Targeted state economic development incentives and entrepreneurship

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Abstract

Purpose – The purpose of this paper is to examine the relationship between state economic development incentives programs and entrepreneurial activity.

Design/methodology/approach – The authors use panel data and a fixed-effects model to examine the determinants of five measures of entrepreneurial activity. To measure state economic development incentives programs, they use a new and substantially improved data set from Bartik (2017). They also include a measure for economic freedom, the Fraser Institute's Economic Freedom of North America index.

Findings – The authors find a robustly negative relationship between development incentives and patent activity. They find some evidence that incentives are negatively associated with small business establishments (< 10 employees) as a percentage of total establishments but positively associated with the large business establishment (> 500 employees) share. They also find evidence of a positive relationship between economic freedom and both patent activity and net business formation.

Research limitations/implications – The results imply that economic development incentive programs are unlikely to increase entrepreneurial activity and may decrease it. They also imply increased economic freedom (lower taxes, lower spending, and lower governmental restrictions on labor markets) may increase entrepreneurial activity.

Originality/value – To the authors' knowledge, this paper provides the first examination of the relationship between development incentives and entrepreneurial activity that utilizes Bartik (2017), a new vastly improved data set of state economic development incentive programs. The paper also contributes to the literature on the relationship between economic freedom and entrepreneurial activity.

Keywords Entrepreneurship, Economic freedom, Patents, Business formation, Sole proprietorship, Targeted development incentives

Paper type Research paper

1. Introduction

State and local governments have been trying to lure businesses away from other areas for decades, offering generous taxpayer subsidies of many varieties. The effectiveness of that strategy has frequently been questioned. While economic development policy is generally aimed at top–down attraction of major firms to a locality, oftentimes innovation and entrepreneurship happen at much lower levels of aggregation. This makes the relationship between entrepreneurship and development incentives very interesting to study. Most economic development incentives are aimed at attracting large, established firms; indeed, the states and localities offering these incentives have neither the time nor the resources to sift through small projects and figure out to which they should award funding. Consequently, it is large companies and large projects that often receive these types of incentives, since the grantors of the incentives can justify the expense by saying the project brought many jobs to the area or resulted in other tangible outcomes. Furthermore, because they have more financial and political capital, larger companies tend to be better able to win these subsidies.

Until very recently, there were very few data sources available for a researcher interested in studying the provision of economic development incentives in any comprehensive way. A great many studies exist that look at the economic impacts of specific types of incentives, or the impact of packages of incentives in a specific geographical location. Yet cross-state panel studies of the effects of state-provided development incentives were virtually

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impossible because of a lack of comparable data on incentives across states. Some, like Calcagno and Thompson (2004), used the National Association of State Development Officers (NASDA) annual report, which produced three volumes between 1983 and 1991; but even NASDA themselves admitted their data were messy and incomplete[1].

In 2017, however, Timothy Bartik released the Panel Database on Incentives and Taxes, which comprehensively measures state-provided development incentives for 45 industries across 32 states (and the District of Columbia) over 26 years (Bartik, 2017). This data set is superior because it captures the magnitude of the impact of both tax- and non-tax incentives on state businesses. Previous cross-state measures of development incentives included either simple counts of the number of programs or awards, or the total value of incentives offered by a state (both of which were often derived from the NASDA report cited above)[2]. Instead, Bartik calculates the proportion of value added for each industry or group of industries that can be accounted for by the provision of incentives. To our knowledge, we are the first to use Bartik's new comprehensive data set of economic development incentives to examine whether entrepreneurial activity is higher or lower in areas that use more incentives. We build on the previous literature by using this new and substantially improved data source.

There are a variety of other factors that may be determinants of entrepreneurial activity. For example, a substantial literature finds greater entrepreneurial activity in areas with more "economic freedom." Economic freedom is a measure of the level of government intervention in the economy. Having less intervention (or more freedom) could be thought of as an alternative strategy for promoting economic development, so by controlling for economic freedom we are able to assess the success of these two different strategies. The next section explores the literature in two areas: the impact of state economic development incentives, and the relationship between state economic freedom and entrepreneurial activity. Section 3 discusses the data we employ in our study. In Section 4, we will detail the results of our panel regressions. The final section will draw implications and conclude the paper.

2. Related literature

This paper essentially brings together two lines of literature. Our primary interest is in the literature examining the impacts of state and local economic development incentives. The second involves the relationship between state economic freedom and entrepreneurial activity. Little work has been undertaken on the specific impacts of development incentives on entrepreneurial activity, which is the primary issue our statistical tests will explore. Mitchell *et al.* (2018) and Bundrick and Snyder (2018) provide two of the most recent reviews of the literature on incentives[3]. The former contains only one mention of the word "entrepreneur" (or any related words such as "entrepreneurial" and "entrepreneurship"). The latter contains only three. The literature on development incentives tends to instead focus on incentives' impact on broader macroeconomic variables like economic growth and job creation.

One of the notable exceptions is Lee (2008), which is specifically interested in how state policies impact a firm's location and relocation decisions. He found only a weak relationship between nine different state development incentive programs (primarily tax exemptions) and the relocation of manufacturing plants. Lee's results imply that the incentive programs were not very successful.

Bruce and Deskins (2012) explore the relationship between state tax policy and four measures of entrepreneurship: the percentage of federal individual income tax returns filed with a Schedule C (as a proxy for small business income earners), the national share of such tax returns (state total divided by national total), the sole proprietorship share of state employment, and the national share of sole proprietorship employees. Many of their

variables are broad-based policy measures such as the top personal and corporate income tax rates. However, they do include a count of tax incentive programs and non-tax incentive programs. They find that tax incentives have a positive and statistically significant, albeit small, relationship with their four measures of entrepreneurship. Non-tax incentives have a small, but statistically significant, negative relationship with their sole proprietorship measures. In neither case is the economic magnitude significant.

In contrast, most of the literature examining the impacts of development incentives on state and local economies has focused on examining the incentives' relationship to broader economic outcomes, rather than entrepreneurial activity. Goss and Phillips (1994) and Bruce *et al.* (2009), for example, look at the relationship between state development agency spending and state employment growth. The former finds a positive relationship, the latter finds no relationship. Bingham and Bowen (1994) echo the latter. Additionally, Bruce *et al.* (2009) find that state development spending also has no relationship with the growth in state income or gross state product. Furthermore, Calcagno and Thompson (2004) find a negative relationship between state economic incentives and manufacturing value added.

Due to the limited availability of cross-state information on development incentives, most literature in this area focuses on either specific types of incentives in a cross-state context, or looks at the impact of larger packages of incentives within a specific geographical area. As an example of the former, Bremmer and Kesselring (1993) look specifically at the impact of job creation tax credits and job training programs on state employment. They find no statistically significant relationship with the tax credits but a positive relationship with the training programs. Trogen (1999), however, finds that these types of targeted incentives have a negative relationship with state per capita income. As an example of the latter approach, Hoyt *et al.* (2008) looked specifically at incentives packages across counties in Kentucky and found that while incentives do have a positive impact on a variety of economic outcomes in counties on the border with neighboring states, they have essentially no impact on interior counties.

More recently, Bundrick and Snyder (2018) examined Arkansas's Quick Action Closing Fund (QACF), a "deal-closing" fund similar to those in most other states. Using county data, they found no relationship between QACF subsidies to firms in those counties and two measures of economic activity: the level of private employment and the number of private business establishments. There was a negative relationship between QACF subsidies in neighboring counties and the number of business establishments, but no relationship with employment. The former implies that there were establishment losses due to subsidies given to firms in neighboring counties, which illustrates the zero-sum nature of the incentives game.

One reason for the failure to find evidence that economic development subsidies work may be the basic idea that resources are scarce and thus any expenditure on subsidies requires a reduction of expenditure on other things, just as any targeted tax break requires higher taxes on others. Two recent papers offer supportive evidence. Wang (2016) found that incentives spending do tend to crowd out other spending in later years. And, Dove and Sutter (2018) found that incentives spending was negatively associated with "economic freedom" (which includes measures of spending, taxes, and labor market restrictions).

While the literature is still unclear as to whether development incentives have any sort of impact on job creation and other economic outcomes, entrepreneurship and innovation have consistently been shown to positively impact state and local economies. Glaeser *et al.* (2010, p. 2), however, claim that differing economic conditions across localities "spawn different levels of entrepreneurship." They distinguish between demand determinants and supply side determinants of entrepreneurship. This paper directly tests the relationship between incentive provision and the supply of entrepreneurial activity.

One of the factors that affect the supply of entrepreneurial activity in states is the institutional environment in which businesses must operate in each state. The various

economic freedom indices are often used as a measure of the degree to which those institutions support markets. There has been much written on the relationship between economic freedom and entrepreneurship. Since our primary interest is economic development incentives, it is beyond the scope of this paper to provide an exhaustive discussion of that previous literature. Kreft and Sobel (2005) provide a useful summary of that literature and were the first to examine this at the state level. Our focus is on that state-level literature. Recent reviews of that literature can be found in Krichevskiy and Snyder (2015) and Hall *et al.* (2016), both in this journal.

Kreft and Sobel (2005) found that state economic freedom had a strong positive association with the growth rate of sole proprietorships. Campbell and Rogers (2007) found a strong positive association with net business formation (births minus deaths divided by total). Sobel (2008) improved on that by incorporating additional entrepreneurship measures. He found that higher state economic freedom was associated with higher values for five different measures of entrepreneurial activity: venture capital investment per capita, patents per capita, sole proprietorship growth rate, total establishment birth rate, and large establishment (500 or more employees) birth rate. Hall and Sobel (2008) add to that by examining the then new Kauffman Index of Entrepreneurial Activity, a measure of new business creation, finding it to also be positively associated with state economic freedom. Hall *et al.* (2013) found similar results.

Since both entrepreneurial activity and economic freedom can be affected by neighboring areas, Goetz and Rupasingha (2009) adjusted for that spatial dependence. They found a positive association between two of the three areas in the state economic freedom index and the growth in the proprietorship share of total employment. The taxation area of the index is found to have a negative association with proprietorship share growth, which follows from the idea that higher taxes (and thus lower freedom) may tend to drive workers into self-employment.

Powell and Weber (2013) use a 28-year panel of data and find a positive association between contemporaneous and lagged economic freedom and net business birth rates. However, they failed to find a statistically significant relationship with four other measures of entrepreneurial activity (although all four did have the expected positive sign). When they examined the three areas of the freedom index separately (instead of the overall index score), four of the five dependent variables had a statistically significant positive relationship with one of the three areas. Campbell *et al.* (2013) also use a panel approach and find somewhat similar results.

Krichevskiy and Snyder (2015) take a similar approach to Campbell *et al.* (2013), but they include several important omitted variables. They find a positive association between overall economic freedom and net business formation. Similar positive signs were found when they examined the three separate areas (rather than the overall score). Finally, Barnatchez and Lester (2017) find that economic freedom is positively associated with four different measures of "economic dynamism" (which consists of the sum of jobs created and jobs destroyed, the difference between jobs created and jobs destroyed, and the same two measures for business establishments instead of jobs).

3. Data

The lack of comparable data across states on economic development incentives has severely limited the ability of researchers to analyze those programs' effectiveness. Bruce and Deskins (2012) nicely summarize the issue:

> An optimal measure of state economic development programs would fully capture the way in which the incentives affect the profitability of entrepreneurial ventures in a state. However, such data are unavailable given the significant variation in incentive programs across states and the way in which many incentive programs are individually tailored (p. 383).

Fortunately, Timothy Bartik, a noted Scholar in this area, has undertaken the Herculean task of determining how incentive programs affect the profitability of firms across states by using a value-added measure, instead of mere counts. That new database, released in 2017, allows us to better capture how incentives affect business decisions.

We use Bartik's new database as our measure of development incentives. His data include information on incentives for the years 1990–2015; thus, our panel includes yearly information for all variables from 1990 to 2015. Our patents variable is the sole exception. Patent information was not available until 1992, so our panel includes fewer observations for this variable. He includes data on 32 states and the District of Columbia. Together, these areas account for more than 90 percent of US output. We lack data on the District of Columbia for a number of our key variables, so this area is dropped from our analysis.

According to Bartik, "the data for incentives or taxes are reported as a proportion of value added for that industry or group of industries in a particular state or in the nation[4]." By using a value-added measure, Bartik's database allows us to make sense of how much development incentives contribute to alleviating local facility costs that a business would otherwise bear. Five types of incentives are included in the database: property tax abatements, customized job training grants, job creation tax credits, investment tax credits, and research and development tax credits. He further divides incentives into those provided to "export base industries," which sell their goods and services outside the state, and "non-export base industries," which only sell goods and services locally. We focus mainly on the total amount of incentives (the sum of both types of incentives) provided by states, since both types influence a potential entrepreneur's decisions[5]. In the data set, value added is calculated as a present value measure, using a 12 percent real discount rate over a 20-year simulation period. According to Bartik, this rate is drawn from the empirical literature, and reflects the view of many corporate decision-makers when evaluating the costs and benefits of a particular investment decision[6]. Bartik also calculates the present value of an industry's value added using a 3 percent real discount rate, which he argues is the discount rate that would more likely be used in cost-benefit analysis by a policymaker. Because we are trying to understand the impact of incentives on entrepreneurial decision-making, we use only the 12 percent real discount rate data.

Since entrepreneurship is a concept with unclear boundaries, no single measure can capture all of its facets. Consequently, we follow many previous researchers in employing multiple measures of entrepreneurship in our study. If the coefficients on our incentives variables all point in the same direction when we use multiple types of entrepreneurship measures, then we can be relatively more confident that the relationship we discover is robust. Alternatively, it might be the case that economic development incentives impact different facets of entrepreneurial activity in different ways; this is what we find.

First, we use total patents per 100,000 population, as found in various publications of the US Patent and Trademark Office's "Patent Counts by Country/State and Year" publications[7]. Second, we use net new business formation, which is equal to: establishment entries minus establishment exits, all divided by state total establishments in any particular year. This measure better captures state business conditions than simply using establishment entries or exits alone. This variable comes from the Business Dynamics Statistics database, which is a product of the Bureau of Labor Statistics. Third, we use the sole proprietorship rate, which measures sole proprietorships as a percent of total businesses. This figure comes from the Bureau of Economic Analysis' State and Local Area Data database. Finally, we use two measures of the number of business establishments: "small" establishments, defined as those with 0–9 employees, and "large" establishments, defined as those with 500+ employees. Both of these are measured as a percentage of total establishments. That data come from the US Census Bureau's Statistics of US businesses program.

Additionally, we employ several geographic and demographic control variables from the entrepreneurship literature. Our data on percentage of the population that is foreign born, median age, population density, percent of the population over 25 with a bachelor's degree, and percent male all come from the closest decennial censuses to the period under examination. Additionally, we include a control variable capturing the impact of state ideology. This variable comes from Berry *et al.* (2010), and is measured on a 0 to 100 scale, with more liberal states being assigned higher scores[8].

Finally, we use the subnational summary score from the 2017 edition of the *Economic Freedom of North America* publication (Stansel *et al.*, 2016) to control for the institutional environment in the state. Consequently, many of the policy control variables that are generally included in studies of entrepreneurship are not included in this study, since they are already incorporated into the EFNA index. The index is comprised of ten variables divided into three areas: government spending, taxation, and labor market regulation. Because these types of policy variables are likely to have a significant impact on a businesses' decision to locate or remain in a particular state, we felt it was important to use this variable as a control. Table I contains the descriptive statistics for our variables. We should note that we leave our incentives variable in a proportion form, rather than converting it to a percentage form (as we do with all of our entrepreneurship variables, and with our geographic and demographic control variables) for the ease of interpretation. The value of incentives offered by a state seldom changes by 1 or 2 percent, so it is easier to read the results if we look at a 100 percent change in value added resulting from a change in the incentives offered. Indeed, incentives as a percentage of value added ranges from 0 to 679 percent in our sample.

4. Results

Because the time period over which we would expect development incentives to affect entrepreneurial activity is theoretically unclear, we test both contemporaneous and lagged effects of development incentives on our five measures of entrepreneurship. Since our panel includes data from 1990 to 2015, we are also able to experiment with different types of contemporaneous and lagged structures. We first use the full panel, and test both contemporaneous effects, and alternate using first-, second-, and third-year lags for all of our regressors. To avoid potential problems with dramatic one-year swings in our incentives and entrepreneurship variables, we next average both our dependent and independent variables over five years, obtaining 22 five-year averages, and test the contemporaneous effects over rolling five-year periods. We then lag our five-year averaged independent

Variable	Mean	SD	Min.	Max.	*n*
Patents per hundred thousand residents	30.75	18.54	6.51	112.86	768
Net new business formation	1.40	1.59	-3.60	18.30	832
Sole proprietorship rate	21.00	3.82	13.44	31.91	832
Small establishments (0–9 employees)	61.87	3.45	52.43	70.67	832
Large establishments (500 + employees)	14.61	2.73	8.70	22.98	832
Total incentives, 12% discount rate	1.30	1.23	0.00	6.79	832
Economic Freedom of North America Index	6.86	0.62	4.62	8.13	832
Foreign born as percent of population	7.77	5.93	0.93	27.19	832
Median age	34.99	2.23	30.60	40.70	832
Population density	212.30	246.57	10.90	1195.50	832
Percent 25 + with a bachelor's degree or higher	23.44	5.31	13.60	39.00	832
Percent male	48.94	0.65	47.92	50.95	832
Ideology	55.49	22.28	5.46	92.45	832

Table I.
Descriptive statistics

variables by five years; that is, we test the relationship between incentives over one five-year period and entrepreneurial activity over the subsequent five-year period[9]. Essentially, we are testing whether the average level of development incentives in a state over one five-year period affects the average level of entrepreneurship in that state over the subsequent five-year period. Our lagged structures are meant to reduce potential endogeneity problems, since it is unlikely that entrepreneurship would increase in response to perceived future incentives. In all regressions, we include year fixed effects to control for factors similar to all states that vary over time[10].

Table II contains results from our contemporaneous full panel regressions. Within our contemporaneous specifications, we find that state development incentives have a negative and significant relationship with patents per 100,000 residents. The results indicate that a 100 percent increase in incentives in value-added terms for a state's industries is associated with a decrease of 2.26 patents per 100,000 residents in that state[11]. We find no relationship with net new business formation or the rate of sole proprietorships. Interestingly, incentives appear to have a negative relationship with the number of small establishments as a percent of total establishments in the immediate term, but a positive relationship with the large establishment share. A 100 percent increase in incentives as a percentage of value added for the affected industries in a state was associated with a 0.18 percentage point decrease in the small establishment share but a 0.11 percentage point increase in the large establishment share. This supports the crony capitalist story that incentives actually benefit large establishments at the expense of small establishments, at least in the short run.

Tables III–V contain our first-, second-, and third-year lagged panel models. Here, we lag all of our independent variables by the relevant number of years in order to help mitigate potential endogeneity problems. As mentioned above, it seems unlikely that entrepreneurial activity would change in response to perceived future benefits, so our lagged models help to clarify how entrepreneurial activity changes in response to actual received incentives. The literature is unclear as to what constitutes an appropriate lag structure, so we experiment with three different lags. Table III contains the results of our one-year lagged model, and the results are substantially similar to those found in Table II. Not only do the relationships between total incentives and our various measures of entrepreneurship display the same

	1	2	3	4	5
LHS	Patents	Net new business	Sole proprietorships	Small est.	Large est.
Total incentives	−2.26** (1.05)	0.01 (0.07)	0.01 (0.14)	−0.18** (0.09)	0.11* (0.06)
EFNA	5.97* (3.52)	0.54*** (0.13)	−0.21 (0.61)	0.02 (0.28)	−0.32 (0.20)
Foreign born	1.02** (0.45)	0.03* (0.02)	0.34*** (0.12)	0.23* (0.12)	0.00 (0.07)
Median age	−0.80 (2.03)	0.09 (0.08)	0.62 (0.44)	−0.29 (0.34)	0.27* (0.16)
Population density	−0.03* (0.02)	−0.00* (0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)
25+ with bachelor's degree	2.49** (1.09)	0.02 (0.03)	−0.13 (0.23)	0.40*** (0.16)	−0.28*** (0.10)
Percent male	−8.77 (5.79)	0.54* (0.31)	−0.50 (0.78)	−0.63 (0.77)	0.45 (0.45)
Ideology	0.04 (0.03)	0.00 (0.00)	−0.01* (0.01)	0.00 (0.00)	−0.00** (0.00)
Constant	385.63 (310.53)	−30.34 (16.32)	24.18 (35.85)	94.94** (42.98)	−10.37 (24.62)
Year FE	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
R^2	0.59	0.60	0.89	0.84	0.95
n	768	832	832	832	832

Notes: Robust standard errors (heteroskedasticity-consistent estimators) are shown in parentheses. *,**,***Significant at 90, 95 and 99 percent levels, respectively

Table II. Total incentives and entrepreneurship, full panel, contemporaneous

LHS	6 Patents	7 Net new business	8 Sole proprietorships	9 Small est.	10 Large est.
Total incentives	−2.41** (1.09)	−0.04 (0.06)	0.04 (0.14)	−0.15* (0.09)	0.10* (0.06)
EFNA	6.25* (3.25)	0.61*** (0.15)	−0.24 (0.63)	0.05 (0.27)	0.35* (0.20)
Foreign born	1.01** (0.42)	0.03* (0.02)	0.32** (0.13)	0.23** (0.12)	−0.01 (0.07)
Median age	−0.93 (2.04)	0.04 (0.08)	0.54 (0.45)	−0.31 (0.33)	0.25* (0.15)
Population density	−0.03* (0.02)	−0.00* (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
25 + with bachelor's degree	2.46** (1.08)	0.00 (0.03)	−0.12 (0.23)	0.39** (0.15)	−0.28*** (0.10)
Percent male	−8.76 (5.74)	0.31 (0.36)	−0.46 (0.77)	−0.47 (0.76)	0.44 (0.43)
Ideology	0.05* (0.03)	0.00 (0.00)	−0.01* (0.01)	0.00 (0.00)	−0.00** (0.00)
Constant	387.11 (304.29)	−18.57 (19.42)	24.76 (35.34)	87.87** (42.41)	−8.83 (23.42)
Year FE	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
R^2	0.60	0.71	0.89	0.84	0.95
n	768	800	800	800	800

Table III.
Total incentives and entrepreneurship, full panel, one-year lags

Notes: Robust standard errors (heteroskedasticity-consistent estimators) are shown in parentheses. *,**,***Significant at 90, 95 and 99 percent levels, respectively

LHS	11 Patents	12 Net new business	13 Sole proprietorships	14 Small est.	15 Large est.
Total Incentives	−2.54** (1.16)	−0.07 (0.06)	0.06 (0.13)	−0.12 (0.09)	0.08 (0.06)
EFNA	6.00** (2.99)	0.48*** (0.13)	−0.17 (0.59)	0.02 (0.25)	−0.28 (0.19)
Foreign born	1.02** (0.41)	0.03** (0.01)	0.31** (0.13)	0.24** (0.12)	−0.02 (0.07)
Median age	−1.16 (2.07)	0.03 (0.07)	0.43 (0.44)	−0.32 (0.33)	0.25* (0.15)
Population density	−0.03* (0.02)	−0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
25 + with bachelor's degree	2.46** (1.08)	−0.02 (0.03)	−0.12 (0.22)	0.38** (0.15)	−0.28*** (0.10)
Percent male	−8.85 (5.80)	0.32 (0.33	−0.41 (0.76)	−0.33 (0.78)	0.41 (0.42)
Ideology	0.06** (0.03)	0.00* (0.00)	−0.01 (0.01)	0.00 (0.00)	−0.00** (0.00)
Constant	398.90 (305.43)	−17.82 (17.48)	25.44 (34.24)	81.07* (43.35)	−7.92 (22.85)
Year FE	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
R^2	0.60	0.72	0.89	0.84	0.95
n	768	768	768	768	768

Table IV.
Total incentives and entrepreneurship, full panel, three-year lags

Notes: Robust standard errors (heteroskedasticity-consistent estimators) are shown in parentheses. *,**,***Significant at 90, 95 and 99 percent levels, respectively

signs, but the same variables that were statistically significant in Table II are also statistically significant in Table III. Furthermore, the magnitudes of these variables are markedly similar to what they were in the contemporaneous model. In both the immediate term and the short term, economic development incentives seem to help big businesses at the expense of small businesses, and to discourage patent activity.

In Table IV, we lag all of our independent variables by three years. While the point estimate on our patent variable remains negative and significant, the point estimates on both small and large establishments lose statistical significance. One plausible explanation is that, while development incentives help attract big businesses in the short run, the effects fade out within just a couple of years. This might also indicate that small and large

establishments are on relatively more equal footing when incentives are not present than when they are present. Table V simply runs the same set of panel regressions, this time lagging all independent variables by three years. Once again, the point estimate on patents per 100,000 is statistically significant, but no other variables achieve statistical significance. This lends credibility to the story that incentives may help big businesses in the short run but have a little enduring effect.

In Tables II–V, our economic freedom variable is always positive when it is statistically significant, and it is statistically significant in just under half of the specifications. No matter the lag structure, economic freedom appears to have a positive relationship with some measures of entrepreneurship. Indeed, in all of the specifications which use patents as the dependent variable, our economic freedom variable is not only statistically significant, but is very large in economic magnitude[12]. This finding of some limited support for a positive relationship between economic freedom and entrepreneurial activity is largely consistent with the previous literature.

As mentioned earlier, within the data the total value of incentives tends to exhibit similar values from year to year in many instances, with discontinuous jumps when states receive large incentive packages. In order to smooth out these (sometimes quite dramatic) swings, in Tables VI and VII we use five-year rolling averages for all of our dependent and independent variables. In Table VI, we look at the contemporaneous effects of our averaged incentives variable on our averaged entrepreneurship variables. Once again, the patent variable is the only variable that is statistically significant, and it is large in magnitude. Here, a 100 percent increase in incentives in value added terms for a state results in a fall in patents per 100,000 residents by almost 3. In Table VII, we lag all of our independent variables by five years, while still using five-year rolling averages for both our dependent and independent variables. Once again, our patents variable is the only variable that is statistically significant, and it retains a similar magnitude to what we have observed throughout the rest of our regressions. In our contemporaneous regression, our economic freedom variable is positive and significant in two out of the five specifications, though it loses significance in the lagged models.

While economic development incentives are touted as being extremely important for the economic development of a state, our results indicate a much more mixed picture when it

LHS	16 Patents	17 Net new business	18 Sole proprietorships	19 Small est.	20 Large est.
Total incentives	−2.36** (1.15)	−0.10 (0.07)	0.10 (0.14)	−0.09 (0.09)	0.07 (0.07)
EFNA	4.98* (2.79)	0.23* (0.12)	−0.21 (0.55)	0.03 (0.24)	−0.17 (0.18)
Foreign born	1.08*** (0.40)	0.03* (0.01)	0.30*** (0.13)	0.25** (0.12)	−0.03 (0.08)
Median age	−1.24 (2.07)	0.01 (0.07)	0.33 (0.44)	−0.33 (0.33)	0.25 (0.15)
Population density	−0.03*(0.02)	−0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
25 + with bachelor's degree	2.54** (1.08)	−0.03 (0.04)	−0.10 (0.21)	0.38** (0.15)	−0.28*** (0.10)
Percent male	−8.62 (5.78)	0.36 (0.33)	−0.44 (0.75)	−0.24 (0.77)	0.40 (0.41)
Ideology	0.06** (0.03)	0.00 (0.00)	−0.01 (0.01)	0.00 (0.00)	−0.00 (0.00)
Constant	395.71 (301.85)	−17.60 (17.41)	29.79 (33.66)	77.37* (43.74)	−8.42 (22.43)
Year FE	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
R^2	0.59	0.73	0.89	0.85	0.94
n	736	736	736	736	736

Notes: Robust standard errors (heteroskedasticity-consistent estimators) are shown in parentheses. *,**,***Significant at 90, 95 and 99 percent levels, respectively

Table V.
Total incentives and entrepreneurship, full panel, three-year lags

LHS	21 Patents	22 Net new business	23 Sole proprietorships	24 Small est.	25 Large est.
Total incentives	−2.86** (1.26)	−0.00 (0.08)	0.01 (0.19)	−0.17 (0.11)	0.10 (0.08)
EFNA	7.27* (3.79)	0.86*** (0.19)	−0.33 (0.79)	−0.20 (0.40)	−0.30 (0.26)
Foreign born	0.99** (0.43)	0.02 (0.03)	0.34*** (0.13)	0.26** (0.13)	0.01 (0.08)
Median age	−1.52 (2.04)	0.06 (0.12)	0.61 (0.47)	−0.24 (0.36)	0.27 (0.17)
Population density	−0.03 (0.02)	−0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
25+ with bachelor's degree	2.18** (1.08)	0.01 (0.04)	−0.16 (0.24)	0.41** (0.17)	−0.31*** (0.11)
Percent male	−8.46 (5.75)	0.45 (0.41)	−0.45 (0.84)	−0.52 (0.84)	0.43 (0.47)
Ideology	0.06* (0.03)	0.01* (0.00)	−0.01* (0.01)	0.00 (0.00)	−0.01** (0.00)
Constant	391.12 (300.55)	−27.82 (22.61)	23.29 (39.69)	89.07 (46.98)	−9.01 (25.83)
Year FE	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
R^2	0.58	0.74	0.90	0.85	0.95
n	704	704	704	704	704

Notes: Robust standard errors (heteroskedasticity-consistent estimators) are shown in parentheses. *,**,***Significant at 90, 95 and 99 percent levels, respectively

Table VI.
Total incentives and entrepreneurship, five-year rolling averages, contemporaneous

LHS	26 Patents	27 Net new business	28 Sole proprietorships	29 Small est.	30 Large est.
Total incentives	−2.23* (1.20)	−0.19 (0.12)	0.11 (0.19)	−0.07 (0.14)	0.03 (0.11)
EFNA	3.16 (3.25)	0.11 (0.14)	−0.46 (0.67)	−0.28 (0.28)	0.17 (0.21)
Foreign born	1.11*** (0.38)	0.01 (0.02)	0.23* (0.13)	0.31** (0.12)	−0.06 (0.08)
Median age	−2.37 (1.98)	0.07 (0.11)	0.04 (0.55)	−0.34 (0.42)	0.27 (0.19)
Population density	−0.03* (0.02)	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)
25+ with bachelor's degree	2.70** (1.12)	−0.05 (0.05)	−0.11 (0.21)	0.41** (0.19)	−0.33** (0.13)
Percent male	−9.39 (5.90)	0.53 (0.37)	−0.56 (1.03)	−0.29 (0.91)	0.42 (0.48)
Ideology	0.07* (0.04)	0.00 (0.00)	−0.01 (0.01)	0.00 (0.01)	−0.00 (0.00)
Constant	482.83 (304.01)	−25.65 (19.52)	48.43 (53.00)	80.58 (54.26)	−10.66 (27.62)
Year FE	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
R^2	0.54	0.77	0.89	0.85	0.94
n	576	576	576	576	576

Notes: Robust standard errors (heteroskedasticity-consistent estimators) are shown in parentheses. *,**,***Significant at 90, 95 and 99 percent levels, respectively

Table VII.
Total incentives and entrepreneurship, five-year rolling averages, five-year lags

comes to entrepreneurship. In no specification were we able to uncover a relationship between development incentives and either net new business formation or the rate of sole proprietorships. When we were able to find significant relationships between establishment size and development incentives, it appeared that these incentives were beneficial to large establishments to the detriment of smaller establishments. In all specifications, we found a negative and statistically significant relationship between economic development incentives and patent activity. Our results suggest that development incentives can at best help large businesses over the short run, and at worst harm small businesses in the short run and slow innovation (as measured by patents per 100,000 residents).

5. Conclusion

Bartik (2017) provides a new comprehensive data set of targeted state economic development incentives that greatly improves upon previous sources of such data. Our primary contribution is to provide what is to our knowledge the first examination of the relationship between such incentives and entrepreneurial activity that uses this new data set. We find a robustly negative and statistically significant relationship between development incentives and patent activity. We also find some evidence that incentives are negatively associated with small business establishments (< 10 employees) as a percentage of total establishments but positively associated with the large business establishment (> 500 employees) share. This is consistent with the crony capitalist story that it is only the largest businesses that have the political and financial capital needed to win these subsidies and that the small businesses are actually harmed by having their own tax dollars used against them. We utilized two other measures of entrepreneurial activity – net new business formation and sole proprietorships – but found no evidence of a statistically significant relationship with those two measures.

Our secondary contribution is to add to the literature on how economic freedom may be related to entrepreneurial activity. We found robust evidence of a positive relationship between economic freedom and both patent activity and net business formation across five of our six specifications. There was virtually no evidence of a statistically significant relationship with any of our other three entrepreneurial activity variables. Our findings are largely consistent with previous findings in the literature.

Notes

1. This caveat is included in each introduction to the various NASDA annual reports.
2. The total value of incentives offered is an inadequate measure for a variety of reasons. For one, many incentives go unclaimed for a number of years before they are utilized. Second, many incentives packages span multiple years, and previous sources often assign the total value of the package to the year in which they were first offered.
3. Each of these were included in a recent issue of the *Review of Regional Studies* (Vol. 48, No. 1) that was devoted to "the relationship between economic freedom and targeted economic development."
4. He goes on to clarify: "Therefore, a number such as 0.01423 for incentives means that incentives for that particular state/industry/starting year are 1.423 percent of value added."
5. Though we do not report the results here, we re-ran our regressions using only the export base industries. Our results were substantially similar across most regressions.
6. The explanation for this high discount rate is that corporate decision-makers tend to "place a higher value on short-term factors than on long-term factors."
7. The publication has changed names over the years, but all titles are variations of the one listed above.
8. We use the NOMINATE measure from the Berry *et al.* (2010) data set. This measure captures what the authors call "operational ideology", or more general ideological environment. This includes more than, for example, a simple vote share measure, or a measure of the percentage of the legislature controlled by a particular political party.
9. So, for example, we test the relationship between the provision of economic development incentives over the 1990-1994 period and entrepreneurial activity in the 1995-1999 period.
10. Within the data, there are many instances in which the total value of incentives changes very little (sometimes not at all) over a few year period within a particular state. For example, from 1990 to 2008, incentives as a percent of value added in the state of Colorado remained at 6.8 percent per year for the entire period. Without substantial variation in incentives over some time periods, we worried that state fixed effects might mask some of our incentives effects. Consequently, we chose not to include state fixed effects in our analysis.

11. We should note that we re-ran all patent regressions without California and Massachusetts, and without including incentives specific to IT industries, in order to test whether these states were skewing the patent results. In every case, the point estimate on patents remained negative and significant, and actually became larger in the majority of the specifications.

12. However, when we re-run our patent regressions without California and Massachusetts, or without incentives specific to IT industries, economic freedom is never statistically significant.

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