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The Location of Business Support Programs: Does the Knowledge Context Matter?

(DRAFT!)

(For the 13th Uddevalla Symposium Special Session of the 50th ERSA Congress)

Haifeng Qian
Kingsley E. Haynes (corresponding author, khaynes@gmu.edu)
Sidney C. Turner

School of Public Policy
George Mason University

ABSTRACT
Business support programs, represented by small business development centers (SBDCs), business incubators and Small Business Innovation Research grants (SBIRs), play an important role in assisting new or small firms, nurturing entrepreneurial culture, and facilitating regional growth. Previous studies have found that the presence of business incubators in a region is positively associated with the level of agglomeration and negatively associated with the level of business development. It is however unclear whether the local knowledge context may influence the local presence of SBDCs, business incubators or SBIRs. This paper examines the role of knowledge in shaping the geography of US business support programs using county-level data.

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1. Introduction

The important role of entrepreneurship in economic development has been widely accepted today (Acs and Audretsch, 2003). One important way to understand entrepreneurship is through new and small firms. In the US, new businesses or start-up firms play an important role in creating jobs, driving growth, and introducing innovations to market. For instance, new firms account for all the positive job growth in the late 1990s (Acs and Armington, 2006). New firm formation is also positively associated with economic growth of US regions (Acs and Armington, 2006). Moreover, empirical studies (Acs and Audretsch, 1987; 1988) have shown that small firms are more innovative than large firms in terms of innovations per employee.

Recognizing the increasingly important role of entrepreneurship in economic development, policy makers at federal, state and local levels have initiated or sponsored several programs to support new businesses and small businesses. At the federal level, the Small Business Development Center (SBDC) program was introduced in 1977 by the Small Business Administration (SBA), offering one-stop assistance to small businesses through local branch offices. Services provided by SBDC offices cover nearly all aspects of small business management such as organization, production, financing, marketing, procurement assistance, international trade, technical assistance, and assistance in applying for Small Business Innovation and Research (SBIR) grants from federal agencies. The SBDC program is a cooperative effort while the SBA offers 50 percent or less of the operating funds and the

matching funds are provided by state governments, chambers of commerce, economic development corporations, private foundations, universities or colleges, and/or others.[1]

Another federal effort to assist small firms is the Small Business Innovation and Research (SBIR) program that was introduced by the Congress in 1982 (reauthorized in 1992 and 2002). According to this program, 11 federal agencies[2] allocate at least 2.5% of their R&D budget to support small and medium enterprises (SMEs) for innovation projects. The SBIR program was designed as three phases. Phase I awards the SME up to $100,000 and six months based on the scientific and technical merit and feasibility of an idea. Phase II chooses those promising Phase I projects and further funds their affiliated SMEs with up to $750,000 and 2 years. Phase III relies on private or non-SBIR federal support for commercialization of developed technologies. A detailed introduction of the SBIR program can be seen in Haynes and Qian (2009).

Public efforts at the state or local levels feature the business incubation program that aims at the successful development of start-up and fledgling companies. The entities pursuing business incubation, called business incubators, provide entrepreneurs with a variety of resources and services such as shared facilities administrative services, business knowledge training, marketing assistance, accounting/financial management, investor and strategic partner linkages, and networking (Wiggins and Gibson, 2003). Business incubators are

[1] Source: http://www.sba.gov/aboutaba/sbaprgrams/sbdc/aboutus/index.html, retrieved March 6, 2010.

[2] Participant agencies are Department of Agriculture, Department of Commerce, Department of Defense, Department of Education, Department of Energy, Department of Health and Human Services, Department of Transportation, Environmental Protection Agency, National Aeronautics and Space Administration, National Science Foundation and Department of Homeland Security.

generally hosted and funded by economic development corporations, local government agencies, or universities or colleges. There are a small number of for-profits business incubators. North American incubators in 2005 assisted 27,000 start-up companies, created more than 100,000 jobs, and generated revenue of $17 billion (Knopp, 2007).

There is a geographic dimension for these three business support programs. Each SBDC office or incubator must be located somewhere. And SBIR grants go to the places where their hosting firms are. The location of SBDCs, SBIRs and business incubators are important not only for individual firms or entrepreneurs but also for a regional economy as a whole. At the micro level, small businesses or entrepreneurs can benefit from business support programs. Chrisman and Katrishen (1995) find that assistance from SBDCs increases the sales and employment of client firms. Tenant firms of the National Business Incubation Association (NBIA) member incubators exhibit a five-year success rate (still in business when five years old) of 87% (University of Michigan et al. 1997), compared with a four-year success rate of 50% for US firms on average (Headd, 2000). And receiving SBIR grants accelerates the growth of awardees firms (Lerner, 1999). At the macro level, Chrisman et al. (1985) reveal that tax dollar returns as a result of supporting the SBDC program in Georgia and South Carolina are higher than the operating costs of SBDC offices. In the case of incubators, 84% of firm graduates choose to stay in their communities (University of Michigan et al., 1997), which subsequently contribute to local economic development. And the SBIR program has fostered entrepreneurial activity (Audretsch et al., 2002).

Despite the importance of the location of business support programs, a spatial or geographic analysis on these programs has been very rare. In particular, the question why some regions but not others host these programs has not been well answered. This may interest regional planners or economic practitioners who have the incentive to create or attract these programs. This paper presents the geographic patterns of SBDCs, incubators and SBIRs in the US, and explores regional or environmental factors that are associated with the local presence of these business support programs. For the latter objective, we specifically examine whether the knowledge context of a region affect the presence of business support programs after controlling a set of demographic, social and economic variables that might matter.

2. Spatial Patterns of SBDCs, Business Incubators and SBIRs

In this section we present the geographic patterns of US business support programs. We first provide some information on our data source, and then show the distributions of these programs by urban/rural division, by state, and by county.

2.1 Data

Information of US SBDC offices was obtained from American's Small Business Development Center Network (www.asbdc-us.org) in January 2010. The website provides the name and detailed address for each SBDC office by state. The address information together with a

commercial database that links ZIP codes with county FIPS codes[3] has allowed us to locate SBDC offices by county.

A complete list of US business incubators to our best knowledge is not available. We use the incubator population identified by a research team including researchers from West Virginia University, George Mason University, and Florida International University (2009). In early 2009, this research team collected information of business incubators based on various sources including the NBIA, state business incubation associations, state government agencies, and the Internet. While business incubators may shut down any time, the existence of those incubators on the preliminary list was verified through either phone calls or those incubators' official websites. After that, 719 incubators in the US (including 713 in continental states) were confirmed.

The SBIR information was gathered from the Small Business Administration (SBA) Technology Resources Network (web.sba.gov/tech-net/public/dsp_search.cfm). All the Phase I awardees in 2009 are considered in this paper. Phase II and Phase III are extensions of Phase I and therefore are not included.

2.2 Geographic patterns of business support programs by urban/rural division

[3] The database was purchased from www.zipinfo.com.

We analyze the spatial patterns of business support programs for the lower 48 states and Washington, DC only considering geographic discontinuity of Alaska and Hawaii. Table 1 presents the distributions of SBDCs, incubators, and SBIRs by urban/rural division using the Metropolitan Statistical Areas (MSAs) criteria defined by the Office of Management and Budget (OMB). It can be seen that business support programs concentrate in cities, while respectively 65.56% of SBDCs, 77.70% of business incubators, and 96.00% of SBIRs are located within MSAs. Only 11.11% of SBDCs, 7.43% of incubators, and 0.54% of SBIRs can be found in places out of core based statistical areas. SBIRs are thus more likely to occur in Metro areas than SBDCs and incubators.

Table 1: Distributions of SBDCs, incubators, and SBIRs by urban/rural division

Area	SBDCs		Incubators		SBIRs	
	Number	Percent	Number	Percent	Number	Percent
Metropolitan	531	65.56%	554	77.70%	3215	96.00%
Micropolitan	189	23.33%	106	14.87%	116	3.46%
Out of Core Based Statistical Areas	90	11.11%	53	7.43%	18	0.54%
Total	810	100%	713	100%	3349	100%

2.3 Geographic patterns of business support programs by state

Figure 1 represents the geographic distribution of SBDCs across states and demonstrates a clear regional disparity. New York (68), Texas (53), California (43), Illinois (37), Florida (34), and Missouri (30) each have more than 30 SBDC locations. By contrast, Delaware (3), Connecticut (5), and District of Columbia (5) each have no more than five SBDC locations.

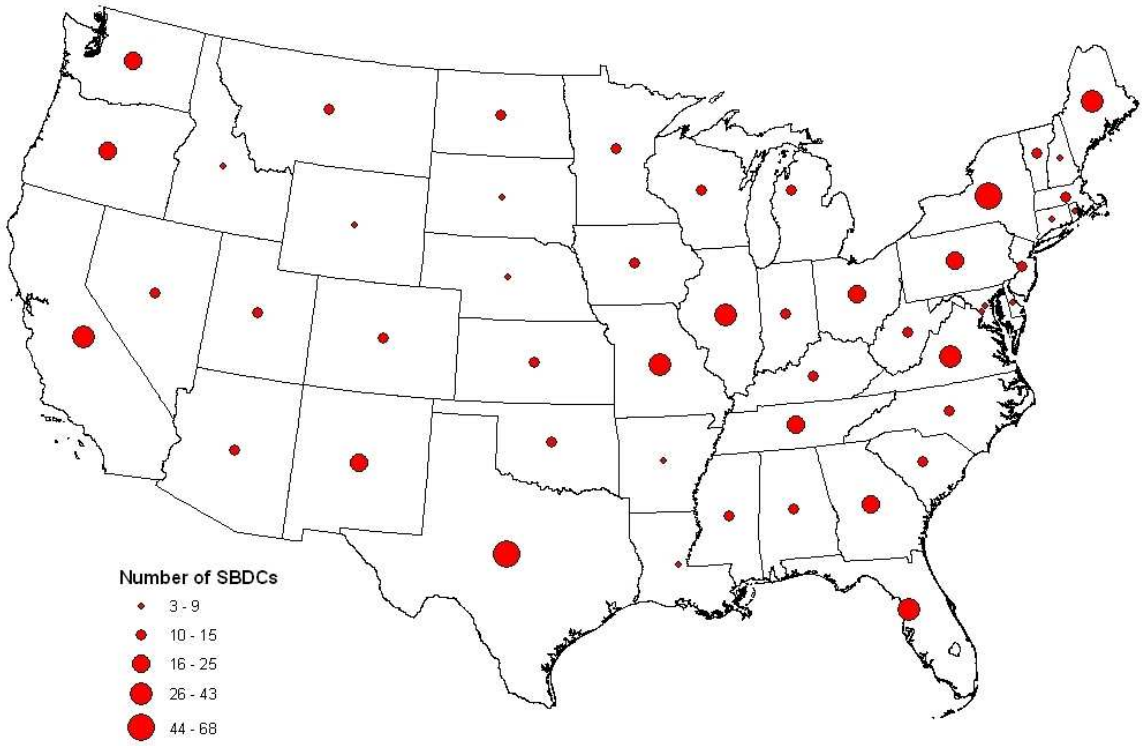

Figure 1: Spatial distribution of SBDCs across US states

The number of incubators varies significantly across states as well (see Figure 2). New York (64), Oklahoma (44), Wisconsin (34), North Carolina (33), and Pennsylvania (30) take the lead in hosting incubators, each with over 30 on their jurisdictional areas and much more than the national average number of 15. At the bottom of the list, District of Columbia (0), Nevada (1), Wyoming (1), Arkansas (2), New Hampshire (2), Rhode Island (2), and Vermont(2) are inactive in business incubation, each with less than three incubators.

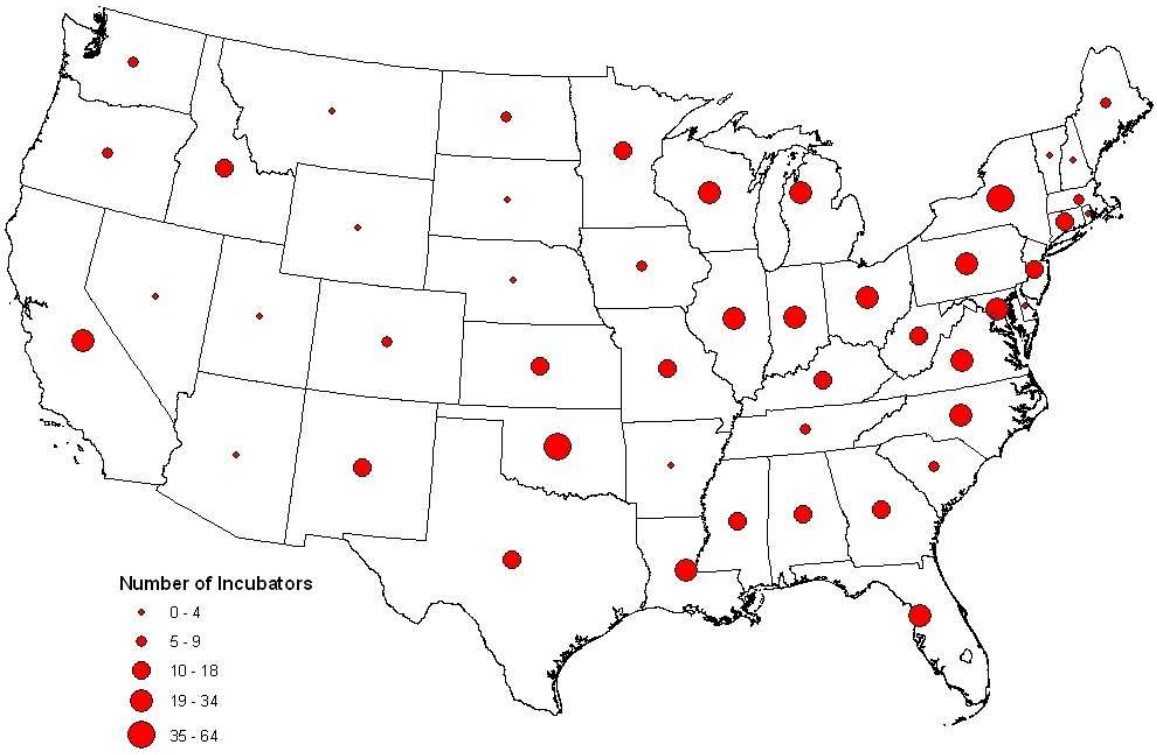

Figure 2: Spatial distribution of incubators across US states

In the case of SBIRs, the number of grants received varies greatly by state (see Figure 3). California (703), Massachusetts (406), Virginia (234), Maryland (164), New York (150), and Texas (150) are the leading recipients of grants. Louisiana (5), Rhode Island (5), the District of Columbia (2), North Dakota (2), and South Dakota (1) receive the fewest grants. It should be noted, however, that the large number of grants received by Virginia and Maryland may be a result of those states encompassing a large share of the DC metropolitan area.

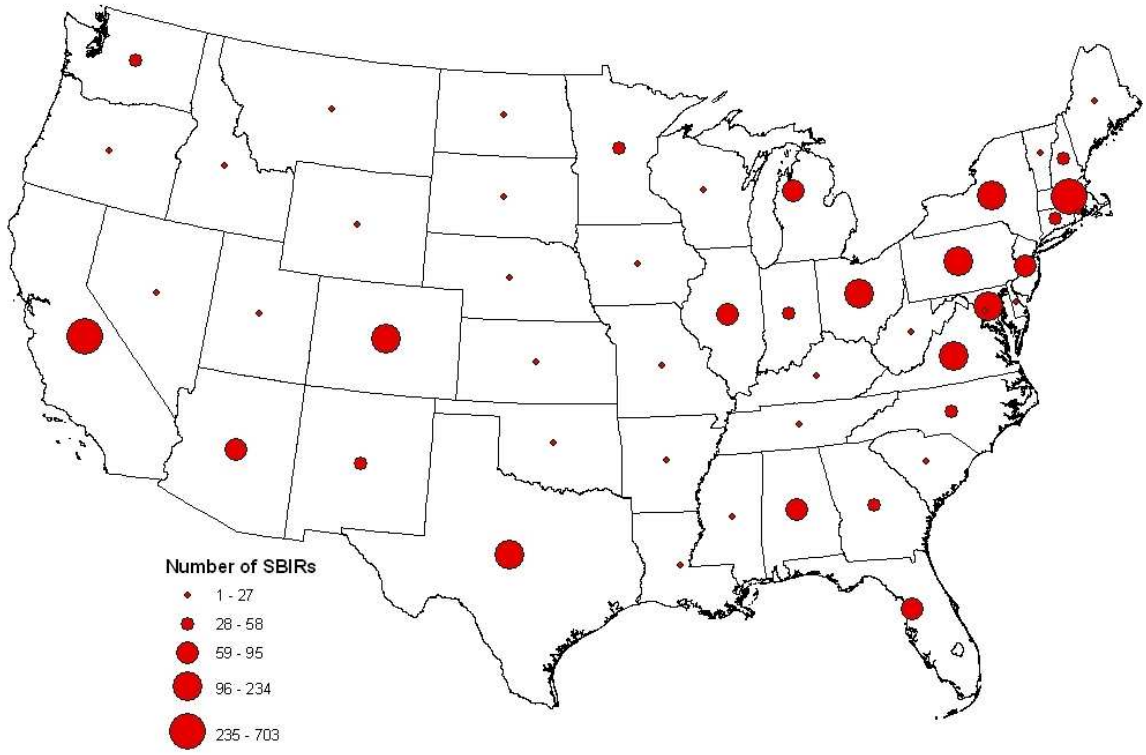

Figure 3: Spatial distribution of SBIRs across US states

Comparing the geographic distribution of SBDCs, incubators, and SBIRs, it appears that the gap between states which receive the highest and lowest levels of business assistance is largest in the case of SBIRs and smallest in the case of business incubators, with SBDCs having a distribution somewhere in-between.

2.3 Geographic patterns of business support programs by county

Similarly, business support programs are unevenly distributed across counties (See Figure 4, Figure 5 and Figure 6). Among the 3108 continental counties[4], only 690, or 22% host one or more SBDC offices. Cook, IL (12), Los Angeles, CA (6), and King, WA (6) are on top of the list, with more than five SBDC locations each. In the case of incubators, 462, or 15% of those

[4] According to the definition of County and City Data Book (2007), there are 3109 counties in the continental states. However, Broomfield County, Colorado, did not exist until 2001 and it is excluded in this study.

counties features the presence of at least one incubator. Leaders are Cook, IL (11), New York, NY (8), and Los Angeles, CA (7), with more than six incubators each. SBIRs, despite a much larger number, are more clustered than SBDCs and incubators. Only 362 counties were recipients of SBIR grants in 2009. Middlesex, MA, Los Angeles, CA, and San Diego, CA were the top three counties with 311, 240, and 104 Phase I SBIR grants respectively.

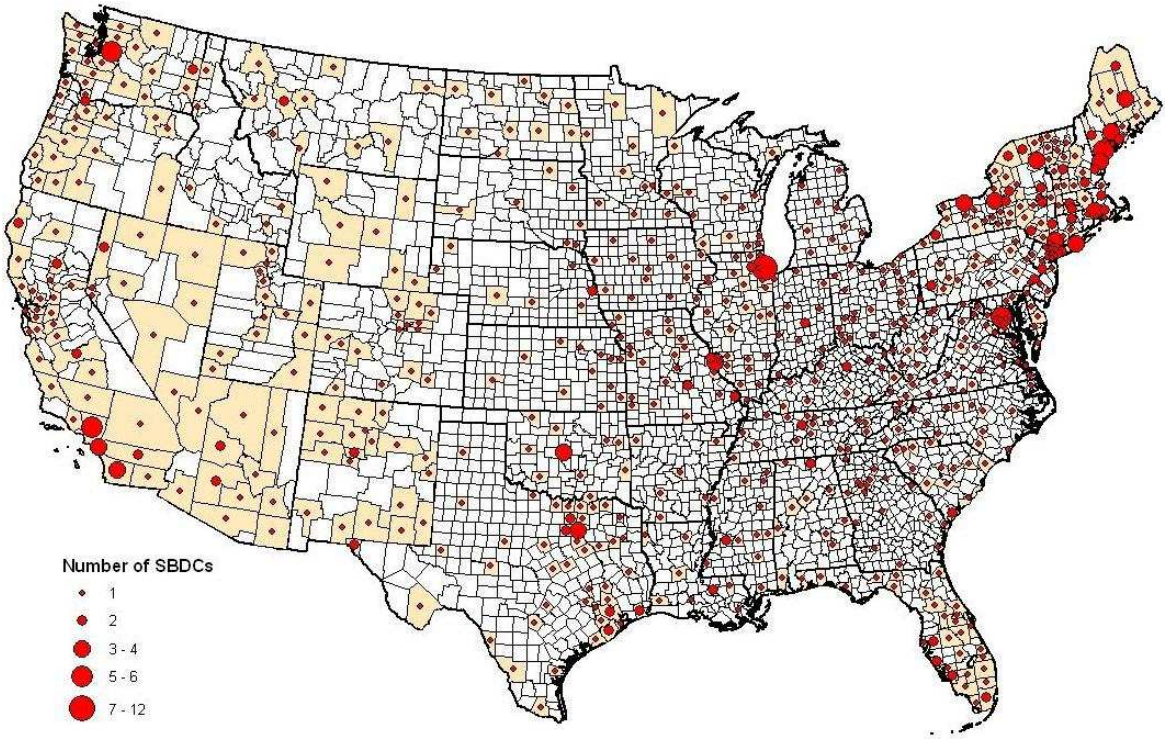

Figure 4: Spatial distribution of SBDCs across US counties

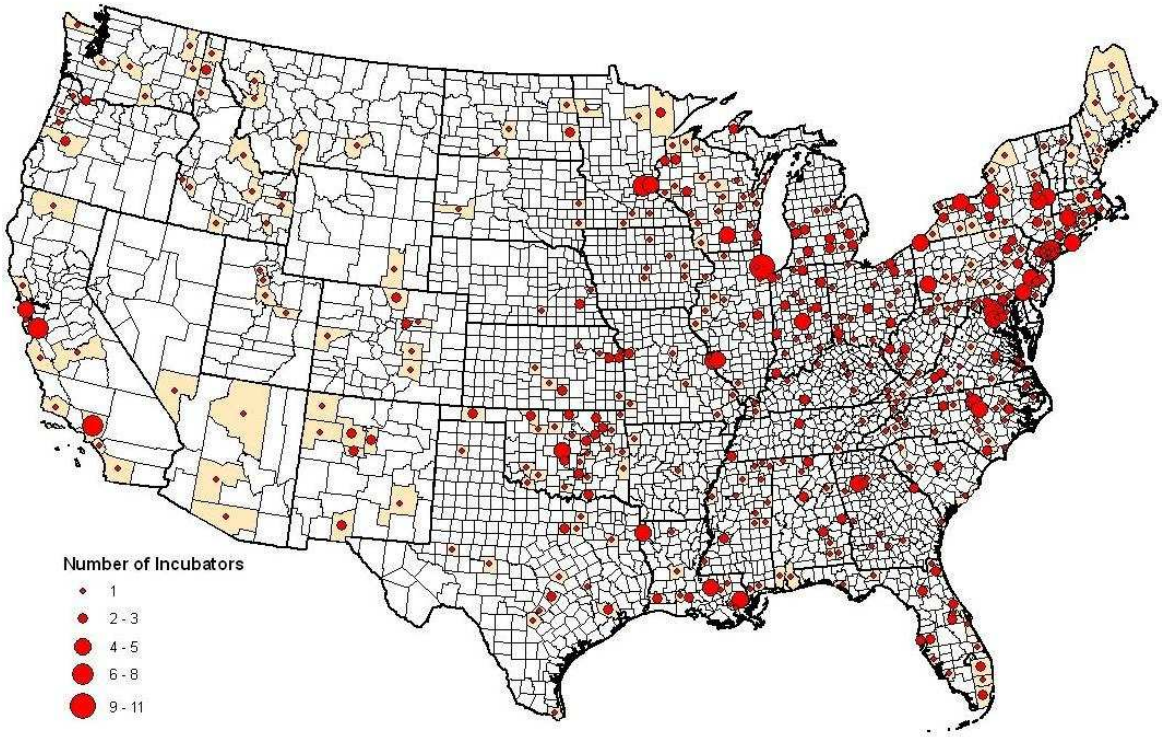

Figure 5: Spatial distribution of incubators across US counties

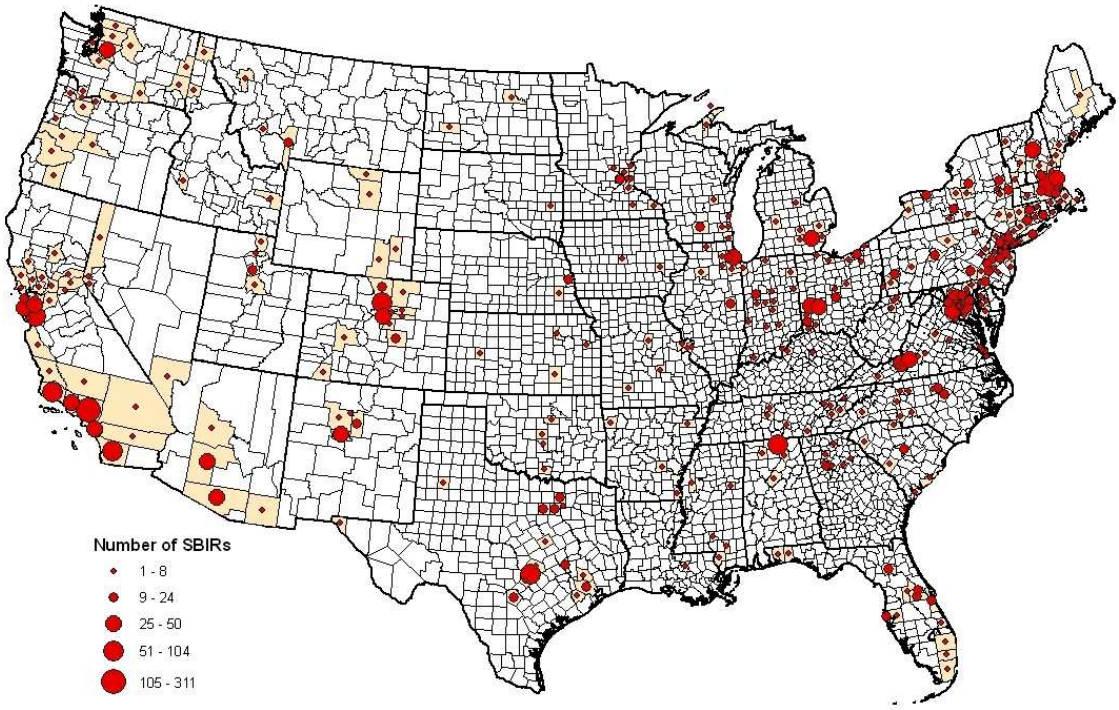

Figure 6: Spatial distribution of SBIRs across US counties

3. County-Specific Factors Associated with Presence of Business Support Programs

This study also explores regional or environment factors that are associated with the presence of SBDC offices or the presence of business incubators at the county level. We first review some literature. Based on that, we introduce three knowledge based variables and 21 control variables with publicly available data at the county level. These variables represent demographic, social, and economic characteristics of the county. We further derived three common factors from the control variables to simply our regression models. Binomial logistic regressions and negative binomial regressions are subsequently used to explore regional factors that are associated with the presence of business support programs.

3.1 Literature

Our research interest is in the geography of business support programs in the US, represented by SBDCs, business incubators and SBIRs. However, regional or environmental factors that are associated with the presence of SBDCs or incubators have rarely been studied. Despite that, it is possible to get some implications from the literature on the geography of entrepreneurship that has a focus on start-up firms and small businesses. New firm formation within a region has traditionally been explained by both population growth, and the degree to which employment is concentrated in small firms (Reynolds et al. 1994). Population growth is a proxy for growth in demand which may in turn induce greater entrepreneurial activity. Concentration of employment in small firms may be a proxy for a

flexible environment amenable to economic growth and new firm formation. The financial/accounting performance of new firms may also be affected by the level of taxation and the competitiveness/cost of capital in the local financial market (Bartik 1989). Feldman (2001), drawing on a study of entrepreneurial activity in the DC metropolitan area, identifies several characteristics of a region that are associated with high technology entrepreneurship, including the supply of venture capital, social capital, entrepreneurial support services, and research universities. Access to knowledge may also be an important determinant of entrepreneurial opportunities in a region (Audretsch 1995; Acs et al. 2009), especially when this knowledge is complemented by large human capital stocks (Lee et al. 2004; Acs and Armington 2006).

While these factors may have an impact on new firm formation, their relationship, if any, to the presence of business support programs cannot be assumed from available evidence. On the one hand, SBDCs and business incubators, dominantly not-for-profits, may act as a compliment to other factors which facilitate the creation of small businesses. On the other hand, they may also be used as a substitute for these factors, in which case these programs would be expected to be active in low-growth regions with limited capital and knowledge resources. Although SBIRs are granted based primarily on proposal merit, as part of the federal budget, regional equality may also be a factor of consideration, and thus they may not necessarily go to those regions with strong business base.

The work of Qian et al. (2010) is one of the few studies that directly target regional factors

that are associated with the presence of business incubators. Based on the literature of entrepreneurship they have examined the effects of agglomeration, welfare, and business development on the presence of business incubators, and found a positive effect of agglomeration and a negative effect of business development. Their study supports an incubation push model over a business pull model.

One set of variables that are not well addressed in Qian et al. (2010) are knowledge based variables. As Feldman (2001) and Acs et al. (2009) have mentioned, regional factors such as the university and human capital are critical to the flourishing of high technology entrepreneurship. Moreover, the literature of the technological system pictures an economic system highlighting "a network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure or set of infrastructures and involved in the generation, diffusion, and utilization of technology" (Carlsson and Stankiewicz, 1991, p.111). The technological system therefore connects knowledge and business support programs (reflected in institutional infrastructure). This connection is strengthened by the work of Qian (2010) in introducing knowledge based regional systems of entrepreneurship.

This study specifically examines the role of knowledge in shaping the geography of business incubators, and also expanded the study of Qian et al. (2010) by investigating the geographic patterns of SBDCs and SBIRs. Local knowledge resources may have a different effect on the probability of a region receiving business support services or the level of support received due to differences in structure between programs. This study will empirically test for

differences in this ‘knowledge effect’.

3.2 Variables, Measures, and Data

We adopt US counties as the geographic unit for analysis, not only because a large population it can provides but also because sine business support programs such as incubators are locally funded. We introduce three knowledge based variables: human capital, the university, and high technology scale (see Table 2). Human capital proxies for the capacity of county residents to absorb and process knowledge, while the presence of a university and employment in high tech industries represent to the ability of the county to utilize human capital in research and development activities. The correlations between these variables are shown in Table 3.

Based on the literature and data availability, we introduce 21 control variables (as shown in Table 2) which reflect the demographic, social, and economic characteristics of counties and are likely to influence the presence of business support programs. The demographic variables include total population, a measure of demand for the goods and services of new firms as well as the supply of locally available inputs for new firms. The population growth rate is included a proxy for demand for new goods and services, which may benefit new firms (Reynolds et al. 1994). Population density is used as an indicator of local knowledge spillover, a potential determinant of entrepreneurship (Audretsch 1995; Aces et a. 2009); ideas are more likely to be exchanged within a community where individuals are in physical

proximity to each other. The percentage of the population between 18 and 64 and the labor force participation rate are used as indicators of the supply of labor available to new firms.

Among the social variables, urbanization is used as an alternative measure of interaction among the population, and thus knowledge spillover. Household mobility is included as an indicator of the willingness of individuals to take risks and general societal dynamics, potential determinants of entrepreneurial activity. Social diversity, here measured by racial diversity may also be a determinant of entrepreneurship (Audretsch et al. 2009). As measure of economic welfare, this study uses health insurance participation, the percentage of the population not in poverty, and income from social security.

Among the economic variables are the number of establishments, non-employer establishments, and firms per capita are used as an indicator of the overall entrepreneurial climate within a region. Income per capita, wages per capita, and median household value are included as they may affect both the demand for new firm goods and services as well as resources available to entrepreneurs to start new businesses. Finally, the fraction of workers employed in state and local government is included as a reflection of government intervention in the economy, and thus a tendency to utilize business support programs.

Variable measures and sources are also listed in Table 2. Due to the heavy reliance on census data, variables are taken for the year 2000 or the nearest available year. The use of county level data results in a large sample of 3108 observations.

Table 2: List of variables

Variables	Measures	Year	Sources
Knowledge:			
* human capital	* percentage of adults with bachelor's degree/above	2000	Census
* university	* dummy variable indicating presence of one or more universities	2000	IPEDS
* high-tech scale	* percentage of employment in high-tech industries [5]	2002	UIUC
Demographic:			
* population	* log(population)	2000	Census
* population growth	* 10-year population growth rate	90-00	Census
* population density	* population by area	2000	Census
* working age population	* percentage of population of 18 - 64 years old	2000	Census
* labor force participation	* labor force participation rate	2000	BLS
Social:			
* urbanization	* percentage of urban population	2000	Census
* household mobility	* percentage of households having moved to a different house during the past five years	2000	Census
* social diversity	* population distribution across racial groups [6]	2000	Census
* high school attainment	* percentage of adults with educational attainment of high school	2000	Census
* health insurance	* overall health insurance participation rate	2000	Census
* poverty reduction	* percentage of population out of poverty	2000	Census
* social security	* log(household social security income)	2000	Census
Economic:			
* establishments	* number of establishments per capita	2000	CBP
* non-employer establishments	* number of non-employer establishments per capita	2002	Census
* firms	* number of firms per capita	2002	Census
* non-farm proprietors	* non-farm proprietors as a percentage of labor force	2000	BEA
* unemployment	* unemployment rate	2000	BLS
* income	* log(income per capita)	1999	Census
* wage	* log(wage per capita)	2000	Census
* house value	* log(median house value)	2000	Census
* local government	* percentage of employment in state and local government	2000	BEA

[5] Using the definition from Hecker (2005), high-tech industries include such four-digit NAICS industries as computer systems design and related services (5415), software publishers (5112), architectural, engineering, and related services (5413), scientific research and development services (5417), internet service providers and web search portals (5181), computer and peripheral equipment manufacturing (3341), internet publishing and broadcasting (5161), navigational, measuring, electromedical, and control instruments manufacturing (3345), data processing, hosting, and related services (5182), aerospace product and parts manufacturing (3364), communications equipment manufacturing (3342), semiconductor and other electronic component manufacturing (3344), pharmaceutical and medicine manufacturing (3252), and other telecommunications (5179).

[6] Following Ottaviano and Peri (2006), social or cultural diversity is measured through $\text{Diversity}_j = 1 - \sum_{i=1}^{M} p_{ij}^2$, where p_{ij} is the proportion of racial group i in county *j*, and *M* is the number of racial groups being considered. Local population is grouped into five groups: non-Hispanic white, black, Latino, Asian, and others, corresponding to i=1, 2, 3, 4, 5.

Table 3: Correlations between knowledge variables

	human capital	university	high technology
human capital	1		
university	0.361	1	
high technology	0.194	0.072	1

3.3 Factor Analysis for Control Variables

The 21 control variables are likely to present high correlations, which will cause multicollinearity in our subsequent multivariate analysis. We therefore adopt the principal components method to isolate shared variance and obtain several uncorrelated factor constructs for these control variables. Table 4 shows the variance explained by factor. The first five factors have eigenvalues over 1. However, the scree plot indicates that after the third factor, variance explained drops off considerably (see Figure 7). Therefore, three factors are retained for further analysis.

To make conceptual sense of the retained factors, the pattern of factor loadings are interpreted. Table 5 displays the loadings on the three factor solution after rotation. Factor 1 has high loadings on variables such as population, population growth, working age population, urbanization, population density, and household mobility. High values on these variables are consistent with communities which are large, growing, and where interaction amongst residents is frequent. This factor is therefore interpreted as indicating the level of agglomeration in the county. Factor 2 has high loading on variables such as poverty, health insurance, income, and high school attainment. These variables are all relevant to the wealth

and welfare of individual residents. This factor is therefore interpreted as indicating the welfare of a county. Finally, Factor three has high loadings on firms per capita, non-employer establishments per capita, and establishments per capita. A high factor score would therefore be consistent with a county with many, small firms. This factor is therefore interpreted as measuring the level of business and entrepreneurial activity in the county. The level of government employment, which did not have a significant (greater than 0.3) loading on any factor, is included as a separate explanatory variable in the regression analysis.

Table 4: Variance explained

	Initial			**Rotating three factors**		
Factor	**Eigenvalue**	**Proportion**	**Cumulative**	**Eigenvalue**	**Proportion**	**Cumulative**
Factor1	**6.275**	**0.299**	**0.299**	**4.769**	**0.227**	**0.227**
Factor2	**4.167**	**0.199**	**0.497**	**4.486**	**0.214**	**0.441**
Factor3	**2.253**	**0.107**	**0.605**	**3.440**	**0.164**	**0.605**
Factor4	**1.306**	**0.062**	**0.667**			
Factor5	**1.018**	**0.049**	**0.715**			
Factor6	0.961	0.046	0.761			
Factor7	0.850	0.041	0.802			
Factor8	0.711	0.034	0.835			
Factor9	0.625	0.030	0.865			
Factor10	0.581	0.028	0.893			
Factor11	0.427	0.020	0.913			
Factor12	0.379	0.018	0.931			
Factor13	0.281	0.013	0.945			
Factor14	0.271	0.013	0.957			
Factor15	0.232	0.011	0.968			
Factor16	0.188	0.009	0.977			
Factor17	0.153	0.007	0.985			
Factor18	0.143	0.007	0.992			
Factor19	0.107	0.005	0.997			
Factor20	0.070	0.003	1.000			
Factor21	0.003	0.000	1.000			

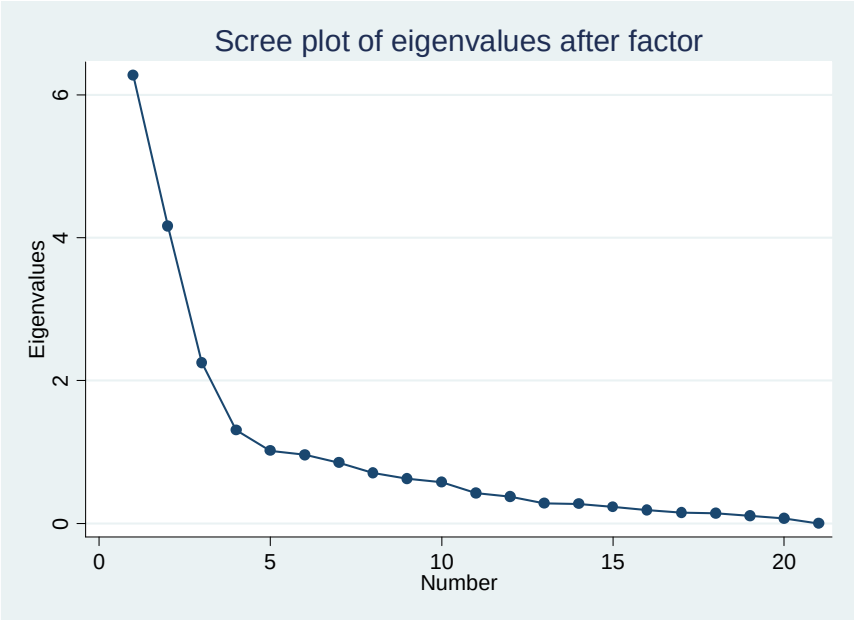

Figure 7: Scree plot

Table 5: Rotated factor matrix (three factor solution)

Variable	Factor1: Agglomeration	Factor2: Welfare	Factor3: Business/ Entrepreneurship
* population	0.792		
* house value	0.770		
* urbanization	0.746		
* household mobility	0.730		
* wage	0.715		
* working age population	0.705		
* population growth	0.514		
* population density	0.350		
* poverty reduction		0.921	
* health insurance		0.860	
* social security		0.711	
* labor force participation		0.697	
* income		0.670	
* high school attainment		0.586	
* unemployment		-0.597	
* social diversity		-0.542	
* firms			0.953
* non-employer establishments			0.929
* establishments			0.762
* non-farm proprietors			0.711

3.4 Regression Analysis

We run binominal logistic regressions to explore geographically mediated factors that are associated with the presence of SBDCs and business incubators at the county level, and run negative binomial regressions for the case of SBIRs with the same explanatory variables. Different methods are used primarily as a result of different distributions of the samples. For SBDCs and business incubators, most counties either have no such a program or have only one. In these two cases, the dependent variable is a binominal variable with its value “1” indicating the presence of one or more SBDCs (or incubators) vis-à-vis “0” indicating no SBDCs (or incubators) in a county. For SBIRs, many counties as recipients have more than one. The dependent variable in the case of SBIRs is thus the number of SBIR grants for each county.

Primary explanatory variables are the three knowledge based variables: human capital, the university, and high technology scale. Control variables include the three factors we have identified in the previous section: agglomeration, welfare, and business/entrepreneurship. The local government variable is separately added because it was not successfully loaded onto these three factors. To control urban/rural effects two binominal variables - metropolitan and micropolitan - are additionally included indicating whether the county is located within a metropolitan area, a micropolitan area, or neither.

The regression results are shown in Table 6. The results indicate that both 'push' and 'pull' factors may be at play in the location of business support programs. Consistent with the 'push' explanation, resident welfare is negatively associated with the probability that a county will host an SBDC or incubators, consistent with the notion that these programs are driven at least in part by the desire to stimulate growth in underdeveloped regions. However, the welfare score is positively associated with the number of SBIRs, indicating differences in the goals of different programs. Also consistent with the 'push' explanation is the negative association between the business/entrepreneurship factor and the probability of a county hosting an SBDC or incubator, as well as the number of SBIRs. These programs are thus more likely to be found in counties with fewer/larger businesses, consistent with one goal of these programs being the stimulation of business activity counties which are lagging in that respect.

Table 6: regression results (all counties)

Independent Variable	**Dependent Variable**		
	SBDC	**Incubator**	**SBIR**
Human capital	0.054 ***	0.080 ***	0.082 ***
University	2.447 ***	1.930 ***	0.965 ***
High technology	-0.935	1.729	4.352 ***
Factor 1 – agglomeration	0.601 ***	0.267 **	1.273 ***
Factor 2 – welfare	-0.206 ***	-0.142 *	0.276 ***
Factor 3 - business/entrepreneurship	-0.134 *	-0.609 ***	-0.227 **
Local government	0.000	0.000	-0.001 *
Metropolitan	0.524 ***	0.563 **	1.006 ***
Micropolitan	0.395 **	0.249	0.516
Obs.	3106	3106	3106
Pseudo R2	0.343	0.291	0.254

There is also evidence for that business support programs are 'pulled' to a location by the presence of resources that support new firm formation and potentially complements the programs. Human capital and the presence of a university are significantly and positively associated with the probability that a county will host an SBDC/incubator as well as the number of SBIRs. Given the role that knowledge resource are thought to play in stimulating entrepreneurship in a region, these results imply that business support programs may be more likely to be undertaken in an environment where there is potential for success. High technology employment has an insignificant effect on the probability of an SBDC or incubator being in the county, but has a positive, significant relationship with the number of SBIR grants, consistent with the technology focus of that program.

The results also indicate that the demographic scale of a local economy may be an important factor in program location. Both the agglomeration factor and the metropolitan dummy have a positive and significant relationship with all three program types. The micropolitan dummy is positive for all three program types, but significant only for SBDCs. This is consistent with business support programs locating in regions which are large enough to support new firms. There may also be economies of scale in the business support programs themselves.

Finally, local government has a statistically insignificant relationship with the probability that a county will host either a SBDC or incubator, but a significant and negative relationship with

the number of SBIRs that are directed towards a county. One potential explanation for this latter finding is that the level of government employment proxies for the level of regulation and/or taxation within the locality, which may have a disproportionate impact on SBIR recipient firms.

3.5 County Size Effects

To investigate the role of scale plays in determining the empirical results, the sample was divided based on whether a county had a population less than or greater than 50,000. Separate regressions were then run on each group. Results are shown in Table 7 and Table 8.

The effect of having a university has on the number of SBIR grants was significantly different between the two samples, having no significant effect for small counties, but a significant and positive effect for large counties. This may reflect unobserved differences between universities in large and small counties. Universities in large counties may be more likely to be large and research-oriented. Consequently, they may produce research and employ scientists that support the type of high-tech firms which tend to receive SBIR grants. High-tech employment shows a similar pattern, having an insignificant effect on the number of SBIR grants in small counties, but a significant and positive effect in large counties. This may be an effect of agglomeration, with larger regions being more capable of support small, specialized technology firms which are eligible for SBIR grants.

The relationship between agglomeration and the presence of SBDCs also differs between the two samples, with agglomeration having an insignificant coefficient on the probability of county hosting an SBDC in small counties, but a positive and significant coefficient in large counties. Given that the agglomeration factor score is partly determined by county population (population in fact has the largest loading on agglomeration), and that the coefficients for incubators and SBIRs are also larger for large counties, one explanation for this difference is that there are increasing returns to scale in business support programs. This may reflect the role that city size plays in fostering small, specialized firms due to presence of large, dynamic markets.

There also differences between samples in the welfare and business/entrepreneurship factors. Welfare is an insignificant determinant of probabilities that a county will host an SBDC or incubator in small counties, but has a significant and negative relationship in large counties. While welfare has a significant, positive association with the number of SBIR grants received for small counties, it has an insignificant impact for large counties. Business/entrepreneurship is significant and negative for SBDC in small counties, but is significant and positive in large counties. For SBIRs, the Business/entrepreneurship factor has an insignificant, negative coefficient in small counties. The sign does not change signs for larger counties, but is significant and slightly larger.

Table 7: regression results (counties with population less than 50,000)

Independent Variable	Dependent Variable		
	SBDC	Incubator	SBIR
Human capital	0.100 ***	0.060 ***	0.107 ***
University	2.490 ***	1.669 ***	0.349
High technology	-1.180	1.656	0.764
Factor 1 – agglomeration	0.164	-0.065	0.979 ***
Factor 2 – welfare	-0.142	-0.083	0.443 **
Factor 3 - business/entrepreneurship	-0.192 *	-0.383 ***	-0.206
Local government	0.000	0.000	-0.001
Obs.	2199	2199	2199
Pseudo R2	0.251	0.112	0.143

Table 8: regression results (counties with population larger than 50,000)

Independent Variable	Dependent Variable		
	SBDC	Incubator	SBIR
Human capital	0.033 *	0.105 ***	0.073 ***
University	1.541 ***	2.093 ***	1.328 ***
High technology	1.155	2.903	8.426 ***
Factor 1 – agglomeration	0.526 ***	0.017	1.281 ***
Factor 2 – welfare	-0.499 ***	-0.459 ***	0.137
Factor 3 - business/entrepreneurship	0.000 ***	-0.701 ***	-0.262 **
Local government	0.000	0.000	-0.001
Obs.	907	907	907
Pseudo R2	0.123	0.139	0.146

4. Concluding Remarks

Small businesses and new businesses play an increasingly important role in the US economic

growth. As a response to this trend, public business support programs, represented by SBDCs, business incubators, and SBIRs, have been created to assistant small businesses or new businesses by providing primary and professional services and/or funding innovative activity. These programs contribute to the performance of client firms and further to regional economic development.

This study presents the geography patterns of US SBDC offices, business incubators, and SBIRs. We have found that most these business support programs are located in metropolitan counties, some states host more (if not much more) business support programs than others, and a majority of counties have no such programs at all. The spatially uneven distribution of business support programs may draw attention from policy makers and economic practitioners who have the interest in fostering small business development.

We have further investigated county-specific factors that are associated with the presence of business support programs. Knowledge resources, measured by the level of human capital, presence of a university, and the degree to which an economy is geared towards high technology, was found to have a significant impact on the probability that a county would host or receive grants from a business support program. This is consistent with a 'pull' explanation for the location of business support programs, where their location is determined at least in part by the regions having resources that are conducive to entrepreneurship. Agglomeration was found to have a positive impact on the presence of SBDCs/incubators as well as the number of SBIR grants. Consistent with a 'push' explanation,

the level of business and entrepreneurship in a county was found to be negatively associated with all three types of business support. The relationship between resident welfare and business support differed between types of programs. Counties with high welfare were found to be less likely to host an SBDC or incubator, but tend to receive more SBIR grants.

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