Entrepreneurship and Cities: Examining the Link Between Startup Rates and Economic Growth Across the United States

Jamie Rosen

Applied-Mathematics Economics Honors Candidate

Brown University

Faculty Advisor: Neil Mehrotra

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Abstract

Does entrepreneurship lead to changes in economic growth? This paper measures both the correlation and causal relationship between startups and urban economic growth in the U.S. over the past thirty years. Correlation results using MSA and time fixed effects find that a one percentage point increase in the startup rate is associated with a 0.102 to 0.137 percentage point increase in population growth rates, a 0.648 to 0.826 percentage point increase in employment growth rates, and a 0.037 to 0.135 percentage point decrease in unemployment rates. Using industry concentration and natural resources and mining employment share as instruments for entrepreneurship, there also appears to be a causal effect of startups on increased personal income per capita, population, and employment growth rates and decreased unemployment rates. Finally, case studies using changes in state corporate tax rates, angel investor tax credits, and digital firm formation laws to exploit statewide variation in entrepreneurship do not show startup rate differences between states that received the policy change and "control" states. This result suggests that traditional policy levers designed to increase entrepreneurship have not resulted in measurable startup growth and calls into question the best actions cities can take to foster entrepreneurship.

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I. Introduction

What is the relationship between entrepreneurship and economic growth? Recent policy decisions, media coverage of business startups, and institutional focus on entrepreneurship often lead to the assumption that the impact of entrepreneurship on economic growth is conclusively positive. Theoretically, if entrepreneurship leads to business creation, and new businesses create jobs, technological progress and innovation, then neoclassical theory of economic growth holds that entrepreneurship should increase economic growth. In reality, the impact entrepreneurs have on cities and urban growth is far more complex. For example, does entrepreneurship grow in a city when the urban economy is not creating enough wage-earning job opportunities? If entrepreneurship fosters new business creation, are these new firms able to provide the same wages and benefits to workers that more established firms can provide? The true relationship between entrepreneurship and economic growth is hard to quantify for two reasons: entrepreneurship is often linked to other factors that can influence growth and identifying exogenous variation in entrepreneurship across cities and states is extremely difficult. This paper adds to existing literature on entrepreneurship and economic growth by presenting a detailed analysis of the correlation between entrepreneurship and urban economic growth in the United States over the past three decades as well as identifying new sources of exogenous variation in entrepreneurship to better understand and estimate the impact of entrepreneurship on economic growth.

This research uses multiple econometric methods to examine the relationship between entrepreneurship and economic growth in metropolitan statistical areas (MSAs) across the United States. The first analysis consists of a series of OLS regressions designed to measure the correlation between entrepreneurship and economic growth across MSAs over the past thirty years.

The OLS regression results indicate that entrepreneurship has been correlated with measures of economic growth over the past thirty years. A one percentage point increase is found to be associated with between a 0.102 and 0.137 percentage point increase in population growth rates, a 0.648 to 0.826 percentage point increase in employment growth rates, and a 0.037 to 0.135 percentage point decrease in unemployment rates. The range in results comes from two empirical specifications, both with MSA and time fixed effects, where one specification includes industry controls and the other specification includes industry and education controls and a smaller sample size. These results remain significant using three-year data averages and MSA fixed effects, a specification that smooths out business cycle variation. The relationship between entrepreneurship and personal income per capita is less clear, with no significant correlation found in the yearly data with MSA and time fixed effects.

The second analysis builds on work by Glaeser, Kerr, and Kerr (2013). These authors found that proximity to coal mines in 1900 was associated with larger firm sizes and less new firms, and therefore could be used as an instrument for entrepreneurship. With this instrument, they established a persistent link between entrepreneurship and city employment growth. I will expand on this work using a measure of modern industry concentration as well as MSA natural resources and mining employment share as two new instruments for entrepreneurship instead of proximity to historical mines. Utilizing yearly differences in the Herfindahl index and the natural resources and mining employment share, I re-examine the link between entrepreneurship and employment growth in addition to multiple other measures of urban growth.

The instrumental variable regressions indicate a causal effect of startup rates on measures of economic growth, although result significance varies by specification. Regressions with MSA and time fixed effects with industry controls and using the Herfindahl index or natural resources and mining employment share as an instrument show that a one percentage point increase in the startup rate results in between a 0.334 and 0.363 percentage point increase in personal income per capita growth rates, which is significant at the 1% level. The remaining regressions using yearly data are not significant. However, running comparable regressions using three-year data averages and MSA fixed effects, a one percentage point increase in the startup rates results in between a 0.797 and 0.805 percentage point increase in personal income per capita growth rates, a 0.663 to 0.667 percentage point increase in population growth rates, a 0.700 increase in employment growth rates, and a 0.416 to 0.441 percentage point decrease in unemployment rates, all of which are significant at the 1% level. While the magnitude of these results should be viewed cautiously due to little significance using yearly data, it does appear that increased entrepreneurship has resulted in increases in personal income per capita, population, and employment growth rates and decreases in the unemployment rate.

The final phase of the paper provides multiple case studies to determine whether differences in corporate tax rates, angel investor tax credits, professional licensing requirements and digital firm formation laws across states have led to exogenous variation in entrepreneurship growth, and if these policy differences could be used as instruments to measure the impact of entrepreneurship on economic growth. The first stage difference-in-differences regressions from these case studies indicate that the chosen policy changes did not result in a significant change in startup rates for states where the policy change occurred compared to the startup rates of other “control states.” The results say nothing about the causal effect of entrepreneurship on economic growth, just that the case studies cannot be used to accurately estimate the causal effect of startup rate growth on measures of economic growth. The major finding from these analyses is that policies currently used by urban planners and politicans to increase entrepreneurship do not appear to be working. This result highlights the need for future research to find new methods that could increase startup rates across cities.

For the purposes of this paper, entrepreneurship is measured using a startup rate, or the ratio of employment in new firms formed during a year to total employment during that year in a given MSA. The rest of this paper proceeds as follows. Section Two provides a background of relevant research on entrepreneurship and economic growth. Section Three describes the data and estimation framework used in this research. Section Four presents econometric results from the fixed effects analyses, MSA case studies, and core instrumental variable results. Section Five concludes with policy implications and possibilities for future research.

II. Background

In order to identify the role of entrepreneurship in U.S. economic growth, I must begin with an explanation of what constitutes entrepreneurship. Joseph Schumpeter (1934, 1950), one of the first scholars to theorize about entrepreneurship, saw the role of the entrepreneur in the ‘‘recognition and realization of new economic opportunities.’’ Schumpeter made the distinction that entrepreneurs develop new technologies and ideas, while other individuals use existing processes. Marshall (1920) also argued that the economic function of entrepreneurs is to take on the risk associated with organizing and controlling a production process. In a more modern interpretation, Sarasvathy, Dew, Velamura, and Venkataraman (2002) wrote that the role of entrepreneurs is to recognize opportunity, to discover opportunity, or possibly to create opportunity. Taking these descriptions and other literature into account, Kielbach (2006) provides the following summary of three main economic functions of entrepreneurs:

> **Opportunity Recognition**. Entrepreneurs are the agents who discover or create new economic opportunities. These can be arbitrage opportunities or they can be related to new products, technologies, or techniques.
>
> **Opportunity Exploration**. Beyond recognition, entrepreneurs are the agents who are actually exploring new opportunities. They organize the necessary resources and manage the implied processes.
>
> **Risk Processing**. By exploring new and unknown territories, entrepreneurs risk failure. Entrepreneurial activity implies taking on this risk.

As described above, entrepreneurs create economic change by starting new business ventures.

While entrepreneurship has been studied in economics for at least the past century, the role of entrepreneurship in U.S. economic growth and development has only recently permeated classic models of economic growth. For example, the well-known Solow model of economic growth did not include a measure of entrepreneurship. Solow (1956) found that two factors, physical capital and labor, were the driving forces of economic growth, and that any residual was explained by the possibility of technological advance. Even when knowledge capital, which consisted of science, technology, creativity, and new ideas, was formally introduced to macroeconomic growth models by Romer (1986) and Lucas (1993), the role small business and entrepreneurship played in economic growth was still not recognized nor was it understood.

In fact, in the 1960s and 1970s, many economists and scholars thought that the role of small business in the U.S. economy was actually declining. Studies from the U.S. during this time period found that small businesses produced less efficiently than larger firms (Pratten, 1971; Weiss, 1976). Small businesses were characterized by lower employee compensation levels (Brown and Medoff, 1989) and less innovative activity (Acs and Audretsch, 1990; Chandler, 1990). Economist Frederic Scherer (1990) wrote that the role of small business was becoming less important in both North America and Europe.

It was not until the late 1970's and early 1980's when policymakers and scholars in the U.S. and Europe, confused by persistent stagnant economic growth despite high levels of both physical and knowledge capital investments, began looking to entrepreneurship as a missing factor in endogenous growth models. Economic analyses by Loveman and Sengenberger (1991) and Acs and Audretsch (1993) examined the re-emergence of small business and entrepreneurship in Europe and North America and found that the importance of small businesses had actually increased since the mid 1970s. This new research led to the entrepreneurial economy model, in which entrepreneurship capital, as well as physical capital, human capital, and knowledge contribute to economic growth. According to Acs et. al (2009), "entrepreneurship capital reflects the capacity of a spatial unit of analysis, such as a community, city, region, state, or country, to generate entrepreneurial activity in the form of new-firm start-ups." Audretsch and Thurik (2000) found that the shift from a market economy to an entrepreneurial economy during this time period accelerated because of increased globalization, and that this entrepreneurial focus led to government policies that favored entrepreneurship. While Acs and Armington (2006) and Acs et. al (2009) did find empirical evidence linking entrepreneurship to regional economic growth in the United States and OECD countries, respectively, these analyses did not examine entrepreneurship at the city level, nor did they measure the explicit link between entrepreneurship capital and economic growth.

The study of the role of entrepreneurship in modern economics, deemed “Entreprenomics” by Thurik (2006), is far less extensive than many other subfields of economics. While economists have begun to analyze the link between entrepreneurship and economic growth across regions and countries, there is a gap in empirical analysis at the city level of the link between entrepreneurship and measures of economic growth like personal income per capita growth, employment growth, and population growth. Measuring the true relationship between entrepreneurship and economic growth is complex, because as Glaeser (2010) notes, “entrepreneurship, in contrast to proximity to coal or a good harbor, is unlikely to be an exogenous local variable determined by nature.” This paper adds to studies of entrepreneurship by providing a comprehensive analysis of the correlation between startup rates and measures of urban growth over the past thirty years and by analyzing new potential instruments like corporate tax rates, angel investor tax credits, digital firm formation laws, industry concentration, and natural resources employment share, to move closer toward an accurate estimation of the relationship between entrepreneurship and urban growth.

My research augments existing literature, mostly from the past decade, that has attempted to find instruments for entrepreneurship and use these instruments to estimate the impact of entrepreneurship on urban growth. Glaeser, Kerr, and Kerr (2013) used proximity to mines in 1900 as an instrumental variable for modern entrepreneurship. The authors reported that historical proximity to mines was associated with larger average establishment size in later years, which resulted in less small startups. Using this instrument, they found a strong connection between a city's initial entrepreneurship levels and later economic growth, but they also acknowledged that historical mines were an imperfect instrument given their likely correlation with other urban factors. Additionally, even if historical mines are a strong instrument for entrepreneurship today, as modern industries become less dependent on coal, proximity to historical mines will likely become a weaker instrument for entrepreneurship.

Examining the same relationship between large average establishment size and less startups in an MSA, this paper uses industry concentration, measured using the Herfindahl index, as an instrument for entrepreneurship. While this instrument is also likely associated with other urban factors, it has an advantage over the original instrument because the Herfindahl index is dependent on average establishment size and includes measures of growth in the technology and health sectors, factors that are more closely tied to modern entrepreneurship. I also use natural resources and mining employment share as an instrument for startup rate, and compare estimates using this instrument to estimates using the Herfindahl index.

The joint determination of entrepreneurship and economic growth and the lack of exogenous variation in entrepreneurship present two major challenges to those working in the field of "Entreprenomics." These challenges have led to gaps in empirical research examining the intersection of entrepreneurship and urban growth. Despite imperfect instruments and confounding factors, empirical research on entrepreneurship and exploitation of exogenous variation in startup rates moves us closer to understanding the true relationship between entrepreneurship and economic growth. This knowledge would be extremely useful for planners and policymakers seeking to foster city growth across the country. If increased entrepreneurship is found to have a direct impact on urban growth, the next step for cities is to determine how they can encourage the formation of new firms.

III. Data and Statistical Methodology

III.A. Data

The position of entrepreneurship in the context of economic growth will be measured using panel data sets from 1983-2014 for 366 MSAs across the United States. This time period provides a compromise between being able to generate estimates over a relatively long range while also permitting expansive firm age categories using the Bureau of the Census Business Dynamics Statistics (BDS), the data source I use for measures of entrepreneurship and other business dynamics at the MSA level.

The BDS, which is compiled from the Longitudinal Business Database (LBD) research-based dataset, includes measures of firm startups and closings, job creation and destruction by firm size, age, and sector, and other business dynamics statistics. The United States economy currently has six million establishments with paid employees, and this number is constantly changing. The BDS includes annual statistics on gross job gains and losses at the MSA level. This data shows the dynamics underneath net employment growth for both small and large businesses.

The relationship between entrepreneurship and four major components of urban growth are examined in my statistical analysis. I will use BDS data for measures of entrepreneurship, personal income per capita growth rates, population growth rates, and employment growth rates at the MSA level. The Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics provides data on MSA unemployment levels and rates from 1990-2014. The BLS Quarterly Census of Employment and Wages provides data on MSA employment by industry using the North American Industry Classification System (NAICS). Educational attainment data from 2007-2014 comes from the American Community Survey and share of adults with a bachelor's degree or higher is used as a control when measuring the relationship between entrepreneurship and economic growth.

For this empirical analysis, I will measure entrepreneurship using a self-constructed startup rate. I use BDS data to calculate the MSA startup rate, which is the ratio of employment in new firms formed during a year to total employment during the same year. The BDS provides data on both establishments and firms. As Neumark et al. (2011) highlight, establishments are single physical locations of economic activity and firms constitute all establishments under operational control of the same enterprise. To make this distinction concrete, in a national chain each store is an establishment, whereas the economic activity from all stores, the chain's headquarters, and all operations centers make up a single firm. I focus on the creation of new firms to measure entrepreneurship.

Net employment growth rates also come from the BDS. The net employment growth rate for an MSA is the change in employment from one period to the next divided by the average employment over the two periods. Davis, Haltiwanger, and Schuh (1996) find that net growth rate measure is an advantageous measure of employment change: (1) it measures both firm entry and exit; (2) it is symmetric for increases and decreases in employment; (3) it is a second-order approximation of the log first difference. This data will be used to control for endogeneity in the model due to a correlation between entrepreneurship and labor that could impact economic growth. In addition, I will also be analyzing the direct relationship between entrepreneurship and net employment growth rates to determine if entrepreneurship influences MSA employment levels beyond increasing the labor supply.

The second part of this paper will examine industry concentration and natural resources and mining employment share as two instruments for entrepreneurship. For these measures, I use data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages on employment by industry. My measure of yearly industry concentration in each MSA is the Herfindahl index, which is the sum of the squares of the industry employment shares. This allows me to measure and compare the concentration of industry across MSAs with more weight given to larger industries.

Finally, I will be examining specific cases of statewide variation in corporate tax rates, angel investor tax credits, and digital firm formation laws to see if these differences may have led to exogenous variation in entrepreneurship. Corporate tax rate data from 2000-2014 for those in the $100,000 tax bracket is from the Tax Foundation, a U.S. independent tax policy nonprofit. The specific corporate tax rates case studies I examine are a North Carolina corporate tax rate cut from 7.75 to 7.5% in 1997, a Colorado corporate tax rate cut from 5.0 to 4.63% from 1999 to 2000, and the repeal of the 4.0% tax surcharge in New Jersey in 2010. Each tax cut affected over 80 firms in the given state. These tax cuts were chosen for case studies because of the relatively large magnitude of the change, the number of firms affected, and because each example allowed for comparable neighboring states who did not have a tax change during the time range being analyzed. Tax information comes from an analysis of corporate income tax changes in the U.S. by Heider and Ljungqvist (2015). The angel investor tax credit case studies include the Kansas Angel Investor Tax Act (2005), the Wisconsin Angel Investor Tax Credit (2005), and the Kentucky Investment Fund Act (1998), and information about these tax credits comes from a paper by Williams (2008) for the Angel Capital Education Foundation. These three credits were chosen because the credits were larger than angel investor tax credits introduced by other states. I use the passage of the 2008 state law fostering online firm formation in Vermont, the first of its kind, as my last case study. Goodenough, a fellow at the Berkman Center for Internet and Society at Harvard Law School as well as a Professor at Law at the Vermont Law School, has published research on this law and how it fosters new business formation.

III.B. Estimation Framework

OLS Regressions

In recognition of the joint determination of entrepreneurship and economic growth, the first analysis looks at the correlation between entrepreneurship and measures of economic growth across MSAs from 1983-2014. Because I am using cross sectional and time series data, I rely on three empirical specifications: an OLS regression with no fixed effects, an MSA fixed effects regression and more demanding MSA and time fixed effects regression. MSA fixed effects regressions are used because of the reasonable assumption that differences in MSAs may impact either entrepreneurship or economic growth and this variation should be controlled for. The more restrictive MSA and time fixed effects regressions control for differences both across MSAs and across years that could impact entrepreneurship and/or economic growth.

The core empirical specification for the no fixed effects regression of a measure of economic growth on the startup rate is below:

(1) $Y_{my} = \beta_0 + \beta_1 \text{STARTUPRATE}_{my} + \beta' X_{my} + \varepsilon_{my}$

where m and y are the MSA and year specifications, respectively, Y_{my} is the measure of economic growth for a given MSA and year, X_{my} are controls taken from urban growth literature including share of adults with a bachelor's degree or higher and industry employment shares, ε_{my} is the error term, and β_1 describes the correlation between the startup rate and a measure of economic growth.

The MSA fixed effects regression of an economic growth measure on the startup rate is as follows:

(2) $Y_{my} = \beta_0 + \beta_1 \text{ STARTUPRATE}_{my} + \beta' X_{my} + \Omega_m + \varepsilon_{my}$

which is similar to Equation (1) other than the inclusion of Ω_m, an unknown intercept for each MSA. Again, β_1 describes the correlation between the startup rate and the economic growth measure.

The next equation is the core empirical specification for MSA and time fixed effects regressions of measures of economic growth on the startup rate:

(3) $Y_{my} = \beta_0 + \beta_1 \text{ STARTUPRATE}_{my} + \beta' X_{my} + \Omega_m + \delta_y + \varepsilon_{my}$

which includes Ω_m, an unknown intercept for each MSA, and δ_y, an unknown intercept for each year. β_1 describes the correlation between the startup rate and the measure of economic growth.

In addition to measuring yearly correlation between startup rates and measures of economic growth, three-year averages of these measures are calculated to examine the correlation between entrepreneurship and economic growth over more extended time periods. Both no fixed effects regressions and MSA fixed effects regressions are examined for the averaged data set. Examining three-year averages smooths out business cycles so time fixed effects become less significant.

Instrumental Variable Regressions

The following regressions build on the research of Glaeser, Kerr, and Kerr (2013), who used proximity to historical mines as an instrument for modern entrepreneurship. Instead of this instrument, I use the Herfindahl index measure of industry concentration and the natural resources and mining employment share as my two instruments. For these two instruments to be valid, they must satisfy instrument relevance and instrument exogeneity. To satisfy instrument relevance, the instrument must be strongly correlated with startup rates. To satisfy instrument exogeneity, the instrument must be uncorrelated with the error term, meaning that it must not be associated with other urban factors that also affect growth.

The empirical analysis for the first stage of this two-staged least squares regression measures the correlation between the Herfindahl index or the natural resources and mining employment share and MSA startup rates to determine if either of these variables could be relevant instruments. The empirical specification for this analysis is very close to the OLS regression specifications. I use three-year averages for these specifications to control for business cycles and time effects and measure the correlation using a no fixed effects regression and an MSA fixed effects regression. The equations for these two regressions are below:

(4) $STARTUPRATE_{my} = \beta_0 + \beta_1 T_{my} + \beta' X_{my} + \varepsilon_{my}$

(5) $STARTUPRATE_{my} = \beta_0 + \beta_1 T_{my} + \beta' X_{my} + \Omega_m + \varepsilon_{my}$

where m and y are MSA and year specifications, respectively, $STARTUPRATE_{my}$ is the startup rate for a given MSA and year, I_{my} is either the Herfindahl index or natural resources and mining employment share for a given MSA and year, X_{my} are the same controls from previous regressions, Ω_m is the unknown intercept for each MSA, ε_{my} is the error term, and β_1 describes the correlation between the instrument and MSA startup rate.

As shown in Tables 6 and 7, the Herfindahl index and natural resources and mining employment share both have significant, negative correlations with startup rates when using three-year data averages and controlling for MSA fixed effects. These results justify the argument that the instruments are relevant. In terms of exogeneity, the Herfindahl index and natural resources and mining employment share are probably not completely exogenous. Natural resources and mining employment share is similar to the instrument used by Glaeser, Kerr, and Kerr, proximity to historical mines, because it is likely associated with local economic factors like manufacturing decline. The Herfindahl index is also an imperfect instrument. While industry concentration may be less closely tied to manufacturing, MSA industry concentration and reliance on any industry could impact urban growth. Despite having imperfect instruments, it is still useful to use these instruments to measure estimates of the causal effect of startup rates on economic growth from multiple empirical specifications.

The empirical analysis for the second stage of this two-staged least squares analysis consists of three estimates: the first estimate includes no fixed effects, the second estimate controls for MSA fixed effects, and the third estimate controls for MSA and time fixed effects. Each estimate also includes a first stage F-statistic that measures the relevance of either the Herfindahl index or the natural resources and mining employment share as an instrument. The closer the F-statistic is to 0, the weaker the instrument is, and a strong instrument generally has an F-statistic above 10. The equations for each specification are below:

No Fixed Effects First Stage

(6) $STARTUPRATE_{my} = \alpha_0 + \alpha_1 I_{my} + \alpha' X_{my} + e_{my}$

MSA Fixed Effects First Stage

(7) $STARTUPRATE_{my} = \alpha_0 + \alpha_1 I_{my} + + \Omega_m + \alpha' X_{my} + e_{my}$

MSA and Time Fixed Effects First Stage

(8) $STARTUPRATE_{my} = \alpha_0 + \alpha_1 I_{my} + + \Omega_m + \delta_y + \alpha' X_{my} + e_{my}$

Second Stage

(9) $Y_{my} = \beta_0 + \beta_1 STARTUPRATE\_HAT_{my} + \beta' X_{my} + \varepsilon_{my}$

where m and y are the MSA and year indicators, respectively, I_{my} is either the Herfindahl Index or the natural resources and mining employment share, $STARTUPRATE_{my}$ is the startup rate for the same MSA and year, $STARTUPRATE\_HAT_{my}$ is the estimate for the startup rate of the same MSA and year given the first stage regression, Y_{sy} is the measure of economic growth for a given MSA and year, and X_{my} are the same controls from previous regressions. The MSA fixed effects first stage regression and the MSA and time fixed effects first stage regression include Ω_m, which controls for variation across MSAs. The MSA and time fixed effects regression also includes δ_y, which controls for variation across years. The estimate of the effect of industry concentration on entrepreneurship is given by α_1. The IV estimate is β_1.

Regressions with no fixed effects and MSA fixed effects regressions using three-year averages of each variable are also examined. Using three-year averages smooths out business cycle fluctuations and allows for the removal of time fixed effects in an alternate model of the relationship between startup rates and economic growth rates.

Case Studies

Multiple case studies are examined to determine if changes in corporate tax rates, angel investor tax credits, and digital firm formation laws can be used to exploit exogenous variation in statewide startup rates. To conduct this analysis, it is necessary to employ a difference-in-differences estimation strategy. For each case study, I identify three states that, at the time of the specific policy decision, have similar characteristics like industry breakdown, population size, and geographic region. Ideally, the policy change is randomly assigned to the "treatment" state, meaning that the only difference between the "treatment" state and the "control" states is the tax change, angel investor tax credit introduction, or digital firm formation law. For these case studies to be useful, the policy decision must have a measurable effect on entrepreneurship but must be independent of all other factors of economic growth. If these conditions hold, then the policy changes can be used as valid instruments to measure the effect of entrepreneurship on statewide urban economic growth.

More formally, the identification strategies for these estimations can be found in the following equations. The naïve OLS estimation model is given by:

(10) $Y_{sy} = \beta_0 + \beta_1 STARTUPRATE_{sy} + \beta' X_{sy} + \varepsilon_{sy}$

where s and y are the state and year indicators, respectively, Y_{sy} is the measure of economic growth for a given MSA and year, X_{sy} are the same controls from previous regressions, and the naïve estimate is represented by β_1.

The two-staged least squares estimate is below:

First Stage

(11) $STARTUPRATE_{sy} = \alpha_0 + \alpha_1 Pol_s + \alpha_2 Post_s + \alpha_3 Pol_s * Post_s + \alpha' X_{sy} + e_{sy}$

Second Stage

(12) $Y_{sy} = \beta_0 + \beta_1 STARTUPRATE_{sy} + \beta' X_{sy} + \varepsilon_{sy}$

where s and y are the state and year indicators, respectively, Pol_s represents whether the state experienced the policy change, $Post_s$ represents whether the time is post-policy change, and $Pol_s * Post_s$ represents the interaction of these two variables. The difference-in-differences estimate of the effect of the policy change on entrepreneurship is given by α_3. The IV estimate is β_1.

In addition to these case studies, I look at the relationship between corporate tax rates for businesses in the $100,000 tax bracket and MSA startup rates from 2000-2014. This empirical specification is the same as the specification described in Equations (4) and (5) but measures the correlation between corporate tax rates and startup rates in the given time period.

IV. Results

OLS Regression Results

I begin with a visual examination of the relationship between average MSA entrepreneurship and urban growth from 1990-2014. Figure 1 presents a scatterplot between an MSA's average startup rate and average personal income per capita growth rate during this period. Figures 2, 3, and 4 present similar plots for average population growth rate, average employment growth rate, and average unemployment rate. As shown, MSAs with higher average startup rates are more likely to have higher average population growth rates, average employment growth rates, and average unemployment rates during this 15-year period. The relationship between higher average startup rates and average personal income per capita growth rates is slightly negative. This is not a correlation analysis, but rather an analysis of general growth characteristics of MSAs with different average startup rates over the past thirty years.

These relationships and their correlations over time are more formally examined using the econometric framework presented in the previous section. Table 2.A presents results for the regression of personal income per capita growth rate on the startup rate. Panel A contains regression results with no fixed effects, Panel B contains regression results with MSA fixed effects, and Panel C contains regression results with MSA and time fixed effects. Column 2 includes controls for industry employment shares and Column 3 includes controls for industry employment shares and educational attainment. Tables 3.A, 4.A, and 5.A present similar results for population growth rate, employment growth rate, and unemployment rate, and the tables are organized like Table 2.A. Tables 2.B, 3.B, and 4.B are comparable regressions to their table counterparts but use three-year data averages rather than yearly data and include only no fixed effects regressions and MSA fixed effects regressions.

Focusing on the most restrictive MSA and time fixed effects regressions in Panel C and using industry controls and industry and education controls with a smaller sample size, the results show that a one percentage point increase in the MSA startup rate is associated with a 0.102 to 0.137 percentage point increase in population growth rates, a 0.648 to 0.826 percentage point increase in employment growth rates, and a 0.037 to 0.135 percentage point decrease in unemployment rates, all of which are significant at the 1% level. These correlations are also significant when examining three-year data averages and MSA fixed effects only, with a one point increase in the three-year average of MSA startup rate correlated with between a 0.350 and 0.400 percentage point increase in the three-year average population growth rate, a 1.107 to 1.406 percentage point increase in three-year average employment growth rates, and a 0.497 to 1.191 percentage point decrease in unemployment rates.

The relationship between startup rates and personal income per capita is less clear from the correlation analysis. The startup rate and personal income per capita growth rate are not significantly correlated using regressions with MSA and time fixed effects, however this relationship becomes significant using three-year averages that smooth out business cycle fluctuations and allow me to examine regressions with MSA fixed effects only. Using three-year data averages, a one percentage point increase in the startup is correlated with a 0.797 to 0.805 percentage point increase in personal income per capita growth rates. While the relationship appears to be positive, these results are not significant using yearly data, so concrete conclusions about the correlation between startup rates and personal income per capita growth rates cannot be drawn.

To understand the magnitude of these results, it is important to specify that in my data set a one percentage point increase in startup rate is on average an increase in approximately 2,412 jobs from new firms. The average yearly MSA employment at new firms is about 6,787 workers, so a one percentage point increase means on average close to a 35% increase in employment at new firms. This is a sizeable increase, but it is not unreasonable that the average MSA increase employment at new firms by 2,412 over the course of multiple years. One standard deviation in the startup rate is 0.013, or a little more than a one percentage point increase in the startup rate. Understanding of the scale of a one percentage point increase in entrepreneurship is important when interpreting these regression results and the results that follow.

Overall, startup rates are found to have had a positive, significant correlation with population growth rates and employment growth rates and a negative, significant correlation with unemployment rates across MSAs for the past thirty years. The correlation between startup rates and personal income per capita growth rates has not been significant over this same time period. While this analysis demonstrates a strong correlation between entrepreneurship and some measures of economic growth, the results cannot speak to the impact of increasing entrepreneurship on urban economic growth. Due to the joint determination of entrepreneurship and economic growth, a valid instrument for entrepreneurship is necessary to estimate the effect of startup rate growth on economic growth.

Instrumental Variables Regression Results

The next section includes regression results of startup rates and economic growth rates using the Herfindahl index and natural resources and mining employment share as instruments for the startup rate. Tables 8.A and 8.B describe second stage results of startup rates and economic growth using the Herfindahl index as an instrument. Table 8.A is yearly data and Column 1 is the no fixed effects regression, Column 2 is the MSA fixed effects regression, and Colum 3 is the MSA and time fixed effects regression. Table 8.B is three-year data averages. Again, Column 1 is the no fixed effects regression and Column 2 is the MSA fixed effects regression. The dependent variables for Panels A-D are personal income per capita growth rate, population growth rate, employment growth rate, and unemployment rate, respectively.

Tables 8.A and 8.B demonstrate potential weakness of the Herfindahl index as a relevant instrument for startup rate. Column C of Table 8.A, which includes MSA and time fixed effects regressions, shows that the F-statistic for all four economic growth measure regressions is less than 10. However, Table 6 indicated that the Herfindahl index was at least somewhat relevant due to the significant correlation of -0.023 between the Herfindahl index and startup rates using three-year data averages and an MSA fixed regression. While I use the Herfindahl index as one instrument to examine the estimated effect of startup rate growth on economic growth, weakness of the Herfindahl index is considered when looking at these results.

The instrumental variable regression results indicate that increases in the MSA startup rate result in increased personal income per capita growth rates, increased population growth rates, increased employment growth rates, and decreased unemployment rates. Regressions using the Herfindahl index as an instrument to predict startup rate find that a one percentage point increase in the predicted startup rate results in a 0.363 percentage point increase in personal income per capita growth rates, which is significant at the 1% level. All of the reported results are from regressions with MSA and time fixed effects and either industry controls or industry and education controls with a smaller sample size. The remaining regressions of predicted startup rate on population growth rates, employment growth rates, and unemployment rates using yearly data are not significant. However, running comparable regressions using three-year data averages and MSA fixed effects, a one percentage point increase in the startup is found to result in a 0.797 percentage point increase in personal income per capita growth rates, a 0.667 percentage point increase in population growth rates, a 0.700 increase in employment growth rates, and a 0.441 percentage point decrease in unemployment rates, all of which are significant at the 1% level. As previously mentioned, the magnitude of these results should be viewed cautiously due to the lack of significance using yearly data, but it does appear using both the Herfindahl index and natural resources and mining employment share as instruments that increased entrepreneurship results in increases in personal income per capita, population, and employment growth rates and decreases in the unemployment rate.

Tables 9.A and 9.B parallel Tables 8.A and 8.B but instead use the MSA natural resources and mining employment share as an instrument for startup rate. Natural resources and mining employment share is also a potentially weak instrument, as F-statistics for regressions including MSA and time fixed effects are below 9. However, Table 7 shows a correlation of -0.080 between natural resources and mining employment share and startup rates, which is significant at the 10% level. This indicates that natural resources and mining employment share has some relevance as an instrument. Natural resources and mining employment share also may have exogeneity issues because it is likely tied to other urban factors that influence growth. Still, it is useful to examine the predicted relationship between startup rates and economic growth using natural resources and mining employment share in addition to the Herfindahl index as an instrument.

The regression results from Tables 9.A and 9.B align with results from Tables 8.A and 8.B on the positive effect of startup rate growth on personal income per capita growth rates, population growth rates, and employment growth rates and the negative effect of startup rate growth on unemployment rates. Yearly data results using MSA and time fixed effects find that a one percentage point increase in the predicted startup rate results in a 0.334 percentage point increase in personal income per capita growth rates, which is significant at the 10% level, and an 0.645 percentage point increase in population growth rates, which is significant at the 1% level. The yearly regressions of predicted startup rate on employment growth rates and unemployment rates using yearly data are not significant. Comparable regressions using three-year data averages show that a one percentage point increase in the predicted startup rate results in a 0.805 percentage point increase in personal income per capita growth rates, a 0.663 percentage point increase in population growth rates, a 0.700 percentage point increase in employment growth rates, and a 0.416 percentage point decrease in unemployment rates.

These results expand beyond the OLS regression results because the instrumental variable regressions use instruments to estimate the effect of startup rate growth on economic growth rather than measuring just the correlation between entrepreneurship and economic growth. While the magnitude of estimates differ depending on the empirical specification and whether I used the Herfindahl index or natural resources and mining employment share as an instrument for entrepreneurship, the results from these regressions indicate a causal effect of startup rate growth on increased personal income per capita growth rates, population growth rates, and employment growth rates, as well as decreased unemployment rates.

The 2SLS estimates using both Herfindahl index and natural resources and mining employment share implicitly assume that the variation in these instruments affects startup rates but not other factors that could influence urban growth; however, this is most likely not the case. The variance in results using different empirical specifications lead to questions about potential biases in this analysis. While I attempted to control for MSA and time specific factors by running of series of regressions with industry controls, time fixed effects, and three-year data averages, the variance across empirical specifications demonstrates that not all error has been controlled for. Despite using imperfect instruments, these regression analyses allow for the examination of similarities in estimated relationships between entrepreneurship and measures of economic growth. With multiple estimates, these results move us closer toward measuring the relationship and causal pathways between startup rates and economic growth.

Case Studies Results

An analysis of one-time changes in state corporate tax rates, angel investor tax credits, and digital firm formation laws and state startup rates following these changes shows that these policies do not have appear to have had a measurable effect on entrepreneurship growth. Using a difference-in-differences approach to compare startup rates in states where these policy changes occurred and similar neighboring states that did not have a policy change, I find that the chosen policy changes did not result in a significant change in startup rates for states where the policy change occurred compared to the startup rates of "control states." In Table 10, I examine a 1999-2000 Colorado corporate tax cut from 5.0 to 4.63%, which affected over 130 firms. Using the empirical specification from Equation (11) with Arizona and Utah as "control" states, the effect of the tax cut on Colorado startup rates in the five years following the policy change, measured by the DID coefficient, is found to be 0.003 and not significant. A visual comparison of startup rates in Colorado, Arizona, and Utah for the five years before and after the tax cut can be found in Figure 5.

Similar analyses of the repeal of the 4.0% tax surcharge in New Jersey in 2010, reported in Table 11, and a cut in the North Carolina corporate tax rate from 7.75 to 7.5% in 1997, reported in Table 12, do not find significant differences in the startup rates of states in the five years following a tax change when compared to startup rates of similar states over the same years. Again, graphs of "treatment" and "control" states startup rates before and after the policy change can be found in Figures 6 and 7, respectively. While it could be the case that tax cuts are tied to changes in state startup rates and this effect is being hidden by other statewide changes that are also impacting entrepreneurship, the lack of significance in the correlation between changes in corporate tax rates and changes in state startup rates invalidates second stage analysis results. This second stage analysis uses corporate tax rates to predict startup rates and measures the relationship between predicted startup rate values and statewide urban growth. The large variation in both the sign and magnitude of the estimated relationships between predicted startup rates and personal income per capita growth rates, population growth rates, employment growth rates, and unemployment rates in Columns 1-4 further demonstrate that state corporate tax rate is a weak instrument for entrepreneurship.

The next case studies look at angel investor tax credits as a potential source of exogenous variation in entrepreneurship across states. The examples used for this analysis are the 2005 Kansas Angel Investor Tax Credit, the 2005 Wisconsin Angel Investor Tax Credit, and the 1997 Kentucky Investment Fund Act. Regression results for these three case studies can be found in Tables 13, 14, and 15, and startup rate graphs for “treatment” and “control” states are found in Figures 8, 9, and 10. The lack of significance in the difference-in-differences estimator for all three case studies indicates that angel investor tax credits are another weak instrument for entrepreneurship, and the results of the second stage analysis are not accurate.

The final case study focuses on the 2008 passage of a digital firm formation law in Vermont, the first law of its kind designed to foster fully digitized business formation. The first stage regression, as shown in Table 16, finds that the passage of this digital firm formation law was associated with a 0.007 unit decrease in Vermont startup rates compared to Connecticut and Massachusetts startup rates from 2008-2012, and this result is statistically significant at the 1% level. These results are surprising, as this law was designed to encourage new business growth in Vermont, however the difference-in-differences estimator indicates that the law did just the opposite. It is unlikely that the passage of this digital firm formation law had a direct negative effect on startup rates in Vermont. The more probable reasons for the negative significance between the two lies are either error due to small sample size or a confounding factor that inhibited Vermont startup rates during the same period. However, this result does calls into question whether the Vermont digital firm formation law achieved its intended goal of increasing business startups in the state.

Finally, I move from case studies to an examination of the relationship between changes in corporate tax rates and MSA startup rates from 2000-2014. For this analysis, I use three-year averages of the variables to control for business cycle fluctuations and limit time-induced variation. The correlation between tax rates for those in the $100,000 tax bracket and MSA startup rates can be found in Table 17. This time trend analysis corroborates case study results, as no significant relationship is found between corporate tax rates and startup rates using three-year data averages and MSA fixed effects regressions (reported in Panel B).

The case studies results indicate that the chosen policy changes do not have an effect on startup rates. While I was therefore unable to use these policy changes to exploit exogenous variation in startup rates, the results from these analyses do not in any way rule out a causal relationship between startup rates and economic growth. As I will discuss in the following section, these results do warrant a discussion of the policy levers currently being used to increase entrepreneurship and whether alternative measures would be more productive in raising startup activity in U.S. cities.

V. Conclusion

This paper examines the relationship between entrepreneurship and economic growth in U.S. cities over the past thirty years. Estimations of the correlation between entrepreneurship and multiple measures of economic growth show that increases in startup rates have been associated with significant increases in MSA population and employment growth rates and decreases in MSA unemployment rates, but the correlation between entrepreneurship and personal income per capita growth rates is not conclusively positive.

Moving from relationships of correlation to causation, the Herfindahl index and the natural resources and mining employment share were used as two instruments for MSA startup rate to examine the causal relationship between entrepreneurship and urban growth. Results from instrumental variable regressions using three-year data averages with the MSA fixed effects estimate that an increase in the startup rate has had a positive and significant effect on personal income per capita, population, and employment growth rates and a negative and significant effect on unemployment rates over the past thirty years. While neither the Herfindahl index nor the natural resources and mining employment share are perfect instruments and variance across empirical specifications raises questions about potential biases in these regressions, the effect of entrepreneurship on personal income per capita, population, and employment growth rates is consistently positive and the effect of entrepreneurship on unemployment rates is consistently negative. These results indicate that entrepreneurship is in fact beneficial for urban growth, and that cities seeking growth should consider existing methods as well as new opportunities to foster the formation of new firms.

Finally, specific policy changes were used to look for startup rate variation across states, but these case studies found no correlation between corporate tax rate cuts, angel investor tax credits, and the creation of digital firm formation laws and startup rates. These results call into question the methods used by urban planners and policy makers in attempts to increase entrepreneurship. While policies like corporate tax cuts and angel investor tax credits are often packaged as being pro-business or designed to foster entrepreneurship, empirical estimates indicate that they are not achieving their intended results. If these policies are not working, how can urban planners spur entrepreneurship in cities? There is no singular solution. Cities have different industry compositions, comparative advantages, and business cultures, all of which may influence what policy decisions are best for entrepreneurship in certain areas. Furthermore, as my analysis highlights, changes that do increase entrepreneurship impact many city aspects, so policy decisions should not be taken lightly. Rather than continuing to focus on "traditional" ways to increase entrepreneurship that have not had proven success, i.e. tax cuts or credits, urban leaders should examine past successes and failures in attempts to foster entrepreneurship and consider new city-specific methods to encourage startups. The general lack of success of the policy levers examined in this paper underscore the need for research on innovative tactics to increase startup rates.

As Glaeser, Kerr, and Kerr (2013) wrote, "It is remarkable how little we know about what lies behind this relationship (between entrepreneurship and economic growth), especially given how wide-held the belief is that entrepreneurship is important for economic performance." Their claim is still true today, but this paper moves us closer to understanding the complex relationship between startups and economic growth. While the case studies and instrumental variable regressions in this paper demonstrate that finding exogenous variation in entrepreneurship is challenging, these analyses and future research are essential to understanding entrepreneurship's role in economic growth and ways to foster startups in our cities.

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Figure 1. Scatter Plot of MSA Average Personal Income Per Capita Growth Rate and Startup Rate (1990-2014)

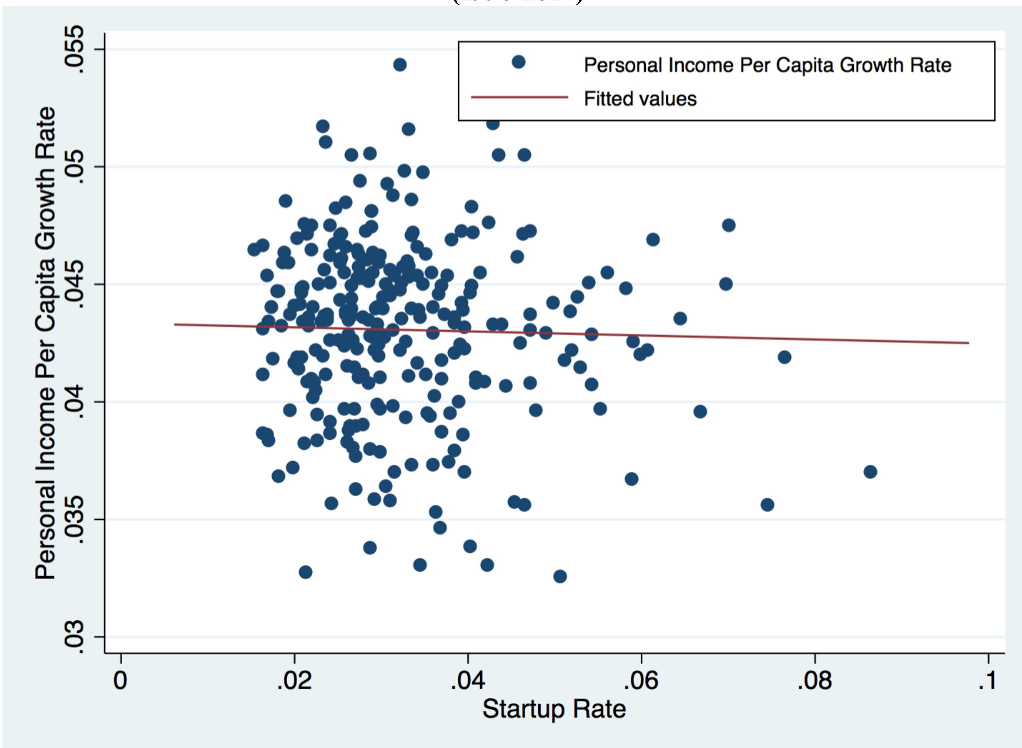

Figure 2. Scatter Plot of MSA Average Population Growth Rate and Startup Rate (1990-2014)

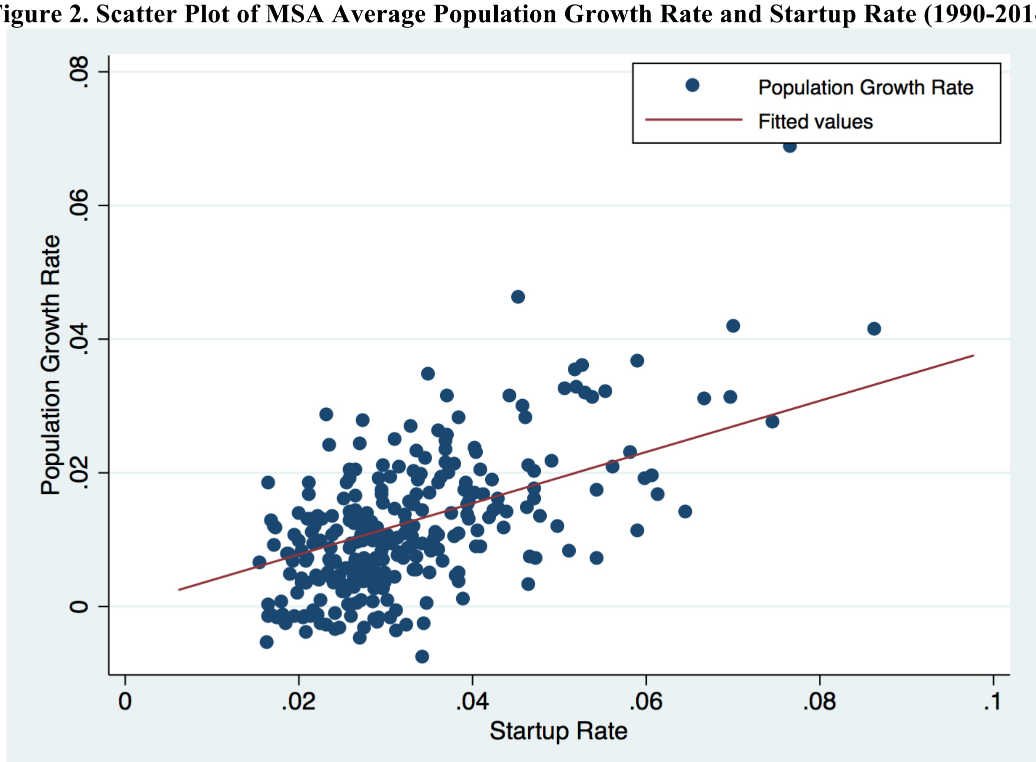

Figure 3. Scatter Plot of MSA Average Employment Growth Rate and Startup Rate (1990-2014)

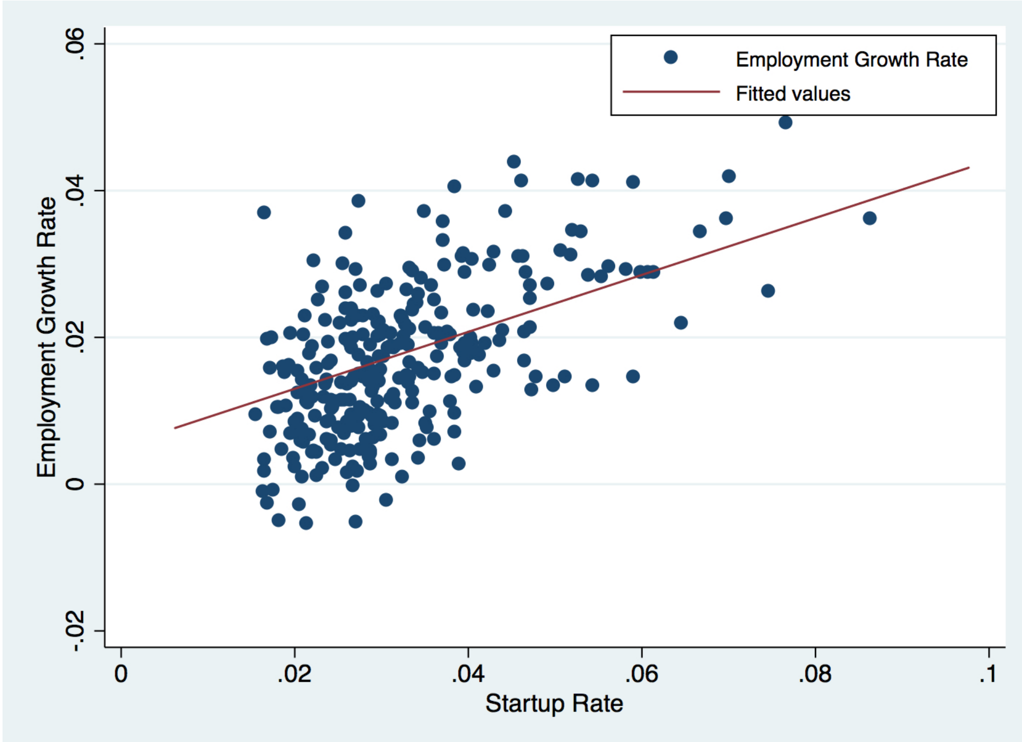

Figure 4. Scatter Plot of MSA Average Unemployment Rate and Startup Rate (1990-2014)

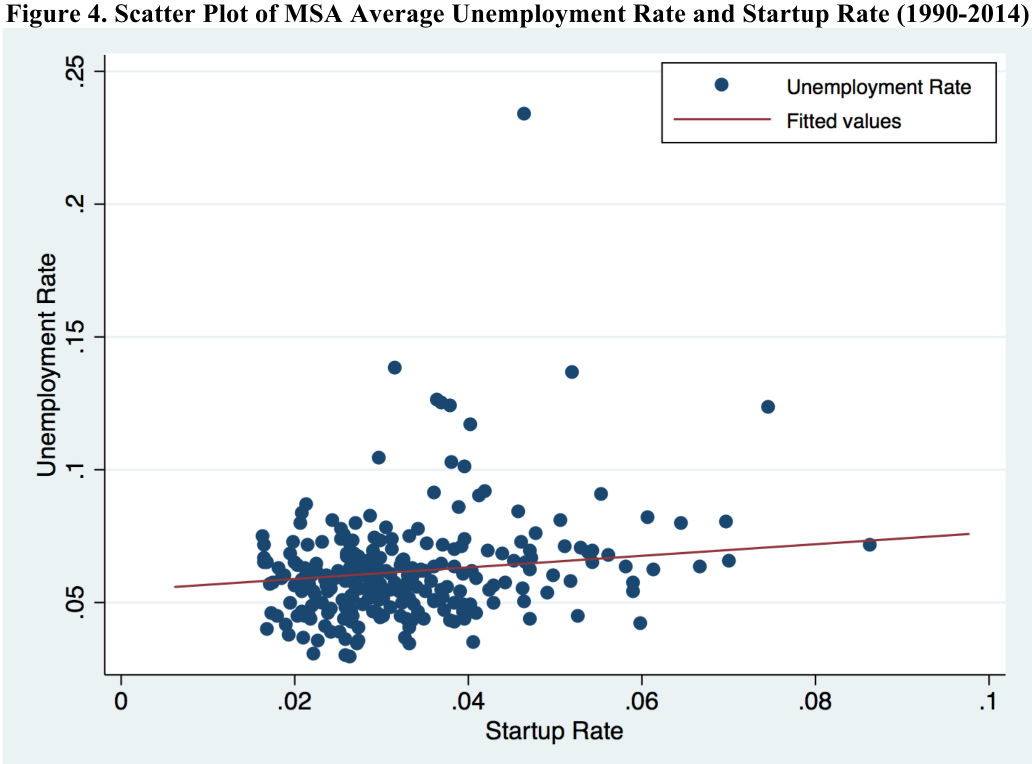

Figure 5. Graph of State Average Startup Rate Over Time
Case Study 1: 1999 Colorado Tax Cut

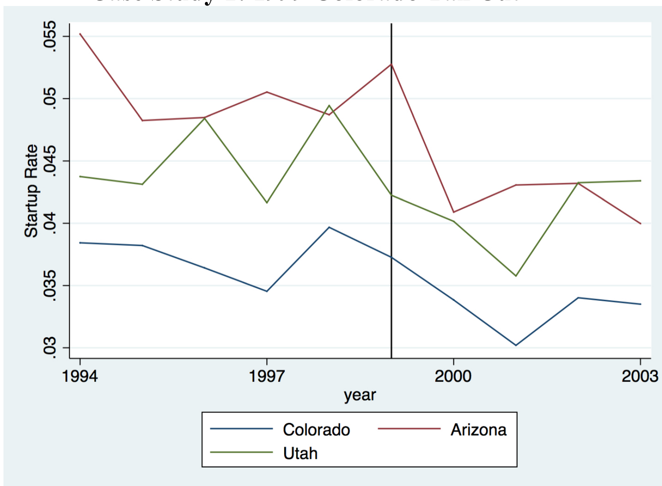

Figure 6. Graph of State Average Startup Rate Over Time
Case Study 2: 2010 New Jersey Tax Cut

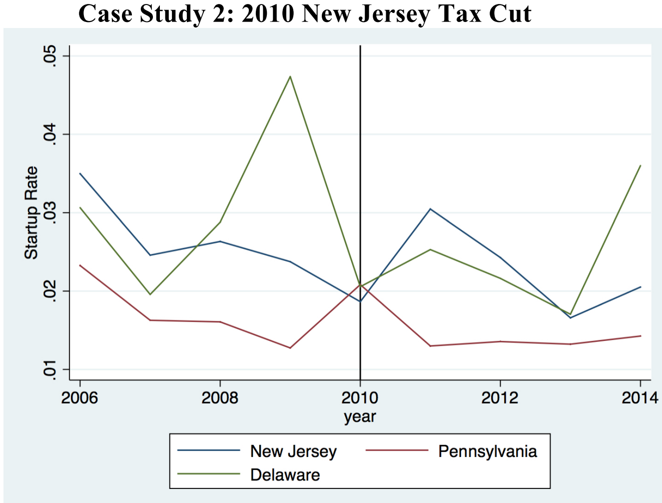

Figure 7. Graph of State Average Startup Rate Over Time
Case Study 3: 1997 North Carolina Tax Cut

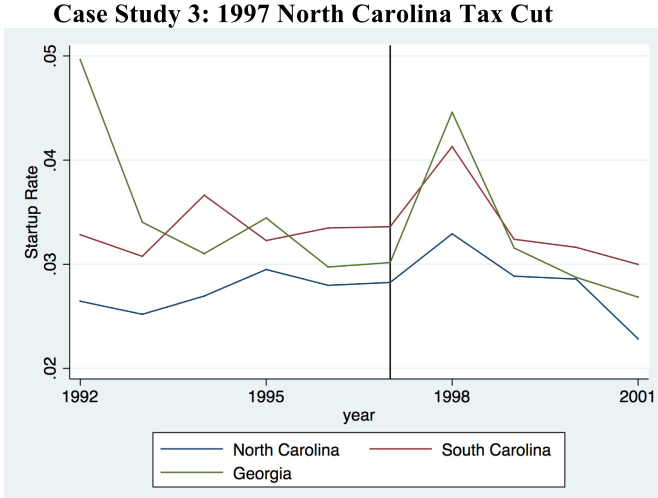

Figure 8. Graph of State Average Startup Rate Over Time
Case Study 4: 2005 Kansas Angel Investor Tax Credit

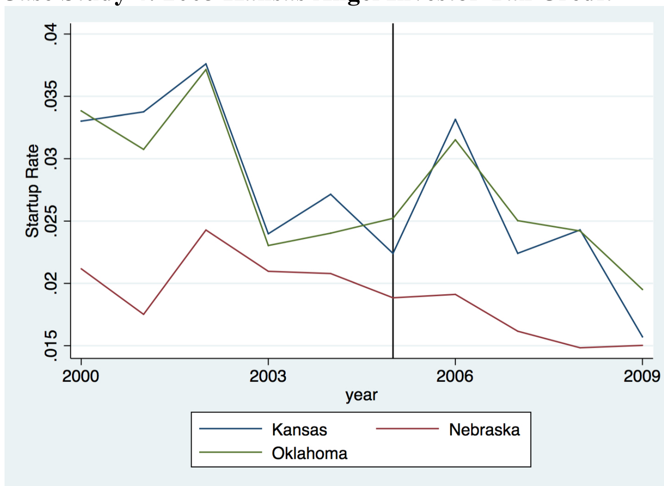

Figure 9. Graph of State Average Startup Rate Over Time
Case Study 5: 2005 Wisconsin Angel Investor Tax Credit

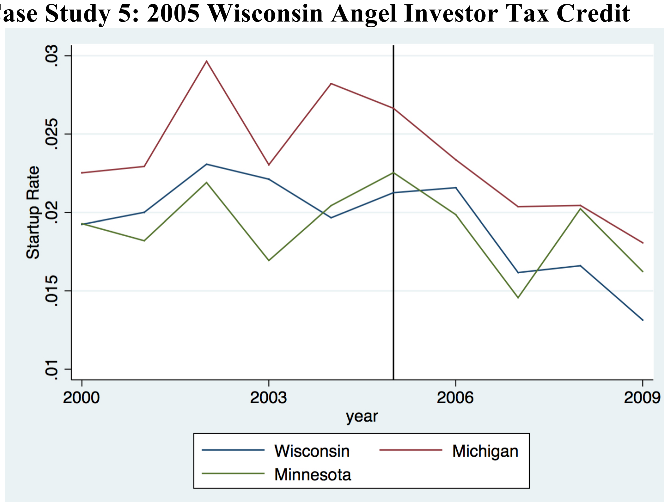

Figure 10. Graph of State Average Startup Rate Over Time
Case Study 4: 1998 Kentucky Investor Tax Credit

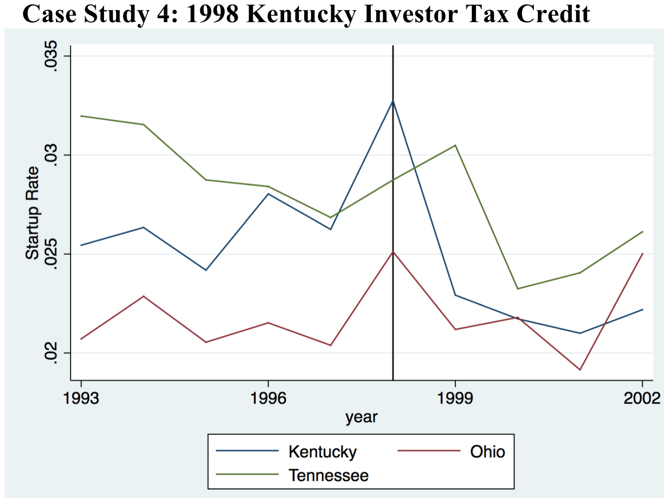

Figure 11. Graph of State Average Startup Rate Over Time
Case Study 7: 2008 Vermont Digital Firm Formation Law Enacted

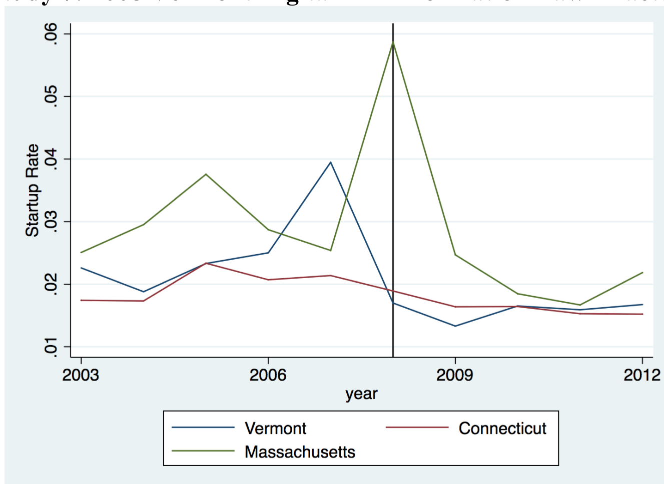

Table 1: Descriptive Statistics for MSAs (1980-2014)

	mean	standard deviation
Employment at Startups	6,787	7,432
Startup Rate	0.030	0.013
Employment	241,186	591,562
Unemployment	19,095	47,187
Population	611,129	1,426,120
Personal Income Per Capita	23.680	9.430
Herfindahl Index	0.557	0.085
Natural Resources and Mining Employment Share	0.022	0.044
Manufacturing Share	0.130	0.083
Local Government Share	0.010	0.042
Trade and Transportation Share	0.195	0.029
Financial Share	0.047	0.019
Education and Health Share	0.126	0.044
Share of Adults with Bachelor's Degree or Higher (2000-2014)	0.864	0.056

Table 2.A. Dependent Variable: Personal Income Per Capita Growth Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	0.397***	0.412***	0.293**
	(0.031)	(0.047)	(0.126)
Manufacturing Employment Share		0.021***	0.006
		(0.005)	(0.014)
Local Government Employment Share		0.007	-0.017
		(0.010)	(0.017)
Trade and Transportation Employment Share		0.047***	0.011
		(0.013)	(0.027)
Financial Services Employment Share		0.032	-0.061
		(0.022)	(0.043)
Education and Health Employment Share		-0.012	0.024
		(0.014)	(0.018)
Percent of Individuals 25+ with Bachelor's Degree			-0.000*
			(0.000)
Constant	0.031***	0.012***	0.038**
	(0.001)	(0.004)	(0.015)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	0.713***	0.401***	0.780***
	(0.053)	(0.066)	(0.215)
Manufacturing Employment Share		0.111***	0.330***
		(0.017)	(0.097)
Local Government Employment Share		-0.039**	-0.192**
		(0.019)	(0.077)
Trade and Transportation Employment Share		0.010	0.953***
		(0.046)	(0.257)
Financial Services Employment Share		-0.005	-0.042
		(0.066)	(0.223)
Education and Health Employment Share		-0.129***	-0.136*
		(0.030)	(0.074)
Percent of Individuals 25+ with Bachelor's Degree			-0.001
			(0.001)
Constant	0.021***	0.029**	-0.099
	(0.002)	(0.013)	(0.124)
Panel C: MSA and Time Fixed Effects	(1)	(2)	(3)
Startup Rate	-0.024	0.047	0.108
	(0.036)	(0.043)	(0.122)
Manufacturing Employment Share		0.037**	-0.005
		(0.016)	(0.041)
Local Government Employment Share		0.003	0.038
		(0.014)	(0.034)
Trade and Transportation Employment Share		-0.100**	-0.235
		(0.040)	(0.173)
Financial Services Employment Share		-0.025	-0.008
		(0.037)	(0.066)
Education and Health Employment Share		-0.031*	0.023
		(0.016)	(0.028)
Percent of Individuals 25+ with Bachelor's Degree			-0.001
			(0.001)
Constant	0.056***	0.063***	0.141*
	(0.002)	(0.010)	(0.074)
Number of Observations	8478	5121	1358

Notes: Unit of analysis is the MSA. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. "Startup Rate" is the share of MSA employment from firms formed during the year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors are in parentheses.

Table 2.B. Dependent Variable: 3-Year Averages of Personal Income Per Capita Growth Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	0.490***	0.787***	1.150***
	(0.042)	(0.070)	(0.140)
Manufacturing Employment Share		0.056***	0.042***
		(0.006)	(0.012)
Local Government Employment Share		-0.004	-0.026
		(0.011)	(0.017)
Trade and Transportation Employment Share		0.065***	0.026
		(0.016)	(0.025)
Financial Services Employment Share		0.109***	0.058
		(0.026)	(0.035)
Education and Health Employment Share		-0.008	0.002
		(0.020)	(0.020)
Percent of Individuals 25+ with Bachelor's Degree			-0.000
			(0.000)
Constant	0.026***	-0.009**	0.004
	(0.001)	(0.005)	(0.014)

Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	1.193***	0.961***	2.147***
	(0.077)	(0.124)	(0.316)
Manufacturing Employment Share		0.122***	0.102
		(0.021)	(0.080)
Local Government Employment Share		-0.013	-0.053
		(0.024)	(0.072)
Trade and Transportation Employment Share		0.021	0.372*
		(0.053)	(0.194)
Financial Services Employment Share		0.212***	0.480***
		(0.056)	(0.131)
Education and Health Employment Share		-0.224***	-0.417***
		(0.045)	(0.148)
Percent of Individuals 25+ with Bachelor's Degree			-0.003**
			(0.001)
Constant	0.004*	0.007	0.221
	(0.002)	(0.016)	(0.140)
Number of Observations	2264	1590	544

Notes: Unit of analysis is MSA 3-year averages. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. "Startup Rate" is share of MSA employment from firms formed during the year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors are in parentheses.

Table 3.A. Dependent Variable: Population Growth Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	0.475***	0.431***	0.314***
	(0.042)	(0.047)	(0.055)
Manufacturing Employment Share		-0.010**	-0.017***
		(0.005)	(0.005)
Local Government Employment Share		-0.005	-0.005
		(0.009)	(0.008)
Trade and Transportation Employment Share		-0.019	-0.013
		(0.017)	(0.015)
Financial Services Employment Share		0.010	0.032*
		(0.019)	(0.018)
Education and Health Employment Share		-0.054***	-0.051***
		(0.014)	(0.012)
Percent of Individuals 25+ with Bachelor's Degree			-0.000*
			(0.000)
Constant	-0.003***	0.011***	0.026***
	(0.001)	(0.004)	(0.008)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	0.163***	0.166***	0.166***
	(0.026)	(0.028)	(0.047)
Manufacturing Employment Share		0.010	0.032***
		(0.006)	(0.012)
Local Government Employment Share		-0.026***	-0.025
		(0.009)	(0.019)
Trade and Transportation Employment Share		-0.029	-0.086*
		(0.022)	(0.049)
Financial Services Employment Share		0.006	0.085***
		(0.018)	(0.019)
Education and Health Employment Share		-0.054***	-0.041***
		(0.012)	(0.014)
Percent of Individuals 25+ with Bachelor's Degree			-0.000
			(0.000)
Constant	0.006***	0.020***	0.031
	(0.001)	(0.005)	(0.031)
Panel C: MSA and Time Fixed Effects	(1)	(2)	(3)
Startup Rate	0.239***	0.137***	0.102**
	(0.030)	(0.028)	(0.046)
Manufacturing Employment Share		-0.019*	-0.003
		(0.010)	(0.011)
Local Government Employment Share		-0.034***	-0.026
		(0.009)	(0.019)
Trade and Transportation Employment Share		-0.072***	-0.163***
		(0.025)	(0.051)
Financial Services Employment Share		-0.009	0.053***
		(0.017)	(0.019)
Education and Health Employment Share		-0.037***	-0.013
		(0.010)	(0.010)
Percent of Individuals 25+ with Bachelor's Degree			0.000
			(0.000)
Constant	0.002	0.035***	0.015
	(0.001)	(0.007)	(0.030)
Number of Observations	8478	5121	1358

Notes: Unit of analysis is MSA. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is share of MSA employment from firms formed during year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors are in parentheses.

Table 3.B. Dependent Variable: 3-Year Averages of Population Growth Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	0.599***	0.614***	0.502***
	(0.053)	(0.054)	(0.067)
Manufacturing Employment Share		-0.007	-0.012**
		(0.005)	(0.005)
Local Government Employment Share		-0.014	-0.012
		(0.011)	(0.008)
Trade and Transportation Employment Share		-0.040**	-0.010
		(0.017)	(0.015)
Financial Services Employment Share		0.007	0.036*
		(0.020)	(0.020)
Education and Health Employment Share		-0.037***	-0.042***
		(0.013)	(0.013)
Percent of Individuals 25+ with Bachelor's Degree			-0.000**
			(0.000)
Constant	-0.006***	0.009**	0.022***
	(0.001)	(0.004)	(0.008)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	0.221***	0.350***	0.400***
	(0.041)	(0.052)	(0.075)
Manufacturing Employment Share		-0.014	-0.026
		(0.009)	(0.024)
Local Government Employment Share		-0.039***	-0.065**
		(0.013)	(0.030)
Trade and Transportation Employment Share		-0.090***	-0.296***
		(0.025)	(0.051)
Financial Services Employment Share		-0.000	0.127***
		(0.028)	(0.048)
Education and Health Employment Share		-0.058***	-0.071**
		(0.016)	(0.029)
Percent of Individuals 25+ with Bachelor's Degree			0.001
			(0.000)
Constant	0.005***	0.032***	0.013
	(0.001)	(0.007)	(0.045)
Number of Observations	2264	1590	544

Notes: Unit of analysis is MSA 3-year averages. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is share of MSA employment from firms formed during the year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors.

Table 4.A. Dependent Variable: Employment Growth Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	1.000***	1.111***	0.359***
	(0.043)	(0.057)	(0.125)
Manufacturing Employment Share		0.007	-0.031***
		(0.006)	(0.011)
Local Government Employment Share		-0.017	-0.047***
		(0.012)	(0.014)
Trade and Transportation Employment Share		0.036*	0.023
		(0.019)	(0.026)
Financial Services Employment Share		0.012	-0.008
		(0.025)	(0.029)
Education and Health Employment Share		-0.029*	-0.014
		(0.017)	(0.018)
Percent of Individuals 25+ with Bachelor's Degree			0.000
			(0.000)
Constant	-0.013***	-0.021***	-0.013
	(0.001)	(0.004)	(0.016)

Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	1.036***	0.961***	0.552***
	(0.066)	(0.085)	(0.194)
Manufacturing Employment Share		0.104***	0.207***
		(0.020)	(0.058)
Local Government Employment Share		-0.098***	-0.193***
		(0.024)	(0.044)
Trade and Transportation Employment Share		0.025	0.215
		(0.051)	(0.160)
Financial Services Employment Share		-0.147**	-0.172
		(0.070)	(0.117)
Education and Health Employment Share		-0.037	0.072
		(0.036)	(0.055)
Percent of Individuals 25+ with Bachelor's Degree			0.004***
			(0.001)
Constant	-0.014***	-0.011	-0.432***
	(0.002)	(0.015)	(0.070)

Panel C: MSA and Time Fixed Effects	(1)	(2)	(3)
Startup Rate	0.717***	0.826***	0.648***
	(0.079)	(0.091)	(0.195)
Manufacturing Employment Share		0.010	0.069*
		(0.022)	(0.041)
Local Government Employment Share		-0.049***	-0.053**
		(0.019)	(0.025)
Trade and Transportation Employment Share		-0.105**	0.091
		(0.053)	(0.086)
Financial Services Employment Share		-0.047	0.006
		(0.044)	(0.052)
Education and Health Employment Share		-0.020	0.059
		(0.029)	(0.037)
Percent of Individuals 25+ with Bachelor's Degree			-0.001
			(0.001)
Constant	-0.023***	0.033**	0.032
	(0.004)	(0.015)	(0.054)
Number of Observations	9326	5932	2165

Notes: Unit of analysis is MSA. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is share of MSA employment from firms formed during year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors are in parentheses.

Table 4.B. Dependent Variable: 3-Year Averages of Employment Growth Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	1.227***	1.249***	0.877***
	(0.048)	(0.070)	(0.140)
Manufacturing Employment Share		0.021***	-0.003
		(0.006)	(0.010)
Local Government Employment Share		-0.031**	-0.041***
		(0.012)	(0.013)
Trade and Transportation Employment Share		0.035*	0.020
		(0.018)	(0.023)
Financial Services Employment Share		0.025	0.015
		(0.027)	(0.029)
Education and Health Employment Share		-0.019	-0.019
		(0.020)	(0.017)
Percent of Individuals 25+ with Bachelor's Degree			0.000
			(0.000)
Constant	-0.018***	-0.027***	-0.017
	(0.001)	(0.004)	(0.014)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	1.551***	1.107***	1.406***
	(0.079)	(0.128)	(0.342)
Manufacturing Employment Share		0.097***	0.361***
		(0.022)	(0.063)
Local Government Employment Share		-0.118***	-0.259***
		(0.034)	(0.076)
Trade and Transportation Employment Share		0.006	0.136
		(0.052)	(0.164)
Financial Services Employment Share		-0.192***	-0.043
		(0.073)	(0.153)
Education and Health Employment Share		-0.058	-0.132
		(0.043)	(0.097)
Percent of Individuals 25+ with Bachelor's Degree			0.008***
			(0.001)
Constant	-0.028***	-0.004	-0.776***
	(0.002)	(0.016)	(0.100)
Number of Observations	2547	1867	821

Notes: Unit of analysis is MSA 3-year averages. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is share of MSA employment from firms formed during the year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors.

Table 5.A. Dependent Variable: Unemployment Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	-0.098	-0.324***	-0.614***
	(0.083)	(0.077)	(0.145)
Manufacturing Employment Share		-0.058***	-0.028
		(0.016)	(0.019)
Local Government Employment Share		0.199***	0.103***
		(0.039)	(0.026)
Trade and Transportation Employment Share		-0.017	-0.0977
		(0.040)	(0.048)
Financial Services Employment Share		-0.319***	-0.133***
		(0.068)	(0.050)
Education and Health Employment Share		-0.006	0.025
		(0.041)	(0.032)
Percent of Individuals 25+ with Bachelor's Degree			-0.001***
			(0.000)
Constant	0.064***	0.078***	0.220***
	(0.002)	(0.012)	(0.042)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	-0.604***	-0.361***	-0.675***
	(0.064)	(0.062)	(0.112)
Manufacturing Employment Share		-0.102***	-0.378***
		(0.022)	(0.056)
Local Government Employment Share		0.060**	0.098***
		(0.021)	(0.029)
Trade and Transportation Employment Share		0.165***	-0.136
		(0.056)	(0.129)
Financial Services Employment Share		-0.150***	-0.165***
		(0.052)	(0.052)
Education and Health Employment Share		0.147***	-0.261***
		(0.048)	(0.061)
Percent of Individuals 25+ with Bachelor's Degree			0.001***
			(0.000)
Constant	0.077***	0.036***	0.004
	(0.002)	(0.012)	(0.043)
Panel C: MSA and Time Fixed Effects	(1)	(2)	(3)
Startup Rate	0.008	-0.037	-0.134**
	(0.034)	(0.032)	(0.055)
Manufacturing Employment Share		-0.080***	-0.026
		(0.024)	(0.023)
Local Government Employment Share		0.014	0.030***
		(0.015)	(0.010)
Trade and Transportation Employment Share		0.164***	0.146*
		(0.052)	(0.077)
Financial Services Employment Share		-0.018	-0.045*
		(0.034)	(0.027)
Education and Health Employment Share		-0.005	0.051***
		(0.047)	(0.014)
Percent of Individuals 25+ with Bachelor's Degree			-0.000
			(0.000)
Constant	0.056***	0.038***	0.018
	(0.001)	(0.012)	(0.023)
Number of Observations	6464	5440	2007

Notes: Unit of analysis is the MSA. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is the share of MSA employment from firms formed during the year. Panels A, B, and C use empirical specifications from Equations (1), (2), and (3), respectively. MSA-clustered standard errors are in parentheses

Table 5.B. Dependent Variable: 3-Year Averages of Unemployment Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Startup Rate	-0.146	-0.497***	-1.191**
	(0.114)	(0.116)	(0.215)
Manufacturing Employment Share		-0.071***	-0.060***
		(0.018)	(0.020)
Local Government Employment Share		0.250**	0.132**
		(0.045)	(0.029)
Trade and Transportation Employment Share		-0.013	-0.078
		(0.042)	(0.029)
Financial Services Employment Share		0.277***	-0.152***
		(0.079)	(0.054)
Education and Health Employment Share		-0.020	0.009
		(0.046)	(0.037)
Percent of Individuals 25+ with Bachelor's Degree			-0.001***
			(0.000)
Constant	0.066***	0.085***	0.238***
	(0.003)	(0.014)	(0.041)

Panel B: MSA Fixed Effects	(1)	(2)	(3)
Startup Rate	-1.090***	-0.712**	-1.674***
	(0.087)	(0.143)	(0.225)
Manufacturing Employment Share		-0.094***	-0.398***
		(0.032)	(0.052)
Local Government Employment Share		0.116***	0.184***
		(0.035)	(0.041)
Trade and Transportation Employment Share		0.207***	0.004
		(0.064)	(0.115)
Financial Services Employment Share		-0.213***	-0.149*
		(0.074)	(0.089)
Education and Health Employment Share		0.131*	0.264***
		(0.079)	(0.083)
Percent of Individuals 25+ with Bachelor's Degree			-0.002**
			(0.001)
Constant	0.092***	0.037**	0.232***
	(0.002)	(0.018)	(0.065)
Number of Observations	2072	1707	755

Notes: Unit of analysis is MSA 3-year averages. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is share of MSA employment from firms formed during the year. Panels A and B use empirical specifications from Equations (1) and (2), respectively. MSA-clustered standard errors.

Table 6. Regression of MSA Startup Rate on Herfindahl Index using 3-Year Data Averages
Dependent Variable: Startup Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Herfindahl Index	-0.019***	0.006	0.012***
	(0.005)	(0.005)	(0.004)
Manufacturing Employment Share		-0.031***	-0.037***
		(0.004)	(0.004)
Local Government Employment Share		0.047***	0.022***
		(0.008)	(0.005)
Trade and Transportation Employment Share		0.020	-0.022***
		(0.013)	(0.010)
Financial Services Employment Share		-0.012	-0.011
		(0.021)	(0.018)
Education and Health Employment Share		-0.093***	-0.051***
		(0.012)	(0.007)
Percent of Individuals 25+ with Bachelor's Degree			-0.000***
			(0.000)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Herfindahl Index	-0.083***	-0.027***	-0.023***
	(0.012)	(0.007)	(0.006)
Manufacturing Employment Share		0.028***	0.050***
		(0.009)	(0.012)
Local Government Employment Share		-0.015	-0.007
		(0.011)	(0.012)
Trade and Transportation Employment Share		0.087***	0.091***
		(0.022)	(0.029)
Financial Services Employment Share		0.046*	0.061***
		(0.024)	(0.023)
Education and Health Employment Share		-0.115***	-0.092***
		(0.017)	(0.018)
Percent of Individuals 25+ with Bachelor's Degree			-0.001***
			(0.000)
Number of Observations	2203	1867	821

Notes: Unit of analysis is MSA. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is the share of MSA employment from firms formed during the year. Panels A and B use empirical specifications from Equations (4) and (5), respectively. MSA-clustered standard errors are in parentheses.

Table 7. Regression of MSA Startup Rate on Natural Resources and Mining Employment Share using 3-Year Data Averages
Dependent Variable: Startup Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Natural Resources and Mining Employment Share	0.060***	0.022**	-0.005
	(0.012)	(0.011)	(0.008)
Manufacturing Employment Share		-0.027***	-0.037***
		(0.004)	(0.004)
Local Government Employment Share		0.040***	0.022***
		(0.008)	(0.006)
Trade and Transportation Employment Share		0.032**	-0.010
		(0.012)	(0.010)
Financial Services Employment Share		0.005	0.008
		(0.022)	(0.017)
Education and Health Employment Share		-0.082***	-0.042***
		(0.011)	(0.006)
Percent of Individuals 25+ with Bachelor's Degree			-0.000***
			(0.000)
Panel B: MSA Fixed Effects	(1)	(2)	(3)
Natural Resources and Mining Employment Share	0.201***	0.083***	-0.080*
	(0.022)	(0.036)	(0.046)
Manufacturing Employment Share		0.031***	0.046***
		(0.009)	(0.012)
Local Government Employment Share		-0.011	-0.012
		(0.011)	(0.013)
Trade and Transportation Employment Share		0.098***	0.082***
		(0.022)	(0.029)
Financial Services Employment Share		0.047**	0.057***
		(0.023)	(0.023)
Education and Health Employment Share		-0.121***	-0.103***
		(0.016)	(0.019)
Percent of Individuals 25+ with Bachelor's Degree			-0.001***
			(0.000)
Number of Observations	2095	1835	821

Notes: Unit of analysis is MSA. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is the share of MSA employment from firms formed during the year. Panels A and B use empirical specifications from Equations (4) and (5), respectively. MSA-clustered standard errors are in parentheses.

Table 8.A. IV Regression Using Herfindahl Index as Instrument for Startup Rate

Panel A. Dependent Variable: Personal Income Per Capita Growth Rate	**(1) No Fixed Effects**	**(2) MSA Fixed Effects**	**(3) MSA and Time Fixed Effects**
Predicted Startup Rate	-0.262	-0.174	0.363*
	(0.336)	(0.193)	(0.186)
Number of Observations	1358	1358	1358
F	43.134	4.727	5.531

Panel B. Dependent Variable: Population Growth Rate	(1)	(2)	(3)
Predicted Startup Rate	0.904***	0.638***	0.645
	(0.076)	(0.041)	(0.040)
Number of Observations	1358	1358	1358
F	43.134	4.727	5.531

Panel C. Dependent Variable: Employment Growth Rate	(1)	(2)	(3)
Predicted Startup Rate	0.613***	0.219	0.218
	(0.236)	(0.141)	(0.135)
Number of Observations	2165	2165	2165
F	71.159	7.446	8.681

Panel D. Dependent Variable: Unemployment Rate	(1)	(2)	(3)
Predicted Startup Rate	1.050***	-0.057	-0.458***
	(0.202)	(0.115)	(0.111)
Number of Observations	2007	2007	2007
F	72.214	8.225	9.471

Notes: Unit of analysis is MSA. "Predicted Startup Rate" is the predicted share of MSA employment from firms formed during the year. Second stage analyses in Panels A-D use empirical specifications from Equation (9). Columns (1), (2), (3) use empirical specifications from Equations (6), (7), and (8), respectively. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. MSA-clustered standard errors are in parentheses.

Table 8.B. IV Regression Using Herfindahl Index as Instrument for Startup Rate 3-Year Averages

Panel A. Dependent Variable: 3-Year Average Personal Income Per Capita Growth Rate	**(1)** **No Fixed Effects**	**(2)** **MSA Fixed Effects**
Predicted Startup Rate	0.252	0.797***
	(0.240)	(0.129)
Number of Observations	544	544
F	26.798	4.719

Panel B. Dependent Variable: 3-Year Average Population Growth Rate	(1)	(2)
Predicted Startup Rate	0.940***	0.667***
	(0.092)	(0.049)
Number of Observations	544	544
F	26.798	4.719

Panel C. Dependent Variable: 3-Year Average Employment Growth Rate	(1)	(2)
Predicted Startup Rate	0.813***	0.700***
	(0.225)	(0.127)
Number of Observations	821	821
F	39.451	7.373

Panel D. Dependent Variable: 3-Year Average Unemployment Rate	(1)	(2)
Predicted Startup Rate	1.105***	-0.441***
	(0.289)	(0.151)
Number of Observations	755	755
F	37.956	7.646

Notes: Unit of analysis is MSA 3-Year Averages. "Predicted Startup Rate" is the predicted share of MSA employment from firms formed during the year. Second stage analyses in Panels A-D use empirical specifications from Equation (9). Columns (1) and (2) use empirical specifications from Equations (6) and (7), respectively. * p<0.10, ** p<0.05, *** p<0.01. MSA-clustered standard errors are in parentheses.

Table 9.A. IV Regression Using Natural Resources and Mining Employment Share as Instrument for Startup Rate

Panel A. Dependent Variable: Personal Income Per Capita Growth Rate	**(1) No Fixed Effects**	**(2) MSA Fixed Effects**	**(3) MSA and Time Fixed Effects**
Predicted Startup Rate	0.053	-0.213	0.334*
	(0.353)	(0.193)	(0.185)
Number of Observations	1358	1358	1358
F	37.986	4.735	5.550

Panel B. Dependent Variable: Population Growth Rate	(1)	(2)	(3)
Predicted Startup Rate	0.984***	0.636***	0.645***
	(0.083)	(0.041)	(0.040)
Number of Observations	1358	1358	1358
F	37.986	4.735	5.550

Panel C. Dependent Variable: Employment Growth Rate	(1)	(2)	(3)
Predicted Startup Rate	0.568**	0.260*	0.215
	(0.244)	(0.141)	(0.135)
Number of Observations	2165	2165	2165
F	65.666	7.388	8.679

Panel D. Dependent Variable: Unemployment Rate	(1)	(2)	(3)
Predicted Startup Rate	0.877***	-0.040	-0.213
	(0.205)	(0.115)	(0.193)
Number of Observations	2007	2007	1358
F	67.243	8.150	4.735

Notes: Unit of analysis is MSA. "Predicted Startup Rate" is the predicted share of MSA employment from firms formed during the year. Second stage analyses in Panels A-D use empirical specifications from Equation (9). Columns (1), (2), (3) use empirical specifications from Equations (6), (7), and (8), respectively. * p<0.10, ** p<0.05, *** p<0.01. MSA-clustered standard errors are in parentheses.

Table 9.B. IV Regression Using Natural Resources and Mining Employment Share as Instrument for Startup Rate 3-Year Averages

Panel A. Dependent Variable: 3-Year Average Personal Income Per Capita Growth Rate	**(1) No Fixed Effects**	**(2) MSA Fixed Effects**
Predicted Startup Rate	0.573***	0.805***
	(0.244)	(0.129)
Number of Observations	544	544
F	23.833	4.720

Panel B. Dependent Variable: 3-Year Average Population Growth Rate	(1)	(2)
Predicted Startup Rate	1.000***	0.663***
	(0.098)	(0.049)
Number of Observations	544	544
F	23.833	4.720

Panel C. Dependent Variable: 3-Year Average Employment Growth Rate	(1)	(2)
Predicted Startup Rate	0.716***	0.700***
	(0.127)	(0.127)
Number of Observations	821	821
F	7.180	7.373

Panel D. Dependent Variable: 3-Year Average Unemployment Rate	(1)	(2)
Predicted Startup Rate	0.824***	-0.416***
	(0.290)	(0.152)
Number of Observations	755	755
F	35.844	7.326

Notes: Unit of analysis is MSA 3-Year Averages. "Predicted Startup Rate" is the predicted share of MSA employment from firms formed during the year. Second stage analyses in Panels A-D use empirical specifications from Equation (9). Columns (1) and (2) use empirical specifications from Equations (6) and (7), respectively. * p<0.10, ** p<0.05, *** p<0.01. MSA-clustered standard errors are in parentheses.

Table 10. Case Study 1: Colorado 1999 Tax Cut
Comparison States: Arizona and Utah

First Stage: Difference-in-Difference Analysis	(1)
Year	-0.006***
	(0.002)
Treated	-0.011**
	(0.004)
DID	0.002
	(0.002)
Constant	0.049***
	(0.004)
Number of Observations	130

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate	(4) Unemployment Rate
Predicted Startup Rate	0.375	0.870*	1.962***	0.578
	(0.306)	(0.463)	(0.411)	(0.595)
Constant	0.028***	-0.009	-0.043***	0.022
	(0.012)	(0.019)	(0.017)	(0.022)
Number of Observations	130	130	130	130
R^2	0.006	0.117	0.097	0.046

Notes: The first and second stage analyses uses empirical specifications from Equations (11) and (12), respectively. First stage coefficient on DID is the difference-in-difference estimator. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is the share of MSA employment from firms formed during the year. The labels below Columns (1), (2), (3), (4) indicate the different economic growth outcome being measured. MSA-clustered standard errors are in parentheses.

Table 11. Case Study 2: New Jersey 2010 Tax Cut
Comparison States: Pennsylvania and Delaware

First Stage: Difference-in-Difference Analysis	(1)
Year	0.003***
	(0.001)
Treated	0.009
	(0.005)
DID	-0.003
	(0.003)
Constant	0.019***
	(0.002)
Number of Observations	90

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate	(4) Unemployment Rate
Predicted Startup Rate	-0.678	-0.654	-2.161***	1.587
	(0.618)	(0.394)	(0.391)	(0.933)
Constant	0.043***	0.018*	0.039***	0.042**
	(0.012)	(0.009)	(0.007)	(0.015)
Number of Observations	60	60	90	90
R^2	0.006	0.072	0.074	0.036

Notes: See Table 10.

Table 12. Case Study 3: North Carolina 1997 Tax Cut
Comparison States: South Carolina and Georgia

First Stage: Difference-in-Difference Analysis	(1)
Year	-0.002
	(0.003)
Treated	-0.007*
	(0.004)
DID	0.003
	(0.003)
Constant	0.035***
	(0.003)
Number of Observations	240

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate	(4) Unemployment Rate
Predicted Startup Rate	0.021	0.153	0.041	1.778***
	(0.322)	(0.635)	(0.795)	(0.704)
Constant	0.045***	0.012	0.028	-0.010
	(0.011)	(0.020)	(0.025)	(0.021)
Number of Observations	240	240	240	230
R^2	0.000	0.001	0.000	0.118

Notes: See Table 10.

Table 13. Case Study 4: Kansas 2005 Angel Investor Tax Credit
Comparison States: Nebraska and Oklahoma

First Stage: Difference-in-Difference Analysis	(1)
Year	-0.004**
	(0.001)
Treated	0.004
	(0.004)
DID	-0.003
	(0.005)
Constant	0.027***
	(0.003)
Number of Observations	50

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate	(4) Unemployment Rate
Predicted Startup Rate	0.990	-0.785	0.339	-0.646***
	(0.907)	(0.526)	(1.086)	(0.223)
Constant	0.019	0.030	0.004	0.054***
	(0.027)	(0.014)	(0.027)	(0.008)
Number of Observations	50	50	50	50
R^2	0.007	0.051	0.001	0.089

Notes: See Table 10.

Table 14. Case Study 5: Kentucky 1998 Investment Fund Act
Comparison States: Ohio and Tennessee

First Stage: Difference-in-Difference Analysis	(1)
Year	-0.001
	(0.001)
Treated	0.001
	(0.002)
DID	-0.001
	(0.001)
Constant	0.025***
	(0.001)
Number of Observations	170

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate	(4) Unemployment Rate
Predicted Startup Rate	0.857	4.163***	16.995***	6.878***
	(2.858)	(1.053)	(3.960)	(2.299)
Constant	0.018	-0.094***	-0.406***	-0.121***
	(0.071)	(0.026)	(0.098)	(0.056)
Number of Observations	170	170	170	170
R^2	0.001	0.071	0.105	0.092

Notes: See Table 10.

Table 15. Case Study 6: Wisconsin 2005 Angel Investor Tax Credit
Comparison States: Michigan and Minnesota

First Stage: Difference-in-Difference Analysis	(1)
Year	-0.003***
	(0.001)
Treated	-0.004**
	(0.002)
DID	0.000
	(0.001)
Constant	0.024***
	(0.001)
Number of Observations	240

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate	(4) Unemployment Rate
Predicted Startup Rate	0.627	-0.085	0.874	-0.102
	(0.406)	(0.299)	(0.734)	(0.709)
Constant	0.009	0.007	-0.025	0.058***
	(0.009)	(0.006)	(0.016)	(0.015)
Number of Observations	240	240	240	230
R^2	0.003	0.001	0.004	0.000

Notes: See Table 10.

Table 16. Case Study 7: Vermont 2008 Digital Firm Formation Law Enacted
Comparison States: Connecticut and Massachusetts

First Stage: Difference-in-Difference Analysis	(1)
Year	-0.003
	(0.002)
Treated	0.003
	(0.002)
DID	-0.007**
	(0.002)
Constant	0.023***
	(0.002)
Number of Observations	70

Second Stage: Regression of Measures of Economic Growth on Predicted Startup Rate Value

	(1) Income Per Capita Growth Rate	(2) Population Growth Rate	(3) Employment Growth Rate
Predicted Startup Rate	5.307	-0.121	1.021
	(2.777)	(0.180)	(0.938)
Constant	-0.083	0.004	-0.026
	(0.061)	(0.004)	(0.021)
Number of Observations	63	63	70
R^2	0.097	0.004	0.005

Notes: See Table 10. Unemployment data is not available for Vermont MSA so not included in table.

Table 17. Regression of MSA Startup Rate on Corporate Tax Rate for $100,000 Tax Bracket using 3-Year Data Averages
Dependent Variable: Startup Rate

Panel A: No Fixed Effects	(1)	(2)	(3)
Corporate Tax Rate ($100,000 Bracket)	-0.064***	-0.036***	-0.025***
	(0.011)	(0.010)	(0.009)
Manufacturing Employment Share		-0.033***	-0.037***
		(0.004)	(0.004)
Local Government Employment Share		0.021***	0.017***
		(0.006)	(0.006)
Trade and Transportation Employment Share		0.009	-0.001
		(0.010)	(0.010)
Financial Services Employment Share		-0.001	0.015
		(0.020)	(0.020)
Education and Health Employment Share		-0.052***	-0.039***
		(0.007)	(0.006)
Percent of Individuals 25+ with Bachelor's Degree			-0.000***
			(0.000)
Constant	0.028***	0.033***	0.045***
	(0.001)	(0.003)	(0.005)

Panel B: MSA Fixed Effects	(1)	(2)	(3)
Corporate Tax Rate ($100,000 Bracket)	-0.001	0.005	0.011
	(0.021)	(0.012)	(0.015)
Manufacturing Employment Share		0.039***	0.042***
		(0.012)	(0.015)
Local Government Employment Share		-0.005	-0.003
		(0.012)	(0.012)
Trade and Transportation Employment Share		0.060**	0.064**
		(0.027)	(0.029)
Financial Services Employment Share		0.088***	0.041
		(0.036)	(0.032)
Education and Health Employment Share		-0.132***	-0.137***
		(0.019)	(0.021)
Number of Observations	992	963	720

Notes: Unit of analysis is MSA. * p<0.10, ** p<0.05, *** p<0.01. "Startup Rate" is the share of MSA employment from firms formed during the year. Panels A and B use empirical specifications from Equations (4) and (5), respectively. MSA-clustered standard errors are in parentheses.