

Entrepreneurship policy and economic growth, solution or delusion?

Evidence from a state initiative**

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ABSTRACT

The last two decades marked a turning point for entrepreneurship policy, highlighting the crucial role of public policy to generate the conditions that encourage business creation and expansion. As more states design and implement entrepreneurship policies of their own, understanding how these policies can support and harness the full potential of entrepreneurship becomes more critical. This paper uses a quasi-market framework for development competition (Feiock, 2002) to report on the effects on economic growth of an entrepreneurship policy implemented in 2004 in the state of Kansas as part of the Kansas Economic Growth Act. Specifically, it studies the impact of tax credit funds provided by one of its programs, the Entrepreneurial Community (E-Community) partnership, on the economy of adopter counties between 2007 and 2010. The results from this study indicate the program has no conclusive effects on five general indicators of local economic and entrepreneurial activity.

Keywords: Entrepreneurship policy, economic growth, tax credits, public policy

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1. Introduction

“From the point of view of economics, subsidies should be only used to correct market failures or inefficiencies.” (Koski & Pajarinen, 2013)

Entrepreneurship is broadly recognized as the essential factor in the process of accelerating and sustaining economic growth (Acs & Szerb, 2007; Audretsch & Keilbach, 2004; Wennekers, van Stel, Thurik, & Reynolds, 2005). In fact, scholars argue that an economy with reduced entrepreneurial activity is likely to show reduced economic growth (Audretsch, Carree, van Stel, & Thurik, 2002). Nonetheless, the core of economic growth theories still lacks a thorough inclusion of entrepreneurship (Acs & Sanders, 2013; Romer, 1986). In this paper, we explore the interaction between entrepreneurship policy geared towards increasing entrepreneurial activity and economic growth by analyzing the local outcome of a state program. Following the verbatim of the program, entrepreneurship in this study is conceived of as entrepreneurial activity that leads to new firm creation (e.g. Reynolds, Bosma, & Autio, 2005). Our output indicator of county economic growth is measured using various indicators of change in local economic and entrepreneurial activity.

In the United States alone, two million entrepreneurs start new businesses every year, contributing to approximately seventy percent of the national economic growth (Kansas Department of Commerce, 2004). Some even suggest that we are living in an entrepreneurial era characterized by “flexibility, turbulence, diversity, novelty, innovation, linkages and clustering” (Audretsch & Thurik, 2004; Thurik, 2007, p. 6) where small businesses are leading the way (Johnson, 2007). Evidence suggests that regions that develop an entrepreneurial culture sustain and persist in the long run, as long as eighty years, surviving through the most turbulent political-economic times (Fritsch & Wyrwich, 2014).

In this scenario, the role of local governments to spur economic growth and development by supporting entrepreneurial activity is becoming more visible; county and state jurisdictions are increasingly crafting policies of their own to support local economic activity and lead the path to innovation (Betz, Partridge, Kraybill, & Lobao, 2012). Nonetheless, very few studies at the county level are available in the literature (Betz et al, 2012; Dewees, Lobao, & Swanson, 2003; Lobao & Kraybill, 2005).

Entrepreneurship policy, in particular, is becoming a popular economic development policy tool at the local, state, regional, and federal levels of government (Johnson, 2007). Some of the most common economic development incentives of our time are tax credit policies, subsidies and exemptions that motivate new start-ups and stimulate economic growth (Assibey-Yeboah & Mohsin, 2011). But, do particular entrepreneurship policies deliver the economic growth as intended and often purported? This study analyzes the case of the Entrepreneurial Community (E-Community) partnership's tax credit program administered by Network Kansas in an effort to empirically answer this question.

The E-Community Partnership's tax credit program was selected for this study because it offers an unusual structural process in which communities (i.e. counties, cities) receive funds that allow them to support their local entrepreneurs, which differentiate this program from others where the tax credits are directly allocated to businesses or are targeted at particular industries. The atypical nature of this strategy may prove useful for future practice, and thus its effects are worthy of exploration and analysis.

There are very few studies in the entrepreneurship literature that use data at the county level (Betz et al, 2012; Lobao & Kraybill, 2005), a level that provides maximum level of precision on our quest to understand what propels local entrepreneurial activity. Given the

scarcity of studies at the county level, this study aims to advance our discussion of how entrepreneurship policy can rightfully support business creation and retention at the local level, so that we are better able to assess its overall impact on the regional and national economies. Furthermore, entrepreneurship research rarely incorporates the entrepreneurship's spatial facet into their empirical applications (Plummer, 2010), thus this study is also a contribution to diversifying the pool of methodologies available in the field.

Key findings of this paper indicate the program has no conclusive effects on five general indicators of local economic and entrepreneurial activity. The remainder of this paper is organized as follows. Section 2 examines the rationales underlying entrepreneurship policy and economic growth, and discusses the often-contradictory findings in the literature regarding the effects of tax credit programs on supporting entrepreneurship, and accelerating and sustaining economic growth. This section also introduces the theoretical framework used for the study. Section 3 presents and discusses the Kansas Economic Growth Act and the entrepreneurship policy contained within. Section 4 describes the empirical implementation and data used for the spatial difference-in-differences analyses. Section 5 presents the key results from the analyses. Section 6 provides a conclusion of the study and discusses practical and policy implications, and suggestions for potential future research on entrepreneurship policy.

2. Background and theoretical framework

2.1 Entrepreneurship policy

“Policy which spurs economic growth and development may be justified either as a correction of markets which fail to adequately reward private investors for generating growth in an economy, to produce a public good in the form of increased social benefits, or to increase the rate of growth in lagging regions for

distributional reasons. The ideal economic policy generates the largest amount of benefits relative to its costs, as possible. We must therefore answer the question, what are the net benefits of entrepreneurship policy?” (Johnson, 2007, p.8).

Entrepreneurship policy, or policy which aims to promote higher entrepreneurial activity, seems to differ from other regulatory business policy in that while the latter frequently constrains firms, the former is aimed at fostering invention and the commercialization of knowledge broadly (Acs & Szerb, 2007). Since the 1990’s, countries have identified entrepreneurship policies as mechanisms to stimulate economic growth (Gilbert, Audretsch, & McDougall, 2004), employment generation, and competitiveness within (Huggins & Izushi, 2007) and in global markets (Lundstrom & Stevenson, 2005). In the last decade, the role of economic policy has shifted from regulating businesses to stimulating entrepreneurial activity (Audretsch & Thurik, 2001). In Sweden, for example, the Swedish Business Development Agency positions ‘good entrepreneurship’ as one of the four pillars of its growth policy[†] (Lundstrom & Boter, 2003). This innovation initiative also identifies the need for investment tax credits, new venture capital funds, and seed and risk financing as crucial components to support a business climate that favors early-stage entrepreneurial activity (Lundstrom & Boter, 2003).

Policymakers are increasingly pressured to assess and report the effectiveness and costs of new and existing policies. Entrepreneurship policy often needs to consider measurements of its direct effect on the entrepreneurial activity in a region, and the subsequent consequences of those activities for society (Lundstrom & Stevenson, 2005). Indeed, “the magnitude of the effects of new firm formation on growth differs considerably across regions pointing to the importance of region-specific factors.” (Fritsch, 2014, p. 3). And, although the determinants of

[†] The other three are capable people, dynamic innovation systems, and strong regions (Lundstrom & Boter, 2003).

entrepreneurship policy have been studied in the last two decades through both theoretical and empirical studies (Carree & Thurik, 2002), the cumulative effects of entrepreneurship policy are only evident in the long run due to ‘cultural embeddings’ (Minniti & Nardone, 2007; Szerb, Rappai, Makra, & Terjesen, 2007; Tominc & Rebernik, 2007) and transformational effects.

Johnson (2007) also suggests that regional conditions –culture, institutions, incentive systems, business organizations, business climate, and availability of assets to entrepreneurs- play a key role in influencing local and regional levels of entrepreneurship that form the basis for sustained economic development. Indeed, institutions provide the organizational arrangement that regulates the creation of incentives and economic performance (North, 1981, 1990) and which also contributes to reducing uncertainty in daily economic transactions (Brinton & Nee, 1998). In fact, a three-decade study by Fritsch and Storey (2014) confirms formal institutions have strengthened their relationship over time with the development of an entrepreneurial culture in the region. In the realm of entrepreneurship, it is thus helpful “to think about the role of the entrepreneur’s context [...] as the regulator of the outcomes of entrepreneurial action.” (Acs, Autio, & Szerb, 2014, p. 479).

As the leading entrepreneurial economy in the world (Schramm, 2006), both in entrepreneurship research and practice, the US has led the development of a more comprehensive entrepreneurship policy framework, when compared to moderately developed (Acs & Szerb, 2007) and developing countries. One of the policies directed specifically to entrepreneurs within any leading entrepreneurial framework is their access to finance (Cassar, 2004). Most organizational entrepreneurship ventures, particularly new firms, are characterized by severe resource constraints (Baker & Nelson, 2005; Román, Congregado & Millán, 2012). Established firms generally have access to venture and public capital markets, but these resources are not

widely available to new (Holtz-Eakin, Joulfaian, & Rosen, 1994; National Venture Capital Association, 2001) or small firms.

In an effort to address market inefficiencies, governments frequently use economic development incentives such as tax credit policies, subsidies and exemptions to motivate investment decisions and stimulate economic growth (Assibey-Yeboah & Mohsin, 2011). In fact, some of the issues addressed in the second Global Entrepreneurship Research Conference focused on the influence of regulation on new firm startups as a development strategy (Acs & Szerb, 2007). Holcombe (1998) states that integrating entrepreneurship as a key element into the economic growth agenda leads to “more promising economic policy recommendations for fostering economic growth” (p. 60). Some even conclude, “federal economic development programs in the US should encourage and strengthen innovation, entrepreneurship, and competitiveness” (Drabenstott, Novack, & Abraham, 2003).

Furthermore, research on entrepreneurship policy across disciplines is highly disconnected. On the one hand, scientists in macroeconomics, economic development and public policy are mostly concerned with the macro effects of entrepreneurship on the economy. On the other hand, entrepreneurship and the management fields are rightly focused on the individual and the firm but do not extend to their implications on the economy (Audretsch, Grilo, & Thurik, 2007). Thus, considering that entrepreneurship policy has become a popular economic and political tool in the last two decades and that its widespread effects are still vastly understudied, empirical evidence that crosses disciplines becomes more salient and critical. New methodologies, individual government studies, and integrative frameworks are warranted (Bartik, 1994; Feiock, 2002) to inform the design, implementation and evaluation of policy that

targets sustainable levels of economic growth through business creation, attraction, retention, and/or expansion.

This study aims to advance prior research efforts on entrepreneurship policy's best practices by evaluating a state entrepreneurship policy using a multi-disciplinary theoretical and methodological lens. The distinctive design of the policy under study and the research design applied offer an opportunity to efficiently capture externality and impact effects that can inform studies in other contexts.

2.1.1 Entrepreneurship policy and tax credits

Entrepreneurship policy alone has not been the only innovative policy tool of the last two decades. Its development interestingly parallels an increase in the use of economic development incentives in the United States (Chi, 1994; Greenberg, 1998; Gabe & Kraybill, 2002; Hicks & LaFaive, 2011) to the point that almost every state offers some kind of incentive package (Coleman, 2005). Prior research finds that US state and local governments spend approximately USD50 billion every year on incentives for economic development (Peters & Fisher, 2004; Thomas, 2000) such as tax credits. The intervention is likely aimed at fixing market failures that derive from capital market imperfections (Catozzella & Vivarelli, 2011) and the non-rivalry of knowledge, which prevents the private sector from fully capturing all the benefits derived from their investments (Arrow, 1962).

'Business' tax credits in particular, sometimes contained within an overarching entrepreneurship policy, are primarily used to support technological innovation (Wu, 2005), joint ventures' riskier research (Bozeman & Link, 1985), encourage reinvestment in empowerment zones (Lorenz, 1995), induce business creation, support expansion and relocation of existing businesses, and protect them from failure and competition (Buss, 2001). Their benefits are

perceived by states to be higher than their costs because ultimately states recover their investment through direct payments or indirectly through taxes and growth (Buss, 2001). Nonetheless, there are conflicting views among scholars and policymakers regarding the net benefits of business tax credit policies. For instance, a regional study in Germany by Fritsch and Mueller (2004) finds mixed effects of new firm formation on regional economic growth, and further argues that the indirect effects (e.g. increased competition and competitiveness) are larger than the direct benefits new firms generate (e.g. job generation).

A large body of literature argues that the public return on tax credit investments is lower than assumed because the programs distort the economic dynamics (Auerbach & Summers, 1979), reduce government revenues (Assibey-Yeboah & Mohsin, 2011), displace private investment that would have happened otherwise (see Catozzella & Vivarelli, 2011 and Wallsten, 2000 for examples), are inadequate for fiscal accountability (Hicks & LaFaive, 2011), and increase the burden on non-beneficiary taxpayers (Betz et al, 2012; Watson, 1995). Pereira (1994) concludes that tax credit incentives are negatively related to investment and output. In the short run, because taxpayers are the bearers of the cost of tax credit policies, economies where these policies are implemented experience a decline in aggregate consumption expenditures due to an income effect (Assibey-Yeboah & Mohsin, 2011). In a study of the California's enterprise zone program, Kolko and Neumark (2010) find that there is a negative relationship between employment generation and the time that it takes for firms to apply for tax credits. They also find that enterprise zones that dedicate a higher share of time to marketing and outreach endeavors experience higher returns on employment.

Furthermore, tax credit incentive programs are also criticized for increasing inequality among firms (Hicks & LaFaive, 2011) and among municipalities. Longitudinal evidence

suggests that more prosperous cities tend to adopt tax credit programs more frequently than poorer municipalities (Buss, 2001; Thompson, 1965). Reese (2006) argues that prosperous cities benefit the most from this type of program due to a higher familiarity with the process than less wealthy cities. Similarly, Hanel (2003) finds that large companies are the most recurrent recipients of tax credits, compared to firms of smaller sizes. And, firms tend to frequently allocate tax credits to projects that promise the highest rate of return (David, Hall, & Toole, 2000), which implies that tax credits are likely to be used on high-growth short-term projects (Cznarnitzki et al, 2004). Opposite evidence suggests that it is in fact poorer or struggling municipalities that engage in economic development incentives (Pagano & Bowman, 1995).

Cznarnitzki and colleagues (2004) argue that, despite some of their benefits, tax credits may not be the most efficient tool to correct market failure because their selection and allocation process by governmental agencies is itself a ‘government failure’, that in some cases may be “even larger than the market failure it is supposed to correct” (p.8). A study of enterprise zone programs by Wilder and Rubin (1996) indicates that tax incentives can become more effective when they are combined with other economic development strategies such as technical assistance or location/site analysis.

In contrast, tax credits are seen as good politics (Mueller, 1989; Peterson, 1981) (as opposed to good policy) because while taxpayers are unaware of or indifferent to the loss of public revenues, businesses and communities that receive tax incentives become more supportive of government (Buss, 2001). Also, officials tend to implement more economic development incentives than the optimal level needed because they are typically uncertain or unaware of the business climate local residents and businesses desire (Jones & Bachelor, 1986). Accordingly, risks to politicians who introduce tax incentives are very low.

Often, tax incentive programs are not required to be included in annual budgets and therefore avoid scrutiny. Any failure in these programs is attributed to economics, market forces or mismanagement (Buss, 2001). Other evidence in favor of tax credit policies suggests that government intervention stimulates innovative firm activity that might have otherwise not taken place (Busom, 2000; González, Jaumandreu, & Pazó, 2005). Research suggests that because they reduce the cost of capital investment, the economy experiences a rise in the number of jobs and investment capital available, while it also increases worker productivity (Assibey-Yeboah & Mohsin, 2011). Moreover, in a study of R&D tax credits in manufacturing firms in Canada, Czarnitzki and colleagues (2004) find that R&D tax credit policy increases investment in R&D among firms, which leads to added innovation productivity.

2.2 A quasi-market framework for development competition

In 2002, Feiock (2002) proposed a quasi-market framework for development incentives and competition, designed to integrate theoretical perspectives on the economic externalities that local governments seek to obtain by supporting competition in the private sector. This framework specifically addresses the relationship among market failures, government intervention, and government failures that takes place in the pursuit of economic development. It reconciles findings on economic development competition that suggest it is beneficial to the economy (Kotler, Haider, & Rein, 1993), with opposing arguments that suggest this strategy is ‘destructive’ (Feiock, 2002) and benefits only a few wealthy groups (Howard, 1994). The framework also incorporates concerns regarding the typically unforeseen costs to communities that development competition creates (Turner, 1990).

Feiock's quasi-market framework for development competition primarily assumes that governments intervene[‡] in the private sector to achieve higher social welfare, and that this intervention is aimed at satisfying citizens' request for economic growth and change. Basically, a quasi-market is efficient in economic terms if and only if "the marginal benefit (economic and social) of the last dollar spent on development programs equals the marginal benefit of the growth induced" (p. 125) and this benefit-cost ratio accounts for the opportunity cost of using a particular development incentive/program. It also acknowledges that with any intervention also come externalities for local residents, and therefore assumes that the value of development on each taxpayer differs by individual perceptions. These perceptions differ among communities because as Feiock (2002) explains, for some localities that are already experiencing growth, the marginal value of additional benefit is lower or zero than for communities still lagging behind (Rubin & Rubin, 1987).

Furthermore, competition among local governments occurs because they offer incentives to attract mobile business capital (Peterson, 1981) from profit-optimizer investors that search for the ideal equilibrium between public services and taxes (Betz et al, 2012). Although some evidence suggests that taxes and government incentives do not influence business mobility (Logan, Whaley, & Kyle, 1997), scholars argue that small differences within an otherwise homogeneous region (i.e. similar natural endowments, geographic location and community characteristics) can decisively determine firm location (Bartik, 1991; Fisher & Peters, 1998). A positive competition effect is thus achieved when "development actions create expanded economic opportunities rather than simply moving investments around" (Feiock, 2002, p. 127).

[‡] Intervention can take different forms depending on the identified needs of the locality. The most common forms of subsidies are tax abatements; tax credits; tax increment financing (TIF); grants; loans; and provision of information, land or infrastructure.

Given the diversity of public incentives and their range of action, development incentives targeted at specific industries or groups can lead to monopoly, excessive concessions and government failures that disrupt the competitive equilibrium and provide little evidence of success (Betz et al, 2012; Feiock, 2002). Clarke and Gaile (1998) suggest that broad-scope incentives which do not target a specific group, and policies which focus on improving human capital and encouraging entrepreneurship are better perceived by taxpayers and generate higher economic returns than those that do not. Based on this evidence and on the goals of the entrepreneurship policy introduced by the The Kansas Economic Growth Act (KEGA) (section 3 below), we propose the primary driving hypothesis for this study

Hypothesis 1. The tax-credit portion of the entrepreneurship policy introduced in the Kansas Economic Growth Act encourages entrepreneurship and generates higher economic activity for counties that participate in the E-community partnership.

3. The object of study

3.1 The Kansas Economic Growth Act (KEGA)

The Kansas Economic Growth Act (KEGA) was passed in the state of Kansas in 2004. It was designed with Entrepreneurship and Bioscience at its core, and a budget of \$530 million to be allocated in development incentives over the subsequent decade (Kansas Department of Commerce, 2004). The entrepreneurial initiative of the KEGA focuses primarily on the creation and expansion of entrepreneurial ventures so that they can sustainably contribute to developing the Kansas economy.

As part of the KEGA, the Kansas Center for Entrepreneurship or Network Kansas was founded to work with all entrepreneurship organizations in Kansas to create policies that foster

entrepreneurship throughout the state, particularly targeting rural and distressed communities. Network Kansas oversees collaboration among federal, state, and local economic development and entrepreneurial assistance organizations. It was also designed to manage the Kansas Community Entrepreneurship Fund, created to provide seed funding for qualified entrepreneurs through the Entrepreneurship Community (E-Community) Partnership's Tax Credit program.

The total budget for both Network Kansas and the Kansas Community Entrepreneurship Fund totaled \$3.5 million in 2004 (Kansas Department of Commerce, 2004). Every year, the E-Community Partnership's Tax Credit program assists qualified partner communities (i.e. counties, cities, towns, clusters of towns) in the creation of local loan funds that support local entrepreneurs. Local organizations can contribute to the local fund and receive in return a tax credit, which allows an investor to utilize 50 percent of a qualifying investment as a dollar-for-dollar credit to reduce their income tax owed to the state. At its creation, Network Kansas was projected to generate approximately three million dollars in business development resources after five years of operations. By 2011, E-Communities reached beyond that goal, by raising \$4.7 million in funds through the Partnership (Network Kansas, 2011).

3.2 Network Kansas and the E-Community Partnership

Network Kansas started operations with the 2006 fiscal year. Its mission is “to promote an entrepreneurial environment throughout the state of Kansas by establishing a central portal that connects entrepreneurs and small business owners with the right resources - expertise, education, and economic resources” (Network Kansas, 2011).

Since 2006, Network Kansas has held an annual competition in which Kansas' counties, cities, or clusters of towns can apply to be part of an innovative Entrepreneurship Community

Partnership where each participant county/city/cluster or towns is referred to as an E-Community. Becoming an E-Community empowers participant communities to raise local seed capital to invest in new or expanding local businesses. E-Communities can apply for up to \$300,000 in tax credits from the Network Kansas Entrepreneurship Tax Credit program (Network Kansas, 2011).

This study focuses solely on the Entrepreneurship Community (E-Community) Partnership's Tax Credit program and the recipient counties. The analysis has three parts. The first part focuses on the development of key indicators of local economic and entrepreneurial activity to explain changes per county. The second part uses a spatial difference-in-differences statistical technique to study how becoming an E-Community and receiving tax credit funds affects participant counties' economic activity. The third and final part includes sensitivity analyses that corroborate the internal validity of the findings.

4. Empirical implementation

4.1 Spatial difference-in-differences

“Entrepreneurship is a phenomenon of time and space” (Plummer, 2010, p. 146).

This study uses a spatial difference-in-differences statistical technique to calculate the effect of the Entrepreneurship Community Partnership Tax Credit program on participating counties. The difference-in-differences specification is a method often used to comparatively evaluate the before and after effects of a treatment on those who receive it, compared to a control group with similar characteristics which does not receive treatment (Artz, Orazem, & Otto, 2005). Several studies use difference-in-differences to address endogeneity in policy causal models. For instance, Kneller and McGowan (2011) use a difference-in-differences technique to address endogeneity bias of tax policy on firm entry and exit dynamics.

Saiz (2001) finds that the economic and political situation of counties affect economic development policies designed and implemented in neighboring counties. As Plummer (2010) argues, spatial dependence in entrepreneurship research is more imminent than most researchers care to admit. He suggests the use of spatial techniques to account for spatial correlation among observations within the same geographic unit. Anselin and Bera (1998) also confirm that spatial dependence among variables produces inconsistent, bias, and inefficient estimators in OLS, therefore suggesting that spatial techniques be applied.

This study uses a spatial difference-in-differences technique because the location of the E-Community counties across the state suggests that spatial autocorrelation may exist. We use Moran's I statistics to test for the potential spatial autocorrelation in the estimated covariance matrix due to 'spillover' effects of participation in the E-Community program. The Moran's I statistic is generated as (Anselin & Bera, 1998, p. 265):

$$I = e_s' W e_s / e_s' e_s \quad (1)$$

where,

W = weight matrix defined using county latitude and longitude coordinates (at centroid)

The null hypothesis for Moran's I statistic is that there is zero spatial autocorrelation present in the dependent variables of interest in participant counties (E-communities). This hypothesis is rejected ($p < .01$) for each of the dependent variables tested[§], which confirms the expected presence of spatial dependence.

We use a spatial lag difference-in-differences model to correct for outcome in county i depending on outcomes in nearby (or spatially dependent) counties. The spatial term in the

[§] Moran I's values for dependent variables are: .055 for per capita proprietor's income growth, .122 for per capita personal income growth, .111 for employment growth, .075 for growth in number of proprietors per capita, and .092 for growth in average earnings per job. All Moran's I values are significant at $p < .01$ and correspond to the difference between 2010-2007 (post treatment).

model is a spatial weights matrix (also in equation 1) defined using county latitude and longitude coordinates (at centroid), which parameterizes the spatial dependence (distance) between Kansas' counties. It follows Tobler's first law of geography (1970), which states, "everything is related to everything else [...] but near things are more related than distance things" (p. 236). We build an inverse-distance matrix W to set the "spatial structure of the data" (Plummer, 2010, p. 153) from Latitude and Longitude data by county of the form

$$W_{ij} = 1/D(i,j) \quad (2)$$

where,

$D(i,j)$ = distance between counties i and j

"The presence of a spatial lag term, $W\gamma$, on the right side of (3) induces a nonzero correlation with the error term, similar to the presence of an endogenous variable" (Anselin & Bera, 1998, p. 246). In the presence of spatial (lag) dependence, parameter estimates in linear regression models will generally be biased and inconsistent (Anselin, 1988). The use of spatial econometrics is also "in general widely accepted as highly relevant in the analysis of cross-sectional data" (Anselin & Bera, 1998). Spatial difference-in-differences is selected over other methods because this approach allows to correct for endogeneity bias caused by observed and unobserved spatial effects (Greenstone & Gayer, 2007) across counties. As Anselin (1988) suggests, the spatial lag model is used when spatial dependence is 'substantive' whereas the spatial error model is used when spatial dependence is 'apparent'. As a robustness check, both models are used and comparative results are presented. Anselin and Bera (1998) and Haining (1990) offer more details on how to deal with spatial correlation by using a spatial term in the model.

-Figure 1 approximately here-

4.2 Dependent variables

We identified five dependent variables as proxy indicators of local economic and entrepreneurial activity post-treatment. These include: Proprietors' income growth per capita between 2010-2007, personal income growth per capita between 2010-2007, employment growth between 2010-2007, growth in the number of proprietors per capita between 2010-2007, and growth in average earnings per job between 2010-2007. These indicators were selected because together they offer a more complete evaluation of economic and entrepreneurial activity per county.

4.3 Independent variables

The main explanatory variable in this model is a continuous variable that represents the tax credit allocation per capita received by the participating county or E-Community over a four-year period (2007-2010). Tax credit amounts allocated to each county were obtained directly from the program.

4.4 Control variable

We include years in the program in the model. 'Years in the program' is a continuous variable that indicates the number of years since the county received its first tax credit allocation (e.g. 0, 1, 2, 3, 4).

4.5 Model specification

The spatial difference-in-differences model for this study is as follows:

$$\gamma_{it} = \alpha + \rho W\gamma_{it} + \beta_1 \text{Adoption}_{it} + \beta_2 \text{county_controls}_{it} + \beta_3 \text{Adoption} * \text{Years}_{it} + u_i \quad (3)$$

where

γ = indicator of local economic activity for adoption period, between 2007 and 2010

ρ = spatial autoregressive parameter

W = spatial weights matrix

Wy = spatially lagged dependent variable

Adoption = Tax credit per capita

Years = Years in the program

$u = (\varepsilon_{it+1} - \varepsilon_{it}) \sim N(0, \sigma^2)$

i = county

t = 2007-2010 (years)

4.6 Sensitivity analyses

We ran a spatial error model and a non-spatial difference-in-differences model as sensitivity analyses. We also ran placebo tests where the dependent variable is lagged to the time before the policy was established (2006-2001) for each one of the models. None of the variables of interest in the placebo tests were statistically significant. This confirms that our spatial difference-in-differences model accounts for the endogeneity bias that can be encountered in policy analysis models. We also ran alternative models using control variables such as job growth rate 2010-2007 and highway adjacency. For these last tests, the results obtained were the same as without the control variables. This is justified by the presence of the spatial lagged term in the model which captures endogeneity due to spatial correlation, and therefore implies a non-zero correlation with the error term.

5. Results

This section discusses the findings from the spatial difference-in-differences model that measures the effectiveness of the E-Community Partnership's Tax Credit program. The analysis includes 85 Kansas counties, 15 of which are E-Communities and 70 of which are non E-Communities. Table 1 shows descriptive statistics for the variables in the main model and

sensitivity analyses. Table 2 presents the results of the spatial (lag) difference-in-differences model, compared to the results of a spatial (error) difference-in-differences model in Table 3 and a non-spatial linear regression model in Table 4.

-Table 1 approximately here-

-Table 2 approximately here-

Overall, the results of the spatial difference-in-differences lag model indicate no effect of the program on five general indicators of local economic and entrepreneurial activity.

Specifically, no significant effect is observed post-treatment (2007-2010) for the following indicators: per capita proprietors' income growth, employment growth, growth in the number of proprietors per capita, and growth in average earnings per job. From the five alternative dependent variables used, only one indicator, personal income growth per capita, is significant ($p < .01$), and indicates a diminishing effect over time (years in the program, $p < .05$), thus suggesting the largest effect of the program on personal income growth per capita occurs at initiation. However, this isolated effect is inconclusive given the overall results. All results are consistent across the spatial lag, spatial error, and non-spatial models. Hypothesis 1 is therefore not supported.

-Table 3 approximately here-

-Table 4 approximately here-

6. Conclusion

Tax incentives, in particular tax credits, are popular tools among politicians who wish to support local businesses and spur economic activity. Nonetheless, among economists, the effect of this type of subsidy on correcting market failures is often mixed. When it comes to entrepreneurship policy, we observe that providing access to finance is typically the main

objective of most entrepreneurship programs. And although entrepreneurship policies can be increasingly identified in practice, public efforts which aim to support entrepreneurial activity are often found intertwined within larger economic development programs.

The E-Community Partnership's tax credit program is part of a larger state initiative enacted in Kansas in 2004 and implemented in late 2006, designed to support entrepreneurship throughout the state. This program was selected for this study because it offers an unusual structural process in which communities (i.e. counties, cities) receive funds that allow them to support their local entrepreneurs, which differentiate this program from others where the tax credits are directly allocated to businesses or are targeted at particular industries. The goal of this study was to evaluate the effects of this state initiative on the local economic and entrepreneurial activity of participant communities.

Our results across spatial and non-spatial models indicate that there is no effect of the E-Community Partnership's Tax Credit program on participating communities, suggesting the success of this program from an econometric perspective is yet to be seen. Further analyses are warranted to make a definite conclusion regarding the long-term effectiveness of the Tax Credit program developed and managed by Network Kansas. Markley and colleagues (2008) suggest that studies regarding economic growth should have at least 10 years of data post-policy implementation. Although the time frame for this study falls short of this ideal, future research on this program should expand the present study by using longitudinal data that includes more years post-adoption. In addition, it would be useful to determine if the overall state economy is enhanced by the program, ideally using a variety of complementary socio-economic indicators.

Wilder and Rubin (1996) argue that development programs that combine tax incentives with other strategies such as local technical assistance are more effective than tax incentive

programs on their own. Considering the goal of the E-Community Partnership to create a self-sustaining entrepreneurial ecosystem in the state, further research could explore the networking assistance and activities that the partnership offers to entrepreneurs and small businesses in addition to the E-Community Tax Credit program. Further research could also examine how the increased networking and access to resources through the network contributes to the economic performance of their corresponding communities.

Public information regarding Network Kansas' strategic activities across the state indicates the program is expanding its efforts across as many counties as it can capture. The Moran's I statistic and the results of the spatial difference-in-differences model in this study, show that participating E-Community counties are indeed spatially correlated, hence enhancing the need for future studies which consider spatial correlations and the immediate economic effects, both positive and negative, on neighboring counties of participant e-communities.

Appendix

Twenty counties with missing information that could not be included in the study

Butler	Grant	Marion	Rooks
Clark	Harper	Marshall	Rush
Coffey	Kearny	Montgomery	Smith
Comanche	Kingman	Morton	Stevens
Ellis	Lane	Ness	Wallace

Table 1. Descriptive Statistics

Variable	Obs	Mean	(SD)	Min	Max
<i>Dependent Variables</i>					
Per capita proprietors' income growth 2010-2007	85	960.23	(1980.8)	28.82	12155.7
Per capita personal income growth 2010-2007	85	.128	(.115)	-.075	.501
Employment growth 2010-2007	85	.01	(.069)	-.173	.235
Growth in number of proprietors per capita 2010-2007	85	.083	(.134)	-.136	.479
Growth in average earnings per job 2010-2007	85	.122	(.147)	-.175	.717
<i>Independent Variables</i>					
Tax credit per capita	85	4.275	(13.45)	0	86.68
Years in the program	85	.459	(1.108)	0	4
<i>Control variables</i>					
Job growth rate 2010-2007	85	.936	(6.518)	-16.38	24.92
Highway adjacent	85	.353	(0.481)	0	1
<i>Placebo tests</i>					
Per capita proprietors' income growth 2006-2001	85	.245	(.649)	-.899	3.175
Per capita personal income growth 2006-2001	85	.158	(.120)	-.219	.426
Employment growth 2006-2001	85	-.015	(.059)	-.143	.177
Growth in number of proprietors per capita 2006-2001	85	.032	(.072)	-.132	.297
Growth in average earnings per job 2006-2001	85	0.185	.165	-.265	.554

Table 2. Difference-in-differences results - spatial lag model

	Per capita proprietors' income growth 2010- 2007	Per capita personal income growth 2010-2007	Employment growth 2010-2007	Growth in number of proprietors per capita 2010-2007	Growth in average earnings per job 2010- 2007
Tax credit per capita	-8.79 (9.79)	.003*** (.001)	.001 (.0009)	.003 (.002)	.002 (.002)
Years in the program	25.77 (143.39)	-.022** (.009)	-.009 (.006)	-.026 (.014)	-.005 (.011)
Rho	.033*** (.013)	.043*** (.014)	.037*** (.008)	.037*** (.011)	.049*** (.021)
Intercept	-510.43 (526.9)	-.116 (.073)	-.005 (.008)	-.052 (.038)	-.139 (.101)
Observations	85	85	85	85	85
Chi2	6.58	9.4	19.4	11.86	5.62
Sigma	1864.92	.10	.07	.12	.14
Log likelihood	-760.74	72.1	116.96	57.22	48.97
Robust model	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are in parenthesis. *, **, *** means significant at the .1, .05, and .01 levels, respectively.

Table 3. Difference-in-differences results - spatial error model

	Dependent Variables				
	Per capita proprietors' income growth 2010- 2007	Per capita personal income growth 2010- 2007	Employment growth 2010-2007	Growth in number of proprietors per capita 2010-2007	Growth in average earnings per job 2010- 2007
Tax credit per capita	-8.421 (8.77)	.002** (.001)	.001 (.0008)	.003 (.002)	.001 (.002)
Years in the program	38.94 (137.71)	-.016** (.008)	-.009 (.006)	-.022 (.013)	.0002 (.009)
Lambda	.033*** (.013)	.043*** (.015)	.039*** (.009)	.037*** (.012)	.051** (.022)
Intercept	-584.8 (551.8)	-.115 (.081)	-.003 (.008)	-.050 (.044)	-.144 (.111)
Observations	85	85	85	85	85
Chi2	6.69	8.39	19.03	9.7	5.16
Sigma	1865.4	.10	.06	.12	.14
Log likelihood	-760.77	71.37	116.74	56.6	48.85
Robust model	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are in parenthesis. *, **, *** means significant at the .1, .05, and .01 levels, respectively.

Table 4. Difference-in-differences results – non-spatial model

	Dependent Variables				
	Per capita proprietors' income growth 2010-2007	Per capita personal income growth 2010-2007	Employment growth 2010-2007	Growth in number of proprietors per capita 2010-2007	Growth in average earnings per job 2010-2007
Tax credit per capita	-20.63*** (6.31)	.003** (.001)	.002 (.001)	.004 (.002)	.002 (.002)
Years in the program	66.54 (106.4)	-.016** (.008)	-.01 (.008)	-.024 (.017)	-.0002 (.009)
Intercept	1017.86*** (252.48)	.124*** (.013)	.007 (.008)	.079*** (.015)	.114*** (.016)
Observations	85	85	85	85	85
F	6.21	3.74	1.76	1.29	.66
R-squared	.013	.053	.063	.059	.028
Robust model	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are in parenthesis. *, **, *** means significant at the .1, .05, and .01 levels, respectively.

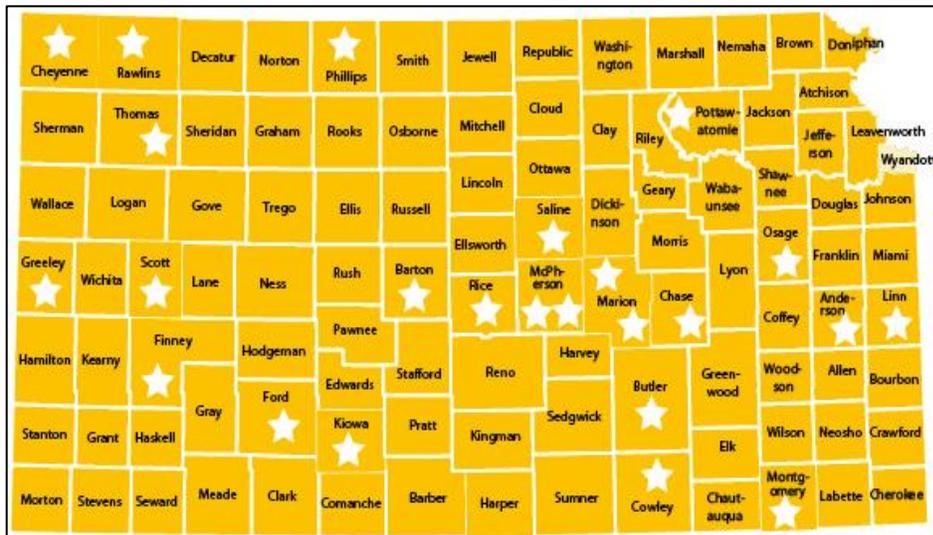


Figure 1. Spatial location of E-communities (counties + cities)

Source: Network Kansas website (2011).

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