

The secular decline in teen employment: the role of compulsory schooling and work permits

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Ciprian Domnisoru[†]

Carnegie Mellon University

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Abstract

I analyze the role that compulsory schooling and employment certificate legislation play in the secular decline in teenage employment since 2000. Using a difference in differences strategy and Current Population Survey data, I show that increases in school leaving ages in 20 states since 1985 have reduced the employment rate of 16 and 17-year-olds by one to two percentage points. Using a similar empirical strategy, I analyze the effect of dropping work permit requirements for 16 and 17-year-olds in five states that did so between 1977 and 1996. The employment rate of 16 and 17 year-olds increased by about two percentage points after employment certificates were no longer required.

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[†]Ciprian Domnisoru, Ph.D. Student, H.John Heinz III College, Carnegie Mellon University. Email: cdomniso@andrew.cmu.edu

1 Introduction

Teenage employment has experienced a secular decline since 2000. The decline was triggered by the March-November 2001 recession, but continued through stages of expansion and accelerated in the latest recession (Figure 1). Analyses of this secular decline have argued that business cycle patterns cannot fully account for the drop in teenage employment (Aaronson et al, 2006; Smith, 2011). Using data until the end of 2010, Smith (2011) showed the counterfactual employment to population rate was two percentage points above the actual rate. The literature has not, however, analyzed the role played by increases in the maximal school leaving age introduced in 20 states since 1987, nor the increasingly tougher truancy and employment certificate laws. I show that increases in the school leaving age account for one to two percentage points of the decrease in employment in states that passed compulsory schooling laws. The 20 states passing such laws account for 44 per cent of the 2013 US population. The employment decline in these states following the introduction of compulsory schooling laws accounts for about one percentage point of the unaccounted decline in the employment to population ratio.

Working during high school is increasingly less common in the United States. In the 1980 High School and Beyond Survey, 44 per cent of enrolled sophomores and 64 per cent of enrolled seniors were employed during the school year (Lewin-Epstein, 1981). Figure 1 shows the significant decline in employment rates for 16 and 17-year-olds between 1984 and 2013 : from 35 to about 10 per cent for sixteen year olds, and from 35 to under 20 per cent for seventeen year olds. Aaronson et al (2006) and Smith (2012) have considered increases in school enrollment as explanations for the decline in teenage employment. Figure 2 however shows that the enrollment rate of 16-year-olds has been relatively constant between 1994 and 2008, a period in which employment decreased considerably. Enrollment increases for seventeen year olds have not exceeded two percentage points since 1994, while the drop in employment was about 15 percentage points. The decline in labor force participation over the past ten years has been so significant that it impacts overall labor force participation. As such, it became a puzzle, leading researchers to discuss the unexplained nature of part of the decline (Aaronson et al, 2006) and to conclude "there is little research on why employment has fallen" (Smith, 2011).

But apart from explaining the macroeconomic labor force participation puzzle, the decline in teenage employment is of policy interest in itself. Part time jobs may give young people better work habits and help them make more informed career choices. Early labor market experiences may also raise subsequent earnings. The federal government supports the notion that students should work during high school as a way of ensuring a smoother transition to full time employment. For example, the Federal School-to-Work Transition Act of 1994 provided 100 million dollars in support of

state school to work initiatives. Working during high school is believed to result in the acquisition of skills, experience and work habits, which would improve students' productivity and later chances of finding employment.

Critics of student employment during high school point to the displacement effect that time spent working has on time spent learning. In response to these concerns, some states passed bills to reduce the number of hours high school students are allowed to work during the school week. Concerns that long hours of work lead to poorer academic outcomes are supported by research. Tyler (2003) uses NELS88 data and shows that a decrease of 10 hours per week in working hours results in a 0.2 standard deviation increase in math scores for twelfth graders. Eckstein and Wolpin (1998) use NLSY79 data and estimate a sequential decision model of high school attendance and work. They find that working full time results in a 0.135 point reduction in cumulative grade point average (on a four-point scale).

If employment during high school is to some extent detrimental to academic performance, it conflicts with another popular policy goal, increasing high school enrollment and graduation rates. Having a high school diploma significantly reduces the risk of unemployment and leads to higher lifetime earnings. The policy goal of increasing high school graduation rates has been specifically addressed through changes in the minimal school leaving age. Twenty states have increased the minimal school leaving age over the past 25 years (twice, in the case of Louisiana) (Table 1). However, enforcing compulsory schooling laws when the enrollment rate is more than 90 per cent is a difficult task, as the reasons why a select, relatively small set of students drop out of high school may be very diverse, pressing and stronger than any incentives and enforcement mechanisms used by school truancy boards. I show the effects of such policy changes on the overall enrollment rate are statistically insignificant, but can reach statistically significant effects of 3 percentage points for teenagers in households in the lowest household income decile (Table 5).

In the push to enforce compulsory schooling policies, states have resorted to mechanisms that limit the probable high school drop out student's outside options: limiting driving privileges ('no pass no drive policies') or conditioning the issuance of a work permit on school enrollment (and performance) . Work permits, or employment certificates, are child labor requirements meant to ensure employers document the age of minors and are made aware of the special nightwork, total hours, health, safety and other special restrictions that apply to minor employees. Eighteen states currently require an employment certificate for minors aged 16 or 17. When compulsory schooling laws increase the minimal school leaving age past the age of sixteen, employment certificates can only be issued if the minor is enrolled in school (with some exceptions, discussed in Section 3). Section 4 elaborates on a theoretical prediction that compulsory schooling laws send a negative

signal to employers about the variance of skills and abilities of cohorts impacted by the policy change: in a nutshell, employers can no longer distinguish between teenagers willingly staying in school and teenagers compelled to enroll. In states requiring employment certificates, compulsory schooling also make hiring sixteen and seventeen year olds more costly and difficult because of work permit fees and extra bureaucratic pressures to comply with certificate requirements, leading to higher decreases in employment for high school students. I show compulsory schooling laws requiring 17-year-olds to stay in school until 18 are associated with a two percentage point decrease in employment.

Legislators in six states relaxed employment certificate requirements between 1973 and 1995, in an attempt to facilitate the hiring of teenage labor. I show that dropping employment certification requirements for 16 and 17 year olds was associated with a statistically significant increase of two percentage points in employment.

Policymakers, school counselors and teachers, parents and students face a dilemma: focus on academic achievement may increase chances of graduation, but could come at the cost of the positive effects of teenage employment. Compulsory schooling laws coupled with employment certificates may lead to modest increases in enrollment, particularly for students from low income households. But the risk is that while they positively impact a few students to stay in school and perhaps graduate from high school, such policies may have a larger, negative effect on employment for a broader set of students than those targeted by compulsory schooling laws.

2 Relation to existing literature

The record lows for teenage employment in recent years have attracted the attention of macroeconomists, as the drop has been so significant that it impacts overall labor force participation. The literature discusses the unexplained decline in labor force participation, after detrending business cycles. Aaronson, Park and Sullivan (2006) found that if the 1987-1997 rate of decline in teenage employment had been maintained, the 2006 rate would have been about 5.5 percentage points higher. However, they find weak evidence of demand factors leading to the decline, as relative wages of teenagers have not changed substantially. Instead, they find increasing enrollment to be the main cause of the decline, accounting for 0.18 percentage points per year in the decline of teenage labor force participation. They do not, however, explore the role of compulsory schooling laws as drivers of the increase in enrollment. My analysis shows that compulsory schooling affects employment not just through the sheer increases in enrollment, but have an effect on employment even under lax or absent enforcement of minimal leaving age increases.

Smith (2011) explored other potential drivers of the decrease in employment: exit exam requirements, merit aid scholarship programs for college and an increase in the number of credits in core subjects needed to graduate. These policies put pressure on the labor supply of teenagers as they increase academic requirements, and, in the case of scholarship programs, displace the need for students to finance their college tuition by working in high school. Smith finds the effect of such labor supply explanations modest in comparison to labor demand explanations which stem from increases in the supply of adult labor that is substitutable by teens, notably unskilled immigrants (Smith, 2012).

The effects of compulsory laws on educational attainment and later labor market outcomes in the US have been explored by canonical papers (Angrist and Krueger, 1991; Acemoglu and Angrist, 2001). Using similar methodologies, Oreopoulos (2009) has shown recent reforms to have positive effects on academic and long term outcomes. Oreopoulos' analysis follows compulsory schooling changes only until 2005. It is also affected by errors in the coding of the compulsory schooling changes that were made in the National center for Education Statistics (NCES) yearly digests. Whitehurst and Whitfield (2012) and Mackey and Duncan (2013) identified these coding problems and proceeded to check the actual state statutes and contact state labor departments. Because of the coding mistakes, essentially all analyses of recent compulsory changes before 2012 may be significantly biased because of coding errors. Biases may be substantial, as large states such as New York and Florida were attributed inexistent law changes. Following Mackey and Duncan (2013), I update the information on actual law changes by proceeding to look for multiple sources and provide details on the actual statute and law changes (Table 1)¹. I find discrepancies in the coding used by Whitehurst and Whitfield (2012) and Mackey and Duncan (2013) as well: a 1991 Arkansas law change increased the compulsory schooling age, mentioning that students aged through 17 on or before the start of the school year are obliged to enroll. This law change was incorrectly coded as a maximal school leaving age of 17, while in fact it is a maximal school leaving age of 18.

The effect of employment certificate requirements on teenage employment has received less attention. The effects of the original implementation of such laws are difficult to analyze, as employment certificate legislation was introduced at the beginning of the 20th century, and its enforcement was a gradual process, as state labor inspectorates were just being set up and states gradually consolidated their legislation on child labor. Tyler (2003) used a snapshot of employment certificate legislation across US states as an instrument for the labor force participation of high school students. While there is a correlation between employment certificate legislation and the employment rate of teenagers (Table 6), Tyler (2003) went no further in exploring the causal links.

¹A detailed list of policies and legal references is available from the author upon request

To my best knowledge, the causal effect of such legislation on employment has not been explored. I tracked state legislative changes and identified six states that dropped the requirement for employment certificates for 16 and 17-year-olds between 1973 and 1995: Utah (1973), Nevada(1977), Virginia (1979), Florida (1981), Kentucky (1984), Oregon (1995).² I exploit these law changes to estimate the effect of dropping work permit requirements on the employment of sixteen and seventeen year olds.

The rich literature on the effect of minimum wages on teenage employment has acknowledged the role of compulsory schooling policies. Neumark and Wascher (1995) include compulsory schooling as covariates. However, they find no statistically significant effect of such policies on employment. As the minimum wage debate unfolded over the 1990s, compulsory schooling policies were an "optional extra" in the set of controls. Recent papers challenging established results in the literature (e.g. Allegreto, Dube and Reich, 2011) or papers revisiting classic results (Neumark, Salas and Washer, 2013) did not account for compulsory schooling changes in the past twenty years. This introduces the possibility of bias in estimates of the effects of minimum wage laws. Unaccounted increases in the minimal school leaving age that occur at the same time as minimum wage increases may introduce an upward bias in the effect of minimum wage policies if compulsory schooling policies and minimum wages both negatively impact the employment rate.

3 Laws affecting teen employment

3.1 Compulsory Schooling

Over the past 25 years, 20 states have increased the minimal school leaving age, twice in the case of Louisiana. In 2014, 20 states and the District of Columbia had a minimal compulsory schooling leaving age of 18. Twelve other states had 17 as the maximum age, with the rest of states requiring that students stay in school until their sixteenth birthday. Several states are currently considering increasing the minimal school leaving age, and, in his 2012 presidential address, President Obama has encouraged all state legislators to consider raising the school leaving age to 18.

The changes to compulsory schooling legislation in the past 25 years have been part of a national drive to reduce the high school drop out rates and increase college attendance. Such policies have generally had the support of educators. For example, The National Association of Secondary School Principals supports the raising to 18 of the minimum age at which a student is allowed to

²A detailed list of policies and legal references is available from the author upon request

leave compulsory education³ The societal motivation for keeping more students longer in school is that dropping out early is costly, both to individuals and to society because of earnings losses and because of higher risks of unemployment and criminal activity. The lifetime earnings of high school dropouts are considerably lower than those of high school graduates. Compulsory schooling policies thus have the potential to lead to significant monetary gains if they also induce students to get a high school diploma.

Raising the compulsory schooling age is enforced through fines or the threat of criminal punishment for parents of truant students. Oreopoulos (2007:91) provides an inventory of such enforcement mechanisms, which include punishment in the form of notices to parents, fines, community service work, imprisonment, social and rehabilitation service or charges of misdemeanor. Since 1987, I documented 18 states have also begun to condition obtaining a driver's license on being enrolled in school. Preliminary evidence (not reported) shows the introduction of no pass no drive policies does not have a statistically significant effect on the teenage enrollment rate. It remains ,however, one of many enforcement mechanisms.

There are , however, many exceptions that allow students to leave school earlier than the minimum required age, either with parental consent or if working. Exceptions include: enrollment in adult education, parental consent, or employment (in some states only under financial duress). I currently do not analyze the impact of such exceptions, or the impact of tougher enforcement mechanisms. Such an analysis would require a detailed review of legislative changes and of state by state administrative enforcement practices, which may differ in practice from those stipulated in state laws. It is worth noting, however, that enforcement mechanisms and exceptions have been changing over the past 20 years. The next section shows an increasing trend in state legislation to link the issuance of employment certificates for sixteen and seventeen year olds to school enrollment. Teen driving laws that link the issuance of a driving license to enrollment are also recent developments. Finally, at the beginning of the 1990s, a series of states have proceeded to increase monetary fines for noncompliance with compulsory schooling and work permit requirements.

Past compulsory schooling policies have been shown to produce earnings gains for students compelled to stay in school . Angrist and Krueger (1991) and Acemoglu and Angrist (2001) estimated that annual adult earnings were 10 per cent higher for students who had been compelled to stay a year longer in school by raising the minimal school leaving age. Revisiting the effects of compulsory schooling policies by analyzing recent changes is warranted by the changing circumstances under which the newer policies operate. High school drop out rates are lower than during the periods

³National Association of Secondary School Principals , Legislative Advocay, <https://www.nassp.org/LegislativeAdvocacy/> [Aug 17, 2013]

analyzed in the literature, and today most students are expected to finish high school. Moreover, students who drop out today may be facing unique family and environmental circumstances.

3.2 Employment certificates for minors

Under state child labor laws, schools and/or state Labor departments may issue employment certificates for minors and/or age certification documents. Not all states have such paperwork requirements for the employment of minors. Table 2 shows that twelve states require no employment certificates, 20 states require an employment certificate for minors under the age of 16 while eighteen states mandate such a certificate until the minor reaches the age of 18. In most states, schools issue the employment certificate, but in others this may also be done by the State Labor Department. Most states that do not require an employment certificate or limit the required age at 16 make the issuance of such a proof for older minors optional. Some states also require employers to have alternative proofs of the age of minors, such as copies of birth certificates, driving licenses or a signed note from parents.

Employment certificates for minors serve as instruments in the enforcement of child labor legislation. The employment of minors is prohibited at the federal level in a series of occupations considered hazardous. To protect the health and physical development of children, the federal government also imposes restrictions on the minimal age at which children may start working, and on the maximum number of hours they are allowed to work. The restrictions however mostly pertain to teenagers under the age of sixteen. Some states have more stringent requirements that also cover the employment of sixteen and seventeen year olds.

Child labor legislation is an active field for state policymakers. Over the past century, most states consolidated their child labor provisions and increased coverage to older ages or strengthened enforcement mechanisms. However, over the past forty years, some states relaxed child labor legislation. These states treated the employment certificates as unnecessarily burdensome, while the former saw them as a valuable tool in the fight against child labor: a 1949 labor legislation conference statement recommended the issuance of employment certificates for minors up to 18 years of age: "Prerequisites of the issuance of the certificate shall include a statement of the employer of his intention to employ the minor, documentary proof of the minors age, school record showing grade minor has completed, and medical examination showing fitness for the job" (Monthly Labor Review, Jan 1950:41). In the following paragraphs, I briefly review state legislative changes using summaries published by the Monthly Labor Review, 1945-2013 . The overall picture is a patchwork of provisions, in some states relaxing, and in other states strengthening child labor and employment

certificate legislation.

First, some states increased the coverage of employment certificates to sixteen and seventeen year olds (Kentucky and Virginia, 1948, Delaware, 1951). After 1960, however, most states have actually proceeded to relax or drop employment certificate requirements for sixteen and seventeen year olds: Utah (1973), Nevada(1977), Virginia (1979), Florida (1981), Kentucky (1984), Oregon (1995). Other states have eliminated employment certificates altogether (Arizona, 1972; South Dakota, 1991; Tennessee, 1978).

Other states have proceeded to relax specific provisions of employment certificate requirements: In 1970, Virginia made the mandatory physician's visit valid for two years instead of one year. Other states eliminated the physical examination requirement for employment certificates altogether (North Carolina, 1971, West Virginia, 1975, Arkansas, 1980). In 1966 in New York, 1969 in Hawaii and in 1973 in North Carolina, teenagers were allowed to use a single permit for all employers, as opposed to obtaining a different one for each employer. Pennsylvania also introduced transferable work permits in 1984. State legislators also found that employment certificate legislation was hindering work study programs. In 1970, Massachusetts eliminated the work permit requirement for students engaged in such programs. States also found permits unnecessary for high school graduates: California exempted them from such requirements in 1977.

As more states increased compulsory schooling requirements, employment certificate legislation began to interact with enrollment legislation. In 1989, Maine prohibited the employment of students habitually truant under the compulsory schooling law, which stipulated 17 as the minimal school leaving age. Also in 1989, New Hampshire added 'a satisfactory level of academic performance' to the prerequisites for the issuance of an employment certificate, providing for the possibility of revocation if the level of academic performance was not maintained. Indiana in 1990 and New York in 1991 introduced similar provisions, authorizing the revocation of an employment certificate in case of a significant drop in grades following the issuance of a permit. Out of the 20 states that increased the compulsory schooling age to either 17 or 18, five states (Alabama, Indiana, Louisiana, California and Michigan) did so while at the same time requiring an employment certificate for minors under the age of 18.

3.3 Minimum wage laws

The federal minimum wage applies to high school students in the labor force, although with some exceptions. The law currently requires that a minimum of 4.25 per hour be paid to employees

under 20 years of age during the first 90 consecutive calendar days with an employer, after which they should receive the regular federal minimum wage. Many high school students work as tipped employees⁴ in the hospitality industry and are subject to a lower minimum wage. The law however requires the employer to pay the federal minimum wage in case the tipped minimum wage plus tips is below the federal minimum wage .

4 The effect of compulsory schooling on employment

In this section I discuss three unambiguous theoretical predictions of the effect of compulsory schooling and employment certificate legislation on employment. I imagine a simple model in which employers make choices about which general groups of workers are best suited for a type of job. The utility of filling a job with a certain type of worker depends on the skills the worker brings, hiring and firing costs, minimum wage provisions, etc. Employers have prior beliefs about the utility each type of worker would bring. Beliefs are updated after the hiring decision. Employers may thus develop preferences for adult workers or for teenage workers, to identify just two potential categories. Hiring teenage workers may present disadvantages, such as low skills, competing interests (school) that may impact effort on the job, burdensome child labor hiring provisions, low flexibility in regards to hours and nighttime work because of child labor provisions, higher probability of quitting, etc. Teenage workers may also bring advantages to employers, notably low wage expectations, temporary subminimum wages for 90 days, low healthcare costs, etc. Because of the low level of skills required in jobs filled by teenagers, substitutability is high, and we generally expect each advantage and disadvantage of teenage workers relative to adults to weigh heavily in the decision to hire teenagers.

Suppose also that teenagers make decision about employment and enrollment based on expected utility, which depends on their taste for leisure, on the bureaucratic cost of applying for jobs and obtaining work permits , on the expected value of waged employment and on their valuation of academic performance, which in turn may be a function of future expected earnings.

Hypothesis 1. The employment rate of sixteen and seventeen year old students is lower if an employment certificate is required for employment. By extension, the employment rate of sixteen and seventeen year old students is lower in states requiring such certificates.

⁴A tipped employee is any employee working in an occupation in which he or she regularly receives more than 30 dollars a month in tips.

In states that require employment certificates for sixteen and seventeen year olds, employers have to pay a monetary cost (10-15 dollars) for the issuance of an employment certificate, and then store the certificates for future inspections. The employers are at risk of being fined for improperly complying with child labor legislation, and this risk increases if an employment certificate is required. For students, obtaining a work permit discourages employment as it reduces the utility of employment through all or some of the following: filling in forms, talking to and obtaining permission from school counselors and parents, visiting the State Department of Labor, obtaining a certificate of physical health, being at risk of losing work privileges if school performance drops.

Hypothesis 2. After the enactment of compulsory schooling laws, employers hire fewer sixteen and seventeen year old students (just sixteen or both sixteen and seventeen, depending on the new maximal school leaving age provided by the compulsory schooling reform).

Following a compulsory schooling policy, the first order effect is that fewer students apply for jobs. Some of the students who would have dropped out may completely displace paid employment for full time schooling and comply with the policy. Regardless of how many students decide to substitute employment for enrollment, the total pool of job applicants is unambiguously lower if any substitution at all is going on. We assume there are no 'deniers', or students who would have stayed in school without seeking a job but choose to seek employment simply because the compulsory schooling law is passed.

The second order effect is that employers may negatively update their beliefs about teenage workers and choose to hire fewer teenagers overall. This is an example of negative selection: the students who choose to apply for exceptions to compulsory schooling laws or simply break the law and leave before the required age may be facing material hardship or may have very low academic skills and struggle in school. Thus the pool of students applying for jobs while not enrolled in school may be negatively selected.

Employers will also face greater uncertainty about the skills and motivations of students enrolled in school following the compulsory schooling policy. Such laws may lead employers to change their beliefs about the average attributes of enrolled students, since students who would have stayed in school are mixed with students who would have dropped out. Thus compulsory schooling policies increases the noise in the employer's ability to assess skills, motivation and work ethic of high school students and may induce employers to substitute high school students for other categories of workers altogether.

To formalize the previous argument, consider a model in which employers have prior beliefs

about categories of workers. For example, they believe the productivity V of job candidates follows a distribution $G(v, \sigma^2)$, with different distributions for high school students, high school dropouts, and adults. In a perfectly competitive market, firms would pay wages equal to expected worker value. Employers however face different constraints for the three categories of workers: different minimum wages for teenagers for 90 days, the cost of complying with child labor legislation, the cost of issuing employment certificates, different healthcare costs depending on the employee's age, etc. The employer's problem is to maximize profits by choosing a mix of candidates from the high school student, high school dropout and adult pools, given the hiring and minimum pay constraints.

Suppose employers form their beliefs about productivity of high school students and high school dropouts based on an enrollment signal, s . Let s be measure of perceived attachment to schooling, ranging from no further schooling to full enrollment, with intermediate categories : part-time schooling, adult education, GED. Assume employers believe the productivity of full high school attendance ($s(1)$), is higher than the productivity of students who have no further attachment to schooling $s(0)$

The pool of minors will then have a distribution of productivity of $G(v(S), \sigma^2)$, where S is a weighted average of schooling signals. $S = ps(1) + (1 - p)s(0)$, where p is the proportion of students enrolled in school.

After the compulsory schooling reform, employers no longer attach the same value to the full time school attendance signal, as they know would be dropouts are now a part of the pool of high school students. The mixing of potential dropouts with students who would have stayed in school is a very salient aspect in the debates surrounding compulsory schooling reforms. Opponents of compulsory schooling often argue students forced to stay in school may have academic and behavioral problems that could contaminate the academic performance and discipline climate of the school. Let δ denote the discount rate employers apply to the full time schooling signal after the compulsory schooling law is passed.

Employers may also downgrade the value they attach to the high school dropout signal, by a discount rate γ . This is because students who continue to drop out after the reform is passed may be negatively selected. For example, the state of Kansas explicitly makes parents of students looking to drop out before the age of 18 sign a disclaimer that the child lacks skills and his or her earnings will be lower later in life. Other students may break the law and face the fines and risk of imprisonment or other sanctions associated with habitual truancy. Some others may be coming from low socio-economic backgrounds and have a demonstrable need to work.

After the compulsory schooling reform, the pool of minors will have a distribution of productivity of $G(v(S'), \sigma^2)$, where S' is the weighted average of schooling signals after the compulsory schooling reform. $S' = p's(1)\delta + (1 - p')s(0)\gamma$.

If $S' < S$, employers will hire fewer minors under 18 and more employees over the age of 18, assuming the distribution of productivity is unchanged for adults. S' is lower than S if $p's(1)\delta + (1 - p')s(0)\gamma < ps(1) + (1 - p)s(0)$.

The perceived distribution of skills will be lower if the discount rates δ and γ are low, meaning employers are more wary of the negative selection process, and when the enforcement of the law is lax, meaning $p' - p$ is small. The model predicts the worst disemployment outcomes occur in situations where the debate surrounding compulsory schooling laws is protracted, casting a negative stigma on both dropouts and the average schoolstayer (low δ, γ), and the enforcement of the policy ends up being lax (low $p' - p$).

5 Data and summary statistics

The main data sources are the nationally representative Current Population Survey (CPS) March Supplements 1962-2013 and the 1979-2014 NBER Merged Outgoing Rotation Group supplements.

The National Bureau of Economic Research extracts of the CPS outgoing rotation files record the fourth and eighth (final) interview for households included in the sample. They provide information on usual weekly hours worked and earnings along other demographic and work related items. Individuals are interviewed if they are aged 16 and over. Households in the CPS are interviewed each month for four months, not contacted for eight months and then interviewed again for four more months. By pooling yearly extracts we will find the same individuals interviewed twice (in the fourth and eighth months). However, all analyses below are conducted with samples of individuals of a certain age. By restricting the analysis to single age cohorts, we avoid the problem of observing individuals twice in combined samples.

Information on compulsory schooling changes is compiled from state session laws and statutes, corroborated with Monthly Labor Review updates on state labor laws, information in Whitfield and Whitehurst (2012), Mackey and Duncan (2013) and email or phone conversations with State Departments of Education. Information on employment certificate legislation is compiled from the Department of Labor Wage and Hour Division website, as well as U.S. Department of Labor, State Child Labor standards publications. Information on minimum wage changes and state aver-

age yearly unemployment rates is also compiled from the US Department of Labor public data.

A series of covariates used in the analysis are constructed variables: using information on households, I sum weekly earnings of individuals aged 18 and over and divide total household weekly earnings by the number of household members. Earnings per family member are updated to 2014 values using the Bureau of Labor statistics CPI inflation calculator. I then create deciles of household income per member. I also record the maximal educational attainment in each household where a sixteen or seventeen year old is surveyed. The employment/enrollment status presented in Table 3 is created using different variables that measure enrollment, labor force status and part time/full time work status.

Table 3 presents the school enrollment and employment status of sixteen and seventeen year olds during the school year for selected years. As expected, the most significant changes in employment and enrollment rates are associated with recessionary periods. The percentage of students reporting being unemployed or not in the labor force has actually dropped over the past 25 years, even during recessions. The unemployed are however a larger share of those in the labor force, since the labor force participation rate has dropped considerably and there has been a substantial increase in teenagers reporting being enrolled and not in the labor force.

Table 4 compares the employment status of sixteen and seventeen year olds in states that require employment certificates past the age of sixteen versus states that do not have such a requirement. Fewer high school students are working part time in states that require employment certificates: 10.96 per cent, compared to 14.24 per cent in states that do not have such requirements. In states requiring certificates, students are more likely to be enrolled in full time schooling and not working. For example, 62.78 per cent of seventeen year olds are enrolled in school and not working in states requiring certificates, compared to 68.3 per cent in states with no mandatory certificates.

6 Estimation methods

I estimate the effect of compulsory schooling laws, state requirements for employment certificates for minors above the age of 16, and minimum wages on school enrollment and employment, at ages 16 and 17, separately. I split the analysis for different ages because such a split is relevant for the way compulsory schooling laws are enforced. Also, such a split avoids observing the same set of individuals twice, in different years, as individuals are observed in the CPS data in the fourth month of their interview and one year later, in the eight month in which the household is observed.

To estimate the effect of compulsory schooling laws on school enrollment, I regress an indicator variable for whether the student was enrolled in school during the school year (September through May) on indicators for whether the student faced a minimal school leaving age of seventeen or eighteen in their state of residence at the time when they were sixteen years old. The regression controls for the log of the state average minimum wage, the state yearly average unemployment rate as well as for a vector of demographic characteristics. The individual controls X_{ist} include: gender, race, an ethnicity indicator variable (Hispanic), indicator variables for the highest level of educational attainment in the household in which the teenager is surveyed and a measure of whether the area of residence was an outlying metropolitan region or a rural area (the baseline being individuals living in principal cities of metropolitan areas). Regressions include state (δ_s) and year (δ_t) fixed effects and errors are clustered at the state level. Regressions are run using individual observations but also by collapsing observations into state-year averages. This specification is also run separately for teenagers living in households in the lower decile of household earnings per member.

$$ENROLLED_{ist} = X_{ist} + DROPAGE17_{st} + DROPAGE18_{st} + \ln MW_{st} + UNEMPL_{st} + \delta_s + \delta_t + \epsilon_{ist}$$

To measure employment outcomes, I create an indicator variable that takes on the value one if the sixteen year old or, in another specification, the seventeen year old is working during the school year. I regress this variable on the previous set of controls.

$$EMPLOYED_{ist} = X_{ist} + DROPAGE17_{st} + DROPAGE18_{st} + \ln MW_{st} + UNEMPL_{st} + \delta_s + \delta_t + \epsilon_{ist}$$

To assess the effect of employment certificate requirements, i use the following specification:

$$EMPLOYED_{ist} = X_{ist} + CERTIFICATE_{st} + \ln MW_{st} + UNEMPL_{st} + \delta_s + \delta_t + \epsilon_{ist}$$

, where the CERTIFICATE variable measures whether states had a law in place requiring employment certificates for sixteen and seventeen year olds.

7 Results

Changes in the minimal school leaving age have a small and statistically insignificant effect on the overall enrollment of sixteen or seventeen year olds. However, the effect of these policies is larger and statistically significant for individuals in the bottom decile of household income. For these students, compulsory schooling laws increase the enrollment rate by about three percentage points. The higher effect of compulsory schooling for students from low income households is consistent with models that predict higher dropout rates for students from credit constrained households.

Laws requiring a higher minimal school leaving age have a negative effect on the employment rate. Requiring a minimal school leaving age of 18 reduces the employment rate at age 16 by 2.1 percentage points and by 1.7 percentage points at age 17 (Table 6, for years 1979-2014). Minimum wage laws have a large and statistically significant negative effect on the employment rate. It is interesting to note that if the increases in the minimum school leaving age reduce the probability that high school students work during high school, and these changes are contemporaneous with minimum wage increases, the disemployment effects of the latter will be confounded and upwardly biased. Out of the 20 states that increased compulsory schooling laws since 1987, eleven did so at the same time as increasing minimum wages. For example, a regression that omits the compulsory schooling indicators shown in Table 6 will show a coefficient of -0.011 (p value 0.001), larger than the coefficient obtained in a regression that accounts for compulsory schooling laws (-0.099 , p value 0.018).

Three of the twenty compulsory schooling changes occurred during the recent recession. We may be concerned that the drastic decrease in employment during the recent recession may bias results. Table 6 also presents estimates for the effect of compulsory schooling laws on employment between 1992 and 2008. The effect is a negative 2.5 percentage point decrease in employment for 16-year-olds for laws requiring schooling until 17 and a decrease of 1.9 per cent for 17-year-olds, both statistically significant.

To test the robustness of the effects of compulsory schooling laws on the employment rate, I estimate the effect of minimal age increases at ages where such policies should not have had an effect. Table 7 presents these estimates, showing that effects are statistically significant at ages 16 and 17, as expected under Hypothesis 2, and not statistically significant at other ages, with the exception of a coefficient in the regression for the sample of 18 year olds. The weak statistical significance of that coefficient may be an artifact of repeated testing but it may also be related to the compulsory schooling law if employers negatively update their belief about all teen workers at the time of the compulsory schooling increase, as suggested by Hypothesis 2.

The effect of relaxing employment certificate requirements is analyzed in Table 8. I estimate the effect of dropping work permit requirements for five states that did so between 1977 and 1995. Dropping the certificate requirement resulted in a 2.7 percentage point increase in the employment rate of 16-year-olds and a 1.9 percentage point increase for 17 year olds, both statistically significant. These results should not be interpreted as the causal effect of employment certificate requirements for sixteen and seventeen year olds, since laws to relax such requirements in some cases also relaxed nightwork and total hours restrictions for sixteen and seventeen year olds. The effects of the employment certificate requirement are thus confounded with other child labor pro-

visions in the specification in Table 8.

8 Conclusions

Increases in the minimal school leaving age in 20 states since 1987 account for a large share of the "unaccounted" secular decline in teenage employment. Previous macroeconomic estimates placed the unaccounted component at between two and three percentage points (Smith, 2011). Given the two percentage point decrease in employment in the 20 states implementing compulsory schooling policies, and the fact that these states represent 44 per cent of the US population, I estimate compulsory schooling laws can account for about one percentage point out of the national level decline in teenage employment.

While potentially raising high school dropouts' chances of finishing high school, compulsory schooling laws may also reduce exposure to the skills, earnings and hands on experience acquired while employed. The present analysis indicates that employment will decrease not only for potential high school dropouts who are kept in school longer, but also for other students, as employers may displace high school students with workers of other ages after a compulsory schooling increase. The large and positive effects that relaxing work permit legislation had on employment also highlight the need for minimal school leaving age increases to be analyzed in conjunction with employment certificate legislation.

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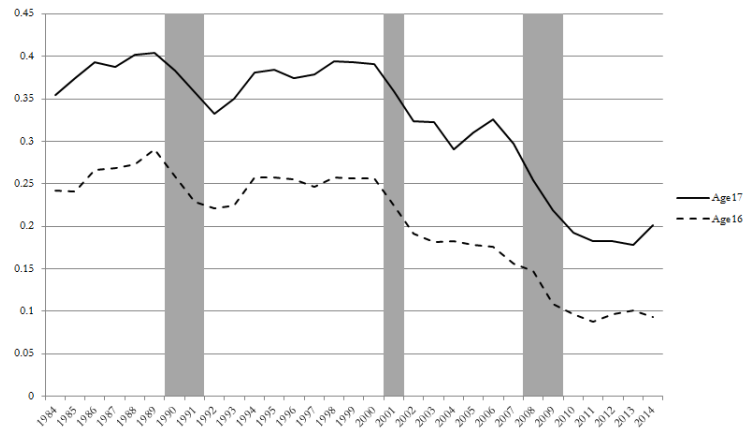
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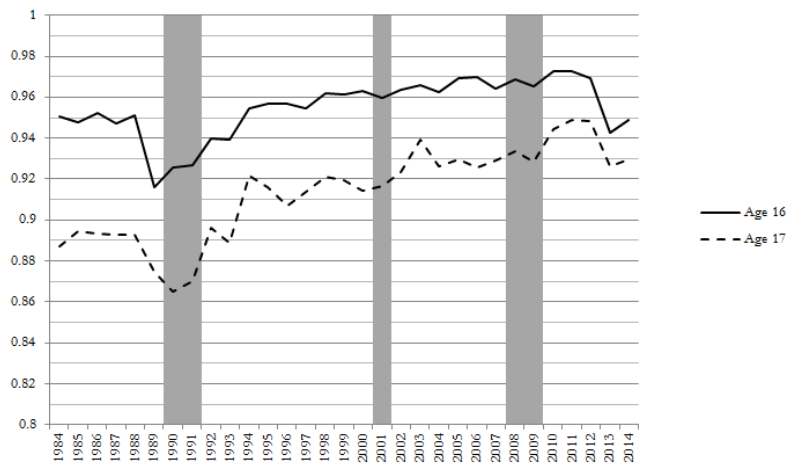
10 Appendix

Figure 1: Employment rate for sixteen and seventeen year olds who were enrolled during the school year



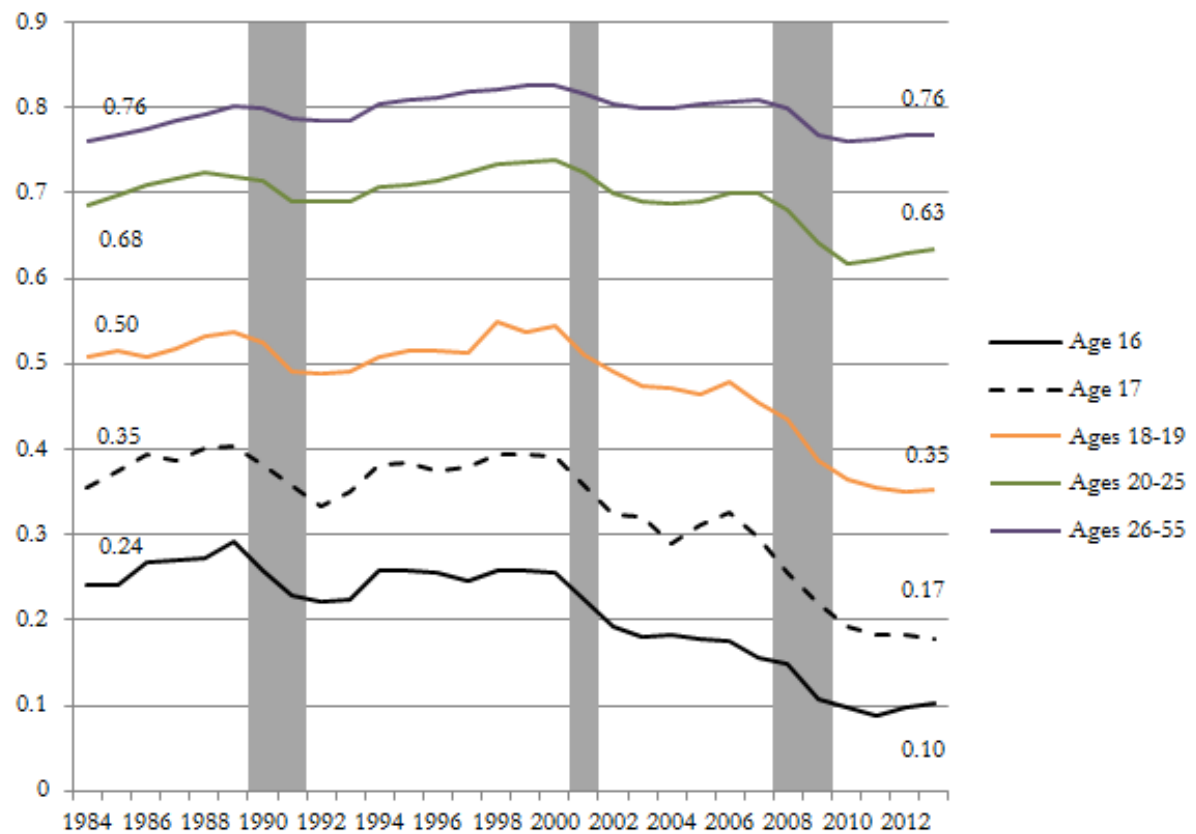
Source: Current Population Survey weighted data, 1984-2014. Observations only include individuals reporting being enrolled in school and being employed, September through May. Shaded regions indicate years with National Bureau of Economic Research designated recessions.

Figure 2: Enrollment rate for sixteen and seventeen year olds, September-May averages



Source: Current Population Survey weighted data, 1984-2014. Observations only include individuals reporting being enrolled in school and being employed, September through May. Shaded regions indicate years with National Bureau of Economic Research designated recessions.

Figure 3: Employment rate for different age groups (September-May averages)



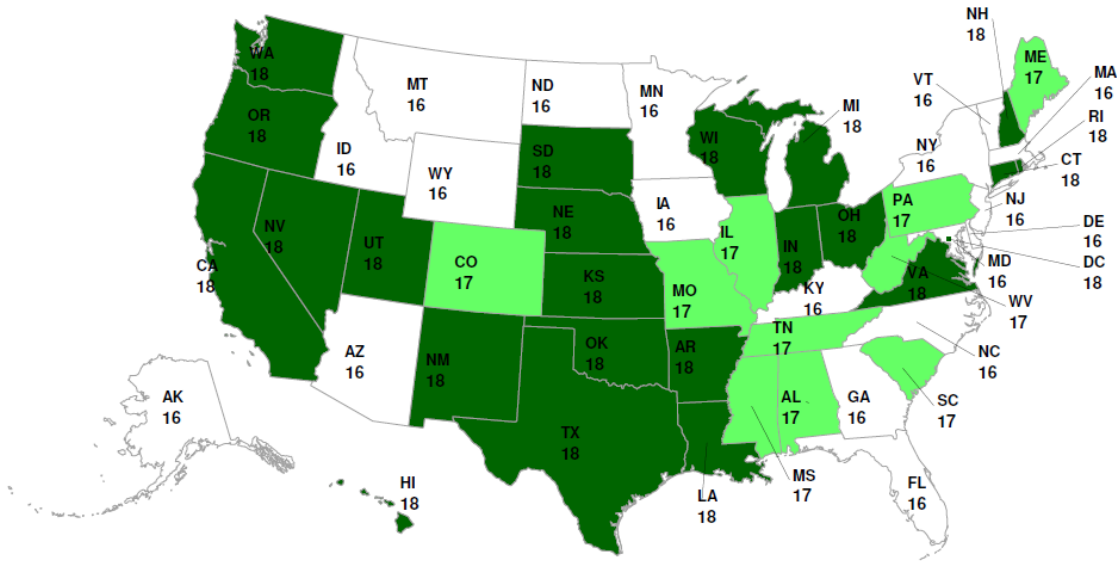
Source: Current Population Survey weighted data, 1984-2013. Observations only include individuals reporting being employed September through May. Shaded regions indicate years with National Bureau of Economic Research designated recessions.

Table 1: State minimal school leaving ages, selected years

State	1990	2000	2014	State	1990	2000	2014
Alabama	16	16	17	Montana	16	16	16
Alaska	16	16	16	Nebraska	16	16	18
Arizona	16	16	16	Nevada	17	17	18
Arkansas	17	18	18	New Hampshire	16	16	18
California	18	18	18	New Jersey	16	16	16
Colorado	16	16	17	New Mexico	18	18	18
Connecticut	16	16	18	New York	16	16	16
Delaware	16	16	16	North Carolina	16	16	16
DC	17	18	18	North Dakota	16	16	16
Florida	16	16	16	Ohio	18	18	18
Georgia	16	16	16	Oklahoma	18	18	18
Hawaii	18	18	18	Oregon	18	18	18
Idaho	16	16	16	Pennsylvania	17	17	17
Illinois	16	16	17	Rhode Island	16	16	18
Indiana	16	16	18	South Carolina	16	17	17
Iowa	16	16	16	South Dakota	16	16	18
Kansas	16	18	18	Tennessee	17	17	17
Kentucky	16	16	16	Texas	17	17	18
Louisiana	17	17	18	Utah	18	18	18
Maine	17	17	17	Vermont	16	16	16
Maryland	16	16	16	Virginia	18	18	18
Massachusetts	16	16	16	Washington	18	18	18
Michigan	16	16	16	West Virginia	16	16	16
Minnesota	16	16	16	Wisconsin	18	18	18
Mississippi	16	17	17	Wyoming	16	16	16
Missouri	16	16	17				

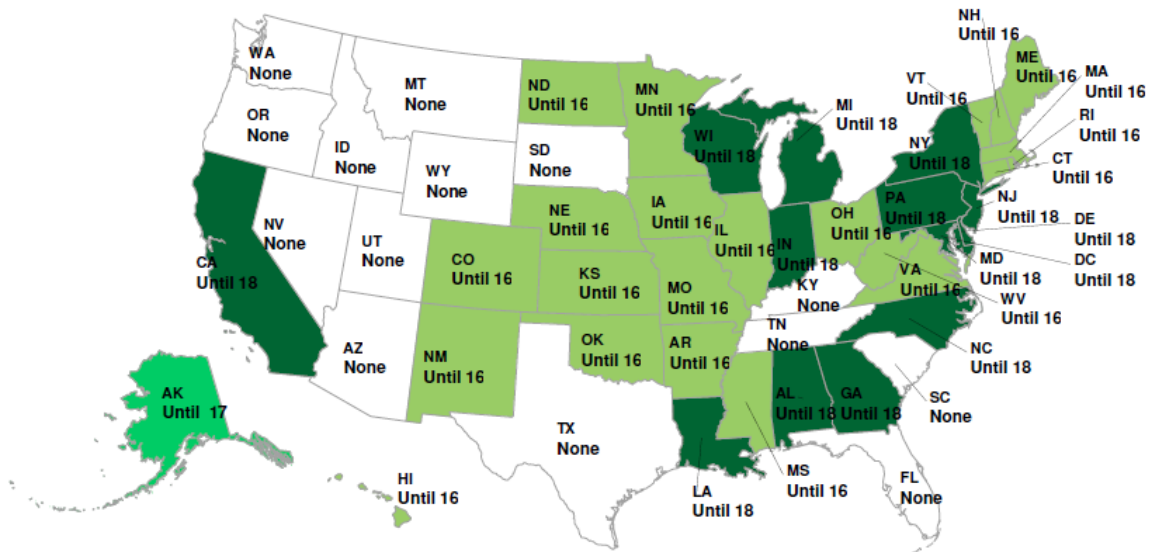
Source: Author's review of state session laws and statutes, corroborated with Monthly Labor Review updates on state labor laws, Whitehurst and Whitfield (2012), Mackey and Duncan (2013) and email or phone conversations with State Departments of Education.

Figure 4: Minimal school leaving ages in 2014



Map created with Statplanet software, replicates information in Table 1, column "2014"

Figure 5: Employment certificate requirements in 2014



Map created with Statplanet software ,replicates information in Table 2

Table 2: State requirements for employment certificates for minors, 2003-2014

No requirement	Arizona, Florida, Idaho, Kentucky, Montana, Nevada ¹ , Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Wyoming
Employment certificate required for minors under the age of 16	Arkansas, Colorado ² , Connecticut, Hawaii, Illinois, Iowa, Kansas ³ , Maine, Minnesota ² , Mississippi, Missouri, Nebraska, New Hampshire, New Mexico, North Dakota, Oklahoma, Rhode Island, Vermont, Virginia, West Virginia.
Employment certificate required for minors under the age of 17	Alaska
Employment certificate required for minors under the age of 18	Alabama, California ⁴ , Delaware, District of Columbia, Georgia, Indiana, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Pennsylvania, Ohio ⁵ , Washington, Wisconsin.

Notes: 1. Nevada requires an employment certificate only for minors under the age of 14. 2. During school hours. 3. Only if not enrolled in school. 4. Only for minors enrolled in school. 5. 16 and 17 during school term.

Source: Information on state certificate requirements comes from the Department of Labor Wage and Hour division website, <http://www.dol.gov/whd/state/certification.htm#5>

Table 3: Employment/ enrollment status of 16 and 17 year olds, selected years

A. Age 16	1984	1994	2000	2001	2002	2006	2007	2008	2009	2012	2014
Full time school only	65.68	64.77	66.95	69.35	73.02	75.38	76.86	78.38	81.68	83.5	83.13
Full time school, part time work	22.05	23.99	23.49	20.81	17.83	16.33	14.48	13.43	9.88	8.88	8.37
In school part time, working part time	0.3	0.23	0.43	0.3	0.25	0.24	0.08	0.21	0.16	0.16	0.13
Working full time, in school full time	0.56	0.38	0.7	0.4	0.36	0.49	0.42	0.6	0.43	0.3	0.39
Working full time, in school part time	0.06	0	0.09	0.04	0.05	0.03	0.11	0.07	0	0.03	0
Unemployed, in school full time	6.39	6	4.61	4.94	4.71	4.4	4.48	4.1	4.3	4.02	2.78
Unemployed, in school part time	0.02	0.11	0.06	0.1	0.13	0.11	0.02	0.07	0.06	0.04	0.06
Not enrolled	4.94	4.51	3.67	4.05	3.65	3.01	3.55	3.16	3.5	3.05	5.12
Not enrolled, working full time	0.6	0.42	0.6	0.59	0.69	0.43	0.64	0.46	0.37	0.51	0.86
Not enrolled, working part time	0.62	0.63	0.55	0.85	0.61	0.54	0.46	0.38	0.55	0.52	0.77
Not enrolled, unemployed	0.75	0.7	0.21	0.36	0.46	0.14	0.33	0.19	0.4	0.18	0.28
Not enrolled, not in labor force	2.97	2.76	2.31	2.25	1.89	1.9	2.12	2.13	2.18	1.84	3.21
A. Age 17	1984	1994	2000	2001	2002	2006	2007	2008	2009	2012	2014
Full time school only	50.04	50.83	51.14	54.29	57.49	58.38	61.26	65.05	67.24	72.72	70.46
Full time school, part time work	28.94	32.34	33.26	30.48	27.63	28.29	25.92	22.61	19.18	16.49	17.99
In school part time, working part time	1.16	1.18	0.79	1.02	1.04	0.7	0.59	0.23	0.41	0.29	0.29
Working full time, in school full time	1.06	1.22	1.44	1.12	0.97	1.1	0.92	0.84	0.71	0.53	0.33
Working full time, in school part time	0.29	0.33	0.25	0.25	0.23	0.1	0.2	0.08	0.02	0.04	0.08
Unemployed, in school full time	6.99	5.61	4.27	4.13	4.67	3.85	3.82	4.39	5.22	4.68	3.71
Unemployed, in school part time	0.24	0.63	0.28	0.39	0.31	0.13	0.22	0.18	0.09	0.08	0.11
Not enrolled	11.29	7.85	8.56	8.32	7.66	7.45	7.08	6.62	7.14	5.16	7.02
Not enrolled, working full time	2.62	1.26	2.32	2.09	1.75	1.47	1.24	0.91	0.89	0.73	0.82
Not enrolled, working part time	1.84	1.48	1.54	2.17	1.65	1.39	1.17	1.12	1.43	0.61	1.85
Not enrolled, unemployed	2.53	1.55	1.56	1.39	1.28	1.33	0.9	0.95	1.21	0.88	0.68
Not enrolled, not in labor force	4.3	3.56	3.14	2.67	2.98	3.26	3.77	3.64	3.61	2.94	3.67

Source: NBER extracts of the Merged Outgoing Rotation Files of the Current Population Survey, 1989-2014. The proportions are calculated using population weights. Averages for the months of September through May.

Table 4: Employment/enrollment status of minors by type of state mandated employment certificate

	Employment status at age 16 (during the school year)		Employment status at age 17 (during the school year)	
	States with no requirement	States requiring certificates	States with no requirement	States requiring certificates
				<i>% of total</i>
Full time school only	77.04	81.00	62.78	68.30
Full time school, part time work	14.24	10.96	23.90	19.74
In school part time, working part time	0.16	0.15	0.55	0.41
Working full time, in school full time	0.50	0.29	0.90	0.68
Working full time, in school part time	0.04	0.05	0.09	0.1
Unemployed, in school full time	4.43	4.14	4.64	4.47
Unemployed, in school part time	0.08	0.06	0.21	0.17
Not enrolled, working full time	0.41	0.49	1.19	0.91
Not enrolled, working part time	0.56	0.45	1.34	1.01
Not enrolled, unemployed	0.31	0.27	1.08	0.97
Not enrolled, not in labor force	2.21	2.13	3.30	3.24
Number of observations	30,356	18,899	30,074	18,613

Source: Data come from the NBER extracts of the Merged Outgoing Rotation Files of the Current Population Survey, 2003-2012. Information on state certificate requirements comes from the Department of Labor Wage and Hour division website, <http://www.dol.gov/vhd/state/certification.htm>. Notes: The school year excludes the months of June, July and August. For information on states included in the no requirement/requiring certificates categories, see Table 3.

Table 5: Regression estimates for the probability of enrollment, ages 16 and 17

	(1)	(2)	(3)	(4)
	Enrollment rate at age 16	Enrollment rate at age 16, bottom decile of HH income	Enrollment rate at age 17	Enrollment rate at age 17, bottom decile of HH income
Must stay in school until 17	.001 (.005)	.010 (.012)		
Must stay in school until 18	.005 (0.003)	.031* (.015)	.007 (0.007)	.037* (.015)
Cons	.916*** (.032)	.840*** (.042)	.862*** (.052)	.846*** (.085)
<i>State fixed effects</i>	Yes	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes
<i>N</i>	1,213	1,213	1,213	1,213

Notes: OLS regressions using Current Population Survey merged outgoing rotation groups(MORG) data for 1991–2014. Errors are clustered at the state level. Clustered robust standard errors in parantheses, + 0.10 signified $p < 0.1$; * Signifies $p < 0.05$; ** signifies $p < 0.01$; *** signifies $p < 0.001$. Regressions include controls for %female, minimum wages, unemployment rate, %Black, %Hispanic, % Female, %Rural, %Outside principal city.

Table 6: Regression estimates for the probability of employment, ages 16 and 17

	Employment rate at age 16,		Employment rate at age 17	
	1979-2014	1992-2008	1979-2014	1992-2008
Must stay in school until 17	-0.018* (0.007)	-0.025* (.011)		
Must stay in school until 18	-0.021** (.008)	-0.019 (.012)	-0.017* (.007)	-0.019* (.011)
Ln Minimum Wage	-0.099* (.040)	-0.099* (.039)	-0.069* (.029)	-0.060* (.034)
Unemployment rate	-0.016*** (.001)	-0.023*** (0.004)	-0.021*** (0.001)	-0.022*** (.003)
Cons	.387*** (.073)	.449*** (.069)	.540*** (.061)	.493*** (.078)
<i>State fixed effects</i>	Yes	Yes	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes
N	1,821	866	1,821	866

Notes: OLS regressions using Current Population Survey merged outgoing rotation groups (MORG) data for years indicated. Errors are clustered at the state level. Clustered robust standard errors in parentheses, + 0.10 signified $p < 0.1$; * signifies $p < 0.05$; ** signifies $p < 0.01$; *** signifies $p < 0.001$. Regressions include controls for %Black, %Hispanic, %Female, %Rural, %Outside principal city, %Of households where the highest level of educational attainment is Some college, %Of households where the highest level of educational attainment is college or graduate degrees.

Table 7: Robustness test for effects of compulsory schooling policies on the employment rate: unaffected age groups

	Employment rate								
	Age 16	Age 17	Age 18	Age 19	Age 20	Age 21	Age 22	Age 23	Age 24
Maximal leaving age 17	-.018* (0.007)	-.007 (.009)	-0.019* (0.007)	-.006 (0.006)	-.005 (0.007)	.000 (0.009)	.002 (0.007)	.011 (.008)	-.003 (0.007)
Maximal leaving age 18	-.021** (.008)	-.017* (.007)	-0.008 (0.007)	-.001 (0.007)	-.002 (0.009)	0.001 (0.012)	-.012 (0.009)	-.006 (0.006)	-0.013+ (0.007)
N	1,821	1,821	1,821	1,821	1,821	1,821	1,821	1,821	1,821

Notes: OLS regressions using Current Population Survey merged outgoing rotation groups(MORG) data for 1979-2014. Errors are clustered at the state level. Clustered robust standard errors in parantheses, + 0.10 signified $p < 0.1$; * Signifies $p < 0.05$; ** signifies $p < 0.01$; *** signifies $p < 0.001$. Regressions include controls for %Black, %Hispanic, % Female, %Rural, %Outside principal city, %Of households where the highest level of educational attainment is Some college, %Of households where the highest level of educational attainment is college or graduate degrees.

Table 8: Effect of work permit requirements on the employment rate of high school students

	Employment rate at age 16, 1977-2002	Employment rate at age 17, 1977-2002
Certificate requirement until age 18 is dropped	.027** (.009)	.019* (.009)
Ln Minimum Wage	.036 (.090)	.077 (.086)
Unemployment rate	-.011*** (0.002)	-.019*** (.000)
Cons	.286*** (.058)	.441** (.101)
<i>State fixed effects</i>	Yes	Yes
<i>Year fixed effects</i>	Yes	Yes
<i>N</i>	711	711

Notes: OLS regressions using Current Population Survey March data, 1977-2002 and includes individuals who were enrolled in high school. Data is collapsed at the state-year level. Errors are clustered at the state level. Clustered robust standard errors in parantheses, + 0.10 signified $p < 0.1$; * Signifies $p < 0.05$; ** signifies $p < 0.01$; *** signifies $p < 0.001$.