Sanctions on driving privileges. *StateNotes: Accountability/Sanctions,* Education Commission of the States, March.

Coleman, J. S. 1961. *The adolescent society.* New York: The Free Press.

Dominitz, J., B. Fischoff, and C. F. Manski. 2001. Who are youth at-risk? Expectations evidence in the NLSY-97. In *Social awakenings: Adolescents' behavior as adulthood approaches,* ed. R. T. Michael. New York: Russell Sage Publications.

Harmon, C., and I. Walker. 1995. Estimates of the economic return to schooling for the United Kingdom. *American Economic Review* 85 (5): 1278–86.

Kansas State Department of Education. 2005. 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.

Laibson, D. 1997. Golden eggs and hyperbolic discounting. *Quarterly Journal of Economics* 112 (2): 443–77.

Lee, V. E., and D. T. Burkam. 2003. Dropping out of high school: The role of school organization and structure. *American Educational Research Journal* 40 (2): 353–93.

Lochner, L., and E. Moretti. 2004. The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. *American Economic Review* 94 (1): 155–89.

National Center for Education Statistics. 2003. The condition of education. Available at: http://nces.ed.gov/.

O'Donoghue, T., and M. Rabin. 1999. Doing it now or later. *American Economic Review* 89 (1): 103–24.

Oreopoulos, P. 2007. Do dropouts drop out too soon? Wealth, health, and happiness from compulsory schooling. *Journal of Public Economics* 91 (11–12): 2213–29.

Palmisano, A., and K. Potts. 2004. Teaching to empty desks: The effects of truancy in Tennessee schools. Report from the Tennessee Office of Education Accountability, January.

Park, J. H. 1994. Estimation of sheepskin effects and returns to schooling using the old and new CPS measures of educational attainment. Working Paper 338, Princeton Industrial Relations Section, December.