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Did the ACA reduce job-lock and spur entrepreneurship?

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Abstract

Purpose – The purpose of this paper is to assess the effect of the recent Affordable Care Act's (ACA) Dependent Mandate (DM) that requires health insurers to extend dependent coverage to the children of their insured, up to age 26. The DM has the potential to free young persons from “job lock,” enabling them to engage in entrepreneurial activity. Using the American Community Survey, the authors analyze the change in self-employment for ages 18-25 relative to the implementation of the DM.

Design/methodology/approach – The authors approach the research question in a unique manner and in doing so, extend the literature. Employing national data, the authors focus on young adults impacted by the DM (those under the age of 26 may remain on their parents' insurance). While the DM is a condition of the ACA, prior to its implementation several states had already passed their own such provision. The authors exploit this state-by-state variation in the methodology.

Findings – The authors find no evidence that the ACA has stimulated self-employment among all young adults. However, the authors determine that the DM has a positive and significant effect on the likelihood of students being self-employed. The result is even more pronounced when using a stricter definition of entrepreneurship, an incorporated business. Sub-group analyses show no evidence of a significant effect on entrepreneurship among young adults in other groups. The results remain after conducting various falsification tests.

Originality/value – The paper empirically addresses the commonly held belief that the ACA is creating new businesses via reduced job lock. Policy makers may wish to target other explanations of job lock rather than health insurance availability.

Keywords Entrepreneurs, Affordable Care Act, Dependent mandate, Job lock

Paper type Research paper

1. Introduction

Health insurance availability is a significant factor in labor market decisions (Aggarwal *et al.*, 2013; DeCicca, 2010; Fairlie *et al.*, 2011; Madrian, 1994). Employer-based insurance can offer desirable characteristics for workers: subsidized group insurance and negotiated lower premiums based on group risk assessment. If an individual decides to leave his or her job to engage in self-employment, obtaining affordable, quality coverage through the individual market is a large concern. The Patient Protection and Affordable Care Act (ACA) aims to increase insurance access for all ages. While certain provisions of the ACA have been phased in over several years, one group was affected early in the process: dependents under the age of 26. These individuals can now remain on their parent's insurance (henceforth known as the Dependent Mandate (DM)[1]). Further, it is noteworthy that many states adopted a DM prior to the implementation of the ACA (Goda *et al.*, 2016). We focus our analysis on the effect of the ACA 2010 DM on entrepreneurship among young adults, while using variation in prior state-level DMs for identification.

There is concern among policy makers and economists that young adults seeking jobs will focus solely on employers that provide health insurance. Young adults that may have



otherwise chosen an entrepreneurial path would be forced into job lock; hence, discouraged from pursuing self-employment due to a lack of access to affordable health insurance. Current estimates indicate that the DM affects 29.5 million young adults (Antwi *et al.*, 2013); thus, a change in the labor decisions of this age group could substantially influence the labor market and the overall economy.

While studies assessing the effects of individual insurance options on self-employment have been conducted, many have concentrated on factors influencing the entire labor force. Studies on specific age groups are smaller in number and narrow in focus (e.g. the effects in a single state, Massachusetts). In this paper, we add to the research regarding health insurance and job lock, by specifically assessing the effects of the DM. Using data from the American Community Survey (ACS), we assess whether the mandate has affected self-employment among individuals aged 18-25.

We use regression models to estimate self-employment as a function of the DM and other demographic, geographic, and educational factors. We exploit the longitudinal aspect of the ACS data to identify both pre- and post-treatment time periods for states' implementation of their DM. Further, we identify both a treated group (individuals aged 18-25 with the implementation of the ACA's DM) and control group (individuals aged 18-25 in states with a pre-ACA DM) in order to identify a causal effect of this policy change on entrepreneurship in this age group. We find that the DM has no statistically significant effect on entrepreneurship among young adults in general, but rather it has a positive and statistically significant effect on young-adult students. Namely, the odds of a student starting a new firm in states without an existing DM are 8.2 percent higher than students in states with DMs in place prior to the ACA. When we utilize a stricter definition of self-employment, that of self-employment in an incorporated business, the effect is a 6 percent increase in the odds of self-employment. However, the largest effect, about 19 percent higher odds, appears to come from students who were not in the labor force when they started their business. Our results remain through various falsification and robustness tests.

2. Literature review

There are many factors that influence the ability of individuals to pursue entrepreneurial ventures. In addition to creativity and individual risk preferences, these characteristics include race, gender, socioeconomic status, and marital status (Jansen *et al.*, 2003; Acs *et al.*, 2004; Douglas and Shepherd, 2002). Further, both the availability and the cost of health insurance can act as a significant barrier to entrepreneurial activity (Aggarwal *et al.*, 2013; Heim and Lurie, 2013; Velamuri, 2012; Fairlie *et al.*, 2011; Selden, 2009). First, we review the literature to identify the link between access to health insurance and the demographic, socioeconomic, and regional characteristics that are likely to influence an individual's decision to become an entrepreneur. Subsequently, we review the specific DM portion of the ACA and identify pathways through which it may influence entrepreneurial activity.

A perfect labor market would include fluid movement of workers between jobs. Wage determination would occur through the interaction of the demand and supply for labor and the underlying product or service being provided. However, we know that frictions occur within labor markets that can prevent this fluid exchange of workers. Job search is not free, nor is relocation. Additionally, employer-provided health insurance is a key factor that influences job mobility. Madrian (1994) finds that among married men between the ages of 20-55 the men with employer-sponsored health insurance are 30-40 percent less likely to change jobs than those with alternative sources of health insurance coverage. Gilleskie and Lutz (2002) find employer-sponsored health coverage reduces mobility for young unmarried males by 10-15 percent. Moreover, a Government Accountability Office (2011) report on job lock and the potential impact of the PPACA surveys 31 published studies and finds that 29 presented evidence consistent with job-lock stemming from employer-sponsored health insurance.

The effects of employer-sponsored health insurance are particularly striking in the entrepreneurial realm where a lack of health insurance negatively affects prospective entrepreneurs (Aggarwal *et al.*, 2013). In a survey conducted of 540 entrepreneurs, Aggarwal *et al.* (2013) find 88 percent of these individuals identify the availability of health insurance to be a key factor in starting a business. Additionally, Fairlie *et al.* (2011) model changes in entrepreneurship given a shift from employer-sponsored health insurance to Medicare at age 65, and find employer-based health insurance to be a discouraging factor toward entrepreneurial activity. Individuals with employer-sponsored health insurance are 2.5 to 3.9 percentage points less likely to become entrepreneurs than those without employer-sponsored or spousal-provided health insurance. Finally, DeCicca (2010) identifies that the New Jersey Individual Health Coverage Plan[2] initiative increased self-employment and job mobility (relative to other states) by 14-20 percent and 25-50 percent, respectively, among individuals aged 25-29.

A lack of access to health insurance affects individuals entering entrepreneurial activities differently (Aggarwal *et al.*, 2013). Individuals with lower socioeconomic status indicate that a lack of health insurance is a larger barrier to becoming an entrepreneur than it is to those of higher socioeconomic status. Aggarwal *et al.* (2013) also find that the degree to which access to health insurance affects entrepreneurs' decisions to start businesses increases with the number of children in their household. Further, married entrepreneurs view access to health insurance as a larger barrier than those who are unmarried (Aggarwal *et al.*, 2013).

The ACA poses a potential benefit to increase both job mobility and entrepreneurship through its subsidies and health insurance exchange. Early studies of the ACA boast significant decreases in the population of the uninsured (Antwi *et al.*, 2013; Roby *et al.*, 2013), and popular press articles highlight potential boons to entrepreneurship (Goodall, 2013; Maltby and Loten, 2013). Maltby and Loten (2013) emphasize the predictions that increased entrepreneurship will be a significant byproduct of the ACA. The Kauffman-RAND Institute for Entrepreneurship Public Policy claims the ACA could increase new businesses by 33 percent over the course of several years (Maltby and Loten, 2013). Further, Goodall (2013) claims that the policy change will add 1.5 million new businesses in the USA through the creation of new health insurance markets, premium-cost reductions, and discounts for non-group members. Blumberg *et al.* (2013) who summarize the most recent ACA research, conclude that evidence thus far strongly suggests that the ACA will increase self-employment.

Recent studies in the field of economics do not robustly support these claims of increased self-employment. Bailey (2013), using a difference-in-difference strategy comparing individuals aged 19-25 with individuals aged 27-33, finds a statistically significant and positive result (ACS data from 2000 to 2013). Namely, that the ACA spurs increased entrepreneurship among the treated group. However, using narrower, more comparable age groups of 23-25 and 27-29 yields less robust results and in certain cases no statistical significance. Bailey and Chorny (2016) find no increase in job mobility (using CPS data) resulting from the ACA's DM and suggest that job lock is not a major concern for young adults. Heim *et al.* (2015) utilize tax records from 2008 to 2012 to investigate labor market outcomes of young adult dependents and find only small evidence of the ACA's influence. They note that the DM may have led men to be self-employed, but that the effects of all of their findings are either relatively modest or statistically insignificant. Heim and Lurie (2015) revisit the Massachusetts reform and find no significant effect on job separations (i.e. job mobility) overall.

Massachusetts provides a test case for health reform and its outcomes. This has been a wellspring for analysis on health reform and the resultant effect on labor markets. The results, drawn from a variety of data sources, have been mixed. Niu (2012, 2014). Heim and Lurie's (2014a) results are mixed with some evidence of a fall in the rate of taxpayers

earning a majority of income from self-employment, with older taxpayers being an exception. This is consistent with early work by these authors wherein state reforms during the 1990s had no statistically significant effect on the propensity to be self-employed overall. Becker and Tuzemen (2015) consider the effect of the Massachusetts reform on self-employment using the CPS (2005-2012) and find evidence of a positive effect. The effects are more pronounced among women, younger individuals, and prime-age adults with children. Niu (2012, 2014) also find supportive evidence that the Massachusetts health reform spurred entrepreneurship among the general population; however, this effect dissipates over time (Niu, 2014).

Massachusetts is not the only state to undertake health reform pre-ACA. Goda *et al.* (2016) list 37 states with a dependent coverage mandate prior to the ACA. For example, North Dakota's DM became effective in 1995. Conversely, Wisconsin's DM began on January 2, 2010[3]. We contribute to the growing literature in this field by exploiting this variation in states' DMs and utilize ACS data to explore the effect of the ACA's DM on self-employment among young adults. To our knowledge, no prior research exists that employs this appropriate under-26 year old cohort while also taking advantage of individual states' timing of DMs.

3. Data and methodology

We use individual responses to the US Census Bureau's ACS from 2008 to 2014 gathered from the Integrated Public Use Microdata Series (IPUMS). Since 2008, the Census Bureau has increased the number of addresses initially selected for the survey from 2.9 million to over 3.5 million. Over this time, the Census Bureau has maintained a respectable response rate over 97 percent[4]. The data provide rich information on the socioeconomic and demographic variables of each individual, including health insurance and detailed employment status. In addition to the ACS, we follow Goda *et al.* (2016) to identify states with existing DMs prior to the ACA and the year in which they became effective (Table I).

We limit the sample to young adults between 18 and 25 to ensure an appropriate and consistent control group in terms of income, health, entrepreneurial aspirations, and job prospects. Our main sample includes approximately 1.5 million individual observations

State	Assumed effective date	State	Assumed effective date
Colorado	January 1, 2016	New Hampshire	September 15, 2007
Connecticut	January 1, 2009	New Jersey	January 1, 2016
Delaware	June 1, 2007	New Mexico	July 1, 2003
Florida	July 1, 2007	New York	September 1, 2009
Georgia ^a	January 1, 2006	North Dakota	July 1, 1995
Idaho	July 1, 2007	Ohio	July 1, 2010
Illinois	June 1, 2009	Oregon	January 1, 2009
Indiana	July 1, 2007	Pennsylvania ^a	September 1, 2009
Iowa	July 1, 2008	Rhode Island	January 1, 2007
Kentucky	July 15, 2008	South Carolina	January 1, 2008
Louisiana	January 1, 2009	South Dakota	January 1, 2005
Maine	September 20, 2007	Tennessee	January 1, 2008
Maryland	January 1, 2008	Texas	January 1, 2004
Massachusetts	January 1, 2007	Utah	January 1, 1995
Minnesota	January 1, 2008	Virginia	July 1, 2007
Missouri	January 1, 2008	Washington	January 1, 2009
Montana	January 1, 2008	West Virginia	July 1, 2007
Nevada ^a	January 1, 2006	Wisconsin	January 2, 2010
		Wyoming ^a	January 1, 2009

Note: ^aPrecise date of implementation is uncertain

Source: Goda *et al.* (2016)

Table I.
States with dependent
coverage mandate
prior to ACA

from 2008 to 2014. Data sets used in similar studies include the Current Population Survey, Medical Expenditure Panel Survey, or Survey of Income and Program Participation. While these data sets are extremely detailed, they have limited variation and a smaller sample size than the ACS when restricting the sample to working-age young adults (ages 18-25 inclusive)[5].

Our empirical strategy is a difference-in-difference approach to isolate the effect of the ACA while removing any unobserved time-varying effects. As the ACA implementation began in 2010, there were many changes taking place in addition to the DM (e.g. ban on pre-existing condition exclusion, ban on coverage rescission, small business tax credit, etc.). While similar studies use the difference-in-difference empirical strategy, the choice of treatment and control groups may bias the results. For example, Bailey (2013) uses those aged immediately under 26 (23-25) for the treated group and those immediately over 26 (27-29) as a control group. Table II shows summary statistics for both of these groups. The older individuals (i.e. control group) are almost twice as likely to be self-employed and married than their younger counterparts (i.e. treated group). Additionally, the older individuals are less likely to be unemployed and students[6]. Based on these differences in key variables driving self-employment, we employ an alternate treatment and control group of individuals who are the same age. The control group are individuals from states with existing DMs in place prior to 2010 (Goda *et al.*, 2016). Table III shows summary statistics for these two groups, and we highlight that there are no significant differences between the two groups across these key variables.

Table IV shows summary statistics for the control variables across various sub-samples we use for analysis: full sample, student sample, and non-student sample. Non-students are more likely to be male, married, and black. They are also more likely to be unemployed, but those who are employed, work longer hours than their student counterparts. Finally, non-students are more likely to have public health insurance, while 76 percent of students have private health insurance. It is worth noting that 87 percent of students have private or public health insurance, whereas only 69 percent of non-students have private or public health insurance.

Further, in order to be confident in our results from the difference-in-difference method, we need to assure there are no pre-treatment trends that could bias our results. Figure 1 shows self-employment rates for individuals under 25 by treatment and control group.

Variable	23-25		27-29		t-Test
	Mean	SD	Mean	SD	
Self-employed	0.03	0.17	0.05	0.21	***
City Population	4180.47	15200.86	4191.88	15175.77	***
Mortgage	0.36	0.48	0.41	0.49	***
Homeowner	0.10	0.30	0.09	0.28	***
Female	0.49	0.50	0.50	0.50	***
Married	0.19	0.39	0.40	0.49	***
Black	0.13	0.34	0.12	0.33	***
Student	0.26	0.44	0.15	0.36	***
Unemployed	0.09	0.29	0.07	0.26	***
Hours Worked	29.81	17.99	32.78	18.37	***
SEI	36.03	24.82	40.33	26.20	***
Public Health Coverage	0.13	0.34	0.14	0.35	***
Private Health Coverage	0.61	0.49	0.63	0.48	***

Table II.
Summary statistics
for 23-25 and
27-29 Year olds

Notes: The 23-25 sample includes 743,850 person-year observations, whereas the 27-29 sample includes 747,511 person-year observations. The *t*-test tests for statistically different means between samples.
****p* < 0.01

Variable	No mandate		Mandate		<i>t</i> -Test
	Mean	SD	Mean	SD	
Self-employed	0.02	0.15	0.02	0.15	
City population	3,448.44	12,417.46	3,796.99	15,401.40	***
Mortgage	0.37	0.48	0.37	0.48	***
Homeowner	0.10	0.30	0.11	0.31	***
Female	0.49	0.50	0.49	0.50	***
Married	0.09	0.29	0.09	0.29	
Black	0.14	0.35	0.13	0.34	***
Student	0.50	0.50	0.50	0.50	***
Unemployed	0.11	0.32	0.10	0.30	***
Hours worked	22.83	18.26	23.52	18.04	***
SEI	28.55	23.59	29.76	23.69	***
Public health coverage	0.15	0.36	0.14	0.34	***
Private health coverage	0.62	0.48	0.65	0.48	***

Notes: The no mandate sample includes 963,494 person-year observations, whereas the mandate sample includes 1,188,425 person-year observations. The *t*-test tests for statistically different means between samples, where: *** $p < 0.01$ and a lack of asterisks indicates no statistical difference between the group means

Table III.
Summary statistics
for mandate and no
mandate states
18-25 year olds

Variable	Full sample		Students		Non-students		<i>t</i> -Test
	Mean	SD	Mean	SD	Mean	SD	
Self-employed	0.02	0.15	0.02	0.13	0.03	0.17	***
City population	3,640.93	14,144.50	3,671.52	14,201.86	3,610.19	14,086.52	***
Mortgage	0.37	0.48	0.37	0.48	0.36	0.48	***
Homeowner	0.11	0.31	0.10	0.30	0.11	0.32	
Female	0.49	0.50	0.52	0.50	0.45	0.50	***
Married	0.09	0.29	0.04	0.19	0.15	0.36	***
Black	0.14	0.35	0.13	0.34	0.15	0.36	***
Student	0.50	0.50					
Unemployed	0.11	0.31	0.09	0.28	0.13	0.33	***
Hours worked	23.21	18.14	17.60	15.89	28.86	18.51	***
SEI	29.22	23.65	28.55	23.92	29.89	23.36	***
Public health coverage	0.14	0.35	0.11	0.32	0.17	0.37	***
Private health coverage	0.64	0.48	0.76	0.43	0.52	0.50	***

Notes: Main sample includes 2,151,919 person-year observations. The student sample includes 1,078,780 person-year observations, whereas the non-student sample includes 1,073,139 person-year observations. All samples are restricted to individuals less than 26 years old. *** $p < 0.01$

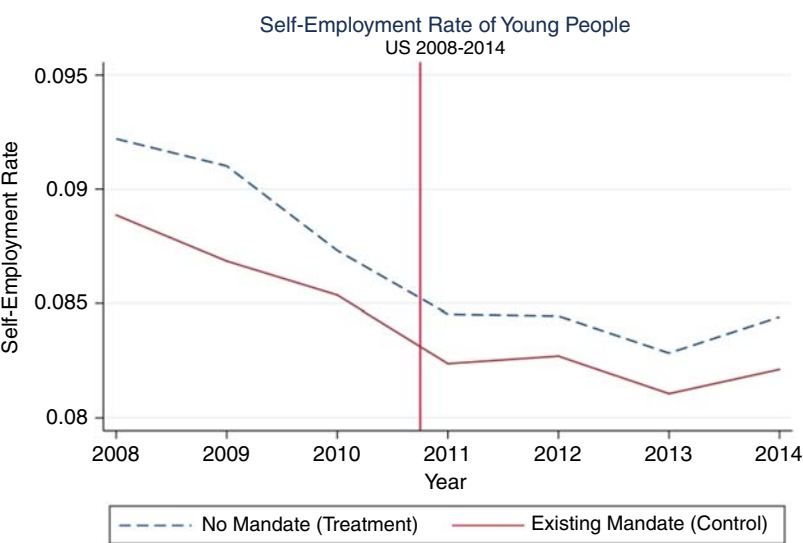
Table IV.
Summary statistics
for students and
non-students

From this figure, states with prior DMs in place appear to have a very similar trend in self-employment rates as states without DMs. We formally test for common trends using linear, quadratic, cubic, quartic, and dummy variable time trends and determine their joint significance. We conduct this analysis by regressing our outcome variable, self-employment, on these various time trends and all covariates in our model. Table V provides the *p*-values of the Wald test comparing these trends between states with and without dependent coverage laws before the passage of the ACA DM. Across all specifications, we cannot reject the null hypothesis of common trends in the pre-period; therefore, we are confident in our assumption of parallel trends.

Our base econometric approach is as follows[7]:

$$\text{Selfemployed}_{ist} = \alpha + \beta \text{Post}_{it} + \gamma \text{NoMandate}_{st} + \delta \text{Post}_{it} \times \text{NoMandate}_{st} + \theta X_{ist} + \varepsilon_{ist},$$

Figure 1.
Comparing
self-employment
rates before and
after the ACA in
no-mandate and
existing-mandate states



	1	2	3	4
	Linear	Quadratic	Cubic	Quartic
Full Sample	0.306	0.441	0.493	0.512
Students	0.500	0.597	0.592	0.570
Employed	0.985	0.668	0.578	0.553
Unemployed	0.719	0.545	0.507	0.508
Not in LF	0.331	0.230	0.177	0.147
Non-students	0.471	0.611	0.694	0.740
Employed	0.523	0.640	0.631	0.608
Unemployed	0.097	0.258	0.344	0.388
Not in LF	0.088	0.196	0.225	0.226
Employed	0.557	0.512	0.469	0.444
Unemployed	0.113	0.205	0.256	0.288
Not in LF	0.059	0.080	0.072	0.061
22-25 vs 27-29	0.000	0.000	0.000	0.000

Notes: Each column considers the test given that particular representation of the time trend. The reported value is the p -value resulting from this test under the null hypothesis that the coefficient on the time trend is 0. The dependent variable is self-employment, and all specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. The last row compares trends between individuals who are 22-25 to 27-29 years of age prior to the 2010 passage of the ACA

Table V.
Test for
common trends

where the outcome variable is whether individual i in state s at time t is self-employed. $Post_{it}$ is a binary variable indicating whether the DM has been enacted; thus, it takes the value of one beginning in the year 2011. $NoMandate_{st}$ is a binary variable equal to one if the state has no DM law in state s and time t and 0 otherwise. The coefficient δ is the main parameter of interest and captures the effect of the DM on self-employment in this framework. We also include a vector of covariates, X_{ist} , that contains individual characteristics including city population, mortgage holder, homeowner, female, black, student, education level,

unemployed, hours worked, socioeconomic index[8], and public and private health coverage. Our model also includes year, industry, and state fixed effects, and the standard errors are clustered at the state level.

4. Results and analysis

We assess the effect of the DM on self-employment among individuals for whom this mandate is binding. We consider young adults aged 18-25 years old and compare these individuals in states with pre-ACA DM coverage to those living in states without pre-ACA DM coverage. In Table VI, we show our results using three outcomes: any self-employment, self-employment in an incorporated company, or self-employment in an unincorporated company. We find no statistically significant effect of the DM on self-employment overall or for particular types of self-employment. This insignificant overall effect is consistent with Nui's (2011) finding that self-employment is not affected by the Massachusetts health care reform and early findings from Heim and Lurie (2014b) wherein state reforms during the 1990s had no statistically significant effect on entrepreneurship.

While we do not see any significant treatment effect overall, we investigate possible heterogeneous effects by conducting sub-sample analyses based upon labor force and student status. If there is entrepreneurship lock that is alleviated by the ACA, individuals who start an incorporated firm may be most affected. Such individuals tend to work longer, have health insurance, and be based outside the home.

Table VII shows the estimated effects of the DM on self-employment by labor force status. Segmenting the sample in this way reveals the differing motivations of necessity

Variable	1 Self-employed	2 Self-employed incorporated	3 Self-employed not incorporated
Treatment	0.994 (0.031)	0.889* (0.059)	1.027 (0.036)
Post	1.073*** (0.024)	1.043 (0.050)	1.079*** (0.028)
Treatment × post	1.009 (0.022)	1.071 (0.050)	0.992 (0.024)
Observations	1,457,547	1,457,225	1,457,547

Notes: Robust standard errors in parentheses. All columns include individuals aged 18-25 and report odds ratios from logit regressions. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table VI.
Effect of ACA
dependent care
mandate on
self-employment
(aged 18-25)

Variable	1 Employed	2 Unemployed	3 Not in labor force
Treatment	0.981 (0.035)	1.077 (0.114)	0.998 (0.079)
Post	1.027 (0.027)	1.242*** (0.101)	1.231*** (0.070)
Treatment × post	1.014 (0.026)	1.009 (0.068)	0.965 (0.052)
Observations	1,084,321	155,675	216,587

Notes: Robust standard errors in parentheses. All columns include individuals aged 18-25 and report odds ratios from logit regressions. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table VII.
Effect of ACA
dependent care
mandate on self-
employment by labor
force status sub
sample (aged 18-25)

entrepreneurs (those unemployed) and opportunity entrepreneurs (those employed). Similar to the larger sample, there is no statistically significant treatment effect for any of the labor force subgroups. A priori, we would expect employed individuals, whose potential lack of access to health insurance prevents them from becoming entrepreneurs, to be more likely to start firms after the DM. Individuals who are unemployed or not in the labor force[9] are expected to be affected less by the DM, but may still be encouraged to start a firm after the DM because it reduces the health insurance coverage barrier to entry. These insignificant effects indicate that individuals in this age group may be less restricted by health insurance options in their employment decisions, or that their entrepreneurial aspirations are determined by factors other than health insurance alone.

In addition to labor force designation, students in this age group may have different entrepreneurial preferences. The university plays a critical role in a region's innovation system, providing human capital and fostering knowledge-intensive startups (Feldman, 2000). Because universities tend to be the birthplace of new ideas and leaders in innovation, many student entrepreneurs offer “next generation” products and services (Politis *et al.*, 2012). Universities offer entrepreneurship education, business incubators, specialized support, and research and development services that result in many spawn firms staying in close proximity to the university (Klofsten, 2000; Hughes *et al.*, 2007). The university milieu develops networking, creativity, and flexibility skills and tends to produce less capital-intensive startups than firms started outside the university environment (Politis *et al.*, 2012). The DM could serve as an impetus to start a new firm for students if health insurance is causing entrepreneurship lock.

Tables VIII and IX show the results of analyses comparing non-students with students that are consistent with our expectation. As in our general analysis, we find no significant effects of the DM on self-employment for non-students aged 18-25. Conversely, we find positive and highly statistically significant effects of the DM on self-employment for the students aged 18-25. Specifically, the odds of a student in a non-mandate state starting a business is 8.2 percent higher than those students in states with an existing DM after the ACA DM[10]. This effect is primarily driven by students who are not in the labor force, who may have more time or resources to devote to their new business. The odds of students not in the labor force becoming entrepreneurs are 19 percent higher after the DM compared to students not in the labor force in states with an existing DM. Surprisingly, by removing the health insurance barrier, students not only begin new firms, but new incorporated firms. Prior to the ACA, students represented approximately 2.5 percent of incorporated self-employment organizations compared to almost 3 percent after the ACA. We find that the odds of a student in a non-mandate state starting an incorporated

Table VIII.
Effect of ACA
dependent care
mandate on
self-employment for
non-student sub
sample (aged 18-25)

Variable	1 Self-employed	2 Self-employed incorporated	3 Self-employed not incorporated	4 Employed	5 Unemployed	6 Not in labor force
Treatment	0.982 (0.037)	0.892 (0.070)	1.012 (0.043)	0.991 (0.041)	0.944 (0.122)	0.907 (0.113)
Post	1.068** (0.029)	1.037 (0.058)	1.075** (0.033)	1.039 (0.032)	1.188* (0.115)	1.210** (0.106)
Treatment × post	1.012 (0.027)	1.066 (0.060)	0.996 (0.029)	1.012 (0.030)	1.042 (0.083)	0.939 (0.077)
Observations	836,188	836,188	836,188	656,618	102,372	76,558

Notes: Robust standard errors in parentheses. All columns include individuals aged 18-25 and report odds ratios from logit regressions. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

	1	2	3	4	5	6
Variable	Self-employed	Self-employed incorporated	Self-employed not incorporated	Employed	Unemployed	Not in labor force
Treatment	1.016 (0.049)	0.830* (0.090)	1.065 (0.057)	0.962 (0.064)	1.364** (0.220)	1.034 (0.081)
Post	1.131*** (0.039)	0.939 (0.075)	1.175*** (0.045)	0.994 (0.048)	1.566*** (0.193)	1.245*** (0.069)
Treatment						
× post	1.065** (0.035)	1.279*** (0.097)	1.019 (0.037)	1.000 (0.046)	0.969 (0.105)	1.150*** (0.061)
Observations	812,588	812,588	812,588	500,326	66,583	245,451

Notes: Robust standard errors in parentheses. All columns include individuals aged 18-25 and report odds ratios from logit regressions. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table IX.
Effect of ACA dependent care mandate on self-employment for student sub sample (aged 18-25)

business are 6 percent higher than those students in a state with an existing DM. This is consistent with previous literature asserting student entrepreneurs are more likely to start next generation firms; we caution that the number of students who are self-employed in incorporated firms is relatively small at 0.3 percent[11].

5. Robustness and sensitivity

We conduct various falsification tests including a placebo test and falsified timing of the mandate. Table X shows that the inclusion of the larger sample of adults with falsely treating adults over age 26, for whom the DM is not binding, yields no effect of the DM on entrepreneurship. Given the large sample, the imprecisely measured effect is meaningful. Further, we vary the timing of the DM to ensure we are not capturing a random time trend in our specification. Columns two through four show no significant effect of the falsified treatment years of 2009, 2011, and 2012 on our outcome measure of self-employment.

Because our most meaningful results occur within the student sub-sample, we conduct additional falsification tests on the non-student and student sub-samples. Tables XI and XII show these results. As in the prior test, we include all adults and falsely treat those above age 26; column one in these two tables shows there is no effect on this falsified treatment group. Columns two through four show no significant effects on the falsified treatment years of 2009, 2011, and 2012 for our student sub-sample, and only a small and marginally significant effect of the falsified treatment year of 2011 in our non-student sub-sample.

	1	2	3	4
Variable	Treated > 26	Placebo 2009	Placebo 2011	Placebo 2012
Treatment	1.000 (0.006)	0.997 (0.032)	0.988 (0.030)	0.993 (0.030)
Post	0.982*** (0.004)	1.077*** (0.025)	1.060*** (0.024)	1.066*** (0.024)
Treatment × post	0.998 (0.004)	1.002 (0.024)	1.035 (0.022)	1.025 (0.024)
Observations	14,418,551	1,457,547	1,457,547	1,457,547

Notes: Robust standard errors in parentheses. Columns 2-4 include individuals aged 18-25 and report odds ratios from logit regressions, while column 1 includes individuals over 26. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table X.
Effect of placebo ACA dependent care mandate on self-employment (aged 18-25)

JEPP
6,2

This could be the result of a delayed response to the treatment for this sub-group, but because of the small magnitude and marginal significance it does not cast doubt on the effects we find in our main analysis.

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6. Conclusion
A central theme of the ACA is to broaden access to health care through increased insurance availability. An oft-cited byproduct of the reform is that this increased access will spur entrepreneurial activity as potential entrepreneurs are unfettered from job lock. Young adults, in particular, stand to gain access to insurance through the DM, wherein they may remain on their parent’s insurance until the age of 26. Therefore, increases in entrepreneurial activity among young adults are of great interest.

The current literature provides mixed evidence on the effect of the DM on entrepreneurial activity. We use the ACS to conduct an analysis across all states and exploit the timing of the ACA DM in comparison to existing state-level pre-ACA DM laws to determine the effect of the ACA DM on entrepreneurship for individuals aged 18-25. We identify heterogeneous effects of this mandate dependent upon student status and type of corporation created, with the only effects coming from students who are not attached to the labor force and those who are creating incorporated companies.

Overall, we find that individuals aged 18-25 are not affected by the DM in terms of their self-employment choice. When we look differentially by student status, the odds of a student in a non-mandate state becoming self-employed in an incorporated company are approximately 6 percent higher compared to students residing in states with an existing mandate.

Table XI.
Effect of placebo
ACA dependent
care mandate on
non-student
self-employment
(aged 18-25)

Variable	1 Treated > 26	2 Placebo 2009	3 Placebo 2011	4 Placebo 2012
Treatment	1.004 (0.006)	0.984 (0.038)	0.974 (0.036)	0.981 (0.036)
Post	0.948*** (0.004)	1.072** (0.030)	1.051* (0.029)	1.060** (0.029)
Treatment × Post	0.997 (0.005)	1.006 (0.030)	1.050* (0.028)	1.031 (0.030)
Observations	9,697,202	836,188	836,188	836,188

Notes: Robust standard errors in parentheses. Columns 2-4 include individuals aged 18-25 and report odds ratios from logit regressions, while column 1 includes individuals over 26. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table XII.
Effect of placebo ACA
dependent care
mandate on student
self-employment
(aged 18-25)

Variable	1 Treated > 26	2 Placebo 2009	3 Placebo 2011	4 Placebo 2012
Treatment	0.995 (0.042)	1.024 (0.059)	1.023 (0.056)	1.021 (0.055)
Post	1.000 (0.029)	1.098** (0.047)	1.097** (0.044)	1.094** (0.045)
Treatment × post	0.984 (0.027)	0.998 (0.043)	1.000 (0.038)	1.007 (0.043)
Observations	449,003	619,550	619,550	619,550

Notes: Robust standard errors in parentheses. Columns 2-4 include individuals aged 18-25 and report odds ratios from logit regressions, while column 1 includes individuals over 26. All specifications include controls for city population, mortgage holder, homeowner, female, black, student, unemployed, education level, hours worked, socioeconomic index, public and private health coverage, and year, industry, and state fixed effects. Standard errors are clustered at the state level. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes

1. "A group health plan and a health insurance issuer offering group or individual health insurance coverage that provides dependent coverage of children shall continue to make such coverage available for an adult child until the child turns 26 years of age." ACA, available at: <http://housedocs.house.gov/energycommerce/ACAcon.pdf>, p. 15.
2. The individual Health Coverage Plan is similar to the Health Insurance Exchange mandated within the ACA. Details are available at: www.state.nj.us/dobi/division_insurance/ihcseh/ihcmain.htm
3. While there is some variation in states' pre-PPACA dependent mandates in terms of age limits, many permit coverage up to age 25 which makes their inclusion in the control group appropriate (Collins *et al.*, 2011; Dillender, 2014). In the cases where a state's pre-PPACA dependent mandate had an age limit below 25, we test if the removal of these states from the control group affect our results, and find no significant changes.
4. In 2013, the response rate was 89.9 percent due to the federal government shutdown that year.
5. We exclude 26 year olds from our analysis because they meet the policy cutoff, and the policy's effect may be different for these individuals.
6. We acknowledge that the presence of a DM has the potential to influence higher education decisions. However, Dillender (2014) finds only a small influence of DMs on enrollment decisions of persons 18 or younger when a DM law was implemented. For males, for example, educational attainment when measured after age 26 increases 0.17 years on average and for females is 0.07 years but is insignificant (Depew, 2015). Jung and Shrestha's working paper (2016) suggests the opposite effect that DMs reduce enrollment.
7. All regressions are run using a Logit model. For brevity, we leave out the log transformation.
8. We use a socioeconomic index provided by IPUMS based on earnings, education, and prestige of particular occupations.
9. Individuals may not be in the labor force for a variety of reasons. Automatic exclusions in this age group are military personnel and institutionalized individuals. Others may choose to be out of the labor force to be homemakers, students, or marginally attached workers.
10. For individuals after the ACA DM took effect, the odds ratio for those in non-mandate states vs mandate states is: $\exp(\beta_{\text{NoMandate}} + \beta_{\text{NoMandate} \times \text{Post}}) = 1.082$.
11. This equates to slightly more than 3,000 individuals.

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