I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13414

The Effects of Non-Compete Agreements on Different Types of Self-Employment: Evidence from Massachusetts and Utah

Ege Can
Frank M. Fossen

JUNE 2020

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13414

The Effects of Non-Compete Agreements on Different Types of Self-Employment: Evidence from Massachusetts and Utah

Ege Can
University of Nevada-Reno

Frank M. Fossen
University of Nevada-Reno and IZA

JUNE 2020

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Effects of Non-Compete Agreements on Different Types of Self-Employment: Evidence from Massachusetts and Utah*

The economic effects of non-compete agreements have received increasing attention from academics and policymakers. This paper investigates how non-compete policies affect different types of self-employment. We exploit policy reforms in Utah and Massachusetts in 2016 and 2018, which decreased the enforceability of non-compete covenants, as quasi-experiments. We separate self-employment into self-employment with incorporated businesses (as a proxy for entrepreneurship) and self-employment with unincorporated businesses. Using representative individual-level data from the American Community Survey and the Current Population Survey, we estimate the probability of being self-employed with these different types of businesses, as well as entry into self-employment, and how these probabilities changed due to the reforms. Our findings show that the decrease in the enforceability of non-compete agreements in the two states resulted in a higher rate of incorporated self-employment in these states. In contrast, there was no sizable effect on the rate of unincorporated self-employment. Our results imply that states can promote entrepreneurial activity by reducing the enforceability of non-compete agreements.

JEL Classification: L26, O38, J23

Keywords: entrepreneurship, non-compete agreements, incorporated, unincorporated

Corresponding author:
Frank M. Fossen
Department of Economics
University of Nevada, Reno
1664 N. Virginia Street
Reno, Nevada 89557-0030
USA

E-mail: ffossen@unr.edu

* Frank Fossen thanks the Ewing Marion Kauffman Foundation for financial support of the research project RG-201802-3798. The contents of this publication are solely the responsibility of the authors.

1. Introduction

Most entrepreneurs work for a company as paid employees before they start their own business (Klepper, 2009). When employees quit their jobs to venture out on their own, this can be a double loss to a company due to losing an efficient worker and the appearance of a new rival. In an attempt to prevent this, companies often have their employees sign covenants not to compete. However, each state in the United States has its own non-compete covenant policy, and enforceability of the agreements varies considerably by state.

Non-compete covenants are widespread: The occurrence rates are 70% for firms receiving venture capital, 40% for engineers and at least 70% for CEOs (Kaplan and Stromberg, 2003; Marx, 2011; Bishara et al., 2015; Starr et al., 2017). Non-compete covenants are contractual limitations that inhibit workers to join another company or start a new business competing against the former employer in a specified area during a certain amount of time after leaving the former employer (Marx et al., 2009; Starr et al., 2017). A possible justification is that it may be regarded unfair if the knowledge that someone has acquired while working for a firm is used against this firm. One might also argue that the possibility of competition by former employees based on the knowledge of the incubator may reduce incentives for knowledge generation. However, non-compete covenants can also hinder innovation by preventing spillovers and causing inefficient matching between employees and employers (Samila and Sorensen, 2011).

In this paper, we focus on the potential barrier to entrepreneurship posed by non-compete agreements by inhibiting spin-offs. In this context, non-compete covenants may reduce innovation because start-ups spinning off from an incumbent firm often commercialize knowledge that otherwise remains unused. Incumbent firms may often not recognize the economic potential of their employees' new ideas due to communication problems and high uncertainty, especially in

case of radical innovation. Moreover, the expected profit from marketing an innovation may be lower for an incubator firm than for an entrepreneur spinning off because the innovation may cannibalize the incumbent firm's existing products. Since there are frictions in the market for ideas due to asymmetric information, newly generated knowledge may often remain dormant if non-compete agreements effectively prevent spin-offs. If spin-off activity is allowed to unfold more freely, entrepreneurs may boost innovation, economic growth and job creation (van Stel et al., 2005; Acs and Armington, 2006; Carree and Thurik, 2010).

A number of studies examine the relationship between the enforceability of non-compete covenants and different concepts that are related to entrepreneurship such as new firm formation, innovation, spin-offs, small firms, and inventors (Stuart and Sorenson, 2003; Marx et al., 2009; Samila and Sorenson, 2011; Marx et al., 2015; Starr et al., 2017; Kang and Fleming, 2020). These studies consistently suggest that higher enforceability of non-compete covenants impedes entrepreneurship. Hence, if the enforceability of non-compete agreements is high in a given state, this could prevent would-be entrepreneurs or push entrepreneurs to other states if they were to spin-off from their company. These spin-offs might be lost opportunities for states because entrepreneurs are the carriers of knowledge spillovers and drive innovation (Zucker et al., 1998; Audretsch et al., 2006; Acs et al., 2009). Thus, policymakers can choose to reduce the enforceability of non-compete covenants with the goal of keeping or accumulating entrepreneurs.

Two U.S. states recently implemented reforms that reduced the enforceability of non-compete covenants. Utah enacted a one-year time limit on the enforceability of non-competes in May 2016, and Massachusetts added a "garden leave" provision in October 2018. These reforms decrease the enforceability as opposed to prior reforms in Michigan and Florida, which have been analyzed by prior literature (Marx et al., 2009, 2015; Kang and Fleming, 2020), but increased the

enforceability. We contribute to the literature by examining the effects of the two non-compete reforms in Utah and Massachusetts on entrepreneurship, and by examining the changes in the rates of different types of self-employment (with incorporated and unincorporated businesses) in a given state due to the curtailment in the enforceability.

Self-employment has widely been used as a proxy for entrepreneurship (e.g., Congregado et al., 2012). However, not all self-employment is related to innovation and growth in the sense of Schumpeterian (1939) entrepreneurs. Levine and Rubinstein (2019) find that innovative self-employed individuals tend to choose to run incorporated businesses, and non-innovative self-employed individuals tend to run unincorporated businesses (see also Fossen, 2019). Therefore, we expect incorporated entrepreneurs to react and spin-off more often due to an enforcement reduction, and we also expect that the reforms should not affect unincorporated self-employment. In the literature on the economic effects of non-compete covenants, none of the earlier work has analyzed reform effects on incorporated versus unincorporated self-employment. Examining the changes in self-employment with an incorporated business is an important contribution because incorporated self-employment is a closer proxy for entrepreneurship than any self-employment; thereby, our analysis informs policymakers aiming to promote innovation and growth.

How much did incorporated self-employment rates change due to decreasing the enforceability of non-compete covenants in Massachusetts and Utah? To address this question, our paper investigates the non-compete covenant reforms that took place in these two states. We examine the changes in the probabilities of being self-employed with incorporated and unincorporated businesses and of entry into self-employment by using a difference-in-differences approach. We utilize individual-level data from the American Community Survey (ACS) for Utah and from the March Supplement of the Current Population Survey (ASEC) for Massachusetts.

We find that the probability of being self-employed with an incorporated business, the proxy for entrepreneurship, increases due to the reforms in both states. Additionally, the probability of being self-employed with an unincorporated business is not affected by the reforms in both states. Our results show that weaker enforceability of non-compete agreements encourages entrepreneurial activity in a given state. Our findings are important because we show that a state can increase entrepreneurial activity by reducing the enforceability of non-compete covenants.

The paper is organized as follows. In the next section, we review the literature on non-compete covenants. The third section describes the enforceability changes in Massachusetts and Utah. We provide a description of our data and empirical model in the fourth and fifth sections. In the sixth section, we present the results of our difference-in-differences analysis, along with robustness checks. We summarize and discuss our results with our conclusion in the final section.

2. Literature Review

In the literature on the economic effects of non-compete agreements, there are a variety of empirical papers estimating effects on small businesses and entrepreneurial activity. Gilson (1999) attributes the high growth of the economy and startups in Silicon Valley in California compared to Route 128 in Massachusetts to the non-enforceability of non-compete covenants in California. Gilson's proposition is empirically tested by Stuart and Sorenson (2003). They examine how the enforceability of post-employment non-compete covenants influences the founding rate of new companies in 308 different metropolitan statistical areas in the United States. They find that there is a negative relationship between the enforceability of non-compete covenants and the within-industry firm foundation rate. Using panel data of metropolitan areas in the United States from 1993 to 2002, Samila and Sorenson (2011) report that when the scope of the non-compete agreements is restricted, venture capitalists tend to invest more in business start-ups and yield

more. Marx and Fleming (2012) illustrate that talented inventors (identified by a number of citations and co-authors) are more likely to move to the states that have less enforceability of non-compete agreements. Starr et al. (2017) demonstrate there is less intra-industry entrepreneurship when there is stronger enforcement of non-compete covenants. Their findings exhibit that higher enforceability impedes the creation of small firms (0-19 employees). These papers analyze changes in intra-state business activity due to non-compete covenants.

A number of other papers exploited quasi-experiments to estimate the effects of changes in the enforceability in different states. Marx et al. (2015) analyze the Michigan Antitrust Reform Act of 1985 (MARA) that inadvertently increased the enforceability of the non-compete agreements in Michigan. They find that due to higher preference for less enforceability, knowledge workers are more likely to depart Michigan after the reform, in particular collaborative and impactful workers. In their difference-in-differences analysis, the variable of interest is the interaction between Michigan residency and the post-MARA period, similar to our approach. For their data, they use the U.S. patent database from 1975 through 2005. Marx et al. (2009) provide evidence of reduced within-state employee mobility across firms among patent-holding inventors due to enforceable non-compete agreements, again using a difference-in-differences approach exploiting MARA. They include transitions from employment to self-employment in their mobility measure, but do not analyze this transition separately. Kang and Fleming (2020) exploit Florida's 1996 legislative change that increased the enforceability of non-competes by also using the difference-in-differences method. They find that there are fewer small firms in Florida due to stronger enforceability. Moreover, their findings demonstrate that the move-in rate and the rate of birth of small firms are reduced due to stronger enforcement. They utilize data from the Business Dynamic Statistics (BDS) from 1993 to 1999, which covers firm-level data in the United States.

These papers show that quasi-experiments with difference-in-differences analysis can be used to examine enforceability changes for non-compete covenants in different states.

To analyze effects on entrepreneurial activity, many papers in the economics literature use self-employment as a proxy for entrepreneurship; thus, self-employed workers also provide the starting point for our analysis. However, before we apply our analysis to the self-employed, entrepreneurship needs to be set apart from non-innovative businesses. In his influential work, Schumpeter (1942) define entrepreneurship as doing new things or the doing of things that are already being done in a new way. Moreover, Glaeser (2007) points out that innovative businesses and non-innovative businesses should not be put into the same category. Therefore, when self-employed workers are considered as a proxy for entrepreneurship, self-employment should be distinguished into innovative and non-innovative, and public policy initiatives should prioritize innovative entrepreneurship.

The literature has distinguished between innovative and non-innovative self-employment in different ways. La Porta and Shleifer (2014) separate self-employed workers by formal and informal firms. They consider formal firms to have higher productivity and to be run by innovative entrepreneurs. Another important characteristic of entrepreneurship which is connected to innovation is risk-taking, where several papers show that risk-taking self-employed individuals are likely to run incorporated businesses (Feldstein and Slemrod 1980; Cullen and Gordon, 2007; Herranz et al., 2015).

Levine and Rubinstein (2017) separate self-employed workers into incorporated and unincorporated to differentiate between entrepreneurs and other business owners in the United States. They argue that incorporated businesses benefit from the corporation's legal attribute that

limits the financial and judicial risk of the owner's encounter, which allows incorporated entrepreneurs to take riskier innovative activities compared to unincorporated entrepreneurs. By using data from the Current Population Survey (CPS) and the National Longitudinal Survey of Youth (NLSY), these authors demonstrate that self-employed individuals with incorporated businesses most of the time perform activities closer to the definition of entrepreneurship such as creative and productivity-enhancing activities and process development. Fossen (2019) demonstrates that self-employed individuals with unincorporated businesses are more likely related to necessity self-employment than those with incorporated businesses because the former more often start their own business due to being unemployed. Incorporated self-employment is more closely related to opportunity entrepreneurship, where workers leave their paid employment to seek innovation and growth. In sum, these researchers indicate that incorporated self-employment indicates innovative activities that, in contrast to unincorporated self-employment, better match the concept of entrepreneurship. These papers show that the distinctions between incorporated versus unincorporated self-employment are higher productivity, risk-taking, and more entrepreneurial activities.

This paper contributes to the literature in three ways. First, we utilize two natural experiments, the non-compete reforms that took place in Utah and Massachusetts. In contrast to other reforms that have been investigated, these reforms decreased the enforceability of non-compete covenants, and *a priori*, it is unclear whether effects can be expected to be symmetric. Secondly, we provide the first paper that applies the separation of incorporated and unincorporated self-employment to analyze the economic effects of non-compete agreements. Lastly, we use representative, large ACS and ASEC data, which have not been utilized in the non-compete agreements literature.

3. Non-Compete Covenant Policy Reforms

Utah

On May 10th, 2016, the U.S. state of Utah implemented "The Utah Post Employment Restrictions Act" that changed the duration of the enforceability of non-compete covenants. The Act (Bill H.4732 in House Bill 251, Utah Code Ann. §§ 34-51-101-301) prohibits non-compete agreements from exceeding one year after employment termination for covenants that are signed on and after May 10th, 2016, in Utah. Additionally, the Act requires an employer to pay all the litigation costs for unenforceable agreements (Utah State Legislature, 2016). The reform makes non-compete agreements unenforceable in Utah if they aim to prevent former employees from competing against their former employers for more than one year, for example by starting their own business in the same industry.

Massachusetts

On October 1st, 2018, the U.S. state of Massachusetts implemented the "Massachusetts Noncompetition Agreement Act" (Bill H.4732) that governed alteration on the enforceability of non-compete covenants. Massachusetts General Law c. 149, section 24L explains the Act by stating, "The noncompetition agreement shall be supported by a garden leave clause or other mutually-agreed upon consideration between the employer and the employee, provided that such consideration is specified in the noncompetition agreement" (Trial Court Law Libraries, 2019). The Act stated that non-compete agreements must be signed by both the employee and the employer, and the agreement must be provided to the employee ten days before the hire. "The garden leave clause" requires the employer to pay the employee for the duration of the non-compete period at least 50% of the employee's highest salary within the last two years of employment if the employee decides to depart from the employer. This is meant to compensate

the former employee for not working for another competing employer or as a competing entrepreneur during the non-compete period. "Mutually agreed upon consideration" must be other than 50% of the highest salary. This Act applies to persons who are residents of and employed in Massachusetts. This law applies to agreements that are constructed on or after October 1st, 2018, and the duration of the non-compete agreement restriction cannot exceed 12 months (Rosen, 2018). The reform significantly decreases the power of non-compete agreements in Massachusetts due to the high costs for the employer of complying with the garden leave clause. Like in Utah, we expect that this reform will make it easier for employees to decide to quit their jobs in order to become entrepreneurs potentially competing against their former employer.

4. Data

ACS (used to analyze the reform in Utah)

Our data to analyze the reform in Utah is the Public Microdata from the American Community Survey (ACS) provided by the US Census Bureau. We use the Integrated Public Use Microdata Series (IPUMS) as described in Ruggles et al. (2020) for 2015-2018. The ACS covers the entire United States. The main advantage of the ACS data is its very large sample size, which ensures we observe a sufficient number of entrepreneurs in Utah. We utilized the cross-sectional annual ACS data from 2015 through 2018. The data show the characteristics of the surveyed individuals, including their state of residence. The ACS polls about one percent of the population of the United States every year either in March or April, and the reform in Utah took place in May 2016. Thus, we designate the survey years 2015 and 2016 our pre-reform period, and 2017 and 2018 our post-reform period.

Moreover, this cross-sectional data permits us to inspect an individual's occupational choice between wage and salary work (for the private sector or federal, state, and local

governments), self-employment with an incorporated business, and self-employment with an unincorporated business. Additionally, we observe socio-demographic characteristics and the industry that an individual works in. Table 1 shows the mean characteristics of the individuals in the ACS data by type of worker for our treatment and control states.[1] The self-employed with incorporated businesses are more likely to have a college degree than paid employees, and the self-employed with unincorporated businesses are less likely to have a college degree. The share of women within the self-employed is only 38%, and the share is even lower (32%) among the self-employed with incorporated businesses. Only 5.2% of the self-employed are Black, as compared to 10.6% among the paid employees, and the share even drops to 4.3% among the incorporated self-employed.

CPS ASEC (used to analyze the reform in Massachusetts)

We use the annual March supplement (ASEC) of the Current Population Survey (CPS) from 2017 to 2019 to analyze the reform in Massachusetts. The dataset is provided by the Census Bureau and distributed as IPUMS-CPS (Flood et al., 2017). ACS data is not yet available for 2019, the time after the reform in Massachusetts (October 1st, 2018), so we use the smaller ASEC sample to analyze this reform instead. Like the ACS, the ASEC is a survey of households and individuals for every U.S. state and the District of Columbia. The ASEC includes more individual information than the monthly CPS, such as detailed income information. Since the data are collected in March (or in February or April in some cases), our pre-reform period includes the survey years 2017 and 2018 and the post-reform period 2019. For the ASEC, households and individuals are interviewed for two successive years in March. The rotating panel structure of the ASEC allows us not only to

[1] Besides the treatment state Utah, these are 43 control states and the District of Columbia, excluding Alaska, California, Hawaii, Nevada, North Dakota, and Oklahoma for reasons explained below.

observe the current employment state (paid employment and the two types of self-employment) but also transitions between these employment states, in contrast to the cross-sectional ACS. Therefore, entry into self-employment can also be observed for both Utah and Massachusetts using the ASEC, distinguishing between incorporated and unincorporated businesses. Table 2 shows descriptive statistics for the ASEC data for our treatment and control states (the same 44 states as in the ACS and the District of Columbia).[2] We use the same variables in the ASEC as in the ACS.

We incorporate the state unemployment rate and real Gross Domestic Product (GDP) per capita into our data. The unemployment rate and population for each state and year are obtained from the Federal Reserve Bank of St. Louis.[3] Real GDP figures are gathered from the Bureau of Economic Analysis.[4]

5. Methodology

We estimate difference-in-differences models exploiting the non-compete reforms in Utah (effective 05/10/2016) and in Massachusetts (effective 10/01/2018). Our empirical model is similar to the approach used by Kang and Fleming (2020). We exclude the states that do not enforce non-compete agreements at all from our sample, which are California, North Dakota, and Oklahoma. Additionally, Alaska, Hawaii and Nevada are removed from the sample because they have different economic and geographic characteristics compared to the other states. Our treatment states are Utah and Massachusetts, which are subject to a non-compete enforceability decrease.

[2] The statistics are unweighted in order to describe the estimation sample. The means in the CPS and ASEC are somewhat different due to oversampling of Hispanic households in the ASEC.
[3] Data for the unemployment rate and population at the state level are available at https://fred.stlouisfed.org/series/.
[4] Data for real GDP at the state level are available at https://www.bea.gov/data.

The remaining 43 states and the District of Columbia are the control states. For Utah, we included Massachusetts in the controls, and vice versa.[5]

For Utah, the total self-employment rates for the treatment state (Utah) and the control states are depicted in Figure 1. Figures 2 and 3 show the rates of self-employment with incorporated and unincorporated businesses, respectively. The constant difference between the treatment and control groups before the reform prompts us to adopt the parallel trends assumption: It seems plausible that the treatment and control states would have continued to develop in parallel in the absence of the reform in Utah. The steeper increase of the total and incorporated self-employment rates after the reform can then be attributed to the effects of the decrease in the enforceability of non-compete covenants. There does not seem to be an effect of the reform on unincorporated self-employment (if anything, a small negative one).

The ACS data provides more precise results due to its bigger sample size compared to the ASEC data.[6] However, as mentioned above, the ACS data does not include the year 2019; therefore, for Massachusetts, we are only able to use the ASEC data. Figures 4, 5, and 6 depict, respectively, total, incorporated and unincorporated self-employment rates for the treatment state (Massachusetts) and the control states. Even though the difference between the treatment and control groups before the reform is not as constant as in the ACS data for Utah, given the imprecision, it seems plausible to adopt the parallel trend assumption for our difference-in-

[5] There are no confounding effects from the reforms in the other state because the policy change in Utah took place before the period of analysis used to estimate the effects of the reform in Massachusetts, and the legislation change in Massachusetts was implemented after the period of analysis used to analyze the reform in Utah (since the 2018 ASEC was administered in March 2018 already).

[6] In the ACS, we have 6,330,718 person-year observations in our estimation sample, compared to 138,467 person-year observations in the ASEC (see Tables 1 and 2).

differences framework. The figures for Massachusetts suggest that both types of self-employment increased after the reform relative to the comparison states.

The figures provide suggestive evidence, but only show the raw data. Our following econometric analysis controls for potential composition changes in the treatment and control groups with respect to individual or regional characteristics and allows the estimation of the economic and statistical significance of the effects.

Our empirical model involves three difference-in-differences regressions with identical independent variables for two treatment states, Utah and Massachusetts. Equations 1, 2, and 3 differ concerning the binary dependent variables, which indicate that an individual is self-employed with any type of business, with an incorporated business, or an unincorporated business, respectively.

$$Selfemployed_{it}=\beta_0 + \beta_1 TreatmentState_{it} + \beta_2 PostReform_t + \beta_3(TreatmentState * PostReform)_{it}+\beta_4 X_{it}+ \alpha_s+ \gamma_t+ \epsilon_{it} \quad (1)$$

$$IncorporatedSelfemployed_{it}=\beta_0 + \beta_1 TreatmentState_{it} + \beta_2 PostReform_t + \beta_3(TreatmentState * PostReform)_{it}+\beta_4 X_{it}+ \alpha_s+ \gamma_t+ \epsilon_{it} \quad (2)$$

$$UnincorporatedSelfemployed_{it}=\beta_0 + \beta_1 TreatmentState_{it} + \beta_2 PostReform_t + \beta_3(TreatmentState * PostReform)_{it}+\beta_4 X_{it}+ \alpha_s+ \gamma_t+ \epsilon_{it} \quad (3)$$

For Utah, the *PostReform* dummy variable takes the value of one in 2017 and 2018, and zero in 2015 and 2016. For Massachusetts, the *PostReform* dummy takes the value of one in 2019, and zero in 2017 and 2018. Since the year 2020 is not available in ASEC data yet, we are not able to use more than one post-treatment year for Massachusetts. We interact the *PostReform* variable with an indicator variable *TreatmentState* that equals 1 when the observation occurs in Utah (or

Massachusetts, respectively) and zero otherwise. The coefficient of this interaction term, β_4, is the parameter of interest, the treatment effect on the treated. To capture potential changes in the composition of the treatment and control groups and to increase efficiency, we control for individual characteristics known to influence self-employment (Parker, 2009): a person's age and its square, the number of children in the household, dummy variables indicating gender, marital status, race, educational attainment, whether the individual lives in a metropolitan area, and ten major industry dummies. The unemployment rate and real GDP per capita at the state level are also included in our empirical model to capture the changing economic strength of the states, which might influence the probability of being self-employed. We add state fixed effects *(α)* and year fixed effects (γ) into our empirical models capturing any time-invariant differences between the states and any developments over time that affect all states. In robustness checks, we include individual income as an additional control variable; we do not include this in the main models due to potential endogeneity concerns.[7]

Since we have panel data from the ASEC, where an individual is observed for two consecutive years, we can also examine entry into self-employment. To estimate the effects of the reforms on entry, we use the sample of wage and salary workers in the first year of a two-year pair, *t*. The estimation equation is analogous to Equation 1, only changing the dependent variable to a dummy variable that takes the value of 1 if the individual becomes self-employed in year $t+1$ and otherwise zero. The annual entry rates into self-employment are low: 2.95% for the 2014-2019 period for Utah and 3.02% for the 2017-2020 period for Massachusetts, and the entry rates into incorporated and unincorporated self-employment are even lower. Therefore, to obtain sufficient

[7] We also applied the synthetic control group method suggested by Abadie et al. (2010). However, this method did not improve the pre-trends of the treatment and control groups sufficiently to justify the use of this method.

precision, we only analyze entry into total self-employment for Utah and Massachusetts and do not distinguish by type of self-employment entry. For Utah, the pre-reform years to estimate entry are 2014 and 2015 (thus, considering entry between March 2014 and March 2015 and between March 2015 and March 2016), and the post-reform years are 2017 and 2018 (entry between March 2017 and March 2018 and between March 2018 and March 2019). For Massachusetts, the pre-reform years to estimate entry are 2016 and 2017, and the post-reform year is 2019.[8] We exclude the survey year 2016 from the sample (entry between March 2016 and March 2017) in the analysis of entry for Utah because we do not observe in this case if an individual switched to self-employment before or after the reform in May 2016. Likewise, we exclude 2018 for Massachusetts. Furthermore, in the analysis of entry, we do not include Massachusetts in the control states for Utah and vice versa because the reforms in these states overlap with the periods of the analyses for entry and might confound the results if they were included. This is not the case in the estimation of the probability of being self-employed, which is based on somewhat different periods.

In the main regressions, we estimate linear probability models by OLS. This has the advantage of offering a straightforward and transparent interpretation of the coefficients of the interaction terms as average treatment effects on the treated. To account for the binary nature of the dependent variable, we report standard errors robust to heteroscedasticity. In robustness

[8] At the time of this analysis, ASEC data is not yet available for 2020, as mentioned above. Therefore, to construct the dummy variable indicating entry between 2019 and 2020, we utilize the CPS monthly survey for February 2020 instead. We do not use the CPS monthly survey for March 2020 because COVID-19 lockdowns started in mid-March in the United States and might confound the analysis. Therefore, the February CPS will remain preferable for this analysis even when the 2020 ASEC becomes available. The monthly CPS provides sufficient information for 2020 because the only variable needed for 2020 is individual information on current self-employment in order to construct the dependent variable.

checks, we also estimate logit models for comparison. As non-compete enforcement varies by state, standard errors are also clustered by state across all specifications.

6. Results

We first present the results from estimating the difference-in-differences models of the probability of being self-employed with different types of businesses for the reform in Utah in 2016 and then for the reform in Massachusetts in 2018. Subsequently, we present the estimations of the probability of entry and robustness checks.

Utah

Table 3 shows the estimation results of difference-in-differences models for the probability of being self-employed, the probability of being self-employed with an incorporated business as well as the probability of being self-employed with an unincorporated business. We estimate whether these probabilities change due to the non-compete reform that took place in Utah in 2016. Our estimated coefficients of interest, the coefficients of the interaction term, are positive and significant at the 1% level for the probability of total self-employment and incorporated self-employment, and negative and significant for unincorporated self-employment.

Due to the non-compete enforceability decrease, individuals in Utah, compared to those in other states, are 0.38 percentage points more likely to be self-employed with an incorporated businesses after the reform. Relative to the baseline probability of being incorporated self-employed of 3.8% (see at the bottom of the table), the reform increased the probability by 10.0%, so the effect is economically important. Also, individuals are 0.26 percentage points more likely to be self-employed with any type of business in Utah after the legislation change; this is 2.5% of the baseline probability of 10.3%. On the other side, individuals in Utah are 0.12 percentage points less likely to be self-employed with an unincorporated businesses after the reform, which is 1.9%

of the baseline probability of 6.5%, so this effect is small in absolute terms. The coefficients of the control variables confirm expectations. Being older, male or white, increase the probability of being self-employed with any type of business and an incorporated business. Having a college degree increases the probability of being incorporated self-employed, but decreases the probability of being unincorporated self-employed. The coefficients of the unemployment rate and real GDP per capita are not statistically significant in any of the estimations.

In sum, the results for Utah show that the reform had a positive effect on being self-employed with an incorporated business, the proxy for entrepreneurship. This effect also drives the positive effect on any type of self-employed. The probability of becoming self-employed with an unincorporated business is negatively affected by the reform, but this effect is small.

Massachusetts

Tables 4 provides the results for the probability of being incorporated, unincorporated, and any type of self-employed in Massachusetts, estimating whether these probabilities change due to the non-compete reform in 2019. The difference-in-differences estimate is positive and significant at the 1% level for the probability of incorporated and all self-employment. The coefficient of the interaction term for the probability of being self-employed with an unincorporated business is not statistically significant and closer to zero. Due to the non-compete enforceability decrease, individuals in Massachusetts, compared to individuals in other states, are 0.49 percentage points more likely to be self-employed with an incorporated business after the reform. Relative to the baseline probability of being incorporated self-employed of 3.6%, the reform increased the probability by 13.1%. Moreover, individuals are 0.79 percentage points more likely to be self-employed with any type of business in Massachusetts (8.4% of the baseline probability of 9.5%).

The results for the control variables are similar to the results for Utah, which are based on a different database.

To summarize, the curbing of non-compete enforceability in Massachusetts increased the probability of being self-employed with an incorporated business, which also results in an overall positive effect on the probability of being self-employed. The reform did not influence the probability of being self-employed with an unincorporated business.

Entry

Table 5 shows the results of the estimation of entry into self-employment from one year to the next for Utah and Massachusetts. The coefficient of the interaction term is positive and significant at the 1% level in Massachusetts, and employees are 2.35 percentage points more likely to enter into self-employment after the reform in 2018. This is 77.8% of the baseline annual entry probability of 3.02%, and thus, a very large effect. Based on the point estimate, employees are 0.54 percentage points more likely to switch over to self-employment per year in Utah after the reform in 2016, this is 18.2% of the baseline probability of 2.95%, but this effect is not statistically significant due to a large standard error.[9] In sum, the decrease in the enforceability of non-compete covenants increased the likelihood of switching from paid employment to self-employment in Massachusetts.

Robustness Checks

We conduct various robustness checks to assess the sensitivity of the results with respect to specification choices. First, we include real individual income in the previous calendar year (in $10,000 in prices of 1999 dollars) as an additional explanatory variable in the main regressions.

[9] The *p*-value of the interaction term for entry in Utah is 0.135.

This variable may capture individual productivity more precisely than the human capital variables in our main model, but we do not include income in the baseline models because of potential endogeneity concerns.[10] Tables A1 and A2 in the Appendix show the OLS results for the probability of being self-employed for, respectively, Utah and Massachusetts when including income. Income is positively associated with incorporated self-employment in both states. The estimated coefficients of the interaction terms, which are of main interest, do not change significantly in comparison to Tables 3 and 4 (the standard errors overlap), so the results are robust.

Next, we estimate logit models of the probability of being self-employed instead of linear probability models. We exclude income again for comparison with our main OLS regressions. Tables A3 and A4 present the logit coefficients for Utah and Massachusetts. Based on the estimated logit coefficients, Tables A5 and A6 (for Utah and Massachusetts) report average predicted probabilities of being self-employed in the treatment and control states before and after the reforms.[11] These predicted probabilities are used to calculate the differences in differences, which represent the average treatment effect on the treated and can be compared to the coefficients of the interaction terms in Tables 3 and 4. For Utah, the predicted increase in the probability of being any type of self-employed is 0.18 percentage points; for the control states, there is a predicted decrease of 0.09 percentage points in the probability of being self-employed. Thus, the difference in differences, which we attribute to the reform, is 0.27 percentage points. For Massachusetts, the estimated difference in differences using the logit coefficients is 1.15 percentage-points.

Concerning the rate of self-employed individuals with an incorporated business, the estimated difference in differences using logit coefficients is 0.37 percentage points in Utah and

[10] Endogeneity might arise from reverse causality of self-employment on income.
[11] We also calculated predicted probabilities at the mean values of the independent variables and obtained very similar results.

0.44 percentage points in Massachusetts.[12] For self-employed individuals with an unincorporated business in Utah, the estimated difference in differences is -0.14 percentage-points; we do not calculate a difference in differences based on the insignificant logit coefficient of the interaction term for Massachusetts. Overall, the results for both states estimated using logit models are similar to the results in our main analysis, confirming that the results are not overly sensitive to the choice of estimator.[13]

7. Conclusion

We analyzed how weakening the enforceability of non-compete covenants influenced self-employment with incorporated and unincorporated businesses, exploiting the policy reforms that took place in Utah (2016) and Massachusetts (2018) as quasi-experiments. We use incorporated self-employment as a proxy for entrepreneurship that is comparably likely to be innovative (Levine and Rubinstein, 2017). By using ACS and ASEC data, our findings show that the probability of being self-employed with incorporated businesses increases in Utah and Massachusetts after the reforms. In contrast, the legislation changes did not notably affect the probability of being self-employed with an unincorporated business, which is less related to innovation, in either state. We also estimated the probability of entry into self-employment and found that individuals are significantly more likely to switch to self-employment from their wage and salary jobs due to the reforms in Massachusetts, which is consistent with the aforementioned results.

Our results indicate that more individuals decide to be entrepreneurs due to the decrease of enforceability of non-compete covenants in Utah and Massachusetts. The reforms encouraged

[12] The full calculations are available from the authors on request.
[13] The predicted probabilities are somewhat different from those in Figures 1-6 because these show the raw self-employment rates not controlling for the individual- and regional level variables. However, the patterns with respect to the effects of the reforms are consistent.

spin-offs in these states because they made it easier for employees to quit their jobs and start their own businesses within the same industry, competing against their former employer. Our findings match with the results of the earlier literature that used quasi-experiments, but based on different reforms and investigating different outcome variables (Marx et al., 2009; Marx et al. 2015; Kang and Fleming, 2020). These papers report that the number of inventors and innovative small-scale businesses decreases due to enforceability increase in Michigan and Florida. Thus, in four different states, there is evidence that dynamic business activity (entrepreneurs, inventors, small-scale businesses) can grow if the enforceability of non-compete covenants were to decrease. Thus, our results reinforce that innovation is likely to rise when there is weaker enforceability of non-compete agreements in a given state. We add to the literature by showing that reducing the enforceability boosts entrepreneurial activity in a given state.

Entrepreneurship is regarded as an engine creating new jobs and economic growth. Thus, for policymakers who wish to promote entrepreneurship, our results imply that weakening the enforcement of non-compete agreements in a given state or country can be considered as a suitable tool to meet the objective of increasing entrepreneurial activity. As for future work, it is important to estimate the long-term effects of the reforms, especially with regard to Massachusetts' 2018 reform. Additionally, as further states or countries around the world weaken or strengthen their non-compete policies, this will provide more opportunities to investigate the generalizability of our results and how specific provisions of non-compete regulations might modify the effects on entrepreneurship.

References

Abadie, A., Diamond, A., Hainmueller, J., 2010. Synthetic control methods for comparative case studies: estimating the effect of California's tobacco control program. Journal of the American Statistical Association 105(490), 493-505

Acs, Z. J., Armington, C., 2006. Entrepreneurship, Geography, and American Economic Growth. Cambridge University Press, Cambridge, United Kingdom.

Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., Carlsson, B., 2009. The knowledge spillover theory of entrepreneurship. Small Business Economics 32 (1), 15–30.

Audretsch, D. B., Keilbach, M., Lehmann, E., 2006. Entrepreneurship and Economic Growth. Oxford University Press, New York, NY.

Bishara, N., Martin, K., Thomas R., 2015. An empirical analysis of noncompetition clauses and other restrictive postemployment covenants. Vanderbilt Law Review 68(1), 1-51.

Carree, M. A., & Thurik, A. R., 2010. The impact of entrepreneurship on economic growth. In: Handbook of Entrepreneurship Research. Springer.

Congregado, E., Golpe, A., Parker, C., 2012. The dynamics of entrepreneurship: hysteresis, business cycles and government policy. Empirical Economics 43, 1239–1261.

Cullen, J., Gordon, R., 2007. Taxes and entrepreneurial risk-taking: theory and evidence for the U.S.. Journal of Public Economics 91(7-8), 1479-1505.

Felstein, M., Slemrod, J., 2008. Personal taxation, portfolio choice, and the effect of the corporation income tax. Journal of Political Economy 88(5), 854-866.

Flood, S., King, M., Ruggles, S., and Warren, J.R., 2017. Integrated Public Use Microdata Series, Current Population Survey: Version 5.0. [Dataset]. Minneapolis: University of Minnesota, https://doi.org/10.18128/D030.V5.0.

Fossen, F.M., 2019. Entrepreneurship over the business cycle in the United States: a decomposition. IZA Discussion Paper 12499. Forthcoming in: Small Business Economics.

Herranz, N., Krasa, S., Vilamil, A., 2015. Entrepreneurs, risk aversion and dynamic firms. Journal of Political Economy 123(5), 1133-1176.

Glaeser, E., 2007. Entrepreneurship and the city. NBER Working Paper No. 13551.

Kang, H., Fleming, L., 2020. Non-competes, business dynamism, and concentration: evidence from a Florida case study. Journal of Economics & Management Strategy, Forthcoming.

Kaplan, S., Stromberg, P., 2003. Financial contracting theory meets the real world: an empirical analysis of venture capital contracts. Review of Economic Studies 70(2), 281-315.

Klepper, S., 2009. Spinoffs: A review and synthesis. European Management Review 6, 159-171.

La Porta, R., & Shleifer, A., 2014. Informality and development. Journal of Economic Perspectives 28(3), 109-126

Levine, R., Rubinstein, Y., 2017. Smart and illicit: who becomes an entrepreneur, and do they earn more? Quarterly Journal of Economics 132(2), 963-1018.

Marx, M., Fleming, L., 2009. Mobility, skills, and the Michigan non-compete experiment. Management Science 55(6), 875-889.

Marx, M., 2011. The firm strikes back: non-compete agreements and the mobility of technical professionals. American Sociological Review 76(5), 695-712.

Marx, M., Fleming, L., 2012. Non-compete agreements: barriers to entry and exit? NBER/Innovation Policy and the Economy 12(1), 39-64.

Marx, M., Singh, J., Fleming, L., 2015. Regional disadvantage? Employee non-compete agreements and brain drain. Research Policy 44(2), 394-404.

Parker, S. C., 2018. The Economics of Entrepreneurship, 2nd Edition. New York, Cambridge: Cambridge University Press.

Rosen, M., Malsberger, B., 2018. MA Legislature Passes Non-compete Reform Bill. Massachusetts Noncompete Law. Retrieved from https://www.massachusettsnoncompetelaw.com/2018/08/malegislature-passes-noncompete-reform-bill/

Ruggles, S., Flood, S., Goeken, R., Grover, J., Meyer E., Pacas J., and Sobek M., 2020. IPUMS USA: Version 10.0 [dataset]. Minneapolis, MN, https://doi.org/10.18128/D010.V10.0.

Samila, S., Sorenson, O., 2011. Venture capital, entrepreneurship, and economic growth. Review of Economics and Statistics 93(1), 338-349.

Schumpeter, J., 1939. Business Cycles: a Theoretical, Historical, and Statistical Analysis of the Capitalist Process. McGraw-Hill Book Company, Inc., New York, NY.

Schumpeter, J., 1942. Capitalism, Socialism, and Democracy. Harper & Brothers, New York, NY.

Starr, E., Balasubramanian, N., Sakakibara M., 2017. Screening spinouts? How noncompete enforceability affects the creation, growth, and survival of new firms. Management Science 64(2), 552-572.

Stuart, S., Sorenson, O., 2003. Liquidity events and the geographic distribution of entrepreneurial activity. Administrative Science Quarterly 48(2), 175-201.

Trial Court Law Libraries. (2019). Mass. General Laws C.149 x 24L. Mass.gov. The Commonwealth of Massachusetts, https://www.mass.gov/info-details/mass-general-laws-c149-ss-24l.

U.S. Bureau of Labor Statistics, Unemployment Rate. Retrieved from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org, April 18, 2020.

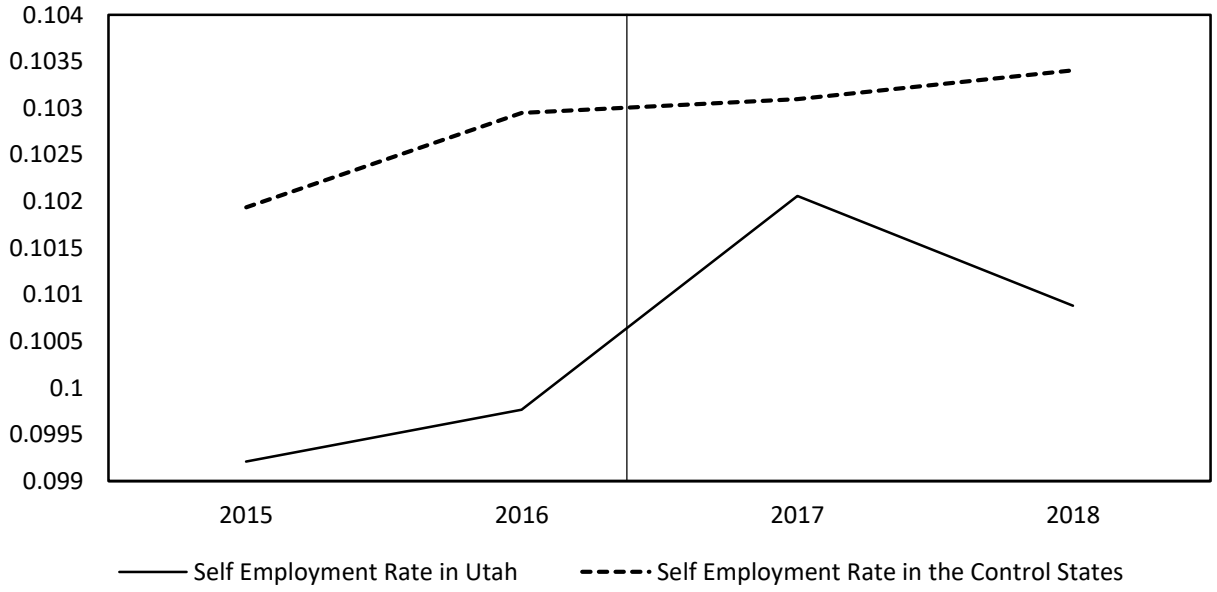
Utah State Legislature (2016). Post-Employment Restrictions Act. Utah.gov, https://le.utah.gov/xcode/Title34/Chapter51.

Van Stel, A., Carree, M., Thurik, R., 2005. The effect of entrepreneurial activity on national economic growth. Small Business Economics 24 (3), 311–321.

Zucker, L., Darby, M., Armstrong, J., 1998. Geographically localized knowledge: spillovers or markets? Economic Inquiry 36(1), 65-86.

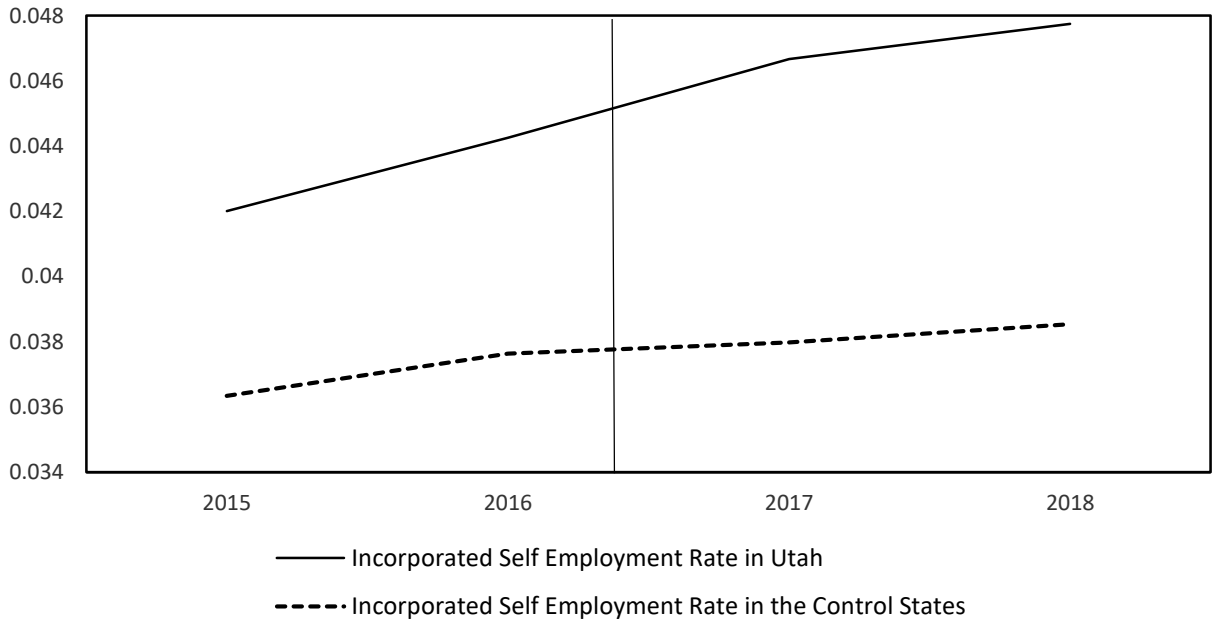
Figures and Tables

Figure 1: Total Self-employment Rates in Utah and Control States (ACS, 2015-2018)



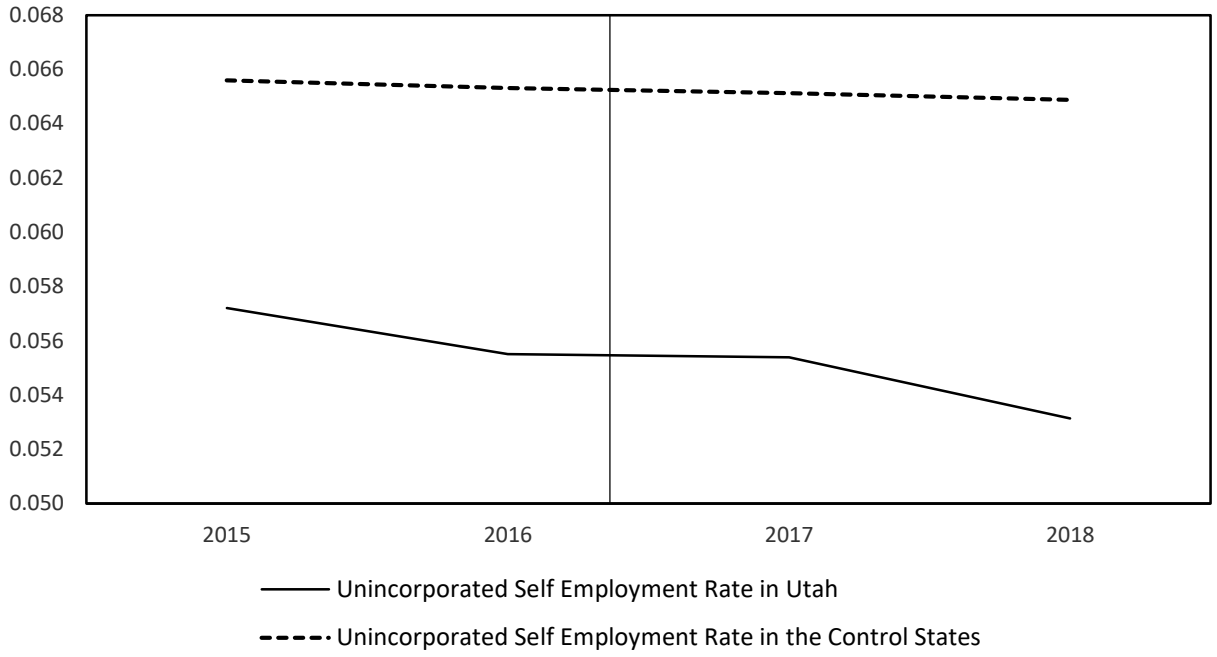
Notes: The figure shows the self-employment rates in Utah and the control states. The vertical line indicates the time of the reform that decreased the enforceability of non-compete covenants in Utah.

Figure 2: Incorporated Self-employment Rates in Utah and Control States (ACS, 2015-2018)



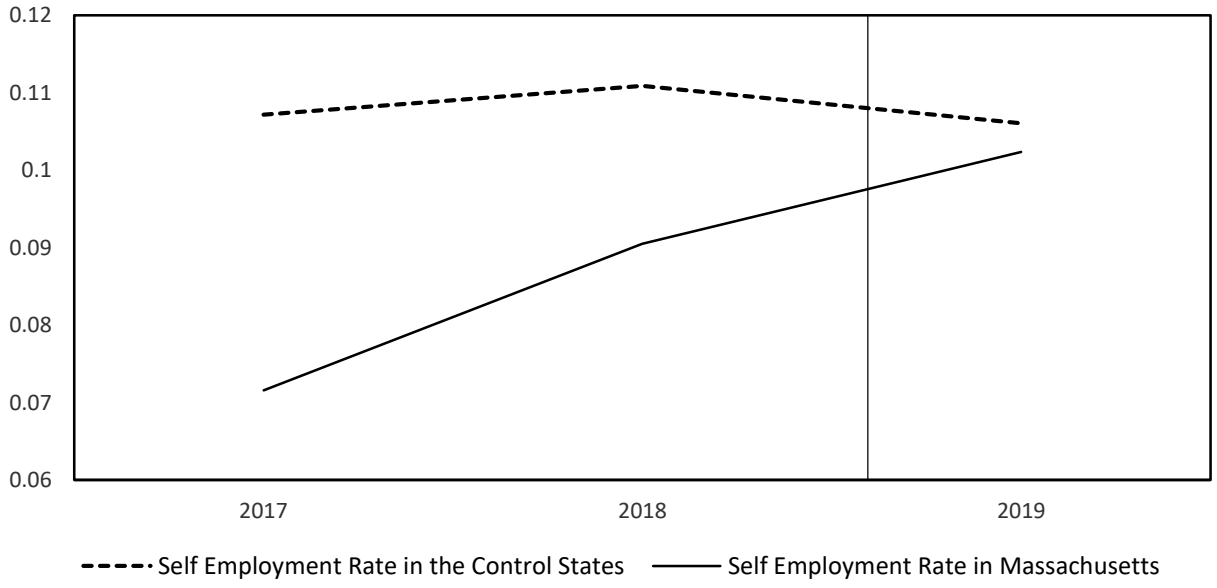
Notes: The figure shows the self-employment rates with incorporated businesses in Utah and the control states. The vertical line indicates the time of the reform that decreased the enforceability of non-compete covenants in Utah.

Figure 3: Unincorporated Self-employment Rates in Utah (ACS, 2015-2018)



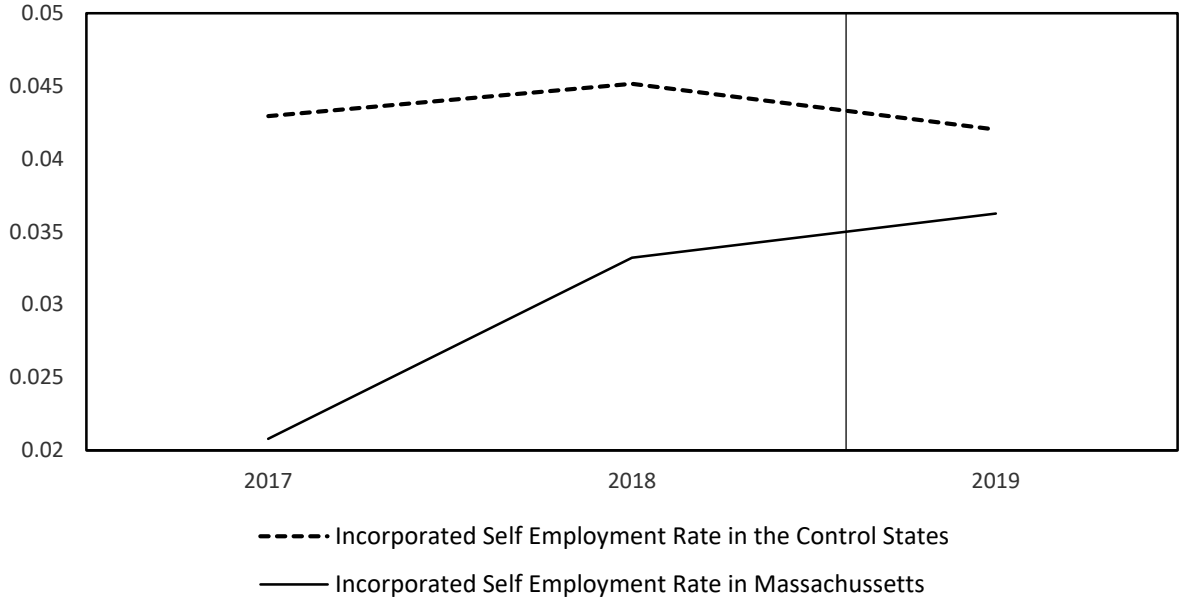
Notes: The figure shows the self-employment rates with unincorporated businesses in Utah and the control states. The vertical line indicates the time of the reform that decreased the enforceability of non-compete covenants in Utah.

Figure 4: Total Self-employment Rates in Massachusetts and Control States (ASEC, 2017-2019)



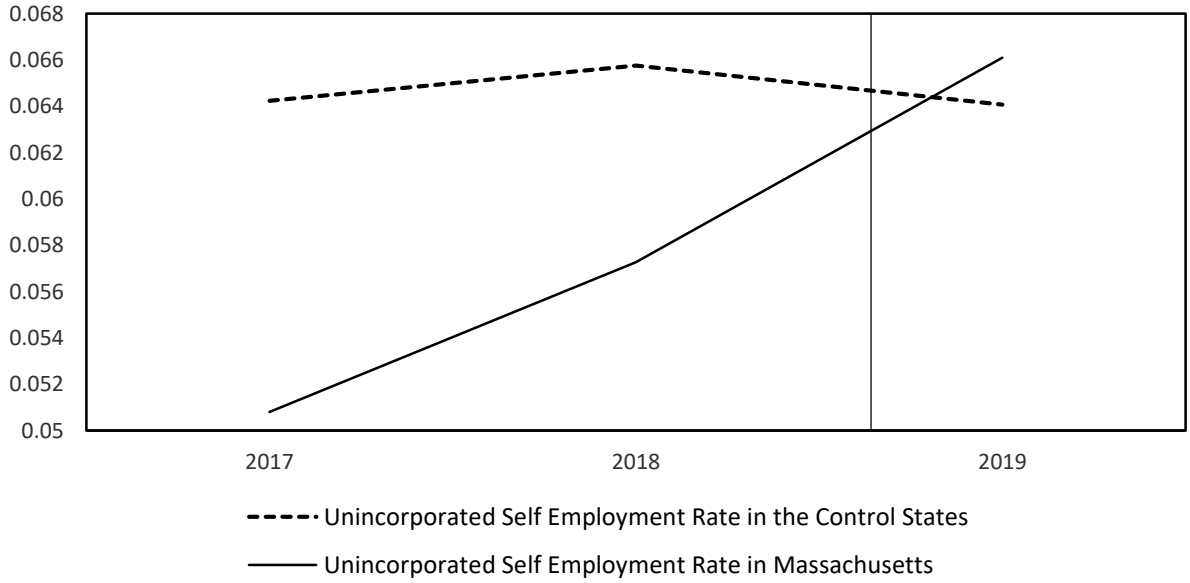
Notes: The figure shows the self-employment rates in Massachusetts and the control states. The vertical line indicates the time of the reform that decreased the enforceability of non-compete covenants in Massachusetts.

Figure 5: Incorporated Self-employment Rates in Mass. and Control States (ASEC, 2017-2019)



Notes: The figure shows the self-employment rates with incorporated businesses in Massachusetts and the control states. The vertical line indicates the time of the reform that decreased the enforceability of non-compete covenants in Massachusetts.

Figure 6: Unincorporated Self-empl. Rates in Mass. and Control States (ASEC, 2017-2019)



Notes: The figure shows the self-employment rates with unincorporated businesses in Massachusetts and the control states. The vertical line indicates the time of the reform that decreased the enforceability of non-compete covenants in Massachusetts.

Table 1: Mean Characteristics in the ACS

Independent Variable	Paid Employees	Self-employed (any type)	Self-employed (incorporated)	Self-employed (unincorporated)
Age	43.6	52.3	52.9	51.9
Female	0.501	0.377	0.319	0.411
Married	0.534	0.681	0.754	0.639
Number of children	0.686	0.691	0.783	0.698
Black	0.106	0.052	0.043	0.057
White	0.799	0.868	0.875	0.864
Other race	0.093	0.078	0.080	0.077
Less than high school	0.089	0.096	0.061	0.116
High school degree	0.253	0.250	0.208	0.275
Some college	0.324	0.288	0.280	0.293
College degree	0.332	0.364	0.449	0.315
Metropolitan area	0.723	0.691	0.742	0.662
Industry:				
Industry unknown	0.016	0.063	0.042	0.075
Mining, manufact. & utilities	0.125	0.041	0.055	0.032
Construction	0.051	0.151	0.143	0.155
Wholesale & retail trade	0.140	0.101	0.132	0.081
Transportation & information	0.061	0.058	0.059	0.058
Financial services	0.060	0.078	0.094	0.069
Profess. & business services	0.098	0.211	0.227	0.203
Educational & health services	0.252	0.106	0.101	0.108
Leisure & hospitality	0.098	0.063	0.067	0.061
Other services	0.093	0.124	0.076	0.152
Regional variables:				
Unemployment rate	4.52	4.48	4.49	4.48
Real GDP per capita	53.8	53.4	53.2	53.6
Observations	5,679,868	650,850	238,748	412,102

Note: Real GDP per capita is measured in 2012 thousand dollars.
Source: ACS (IPUMS) 2015-2018.

Table 2: Mean Characteristics in the ASEC

Independent Variable	Paid Employees	Self-employed (Any Type)	Self-employed (Incorporated)	Self-employed (Unincorporated)
Age	41.7	48.326	49.211	47.766
Female	0.491	0.367	0.306	0.398
Married	0.589	0.735	0.803	0.691
Number of Children	1.06	1.195	1.239	1.167
Black	0.139	0.074	0.062	0.082
White	0.779	0.850	0.857	0.845
Other race	0.081	0.076	0.079	0.072
Less than high school	0.082	0.077	0.034	0.101
HS degree	0.271	0.264	0.210	0.299
Some College	0.278	0.260	0.250	0.266
College Degree	0.366	0.399	0.503	0.333
Metropolitan Area	0.823	0.774	0.802	0.756
Industry:				
Industry unknown	0.017	0.072	0.045	0.089
Mining, manufact. & utilities	0.124	0.037	0.050	0.028
Construction	0.061	0.172	0.154	0.183
Wholesale & retail trade	0.127	0.098	0.121	0.083
Transport. & information	0.059	0.056	0.057	0.055
Financial services	0.064	0.077	0.098	0.063
Profess. & business services	0.104	0.214	0.227	0.206
Educat. & health services	0.250	0.109	0.101	0.114
Leisure & hospitality	0.090	0.069	0.076	0.065
Other services	0.100	0.092	0.067	0.108
Regional variables:				
Unemployment rate	3.93	3.87	3.86	3.88
Real GDP per capita	55.9	55.2	55.4	55.1
Observations	125,200	13,267	5,147	8,120

Note: Real GDP per capita is measured in 2012 thousand dollars.
Source: ASEC (IPUMS) 2017-2019

Table 3: Difference-in-differences Results for Utah (ACS, 2015-2018)

Independent Variables	Self-employed (Any Type)	Self-employed (Incorporated)	Self-employed (Unincorporated)
Utah	0.00478	0.00632***	-0.00154
	(0.00439)	(0.00205)	(0.00346)
Post reform	-0.000865	0.000401	-0.00127
	(0.00180)	(0.000856)	(0.00117)
Interaction Utah x post reform	0.00255***	0.00375***	-0.00120***
	(0.000606)	(0.000285)	(0.000409)
High school degree	-0.0121***	0.00306***	-0.0152***
	(0.00186)	(0.000876)	(0.00185)
Some college	-0.00878***	0.0101***	-0.0189***
	(0.00200)	(0.000973)	(0.00197)
College	0.00391**	0.0234***	-0.0195***
	(0.00184)	(0.00153)	(0.00232)
Age	0.000306	0.000564***	-0.000258
	(0.000217)	(9.22e-05)	(0.000163)
Age squared	2.96e-05***	6.03e-06***	2.36e-05***
	(2.09e-06)	(7.94e-07)	(1.82e-06)
Female	-0.0176***	-0.0169***	-0.000711
	(0.00131)	(0.000982)	(0.000849)
Married	0.0169***	0.0151***	0.00182**
	(0.000610)	(0.000616)	(0.000861)
Number of children	0.00716***	0.00297***	0.00419***
	(0.000359)	(0.000152)	(0.000387)
Black	-0.0328***	-0.0133***	-0.0196***
	(0.00188)	(0.00162)	(0.00105)
Other race	-0.00672***	-0.00219**	-0.00452***
	(0.00215)	(0.000953)	(0.00149)
Metropolitan area	-0.00860***	0.00240**	-0.0110***
	(0.00164)	(0.00102)	(0.00104)
Mining, manufact. & utilities	-0.272***	-0.0601***	-0.212***
	(0.0263)	(0.00571)	(0.0214)
Construction	-0.0563**	0.00965	-0.0660***
	(0.0255)	(0.00678)	(0.0203)
Wholesale & retail trade	-0.216***	-0.0325***	-0.184***
	(0.0261)	(0.00560)	(0.0212)
Transportation & information	-0.206***	-0.0413***	-0.165***
	(0.0259)	(0.00547)	(0.0212)
Financial services	-0.179***	-0.0246***	-0.155***
	(0.0291)	(0.00705)	(0.0227)
Profess. & business services	-0.105***	-0.00166	-0.104***
	(0.0266)	(0.00621)	(0.0212)
Educational & health services	-0.254***	-0.0585***	-0.195***
	(0.0260)	(0.00560)	(0.0212)
Leisure & hospitality	-0.196***	-0.0284***	-0.167***
	(0.0255)	(0.00531)	(0.0209)
Other services	-0.175***	-0.0479***	-0.127***
	(0.0261)	(0.00540)	(0.0214)
Unemployment rate	-0.000172	-0.000476	0.000304
	(0.000896)	(0.000439)	(0.000597)
Real GDP per capita	0.0671	0.0891	-0.0220
	(0.396)	(0.170)	(0.357)
Constant	0.222***	0.0176*	0.204***
	(0.0316)	(0.00874)	(0.0268)
Mean of the dep. variable	0.1028	0.0377	0.0650
Observations	6,330,718	6,330,718	6,330,718
R^2	0.085	0.035	0.056
State and year fixed effects	YES	YES	YES

Notes: We estimate linear probability models (OLS). The dependent variable is a dummy variable indicating that an individual is self-employed (Column 1), self-employed with an incorporated business (Column 2), or self-employed with an unincorporated business (Column 3). Real GDP per capita is in 2012 million dollars. Standard errors clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Table 4: Difference-in-differences Results for Massachusetts (ASEC, 2017-2019)

Independent Variables	Self-employed (Any Type)	Self-employed (Incorporated)	Self-employed (Unincorporated)
Massachusetts	0.0492	-0.0535*	0.103
	(0.0826)	(0.0295)	(0.0739)
Post reform	0.000799	-0.00441	0.00521
	(0.00496)	(0.00290)	(0.00424)
Interaction Mass. x post reform	0.00793*	0.00486***	0.00307
	(0.00402)	(0.00161)	(0.00397)
High school degree	0.0122**	0.0132***	-0.000977
	(0.00573)	(0.00195)	(0.00492)
Some college	0.0197***	0.0231***	-0.00343
	(0.00631)	(0.00224)	(0.00520)
College	0.0283***	0.0366***	-0.00824
	(0.00629)	(0.00253)	(0.00491)
Age	0.000289	0.000611*	-0.000322
	(0.000656)	(0.000312)	(0.000497)
Age squared	3.01e-05***	6.82e-06*	2.33e-05***
	(8.12e-06)	(3.63e-06)	(6.24e-06)
Female	-0.0139***	-0.0160***	0.00206
	(0.00244)	(0.00123)	(0.00211)
Married	0.0166***	0.0138***	0.00285*
	(0.00235)	(0.00125)	(0.00169)
Number of children	0.00651***	0.00226***	0.00425***
	(0.00124)	(0.000733)	(0.00111)
Black	-0.0242***	-0.0108***	-0.0134***
	(0.00334)	(0.00212)	(0.00221)
Other race	-0.000808	-0.000678	-0.000130
	(0.00404)	(0.00238)	(0.00348)
Metropolitan area	-0.0188***	-0.00406**	-0.0148***
	(0.00479)	(0.00189)	(0.00387)
Mining, manufact. & utilities	-0.260***	-0.0534***	-0.207***
	(0.0271)	(0.00788)	(0.0229)
Construction	-0.0586**	0.0121	-0.0706***
	(0.0267)	(0.00796)	(0.0227)
Wholesale & retail trade	-0.200***	-0.0241***	-0.176***
	(0.0273)	(0.00791)	(0.0228)
Transportation & information	-0.197***	-0.0334***	-0.163***
	(0.0273)	(0.00745)	(0.0235)
Financial services	-0.177***	-0.0168**	-0.160***
	(0.0281)	(0.00818)	(0.0230)
Profess. & business services	-0.108***	0.00205	-0.110***
	(0.0270)	(0.00809)	(0.0234)
Educational & health services	-0.241***	-0.0516***	-0.190***
	(0.0275)	(0.00801)	(0.0229)
Leisure & hospitality	-0.179***	-0.0154**	-0.164***
	(0.0260)	(0.00719)	(0.0223)
Other services	-0.199***	-0.0442***	-0.155***
	(0.0272)	(0.00781)	(0.0231)
Unemployment rate	0.00160	0.00106	0.000533
	(0.00382)	(0.00296)	(0.00346)
Real GDP per capita	-1.819	1.291	-3.109
	(2.549)	(0.910)	(2.283)
Constant	0.264**	-0.0470	0.311***
	(0.0981)	(0.0384)	(0.0883)
Mean of the dependent variable	0.095	0.037	0.058
Observations	138,467	138,467	138,467
R^2	0.078	0.036	0.050
State and year fixed effects	YES	YES	YES

Notes: We estimate linear probability models (OLS). The dependent variable is a dummy variable indicating that an individual is self-employed (Column 1), self-employed with an incorporated business (Column 2), or self-employed with an unincorporated business (Column 3). Real GDP per capita is in 2012 million dollars. Standard errors clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Table 5: Probability of Entry into Self-employment

Independent Variables	Utah	Massachusetts
Treatment state dummy	0.0229**	0.00772
	(0.00883)	(0.0580)
Post reform	0.00658	-0.00440
	(0.00615)	(0.00602)
Interaction treatment x post reform	0.00536	0.0235***
	(0.00351)	(0.00475)
High school degree	-0.00258	-0.00264
	(0.00396)	(0.00456)
Some college	-0.000828	0.00117
	(0.00404)	(0.00498)
College	0.00384	0.00564
	(0.00405)	(0.00544)
Age	-0.000562	-0.000365
	(0.000410)	(0.000450)
Age squared	1.45e-05***	1.10e-05**
	(4.79e-06)	(5.11e-06)
Female	-0.00830***	-0.00691***
	(0.00153)	(0.00161)
Married	0.00224	0.00271
	(0.00157)	(0.00182)
Number of children	0.00176**	0.00114
	(0.000829)	(0.00114)
Black	-0.00846***	-0.00345
	(0.00187)	(0.00348)
Other race	0.000766	-0.00226
	(0.00330)	(0.00378)
Metropolitan area	-0.00571**	0.000324
	(0.00255)	(0.00286)
Mining, manufact & utilities	-0.0503***	-0.0714***
	(0.0105)	(0.0107)
Construction	-0.00863	-0.0257**
	(0.0106)	(0.0109)
Wholesale & retail trade	-0.0375***	-0.0561***
	(0.0103)	(0.0116)
Transportation & information	-0.0305***	-0.0548***
	(0.0104)	(0.0119)
Financial services	-0.0258**	-0.0490***
	(0.0105)	(0.0111)
Profess. & business services	-0.0235**	-0.0396***
	(0.00978)	(0.0125)
Educational & health services	-0.0488***	-0.0691***
	(0.00997)	(0.0113)
Leisure & hospitality	-0.0326***	-0.0553***
	(0.0101)	(0.0119)
Other services	-0.0351***	-0.0596***
	(0.0108)	(0.0113)
Unemployment rate	-0.00103	-0.00412
	(0.00248)	(0.00277)
Real GDP per capita	-3.888***	-1.097
	(0.855)	(1.845)
Constant	0.225***	0.150**
	(0.0386)	(0.0740)
Mean of the dependent variable	0.0295	0.0302
Observations	56,957	70,822
R^2	0.013	0.014
State and year fixed effects	YES	YES

Notes: We estimate linear probability models (OLS). The dependent variable is a dummy variable indicating an entry into self-employment for Utah (Column 1) and Massachusetts (Column 2) between two survey years t and t+1. Real GDP per capita is in 2012 million dollars. Standard errors clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Appendix

Appendix Table A1: Income Included for Utah (ACS)

Independent Variables	Self-employed (Any Type)	Self-employed (Incorporated)	Self-employed (Unincorporated)
Utah	0.000913	0.00777***	-0.00686*
	(0.00454)	(0.00205)	(0.00376)
Post Reform	-0.000428	0.000236	-0.000664
	(0.00175)	(0.000888)	(0.00113)
Interaction Utah x post reform	0.00277***	0.00367***	-0.000892**
	(0.000573)	(0.000300)	(0.000386)
Income	-0.00918***	0.00345***	-0.0126***
	(0.000391)	(0.000227)	(0.000557)
High school degree	-0.00979***	0.00218***	-0.0120***
	(0.00186)	(0.000758)	(0.00164)
Some college	-0.00265	0.00784***	-0.0105***
	(0.00202)	(0.000810)	(0.00171)
College	0.0278***	0.0144***	0.0135***
	(0.00195)	(0.00119)	(0.00181)
Age	0.00256***	-0.000283**	0.00284***
	(0.000197)	(0.000105)	(0.000170)
Age squared	5.65e-06***	1.50e-05***	-9.38e-06***
	(1.72e-06)	(9.86e-07)	(1.68e-06)
Female	-0.0288***	-0.0127***	-0.0161***
	(0.00107)	(0.000989)	(0.000918)
Married	0.0215***	0.0134***	0.00813***
	(0.000704)	(0.000619)	(0.00101)
Number of children	0.00848***	0.00247***	0.00601***
	(0.000349)	(0.000152)	(0.000379)
Black	-0.0375***	-0.0115***	-0.0261***
	(0.00181)	(0.00162)	(0.00113)
Other race	-0.00953***	-0.00113	-0.00840***
	(0.00195)	(0.000993)	(0.00121)
Metropolitan area	-0.00404**	0.000682	-0.00472***
	(0.00163)	(0.00100)	(0.00102)
Mining, manufact & utilities	-0.260***	-0.0645***	-0.196***
	(0.0261)	(0.00581)	(0.0210)
Construction	-0.0539**	0.00873	-0.0626***
	(0.0250)	(0.00695)	(0.0196)
Wholesale & retail trade	-0.212***	-0.0339***	-0.178***
	(0.0257)	(0.00575)	(0.0206)
Transportation & information	-0.199***	-0.0438***	-0.156***
	(0.0256)	(0.00560)	(0.0208)
Financial services	-0.162***	-0.0308***	-0.132***
	(0.0285)	(0.00734)	(0.0218)
Profess. & business services	-0.0967***	-0.00484	-0.0919***
	(0.0263)	(0.00633)	(0.0208)
Educational & health services	-0.250***	-0.0600***	-0.190***
	(0.0255)	(0.00577)	(0.0206)
Leisure & hospitality	-0.195***	-0.0287***	-0.166***
	(0.0252)	(0.00542)	(0.0204)
Other services	-0.172***	-0.0488***	-0.123***
	(0.0257)	(0.00553)	(0.0209)
Unemployment Rate	-0.000418	-0.000383	-3.51e-05
	(0.000853)	(0.000448)	(0.000534)
Real GDP Per Capita	0.330	-0.00979	0.340
	(0.426)	(0.168)	(0.401)
Constant	0.173***	0.0360***	0.137***
	(0.0325)	(0.00882)	(0.0281)
Mean of the dep. variable	0.1028	0.0377	0.0650
Observations	6,330,718	6,330,718	6,330,718
R^2	0.098	0.040	0.091
State and year fixed effects	YES	YES	YES

Notes: We estimate linear probability models (OLS). The dep. var. is a dummy variable indicating that an individual is self-employed (Column 1), incorporated self-employed Column 2), or unincorporated self-employed (Column 3). Income is in 1999 ten thousand dollars. Real GDP per capita is in 2012 million dollars. Std. err. clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Appendix Table A2: Income Included for Massachusetts (ASEC)

Independent Variables	Self-employed (Any Type)	Self-employed (Incorporated)	Self-employed (Unincorporated)
Massachusetts	0.0255	-0.0442	0.0697
	(0.0842)	(0.0289)	(0.0760)
Post reform	-0.000385	-0.00394	0.00356
	(0.00508)	(0.00290)	(0.00444)
Interaction Mass. x post reform	0.0101**	0.00402**	0.00604
	(0.00415)	(0.00160)	(0.00412)
Income	-0.00701***	0.00277***	-0.00977***
	(0.000447)	(0.000191)	(0.000433)
High school degree	0.0159***	0.0117***	0.00426
	(0.00558)	(0.00193)	(0.00469)
Some college	0.0265***	0.0205***	0.00600
	(0.00611)	(0.00227)	(0.00494)
College	0.0496***	0.0282***	0.0214***
	(0.00624)	(0.00262)	(0.00493)
Age	0.00149**	0.000138	0.00135***
	(0.000635)	(0.000319)	(0.000465)
Age squared	1.86e-05**	1.14e-05***	7.21e-06
	(7.85e-06)	(3.72e-06)	(5.78e-06)
Female	-0.0239***	-0.0120***	-0.0119***
	(0.00234)	(0.00122)	(0.00203)
Married	0.0200***	0.0125***	0.00755***
	(0.00234)	(0.00126)	(0.00173)
Number of children	0.00739***	0.00191**	0.00548***
	(0.00120)	(0.000715)	(0.00105)
Black	-0.0278***	-0.00935***	-0.0185***
	(0.00341)	(0.00213)	(0.00234)
Other race	-0.00150	-0.000404	-0.00110
	(0.00396)	(0.00238)	(0.00333)
Metropolitan area	-0.0158***	-0.00524***	-0.0106***
	(0.00470)	(0.00189)	(0.00374)
Mining, manufact. & utilities	-0.249***	-0.0577***	-0.192***
	(0.0267)	(0.00801)	(0.0222)
Construction	-0.0547**	0.0105	-0.0653***
	(0.0263)	(0.00807)	(0.0221)
Wholesale & retail trade	-0.195***	-0.0261***	-0.169***
	(0.0268)	(0.00804)	(0.0222)
Transportation & information	-0.190***	-0.0359***	-0.155***
	(0.0269)	(0.00756)	(0.0230)
Financial services	-0.165***	-0.0217**	-0.143***
	(0.0277)	(0.00830)	(0.0225)
Profess. & business services	-0.0996***	-0.00131	-0.0983***
	(0.0267)	(0.00815)	(0.0229)
Educational & health services	-0.236***	-0.0538***	-0.182***
	(0.0270)	(0.00817)	(0.0222)
Leisure & hospitality	-0.177***	-0.0163**	-0.160***
	(0.0256)	(0.00727)	(0.0218)
Other services	-0.195***	-0.0461***	-0.149***
	(0.0268)	(0.00792)	(0.0225)
Unemployment rate	0.00269	0.000632	0.00206
	(0.00395)	(0.00288)	(0.00344)
Real GDP per capita	-1.023	0.977	-2.000
	(2.597)	(0.890)	(2.343)
Constant	0.208**	-0.0249	0.233**
	(0.0992)	(0.0369)	(0.0888)
Mean of the dependent variable	0.095	0.037	0.058
Observations	138,467	138,467	138,467
R^2	0.089	0.040	0.084
State and year fixed effects	YES	YES	YES

Notes: We estimate linear probability models (OLS). The dependent variable is a dummy variable indicating that an individual is self-employed (Column 1), self-employed with an incorporated business (Column 2), or self-employed with an unincorporated business (Column 3). Income is in 1999 ten thousand dollars. Real GDP per capita is in 2012 million dollars. Standard errors clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Appendix Table A3: Logit Model for Utah (ACS)

Independent Variables	Self-employed (Any Type)	Self-employed (Incorporated)	Self-employed (Unincorporated)
Utah	0.0722	0.195***	-0.0217
	(0.0517)	(0.0584)	(0.0603)
Post reform	-0.0108	0.0183	-0.0214
	(0.0209)	(0.0270)	(0.0197)
Interaction Utah x post reform	0.0316***	0.0838***	-0.0249***
	(0.00718)	(0.00907)	(0.00708)
High school degree	-0.148***	0.144***	-0.247***
	(0.0207)	(0.0310)	(0.0214)
Some college	-0.131***	0.336***	-0.329***
	(0.0220)	(0.0373)	(0.0240)
College	0.0251	0.684***	-0.336***
	(0.0194)	(0.0459)	(0.0287)
Age	0.0592***	0.0992***	0.0411***
	(0.00236)	(0.00226)	(0.00191)
Age squared	-0.000225***	-0.000635***	-8.03e-05***
	(2.48e-05)	(2.42e-05)	(2.07e-05)
Female	-0.200***	-0.469***	-0.00837
	(0.0160)	(0.0170)	(0.0146)
Married	0.188***	0.435***	0.0270*
	(0.00970)	(0.0125)	(0.0144)
Number of children	0.0880***	0.0922***	0.0732***
	(0.00464)	(0.00295)	(0.00627)
Black	-0.553***	-0.619***	-0.470***
	(0.0199)	(0.0429)	(0.0201)
Other race	-0.0783***	-0.0393	-0.0910***
	(0.0287)	(0.0300)	(0.0300)
Metropolitan area	-0.0911***	0.0777***	-0.171***
	(0.0179)	(0.0293)	(0.0160)
Mining, manufact & utilities	-2.622***	-1.638***	-2.857***
	(0.146)	(0.0993)	(0.137)
Construction	-0.349***	0.0892	-0.455***
	(0.115)	(0.0760)	(0.104)
Wholesale & retail trade	-1.661***	-0.671***	-1.953***
	(0.123)	(0.0705)	(0.114)
Transportation & information	-1.496***	-0.884***	-1.524***
	(0.120)	(0.0712)	(0.115)
Financial services	-1.217***	-0.512***	-1.353***
	(0.151)	(0.0997)	(0.137)
Profess. & business services	-0.625***	-0.122*	-0.722***
	(0.120)	(0.0710)	(0.110)
Educational & health services	-2.276***	-1.651***	-2.264***
	(0.128)	(0.0881)	(0.115)
Leisure & hospitality	-1.395***	-0.564***	-1.590***
	(0.114)	(0.0658)	(0.111)
Other services	-1.169***	-1.096***	-0.997***
	(0.124)	(0.0715)	(0.118)
Unemployment rate	-0.00123	-0.00718	0.00593
	(0.0105)	(0.0145)	(0.0103)
Real GDP per capita	0.953	2.815	-0.474
	(4.825)	(4.878)	(6.406)
Constant	-3.068***	-6.409***	-2.683***
	(0.240)	(0.203)	(0.293)
Mean of the dependent variable	0.1028	0.0377	0.0650
Observations	6,330,718	6,330,718	6,330,718
Pseudo R^2	0.1264	0.1119	0.1089
State and year fixed effects	YES	YES	YES

Notes: The table shows estimated logit coefficients. The dependent variable is a dummy variable indicating that an individual is self-employed (Column 1), self-employed with an incorporated business (Column 2), or self-employed with an unincorporated business (Column 3). Real GDP per capita is in 2012 million dollars. Standard errors clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Appendix Table A4: Logit Model for Massachusetts (ASEC)

Independent Variables	Self-employed (any type)	Self-employed (incorporated)	Self-employed (unincorporated)
Massachusetts	0.586	-1.558*	1.895
	(1.128)	(0.929)	(1.460)
Post reform	0.00744	-0.127	0.0941
	(0.0657)	(0.0825)	(0.0840)
Interaction Mass. x post reform	0.0967*	0.126**	0.0566
	(0.0543)	(0.0502)	(0.0765)
High school degree	0.146*	0.624***	-0.0212
	(0.0765)	(0.120)	(0.0722)
Some college	0.220***	0.918***	-0.0826
	(0.0824)	(0.122)	(0.0789)
College	0.328***	1.260***	-0.178**
	(0.0792)	(0.136)	(0.0717)
Age	0.0630***	0.120***	0.0367***
	(0.00643)	(0.0104)	(0.00652)
Age squared	-0.000267***	-0.000841***	-4.35e-05
	(7.17e-05)	(0.000102)	(7.59e-05)
Female	-0.180***	-0.472***	0.0370
	(0.0323)	(0.0349)	(0.0409)
Married	0.224***	0.479***	0.0615*
	(0.0316)	(0.0474)	(0.0333)
Number of children	0.0805***	0.0626***	0.0798***
	(0.0144)	(0.0186)	(0.0189)
Black	-0.429***	-0.510***	-0.347***
	(0.0539)	(0.0868)	(0.0567)
Other race	-0.00592	0.000702	-0.0125
	(0.0537)	(0.0690)	(0.0731)
Metropolitan area	-0.215***	-0.118**	-0.240***
	(0.0535)	(0.0554)	(0.0620)
Mining, manufact & utilities	-2.580***	-1.538***	-2.916***
	(0.152)	(0.146)	(0.165)
Construction	-0.239*	0.251**	-0.390***
	(0.127)	(0.104)	(0.125)
Wholesale & retail trade	-1.450***	-0.462***	-1.790***
	(0.134)	(0.118)	(0.133)
Transportation & information	-1.372***	-0.683***	-1.484***
	(0.141)	(0.114)	(0.153)
Financial services	-1.146***	-0.306**	-1.421***
	(0.146)	(0.122)	(0.143)
Profess. & business services	-0.558***	0.0190	-0.715***
	(0.129)	(0.115)	(0.137)
Educational & health services	-2.119***	-1.466***	-2.165***
	(0.139)	(0.124)	(0.134)
Leisure & hospitality	-1.158***	-0.199*	-1.496***
	(0.124)	(0.117)	(0.134)
Other services	-1.403***	-1.068***	-1.336***
	(0.141)	(0.133)	(0.143)
Unemployment rate	0.0159	0.0219	0.00496
	(0.0493)	(0.0844)	(0.0692)
Real GDP per capita	-22.44	36.58	-57.84
	(34.78)	(28.57)	(45.10)
Constant	-2.619*	-8.744***	-0.606
	(1.431)	(1.233)	(1.824)
Mean of the dependent variable	0.095	0.037	0.058
Observations	138,467	138,467	138,467
Pseudo R^2	0.1191	0.1177	0.1001
State and year fixed effects	YES	YES	YES

Notes: The table shows estimated logit coefficients. The dependent variable is a dummy variable indicating that an individual is self-employed (Column 1), self-employed with an incorporated business (Column 2), or self-employed with an unincorporated business (Column 3). Real GDP per capita is in 2012 million dollars. Standard errors clustered at the state level in parentheses. Stars (***/**/*) indicate significance at the 1%/5%/10% levels.

Appendix Table A5: Predicted Probabilities of Being Self-employed in Utah (Logit Models)

Group	Before the Reform	After the Reform	Change	Difference-in-differences
Utah	0.10936	0.11120	0.00183	
Control states	0.10319	0.10229	-0.00090	0.00273

Note: Using the estimated logit coefficients shown in the first column of Table A3 for Utah, this table provides average predicted probabilities for the treatment and control groups before and after the reform obtained by switching the treatment and post reform dummies on and off for all observations. The average probabilities are then used to calculate the difference-in-differences.

Appendix Table A6: Predicted Probabilities of Being Self-employed in Massachusetts (Logit Models)

Group	Before the Reform	After the Reform	Change	Difference-in-differences
Massachusetts	0.15048	0.16255	0.01207	
Control states	0.09479	0.09538	0.00058	0.01149

Note: Using the estimated logit coefficients shown in the first column of Table A4 for Massachusetts, this table provides average predicted probabilities for the treatment and control groups before and after the reform obtained by switching the treatment and post reform dummies on and off for all observations. The average probabilities are then used to calculate the difference-in-differences.