Review of Economic Analysis

REA Review of Economic Analysis

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Volume 14, Number 3, 2022

URI: https://id.erudit.org/iderudit/1113833ar
DOI: https://doi.org/10.15353/rea.v13i3.3510

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Publisher(s)

International Centre for Economic Analysis

ISSN

1973-3909 (digital)

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Cite this article

Snarr, H. & Friesner, D. (2022). The Impact of Enterprise Zones on the Incubation and Evolution of Technology and Manufacturing Businesses in New York State. *Review of Economic Analysis*, *14*(3), 361–379. https://doi.org/10.15353/rea.v13i3.3510

Article abstract

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Review of Economic Analysis 14 (2022) 361-379 1973-3909/2022361

The Impact of Enterprise Zones on the Incubation and Evolution of Technology and Manufacturing Businesses in New York State

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The START-UP NY program is a creation-based entrepreneurial policy that sets up enterprise zones in several New York counties. The purpose of this study is to test the hypothesis that the program does not affect entrepreneurial activity in the industrial sectors it targets: manufacturing and high technology. Unlike many of the studies in the literature, which use indirect measures of entrepreneurial activity (e.g., unemployment rates, poverty rates, local economic growth, etc.), this analysis employs a direct measure—the number of firms that are targeted by the policy. Complicating the analysis is the state's subsequent tax reforms, which were implemented to promote creation- and discovery-based entrepreneurship in all parts of the state. To test our hypothesis, we control for this reform (and other factors) in a multiple equation difference-in-differences model. The results show that START-UP NY increases the number of 'micro' and 'small' firms in the targeted sectors by between 16.7% and 19.7% in the five years after the program was enacted.

Keywords: entrepreneurship, employment, regional economic development

JEL Classifications: M13, O12, R11, J38

1 Introduction and literature review

Entrepreneurs are known to identify and exploit opportunities (Alvarez and Barney 2007; Dai et al. 2020). As they do this, they create value, which may improve economic growth, reduce poverty, and affect positive changes in legal, social, and cultural institutions (Goel and Karri 2020). Identifying and implementing mechanisms to promote and enhance entrepreneurship is

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therefore of paramount concern to policymakers. The entrepreneurial activities they promote are either creation- or discovery-based.

Creation-based entrepreneurship satisfies existing demand more efficiently and effectively (Acs et al. 2016). Policies that promote it include increasing access to financing at reduced interest rates, improving access to resource markets, or reducing transportation costs. Such interventions reduce the costs of conducting business and provide entrepreneurs with advantages that allow them to circumvent entrance barriers or reduce long-run average costs. The unintended consequences of policy and the factors that inhibit creation-based entrepreneurship must be identified and well understood if the interventions are to be effective. This effort has resulted in policy initiatives that are focused on the promotion of entrepreneurship within specific or related industries or by creating 'clusters' of related firms that collaborate in ways that capture knowledge or capital-based synergies and shared efficiencies (Xu et al. 2019). Most US states, as well as many developed and developing countries, have enacted policies to facilitate the development of industry clusters (Crawford 2008; Mas Verdu and Roig Tierno 2019; Xu et al. 2019).

Discovery-based entrepreneurship results in the creation of fundamentally new markets. The value created by it is private because, as Acs et al. (2016) noted, "[p]eople choose to become entrepreneurs predominately because they like it," not because they may generate greater earnings or lessen poverty and unemployment. Public policy cannot directly induce discovery-based innovations. Rather, it can create an environment where people have the time, energy, and security to identify those discoveries organically through their curiosity and reflection.

Empirical evidence suggests that earnings from entrepreneurship, as measured by self-employment, are generally lower than otherwise comparable non-self-employment (Acs et al. 2016). With lower earnings, many of these firms are unlikely to employ dozens of workers. They are 'micro' enterprises where the owner is the primary, or often the only, employee. Such enterprises generate positive privately-held value for the owner and thus may signal a positive overall result when all benefits are considered. However, this simultaneously implies that public policies focusing solely on promoting or enhancing entrepreneurship must be evaluated using outcomes that reflect these privately held benefits. Studies that use poverty, employment, earnings, or local economic growth metrics may substantially understate the effectiveness of the policies being evaluated. Moreover, studies using such measures are problematic as they presume that some outcomes of the entrepreneurial process matter more than others. The appropriate outcome of policies intended to promote entrepreneurship are measures of changes in the number of firms and changes in the sizes of firms over time. This is not to say that public policies promoting entrepreneurship are incapable of generating broad socio-economic outcomes. Rather, such outcomes are not guaranteed and are secondary to the effectiveness of the policy in incubating new ventures and to the institutional, industrial, and ownership-specific features that facilitate the growth in the size of these firms over time.

Despite this logic, the relevant empirical literature does not consistently utilize well-defined, appropriate outcome measures. As a result, studies assessing the impact of public policies on entrepreneurship have not reached a consensus on whether (and how much) these policies are effective at promoting enterprise. Rubin and Boyd (2013) examined state-level data over 60 years and found no evidence that tax incentives for businesses led to increased economic growth. Other studies, including but not limited to Couch and Barrett (2005) and Couch et al. (2005), found that economic enterprise zones experienced economic growth exceeding that of the nation. Snarr et al. (2018) found that a New York State economic development initiative, START-UP NY,[1] was not significantly associated with county-level unemployment rates. Wilson (2009) found that local enterprise zones did not impact firm growth but instead altered where the growth occurred, which Salder and Bryson (2019) call 'adaptive embeddedness.' Xu et al. (2019) found that policies providing tax incentives significantly promote firm clustering in related industries, while policies providing interest and financing incentives were less effective at promoting such clusters. Moreover, the authors found that the size of clustering firms grew from 'micro' firms to 'small' firms, but they failed to grow into intermediate or large firms. As noted previously, what is most curious about the literature is that a relatively small number of empirical studies (e.g., Xu et al. 2019) attempt to measure the outcomes of entrepreneurially oriented public policies in a manner consistent with the outcome of the entrepreneurship process: the creation of new firms and their growth into larger firms over time.

This case study empirically evaluates the effectiveness of the creation-based entrepreneurial policy, START-UP NY, using the number of firms in targeted industries as outcome variables during the period 2011 to 2018. Complicating this task is the tax reform that New York State enacted after it launched START-UP NY. This is problematic because the former can induce entrepreneurial activity anywhere in the state while the latter can induce this activity in its enterprise zones, which are on or near SUNY and CUNY campuses. In simultaneously accounting for these entrepreneurial policy initiatives, our methodology provides a template for future research to more fully evaluate policy initiatives in other regional economies or that intend to develop clusters in different industries.

The remainder of this paper proceeds as follows. In section 2, we describe the details of START-UP NY and New York's 2016 tax reforms. The third section describes our empirical methodology and the data. The fourth section contains our empirical results. In the final section, we summarize our findings, provide several important policy implications arising from our analysis, discuss the study's limitations, and posit some directions for future research.

[1] The formal title of the program is SUNY Tax-free Areas to Revitalize and Transform Upstate NY.

2 An overview of two New York State public policies

In the mid-2010s, New York State enacted two major economic development policies, START-UP NY and tax reform. START-UP NY was implemented in 2014, the middle of our evaluation window. It established enterprise zones on SUNY and CUNY campuses that incubate or facilitate small technology firms. Participating firms are required to conduct their business entirely within these zones to receive tax credits that offset any state or local taxes for up to 10 years (York College 2018). Firms that conduct a portion of their business within the zone can receive a prorated tax offset. Employees of firms operating in these zones may also receive state and local income tax exemptions on any wages or salaries derived from employment within these firms for up to 10 years (Chumley 2014). Naturally, there are guidelines and restrictions. For example, one must work for the company for an entire calendar year to claim the tax exemption, and employees who earn more than $200,000 annually may only claim the exemption for five years (Chumley 2014). Snarr et al. (2017) summarize the details of the program and then theoretically analyze and critique it. They conclude that the program may be effective at generating start-ups in a narrowly defined range of industries that have little potential for growth.

After START-UP NY was implemented, the State of New York passed legislation in 2016 that dramatically altered the tax code (Bishop-Henchman 2014). Corporate income tax rates were reduced from 7.1 percent to 6.5 percent, and the number of corporate tax bases was reduced from four to three. The reform exempted many small-business owners from estate taxes. The provisions for net operation loss carryovers were changed to allow firms greater flexibility with which to smooth their tax burdens. Another provision implemented a 'freeze' on property taxes for qualifying homeowners that was payable via a personal income tax credit. A final relevant policy provision reduced the income and property tax rates to which manufacturing firms are subjected.

New York State adopted these two policies to incubate new ventures and induce firms in other states to relocate to it. START-UP NY incentivizes creation-based entrepreneurial activities.[2] The tax reform can induce creation- or discovery-based entrepreneurship because it directly impacts households and businesses beyond simply promoting entrepreneurship (Acs et al. 2016). The type that is sparked depends on whether heirs of estates, which the reforms have made more valuable, retain or alter the deceased owner's missions, visions, resources, and processes. Firms that relocate to New York to reap the benefits of the two policies would be considered a positive outcome from the state's planning perspective but not from a regional or

[2] Even though the START-UP NY program may reduce personal income tax obligations, those reduced obligations only accrue after the venture launches and the employee has worked for it for an entire calendar year. Thus, the timing of the benefit largely contradicts any assertion that the benefit incentivizes discovery-based entrepreneurship.

national perspective *if* relocations simply shift where the production is performed. The relocations would be judged as a success from all three perspectives if the relocated firms expand more than they would have had they not moved.

3 Data and empirical methods

The purpose of this study is to test the hypothesis that the START-UP NY program does not affect entrepreneurial activity in the industrial sectors it targets, which are the professional, scientific, and technical (PST) and manufacturing (MFG) classifications. Complicating our analysis is the tax reform that was enacted after START-UP NY was passed. Fortunately, the literature provides meaningful empirical methodologies that are adapted for this analysis. The most applicable is used in Snarr et al. (2018).

Snarr et al. (2018) used county-level unemployment rates to evaluate the effectiveness of the START-UP NY program over the 2014 to 2017 period.[3] Using unemployment for this purpose is problematic. First, as mentioned previously, new ventures tend to be small and are not started to alleviate unemployment. They were launched to better satisfy consumer needs in existing markets or invent and supply innovative new products and services. In their short evaluation window, there is simply not enough time for incubated micro firms to expand into sufficiently large employers to affect a measurable reduction in unemployment. Even if declines in unemployment attributable to entrepreneurial policy are measurable, county unemployment rates, in the context of Snarr et al. (2018), would understate the effectiveness of entrepreneurial policy initiatives that incubate new ventures and facilitate their growth. This is due to how unemployment is calculated, which is based on where workers live, not where they work. In the program, participating firms are physically located in enterprise zone counties (henceforth, zone counties) but their workers may live in those or nearby counties. If the addresses of these workers are fairly distributed across these counties, the unemployment rates of the two types of counties will fall together as entrepreneurial activity expands.

To disentangle the effects of the two entrepreneurial policies, Snarr et al. (2018) adapted a difference-in-differences model with two control groups. Pennsylvania counties comprised the baseline control group as these counties experienced neither the reduction in business income taxes nor access to enterprise zones. It also represents a comparable geographic region that is adjacent to New York.[4] Small businesses that relocate to New York from Pennsylvania may have done so because such relocations keep them close to their resource and product markets. Non-zone counties formed the other control group. Whereas New York counties benefited from

[3] This is a brief summary of the Snarr et al. (2018) methodology. Readers should consult this article for a more complete discussion.

[4] Snarr et al. (2018) gives a detailed comparison of Pennslyvania and New York.

only the business tax reforms, zone counties benefited from both policies. To estimate these effects, Snarr et al. (2017) used the following difference-in-differences model:[5]

$$y_{it} = \alpha_0 + \alpha_1 NY + \alpha_2 SU + \boldsymbol{\tau}' \mathbf{YEAR} + \boldsymbol{\beta}' \mathbf{YEAR} \times NY + \boldsymbol{\delta}' \mathbf{YEAR} \times SU + \boldsymbol{\gamma}' \mathbf{X}_{it} + \upsilon_i + \varepsilon_{it} \quad (1)$$

Here, y is the county unemployment rate, NY is a dummy that indicates counties are in New York, SU is a dummy that indicates counties have a START-UP NY campus or is a New York county that shares a border with such a county, **YEAR** is a set of year dummies, **X** is a collection of time-varying county-level controls, υ is the set of county-level fixed effects, and ε is the set of white-noise errors. Given this specification and holding the other regressors constant, the δ estimates represent the impact of START-UP NY on unemployment while the β estimates represent the impact of tax reform on county unemployment.

Since START-UP NY's primary goal is to incentivize high-technology firms to incubate in or relocate to New York State, several modifications were made to the above methodology. This study utilizes a direct measure of entrepreneurial activity and a wider evaluation window. The dependent variable in the present analysis is the number of firms operating in a given county's PST industrial sector. Since START-UP NY focuses on smaller firms in this sector, PST firm counts are disaggregated into micro and small firms. These firms employ either one to nine workers or 10 to 19 workers. Since program funds can be allocated to similarly sized MFG firms, the analysis includes additional dependent variables for similarly defined micro and small MFG firms. $PSTM_i$ and $MFGM_i$ are counts of micro firms operating in county i in the respective industries, and $PSTS_i$ and $MFGS_i$ are their small firm counterparts.

The longer timeframe, 2011 to 2018, in this study allows us to capture the entrepreneurial dynamics within the two states, before and after the enterprise zones and the latter tax code reform provisions were enacted. It also allows enough time to elapse for firms to evolve and expand into larger firms. Using NY and SU interactions with year dummies to disentangle the enterprise zone effects from the tax reform effects in Snarr et al. (2018) was appropriate for their shorter timeframe. In our longer timeframe, we need to account for the delayed rollout of the tax reform provisions. In our study, the NY interactions with the 2017 and 2018 year dummies account for these effects. To control for the 2016 corporate tax rate reductions, we interact NY with the corporate tax cut dummy (TC16), which equals one for the years 2016 and on but equals zero otherwise.

As was the case in Snarr et al. (2018), the key explanatory variable is the treatment dummy, SU. They defined it less narrowly than we do. Here, since participating firms operate in zone counties, SU equals one for counties that are listed on the state's published list of enterprise

[5] Difference-in-differences models are predicated on the common trend assumption. If this assumption fails to hold, the methodology can generate unreliable results (Card and Krueger 1994 and Duflo et al. 2004).

zones but equals zero otherwise. That list also reports the number of START-UP NY facilities in each zone county. Some have one, like Columbia County, while others have multiple, like Albany County, which has 67. To capture this enterprise zone intensity, the number of facilities in each zone county (SUn) is included in the analysis.

County-level explanatory variables are included to control for the general business climate and the infrastructure that is needed to support entrepreneurial activity. The unemployment rate (Ucty) accounts for labor scarcity within county labor markets. The share of county residents with a bachelor's degree or higher (college) controls for the quality of employees needed by PST entrepreneurs. Racial segregation (DegSeg), as measured by the Caucasian to non-Caucasian dissimilarity index,[6] is included to control for the diversity and inclusion that is needed in firms to succeed in today's marketplace. The homeownership rate (hownrate) and real per capita personal income (rPCPI) are reasonable proxies for alternatives to traditional small business financing. The county income inequality index (IncIneq) is included because counties with high inequality will generally have larger pools of high earners who are potential investors in new ventures. Average commute time (commute) serves as a proxy for the general level of commerce occurring within counties. We control for past firm counts in the targeted industries that have one to nine employees (TARGM), 10 to 19 employees (TARGS), 20 to 49 employees (TARGI), and 50 or more employees (TARGL).

The data are drawn from several government sources. Firm counts are from County Business Patterns tables.[7] The location of enterprise zones and the number of facilities in each are from the New York Open Data Program.[8] The controls are from the Federal Reserve Economic Database.[9]

Our econometric strategy is straightforward. First, we want to generate reliable estimates of our equations that are relatively easy to interpret. A system estimator, like seemingly unrelated regression, is unnecessary since such estimators provide no gains in efficiency because there are identical regressors in our equations. Because we have few controls, we estimate the equations with the fixed effects estimator to account for important and unobserved differences in the 124 counties that are in the analysis. Following Duflo et al. (2004), clustered-robust standard errors are computed to account for any heteroskedasticity and within-panel serial correlation that may be present in our model. All continuous variables are transformed into natural logarithms to convert the corresponding coefficients into elasticities and all continuous

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[6] A dissimilarity index of 0 indicates conditions of total integration under which both groups are distributed in the same proportions across all neighborhoods. A dissimilarity index of 100 indicates conditions of total segregation such that the members of one group are in completely different neighborhoods than the second group.

[7] The flat files can be downloaded here: www2.census.gov/programs-surveys/cbp/datasets.

[8] See https://ata.ny.gov/Economic-Development/START-UP-NY-Tax-Free-Area-Locations/xrve-jg9b.

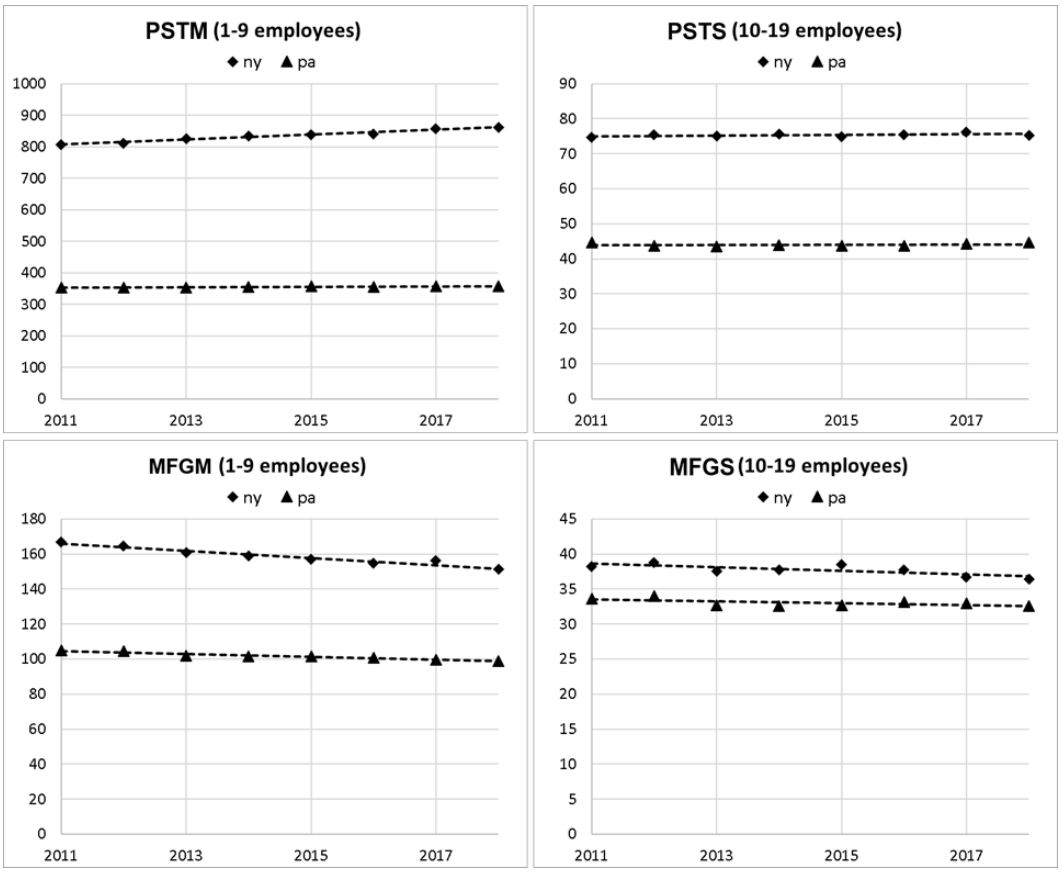
[9] The data can be downloaded here: https://fred.stlouisfed.org.

regressors are lagged one period[10] because current entrepreneurship is affected by past increases in living standards, wealth, job creation, etc. (Audretsch and Keilbach 2004; Parker 2009).

4 Results

The data used in the analysis are summarized in Figure 1 and Tables 1 and 2. The figure shows trends in county mean counts of micro and small PST and MFG firms. It suggests that the common trend assumption holds as the pair of means in each chart follow a single trend and/or consistent pattern over time.[11] The charts show that the two states are experiencing slow and steady declines in their MFG industrial sectors but very slight expansions in their PST industrial sectors.

Figure 1. Trends in the number of firms



[10] In Table 2, the prefix "L." is used to denote regressors that are lagged one year.

[11] See footnote 5.

Table 1 contains basic descriptive statistics for each of the variables by state. On average, there are many more of these firms in New York than there are in Pennsylvania. The same trends exist for the variables measuring the totals of intermediate and large firms in the targeted industries (TARGI and TARGL). On average, income inequality (IncIn), real per-capita personal income (rPCPI), and college attainment (college) are higher in New York, but the rate of homeownership (hownrate) is greater in Pennsylvania, while the county unemployment rate (Ucty), commute times (commute), and racial segregation (DegSeg) are roughly equal across the two states. The standard deviations, as ratios of the corresponding means, of the firm counts, personal income, homeownership rate, or income inequality, are much larger for New York, which is not surprising given Manhattan's skewed wealth and income.[12] This was not the case for college attainment, unemployment, commute time, and segregation. Their standard deviations, relative to their means, were comparable across the two states.

Table 1. County-level descriptive statistics

	Both (N = 1030)		**PA (N = 536)**		**NY (N = 494)**	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
PSTM	585.1	1541.4	355.5	641.4	834.1	2095.9
PSTS	59.0	160.6	44.0	81.4	75.3	214.8
MFGM	129.1	226.9	101.7	128.6	158.8	296.4
MFGS	35.3	54.5	33.0	41.7	37.7	65.5
TARGM	714.2	1745.5	457.2	759.7	992.9	2363.0
TARGS	94.3	205.5	77.0	119.8	113.1	268.1
TARGI	69.3	146.5	61.1	93.1	78.2	187.8
TARGL	53.2	114.0	49.5	71.3	57.2	147.0
Ucty	6.4	1.7	6.4	1.7	6.4	1.8
rPCPI	46156.6	14558.7	44793.6	8722.8	47635.5	18857.8
College	23.9	9.0	21.6	8.2	26.4	9.1
Commute	25.2	5.5	25.0	4.6	25.3	6.2
Hownrate	73.8	9.5	76.2	4.9	71.1	12.2
DegSeg	40.4	12.8	40.2	13.0	40.6	12.5
IncIn	12.6	3.6	11.8	2.2	13.4	4.6
NY	0.5	0.5	0.0	0.0	1.0	0.0
Sun	2.9	9.7	0.0	0.0	6.1	13.3
SU	0.2	0.4	0.0	0.0	0.5	0.5

[12] See Misra (2015) for more details.

Table 2. Percent change in select means over the period studied

	Pennsylvania Counties			New York Counties			
	2011	2018	$\%D_{PA}$	2011	2018	$\%D_{NY}$	$\%D_{NY} - \%D_{PA}$
TARGM	458.3	455.8	-0.5	973.6	1012.0	3.9	4.5
TARGS	78.2	77.2	-1.3	113.0	111.8	-1.1	0.2
TARGI	60.4	61.3	1.5	78.0	75.0	-3.8	-5.3
TARGL	49.1	48.1	-2.0	55.1	57.5	4.4	6.4
Ucty	8.1	4.5	-45.0	8.4	4.5	-47.0	-2.0
rPCPI	42777.7	47852.1	11.9	45060.1	50911.1	13.0	1.1
college	20.1	23.2	15.3	25.3	28.0	10.9	-4.5
commute	24.5	25.7	4.8	24.8	25.9	4.4	-0.4
hownrate	77.3	75.6	-2.1	71.9	70.9	-1.4	0.7
DegSeg	41.0	38.9	-5.1	41.6	40.1	-3.5	1.6
IncIn	11.3	12.3	8.8	12.7	14.1	11.2	2.4

Table 2 above presents New York and Pennsylvania county means for the first and final years of the study and the percent changes in these means. In the final column, the differences in these percent changes show how entrepreneurial conditions evolved in New York counties relative to their counterparts in Pennsylvania. Relative to Pennsylvania, New York's micro and large firm counts grew 4.5 percent and 6.4 percent in the targeted industries, respectively. Given the objectives of New York's two entrepreneurial policy initiatives, these results provide anecdotal evidence that these initiatives sparked micro ventures to life in the targeted sectors while the tax reforms are associated with large firms expanding their operations in these sectors. Relative to Pennsylvania, New York had no growth in the number of targeted small firms but experienced a 5.3 percent contraction in targeted intermediate firms. The first result would occur if the two policies facilitated comparable increases in micro firms growing into small firms, and small firms growing into intermediate firms. The latter result would occur if the number of expanding intermediate firms exceeds the number of expanding small firms. The remaining differences in variable growth rates show college attainment and commuting falling and homeownership, labor scarcity, incomes, income inequality, and racial segregation increasing in New York relative to Pennsylvania.

The fixed effects regression results are reported in Table 3. Clustered-robust standard errors are reported in the table because heteroskedasticity and within-panel correlation were present in our models. For the sake of simplicity and to ease exposition, coefficients estimates are regarded as statistically significant at the 10 percent level or better in the discussion that follows. Statistical significance at that level and at the one and five percent levels are noted in

Table 3, and it is a straightforward exercise for the interested reader to interpret the results using more strict definitions of statistical significance.

Table 3—Regression results†

	PSTM	PSTS	MFGM	MFGS
L.TARGM	0.3894***	0.2113	0.5952***	0.0388
	(0.0399)	(0.1372)	(0.1107)	(0.1674)
L.TARGS	0.0276	0.2093*	0.0064	0.3528***
	(0.0172)	(0.1097)	(0.0288)	(0.0774)
L.TARGI	0.0362	-0.0303	0.0197	0.0447
	(0.0268)	(0.0794)	(0.0316)	(0.0546)
L.TARGL	0.0045	-0.1047	0.0370	0.0428
	(0.0128)	(0.0781)	(0.0258)	(0.0655)
L.Ucty	-0.1075*	0.0023	-0.0860	0.3717*
	(0.0552)	(0.1865)	(0.1093)	(0.2231)
L.rPCPI	0.3305*	-0.6977	-0.1970	0.3839
	(0.1899)	(0.6455)	(0.2683)	(0.4954)
L.college	0.1371	-0.6652*	-0.0351	-0.0630
	(0.1263)	(0.3911)	(0.1544)	(0.3723)
L.commute	0.2319	-0.1295	0.0866	-0.3083
	(0.1686)	(0.5718)	(0.4332)	(0.5190)
L.hownrate	-0.5161	-1.4711	-0.0356	0.1777
	(0.3995)	(1.1535)	(0.5757)	(1.0186)
L.DegSeg	0.0030	0.0210	-0.0960***	0.0038
	(0.0361)	(0.0826)	(0.0260)	(0.0582)
L.IncIn	0.0452	0.4746*	0.0855	0.1668
	(0.1026)	(0.2419)	(0.1437)	(0.2632)
NY	-	-	-	-
SUn	0.0161**	0.0460	-0.0139	0.0029
	(0.0065)	(0.0288)	(0.0126)	(0.0212)
SU	-0.0590*	-0.1452	0.0699	-0.1552**
	(0.0307)	(0.1101)	(0.0444)	(0.0680)
y12	-0.0141	0.0082	0.0174	0.0271
	(0.0130)	(0.0480)	(0.0168)	(0.0327)
y13	-0.0343*	-0.0021	-0.0270	0.0177
	(0.0188)	(0.0430)	(0.0263)	(0.0309)
y14	-0.0279*	-0.0021	-0.0279	0.0238
	(0.0167)	(0.0577)	(0.0255)	(0.0444)
y15	-0.0705***	0.0021	-0.0486	0.1201
	(0.0269)	(0.0881)	(0.0430)	(0.0886)
y16	-0.1101***	0.0056	-0.0378	0.1582
	(0.0338)	(0.1050)	(0.0540)	(0.1040)

	PSTM	PSTS	MFGM	MFGS
y17	-0.1352***	-0.0098	-0.0896	0.0887
	(0.0500)	(0.1127)	(0.0693)	(0.0989)
y18	-0.1521***	0.0372	-0.0653	0.1707
	(0.0442)	(0.1246)	(0.0693)	(0.1322)
NY×Y12	-0.0108	-0.0332	-0.0195	0.0330
	(0.0149)	(0.0582)	(0.0202)	(0.0469)
NY×Y13	0.0160	-0.0418	0.0084	-0.0108
	(0.0158)	(0.0536)	(0.0231)	(0.0436)
NY×Y14	0.0076	-0.0608	-0.0299	0.1557***
	(0.0260)	(0.0780)	(0.0328)	(0.0546)
NY×Y15	-0.0238	-0.0354	0.0491	0.0165
	(0.0273)	(0.0834)	(0.0395)	(0.0744)
NY×Y16	-	-	-	-
NY×Y17	-0.0476	-0.2015	0.0220	-0.2623*
	(0.0396)	(0.1362)	(0.0368)	(0.1478)
NY×Y18	0.0021	-0.2607*	0.0091	-0.0952
	(0.0217)	(0.1441)	(0.0337)	(0.1303)
SU×Y15	0.0404**	-0.0105	-0.0923***	0.1763**
	(0.0192)	(0.1092)	(0.0346)	(0.0767)
SU×Y16	0.0444**	0.0752	-0.0856**	0.0696
	(0.0217)	(0.1099)	(0.0399)	(0.0705)
SU×Y17	0.0929***	0.2622*	-0.0528	0.4085**
	(0.0342)	(0.1440)	(0.0444)	(0.1699)
SU×Y18	0.0504*	0.3665**	-0.0602	0.1628
	(0.0264)	(0.1612)	(0.0523)	(0.1354)
NY×TC16	-0.0236	-0.1014	0.0291	0.0860
	(0.0271)	(0.0968)	(0.0372)	(0.0748)
N	1030	1030	1030	1030
adj. R-sq	0.2576	0.0893	0.2120	0.1160
Clustered Std. Errors	yes	yes	yes	yes
Constant	yes	yes	yes	yes

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01
† All continuous variables are in natural logarithms.

The launch and success of PST and MFG firms depend on the quality and quantity of labor. Labor scarcity, as measured by low unemployment, increased substantially. Between 2011 and 2018, the mean county unemployment rate declined by 46 percent or 5.7 percent per year. This annual decline had an insignificant effect on small PST and micro MFG firm formation but was associated with subsequent year increases of 0.6 percent and 2.1 percent in the numbers of micro PST and small MFG firms, respectively, holding all other regressors constant. Regarding

the diversity of county-level labor markets, racial segregation had a negative and significant effect on micro MFG firm formation but had an insignificant effect on the numbers of firms in the other classes. The availability of college-educated labor did not significantly impact micro or small MFG firm counts or the micro PST firm count. However, its relationship with the growth of small PST firms was negative and statistically significant. This coefficient suggests that a 10 percent rise in a county's college-educated labor pool reduces the number of small PST firms in the following year by 6.1 percent.

County homeownership rates (hownrate), real per capita personal income (rPCPI), and income inequality (IncIn) are reasonable proxies for alternative financing options for new and unproven entrepreneurs.[13] Only two of these coefficients were statistically significant. The first to be discussed is the real per capita personal income coefficient in the micro PST equation. It suggests that a 10 percent increase in personal income is associated with a subsequent year increase in micro PST firm formation of 3.2 percent, holding all other regressors constant. The other significant coefficient suggests a 10 percent increase in income inequality is associated with a subsequent year increase in small MFG firm formation of 4.6 percent, holding all other regressors constant. Both results are plausible. Relative to small firms, recently incubated micro firms will have less access to traditional financing. Since high earners tend to have more savings than low earners, they can self-finance entrepreneurial efforts in the PST sector. Entrepreneurs in the capital-intensive MFG sector will need substantial start-up capital. They are likely to secure it if there is a large pool of private investors making hard money loans. High-income-inequality counties have large pools of high earners who could provide these loans.

The remaining controls account for the general business climate in START-UP NY's targeted industries (TARGM, TARGS, TARGI, and TARGL) and the general level of commerce within counties (commute). The coefficients on the county commute times are statistically insignificant. Only four of the sixteen coefficients for the other controls in this group are significant. In the micro PST and MFG firm equations, the coefficients for micro firm counts in the targeted industrial sectors (TARGM) suggest that a 10 percent increase in the number of micro firms in these sectors lead to subsequent year increases of 3.8 percent and 5.8 percent in the numbers of micro PST and MFG firms, respectively, holding all other regressors constant. In the small PST and MFG firm equations, the coefficients for small firm counts in the targeted industrial sectors (TARGS) suggest that a 10 percent increase in the number of small firms in these sectors lead to subsequent year increases of 2.0 percent and 3.4 percent in the numbers of small PST and MFG firms, respectively, holding all other regressors constant.

[13] In https://www.extension.iastate.edu/agdm/wholefarm/html/c5-92.html, Don Hofstrand summarizes a variety of ways small businesses can be financed.

Year effects are statistically significant in only the micro PST equation. All year effects in this equation are negative, generally increase in absolute value, and all but the first is significant. The set, holding all other regressors constant, implies that the rate of contraction in the number of micro PST firms was zero from 2011 to 2012, but increased annually from about 3 percent in 2013 and 2014 to 7.3 percent in 2015, 11.6 percent in 2016, 14.5 percent in 2016, and 16.4 percent in 2017. Collectively, the year effects suggest that the general environment in Pennsylvania and New York is unfriendly to entrepreneurs wanting to launch new technology and manufacturing ventures.

Slightly different patterns emerge when examining the coefficient estimates for the interactions between the year dummies and the New York dummy. The only significant estimates are the 2014 and 2017 interactions in the small MFG equation and the 2018 interaction in the small PST equation. The 2014 interaction suggests that the mean number of small MFG firms spiked 16.8 percent in New York counties in the year START-UP NY was enacted. This spike could be capturing the anticipatory effect of the coming enterprise zones. The 2017 and 2018 interactions suggest that the mean numbers of small MFG and PST firms both declined by about 23 percent in New York counties after pro-growth provisions of the state's tax reforms were in place. Such a decline would occur in an industrial sector if the number of micro firms growing into small firms is less than the number of small firms growing into larger firms. The declines could also be caused by larger firms, which are more able to capitalize on incentives being buried in complex tax reform legislation, crushing or absorbing their smaller competitors.

The effect of the state corporate tax rate cut in 2016 is captured by the interaction of the New York dummy and the corporate tax cut dummy (NY×TC16). All of them are statistically insignificant. The tax cut is thus not associated with the formation of micro or small ventures in the sectors targeted by START-UP NY. Given the 5.3 percent contraction in intermediate firms and the 6.4 percent growth in large firms that were reported and discussed above, large firms are the likely beneficiaries of the tax cut for reasons mentioned in the previous paragraph. This is plausible but unsupported in this study. Future research is needed to resolve this issue.

The hypothesis of this study, the START-UP NY program does not affect the number of micro and small firms in targeted industries, is tested with the coefficients for enterprise zone intensity (SUn), the START-UP NY dummy (SU), and the interactions between this dummy and the year dummies. Enterprise zone intensity is statistically significant in just the micro PST equation. The corresponding coefficient suggests that a 10 percent increase in the number of facilities in a zone is associated with a subsequent year increase in the number of micro PST firms of 0.2 percent. The START-UP NY dummy is negative and statistically significant in two equations. Their corresponding marginal effects are displayed in row 2014 of Table 4.a.

Table 4.a—Significant marginal effects of SU and SU×YEAR†

	PSTM	PSTS	MFGM	MFGS	%D
2014	-5.7%*			-14.4%**	-4.7%
2015	4.1%**		-8.8%**	19.3%**	1.8%
2016	4.5%**		-8.2%**		1.5%
2017	9.7%**	30.0%*		50.5%**	12.5%
2018	5.2%*	44.3%**			7.9%

† The values in the 2014 row are the marginal effects of the SU dummy. The remaining values are the marginal effects of SU×**YEAR**.
* Significant at the 10% level.
**Significant at the 5% level.

Table 4.b—Firm counts in the average New York county

	PSTM	PSTS	MFGM	MFGS	Total
2013	355	45	103	34	537
2014	335	45	103	29	512
2015	348	45	94	34	521
2016	364	45	86	34	529
2017	399	58	86	52	595
2018	420	84	86	52	642
%D	18.4%	87.6%	-16.3%	53.7%	19.6%

Using marginal effects that are significant at the 5% level results in 2013 and 2018 forecasted means of 536 and 626 small and micro PST and MFG firms, respectively, resulting in a five-year growth rate of 16.7%.

They suggest that program implementation is associated with contractions in the numbers of New York micro PST and small MFG firms of 5.7 percent and 14.4 percent, respectively. These results represent an anticipatory effect if the news of the new program causes entrepreneurs, who were about to launch their ventures, to wait for the set-up of enterprise zones and the distribution of program benefits.

The START-UP NY dummy interactions measure the year-to-year performance of the program, holding all other factors constant. Ten of them are significant. Their corresponding marginal effects are displayed in rows 2015 to 2018 of Table 4.a. These effects are used to forecast firm counts from the 2013 New York county mean numbers of micro and small firms in the targeted sectors. These means and the subsequent forecasts are reported in Table 4.b. The significant marginal effects of program implementation reduce the county means of the number of micro PST and small MFG firms, respectively, from 355 and 34 in 2013 to 335 and

29 in 2014, respectively (see rows 2013 and 2014 of Table 4.b). Row 2018 of Table 4.b gives forecasted county means of the number of firms in each class at the end of the evaluation window. The final row of this table reports the five-year growth rates of the projected county means. The number of small PST firms grew the most at 87.6 percent in five years. Micro PST and small MFG firm counts grew 18.4 percent and 53.7 percent, respectively. The micro MFG firm count contracted 16.3 percent. Because that contraction is swamped by the increase in the count of slightly larger MFG firms, perhaps these two results imply that START-UP NY is facilitating the expansion of micro MFG firms into small MFG firms. The evidence displayed in Table 4 rejects our null hypothesis. Thus, we conclude that the program appears to be doing what it was designed to do, incubate micro and small firms in the program's targeted industries and then facilitate their evolution into larger firms.

The final column of Table 4 reports the program's aggregated effects. Comparing these to the disaggregated effects, reported in the other columns of the table, illustrates the importance of using disaggregated direct outcomes to evaluate entrepreneurial policy initiatives that target one or more industries. Though the disaggregated results show stability in the PST industrial sector and micro PST firms growing into small PST firms, they reveal a seemingly unstable process in the MFG sector. Micro MFG formation contracted dramatically in 2015 and 2017 and small MFG firm growth grew by large percentages, two years apart. That said, in the MFG sector, sporadic growth is expected as it tends to be very capital intensive. The two contractions perhaps result from START-UP NY allowing entrepreneurs to go bigger at launch than they would have done otherwise. Thus, entrepreneurs may be leapfrogging the micro stage of development to launch as small firms instead. The two years that separate the growth spurts of small MFG firms perhaps reflect the longer planning horizon such operations need relative to service-providing firms. Thus, using aggregated outcomes clouds the analysis and our understanding of the development process.

5 Discussion and conclusions

The primary objective of this research was to empirically assess whether the START-UP NY program promotes entrepreneurial activity in New York's PST and MFG industrial sectors. Utilizing a natural experiment with two geographic control groups, which experienced similar economic conditions and share socio-economic characteristics that impact entrepreneurial activity, that includes pre- and post-implementation periods and controls for concurrent tax reform (and other factors), we confirmed that START-UP NY is accomplishing what it was designed to do; it promotes creation-based entrepreneurship in the high technology and manufacturing industrial sectors. The way the program promotes this is interesting. The results reveal patterns suggesting that the program allows entrepreneurs to incubate ventures in the targeted industries and then facilitates their expansion into larger firms that hire additional employees. The mean number of firms in the targeted industrial sectors, of an average New

York county, increased between 16.7 percent[14] and 19.7 percent[15] over the five years following the implementation of the program.

The results also indicate that New York's tax reforms are associated with large contractions in the numbers of small MFG firms in 2017 and small PST firms in 2018. We posit two explanations. The tax reforms, which disproportionally benefit larger firms because they have a scope of activities that allows them to more efficiently and effectively navigate and exploit the complexities of legislative changes, promote the entrepreneurial activities of larger firms in all sectors of the state's economy. These activities likely include larger firms outperforming poorly performing smaller firms or absorbing successful smaller operations. In the targeted industrial sectors, enterprise zones and tax reform may also be inducing more firm expansion among small firms than it does among micro firms. Either way, the tax reforms would be promoting entrepreneurial activity in all sectors of the state's economy. Since this implication is tentative, it should be supported by future research.

This analysis has important implications for the entrepreneurial policy literature. It explains why studies using secondary outcomes, like poverty and unemployment metrics, find little or no evidence to support entrepreneurial public policies or why the evidence in such studies is weaker the earlier the analysis is performed. In the case studied here, the workers who are hired by the firms that were incubated in the program live in zone counties or nearby non-zone counties. If the addresses of these workers are distributed fairly across the two types of counties, the county unemployment rates, which Snarr et al. (2018) differenced, would fall together as the program fosters entrepreneurial activity. Alternatively, the firms that were first to incubate in the program were small, headed by their founders, and staffed with few or no people.[16] Thus, in the first years of the program, the number of new workers hired by these firms would simply be too small to impact poverty or unemployment rates. Both explanations explain why the present results support START-UP NY as an entrepreneurial enhancing policy and the Snarr et al. (2018) results do not.

The analysis in this study has important implications for future research on enterprise zones. First, utilizing direct outcomes, as this study does, is more appropriate because entrepreneurs do not start businesses to alleviate poverty or reduce unemployment. They start businesses because they enjoy the process or they want to meet consumer demands that are unmet or are

[14] This value was computed using mean county projections that were calculated with marginal effects that were significant at the five percent level. These effects are denoted with '*' in Table 4.a.

[15] This value is reported in the last row of the final column of Table 4.b. It was computed using mean county projections that were calculated with marginal effects that were significant at the ten percent level.

[16] The circumstantial evidence in the academic and popular press reports that most of START-UP NY's success stories are small, owner-operated businesses with very specific or limited market niches (Snarr et al. 2017).

not being met effectively or efficiently. Second, indirect outcomes, like poverty or unemployment rates, can be useful in understanding how entrepreneurial policies affect society at large. However, these evaluations should be delayed sufficiently to allow the first and second cohorts of incubated firms to grow and evolve into larger firms. If these evaluations are done in the first years of implementation, the number of idle workers who secure positions in ventures incubated in enterprise zones will be too small to impact poverty and unemployment rates. Likewise, the collective earnings of these workers will be small next to state gross domestic product. Third, the outcomes that are selected to evaluate enterprise zones should be disaggregated according to the objectives of the policy that created them. Using overly aggregated outcomes can cloud evaluations and our understanding of the entrepreneurial process.

This study meaningful extends the entrepreneurial public policy literature. The results indicate that START-UP NY is accomplishing its objectives, and the above discussions resolve the discord in this literature. That said, the results do not evaluate whether START-UP NY generates optimal, or even cost-effective, outcomes. Future research is needed to determine if the entrepreneurial activities it generates are sufficient to justify the resources invested in it.

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