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The Affordable Care Act and the Market for Higher Education

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Abstract

Through changing the connection between insurance and employment, the Affordable Care Act (ACA) has affected people's incentives to obtain education. We employ a triple-difference strategy comparing counties with different levels of uninsurance pre-ACA and in states with different Medicaid expansion decisions across time to investigate changes in enrollment in different types of higher education institutions. We find that enrollment in less-than-two-year for-profit colleges increased more between high- and low-uninsurance counties in states that expanded Medicaid relative to states that did not do so, with nearly all the increase taking place after the 2012 Supreme Court decision that gave states the right to choose not to expand Medicaid. Differential enrollment is flat for all other comparable college types. We find this differential increase in less-than-two-year for-profit college enrollment to be remarkably general across demographic groups, although the effect is statistically and economically more significant for Hispanics. Studying effects on degree completion, we find strong evidence that the increase in enrollment led to an increase in certificates awarded, most prominently in vocational fields. This pattern is consistent with the notion that by relaxing job-lock, the ACA encouraged individuals to seek training in vocational fields that would facilitate employment in low-insurance industries. Our results are robust to controlling for confounders such as the differential impact of the Great Recession, changes in state appropriations for higher education, and differences in age composition across counties, thus ruling out the role of the young adult provision of the ACA in contributing to our results, and they survive a plethora of sensitivity checks.

Key words: Affordable Care Act, postsecondary education, for-profit schools, health insurance, Medicaid

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1 Introduction

Getting health insurance in America is intimately connected to choosing whether and where to work. Therefore, it should not be surprising that the U.S. health insurance market may influence, and be influenced by the market for higher education. In this paper, we investigate the effects of the largest overhaul of health insurance in the U.S. in recent decades – the Patient Protection and Affordable Care Act of 2010 (ACA) – on college enrollment choices.

The Affordable Care Act revolutionized the health insurance landscape faced by individuals under 65 and made the ability to purchase meaningful health insurance much less contingent on holding a job that offered one. Previously, the only well-functioning insurance markets were those for employers providing insurance to their workers, since the workforce of a large firm offered a homogeneous pool with respect to health. Small group or nongroup health insurance markets were plagued by adverse selection, and were unable to effectively insure individuals against long-term shocks to their health expenditures. The ACA attempted to solve the adverse selection problem in the nongroup market by 1) forbidding insurers to price on health status, 2) mandating that everyone buy health insurance or pay a penalty, thus limiting the adverse selection against the nongroup market as a whole, and 3) subsidizing health insurance for those too poor to purchase it. The subsidies took two forms: explicit tax credits on special health insurance exchanges, and an expansion of the Medicaid program to all adults earning under 138% of poverty, regardless of family status. Consequently, individuals not working in a large firm could now purchase insurance at prices closer to actuarial fairness on the newly regulated individual market, or could become eligible for Medicaid.

By extending meaningful health insurance to self-employed and small-employer settings, the Affordable Care Act increased the marginal benefits of working in these settings. Therefore, the ACA should have increased the demands for investment in the skills required for these jobs, which is typically done through higher education. In theory, there are multiple, often countervailing effects that the passage of the ACA could have on the demand for higher education. First, ACA served to relax job-lock (the labor market phenonmenon where workers choose jobs based on health insurance availability rather than inherent preference) by increasing health insurance availability in smaller firms and subsidizing insurance at the exchange. This may have encouraged workers to pursue their "dream jobs" in small firms which earlier did not provide health insurance, but now do. This would in turn lead to demands for shorter degrees and certificates that offer a quick training or re-training in fields that serve as conduits to these "dream jobs". Relatedly, if it leads individuals to shift from jobs in firms that offer health insurance to jobs in firms that don't, the ACA could incentivize people to switch towards the types of higher education that provide the relevant skills for jobs in firms without health insurance. Notably, the passage and implementation of the ACA largely followed the rise of for-profit colleges – many offering very quick (less-than-2 year) degrees geared towards specific jobs, such as cosmetology, grooming and construction etc. Many of these jobs are performed in small establishments that earlier did not offer health insurance but now do, or still don't offer health insurance, or by the self-employed. Second, by weakening the link between employment and insurance, the ACA could encourage people to exit the labor force – for example, by becoming homemakers – which would decrease their demand for higher education. Third, as colleges typically offered insurance to their students before the enactment of the ACA (since they, like large businesses, were homogeneous pools with respect to health), the ACA created incentives for individuals to leave college to enter the labor force in a job that would not have offered insurance before the ACA. The ACA could have also discouraged work more generally through high marginal tax rates (Mulligan and Gallen 2013a and b), and thus discouraged investment in higher education. Fourth, the ACA may have increased the demand for education through a wealth effect of individuals receiving subsidized insurance. Finally, since the ACA increased the Medicaid eligibility threshold substantially (to a value that is in excess of the earnings of many jobs that typically do not offer insurance), it may have increased the incentive for poor people to take these jobs without losing their Medicaid coverage, and to get training for them.

We exploit the 2012 Supreme Court decision that left the choice of Medicaid expansion up to the states in order to obtain variation across states in the intensity of the implementation of the Affordable Care Act. This variation has traditionally been used to assess the effects of the ACA on various outcomes. Pinkovskiy (2015) finds positive effects of the Affordable Care Act and of the Medicaid expansion on employment, while Kaestner et al. (2015) does not find any effects of Medicaid expansion on employment. Duggan et al. (2017) finds that labor force participation increased in areas with higher potential Medicaid enrollment but these increases were offset by reductions from other parts of the ACA. Pinkovskiy (2015) looks at industry-specific effects and finds that the positive effects of the Affordable Care Act on employment were concentrated in "low-insurance industries," such as leisure and hospitality. As in these previous papers, we confront the concern that Medicaid expansion decisions by the states are endogenous. Therefore, we investigate effects on enrollment in different types of higher education over time by comparing counties with low and high pre-ACA uninsurance rates in states that did and did not expand Medicaid. While low-uninsurance counties and high-uninsurance counties are, possibly, different ex ante, and the Medicaid expansion decision is likely endogenous, it is unlikely that state-level Medicaid expansion decisions are endogenous to economic outcomes in any single county. In our county-level setup, we formally investigate this hypothesis by including state by year fixed effects in our regression in one of our robustness checks, which should flexibly control for any determinants of the state decision of whether to expand Medicaid or not.

We find that areas that were substantially affected by the Medicaid expansion (high uninsurance areas in Medicaid expanding states) saw an increase in enrollment in less-than-two-year for-profit colleges, starting in fall 2012, the academic year immediately following the 2012 Supreme court ruling. This increase is very general across various demographic groups and age categories, however the effects are statistically and economically stronger for Hispanic students. Our results cannot be explained by a variety of potentially omitted trends, differential recovery paths from the Great Recession and differential changes to public funding of higher education. They also survive several other sensitivity checks. The more pronounced enrollment increase for Hispanic students is consistent with the fact that Hispanics were most likely to gain insurance in some form under the ACA. These findings are consistent with the framework described above because less-than-two-year for-profit colleges typically cater to vocational and other skills demanded in low-insurance industries with small firms. Hence, a relative increase in the attractiveness of jobs in such industries should spur a relative increase in demand for the skills associated with them. Indeed, we find that the increases in enrollment that we attribute to the ACA translated into increases in certificate attainment shortly afterwards and these increases were concentrated in the vocational sector, which primarily prepares students for work in low-insurance industries.

2 The Affordable Care Act and the Medicaid Expansion

Adverse selection has historically been a major problem in health insurance markets because patients tend to have much more information about their propensity to utilize medical resources than they can credibly reveal to insurers. Therefore, health insurance markets in the U.S. have functioned well only in the context of large businesses buying insurance for their employees, who would then constitute a large pool that is randomly selected from the point of view of health. The individual and small group insurance market – used by people who are not employed, self-employed, or employees of small firms – sees relatively low premiums for healthy individuals and groups, but outright denial of coverage for individuals and groups who have a high risk of substantial medical expenditures. The fact that people with high risk cannot purchase insurance at a price that is close to being actuarially fair, and the fact that insurance firms compete on attracting the best risks instead of on being the best at managing risks, indicates an information failure in the nongroup market and represents substantial welfare loss (Hendren 2013).

The approach of the ACA in solving this problem is threefold. First, insurance firms are now forbidden from denying insurance or increasing premiums based on health status – premiums can now vary only based on features of the plan, and the age and tobacco use of the policyholder. Second, everyone is obligated to buy and hold a health insurance policy in order to prevent people from buying insurance only when they are sick and thus bankrupting the insurers. Finally, to make sure that poor households and firms have affordable insurance options, the government offers a subsidy to buying insurance, which phases out as the income of the policyholder grows.

A critical component of the subsidy component is the expansion of Medicaid eligibility to all individuals legally residing in the U.S. whose income is below 138% of the federal poverty line. This expansion would have extended insurance to people earning relatively higher incomes, as well as to childless adults, who typically face much lower earning limits to qualify for Medicaid. As Medicaid is a program that is administered by the states, the ACA could not directly compel the states to implement the envisioned expansion, but instead incentivized states to expand the program by threatening to take away the matching funds that the federal government provides to state Medicaid programs. Given that nonexpanding states would have to cut their Medicaid spending considerably following the loss of the matching funds, it was anticipated that all states would expand Medicaid. However, on June 28, 2012, the U.S. Supreme Court ruled in *National Federation of Independent Businesses vs. Sebelius* that it was unconstitutional for the federal government to take away the matching funds for existing Medicaid spending from the nonexpanding states, thus making it considerably more feasible for individual states not to proceed with the expansion.[1]

Shortly after the Supreme Court ruling, some states declared that they would be adopting the expansion while other states declared that they would not be. By January 2014, when the expansion was set to begin nationwide, 24 states and the District of Columbia decided to expand Medicaid to the thresholds specified in the ACA, while the remaining states did not proceed with the expansion. The number of expanding states has increased to 31 (plus D.C.) by 2018, with several additional states adopting a modified version of the expansion after negotiations with the federal government. While expanding states tended to be located in the Northeast, Midwest and on the Pacific Coast, there were many instances of similar states, such as Kentucky and Tennessee, differing in their Medicaid expansion decisions, and thus creating useful variation for observing the effect of the expansion. Figure 1 Panels A-C show, respectively, the states that made statements in support of adopting the expansion by July 2012 (as measured by the Advisory Board), the states implementing the expansion by January 2014, and the states that have implemented the expansion as of 2018. Figure 2 shows the chronological order of these events.

It is by now well known that the Affordable Care Act substantially decreased uninsurance (Kaestner et al. 2015; Duggan et al. 2017). Appendix Figure A.1 Panel A shows that there was considerable variation in the baseline (2009) distribution of uninsurance rates. Figure 3 Panel A maps the county-level uninsurance rates in 2009, while Figure 3 Panel B maps county-level uninsurance rates in 2014 and 3 Panel C maps county-level differences between the two (all data from the U.S. Census, Small Area Health Insurance Indicators). We see that uninsurance rates declined across the country, with particularly large declines in high-uninsurance areas that adopted the Medicaid expansion, such as West Virginia, Kentucky and Arkansas. Moreover, the uninsurance rate declines are closely correlated with uninsurance rates in 2009, before the ACA was voted into law. Figure **??** plots uninsurance rate declines between 2009 and 2014 against 2009 uninsurance rates at the county level, differentiating between counties in states that expanded Medicaid by January 2014 and counties in states that did not. We see that while the correlation between uninsurance rates in 2009 and their subsequent declines is much stronger for counties in Medicaid expansion states, it is present and substantial for both sets of counties. This variation in the strength of the impact of the ACA on counties that differ in uninsurance rate

[1] The 2012 Supreme Court challenge to the constitutionality of the ACA was centered around the question of the constitutionality of the individual mandate at the heart of the law, with the Medicaid expansion question of secondary concern. On the eve of the decision, most observers believed that the Supreme Court was likely to strike down the ACA in its entirety, with very few expecting the law to remain on the whole but the Medicaid expansion to be weakened. (https://fivethirtyeight.blogs.nytimes.com/2012/06/27/overconfidence-suggested-in-supreme-court-predictions/).

and Medicaid expansion status will be the identifying variation for this paper.

There is a large literature on employer-based health insurance inducing "job lock" in the labor market because of adverse selection (Madrian 1994, Gruber and Madrian 1994, 1997). This mechanism induces workers to stay in jobs in which they do not have a comparative advantage because the absence of a functional individual market precludes them from obtaining comparable health insurance elsewhere. Garthwaite, Gross and Notowidigdo (2014) show "job lock" can also result in "employment lock" as individuals inefficiently participate in the labor market instead of withdrawing in order to keep access to health benefits. Empirical evidence on whether insurance expansion decreases or reallocates labor supply has been mixed, with Baicker et al. (2014) finding no significant effects on labor supply of being randomly assigned to Medicaid in the Oregon Health Insurance Experiment, while Dague et al. (2017) find reductions in labor supply from receiving Medicaid through plausibly exogenous variation in Medicaid expansion in Wisconsin. In the wake of the implementation of the Affordable Care Act, a number of papers looked at the effects of the ACA on labor supply (Duggan et al. 2017; Kaestner et al. 2017, Leung and Mas 2016, Heim et al. 2018). These studies do not find any substantial reduction in labor supply as a result of relaxation of employment lock, or reallocation as a result of relaxation of job lock under the ACA, although they are consistent with heterogeneous effects for different subgroups. Peng et al. (2018) finds a transitory disemployment effect from Medicaid in low-insurance industries by comparing border counties of states that did and did not expand Medicaid. Antwi et al. (2015) show that labor market outcomes for young adults were generally unaffected by the ACA although there was evidence of reduced work hours (see also Bailey and Chorniy 2015), while Dillender et al. (2019) found no evidence of people going into health care fields in response to local health care demand as induced by the ACA. Dillender et al. (2018) find that demand for health care workers as proxied by vacancy postings increased in response to the ACA. Kofoed and Frasier (2019) find that the young adult insurance provision under the ACA decreased reenlistment in the U.S. Army and find descriptive evidence that it increased college-going of young veterans as captured by increased post-9/11 GI bill benefit usage. Our results are consistent with the prior literature in not finding substantial supply-side responses in the health care sector, but add to this literature by finding supply-side responses consistent with reallocations at the margin from industries that typically offered insurance before the ACA to industries that typically didn't (see also Pinkovskiy 2015). Building on this literature, our paper is the first to study supply side responses as reflected in detailed education choices of individuals such as choice of type of institution, degree and field of study. This paper is the first to establish an inflow into the less than two-year for-profit education following the ACA and Medicaid expansion and the concentration of this increase in vocational certificates.

3 Data

3.1 County-Level Uninsurance Data and Medicaid Data

We obtain data on uninsurance rates at the county level from the U.S. Census's Small Area Health Insurance Estimates. These estimates integrate data from the American Community Survey, the U.S. Census, participation data from Medicaid and CHIP as well as additional data from the IRS and the food stamp program (SNAP) using Bayesian hierarchical modeling (Bauder et al. 2012). While the resulting estimates of uninsurance rates contain measurement error, there is no reason that it will correlate with the errors in our dependent variables. If this measurement error is uncorrelated with the errors in our dependent variables, it should attenuate the coefficients on terms in our specification that include county-level uninsurance rates and yield underestimates of our coefficient of interest.

We use four different ways to classify states as expanding Medicaid or not: (i) those that announced their decision to expand just after the Supreme Court ruling in 2012[2] (ii) those that expanded early, before ACA implementation on January 1, 2014; (iii) those that expanded before or on January 1, 2014, and (iv) those that expanded after January 1, 2014, but before September 2018. We will also use the simulated change in Medicaid eligibility from 2010 to 2015 based on data from Frean, Gruber and Sommers (2017). We are grateful to the authors for sharing the data with us.

3.2 Higher Education Data

The higher education data we use in our analysis comes from two sources: Integrated Post-secondary Education Data System (IPEDS) and College Scorecard data (CSD). We discuss each of these datasets in turn below.

Enrollment data come from the IPEDS and are at the institution-year level. We focus on two measures of total enrollment: fall undergraduate enrollment and twelve-month undergraduate enrollment[3]. Fall enrollment count measures the enrollment of an institution in the beginning of the academic year (typically on October 31st). Twelve-month undergraduate enrollment, in addition, counts students who enroll during the academic year, after October 31st. In addition to measures of overall enrollment, we also leverage enrollment measures by racial groups (Black, Hispanic and White), gender groups (Female and Male), age groups (under 25, 25-29, 30-34, 35-39, 40-49, 50-64) and enrollment statuses (full-time and part-time). To test that our results are robust to variations in state appropriations across counties and years, we use institution-year level data on state appropriations for our period of interest (2005 through 2014) which we aggregate to county-year level.

[2]These data reflect announced state intentions to expand Medicaid as of July 2012. We obtain these data from http://reformmedicaid.org/wp-content/uploads/2012/07/DB_medicaid_map_lg7_6.jpg, originally the Advisory Board.

[3]We focus on undergraduate enrollment because impacts are more likely to be perceived in undergraduate enrollment. Students who have already decided on higher studies are less likely to be discouraged by the ACA to discontinue. Alternatively, graduate studies involve considerable investments and hence it is less likely that students would opt in favor of higher studies just because of the ACA. Moreover, undergraduate enrollment measures are better populated largely because not all institutions offer graduate level courses. Undergraduates constitute bulk of higher education students (86%). Nevertheless, we do investigate effects on graduate enrollment and do not find any impacts.

We differentiate between various types of post-secondary institutions (less than two-year, two-year and four-year; public, private for-profit and private not-for-profit) to understand whether differences in exposure to the ACA at the county level led to changes in enrollment in the different types. Figure A.2 shows the composition of the various post-secondary education types by institution share and enrollment share. As can be seen, the less than two-year market is dominated by for-profit institutions, the two-year market is dominated by public institutions while the four-year market is characterized by some large public institutions contributing a large share of enrollment. Figure A.3 presents some examples of the various school types used in this paper. Since our identifying variation is at the county level, we aggregate the institution-year level education data to county-year level. We balance our data at the county-year-institution type level to ensure that all regressions are run on the same set of counties and years. This balancing is done by imputing a zero enrollment in a county-year-institution type cell when that cell does not have any institution. In all our regressions, we include a dummy that takes a value of 1 for the imputed zero values of our dependent variables.

3.3 Other Data

We employ a range of covariates from the US Census, which contains demographic and education information. We use total age distribution of the population (%18-24, %25-34, %35-44, % 45-64, %65 or over) at county-year level in the baseline (2000). In addition, we obtain education distribution in the baseline (2000) from the Census which we interact with year dummies to get relatively exogenous variation in county level education over time, which we later employ as controls. The specific education measure we use in our analysis is the share of population with at least some college, but our results are robust to other education measures such as share of population with high school or above, share of population with bachelors or above. In some of our robustness checks, we use the county-level unemployment rate in the baseline (2009) as provided by the Bureau of Labor Statistics and interact it with year dummies to get county-year level variation.

To study whether the ACA affected mobility across states and counties, we use individual-level data from the Federal Reserve Bank of New York/Equifax Consumer Credit Panel (CCP). We observe individuals' state and county of residence each quarter, allowing us to track whether mobility was affected by the Medicaid expansion status of the state in which an individual resides and whether any such effects differed by the level of uninsurance in individuals' original counties.

3.4 Descriptive Statistics

Tables A.1, A.2, A.3, and A.4 contains descriptive statistics of our main analysis variables at the county level. Our data include 1582 counties and 10 years of data, 2005 through 2014. Since our main variables of interest are different measures of enrollment, most of which are measured in the fall of an academic year, we index academic years by the fall semester of the year throughout our analysis.

Table A.1 shows that there was substantial variation in Medicaid expansion across counties and time: 18% of the counties were in states that announced after the Supreme Court ruling in 2012 their intention to expand Medicaid by 2014. We refer to these states as "2012 Medicaid states" in rest of the paper. On the other hand, 42% of counties experienced expansion by 2014 ("2014 Medicaid states") and 53% experienced expansion by 2018 ("2018 Medicaid states"). Using the Frean-Gruber-Sommers measure of simulated Medicaid eligibility, we find that average Medicaid eligibility was 9% during our period of analysis.

The under-65 uninsurance rate in 2009 at the county level was on average 20% with a standard deviation of 6. Figure A.1 shows there was a lot of variation in uninsurance rates across counties, with uninsurance rates ranging from around 5% in the highest insurance rate county to around 50% in the lowest insurance rate county. As is seen in Table A.1, the median county had an uninsurance rate of 20%, while the interquartile range was 9%.

Table A.1 also shows some general statistics about the counties and populations that we are analyzing. An average county in our sample had a population of 133 thousand, somewhat larger than the average county in the U.S. The average unemployment rate in 2009 (at the depth of recession) across our counties was 9.2%. The average share of young adults (18-24) in a county is 14%, and the share aged 25-34 (potential returning students) is 17%. On average, 4.4% of the individuals moved counties in a given year. Share of state appropriations for less-than 2-year public colleges in an average county that received such appropriations (e.g. because it had a public college) was 14% in 2005, suggesting that public colleges receive substantial subsidies from state governments.

Tables A.2 and A.3 present enrollment statistics by college type. The top panel includes summary statistics for all counties with positive enrollment of the specified type of college, while the bottom panel includes the zeros assigned to counties lacking the corresponding types of higher education institutions. During our period of analysis, looking at the bottom panel, average county fall enrollment was 1,215; county twelve-month enrollment (which includes enrollments after October 31st and during the academic year) was on average 1,654. At the county level, enrollees were more likely to be white and slightly more likely to be female, more likely to be below 25 years old and more likely to attend school full-time. Less than 2-year for-profit colleges had an average county fall enrollment of 174 and a twelve-month enrollment of 299, suggesting that enrollment in these colleges makes up 14-18% of overall enrollment. In the less than two-year sector, for-profit schools are the largest in size. In both the four-year and two-year sectors, for-profit schools are much smaller than their public counterparts, but larger than their not-for-profit counterparts. While all institution types have more white students, for-profits have a higher share of minority students (blacks and Hispanics). They also have a higher share of females. Except community colleges (2-year public colleges) all institution types have a higher share of full-time students.

Finally, Table A.4 shows that certificate attainment in <2 year for-profits is dominated by vocational and healthcare certificates. The most popular vocational fields in terms of certificate attainment are culinary and personal care and cosmetology and grooming, while for healthcare it is medical. Within medical, by far the most popular subfield is medical assistants certificates.

4 Empirical Strategy

We seek to obtain plausibly exogenous variation in the exposure of an area to the Affordable Care Act. It is clear from Figure 3 Panel C that different counties experienced different changes in uninsurance because of the ACA, and uninsurance rates in 2009, a variable that is predetermined with respect to the law, was a key predictor of these changes. However, counties with different uninsurance rates in 2009 also differ on many other dimensions – such as income and unemployment – which may place them on differential trends with respect to enrollment in different types of higher education for reasons unrelated to the implementation of the ACA. We argue that we can improve the quality of the variation in county uninsurance rates in 2009 by interacting them with indicators for whether the state in which the county was located expanded Medicaid. While Medicaid expansion decisions may be endogenous, as they are taken through a political process, it is unlikely that they are made because of the circumstances of a single county or group of counties within the state in question. Hence, we may take counties that are located in Medicaid-expanding states as counterfactuals for counties with the same rates of uninsurance in 2009 in states that did not choose to expand Medicaid.

A concrete example can be found by thinking of Bolivar County in Mississippi and Phillips County in Arkansas. Both are small, rural counties in the valley of the Mississippi River with around 20% uninsurance rates and over 60% of the population being African-American. However, Arkansas decided to adopt the Medicaid expansion, while Mississippi decided not to move forward with it. Therefore, because of the political dynamics of the rest of their states (which otherwise need not affect the counties in question), Phillips County receives the Medicaid expansion while Bolivar County does not.

Our specification is as follows:

$$\ln\left(y_{c,t}\right) = \eta_c + \mu_t + \alpha_t \times MCE_{s(c)} + \beta_t \times U_c^{2009} + \gamma_t \times MCE_{s(c)} \times U_c^{2009} + \delta z_{c,t} + \Phi X_{c,t} + \varepsilon_{c,t} \tag{1}$$

where $y_{c,t}$ is a dependent variable of interest (usually enrollment in some type of higher education institution in the given county c and year t), η_c are county fixed effects, μ_t are year fixed effects, $MCE_{s(c)}$ is a time-constant indicator for state s in which county c is located adopting the Medicaid expansion, U_c^{2009} is the uninsurance rate of county c in 2009, and $MCE_{s(c)} \times U_c^{2009}$ is an interaction of the two. The year fixed effects α_t multiplying the Medicaid expansion indicator flexibly control for differential nonlinear time trends between counties located in states that expanded Medicaid and counties located in states that didn't. The year fixed effects β_t flexibly control for differential time trends between counties with different uninsurance rates in 2009. The parameters of interest in this specification are the fourth set of year fixed effects γ_t, which measure the differences-in-differences in the dependent variable in question at time t between high-uninsurance and low-uninsurance counties in states that expand Medicaid compared with states that don't.[4] Our identification assumption is that the only reason why differentials in the dependent variables (e.g. enrollment rates in various types of colleges) between high- and low-uninsurance counties and across expanding and non-expanding states vary over time is because of the changes to health insurance markets brought about by the Affordable Care Act, and specifically because of the differential Medicaid expansion decisions resulting from the 2012 Supreme Court decision in *NFIB vs. Sebelius*.

Since our dependent variable $y_{c,t}$ is typically a count variable that may equal to zero, and the logarithm of zero is undefined, we follow the procedure of Pakes and Griliches (1980) (also employed by Acemoglu and Linn 2004) and include a variable $z_{c,t}$ that is an indicator for whether $y_{c,t}$ is equal to zero. This correction tends to be unimportant in practice. In some versions of our specification we also seek to control for potential omitted variables $X_{c,t}$ that may be third factors explaining the observed correlations (or lack thereof) between enrollment in various types of higher education and the variables measuring ACA exposure intensity. These will be discussed in greater detail in the Results section.

We will experiment with multiple definitions of Medicaid expansion, but we will focus on defining expanding states as the states that announced their intent to expand Medicaid in July 2012, shortly after the decision. All of these states eventually expanded Medicaid. We will also consider other definitions of Medicaid expansion by looking at the states (i) that expanded early before the anticipated January 1, 2014 expansion date, (ii) that expanded on or before January 1, 2014, and (iii) that expanded by September 2018. Appendix Figure A.4 lists the states that belong to this various Medicaid expansion groups. Additionally, we will estimate our specification replacing the Medicaid expansion variable with simulated Medicaid eligibility from Frean, Gruber and Sommers (2017), which is the percentage newly eligible for Medicaid in 2015 relative to 2010 under each state's law out of a demographically and economically standardized population.

5 Results

5.1 Main Results: Effects on Overall Enrollment

The objective of this section is to understand the effects of county level differences in exposure to the ACA (as captured by differences in Medicaid expansion and baseline county uninsurance measures) on postsecondary education choices of individuals as captured by postsecondary enrollment. Our main results presented in this section estimate specification (1) in section 4. It is important to note that our main results do not rely on the inclusion of any state-year level covariates (X_{ct}) or county trends. We will later see that our results hardly change with the inclusion of controls, county trends, state by year fixed effects or more sophisticated control

[4]It is important to note that the Medicaid expansion indicator may be measuring not just the direct effect of the Medicaid expansion on higher education enrollments but also the effects of a state's more favorable policy towards the ACA more generally. For example, states could influence the extent to which the uninsured participated in the health insurance exchanges through advertising, exchange design, outreach, and other channels.

strategies (section 5.8). Moreover, estimates from this specification suggest that the pre-trends in differential enrollment between high- and low-uninsurance counties in expanding and non-expanding states are flat at zero, and therefore adequately accounted for. Therefore, we do not include controls in our baseline specification but rather consider them as robustness checks, since they do not appear to be necessary for identification.

We begin by studying the effects on overall enrollment. Figure 4 Panels A and B present results from estimation of the event study specification (1) on overall enrollment. Here we focus on the 2012 Medicaid expansion definition(see section 4). Throughout our analysis, we only present results for <2 year and 2-year for-profit and public institutions. We do not find any effect on enrollment in 4-year institutions or on not-for-profit institutions, so these results are not reported to save space, but are available on request. The top right chart of Figure 4 shows that counties with 1% higher uninsurance rates in Medicaid expanding states experienced 1.25% higher enrollment in <2 year for-profit institutions after three years (2014) of the 2012 Medicaid expansion announcement following the Supreme Court ruling as compared to their counterparts in non-expanding states. This effect is highly statistically significant. In the sample of 2012 Medicaid states, the median county had an uninsurance rate of 17%, a bottom quartile county had an uninsurance rate of 13% and a top quartile county a rate of 23%. So our result implies that in comparison to a bottom quartile county, the top quartile county in 2012 Medicaid states experienced an approximately 13% increase in enrollment in <2 year for-profit institutions after three years relative to states that did not announce their intention in 2012 to expand Medicaid by 2014. We do not find any evidence of effects on enrollment in any other institution-type as evidenced in the other event-study charts in the figure.

Figure 4 Panel B shows that a higher exposure to ACA leads not only to an increase in enrollment among traditional enrollees starting in early fall but also among enrollees who enroll later during the academic year. A 1% increase in uninsurance rate in a Medicaid expanding state leads twelve-month enrollment (that captures both fall enrollees and enrollees who enroll later in the academic year) in <2-year for-profit institutions to increase by 1.5% after three years. This suggests that some of the new entry due to the ACA took place during the academic year, after early fall. To investigate the extent of entry among these late enrollees, Figure 4 Panel C presents results from the event study specification (1) where the dependent variable is difference in enrollment between twelve-month and fall enrollment. We find a 2% increase in entry among these late enrollees driven by the ACA.

The timing of the increases is noteworthy. While we do not find any evidence of any pre-trend in <2 year for-profit enrollment, the increases commence immediately after the June 2012 Supreme court decision when the 2012 Medicaid states announced their intention to expand. Also noteworthy is that the increase continues for all the three post-years in our sample which may reflect better information percolation over time as well as more time for prospective students to make their postsecondary choices.

In the Appendix, we investigate the robustness of these results to alternative definitions of Medicaid expansion. Figure A.5 Panels A-C presents estimates using alternative definitions of Medicaid expansion. Figure A.5 Panel A presents results where Medicaid expanding states are states that expanded Medicaid on or before January 1, 2014. In Figure A.5 Panel B, Medicaid expanding states are states that expanded Medicaid by September 30, 2018. In Figure A.5 Panel C, Medicaid expanding states are states that expanded Medicaid early, before the planned expansion in 2014 took place (Hu et al., 2018).[5] The idea in the first two panels is to explore whether anticipation effects in states that later expanded ACA (by 2014 or 2018) led individuals in the more exposed counties (that had higher uninsurance rates) to switch to college, or more specifically to <2 year for-profit institutions. We find strong evidence in favor of this hypothesis. As may be expected, these effects are somewhat muted (approximately 0.75%) relative to the Medicaid 2012 effects (between 1.25-1.5%) as these effects are driven by anticipation while the Medicaid 2012 results are driven by actual announcement in the 2012 Medicaid states that they will expand Medicaid by 2014. In panel C, we also find that our early Medicaid expansion intention definition is robust to looking at the list of states that actually expanded Medicaid early, rather than simply declaring their intention to do so early enough.

Finally, in Figure A.5 Panel D, we use yet another measure of Medicaid expansion where we use a simulated Medicaid eligibility increase (section 4), based on Frean, Gruber and Sommers (2017). Our results remain qualitatively similar, with a statistically significant increase in <2 year FP enrollment starting after 2012 and a flat pretrend, with no enrollment effects for other college types. This is encouraging as this simulated measure is another, plausibly exogenous way to assess the magnitude of the effect of the Medicaid expansion.

5.2 Heterogeneities in Effects

In this section, we investigate whether there were heterogeneities in <2 year for-profit enrollment effects by race, gender, enrollment-status, age-group and interactions of enrollment status and age. Since we do not find any enrollment effects in the other types of institutions, we will limit our discussion to only this type of postsecondary institutions. Figure 5 Panel A explores heterogeneities by race. We find that increases in ACA exposure led to increases in Hispanic enrollment in the <2 year for-profit enrollment that grows over time; these effects vary between 1-1.5%. We also find evidence in favor of increases in enrollment of Black students in <2 year for-profit institutions (approximately 1% in the first year), but the effect is no longer statistically significant in the latter years. We find evidence in favor of increases in White enrollment but it is only marginally statistically significant. Figure 5 Panel B explores heterogeneities by gender. We find that the enrollment increases in the <2 year institutions are contributed by increases in both male and female enrollments.

Figure 5 Panel C differentiates between the effects by enrollment status (part-time, full-time). The results for part-time enrollment are relatively imprecise and we do not find any statistically significant evidence of effects on part-time enrollment, although the effects vary between 0.5% and 0.85% in magnitude. On the other

[5] These states are Delaware, Massachusetts, New York, Vermont, Washington D.C., Arizona, California, Connecticut, Hawaii, Iowa, Minnesota and Washington.

hand, we find positive statistically significant effects on full-time enrollment that grows over time and varies between 0.5-1.25% during our post-period of analysis (2012-2014).

Figure 6 explores heterogeneities in effects by age and interaction between age and enrollment status. We find that the <2 year enrollment effects have been contributed both by young enrollees (0.8% enrollment increase in under 25 age group) and relatively older enrollees (1.25% increase in 25-49 age agroup). Interestingly, once again we find that these enrollment effects in both age groups are driven more consistently by increases in enrollment among full-time students. The effects for part-time enrollment are marginally significant for the older group and not statistically significant for the younger age group and seem to precede Medicaid expansion.

5.3 Effects on Degree Completion

We now consider whether the enrollment increases at <2 year for-profit colleges that we attribute to the ACA led to an increase in actual certificates conferred by these colleges. It is not obvious that if the ACA incentivized individuals to go to for-profit colleges, then these individuals would have persevered to receive a certificate at the end of their studies. Figure 7 presents triple interaction coefficients from specification (1), where the dependent variable is the log of the total number of certificates conferred. We see that certificates earned rise steadily starting in 2012 following a flat pre-trend. There is a statistically significant 2% increase in certificates awarded by 2014 (2014-15 academic year) for every 1 percentage point of pre-ACA uninsurance in Medicaid expanding states relative to nonexpanding states. This is when many of the students enrolling in 2012 and 2013 would expect to complete their program. It is worth noting that the 2% increase in certificates in 2014 and 2015 mirrors the nearly 2% increase in enrollment that we found in Figure 4.

Since IPEDS reports certificate data by major, we can investigate whether the increase in certificates earned came from the fields of study that one would expect to become relatively more popular in states that expand Medicaid relative to states that don't. Appendix Figure A.6 presents classification of fields and subfields of certificates offered by less than two-year institutions. In the analysis that follows in this section, we will investigate which of these fields or subfields contributed to the increase in less than two-year for-profit certificates obtained above.

In Figure 8, we present estimates of the effect of the ACA on certificate attainment in the six fields in Appendix Figure A.6: vocational, health care, business, liberal arts, STEM and social science. Under the hypothesis that expanding Medicaid should have increased returns in occupations that did not offer health insurance prior to the ACA relative to those that did, one would expect an increase in certificates earned in vocational majors, which is exactly what we see in Figure 8. Another hypothesis that we considered in Section 1 was that Medicaid expansion may have increased labor demand in the health care sector, which may have led people to go to college for health care related degrees, which is also discussed in Dillender et al. (2019). The top left chart in Figure 8 shows that attainment of health care certificates increased after the 2012 Supreme

Court decision, with the pre-trend being flat, but that this increase is not statistically significantly different from zero. This finding is consistent with Dillender et al. (2019) because they also do not find significant effects on attainment of health care degrees following the ACA; however, they look at for-profit colleges in general rather than specifically at <2 year for-profit colleges, which are the most nimble and the most oriented to students seeking a vocational education. Our findings are consistent with a response to increased demand for health care professionals resulting in greater health care degree attainment in <2 year for-profit colleges but in no other institutions of higher education.

The second chart in the top row looks at the effect on vocational certificates. We find a strong effect on vocational certificates awards that is both economically and statistically significant. It is by far the largest effect among the various majors. Both the timing and the magnitude tally well with the increase in enrollment we see in Figure 4, suggesting that the increased enrollment in less than two-year for-profit colleges resulted in vocational certificates receipts. The prominent effect in vocational majors is consistent with the ACA relaxing job-lock and increasing access to self-employment, lower insurance industries or smaller firms that did not provide insurance prior to ACA, but now do.

The last four categories of certificates show no effects of the ACA following the 2012 Supreme Court decision. This finding is not surprising, as they all relate to jobs that used to provide insurance before the ACA and the demand for which should not have been significantly affected by the ACA. Therefore, our analysis of certificates by major is consistent with the ACA affecting labor demand primarily through relaxing job lock, and possibly also through increasing demand for health care professionals.

Further decomposition of certificate attainment by narrow subfields within each major field confirms our view. Figure 9 shows that the primary subfields within vocational field for which certificates rose were cosmetology and personal grooming, security, and transportation and materials moving. All of these subfields involve low-wage work in small employer settings, which meant that providing health insurance in these settings was difficult before the ACA. On the other hand, Appendix Figure A.7 shows that construction trade, mechanic and repair, culinary arts and precision production certificates do not seem to have been affected by the 2012 Supreme Court decision. This is consistent with our hypothesis as these occupations are better paid and carried out in larger enterprises.

Next, we turn our attention to the subfields of healthcare (Appendix Figure A.6). Biology and Psychology constitute a negligible number of less than two-year certificates, so we focus on medical certificates in Figure 10 Panel A. We find evidence in favor of increase in Medical certificates but the effects, while economically significant (1.75% increase), are not statistically significant. Looking at the subfields of the Medical field (Figure 10 Panel B and Appendix Figure A.8), we find that the subfields in the medical field in which certificate attainment has grown with the impact of the ACA are dental certificates, insurance coding and medical assistants. In contrast, we do not find evidence of effects in the other medical subfields: medical billing, medical administration, nursing, alternative medicine and rehabilitation (Appendix Figure A.8).

5.4 ACA and Pell Receipt

To further explore whether exposure to ACA encouraged lower income students to differentially go to for-profit (or other colleges), we estimate specification (1) where we replace the dependent variable by share of undergraduates in a college who were Pell recipients. Pell recipients are relatively poorer than their peers who did not qualify for Pell grants. So Pell recipiency is regarded as a measure of income. As Figure 11 shows, we find no evidence that the ACA led to an increase in Pell enrollment.

5.5 Anticipation Effects

A check on our identification strategy is to examine differential effects among three groups of states based on the timing of their Medicaid expansion and announcement: (i) states that confirmed that they were expanding Medicaid immediately after the 2012 Supreme Court decision (ii) states that did not commit immediately but nevertheless expanded in 2014, and (iii) states that expanded after 2014 but by December 2018. To do so, we enrich our baseline specification by interacting the 2009 uninsurance rate with three sets of Medicaid expansion dummies instead of one, with each dummy capturing one of the above Medicaid expansion timings. The specification we estimate is reported below:

$$y_{c,t} = z_{c,t} + \eta_c + \mu_t + \gamma_t^0 \times MCE_c^{2012} + \gamma_t^1 \times U_c^{2009} + \gamma_t^2 \times U_c^{2009} \times MCE_c^{2012} + \gamma_t^3 \times MCE_c^{\{2014-2012\}}$$
$$+\gamma_t^4 \times U_c^{2009} \times MCE_c^{\{2014-2012\}} + \gamma_t^5 \times MCE_c^{\{2018-(2014-2012)\}} + \gamma_t^6 \times U_c^{2009} \times MCE_c^{\{2018-(2014-2012)\}} + \epsilon_{c,t} \qquad (3)$$

The resulting three sets of interaction coefficients are plotted against time in Figure 12.We see from the figure in the top row that the effects of the 2009 uninsurance rate in states announcing their decision to expand in 2012 follow the by now expected pattern of being flat at zero before 2012 and rising and statistically significant thereafter with a similarly sized effect seen earlier. However, the effects for states expanding in 2014 but not announcing their decision to do so by 2012 are flat at zero both before and after the Supreme Court decision. This is likely because their expansion decisions were made sufficiently late that individuals and colleges did not have time to anticipate them before 2014. Lastly, the effects of the 2009 uninsurance rates in states expanding Medicaid after 2014 show a very similar pattern to the effects for states announcing their decision to expand in 2012. They are generally close to zero before 2012 (although with a statistically insignificant pretrend in 2005-2007), and then statistically significantly rise after 2012.

Since it should have been particularly difficult to anticipate the Medicaid expansions of states that expanded after 2014, the fact that their effect pattern follows that of the states announcing their decision to expand in 2012 is puzzling. However, this pattern is actually driven by only two of the late-expanding states: Louisiana and

Pennsylvania. Both of these states are special because they had considerable internal political battles over the question of whether to expand, and reasonable observers could have concluded that these states would expand Medicaid eventually even while the issue was being debated. In particular, Pennsylvania, a swing state, had an unpopular Republican governor who first opposed expansion, but then supported a qualified version of the expansion under constituent pressure, so it may have been reasonable for observers to assume from the beginning that this governor would either expand Medicaid or be replaced by a challenger favorable to Medicaid expansion. Louisiana, a deeply conservative state, nevertheless had substantial support for the expansion in both parties because of the associated transfers from the federal government. While excluding any one of these two states makes the Medicaid expansion effects insignificant after 2012 for the states announcing their expansion decision after 2014 (second row of Figure 12), excluding both states makes the effect pattern for the late expanders completely flat in our entire post- period (last chart in Figure 12). This is in line with our prior that Medicaid expansion should have larger effects on outcomes in states that announced their decision to expand early rather than in states that announced this decision late.

5.6 Supply Side Responses and For-Profit Entry

Since we find that ACA exposure led to increases in enrollment in less than 2-year for-profit colleges, we next investigate whether the ACA led to entry of for-profit institutions in the less than 2-year sector in Figure 13. While the figure seems to suggest a little uptick in counties with marginally higher uninsured in Medicaid states, the effect is economically very small (approximately 0.1 percentage increase) and statistically not significant. This indicates that the increase in enrollment was due to existing for-profit colleges absorbing more students in the less than two-year sector.

5.7 Are the Effects Driven by Differential Migration?

In this section, we investigate whether the effects obtained above were contributed to some extent by differential migration to (or from) the counties that were more exposed to the ACA (as captured by high baseline uninsurance rates and Medicaid expansion). For this purpose, we construct two measures of migration at the individual-county-year level using data from the CCP (see section 3.3). Our measures, in-migration and out-migration, draw heavily on the measures constructed in Schwartz and Sommers (2014). The first measure, in-migration, captures an individual who moved into a county i in a quarter but was in another county j in the previous quarter. The second measure, out-migration, captures an individual seen in county i in a quarter who has moved to another county k in the following quarter. Using each of these as dependent variables in separate regressions, we estimate our specification (1) above (section 4).

The results for in-migration and out-migration are respectively presented in Figure 14 Panels A-B in event-study style charts like our main results above. As we can see, there is no evidence of any differential in-migration or out-migration that covary with ACA exposure. This analysis rules out that our results are driven by differential migration of individuals into counties exposed more to the ACA.

5.8 Robustness Checks

In this section, we conduct a variety of robustness tests to check the sensitivity of our above results. The findings are presented in Figure 15. In the four charts in Figure 15 Panel A, we respectively add linear county time trends, linear county time trends and state-year fixed effects, linear county time trends and CBSA-year fixed effects, and linear county time trends and commuting zone-year fixed effects, each to our baseline specification (1). Figure 15 Panel B controls for several potentially important covariates that are not explicitly considered by our baseline specification. The top left chart of Figure 15 Panel B controls for unemployment dynamics by including interactions of the county 2009 unemployment rate with year dummies. We use 2009 unemployment rate because this measure captures the variations in unemployment (and labor market) across counties in 2009 in the depth of the recession, when unemployment rate hit its peak. Since the policy change we exploit took place soon after the recession we want to rule out that some of the effects are due to differences in impacts of the recession across states and counties. The top right chart in Figure 15 Panel B includes controls for the age distribution of population in 2000 (%18-24, %25-34, %35-44, % 45-64, %65 or over) interacted with year fixed effects. The bottom left chart in Figure 15 Panel B controls for a county-year level measure of state appropriations to higher education per student in less than two-year public institutions.[6] Changes in appropriations to public colleges across states could have been a driver of differential enrollment in public and for-profit colleges (Deming and Walters 2017; Chakrabarti, Gorton and Lovenheim 2019) and could also be associated with state expenditures on health insurance programs, as these are known to be substitutes for education spending in state budgets (Kane, Orszag and Gunter 2002). The bottom right chart in Panel B includes the share of revenue sourced from state appropriations at less than two-year public colleges, measured at the county level in 2005, interacted with a full set of state-by-year fixed effects to non-parametrically control for state appropriations to less than two year public institutions as well as state-year level economic conditions and policy changes that may affect less than two year postsecondary enrollment.

Finally Figure 15 Panel C includes these covariates together: linear county trends, county unemployment rate in 2009 interacted with year dummies, age distribution of population in 2000 (%18-24, %25-34, %35-44, % 45-64, %65 or over) interacted with year dummies and county-year level state appropriations to higher education per student in less than two-year public institutions.

The results remain comfortably robust in each of these iterations. They barely budge from the baseline results either in terms of economic significance or statistical significance. In fact inclusion of each of CBSA-year fixed effects and commuting zone-year fixed effects make the effects slightly stronger, as does the inclusion of

[6] This measure is constructed by taking a weighted average of state appropriations per student for all less than two-year public institutions in that year in the county.

county trends. While our baseline results showed a 1.5% increase in total enrollment for <2 year for-profit schools, the effect sizes in these various robustness exercises vary between 1.5% to 4%. The upper bound of the effects (between 2.5% and 4% are obtained when Commuting zone-year and CBSA-year effects are included along with county time trends. In other specifications the effects vary between 1.5% and 1.75%. The robustness of our results across a variety of specifications adds considerable confidence to our findings. It is worth highlighting here the importance of the robustness of our results to the inclusion of detailed measures of age composition of the population. This finding rules out a role for the young adult provision of the ACA in contributing to the effects obtained above. If part of our effects was contributed by the young adult provision, we would expect our coefficient estimates to attenuate. Rather, we find that our estimates barely budge with inclusion of the age composition of the population.

6 Conclusion

The strong connections between health insurance and employment in the U.S. imply that a major health insurance reform is likely to change individuals' incentives to invest in their human capital. We investigate how the Affordable Care Act impacted educational choices by exploiting the interaction of different baseline uninsurance levels across counties of the U.S. before the ACA together with the state-level Medicaid expansion decisions that state governments made in the wake of the 2012 Supreme Court decision in *NFIB vs. Sebelius*. Our empirical strategy compares the changes in enrollment between high- and low-uninsurance counties in expanding states with the same differential in nonexpanding states, and interprets its evolution over time as caused exclusively by the differential Medicaid expansion under ACA.

We find that enrollment in <2 year for-profit institutions increases in high-uninsurance counties relative to low-uninsurance counties within states that expand Medicaid relative to those that don't, immediately following the Supreme Court decision and the effect persists and becomes stronger over time. An additional percentage point uninsured is associated with an approximately 1.25-1.5% higher <2-year for-profit college enrollment in a county located in a Medicaid expansion state as compared with nonexpansion state by 2014. This result is robust, both in magnitude and in statistical significance, to controlling for differential county recovery dynamics from the Great Recession, differential changes in state appropriations to less than two-year postsecondary public institutions, differential age compositions of counties (thus ruling out the role of the young adult provision of the ACA in generating the effects observed), unobserved county trends in enrollment that are linear over time, and unobserved state or commuting zone time-varying effects of arbitrary form. The enrollment increase in <2-year for-profit colleges is present for a variety of ways of measuring enrollment or defining which states were affected by the Medicaid expansion. The enrollment increase is more prominent (economically and statistically more significant) for full-time rather than for part-time enrollment, but is found across different race and gender types although the effect is stronger for Hispanics. We do not find evidence of changes in enrollment in other types of educational institutions besides the <2-year for-profit colleges. This is intuitive, because for-profit colleges tend to specialize in short programs aimed towards getting students jobs in particular trades, many of which tended to be conducted in small group settings that made insurance purchase different before the ACA.

Moreover, we find that certificate attainment also rises in <2 year for-profit colleges within a few years of the 2012 Supreme Court decision, with the magnitude of the increase in certificates being comparable to the magnitude of the enrollment increase. The new certificates are concentrated in the vocational field (such as cosmetology and personal grooming, parks and leisure, security and transportation), which should have become relatively more popular because of the relaxation of the job-lock channel. While we find some effects on certificates in health care (such as dental certificates, insurance coding and medical assistants), they are less consistent over years both in terms of magnitude and statistical significance. However, the estimated effects are large in some post-years and the pre-trends are flat, suggesting some scope for a health care demand channel in the most nimble of educational institutions.

We interpret our results as consistent with students and colleges acting rationally in anticipation of the ACA making health insurance available off the job. To the extent that it did so, the ACA made it easier for workers to allocate themselves to jobs where their marginal benefits are relatively high and their marginal costs of labor are relatively low. Our results are consistent with the idea that using firms as pools to reduce adverse selection creates considerable frictions both in the market for labor and in the market for human capital. However, our results do not permit us to make a statement about the welfare consequences of the ACA as a whole.

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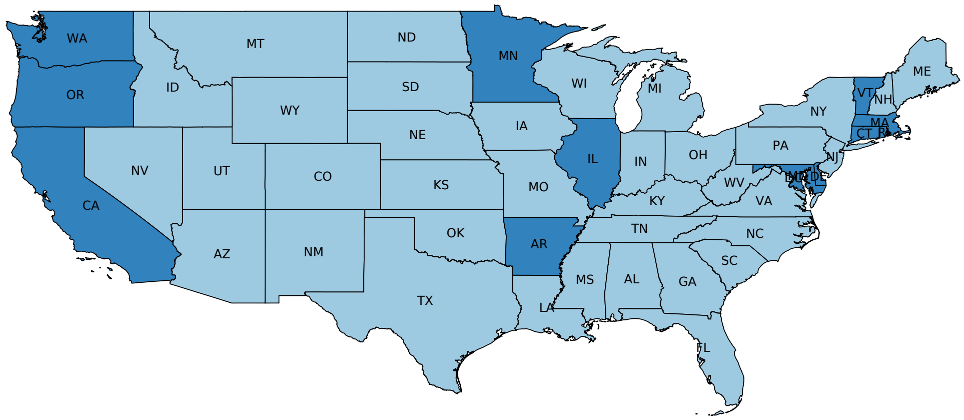
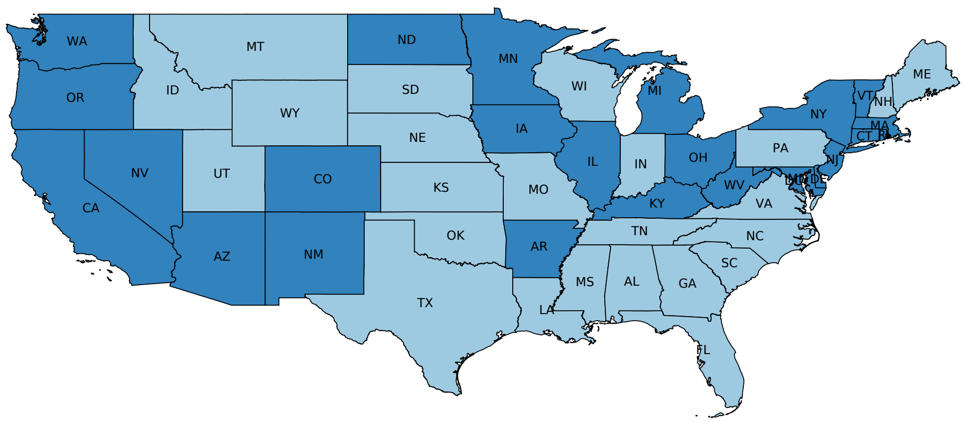
Figure 1: Medicaid Expansion Over Years

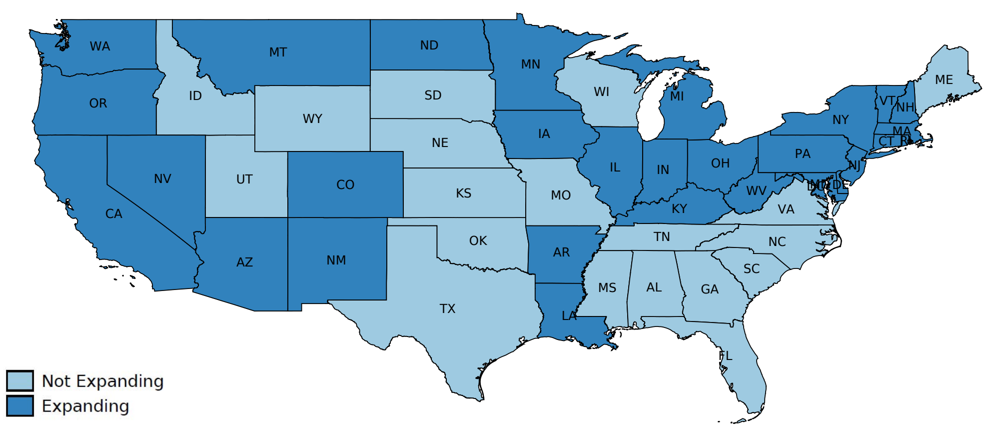
Panel A: Medicaid Expansion Status as of July 2012



Panel B: Medicaid Expansion Status as of July 2014



Panel C: Medicaid Expansion Status as of September 2018



Data for these maps are obtained from the Advisory Board and the Kaiser Family Foundation. These three maps respectively represent Medicaid statuses as of July 2012, July 2014 and September 2018 and correspond to the various Medicaid definitions used in this paper. States that expanded post-2018 are Idaho, Maine, Nebraska, Utah, Virginia.

Figure 2: Timeline of ACA and Medicaid Events

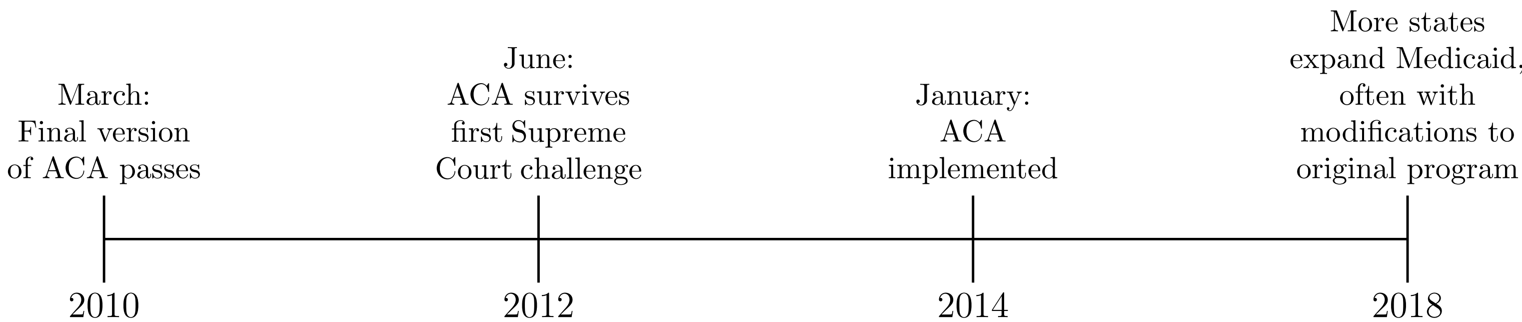
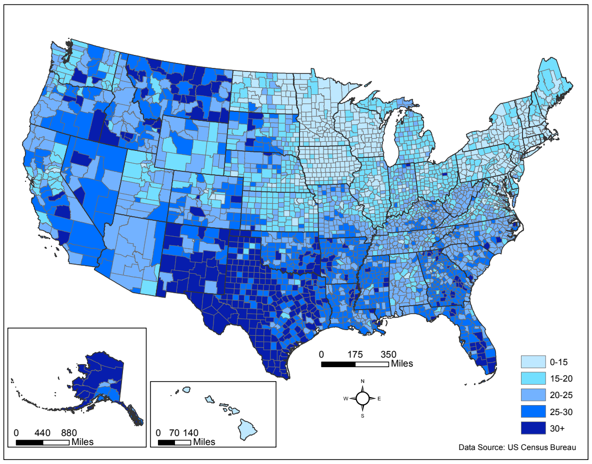
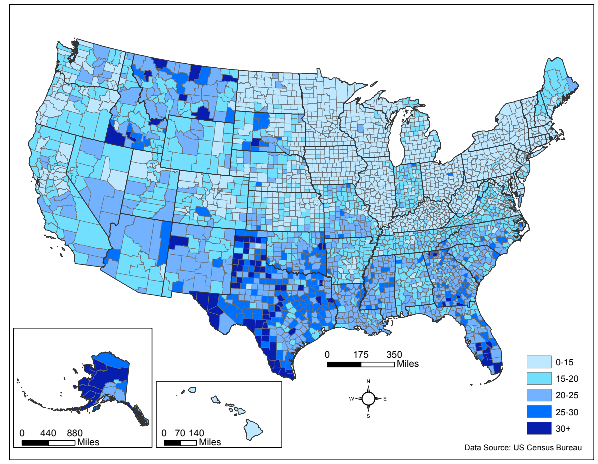


Figure 3: Uninsurance Rates Before and After ACA

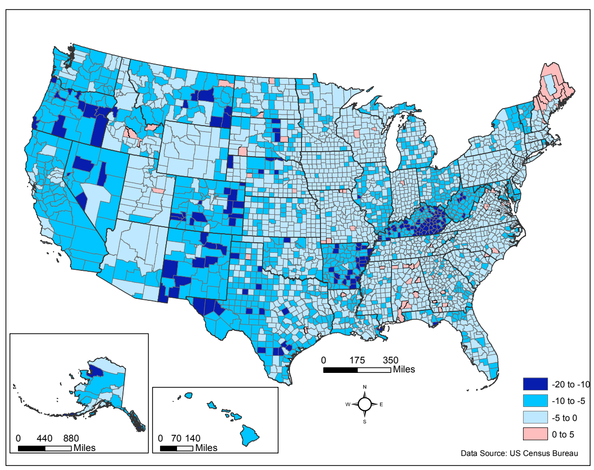
Panel A: Uninsurance in 2009



Panel B: Uninsurance in 2014



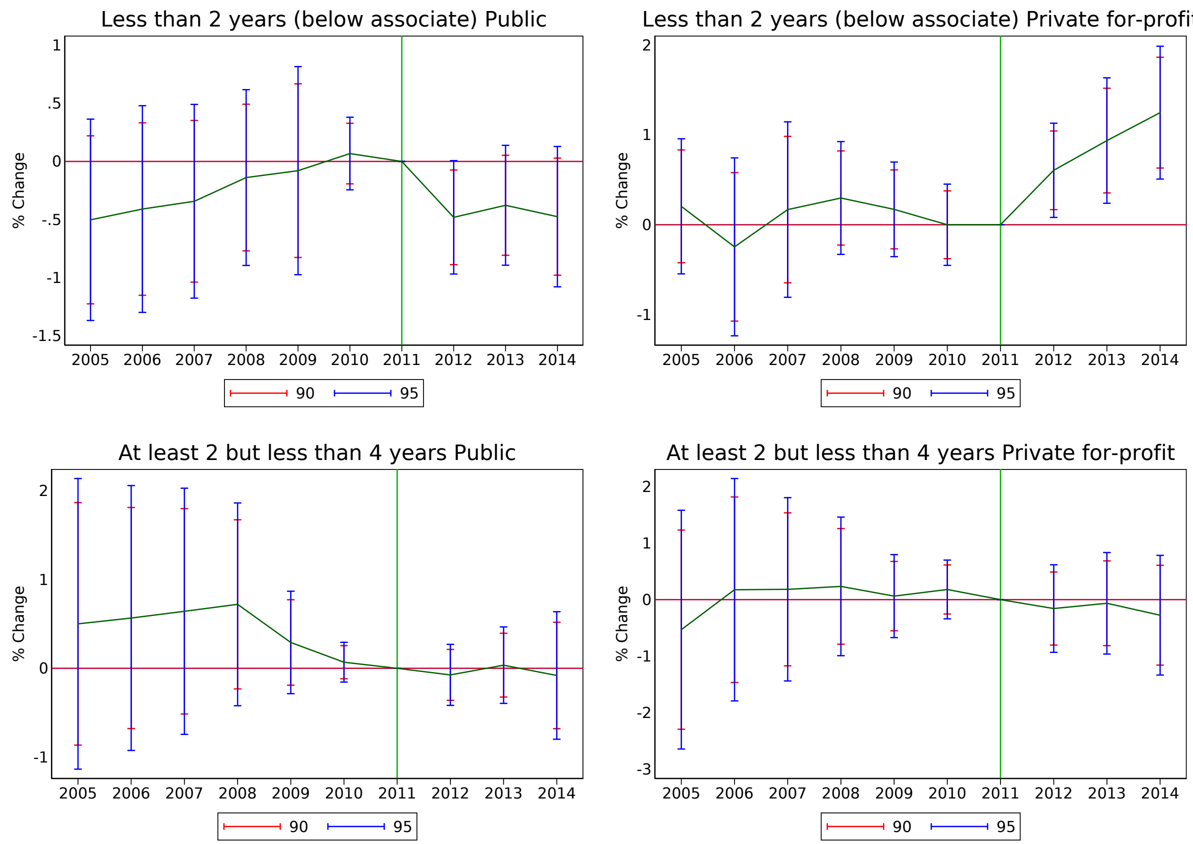
Panel C: Change in Uninsurance from 2009 to 2014



Panels A and B map the distribution of county-level uninsurance rates as of 2009 and 2014. Panel C maps the county-level changes in uninsurance rates between 2009 and 2014. The data for these maps are obtained from SAHIE (US Census Bureau)

Figure 4: Effects on Post-Secondary Enrollment

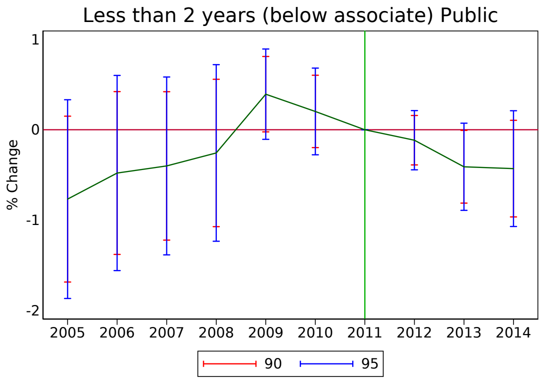
Panel A: Fall Undergraduate Enrollment

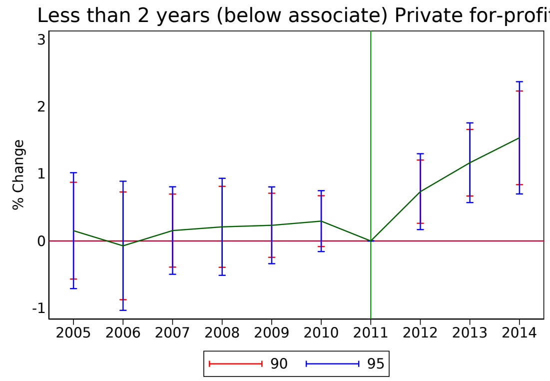


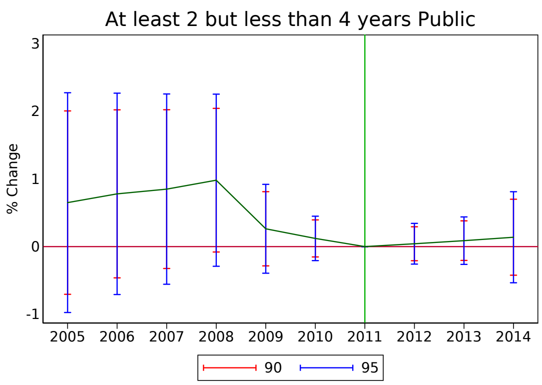
These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. Graphs with alternative Medicaid expansions are presented in Appendix Figure A.5. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. Fall enrollment is defined as student enrollment on October 31st of the year in the college. Data on college enrollment are obtained from IPEDS. The dependent variable is college's fall enrollment that academic year. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively.

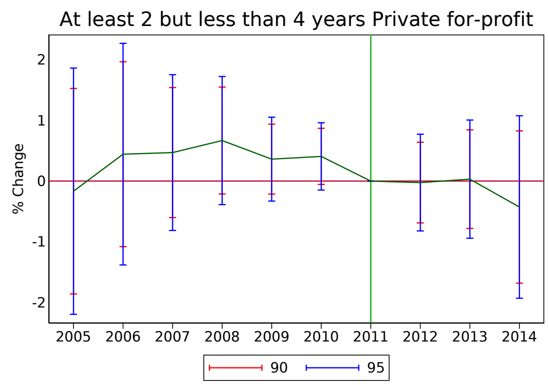
Figure 4: Effects on Post-Secondary Enrollment (Continued)

Panel B: Twelve-Month Undergraduate Enrollment

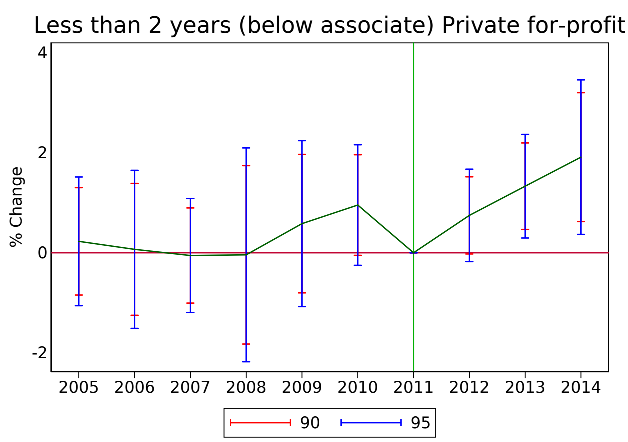








Panel C: Difference Between Twelve-Month Enrollment and Fall Enrollment

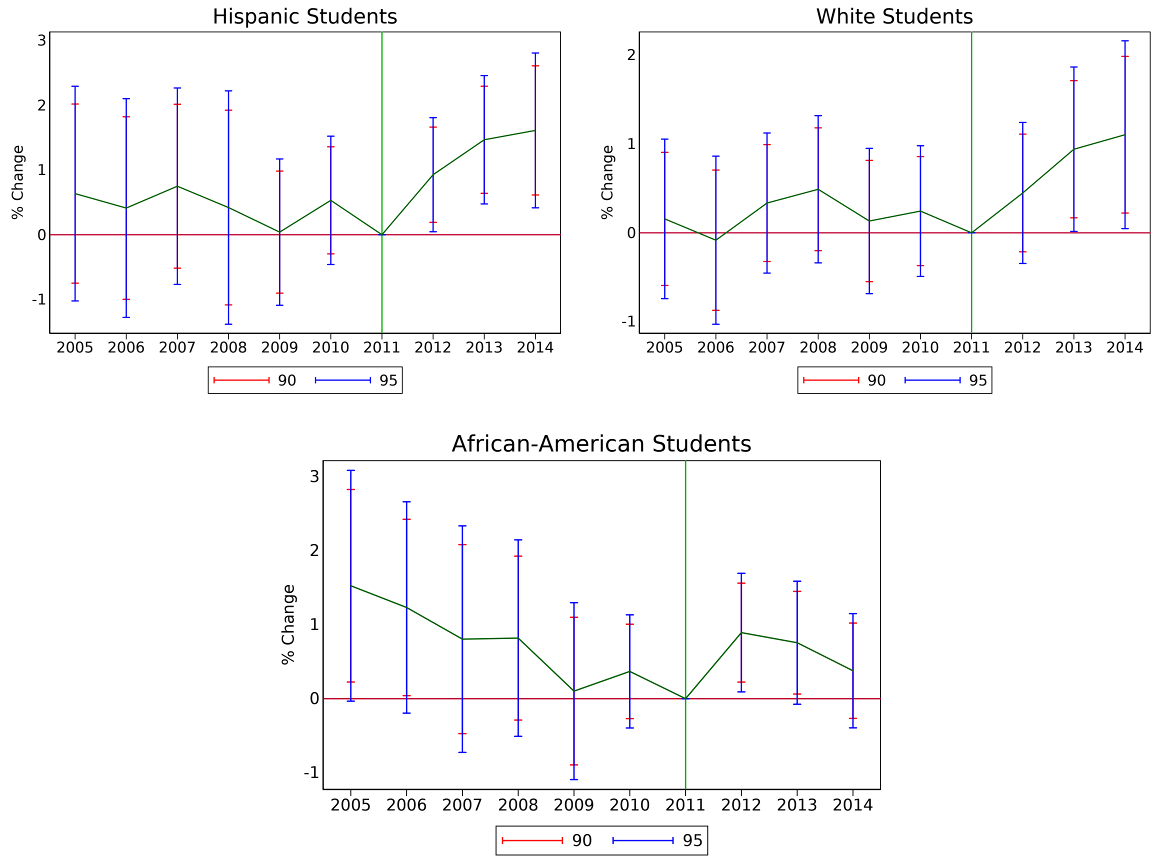


These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. Graphs with alternative Medicaid expansions are presented in Appendix Figure A.5. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. A college's fall enrollment is defined as that college's student enrollment on October 31st of the year. Twelve-month enrollment represents the total number of students enrolled during the academic year. Data on college enrollment are obtained from IPEDS. The dependent variable is college's twelve-month enrollment that academic year in Panel B and the difference between twelve-month enrollment and fall enrollment in Panel C. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively.

Figure 5: Heterogeneities by Race, Gender and Enrollment Status

Less Than 2 Year (Below Associate) Private For-Profit Schools

Panel A: Race

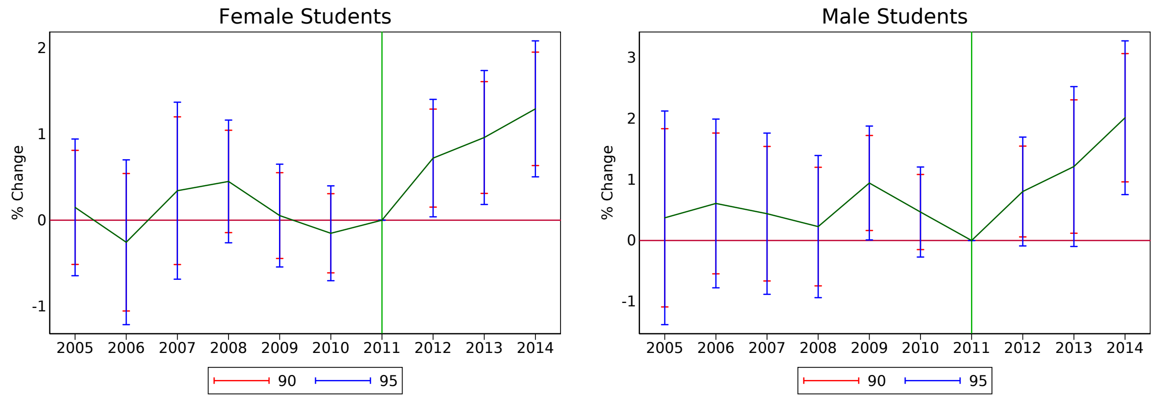


These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. A college's fall enrollment is defined as that college's student enrollment on October 31st of the year. Fall enrollment data of colleges by race are obtained from IPEDS. The dependent variable is college's percent of students in that race, obtained by expressing fall enrollment by race as a percentage of fall enrollment. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively.

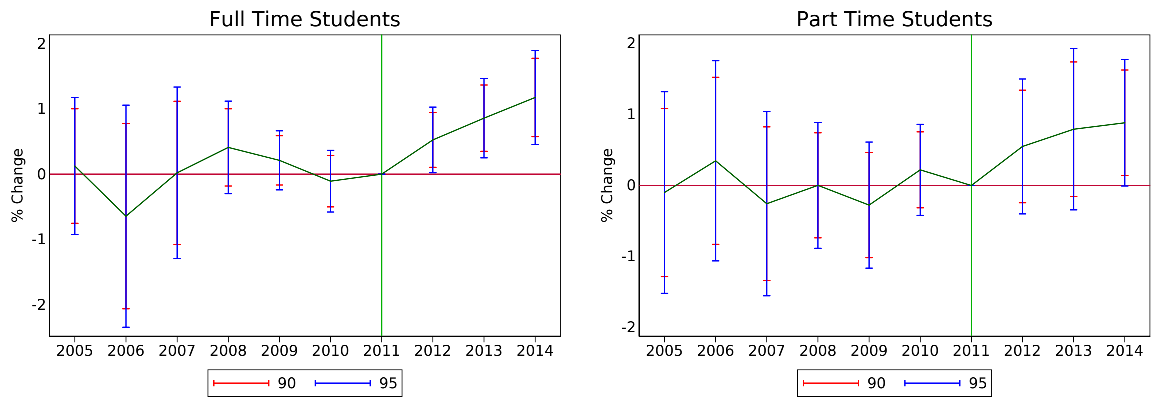
Figure 5: Heterogeneities by Race, Gender and Enrollment Status (Continued)

Less Than 2 Year (Below Associate) Private For-Profit Schools

Panel B: Gender



Panel C: Enrollment Status

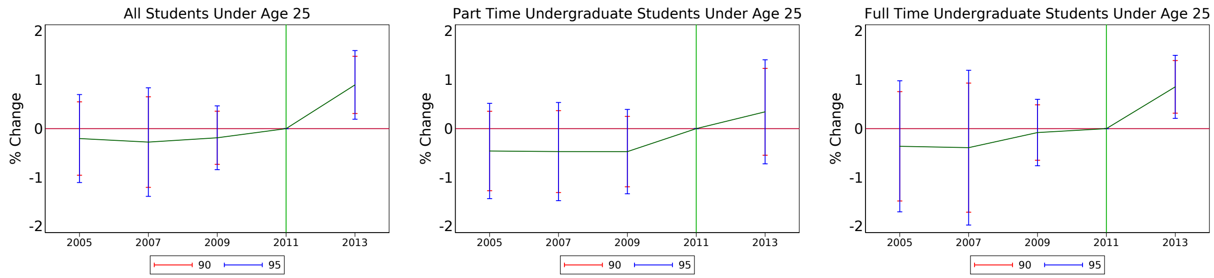


These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. Fall enrollment is defined as student enrollment on October 31st of the year. Fall enrollment data of colleges by race, gender and enrollment status are obtained from IPEDS. Data on college enrollment are obtained from IPEDS. The dependent variable is college's percent of students in that gender or enrollment status, obtained by expressing fall enrollment by gender and enrollment status (full time, part time) respectively as a percentage of fall enrollment. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively.

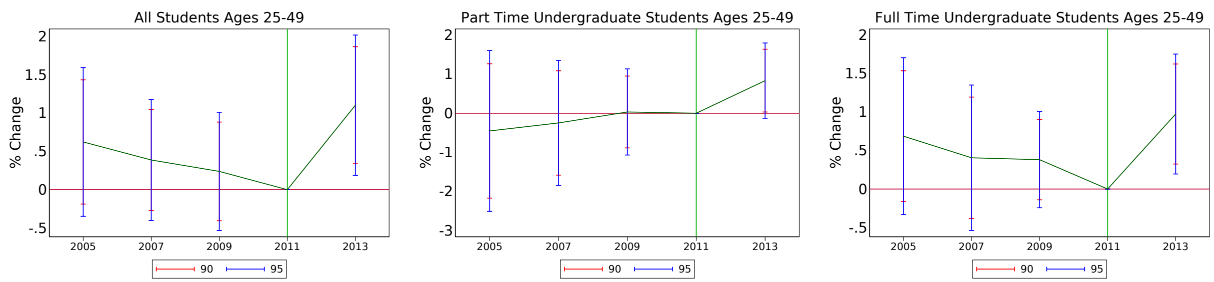
Figure 6: Heterogeneities by Age and Enrollment Status

Less Than 2 Year (Below Associate) Private For-Profit Schools

Panel A: All Students Under 25 Years Old



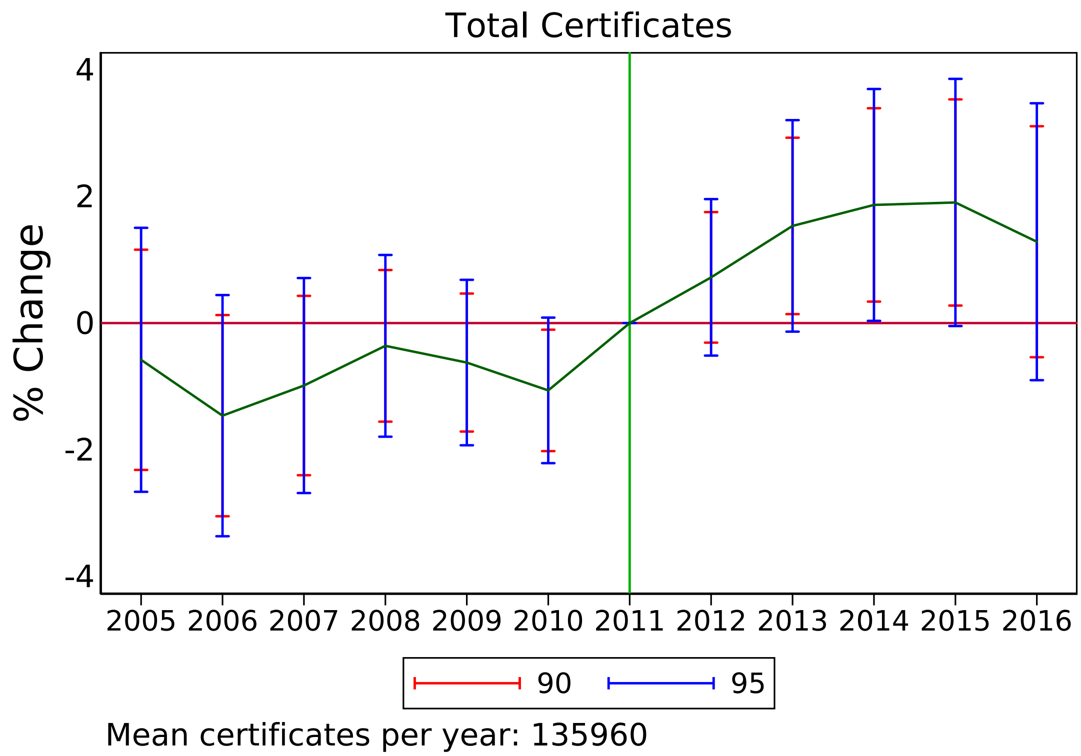
Panel B: All Students 25-49 Years Old



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. Annual fall enrollment data of colleges by enrollment status and biennial data by age are obtained from IPEDS. The dependent variable is a college's percent of students in that age range and enrollment status. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively.

Figure 7: Effects on Certificate Production

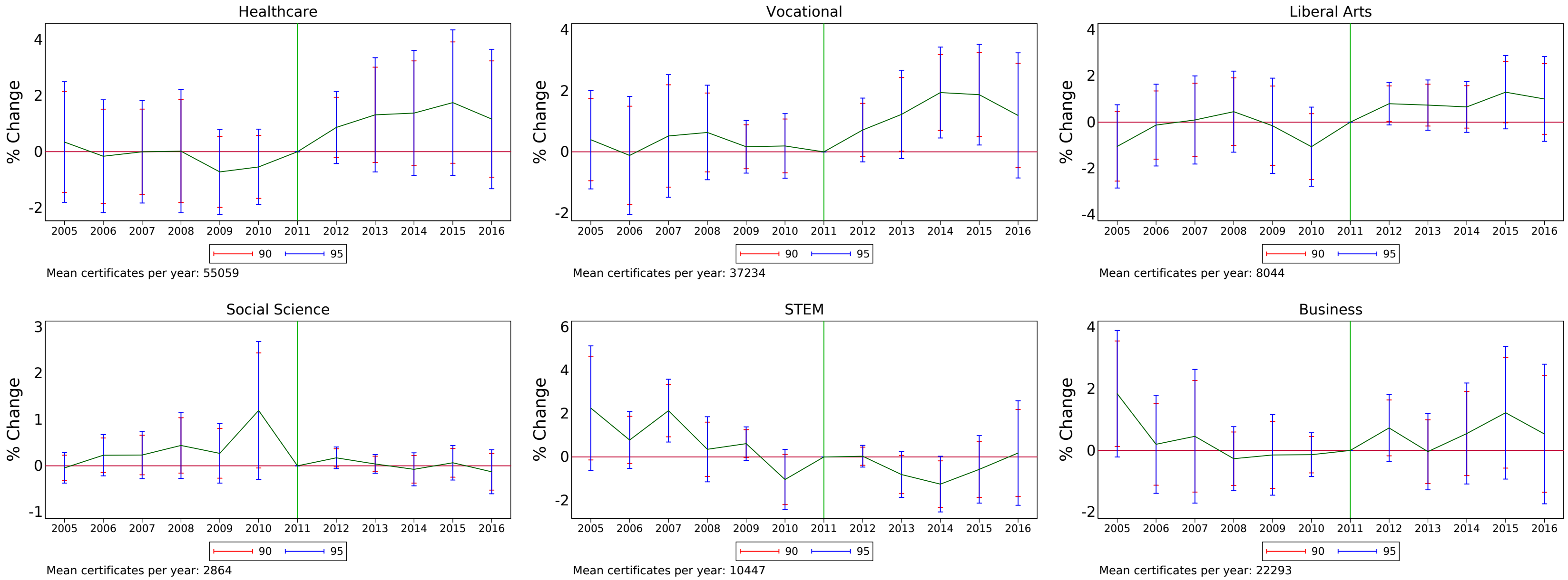
Less Than 2 Year (Below Associate) Private For-Profit Schools



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. The dependent variable is college's number of certificates granted that academic year. Mean certificate counts give the average number of <2yr for-profit certificates granted per year across the country.

Figure 8: Effects on Health Care, Vocational and Other Certificates

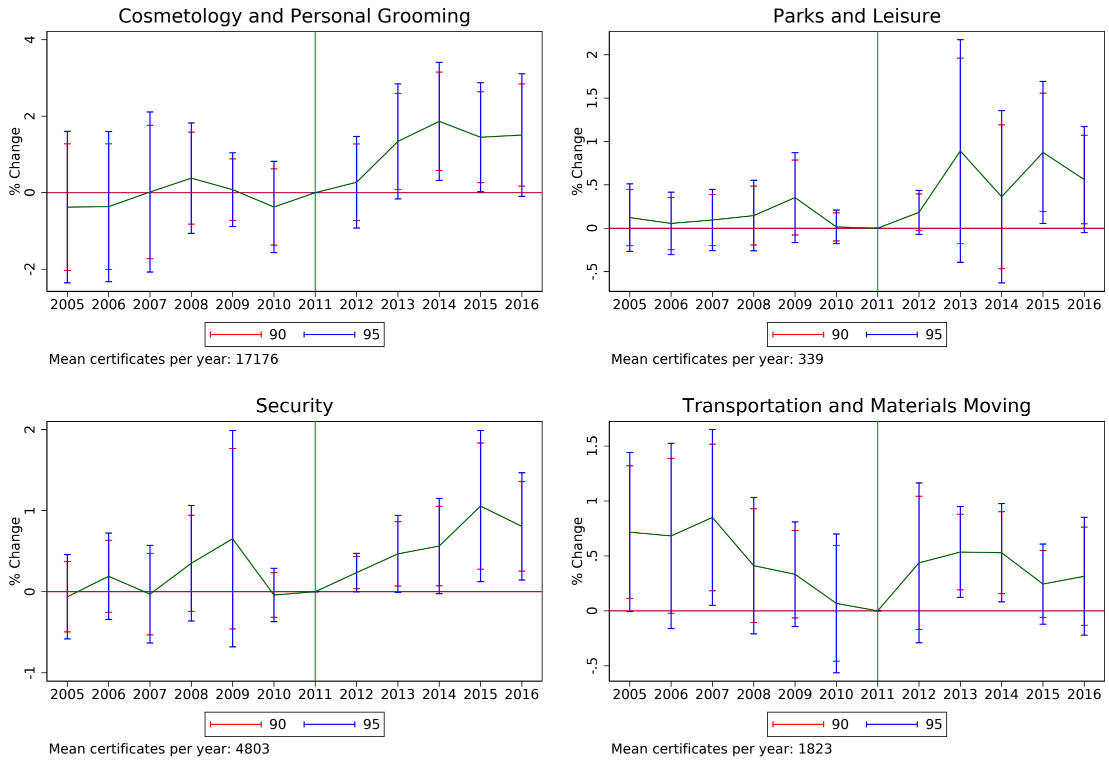
Less Than 2 Year (Below Associate) Private For-Profit Schools



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. The dependent variable is college's number of certificates in that field granted that academic year. See Appendix Figure A.6 for degree classification. Mean certificate counts give the average number of <2yr for-profit certificates granted per year across the country.

Figure 9: Effects on Certificates in Vocational Subfields

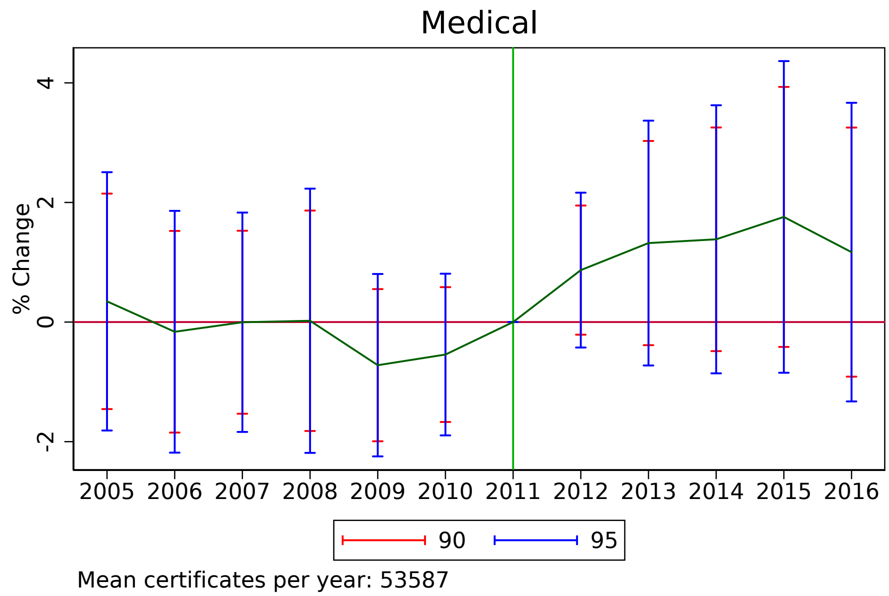
Less Than 2 Year (Below Associate) Private For-Profit Schools



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. The dependent variable is college's number of certificates granted in that subfield that academic year. See Appendix Figure A.6 for degree classification. Mean certificate counts give the average number of <2yr for-profit certificates granted per year across the country.

Figure 10: Effects on Certificates in Health Subfields

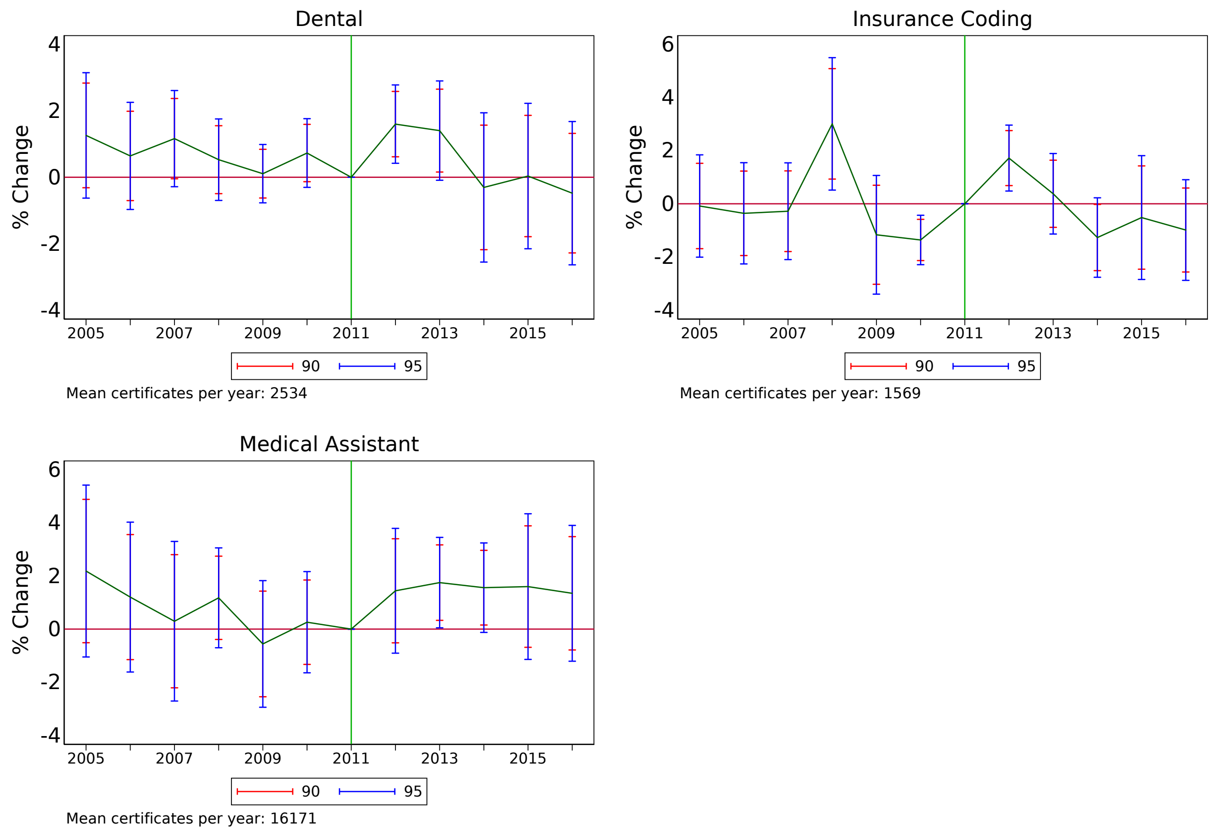
Panel A: Effects on Certificates in Medical Field



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. The dependent variable is college's number of certificates in medical field granted that academic year. See Appendix Figure A.6 for degree classification. Mean certificate counts give the average number of $<$2yr for-profit certificates granted per year across the country.

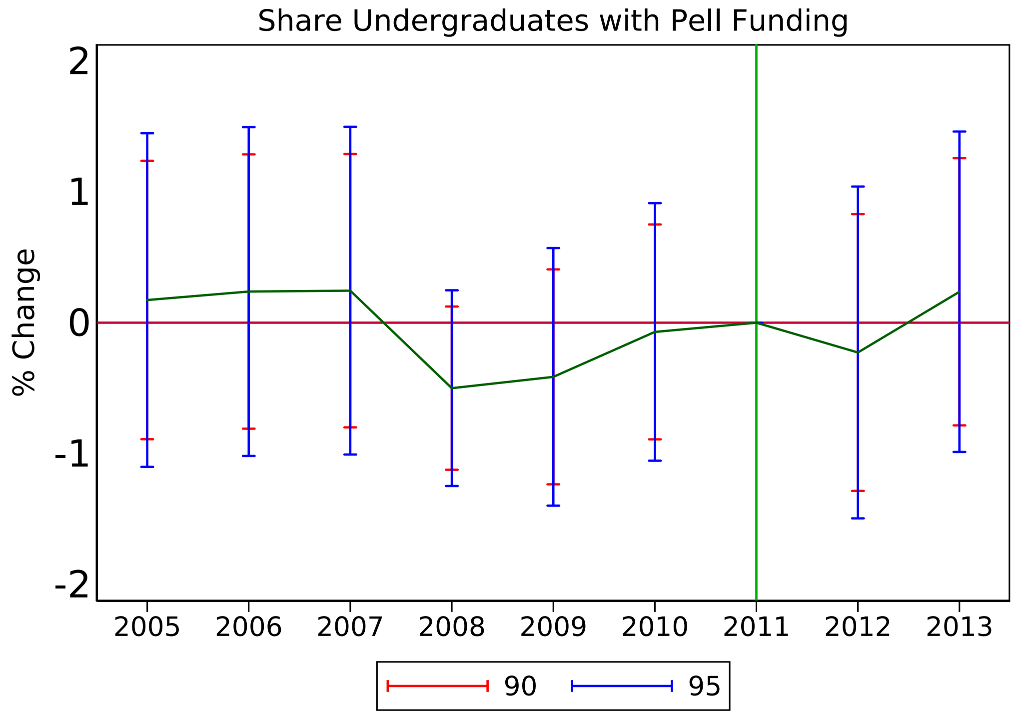
Figure 10: Effects on Certificates in Health Subfields (Continued)

Panel B: Effects on Certificates in Medical Subfields



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. The dependent variable is college's number of certificates granted in various medical subfields that academic year. See Appendix Figure A.6 for degree classification. Mean certificate counts give the average number of <2yr for-profit certificates granted per year across the country.

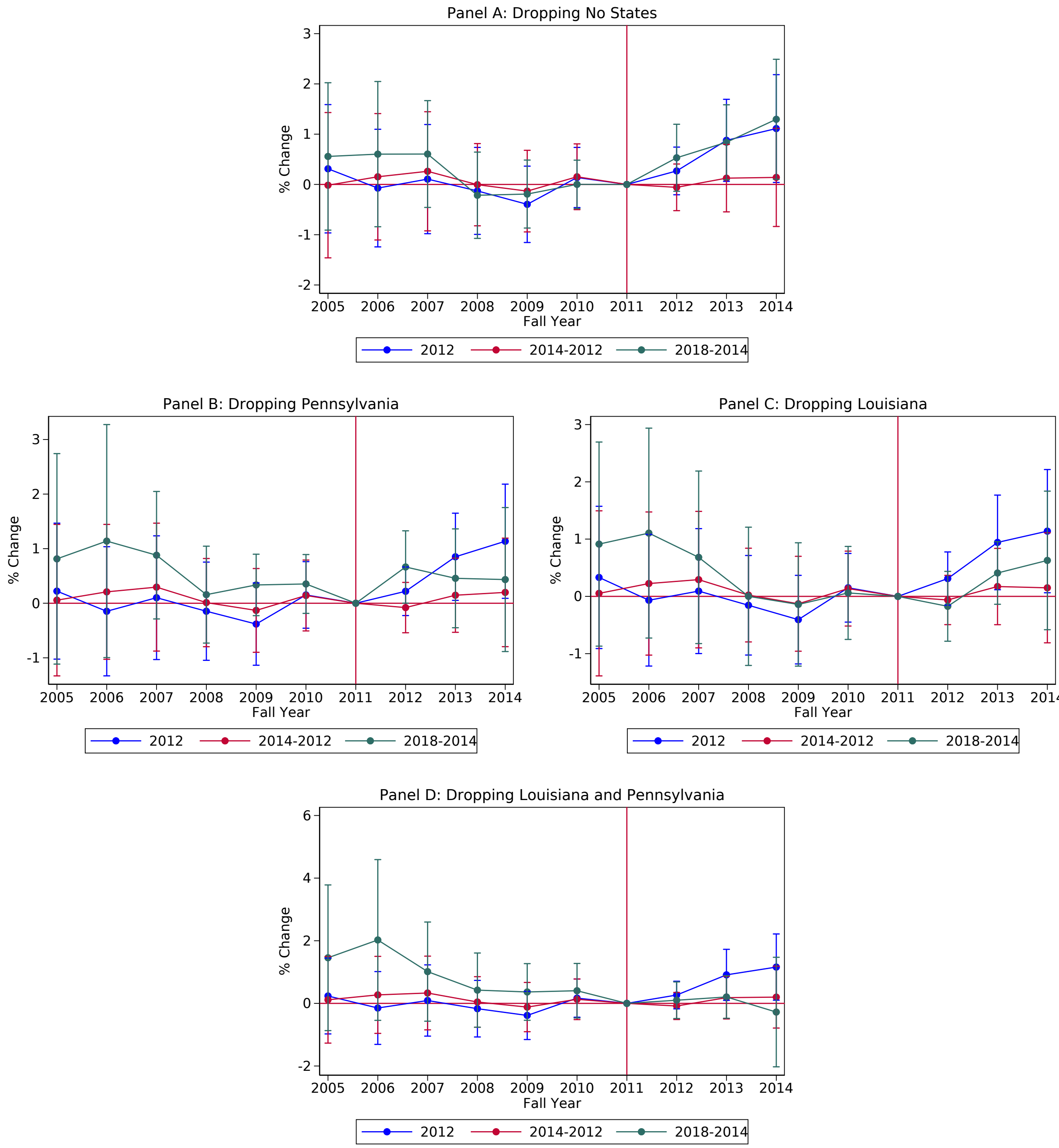
Figure 11: Effects on Students with Pell Funding



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. Fall enrollment data on number of students receiving Pell grants in each year are obtained from IPEDS. The dependent variable is college's share of undergraduates receiving Pell grants that academic year. The denominator is fall enrollment of the college in that year and is obtained from IPEDS. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on the fraction of students with Pell funding are from IPEDS.

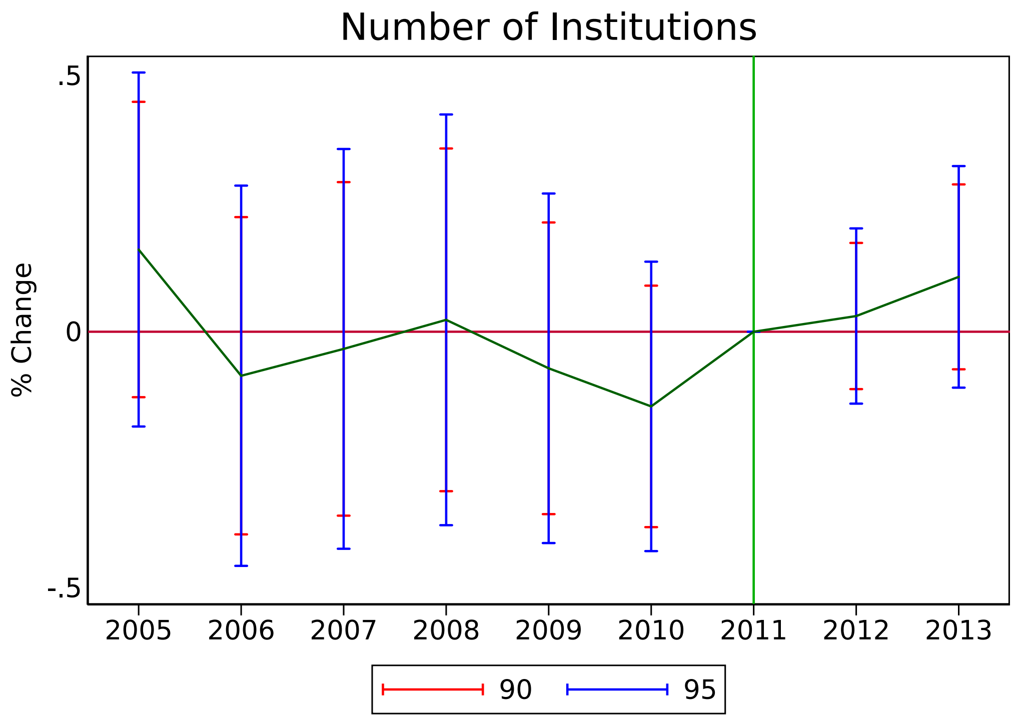
Figure 12: Studying Anticipation Effects

Less Than 2 Year (Below Associate) Private For-Profit Schools



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4. The coefficient for 2011 is normalized to zero. Standard error bars at the 95% confidence level (clustered by state) drawn for each series in its own color. States in the "2014-2012" group expanded Medicaid by January 1, 2014, but not before August 2012. States in the "2018-2014" group expanded Medicaid after January 2, 2014. The dependent variable is twelve-month enrollment of colleges, these institution-year level data are obtained from IPEDS. Data on Medicaid expansion and uninsurance in 2009 from the Advisory Board and SAHIE respectively.

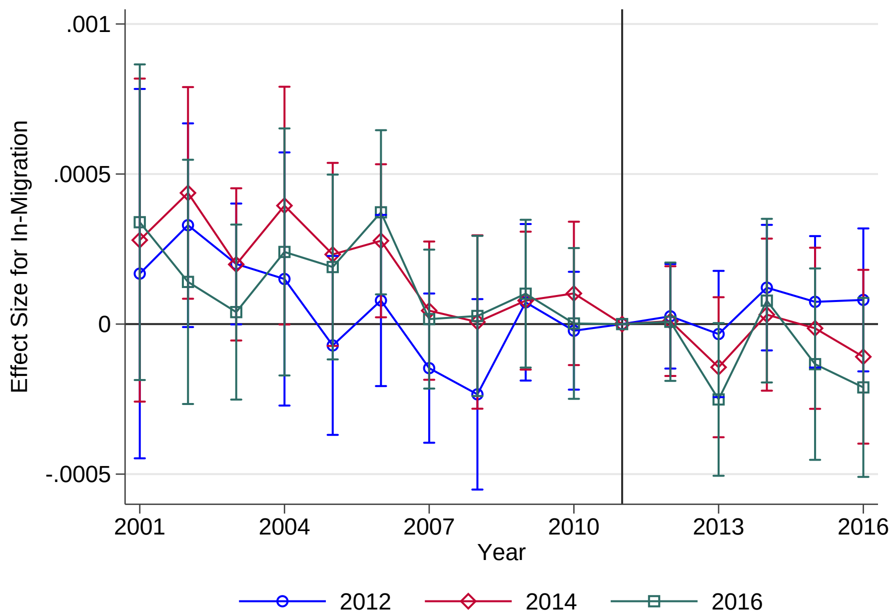
Figure 13: Did ACA Lead to Entry of For-Profit Colleges?



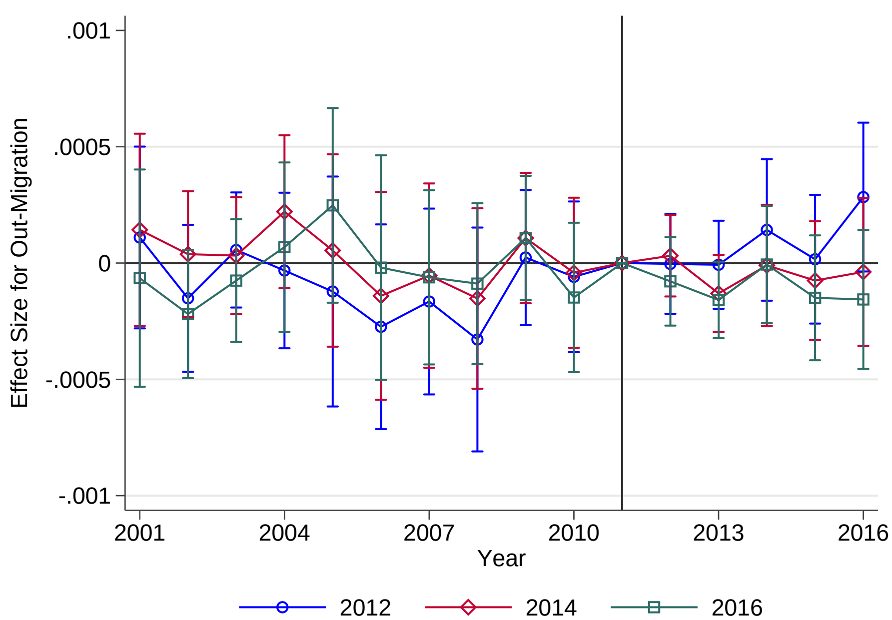
These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. The dependent variable is number of less-than-two-year for-profit institutions in that county and academic year. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on the number of institutions are from IPEDS.

Figure 14: Studying Effects on Migration

Panel A: Effect on In-Migration



Panel B: Effect on Out-Migration



These graphs present estimates of the coefficients $\gamma_{t,i}$ from specification (1) in Section 4; an important distinction is that the dataset here is at the person-year level instead of the county-year level. The coefficient for 2011 is normalized to zero. Standard error bars at the 95% confidence level (clustered by state) drawn for each series in its own color. Following Schwartz and Sommers (2014), in-migration is defined as a person's move into an expansion or control state from another state in the previous year and out-migration is defined as a person's move from a control or expansion state to another state in the previous year. For in-migration (out-migration), the dependent variable takes a value of one if the person moves into (from) an expansion or control state from (to) another state in the previous year, and zero otherwise. Data on migration flows are based on records in the NY Fed Consumer Credit Panel / Equifax. Data on Medicaid expansion and uninsurance in 2009 from the Advisory Board and SAHIE respectively.

Figure 15: Robustness to Covariates and Time Trends

Less Than 2 Year (Below Associate) Private For-Profit Schools

Panel A: Controlling for Time Trends

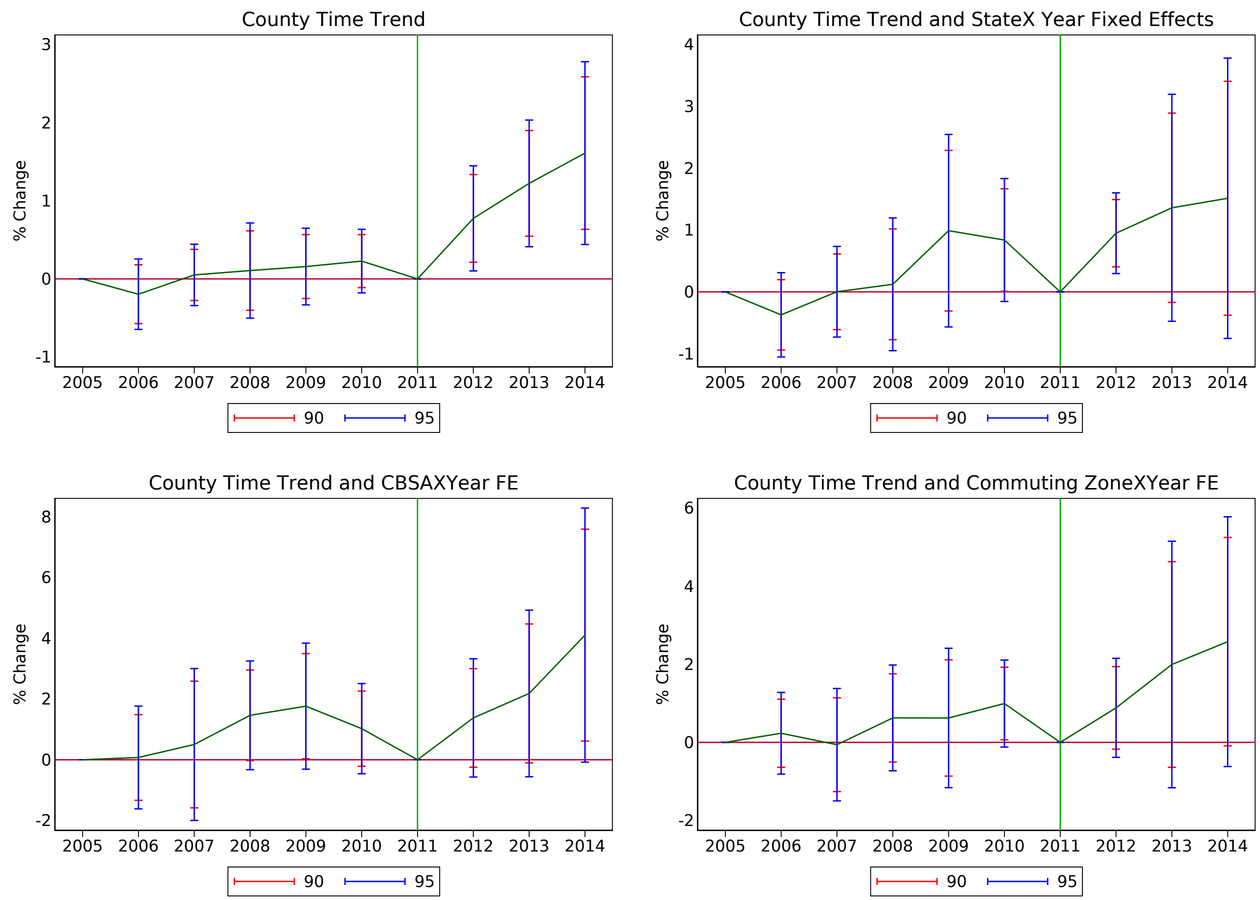
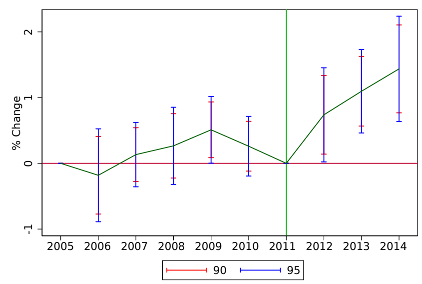


Figure 15: Robustness to Covariates and Time Trends (Continued)

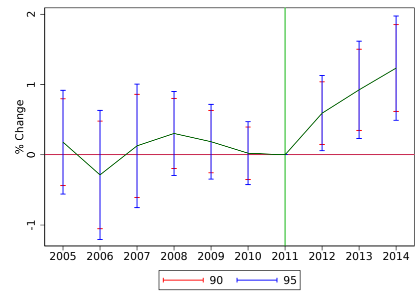
Less Than 2 Year (Below Associate) Private For-Profit Schools

Panel B: Controlling for Economic Conditions

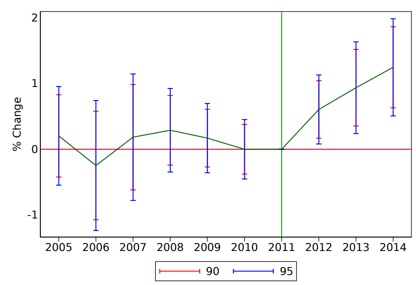
Panel B1: Unemployment Dynamics



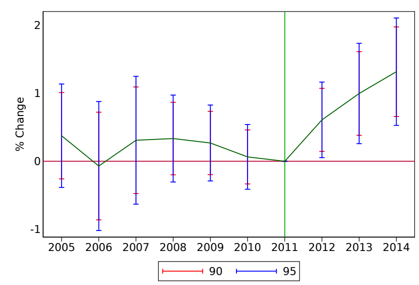
Panel B2: 2000 Age Brackets ∗ Year dummies



Panel B3: State Appropriations per Student



Panel B4: SA Share ∗ State-by-Year dummies



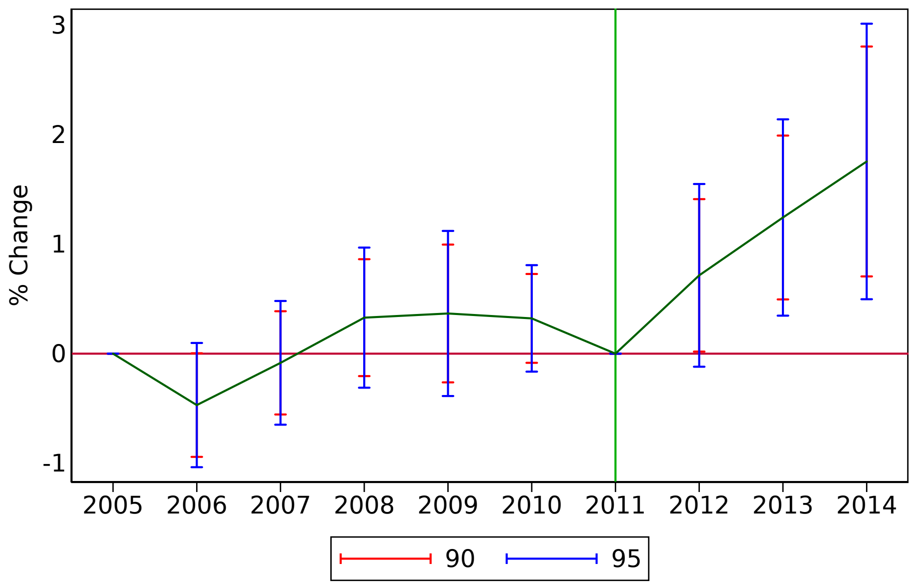
These graphs present estimates of the coefficients γ_t from specification (1) in Section 4. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. Data on enrollment are from IPEDS. The dependent variable is college's twelve-month enrollment in that academic year. Data on Medicaid expansion and uninsurance in 2009 from the Advisory Board and SAHIE respectively.

Each graph in Panel A estimates specification (1) also including county dummies interacted with a continuous time variable as well as the other fixed effects mentioned. The "Unemployment Dynamics graph in Panel B1 estimates specification (1) also including year dummies interacted with county unemployment in 2009 from the Local Area Unemployment Statistics (LAUS) of BLS. The "2000 Age Brackets ∗ Year dummies" graph in Panel B2 estimates specification (1) (1) also including 2000 population shares in age ranges 18-24, 25-34, 35-44, 45-64, and 65+, all interacted with year dummies. The "State Appropriations per Student" graph in Panel B3 estimates specification (1) also including state appropriations per student at less-than two-year public colleges by county. The "SA Share ∗ State-by-Year dummies" graph in Panel B4 estimates specification (1) also including share of revenue sourced from state appropriations at less-than-two-year public colleges, measured at county level in 2005, interacted with a full set of state-by-year fixed effects. Data on total revenue and state appropriations of colleges are obtained from IPEDS and are aggregated to county level, the geographic unit of analysis in this paper. To obtain share of state appropriations for less-than-two year public colleges in 2009, we divide county level state appropriations thus obtained by county level revenue of these colleges in the same year.

Figure 15: Robustness to Covariates and Time Trends (Continued)

Less Than 2 Years Private For-Profit Schools

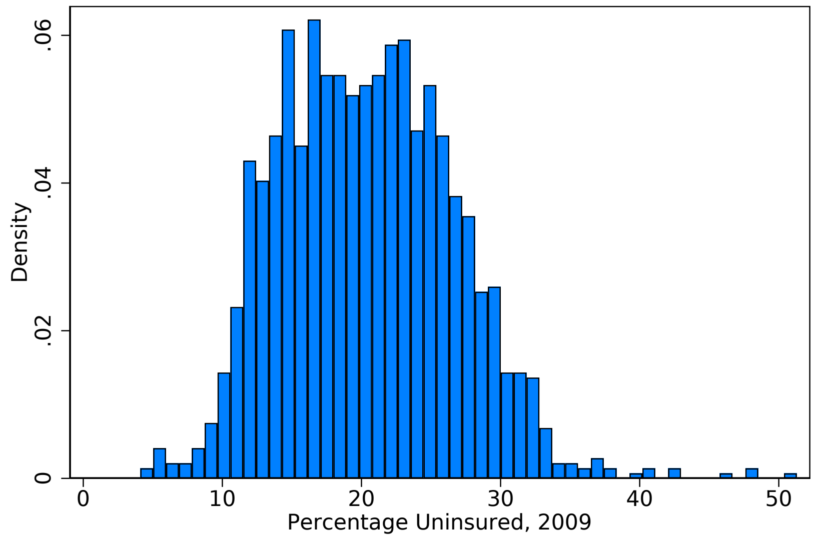
Panel C: All Controls, Including State Appropriations



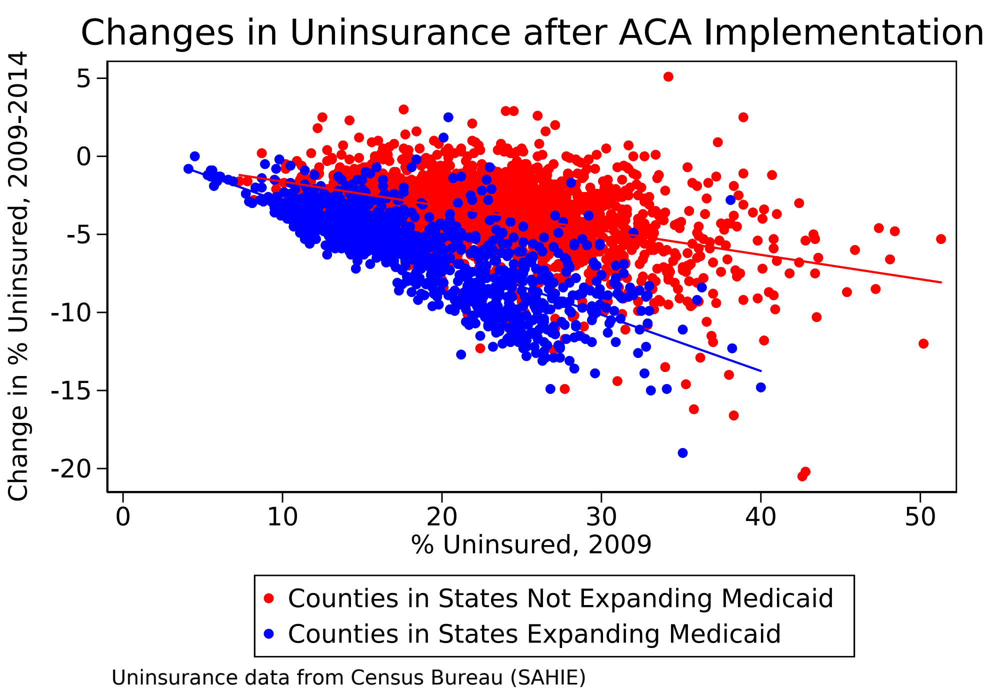
This graph presents estimates of the coefficients γ_t from specification (1) in Section 4 including county linear time trends, and all the additional variables from Panels B1, B2 and B3 in Figure 15. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. Data on enrollment are from IPEDS. The dependent variable is college's twelve-month enrollment in that academic year. Data on Medicaid expansion and uninsurance in 2009 are from the Advisory Board and SAHIE respectively.

Figure A.1: Uninsurance Rates

Panel A: Distribution of Baseline Uninsurance Rates

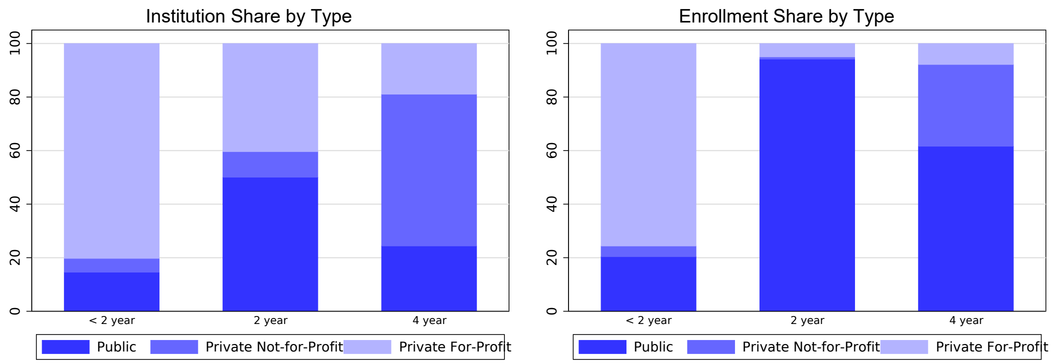


Panel B: Change in Uninsurance from 2009 to 2014 vs. Uninsurance in 2009



Panel A represents the distribution of baseline (2009) county-level uninsurance rates while Panel B represents county-level changes in uninsurance rates for counties in states expanding and not expanding Medicaid. The data are obtained from SAHIE (US Census Bureau).

Figure A.2: Composition of the Post-secondary Education Market



Data for this figure are obtained from IPEDS. The bar heights in the first graph symbolize the share of higher education institutions by type, and the bar heights in the second graph symbolize the share of enrollment by type.

Figure A.3: Examples of School Types

School Type	Examples
Public (4yr)	University of California at Berkeley, Ohio State, CUNY Queens College, University of Illinois at Springfield,...
Private For-Profit (4yr)	University of Phoenix, Devry University, American College of Acupuncture and Oriental Medicine,...
Public (2yr)	Jefferson Davis Community College, Palo Alto College,...
Private For-Profit (2yr)	Kaplan College, Faust Institute of Cosmetology,...
Public (<2yr)	Delta Montrose Technical College, Coffeyville Community College,...
Private For-Profit (<2yr)	Hair Academy of Safford, Austin Institute of Real Estate,...

The table presents some examples of the different school types used in this paper.

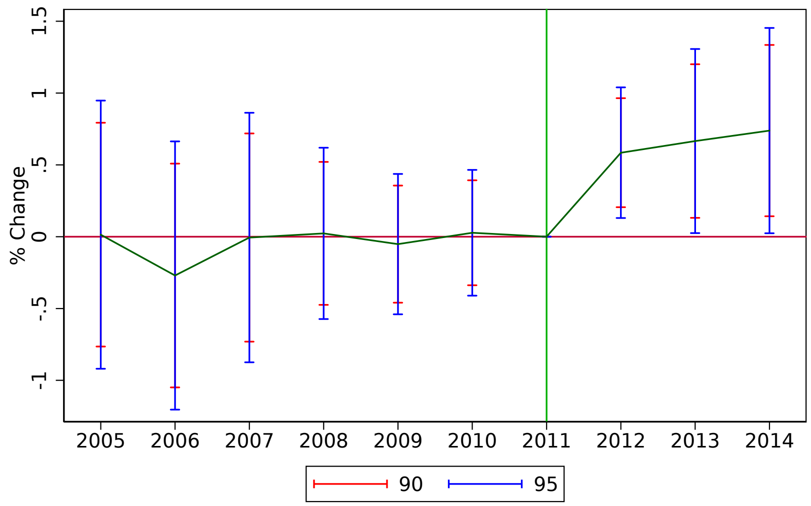
Figure A.4: States by Medicaid Expansion Group

Category	Number of States	States
Announced as of July 2012 that they would expand	14	Arkansas, California, Connecticut, Delaware, District of Columbia, Hawaii, Illinois, Maryland, Massachusetts Minnesota, Oregon, Rhode Island, Vermont, Washington
Expanded early (strictly before January 2014)	11	Arizona, California, Connecticut, Delaware, Hawaii, Iowa, Massachusetts, Minnesota, New York, Vermont, and Washington
Expanded as of January 2014	25	Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Rhode Island, Vermont, Washington, West Virginia
Expanded as of January 2018	32	Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, West Virginia
2014-2012 balance (expanded in 2014 but had not said they would in 2012)	12	Arizona, Colorado, Iowa, Kentucky, Michigan, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, West Virginia
2018-2014-2012 balance (expanded in 2018 but had not said they would in either 2012 or 2014)	6	Alaska, Indiana, Louisiana, Montana, New Hampshire, Pennsylvania

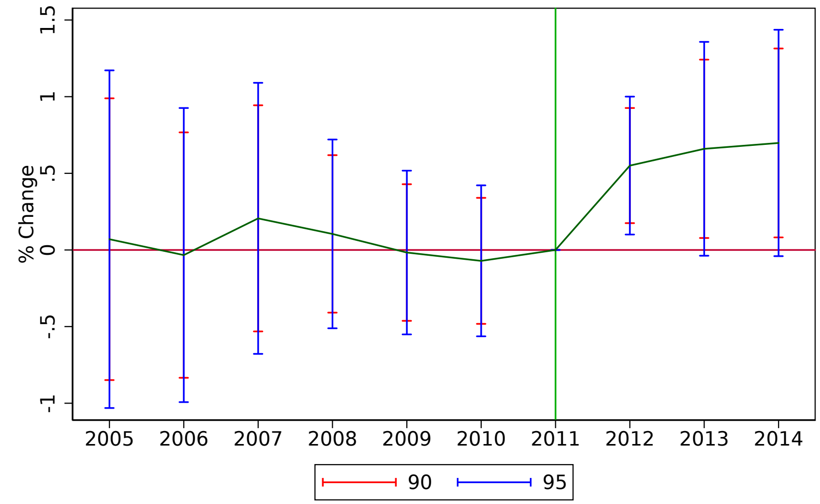
Data from the Advisory Board (for July 2012) and Kaiser Family Foundation (all other rows).

Figure A.5: Effects on Post-Secondary Enrollment Using Alternative Medicaid Eligibility Definitions

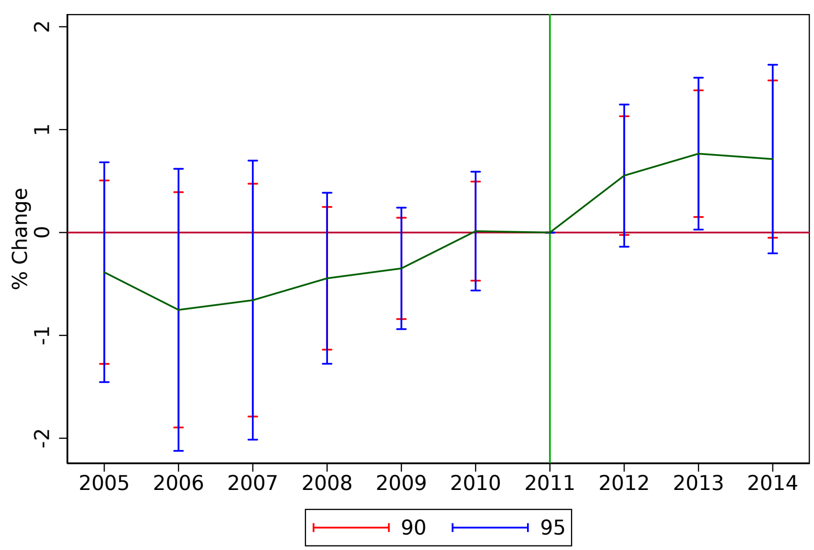
Panel A: Medicaid 2014 Classification



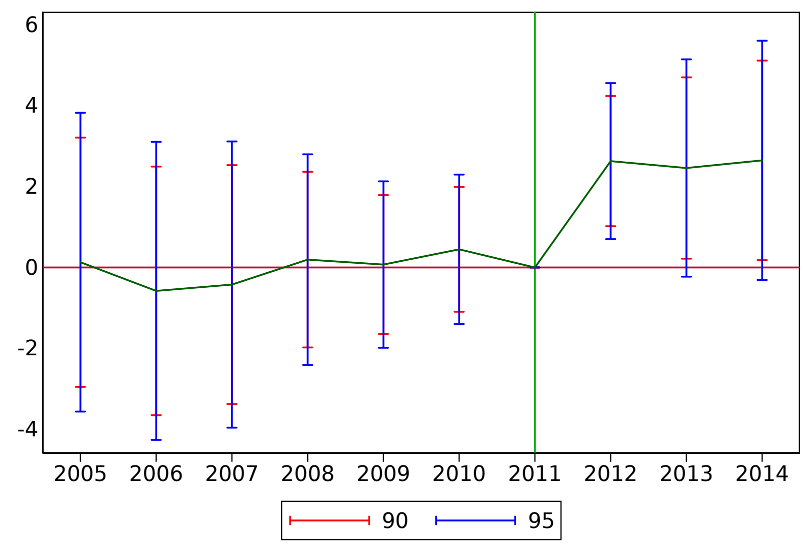
Panel B: Medicaid 2016 Classification



Panel C: Early Medicaid Expanding States



Panel D: Gruber Specification



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year. The dependent variable is college's twelve-month enrollment in that academic year. Twelve-month enrollment represents the total number of students enrolled during the academic year. Data on college enrollment are obtained from IPEDS. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. The top left graph defines Medicaid-expanding states to be the ones that expanded by January 1, 2014, as described in Figure A.4. The top right graph defines Medicaid-expanding states to be the ones that expanded by September 1, 2018, as described in Figure A.4. The bottom left graph defines Medicaid-expanding states to be the ones classified as early expanders by Hu et al. 2018 (specifically Delaware, Massachusetts, New York, Vermont, Washington D.C., Arizona, California, Connecticut, Hawaii, Iowa, Minnesota, and Washington), all of which began or completed their expansions before January 1, 2014). The bottom right graph replaces the Medicaid expansion variable with the increase in simulated Medicaid eligibility from Frean, Gruber and Sommers (2017).

Figure A.6: Classification of <2 Year Certificates

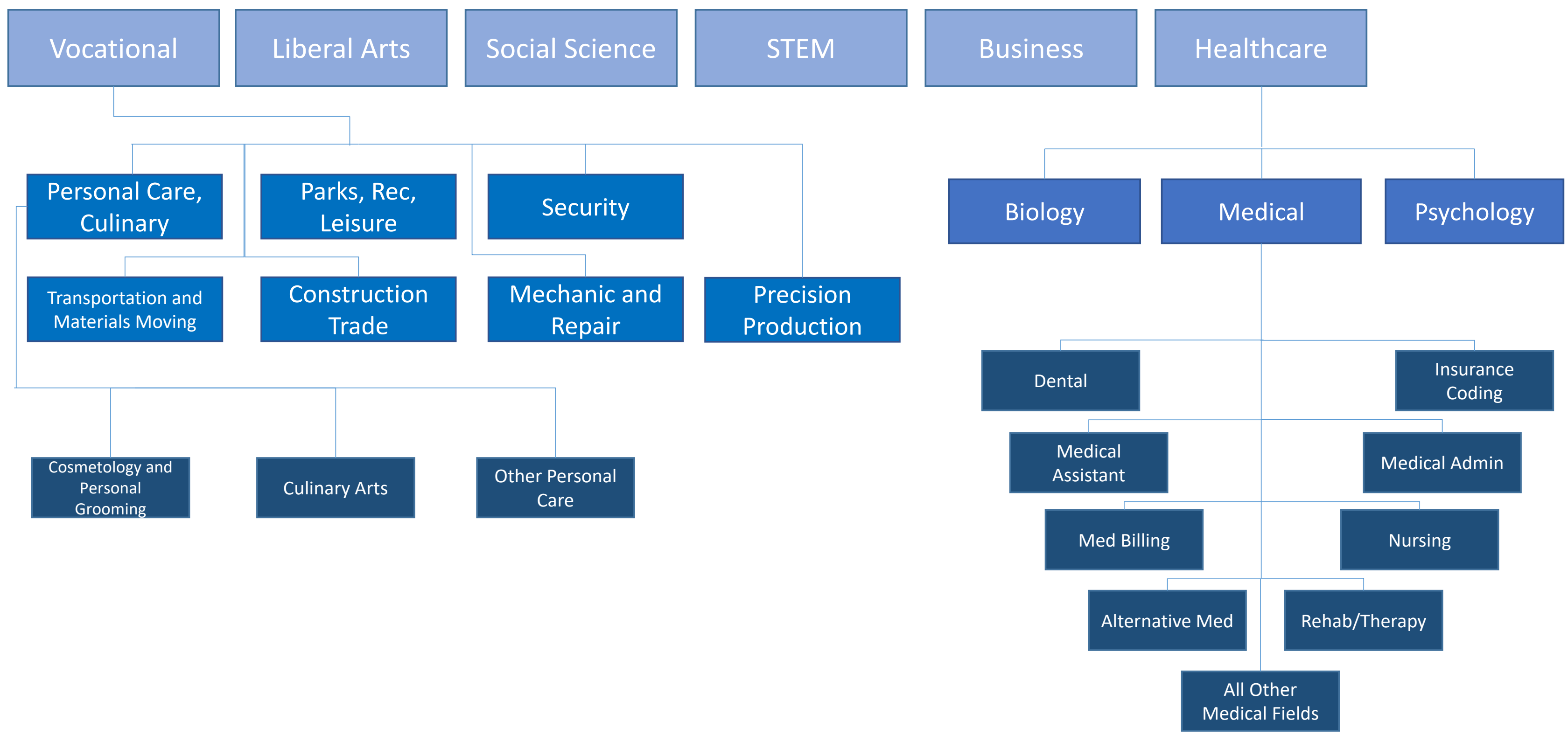
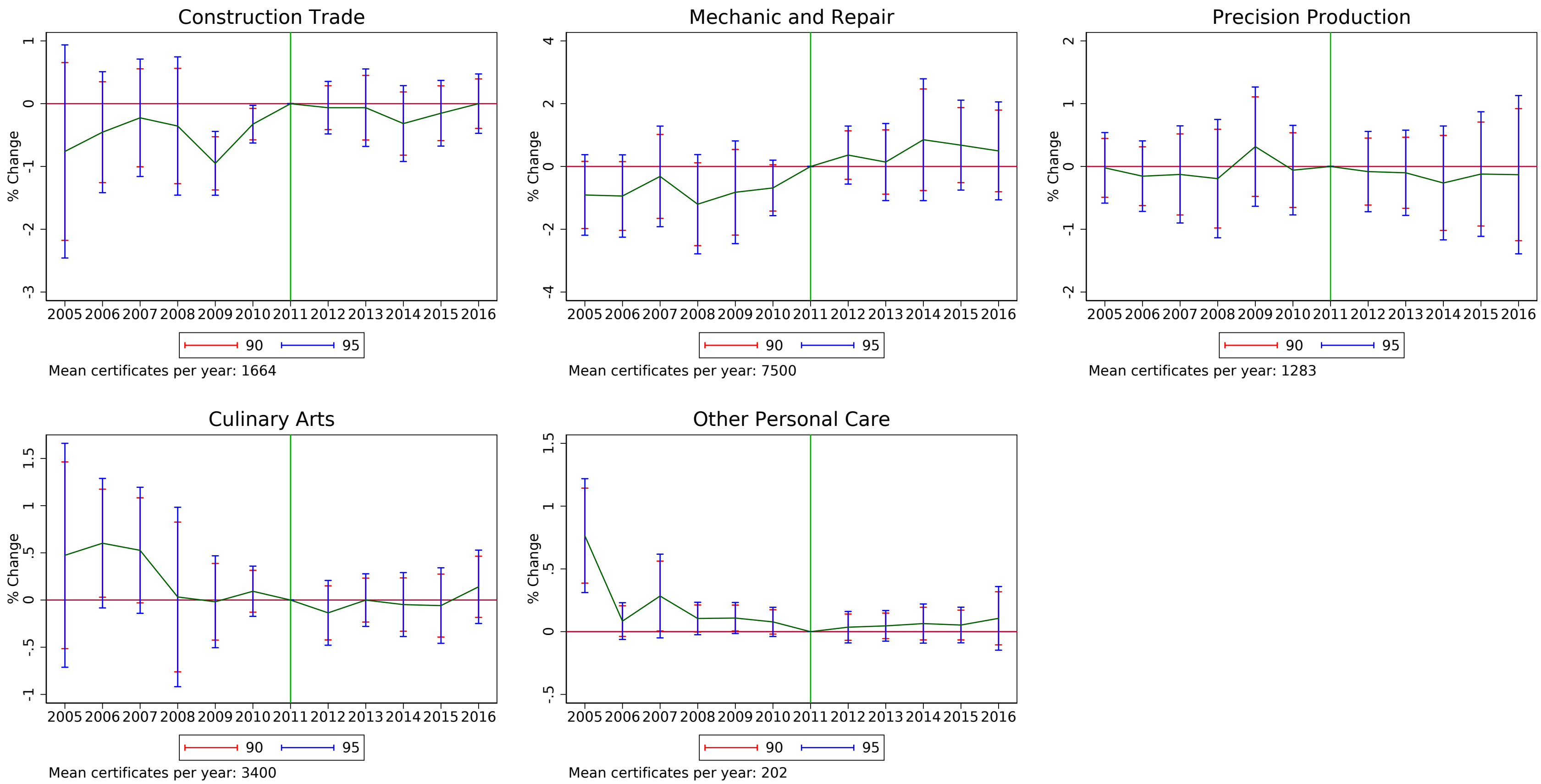


Chart based on classifications of <2-year certificates in IPEDS. "Other Personal Care" includes unclassified "personal and culinary services" certificates as well as funeral service and mortuary science. Together, they constitute a negligible number of certificates. "All Other Medical Fields" includes varied medical subfields such as dietetics, veterinary medicine, etc.

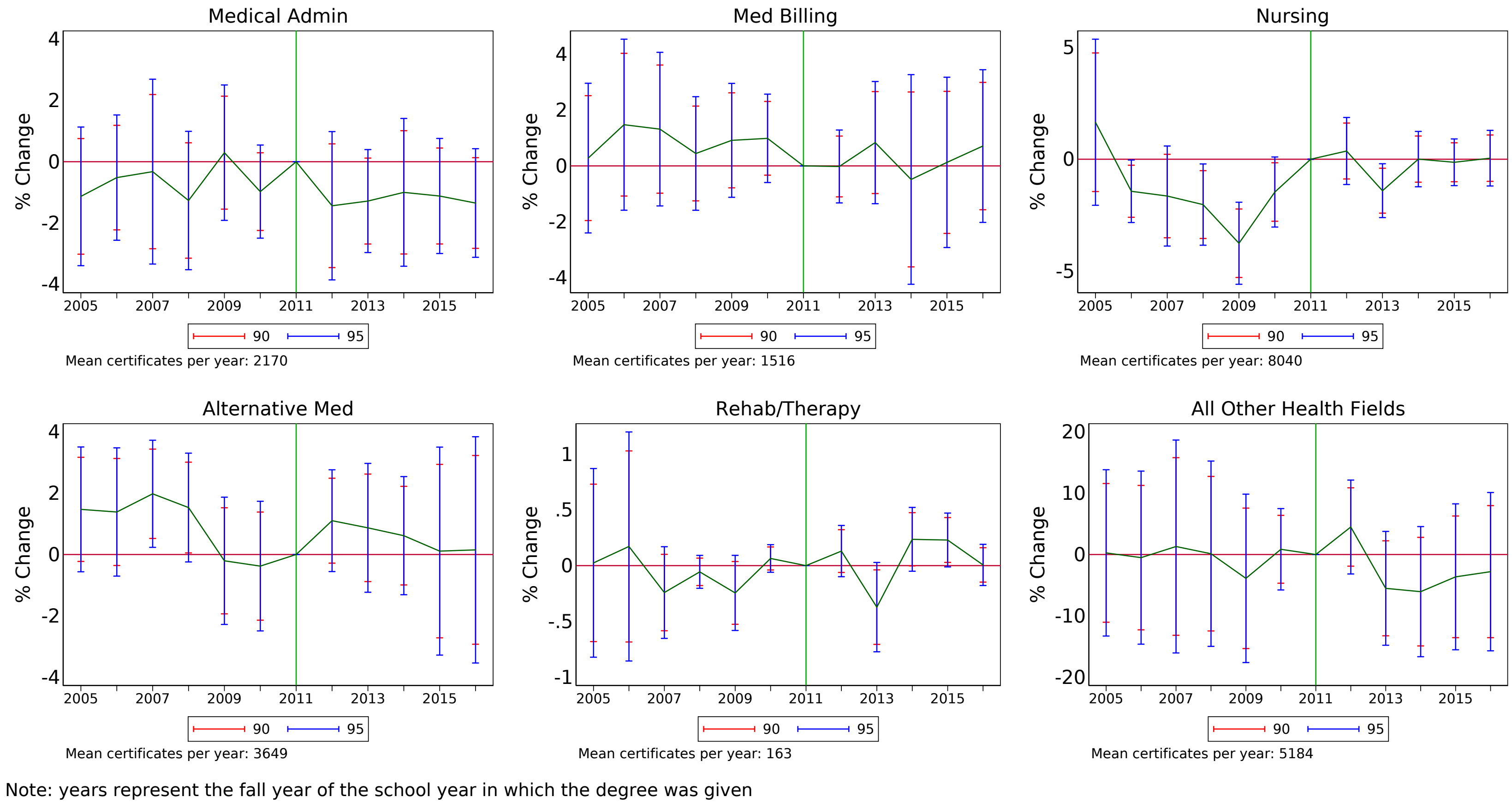
Figure A.7: Effects on Certificates in Other Vocational Subfields



Note: years represent the fall year of the school year in which the degree was given

These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when the certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. The dependent variable is college's number of certificates in that vocational subfield granted that academic year. See figure A.6 for degree classification. Mean certificate counts give the average number of <2yr for-profit certificates granted per year across the country.

Figure A.8: Effects on Certificates in Other Health Subfields



These graphs present estimates of the coefficients γ_t from specification (1) in Section 4 and use Medicaid expansion as of 2012. The coefficient for 2011 is normalized to zero. Standard error bars at the 90% and 95% confidence level (clustered by state) are drawn with red and blue tick marks respectively. The years in the horizontal axes correspond to the fall semester of the respective academic year when certificate was given. Data on Medicaid expansion and 2009 county uninsurance rates are obtained from the Advisory Board and SAHIE respectively. Data on certificate attainment are from IPEDS. "All Other Health Fields" includes otherwise uncategorized medical subfields ("All Other Medical Subfields" in Appendix Figure A.6) as well as Biology and Psychology, both of which contribute negligible amounts of for-profit certificates. The dependent variable is college's number of certificates in that health subfield granted that academic year. See figure A.6 for degree classification. Mean certificate counts give the average number of <2yr for-profit certificates granted per year across the country.

Table A.1: Summary Statistics

Variable	**N**	**mean**	**sd**	**25^{th} perc.**	**median**	**75^{th} perc.**
Percentage Uninsured, 2009	142380	20	6.3	16	20	25
Expanded Medicaid, 2012	142380	.18	.39	0	0	0
Expanded Medicaid, 2014	142380	.42	.49	0	0	1
Expanded Medicaid, 2016	142380	.53	.5	0	1	1
Gruber Simulated Medicaid Eligibility	144018	.089	.11	0	0	.23
State Appropriations to <2yr Public Schools, County-Year Level, Conditional on Non-zero <2-year Public Enrollment in County						
State Appropriations per Enrolled Student	212	2336	9,701	0	0	1479
State Appropriations Share of School Revenue, 2005	213	.14	.21	0	0	.26
State Appropriations to <2yr Public Schools, County-Year Level, All Counties						
State Appropriations per Enrolled Student	1582	313	3,632	0	0	0
State Appropriations Share of School Revenue, 2005	1582	.019	.09	0	0	0
Migration, Person-County-Year level						
In-Migration	6,426,601	.044	.205	0	0	0
Out-Migration	6,426,601	.044	.205	0	0	0
Controls						
Share (of Population +18) which is Ages 18-24, 2000	143928	.14	.053	.11	.12	.15
Share (of Population +18) which is Ages 25-34, 2000	143928	.17	.028	.15	.17	.19
Share (of Population +18) which is Ages 35-44, 2000	143928	.21	.025	.2	.21	.22
Share (of Population +18) which is Ages 45-64, 2000	143928	.3	.031	.29	.31	.32
Share (of Population +18) which is Ages 65+, 2000	143928	.18	.045	.15	.18	.21
Population (in Thousands), 2005	142380	133	320	24	47	116
Unemployment Rate, 2009	142290	9.2	2.9	7.3	8.9	11

Source: Integrated Post Secondary Education Data System, Kaiser Family Foundation, Census and New York Fed/Equifax Consumer Credit Panel. Using the county-year level dataset used in this paper, we present county level statistics (mean, standard deviation, quartiles) in this table, unless otherwise indicated. Some variables pertain to a baseline year as indicated in the table. Includes academic years 2005-2006 through 2014-2015 and 1582 counties.

Table A.2: Summary Statistics By School Type

Variable	All	< 2-year	2-year	4-year	< 2-year FP	< 2-year NFP	< 2-year Pub.	2-year FP	2-year NFP	2-year Pub.	4-year FP	4-year NFP	4-year Pub.
						Conditional On Non-zero Fall Enrollment of Specified Type in County							
Fall Enrollment	4,934	446	5,262	7,174	543	213	279	1,046	391	7,791	4,460	4,248	11,560
	(12,599)	(1,147)	(15,249)	(12,593)	(1,295)	(345)	(854)	(2,003)	(515)	(18,645)	(17,977)	(7,902)	(12,966)
12mo Enrollment	6,718	749	8,085	8,769	931	350	429	1,701	547	11,938	7,090	5,022	13,660
	(18,293)	(2,015)	(23,545)	(16,683)	(2,255)	(546)	(1,564)	(3,255)	(779)	(28,801)	(27,980)	(9,448)	(15,670)
Hispanic Students	709	103	903	861	130	70	50	198	35	1,333	548	420	1,484
	(4,101)	(553)	(5,701)	(3,221)	(590)	(124)	(529)	(710)	(84)	(7,111)	(1,977)	(1,388)	(4,673)
White Students	3,218	177	2,797	5,377	198	58	162	436	217	4,193	2,182	3,674	8,584
	(6,529)	(295)	(5,332)	(8,424)	(325)	(154)	(232)	(718)	(294)	(6,269)	(9,226)	(7,103)	(8,404)
African-American Students	745	107	750	1,105	145	49	34	240	74	1,068	1,279	663	1,532
	(2,215)	(321)	(2,193)	(2,719)	(384)	(94)	(112)	(495)	(146)	(2,683)	(4,694)	(1,562)	(2,571)
Undergraduate Female Students	2,812	325	3,032	4,016	416	136	162	672	260	4,454	2,747	2,437	6,303
	(7,143)	(828)	(8,343)	(7,500)	(967)	(237)	(463)	(1,217)	(344)	(10,180)	(12,231)	(4,530)	(7,064)
Undergraduate Male Students	2,122	120	2,230	3,158	127	76	117	374	131	3,337	1,714	1,811	5,257
	(5,561)	(368)	(6,944)	(5,284)	(369)	(135)	(405)	(893)	(217)	(8,508)	(5,895)	(3,435)	(5,998)
Undergraduate Part Time Students	1,810	92	3,046	1,561	83	36	128	110	104	4,744	1,317	738	2,585
	(7,053)	(287)	(10,566)	(3,632)	(222)	(238)	(409)	(232)	(211)	(12,972)	(4,262)	(1,957)	(4,457)
Undergraduate Full Time Students	3,124	354	2,215	5,612	460	177	151	936	287	3,046	3,144	3,510	8,975
	(7,468)	(969)	(4,882)	(10,370)	(1,137)	(229)	(523)	(1,874)	(400)	(5,841)	(15,992)	(6,662)	(9,987)
							All Observations						
Fall Enrollment	1,215	73	1,508	2,063	174	8	38	249	30	4,245	617	1,629	3,945
	(6,603)	(494)	(8,502)	(7,494)	(776)	(78)	(328)	(1,074)	(177)	(14,298)	(6,859)	(5,310)	(9,350)
12mo Enrollment	1,654	123	2,317	2,523	299	13	59	405	42	6,505	981	1,925	4,662
	(9,528)	(864)	(13,124)	(9,789)	(1,349)	(125)	(598)	(1,745)	(261)	(22,073)	(10,688)	(6,339)	(11,214)
Hispanic Students	174	17	259	248	42	2.6	6.8	47	2.7	726	76	161	507
	(2,058)	(227)	(3,079)	(1,771)	(340)	(27)	(195)	(356)	(25)	(5,290)	(759)	(883)	(2,819)
White Students	792	29	802	1,547	63	2.2	22	104	17	2,284	302	1,409	2,930
	(3,524)	(136)	(3,122)	(5,132)	(206)	(32)	(102)	(396)	(1.0e+02)	(5,076)	(3,512)	(4,747)	(6,377)
African-American Students	183	18	215	318	46	1.8	4.6	57	5.7	582	177	254	523
	(1,145)	(136)	(1,222)	(1,541)	(228)	(20)	(43)	(262)	(45)	(2,051)	(1,800)	(1,019)	(1,668)
Undergraduate Female Students	692	53	869	1,155	133	5.1	22	160	20	2,427	380	934	2,151
	(3,746)	(357)	(4,672)	(4,414)	(581)	(53)	(179)	(659)	(118)	(7,834)	(4,646)	(3,045)	(5,095)
Undergraduate Male Students	522	20	639	908	41	2.9	16	89	10	1,818	237	694	1,794
	(2,907)	(156)	(3,851)	(3,174)	(217)	(30)	(154)	(464)	(69)	(6,496)	(2,270)	(2,302)	(4,300)
Undergraduate Part Time Students	446	15	873	449	27	1.4	17	26	8	2,585	182	283	882
	(3,585)	(121)	(5,821)	(2,072)	(131)	(47)	(156)	(123)	(65)	(9,862)	(1,649)	(1,264)	(2,878)
Undergraduate Full Time Students	769	58	635	1,614	148	6.6	20	223	22	1,660	435	1,345	3,063
	(3,942)	(414)	(2,799)	(6,114)	(679)	(56)	(199)	(997)	(135)	(4,571)	(6,044)	(4,464)	(7,221)
Unique Institutions	8451	2471	2511	3133	299	119	2053	678	1691	764	1163	214	1134

Source: Integrated Post Secondary Education Data System. Includes academic years 2005-2006 through 2014-2015 and all institution types. Cells are county-level means with corresponding standard deviations below in parentheses.

Table A.3: Summary Statistics By School Type

Variable	All	< 2-year	2-year	4-year	< 2-year FP	< 2-year NFP	< 2-year Pub.	2-year FP	2-year NFP	2-year Pub.	4-year FP	4-year NFP	4-year Pub.
Conditional On Non-zero Fall Enrollment of Specified Type in County													
Undergraduate Students Under 25	3,304	214	3,105	5,276	546	217	270	1,056	394	7,769	5,662	6,247	14,127
	(7,943)	(567)	(9,001)	(8,470)	(1,341)	(389)	(744)	(2,034)	(516)	(18,517)	(23,400)	(13,719)	(16,129)
Full Time Undergraduate Students Under Age 25	2,453	174	1,580	4,634	551	220	272	1,058	396	7,769	5,681	6,251	14,127
	(5,546)	(503)	(3,740)	(7,522)	(1,347)	(391)	(749)	(2,036)	(517)	(18,517)	(23,443)	(13,723)	(16,129)
Part Time Undergraduate Students Under Age 25	851	40	1,525	642	803	335	384	1,566	546	7,820	6,541	6,410	14,195
	(3,555)	(124)	(5,393)	(1,587)	(1,657)	(595)	(948)	(2,525)	(585)	(18,572)	(25,247)	(13,876)	(16,144)
Undergraduate Students Ages 25-49	1,423	203	1,868	1,677	548	218	270	1,059	397	7,771	5,652	6,262	14,132
	(4,960)	(540)	(5,357)	(5,774)	(1,342)	(390)	(744)	(2,036)	(517)	(18,519)	(23,379)	(13,735)	(16,130)
Full Time Undergraduate Students Ages 25-49	609	161	587	888	553	222	273	1,060	399	7,771	5,652	6,280	14,132
	(3,104)	(447)	(1,118)	(4,823)	(1,350)	(392)	(749)	(2,037)	(519)	(18,519)	(23,379)	(13,757)	(16,130)
Part Time Undergraduate Students Ages 25-49	814	42	1,281	789	819	306	390	1,555	539	7,837	6,535	6,450	14,190
	(3,045)	(151)	(4,381)	(2,020)	(1,672)	(581)	(953)	(2,514)	(585)	(18,590)	(25,233)	(13,925)	(16,143)
All Observations													
Undergraduate Students Under 25	812	35	891	1,511	86	2.9	16	125	17	2,531	177	1,248	3,107
	(4,187)	(243)	(5,021)	(5,122)	(398)	(26)	(119)	(571)	(102)	(8,442)	(1,461)	(4,195)	(7,387)
Full Time Undergraduate Students Under Age 25	603	29	453	1,327	75	2.5	7.9	115	14	1,232	137	1,161	2,684
	(2,946)	(214)	(2,127)	(4,538)	(359)	(22)	(66)	(545)	(87)	(3,515)	(1,283)	(3,961)	(6,415)
Part Time Undergraduate Students Under Age 25	209	6.6	438	184	11	.43	8.3	10	3	1,299	40	88	423
	(1,800)	(52)	(2,970)	(897)	(53)	(9.5)	(72)	(46)	(25)	(5,035)	(316)	(342)	(1,453)
Undergraduate Students Ages 25-49	350	33	536	480	79	4.5	16	113	13	1,482	384	320	736
	(2,535)	(232)	(2,991)	(3,181)	(365)	(53)	(147)	(486)	(79)	(5,025)	(4,912)	(1,301)	(2,108)
Full Time Undergraduate Students Ages 25-49	150	27	168	254	66	3.5	10	99	8	398	267	158	338
	(1,561)	(191)	(655)	(2,612)	(313)	(31)	(90)	(445)	(51)	(1,002)	(4,384)	(684)	(873)
Part Time Undergraduate Students Ages 25-49	200	6.9	368	226	14	.94	6	15	4.6	1,084	118	162	397
	(1,550)	(63)	(2,417)	(1,138)	(72)	(39)	(71)	(66)	(41)	(4,093)	(1,166)	(827)	(1,340)
Unique Institutions	8291	2401	2506	3118	309	117	1975	680	1682	756	1152	225	1129

Source: Integrated Post Secondary Education Data System. Includes academic years 2005-2006 through 2014-2015 and all institution types. Enrollment figures by age group include only academic years for which the fall year is an odd number, since those are the only years in which institutions are required to report enrollment by age group. Cells are means with corresponding standard deviations below in parentheses.

Table A.4: Summary Statistics, County-Year Level Certificate Counts by Field

Variable	**N**	**mean**	**sd**	25^{th} **perc.**	**median**	75^{th} **perc.**
Conditional on Non-zero <2-year For-Profit Certificates Awarded in County						
Total Certificates	4925	389	952	36	95	360
Liberal Arts	4925	4.6	43	0	0	0
Social Science	4925	5.7	41	0	0	0
STEM	4925	14	60	0	0	0
Healthcare	4925	176	529	0	0	142
Business	4925	8.9	42	0	0	0
Vocational	4925	180	393	24	59	163
Culinary and Personal Care	4925	142	314	23	53	137
Parks, Rec, Leisure	4925	.59	6.2	0	0	0
Security	4925	.59	10	0	0	0
Construction Trade	4925	4.5	29	0	0	0
Mechanic and Repair	4925	15	76	0	0	0
Precision Production	4925	3.6	29	0	0	0
Transportation, Materials Moving	4925	14	78	0	0	0
Funeral and Mortuary	4925	0	0	0	0	0
Cosmetology and Personal Grooming	4925	140	304	23	55	138
Culinary Arts	4925	8.6	81	0	0	0
Other Personal Care	4925	1.4	30	0	0	0
Other Vocational Fields	4925	33	163	0	0	0
Medical	4925	176	529	0	0	142
Psychology	4925	0	0	0	0	0
Biology and Biomed	4925	.064	1.5	0	0	0
Medical Admin	4925	5.2	37	0	0	0
Dental	4925	14	56	0	0	0
Med Billing	4925	7.9	36	0	0	0
Insurance Coding	4925	7.5	34	0	0	0
Nursing	4925	17	86	0	0	0
Medical Assistant	4925	86	269	0	0	65
Alternative Med	4925	30	87	0	0	22
Rehab/Therapy	4925	.12	2.5	0	0	0
All Other Health Fields	4925	8.5	84	0	0	0
All Counties						
Total Certificates	15820	121	561	0	0	30
Liberal Arts	15820	1.4	24	0	0	0
Social Science	15820	1.8	23	0	0	0
STEM	15820	4.2	34	0	0	0
Healthcare	15820	55	306	0	0	0
Business	15820	2.8	24	0	0	0
Vocational	15820	56	234	0	0	19
Culinary and Personal Care	15820	44	187	0	0	17
Parks, Rec, Leisure	15820	.18	3.5	0	0	0
Security	15820	.18	5.8	0	0	0
Construction Trade	15820	1.4	16	0	0	0
Mechanic and Repair	15820	4.7	43	0	0	0
Precision Production	15820	1.1	16	0	0	0
Transportation, Materials Moving	15820	4.3	44	0	0	0
Funeral and Mortuary	15820	0	0	0	0	0
Cosmetology and Personal Grooming	15820	44	182	0	0	20
Culinary Arts	15820	2.7	45	0	0	0
Other Personal Care	15820	.43	17	0	0	0
Other Vocational Fields	15820	10	92	0	0	0
Medical	15820	55	306	0	0	0
Psychology	15820	0	0	0	0	0
Biology and Biomed	15820	.02	.83	0	0	0
Medical Admin	15820	1.6	21	0	0	0
Dental	15820	4.2	32	0	0	0
Med Billing	15820	2.5	21	0	0	0
Insurance Coding	15820	2.3	19	0	0	0
Nursing	15820	5.4	49	0	0	0
Medical Assistant	15820	27	156	0	0	0
Alternative Med	15820	9.5	51	0	0	0
Rehab/Therapy	15820	.038	1.4	0	0	0
All Other Health Fields	15820	2.4	47	0	0	0

Source: Integrated Post Secondary Education Data System, Kaiser Family Foundation, and Census. Includes academic years 2005-2006 through 2014-2015 and 1582 counties unconditional on degrees awarded. County level statistics (mean, standard deviation and quartiles) are reported.