



Entrepreneurship in Tennessee: Striving for Success

A Baseline Analysis

Michael D. Wilcox, Jr.
Assistant Professor
Department of Agricultural Economics
University of Tennessee
314B Morgan Hall
2621 Morgan Circle
Knoxville, TN 37996-4511
t: (865) 974 - 7410
f: (865) 974 - 9492
e: mwilcox2@utk.edu

Dayton M. Lambert
Assistant Professor
Department of Agricultural Economics
University of Tennessee
321C Morgan Hall
2621 Morgan Circle
Knoxville, TN 37996-4511
t: (865) 974 - 7472
f: (865) 974 - 7383
e: dmlambert@utk.edu

Kelly L. Brannon
Graduate Research Assistant
Department of Agricultural Economics
University of Tennessee
2621 Morgan Circle
Knoxville, TN 37996-4511
e: kbrannon@utk.edu

Lance A. Stewart
Graduate Research Assistant
Department of Agricultural Economics
University of Tennessee
2621 Morgan Circle
Knoxville, TN 37996-4511
e: lstewal1@utk.edu

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Introduction

Entrepreneurship has received an increasing amount of attention among researchers, economic development professionals, policymakers and local government officials, as the singular emphasis on industrial recruitment broadens to a more comprehensive strategy that encompasses business creation, retention and expansion (Walzer, 2007 and Acs and Armington, 2006). Concurrently, entrepreneurs continue to play an ever more important role in Tennessee’s economy. Though defined and measured in many different ways, entrepreneurs generated more than \$23 billion (in the form of total nonfarm proprietor income or \$31,693 per nonfarm proprietor) or 12 percent of total personal income in Tennessee. This constituted 84 percent of all Tennessee employer firms (in the form of firms with fewer than 20 employees) and made up nearly 20 percent of Tennessee’s 3,724,901 total full-time and part-time jobs in 2006 (Table 1).¹

These statistics suggest the importance of entrepreneurs to the Tennessee economy and the lives of Tennesseans. But, by one measure, Tennessee recently experienced the fourth largest decrease in entrepreneurial activity in the United States during the last decade (Fairlie, 2007)². And though agreement that economic development is more likely with a multifaceted strategy that goes beyond one-dimensional industrial recruitment is solidifying, consensus on promoting economic growth by creating and sustaining a supportive environment for entrepreneurs needs to be reached. The literature suggests that such an environment is composed of social capital (climate of inclusiveness and flexible networks), human capital (skilled and creative workforce, access to education/training, etc.), natural and cultural capital (amenities that enhance quality of life), political capital (government and community institutions that are willing to work collaboratively towards fostering entrepreneurship through resource acquisition and allocation) in addition to the traditional orientation towards financial and built capital (infrastructure) (Flora and Flora, 2007). Conversely, these broad ‘environmental’ factors could have positive spillover effects on other local economic development strategies and not simply favor a myopic focus on entrepreneurship, which could elicit unintended consequences (Shane, 2008).

Table 1. Statewide indicators of entrepreneurial activity in Tennessee for select years.

Item	2000	2005	2006
Total Nonfarm Proprietor Income (000’s of \$)	14,971,726	22,094,827	23,026,689
Nonfarm Proprietor Income/Total Personal Income (%)	10.1	12.0	11.8
Nonfarm Proprietor Income/ Number of Nonfarm Proprietors (\$)	26,936	32,220	31,693
Number of Nonfarm Proprietor/ Total Full-Time and Part-Time Employment (%)	15.9	18.8	19.5
Share of All Establishments with between 1 and 19 Employees	83.9%	84.1%	83.7%

¹ The share of farm proprietors in total full-time and part-time employment was 2.7 percent in 2000, 2.4 percent in 2005 and 2.3 percent in 2006. Although, emphasis is placed on nonfarm proprietors and small businesses throughout this summary, the reader should not infer a lack of importance for the agricultural sector. Data limitations dictate the exclusion of entrepreneurs who are involved solely in production agriculture. Similarly, public employment (local, state and federal government) is not included in the analysis.

² The Kaufman Index of Entrepreneurial Activity “measures the monthly rate of business creation at the individual owner level, reporting the percent of non-business owning adults who start businesses with more than fifteen hours worked per week”.

The research aims to measure entrepreneurship in Tennessee and the Southeast region using a range of metrics. Particular emphasis is placed on nonmetropolitan areas across Tennessee, and comparisons are made with respect to Tennessee's neighboring states, including Alabama, Arkansas, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Virginia. This report is by no means definitive, but rather serves as a starting point for policymakers, service providers and entrepreneurs to discuss how Tennessee can truly "strive for success" and enhance economic growth through entrepreneurship.

Box 1: Defining Entrepreneurship

What is an "entrepreneur"? The famous economist, Joseph Schumpeter, described entrepreneurs as agents of innovation and economic transformation. Their projects are the source of new jobs, higher income and creative energy (McGraw, 2007). Some envision entrepreneurs as innovators who start high-growth firms in the technology sector. Others see entrepreneurs more generally as individuals who assimilate ideas and generate new knowledge to be used as the foundation of marketing a product or service. Still others consider entrepreneurs as self-employed individuals willing to take risks and endure uncertain returns on their investments.

Policymakers and resource providers typically consider self-employed individuals and small businesses to be entrepreneurs. However, what qualifies as a small business covers a broad range. The Small Business Administration (2008) uses the North American Industrial Classification System to delineate "small" firm size by sector, either by average annual receipts (a range of \$750,000 for most of the agricultural production sector to \$31.5 million for hospitals) or average employment of a firm (a range of 100 employees for merchant wholesalers of durable goods to 1,500 employees for aircraft manufacturers – with most sectors at 500 employees). On the opposite end of the spectrum, the Association for Enterprise Opportunity defines 'microenterprise' as "a business with up to five employees, which requires \$35,000 or less in start-up capital".

Entrepreneurship is measured in this report as the propensity of a county to support small businesses. This propensity is measured in three ways. First, as the ratio of the number of nonfarm proprietors to total nonfarm employment. This variable was used in several regression models, looking at economic growth in the Southeastern U.S. These data come from the Bureau of Economic Analysis' Regional Economics Information System files. BEA derived this measure from self-employment (Schedule C) tax returns and partnerships. Counties are considered to have relatively more entrepreneurs when a relatively high percent of employed persons are nonfarm proprietors.

The second entrepreneurship measure is the ratio of the number of establishments to County Business Patterns employment (which excludes farm, public and self-employment). This measure is correlated with the nonfarm proprietors measure (Appendix A). In general, larger values of this ratio indicate that a given county has relatively fewer establishments employing the workforce. Therefore, counties with relatively more firms per worker are more likely to have a greater concentration of small business enterprises.

Lastly, the third measure of entrepreneurship is the number of small businesses in a county (e.g., 1 to 4, 5 to 9 or 10 to 19 employees). This information is obtained from the County Business Pattern files from 1990 and 2000. Counties with more small business enterprises relative to all business establishments are considered to have relatively more entrepreneurs. These data do not include public, farm or self-employed persons.

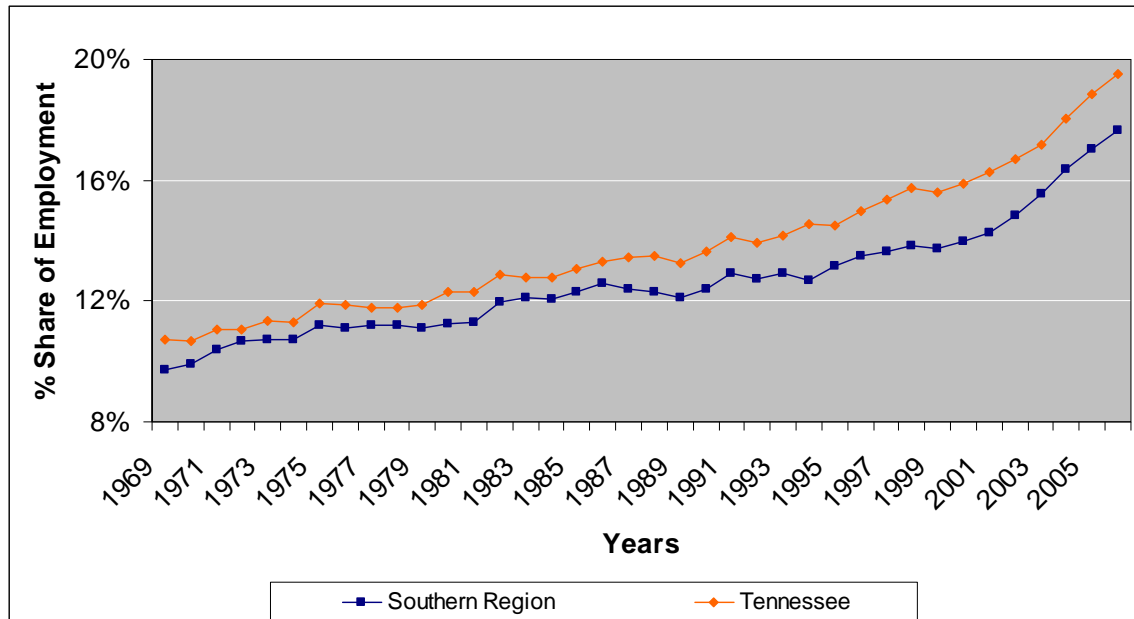
This report is organized as follows. First we examine where entrepreneurs (see Box 1) in Tennessee are located and analyze whether entrepreneurial growth differs by sector and location (metropolitan versus nonmetropolitan). Nonfarm proprietor income, share of total employment and share of small businesses (<20 employees) is of particular interest. Second, regression analysis is employed to determine the relationship between entrepreneurship, the creative class (see Box 2) and economic growth. Included in this section is a value chain analysis which aims to uncover the linkages between purchasers and suppliers and then use those relationships to determine the extent to which entrepreneurship influenced the likelihood of new firm birth in that

particular value chain. Both of the regression-oriented research strands receive a detailed treatment in the Appendix. Third, a short discussion of service provision to entrepreneurs in Tennessee is offered. Pertinent contact information is included in the Appendix. Lastly, concluding remarks, recommendations and a discussion of remaining questions are presented.

Entrepreneurs in Tennessee: Where are they and are they growing?

The share of entrepreneurs in Tennessee (measured by nonfarm proprietors as a share of total employment) increased between 1990 – 2005 (Figure 1). The growth trend was similar to other Southern states bordering Tennessee. Although the growth trends are similar between the Southern states’ average and Tennessee, Tennessee has historically had more persons employed in the nonfarm proprietor sector compared to the regional average (Figure 1). By 2005, there was a 2 percent difference between the average county-level nonfarm proprietor share of total employment in Tennessee and these Southern states (19 and 17 percent, respectively).

Figure 1. Growth of nonfarm proprietor employment shares.¹



Source: REIS 2008

¹ State totals of nonfarm proprietors divided by total employment and total employment is comprised of full- and part-time workers.

In 2005, 83 percent of the 102,482 firms in the metropolitan counties of Tennessee employed fewer than 20 people (Table 2a). The concentration of these small firms varied across sectors. For example, 14.2 percent of all firms were small business enterprises in the retail sector (14,513), followed by professional services (8.3 percent, or 8,472 firms) and the construction sector (7.5 percent, or 7,685 firms). As a sub-group of small businesses, 69 percent of all business establishments in Tennessee’s metropolitan counties employed fewer than 10 people (Table 2b). Lastly, 49 percent of all firms employed between one and four people in metropolitan Tennessee.

A slightly different picture emerges in Tennessee’s noncore counties (located neither in a Metropolitan nor Micropolitan Statistical Area as defined by the US Office of Management and

Budget³). In 2005, 89 percent of the 12,045 firms in the noncore Tennessee counties employed fewer than 20 people (Table 2a). The smaller total number of firms in rural Tennessee simply reflects the smaller economy of the noncore counties relative to their metropolitan counterparts. The concentration of these small firms varied across sectors. For example, 20.3 percent of all firms were small business enterprises in the retail sector (2,444), followed by construction (8.3 percent, or 1,003 firms) and the food and accommodations sector (6.1 percent, or 730 firms). Of all firms located in noncore counties, 77 percent employed fewer than 10 people (Table 2b). Noncore counties had the highest share of business in the one to four employee category at 56 percent. The overall pattern by sector was similar in Tennessee's micropolitan counties, where 87 percent of the 18,346 firms employed fewer than 20 people, 74 percent less than 10 and 52 percent between one and four.

Growth in entrepreneurship, as measured by small businesses of fewer than 20 employees, increased in Tennessee's metropolitan counties between 2000 and 2005 by 2.4 percent; a total net gain of 1,975 firms from a base of 83,085 in 2000 (Table 2a (percent change) and Table 2c (number of firms)). This increase was driven by gains in professional services (909 firms, or 12.0 percent) and food services and accommodations (707 firms, or 16.1 percent), although the number of retail establishments declined (-443 firms, or 3 percent). In the noncore counties, there was an overall decline in the number of small business establishments (-1.3 percent), or a loss of 136 firms from a starting number of 10,856 in 2000. The decline in the noncore counties was driven by losses in the retail (163 firms or -6.3 percent), construction (50 firms, or -4.8 percent), and agriculture (27 firms, or -18.1 percent) sectors, despite gains in professional services (50 firms, or 8.6 percent) and food services and accommodations (42 firms, or 6.1 percent). Micropolitan counties saw little net change in the number of small business establishments. Sector-specific gains and declines followed their metropolitan and noncore counterparts.

Nonfarm Proprietor Income

From 2000 to 2005, county average nonfarm proprietor income decreased by 6 percent, to \$18,027, in the metropolitan counties of the Southern region (Table 3). In nonmetropolitan counties, the decrease was even greater, at 14 percent, to \$14,958. County average nonfarm proprietor income was significantly different between metropolitan and nonmetropolitan counties in the Southeast, and the gap between these groups widened by 70 percent between 2000 and 2005 (Table 3).

In contrast, changes in county average nonfarm proprietor income in Tennessee's metropolitan and nonmetropolitan counties during the same period were considerably less than the regional changes. Between 2000 and 2005, county average nonfarm proprietor income in Tennessee's metropolitan counties increased only 0.64 percent, to \$22,947.

³ The Office of Management and Budget defines a Metropolitan Statistical Area as "A Core Based Statistical Area associated with at least one urbanized area that has a population of at least 50,000" and A Micropolitan Statistical Area as "A Core Based Statistical Area associated with at least one urban cluster that has a population of at least 10,000, but less than 50,000" and both "comprise the central county or counties containing the (metropolitan or micropolitan) core, plus adjacent outlying counties having a high degree of social and economic integration with the central county as measured through commuting". Those counties that do not fit either definition are considered "noncore" and are presumed to be the most rural. See: <http://www.census.gov/population/www/metroareas/files/00-32997.txt> . For a map of Tennessee counties by statistical area, please see: <http://www.rupri.org/Forms/Tennessee.pdf> or for a list, please see the Appendix.

Table 2a. Comparison of small business¹ number, growth (percent change of firms) and share of total number of firms in Southeast Region and Tennessee across different sectors by county typology², 2000-2005.

Sector ⁵	< 20 Employees					
	Region			TN		
	# 05	%Δ 00-05 ³	Share of Total ⁴	# 05	%Δ 00-05	Share of Total
	-----Metropolitan-----					
Agriculture	2218	-5.8%	0.3%	90	-11.8%	0.1%
Construction	81139	10.3%	9.8%	7685	2.7%	7.5%
Manufacturing	21009	-0.1%	2.5%	2912	-2.4%	2.8%
Retail	112149	1.1%	13.5%	14513	-3.0%	14.2%
Professional	85490	20.9%	10.3%	8472	12.0%	8.3%
Arts and Entertainment	9287	15.3%	1.1%	1504	9.5%	1.5%
Food Services and Accommodations	41274	18.8%	5.0%	5088	16.1%	5.0%
All ⁶	698325	8.5%	84.0%	85060	2.4%	83.0%
	----- Micropolitan -----					
Agriculture	1439	-9.3%	0.8%	59	-25.3%	0.3%
Construction	16934	-0.2%	10.0%	1470	-2.6%	8.0%
Manufacturing	5285	0.5%	3.1%	684	0.7%	3.7%
Retail	31315	-3.7%	18.4%	3663	-6.5%	20.0%
Professional	11031	12.2%	6.5%	1063	12.8%	5.8%
Arts and Entertainment	2044	5.2%	1.2%	286	13.9%	1.6%
Food Services and Accommodations	9224	8.7%	5.4%	1222	11.0%	6.7%
All	147778	2.4%	87.0%	15961	0.8%	87.0%
	----- Non- Core -----					
Agriculture	2487	-8.5%	2.1%	122	-18.1%	1.0%
Construction	12241	5.9%	10.3%	1003	-4.7%	8.3%
Manufacturing	4139	0.0%	3.5%	605	-1.9%	5.0%
Retail	23065	-5.1%	19.3%	2444	-6.3%	20.3%
Professional	6702	7.1%	5.6%	630	8.6%	5.2%
Arts and Entertainment	1420	17.4%	1.2%	151	2.0%	1.3%
Food Services and Accommodations	6851	4.8%	5.7%	730	6.1%	6.1%
All	106227	0.8%	89.0%	10720	-1.3%	89.0%

Source: County Business Patterns 2008 (<http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl>)

¹ Small Businesses are defined as less than 20 employees.

² Data is separated into three metropolitan (urban), micropolitan and non-core (rural)

³ The %Δ 00-05 category measures the percent change in the number firms based on the original number found in 2000.

⁴ Share of small businesses, by sector, in total number of firms in this county typology regardless of firm size.

⁵ Sectors (NAICS Code) included for all tables: Forestry, fishing, hunting, and agriculture support (11), Construction (23), Manufacturing (31), Retail trade (44), Professional, scientific & technical services (54), Arts, entertainment & recreation (71), Accommodation & food services (72). Additional sectors (NAICS Code) included only in the 'All' category: Mining (21), Utilities (22), Wholesale trade (42), Transportation & warehousing (48), Information (51), Finance & insurance (52), Real estate & rental & leasing (53), Management of companies & enterprises (55), Admin, support, waste mgt, remediation services (56), Educational services (61), Health care and social assistance (62), Other services (except public administration) (81) and Unclassified establishments (99).

⁶ In County Business Patterns, the sectors are split into 20 or so categories. The 'All' category includes all 20 sectors.

Table 2b. Comparison of small business¹ share (as number and percent of firms) in Southeast region and Tennessee across different sectors by firm-size class and county typology², 2005.

Sector	< 9 Employees				10 - 19 Employees			
	Count in	% in	Count	% in	Count in	% in	Count	% in
	2005	2005	in 2005	2005 ³	2005	2005	in 2005	2005
	Region		TN		Region		TN	
	-----Metropolitan-----				-----Metropolitan-----			
Agriculture	1,976	85%	79	85%	242	10%	11	12%
Construction	71,139	79%	6,568	75%	10,000	11%	1,117	13%
Manufacturing	16,051	49%	2,191	48%	4,958	15%	721	16%
Retail	91,407	70%	11,835	69%	20,742	16%	2,678	16%
Professional	77,279	82%	7,514	81%	8,211	9%	958	10%
Arts and Entertainment	7,916	69%	1,288	72%	1,371	12%	216	12%
Food Services and Accommodations	28,478	45%	3,414	42%	12,796	20%	1,674	21%
All ⁴	589,989	71%	70,665	69%	108,336	13%	14,395	14%
	----- Micropolitan -----				----- Micropolitan -----			
Agriculture	1,236	81%	57	93%	203	13%	2	3%
Construction	15,083	83%	1,327	83%	1,851	10%	143	9%
Manufacturing	4,032	46%	518	47%	1,253	14%	166	15%
Retail	26,191	75%	3,068	75%	5,124	15%	595	15%
Professional	10,037	87%	968	87%	994	9%	95	9%
Arts and Entertainment	1,721	72%	227	72%	323	14%	59	19%
Food Services and Accommodations	6,381	47%	819	46%	2,843	21%	403	23%
All	125,954	74%	13,544	74%	21,824	13%	2,417	13%
	----- Non- Core -----				----- Non- Core -----			
Agriculture	2,146	82%	115	91%	341	13%	7	6%
Construction	11,034	85%	909	86%	1,207	9%	94	9%
Manufacturing	3,171	46%	461	47%	968	14%	144	15%
Retail	19,497	77%	2,070	77%	3,568	14%	374	14%
Professional	6,222	90%	590	92%	480	7%	40	6%
Arts and Entertainment	1,273	82%	139	89%	147	10%	12	8%
Food Services and Accommodations	4,955	55%	546	56%	1,896	21%	184	19%
All	92,047	77%	9,287	77%	14,180	12%	1,433	12%

Source: County Business Patterns 2008 (<http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl>)

¹ Small Businesses are defined as less than 20 employees.

² Data is separated into three metropolitan (urban), micropolitan and non-core (rural)

³ The percents are additive across firm size class by region (Southeast or Tennessee) and sector within each county typology with the residual comprised of firms with twenty employees or more. For example, 85% of metropolitan agriculture firms employ 1-9, and 12% employ 10-19 summing to 97% of agricultural firms have less than 20 employees.

⁴ In County Business Patterns, the sectors are split into 20 or so categories. This table highlights 7 sectors in which entrepreneurs are typically involved. The 'All' category includes all 20 sectors.

Table 2c. Comparison of small business¹ growth (in change of number and percent change of firms) in Southeast Region and Tennessee across different sectors by firm size class and county typology², 2000-2005.

Sector	< 9 Employees				10 - 19 Employees			
	# Δ 00-05 ³	% Δ 00-05 ⁴	# Δ 00-05	% Δ 00-05	# Δ 00-05	% Δ 00-05	# Δ 00- 05	% Δ 00-05
	Region		TN		Region		TN	
	-----Metropolitan-----				-----Metropolitan-----			
Agriculture	-121	-6%	-17	-18%	-16	-6%	5	83%
Construction	7,099	10%	186	3%	484	5%	16	1%
Manufacturing	25	0%	-80	-4%	-53	-1%	8	1%
Retail	1,185	1%	-399	-3%	46	1%	-44	-2%
Professional	13,694	20%	837	13%	1,101	13%	72	8%
Arts and Entertainment	1,134	15%	111	9%	100	8%	19	10%
Food Services and Accommodations	4,352	16%	470	16%	2,190	19%	237	16%
All ⁵	47,694	8%	1,307	2%	7,305	7%	668	5%
	----- Micropolitan -----				----- Micropolitan -----			
Agriculture	-130	-9%	-18	-24%	-18	-8%	-2	-50%
Construction	-2	4%	-2	0%	-37	-1%	-37	-21%
Manufacturing	16	0%	-18	-3%	12	1%	23	16%
Retail	-1,102	-4%	-266	-8%	-114	-2%	10	2%
Professional	1,025	11%	99	11%	175	21%	22	30%
Arts and Entertainment	95	6%	17	8%	6	1%	18	44%
Food Services and Accommodations	464	8%	87	13%	275	14%	34	9%
All	2,478	2%	-22	0%	1,026	5%	147	6%
	----- Non- Core -----				----- Non- Core -----			
Agriculture	-144	-6%	-21	-15%	-87	-20%	-6	-46%
Construction	621	6%	-48	-5%	65	6%	-2	-2%
Manufacturing	6	0%	-6	-1%	-8	-1%	-6	-4%
Retail	-1144	-6%	-159	-7%	-105	-3%	-4	-1%
Professional	361	6%	44	8%	85	20%	6	18%
Arts and Entertainment	214	19%	34	32%	-4	-3%	-31	-37%
Food Services and Accommodations	147	2%	13	2%	167	9%	29	19%
All	341	0%	-189	-2%	546	4%	53	4%

Source: County Business Patterns 2008 (<http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl>)

¹ Small Businesses are defined as less than 20 employees.

² Data is separated into three metropolitan (urban), micropolitan and non-core (rural)

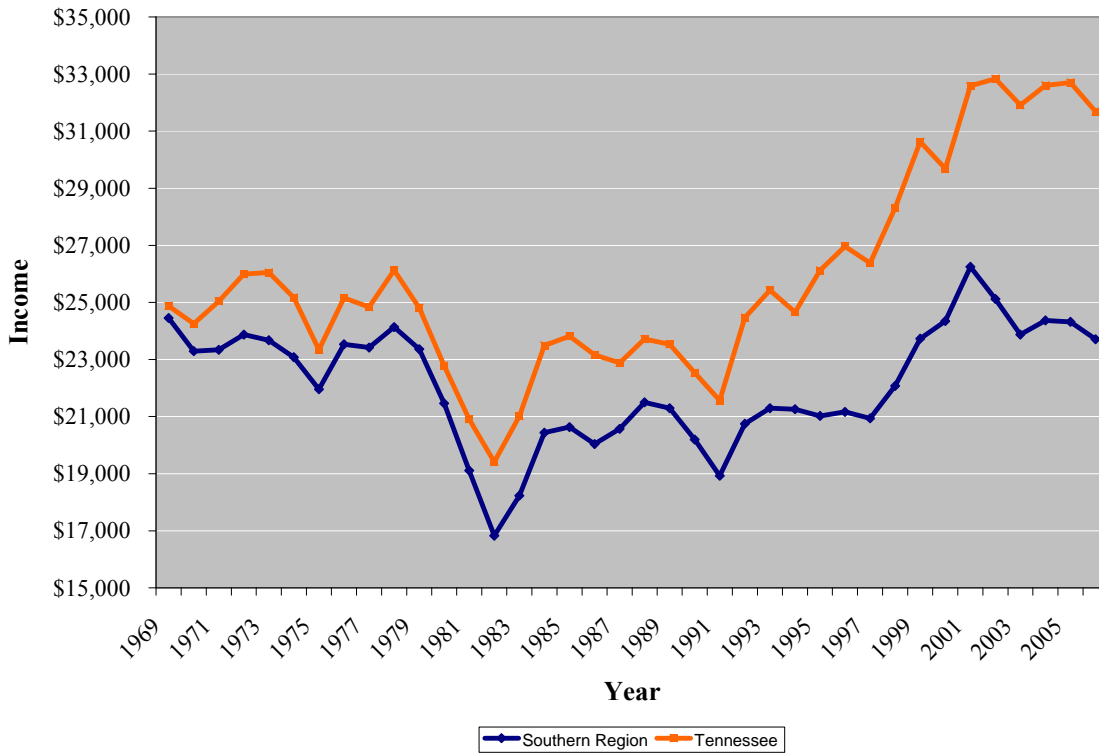
³ The # Δ 00-05 category shows the “churn” of small businesses. That is, after five years, the net loss or gain in the number of firms. For example, in the TN agriculture sector for 1-9 employees, there were 17 less businesses in 2005 than there were in 2000.

⁴ The % Δ 00-05 category measures the percent change in the number firms based on the original number found in 2000 for that firm size and sector category.

⁵ In County Business Patterns, the sectors are split into 20 or so categories. This table highlights 7 sectors in which entrepreneurs are typically involved. The ‘All’ category includes all 20 sectors.

In the nonmetropolitan counties, the percent change in the county average nonfarm proprietor’s income was even less, at -0.39 percent, ending at \$19,168. Despite the approximate \$3,500 gap between metropolitan and nonmetropolitan counties in Tennessee, the difference between counties in the two groups only increased by about 1 percent. This difference was not significant in 2005. In comparison to other Southeastern states, Tennessee entrepreneurs have, on average, significantly higher incomes. This trend has persisted over time as can be seen using state-level per capita nonfarm proprietor income data (Figure 2). Though the Tennessee and Southern Region follow similar paths, the gap has widened in recent years.

Figure 2. Nonfarm Proprietor Income in 2006 dollars, 1969 - 2006



Source: REIS 2008

¹Non-farm proprietor’s income by county was summed for each state, then divided by the number of non farm proprietors.

² A deflator with a base year of 2006 was multiplied by each year.

Nonfarm Proprietor Share of Total Employment

On average, in the Southeast region, the share of the workforce who were nonfarm proprietors increased in metropolitan and nonmetropolitan counties by approximately 3 percent between 2000 to 2005. The percent of workers who were nonfarm proprietors was consistently higher in metropolitan than nonmetropolitan counties (21 versus 20 percent in 2005, respectively) (Table 3). The employment pattern was similar in Tennessee metropolitan and nonmetropolitan counties, but the percent change was slightly greater in metropolitan counties (4 percent) compared to nonmetropolitan counties (3 percent) between 2000 and 2005.

The geographic distribution of entrepreneurs across Tennessee can be seen graphically in Figures 3a (2000) and 3b (2005). Entrepreneurs, as measured by share of nonfarm proprietors, are concentrated more heavily (darker shades of green) in more rural areas. Some clustering is evident in the Cumberland Plateau region. However, between 2000 and 2005, that region's entrepreneur share of total employment declined (shades of grey) (Figure 3b). This overall trend is apparent throughout Tennessee, with few exceptions of growth (shades of orange). In comparison to other Southeastern states, Tennessee counties have an above-average proportion of entrepreneurs. Within Tennessee, entrepreneurship continues to grow in metropolitan counties. In contrast, entrepreneurship, as a share of total employment, in nonmetropolitan counties has declined.

Table 3. Indicators of entrepreneurial activity in Southeastern Region of Tennessee across metropolitan and nonmetropolitan counties in selected years (2000 and 2005).

Variable	Year	Southeastern Region			Tennessee		
		<i>Metro</i>	<i>Non-metro</i>	<i>Difference</i> ¹	<i>Metro</i>	<i>Non-metro</i>	<i>Difference</i> ¹
Average nonfarm proprietor income ^{2,3}	2000	19,234	17,430	1,804*	22,800	19,238	3,562**
	2005	18,027	14,958	3,069*	22,947	19,168	3,779
	% change, (00-05)	-6.28%	-14.18%	7.91%	0.64%	-0.36%	1.01%
Nonfarm proprietor share of employment	2000	18.4%	17.4%	1.0%***	21.2%	21.8%	-0.7%
	2005	21.4%	20.2%	1.2%***	25.1%	24.6%	0.5%
	% change, (00-05)	2.9%	2.8%	0.18%	3.9%	2.8%	1.13%
Small business enterprises (fewer than 20 employees)	% of all firms, 2000	87.3%	88.8%	-1.46%*	86.7%	88.0%	-1.3%**
	% of all firms, 2005	87.4%	88.9%	-1.42%*	87.0%	88.5%	-1.5%**
	% change, (00-05)	0.13%	0.09%	0.04%	0.3%	0.5%	-0.19%

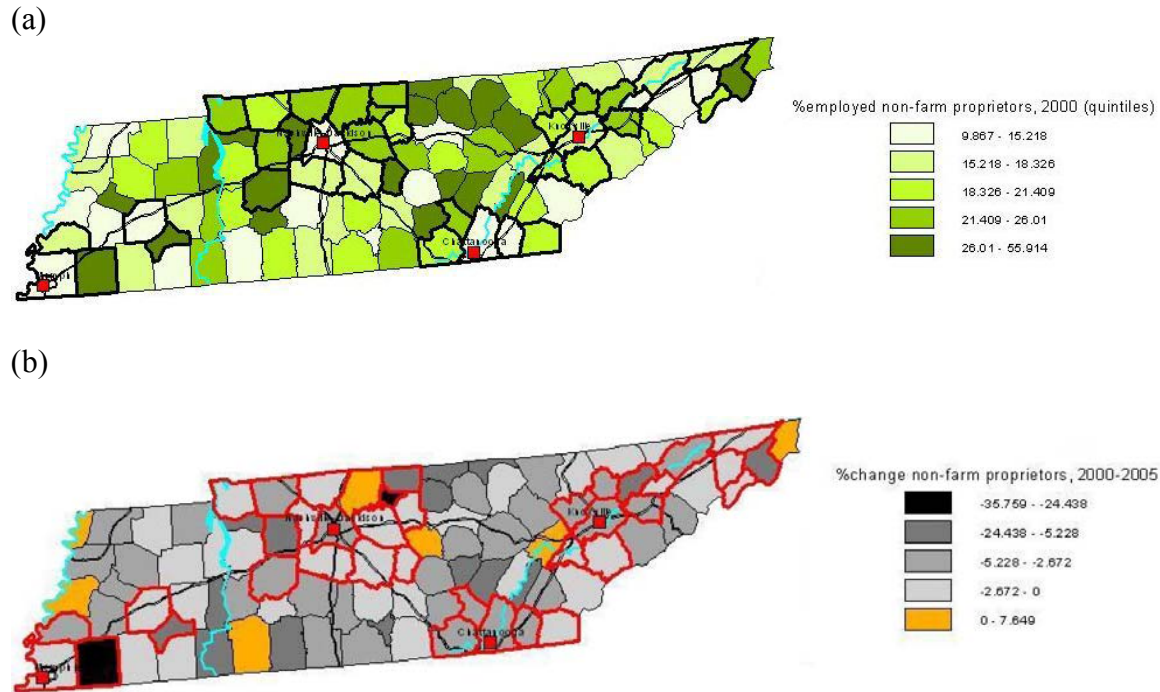
Notes:

¹ Metropolitan less non-metropolitan values, *, **, *** significantly different at the 1, 5 and 10 percent levels.

² These overall income measures should be put into some perspective. These are reported averages across counties in the study region and Tennessee and not aggregates. Therefore, the reported levels are sensitive to outliers or data that is markedly different from the rest. There are counties with extremely low nonfarm proprietor income and others where nonfarm proprietor income losses were recorded.

³ In 2005 dollars.

Figure 3. Density of Tennessee nonfarm proprietors (a) and the percent change in density of nonfarm proprietors (b), 2000-2005



Distribution Small Business Enterprises

Overall, 85 percent of all Tennessee businesses have fewer than 20 employees. The distribution of Tennessee’s small business enterprises was similar to the overall distribution across the Southeastern states (Table 3). The county average share of establishments with fewer than 20 employees was greater in the nonmetropolitan counties of both the Southeastern region and Tennessee (about 89 percent in both cases). The metropolitan county average share of business establishments with fewer than 20 employees was about 2 percent less.

Entrepreneurship and Economic Growth

Regression analysis is often used to supplement descriptive findings. In regional growth studies, regression analysis is useful because it isolates the relationships local factors have on economic growth. By isolating which local factors are associated with an outcome, such as changes in jobs, new firm births or income, a more in-depth understanding of what components drive economic growth is possible. We use regression analysis in two cases. The first case examines the relationships between local economic growth, entrepreneurs and the creative class (using the ERS measure, see Box 2) in the Southeast region between 2000 and 2005 (see Case 1 and Appendix A). The second regression analysis looks at the relationship between entrepreneurs and firm birth between 2000 and 2006 for Tennessee’s 95 counties (see Case 2 and Appendices B and C).

Box 2: The Creative Class

The “Creative Class” is a term popularized by Dr. Richard Florida in his book, “Rise of the Creative Class” (Florida, 2002). In the book, he identifies two classes of “creative” occupations that are key to economic growth and therefore should be attracted and retained by communities. This includes the “Super Creative Core” (e.g., scientists, engineers, professors, writers, actors, etc.) and “creative professionals” (e.g., jobs in the high technology, financial and health sectors). However, the analysis is primarily examined in an urban context.

In an effort to study the creative class from a rural or nonmetropolitan perspective, McGranahan and Wojan (2007) ‘recast’ the creative class by using different criteria and data sourced from the US Department of Labor’s Occupational Information Network. They concentrate on the occupations that involve “Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions” (Table 4). They eliminate creative occupations that are essential and proportionate to the population, such as doctors and teachers. Though definitions differ, both groups agree that the creative class are relatively “footloose” (willing to migrate) and attracted to high amenity places.

Table 4. Creative class as reformulated by McGranahan and Wojan (2007)

Occupation title	Standard Occupation Code (SOC)
<i>Management occupations:</i>	
Top executives	11-1000
Advertising, marketing, promotions, public relations, and sales managers	11-2000
Financial managers	11-3030
Operations specialties managers, except financial managers	11-3010, 11-3020, 11-3040 through 11-3070
Other management occupations, except farmers and farm managers	11-9020 through 11-9190
<i>Business and financial operations occupations:</i>	
Business operations specialists	13-1000
Other financial specialists	13-2020 through 13-2090
<i>Computer and mathematical occupations:</i>	
Computer specialists	15-1000
Mathematical science occupations	15-2000
<i>Architecture and engineering occupations:</i>	
Architects, surveyors, and cartographers	17-1000
Engineers	17-2000
Drafters, engineering, and mapping technicians	17-3000
<i>Life, physical, and social science occupations:</i>	
Life and physical scientists	19-1000 and 19-2000
Social scientists and related workers	19-3000
<i>Education, training, and library occupations:</i>	
Postsecondary teachers	25-1000
Librarians, curators, and archivists	25-4000
<i>Arts, design, entertainment, sports, and media occupations:</i>	
Art and design workers ^{1/}	27-1000 ^{1/}
Entertainers and performers, sports, and related workers ^{1/}	27-2000 ^{1/}
Media and communications workers	27-3000 and 27-4000
<i>Sales and related occupations:</i>	
Sales representatives, services, wholesale and manufacturing	41-3000 and 41-4000
Other sales and related occupations, including supervisors	41-1000 and 41-9000

Source: USDA’s Economic Research Service (2008). Creative Class County Codes: Data Documentation and Methods. <http://www.ers.usda.gov/Data/CreativeClassCodes/methods.htm>. Standard Occupation Codes are available online from the Bureau of Labor Statistics at: <http://www.bls.gov/soc/>.

^{1/}These two categories comprise the arts occupation subset.

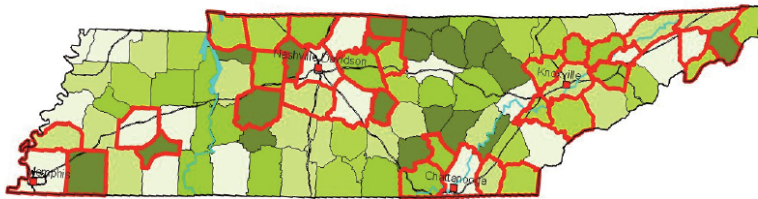
Case 1: Entrepreneurship and the Creative Class in the Southeast and Tennessee

Though their individual effect on economic growth has been studied rather extensively, entrepreneurship and the creative class (see Box 2) are cross cutting concepts that defy classification as simply social or human capital, respectively (McGranahan, Wojan and Lambert, 2008; McGranahan and Wojan, 2007 and Audretsch and Keilbach, 2005). As such, definitions and measurement of ‘Creative capital’ and ‘Entrepreneurship capital’ are being developed. In this case, we examine each individually across the Southeastern region at the county level, and between metropolitan and nonmetropolitan counties. We also explore their potential interrelationship by interacting the two terms in the regression analysis. As McGranahan, Wojan and Lambert (2008) note, “Creative capital provides the knowledge and ideas required for growth while entrepreneurship provides the means for incorporating knowledge and ideas into the local economy.”

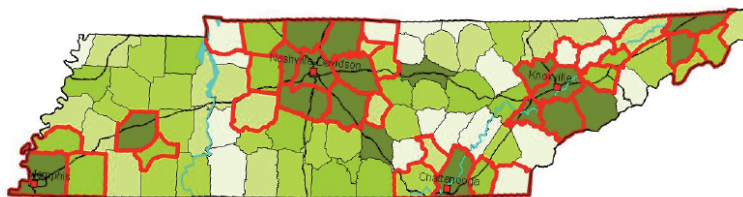
Figure 4 provides some insight to the distribution of entrepreneurs and the creative class in Tennessee. As discussed above (pages 10-11), entrepreneurs in Tennessee, as measured by nonfarm proprietor’s share of total employment, are generally concentrated in more rural areas (darkest green) (Figure 4). In contrast, the creative class is concentrated in the metropolitan areas of Tennessee (outlined in red).

Figure 4. Distribution of Tennessee nonfarm proprietors (a) and creative class (b) in 2000.

(a)

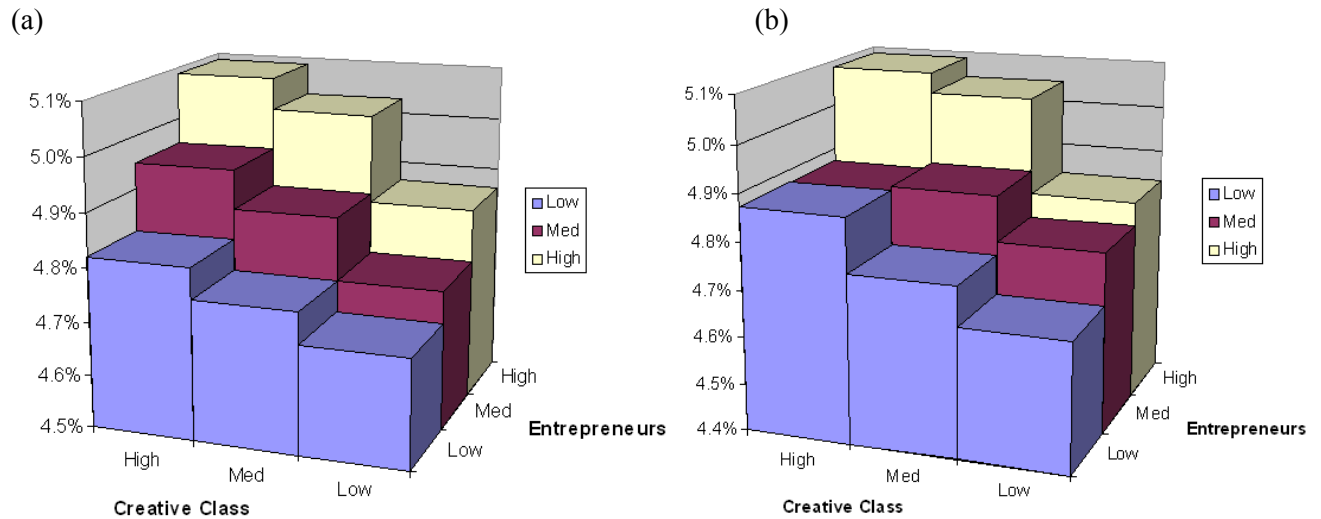


(b)



We measured economic growth in terms of (1) changes in employment and (2) the number of establishments per employee, both measures covering the 1990 to 2000 period. The creative class measure was based on McGranahan and Wojan (2007). Entrepreneurship was measured in two ways (see Box 1). First, we measured entrepreneurship as the ratio of the number of nonfarm proprietors to nonfarm employment and second as the ratio of the number of establishments to County Business Patterns employment. Regression analysis was performed using data for the Southeastern region. The fact that county-level data was being used precluded a similar regression analysis for Tennessee given the low number of observations. However, graphical analysis was employed to determine the general relationship between entrepreneurship, creative class and economic growth.

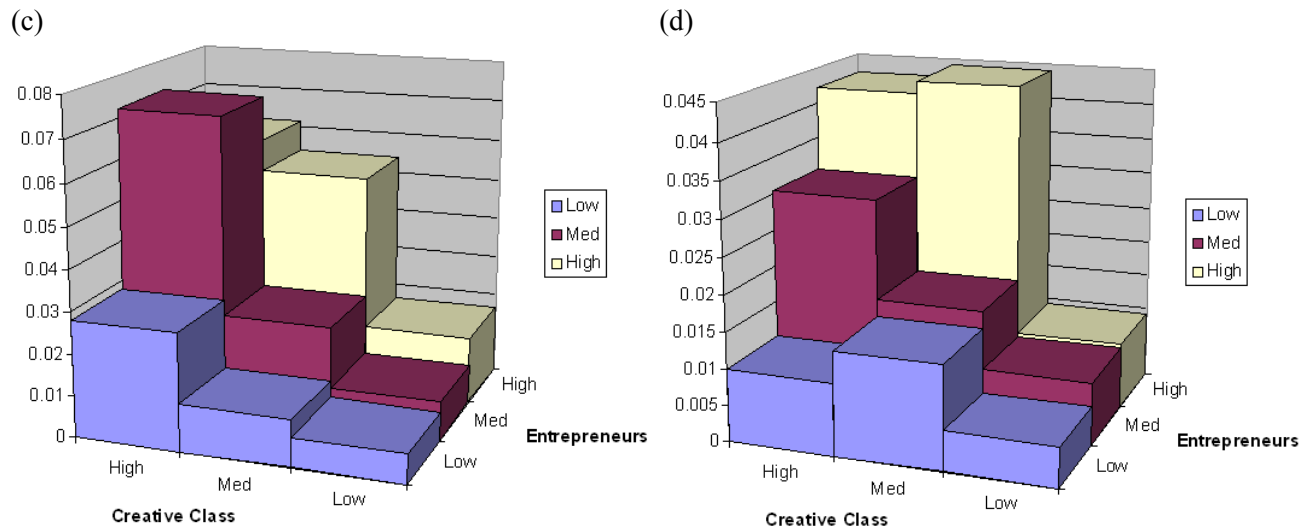
Figures 5a and b. Percent change in number of jobs (1990-2000), by entrepreneur (self-employment rate) and creative class share, Southeast Region (a) and Tennessee (b)



Source: County Business Patterns 2008

¹ Shows interaction of creative class and entrepreneurs' effect on growth of jobs over ten years

Figures 5c and d. Change in Number of Establishments (per 1000 1990 jobs), by entrepreneur (self-employment rate) and creative class share, Southeast Region (c) and Tennessee (d)



Source: County Business Patterns 2008

¹ Shows interaction of creative class and entrepreneurs' effect on establishment growth per 1000 jobs

² In counties with a medium range of creative class and high entrepreneurs, there is a growth of over 4 new establishments per 1000 jobs.

Case 2: Value Chain Growth and Entrepreneurs in Tennessee, 2000 – 2006

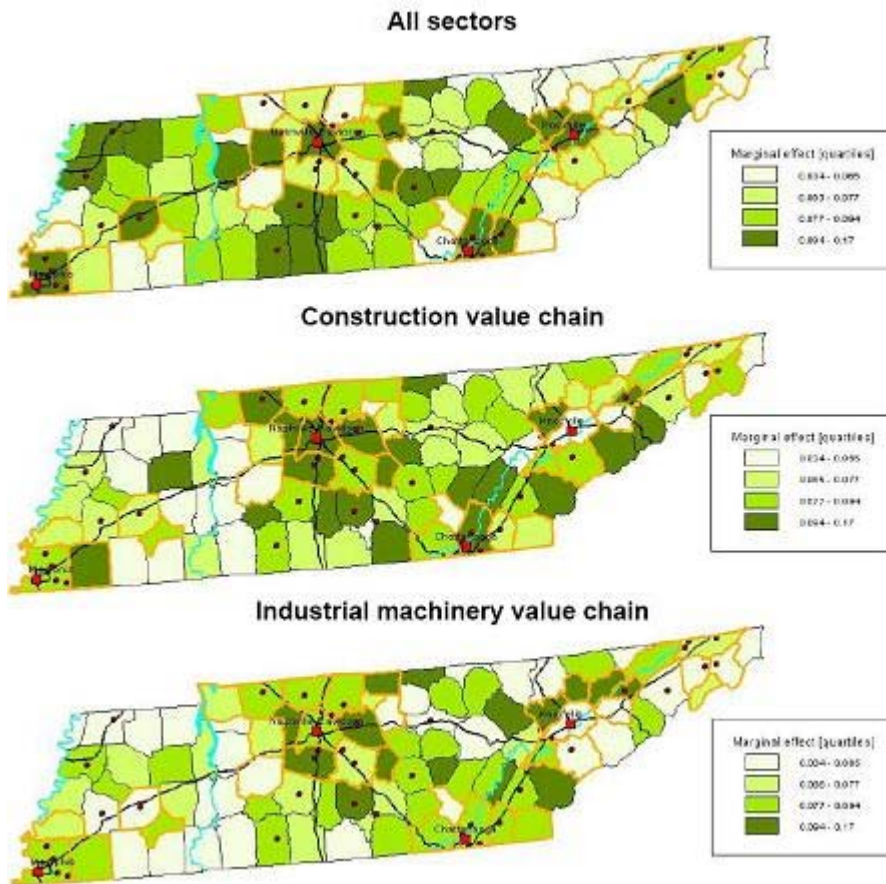
An industry cluster analysis uncovered linkages between purchasers and suppliers at the county and regional level for 447 economic sectors in Tennessee. Sector-level information was obtained from the Impact Analysis for Planning data files (IMPLAN), 2000 and 2006 economic transaction files. The cluster analysis identified 43 unique value chains in Tennessee. A value chain includes sectors that buy and sell (or have ‘backward’ and ‘forward’ linkages, respectively) intermediate or final products to firms in other sectors.

After identifying value chains (Appendix Table 3), regression techniques determined the extent to which entrepreneurs (in 2000) influenced the likelihood that a firm belonging to a value chain was established in a county between 2001 – 2006. In other words, the analysis tracks the probability of firm birth into a specific value chain during this period. For illustrative purposes, the results presented focus on two identified value chains: the ‘construction’ and ‘industrial machinery’ value chains (Figure 6). A sector-wide analysis, including all of Tennessee’s economic sectors, supplements the value chain regressions.

Entrepreneurs influenced business establishment birth in a variety of ways from 2001 to 2006. When all sectors in Tennessee’s economy were considered, entrepreneurship had a positive relationship with respect to the likelihood of firm birth across every county, statewide. Given a 1 percent change in the proportion of nonfarm proprietors to nonfarm jobs, a county was twice as likely to experience a firm birth belonging to any sector from 2001 - 2006. Likewise, given a 1 percent change in entrepreneurs, counties were, on average, seven times more likely to have a firm belonging to the construction value chain enter the economy. Lastly, for the industrial machinery value chain, counties were about six times more likely to attract investment from a sector member of this value chain, given a percentage change in the nonfarm-proprietor to nonfarm-jobs ratio.

Alternatively, the relationship between entrepreneurs and the likelihood a new firm being located in a sector can be examined using probabilities. This way, the question can be asked, “How much does the probability of attracting a business establishment represented by a value chain increase, given a percent change in entrepreneurs?” The advantage of looking at the results this way include being able to map these firm entry probabilities across Tennessee, to assess county comparative advantage. For example, a 1 percent increase in entrepreneurs corresponds with a 16 percent increase in the probability that an establishment in one of the sectors making up the ‘construction’ value chain appeared in Hamilton County, 2001 – 2006 (Figure 6). Similarly, for a 1 percent change in the entrepreneur measure in Bedford County, the increase in the probability a firm belonging to one of the sectors representing the industrial machinery value chain started operations there during 2001 – 2006 was about 8 percent.

Figure 6. Marginal effects of entrepreneurs (nonfarm proprietors to nonfarm employment) on the probability of firm births in all Tennessee business sectors, 2001 – 2006.



- Includes all 509 sectors in Tennessee

Sectors in the construction value chain

- New residential 1-unit structures-nonfarm
- New multifamily housing structures-nonfarm
- New residential additions and alterations-nonfarm
- New farm housing units and additions and alterations
- Manufacturing and industrial buildings
- Commercial and institutional buildings
- Other new construction
- Maintenance and repair of nonresidential buildings
- Architectural and engineering services
- Agriculture and forestry support activities
- Water- sewage and other systems
- Office administrative services

Sectors in the industrial machinery value chain

- Ball and roller bearing manufacturing
- Metal-forming machine-tool manufacturing
- Special tool- die- jig- and fixture manufacturing
- Iron and steel forging
- Machine shops
- AC- refrigeration- and forced air heating
- Speed changers and mechanical power transmission e???
- Measuring and dispensing pump manufacturing
- Elevator and moving-stairway manufacturing
- Industrial process furnace and oven manufacturing
- Scales- balances- and miscellaneous general purpose
- Motor and generator manufacturing
- Switchgear and switchboard apparatus manufacturing

Note: Counties with orange borders define Tennessee’s Metropolitan Statistical Areas (MSAs).

Inventory of Entrepreneurial Support in Tennessee

There are many federal, state, regional and local resources/services available to nascent entrepreneurs or those seeking to remain or expand their firms in Tennessee. In addition, academic institutions across the state provide a wide variety of education, training and technical assistance to small businesses. In 2007, the Business Enterprise Resource Office (BERO) in the Tennessee Department of Economic and Community Development assembled a directory of service providers, by county, for entrepreneurs in Tennessee (see: <https://www.tnecdit.net/BERODirectory/>). The directory provides information on many of the organizations and institutions focused on entrepreneurship and small business development in Tennessee. Though not exhaustive, the directory is the most comprehensive listing of its kind in Tennessee and is a worthwhile effort that should be continued, expanded and maintained.

This information is useful not only as a directory, but potentially also as a platform for policy makers and other leaders to contemplate inter-agency capacity-building and partnership opportunities. One challenge is the sheer number of organizations, well over one hundred, even when individual Chambers of Commerce and other local institutions are aggregated into generic, state-level categories. Though there has not been a comprehensive inventory of programs, organizations and institutions that support entrepreneurship, the directory provides a launching point for analysis.

For the purposes of this report, examples of organizations that provide entrepreneurship services directly to entrepreneurs, and their communities, are listed by governmental jurisdiction or geographic area (Tables 6-9). These tables simply represent a small sample of agencies, organizations and institutions either listed in the directory or known to the authors. Descriptions have been adapted from the directory or from the organization's informational materials.

Federal agencies listed work in Tennessee and all other States. The only exception is the Tennessee Valley Authority which is a federal corporation which operates in the Tennessee Valley region. Most of the federal agencies help entrepreneurs and small businesses through the provision of financial assistance and capacity building activities. Nationally, the Small Business Administration serves as an important source of information and advocacy for and about small business. On a community level in Tennessee, USDA Rural Development - Tennessee has provided funding to ameliorate the physical infrastructure of communities.

On a state level, entrepreneurs have access to start-up information through the "One Stop Business Resource" and the "Small Business Technical Assistance Guide" websites (State of Tennessee, 2008). The Tennessee Department of Economic and Community Development's (ECD) Business Enterprise Resource Office (BERO) provides technical, financial and management information assistance to small, minority and women owned businesses. On the community-level, ECD has recognized the importance of entrepreneurship through the inclusion of entrepreneurship-related benchmarks in the Three Star Program. Lastly, agricultural-related entrepreneurship receives support through entities such as the Tennessee Department of Agriculture - Market Development Division.

Table 6. Selected Agencies, Organizations and Institutions that Provide Entrepreneurial Support at the Federal Level

Domain	Name	Description	Website
Federal	U.S. Department of Agriculture -Rural Development	The U.S. Department of Agriculture, Rural Development office operates small business financing programs targeted at rural entrepreneurs and business owners, with an emphasis on retaining and creating jobs in rural Tennessee.	http://www.rurdev.usda.gov/tn/
	U.S. Department of Agriculture -Farm Service Agency	FSA in Tennessee administers farms loans, farm programs, conservation and stewardship incentives, disaster assistance and food aid across the country and around the world. FSA works to help beginning farmers with the many challenges they face, and we support youth-centered agricultural programs.	http://www.fsa.usda.gov/tn/
	U.S. Minority Business Development Agency	MBDA is an entrepreneurially focused and innovative organization committed to wealth creation in minority communities. The Agency's mission is to actively promote the growth and competitiveness of large, medium and small minority business enterprises. MBDA actively coordinates and leverages public and private-sector resources that facilitate strategic alliances in support of its mission	http://www.mbda.gov/
	U.S. Small Business Administration	The SBA provides a number of financial assistance programs for small business, including 7(a), 504, disaster assistance loan, Community Express and Patriot Express loans. In addition to loans, the SBA operates the 8(a) development program to socially and economically disadvantaged firms; a Small Disadvantaged Business certification program; Small Business Innovation Research and Small Business Technology Transfer program assistance and exporting assistance. Comprehensive tools for entrepreneur development and planning are available online.	http://www.sba.gov and http://www.sba.gov/tn
	Tennessee Valley Authority	The Tennessee Valley Authority is a federal corporation and the nation's largest public power company. The TVA has three areas of responsibility: energy, environment, and economic development. The TVA supports small, disadvantaged, minority, and women-owned firms and targeted commercial sector businesses through strategic partnerships, outreach activities, networks, electronic tools, and business assistance.	http://www.tva.com

Table 7. Selected Agencies, Organizations and Institutions that Provide Entrepreneurial Support at the State Level

Domain	Name	Description	Website
State	Tennessee Department of Economic and Community Development - Business Enterprise Resource Office	BERO provides technical, financial and management information assistance to small, minority and women owned businesses. BERO focuses on four main areas of development to achieve its mission: providing technical assistance (business planning, licensing, certification, financial assistance, expansion assistance and other special needs), assisting with procurement opportunities, driving manufacturing initiatives and creating export opportunities.	http://ecd.state.tn.us/bero/
	Tennessee Department of Economic and Community Development - Community Development Division - Three Star Program	The Three-Star Program is designed as a road map to assist local communities in their effort to achieve excellence in community and economic development. Participating communities are guided through a comprehensive plan of essential criteria developed by local economic development professionals and a cooperative collaboration of various state agencies. Entrepreneurial Development at the community level is a key component of the "Economic Development" section of the plan.	http://www.state.tn.us/ecd/3star.htm and http://www.state.tn.us/ecd/pdf/3Star_07.pdf
	Tennessee Department of Agriculture - Market Development Division	The Market Development Division (MDD) is the agricultural industry development and marketing arm of the Tennessee Department of Agriculture (TDA). TDA's primary focus is to work with farmers, agribusinesses, commodity organizations and consumers. The Division works closely with the Tennessee Department of Economic and Community Development, the UT Institute of Agriculture, the UT Center for Profitable Agriculture, and federal agencies and commodity groups. Programs reflect the diversity of Tennessee agriculture and the changing marketplace.	http://www.tennessee.gov/agriculture/marketing/index.html
	Governor's Office of Diversity Business Enterprise	The Governor's Office of Diversity Business Enterprise is the central point of contact to attract, direct, and support minority, women and small businesses. The goal of this office is to increase procurement opportunities for small, minority, and women owned businesses.	http://www.tennessee.gov/businessopp/
	Tennessee Department of Transportation	The Tennessee Department of Transportation has a Small Business Development Program. Its primary goal is to increase the number of minority and female businesses in the highway and bridge construction industry. It provides quality technical assistance, resources, and guidance.	http://www.tdot.state.tn.us/civil-rights/smallbusiness/
	Tennessee Small Business Development Centers	The TSBDC provides no cost one-on-one counseling and low cost educational workshops to start-up and existing business owners. Business counseling is offered in the areas of financial management, marketing, human resources, operations, and information technology. Workshops topics include "nuts and bolts" for starting a business, market research, writing a business plan, understanding financials, legal issues, marketing, selling, patents & copyrights, new product development, and accessing financing.	http://www.tsbdc.org
	Tennessee Technology Development Corporation	TTDC is a private, 501(c)(3) corporation created by State Legislature in 1998 and tasked with implementing an innovation-based economic development agenda throughout the state. Currently, the TTDC is actively engaged in three areas via three emerging initiatives: research and development through the Tennessee Strategic Research Board; entrepreneurial environment through the Tennessee Entrepreneurship Network and venture capital formation through the Tennessee Capital Formation Board.	http://www.tntechology.org/

Table 8. Selected Agencies, Organizations and Institutions that Provide Entrepreneurial Support at the Regional and Local Level

Domain	Name	Description	Website
Regional	Tennessee Development Districts	Nine development districts were established by the Tennessee General assembly under the Tennessee Development District Act of 1965. Though each is an individual entity, the districts work regionally in wide variety of ways that support small business and entrepreneur development in addition to conducting community-level development projects and programs.	
Regional	SCORE	Sponsored by the U.S. Small Business Administration, SCORE offers management counseling for small business. The wide range of expertise of SCORE members, all retired executives and business owners, allows for matching SCORE members with client needs. SCORE works confidentially with existing businesses to analyze problems and help find solutions. SCORE also conducts seminars and workshops with special emphasis on small business start-up.	National: http://www.score.org/index.html Chattanooga: http://www.scorechattanooga.org/ Johnson City: http://www.scoretn.org/index.html Knoxville: http://www.scoreknox.org/ Memphis: http://www.scorememphis.org/ Nashville: http://www.scorenashville.org/
Regional (East)	Tech 2020	Tech 2020 is a public-private partnership focused on encouraging entrepreneurship, increasing access to capital, growing technology companies and supporting the technology community in East Tennessee through a range of initiatives (e.g., The Center for Entrepreneurial Growth, The Southern Appalachian Fund, etc.)	http://www.tech2020.org
Regional (Middle)	Mind2Marketplace	A consortium of academic professionals, businesspeople, PreK-12 educators, Chambers of Commerce and government, formed in 2006, to bring technology-based ideas and concepts forward to be developed, tested and introduced to the marketplace, all in order to create jobs and expand economic development in a 40-county region in Middle Tennessee.	http://www.mind2marketplace.com
Regional (West)	Memphis Bioworks Foundation	Founded in 2001 as a nonprofit 501(c)(3), the Memphis Bioworks Foundation leads an unprecedented collaboration of public, private, academic, and government organizations aligned behind a common mission, "To establish the Memphis region as an internationally recognized center for the development and commercialization of biomedical technologies." Memphis Bioworks is engaged in a wide-variety of initiatives ranging from the development of a research park to promoting education. Entrepreneurship activities include technology transfer, capital acquisition and product commercialization.	http://www.memphisbioworks.org
Local/Regional /State	Chambers of Commerce and local Economic Development Organizations	Whether based on geography, ancestry or gender, there are over one hundred Chambers of Commerce and local economic development organizations across Tennessee. Though each varies in size and capacity, these organizations are dedicated to championing their 'community' and fostering the success of their members typically through networking, education and training.	

Table 9. Selected Agencies, Organizations and Institutions that Provide Entrepreneurial Support at the University Level

Domain	Name	Description	Website
Colleges and Universities	University of Tennessee (UT)	"The University of Tennessee serves the people of Tennessee and beyond through: providing access to and success in undergraduate, graduate, and professional education; pursuing research and scholarly achievement and its associated economic development; and ensuring educational outreach and ensuring preparedness for the global marketplace.	http://www.tennessee.edu/
	UT Research Foundation	The University of Tennessee Research Foundation (UTRF) is a not-for-profit corporation whose mission is to take ideas and discoveries made at the University of Tennessee and turn them into products and services that improve the quality of life for people around the world. UTRF business incubation facilities are located in Memphis, Tullahoma and Knoxville that provide affordable business space in an environment that supports entrepreneurship for start-up companies.	http://utr.f.tennessee.edu/
	University of Tennessee Institute for Public Service	IPS helps companies, entrepreneurs, organizations, and cities and counties across the state access university expertise, resources and intellectual assets to help advance the economic well being of Tennessee and create and retain quality job opportunities.	http://www.ips.tennessee.edu
	UT Extension / TSU Cooperative Extension	The University of Tennessee Extension is an off-campus division of the UT Institute of Agriculture. It is a statewide educational organization, funded by federal, state and local governments, that brings research-based information about agriculture, family and consumer sciences, and resource development to the people of Tennessee where they live and work. Similarly, the TSU Cooperative Extension Program is committed to helping educate limited-resource urban and rural families, small farmers, individuals, and other groups and organizations within the rural and urban communities	UT Extension http://www.utextension.utk.edu/ TSU Cooperative Extension http://www.tnstate.edu/cep/
	UT Extension - Center for Profitable Agriculture	The Center is a partnership between the Tennessee Farm Bureau Federation and The University of Tennessee Institute of Agriculture. The Center is committed to the mission of increasing the value of Tennessee's economy through new, expanded and improved processing and marketing of agricultural, aquacultural and forestry products in Tennessee.	http://cpa.utk.edu/default.htm
	UT Law School - Clayton Center for Entrepreneurial Law	The Clayton Center for Entrepreneurial Law seeks to improve the training of business lawyers in both transactional and litigation practices through the College of Law curriculum and Concentration in Business Transactions, faculty and student scholarship, and presentations for the business bar and community both regionally and nationwide.	http://www.law.utk.edu/ccel/
	UT - Martin - Regional Entrepreneurship and Economic Development Center	The Regional Entrepreneurship and Economic Development Center (REED Center) serves existing and prospective entrepreneurs and supports economic development in rural northwest Tennessee. The REED Center offers courses, workshops and training sessions that respond to the needs of small businesses and supports regional economic development.	http://www.utm.edu/departments/reed/

Regionally, there are examples of sector-specific and regionally-specific initiatives. Entrepreneurs in the technology and bioscience fields receive support from Tech 2020 and Memphis Bioworks, respectively. Tech 2020 serves eastern Tennessee by leveraging the location and resources of institutions such as the University of Tennessee – Knoxville and Oak Ridge National Laboratory, among others. Memphis Bioworks Foundation serves west Tennessee, in partnership with public and private entities. Mind2Marketplace, in middle Tennessee, is a forty county alliance that has a particular interest in facilitating the commercialization of technology from the fields of aerospace and biotechnology. In each of these cases, the organization has limited itself geographically in scope and sectorally in emphasis through the inclusion of adjacent public knowledge generating institutions and private business.

At a local level, the directory includes a vast number of entities that serve entrepreneurs in specific localities or entrepreneurs from specific groups, often based on ancestry or gender. Most are organized as a Chamber of Commerce or other non-profit entity. In metropolitan areas of Tennessee, there is a cadre of business incubators (e.g., Emerge Memphis).

Educational institutions are an integral part of “keeping the entrepreneurial pipeline” of Tennessee full. By stimulating the interest in entrepreneurship, students find a means for making basic content directly relevant to their lives. As Wilcox and Phillips (2008) note, one of the main youth development priorities that surfaced during community forums held across Tennessee in 2008 was youth entrepreneurship. This emphasis was driven by the fact that youth entrepreneurship “includes developing critical thinking skills and the capacity to evaluate risks and estimate rewards as youth consider pursuing their entrepreneurial venture. The power of this approach lies in the fact that skills are transferrable and can be used throughout life”. Junior Achievement, 4-H Youth Development and FFA were all mentioned during the forums as examples of entrepreneurship development opportunities available to students prior to post-secondary education.

At the highest level, colleges and universities play an important role in entrepreneurial development. Many members of the Tennessee Board of Regents (e.g., Middle Tennessee State University, Tennessee State, Austin Peay State University, Dyersburg State Community College and eight others) are hosts of the Tennessee Small Business Development Centers. These centers play a central role in the development and support of entrepreneurs and small business across the state. Private institutions, like Vanderbilt University and Belmont University, are involved in capital formation (Nashville Capital Network, <http://www.nashvillecapital.com/>) and experiential learning (Center for Entrepreneurship, <http://www.belmont.edu/ce/index.html>) initiatives, respectively. Lastly, the University of Tennessee is involved in entrepreneurship development through an array of programs. As one of two Land Grant institutions in the state, the University of Tennessee’s Extension programming is conducted in all 95 counties in the state. In addition, the Institute for Public Service serves entrepreneurs and small businesses at a community level through training and assistance to build community capacity and at the firm level through the Center for Industrial Services. The next generation of business attorneys are being educated in the University of Tennessee School of Law’s Clayton Center for Entrepreneurship and businesses are being incubated at the Center for Entrepreneurial Growth.

Entrepreneurs in western Tennessee receive technical assistance from the University of Tennessee-Martin's Regional Entrepreneurship and Economic Development Center.

While service provision might appear extensive in Tennessee, it should be noted that virtually all regional, state and federal providers are physically located in metro- and micropolitan counties. Though mobile and quite cognizant of the need for entrepreneurial support in the noncore counties, it has been recognized, albeit anecdotally, that service providers generally find it difficult to reach entrepreneurs found in the further reaches of their service region. The result is that rural entrepreneurs do not receive support relative to their density or importance to the local economy. Estimating this potential gap should be made a priority. Lastly, there is currently no formal statewide network of service providers in the state, nor any widespread coordination. Attempts have been made (e.g., Tennessee Network for Community and Economic Development (TNCED) and Tennessee Alliance for Local Enterprise (TALENT)) to create a sustainable network of entrepreneurs with some short term success. As Edgecomb (2008) points out, such a network, or system, needs to decide if it is going to be "supplier driven" where the network serves to help providers understand what each offers and does not offer, assists in comprehensive needs assessment, identifies service provision gaps and enhances the referral system. A demand driven system, on the other hand, seeks to increase transparency in the business development process, build capacity and provide pertinent information for aspiring entrepreneurs. Dabson (2005) provides the underlying premise of a successful system or network: "An effective entrepreneurship development system integrates a wide range of programs and tailors products and services to meet the diverse needs of entrepreneurs. It should be comprehensive, flexible, culturally sensitive, and integrated, and should require providers to collaborate rather than operate independently or in isolation". Such a system, as defined by Dabson, does not currently exist in Tennessee. Currently, TALENT and the Tennessee Technology Development Corporation's proposed Tennessee Entrepreneurship Network are two statewide efforts. As mentioned before, regional and local efforts also exist. Examples of a variety of initiatives from across the United States are discussed in Markley and Dabson (2008).

Markley and Dabson (2008) also examine the issue of supporting entrepreneurs in Kentucky. They argue that a "system of support" should be established. Just as in Tennessee, entrepreneurial support originates at a broad range of levels, from local non-profit to Federal agencies. However, duplication of services and lack of collaboration is resulting in less than efficient use of resources and a delivery infrastructure that increases search costs and limits the ability of the entrepreneur to locate the proper service provider. Markley and Dabson (2008) note that advances are being made through collaborative efforts but suggest that the statewide system is facing several constraints that are directly relevant to the situation in Tennessee.

They suggest that policymakers should consider the fact that an effective and systematic approach requires:

- An overarching vision for entrepreneurship and small business development
- An amount of funding invested in entrepreneurship programming comparable to other economic development efforts
- Every program should have robust evaluation and performance measures in place for assessment purposes

- The pipeline of entrepreneurs should be filled though engaging young people in entrepreneurship programs
- Incentives for information-sharing, networking and collaborating across service providers need to be established

Conclusions, Recommendations and Remaining Questions

It goes without saying that the fall of 2008 made its mark in terms of economic history. The global financial market crashed in the wake of a collapsed housing market and overall lack of confidence in the credit markets. As a result, credit has tightened for investors on Wall Street and Main Street America alike, with soaring interest rates reflecting lender pessimism about loan payback. Shrinking capital markets have created constraints and barriers that essentially limit or prohibit access by nascent entrepreneurs and those who seek to persist and expand. According to the economist Schumpeter, credit is the lifeblood of capital markets, and entrepreneurs the catalysts transforming ideas and capital into new business establishment and jobs. Entrepreneurs operate the largest firms and smallest enterprises; they build new businesses and create jobs at all levels of economic activity in a community. But as entrepreneurs find it more and more difficult to obtain credit to realize their objectives, job creation will inevitably slow down and economic growth will stagnate or decline.

In recent times, Tennessee appears to enjoy comparative advantage with respect to growth in its stock of entrepreneurs relative to the Southeastern region. But a single answer as to the state of entrepreneurial growth in Tennessee is difficult to discern because the evidence is mixed, and depends on where one looks, and what measure is used. For example, the number of businesses employing 1 to 4 persons declined from 2000 to 2005 in nonmetropolitan counties. Yet growth in the number of businesses employing 1 to 4 persons in the construction sector in noncore counties, and small enterprises of the same size in the agriculture sector in micropolitan counties experienced overall growth. At the state level, the percent of jobs belonging to nonfarm proprietors has increased from 2000 to 2006. But a less sanguine picture is painted when entrepreneurship was gauged as the proportion of nonfarm proprietors over total employment at the county level, as the breadth of entrepreneurs appears to be in decline.

Regardless of recent trends, small businesses enterprises continue to play an important role in Tennessee's economy, employing more than 80 percent of the workforce in the metropolitan and nonmetropolitan counties of Tennessee. Counties with relatively more entrepreneurs were also more likely to experience business creation from 2001 to 2006.

What emerges is a complex pattern reflecting growth of small businesses in some sectors and in some counties, and declines in small business enterprises in other locations. The pattern suggests a "one-size-fits-all" approach may not be effective in terms of targeting small business growth in metropolitan and nonmetropolitan counties alike, and that policies targeting entrepreneurial development reflect the demands specific to certain sectors. Given the need for policy devolution, the question remains as to which forms local, sector-specific policies will take, and how one might gauge their effectiveness. Undoubtedly, such policies will be context-dependent in terms of location and the demands of entrepreneurs engaged in specific sectors. This will certainly entail identifying local resources and capacity constraints, engaging and involving

stakeholders, and developing assessment protocols to evaluate project milestones and enhance local accountability.

A starting point for local policy initiatives will inevitably require the following components.

- Enable entrepreneur networks and communication at the local, regional and state level.
- Enhance collaborative efficiency between service providers and seek to fill service gaps in a coordinated fashion.
- Connect nascent entrepreneurs to information and services through online portals, education and networks (including retirement, health care, capital, patent proposal evaluation, etc.).
- Discover local constraints to entrepreneurial development, as well as the sector-specific demands of entrepreneurs.
- Assist rural communities with their transformation into an “entrepreneurial community” through strategic planning efforts, incentive programs and positive asset mapping.
- Provide opportunities for students at all levels to build entrepreneurial skills and aptitude through experiential learning and realistic events that promote transformation of ideas to economically viable products and services.
- Foster connections with the “creative class” and strengthen efforts to recruit creative people and jobs.

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Appendix A. Regression model analyzing economic growth, entrepreneurs, and the creative class.

The regression models, growth and entrepreneurship measures, and the covariates used in the statistical models are discussed in this appendix. The key results of these models are presented in the main body of the report. Readers interested in the effects of the control variables included in the regression on economic growth may refer to the regression tables presented in this section.

The following reduced-form regression model was used to analyze the influence of entrepreneurs and the creative class on growth in the Southeastern region (including Alabama, Georgia, Kentucky, Tennessee, Mississippi, Virginia, Arkansas, North Carolina, and South Carolina) from 1990 – 2000:

$$\begin{aligned}\Delta EST &= C, \text{ Entre, } C \times \text{Entre, } \Delta EST_{-1}, \Delta EMP_{-1}, \Delta POP_{-1}, LM, I, NA, S, D \\ \Delta EMP &= C, \text{ Entre, } C \times \text{Entre, } \Delta EST_{-1}, \Delta EMP_{-1}, \Delta POP_{-1}, LM, I, NA, S, D\end{aligned}$$

where;

ΔEST = change in number of business establishments, 1990-2000;

ΔEMP = change in number of jobs, 1990-2000;

Entre = entrepreneurship measure, 1990;

C = ratio of creative class to all employed 1990;

C x Entre = interaction of C and Entre;

ΔEST_{-1} , ΔEMP_{-1} , and ΔPOP_{-1} = change in establishments, jobs, and population, 1980-1990;

I = industrial structure, 1990;

LM = labor market indicators;

NA = natural amenities;

S = settlement characteristics;

and D = demographic characteristics.

Discussion of the growth measures, the entrepreneurship and creative class proxies, and the statistical methods follow. Descriptive statistics and regression results are presented in Appendix Tables 1 and 2.

McGranahan, Wojan, and Lambert (2008) entrepreneurship measures

Following McGranahan, Wojan, and Lambert (2008), entrepreneurship was defined as the relative abundance of small businesses in a county. “Relative abundance” was measured in two ways. First, the ratio of the number of nonfarm proprietors to nonfarm employment, averaged over 1988-1990 and comes from the BEA REIS files (from here, “Self Employment”). BEA determines self-employment status using (Schedule C) tax returns and partnerships. Low, Henderson and Weiler (2005) used the same measure to indicate “entrepreneurship breadth”. The measure may overestimate entrepreneurship because it includes part-time jobs and because it is by place of residence rather than place of work (the basis of wage and salary employment), especially in counties with extensive commuting.

The second entrepreneurship measure was the ratio of the number of establishments to CBP employment (from here, “Establishments”). Acs and Armington (2002) used this measure in their study of employment growth and entrepreneurship in urban areas. This measure excludes farm, government service, and self-employment. A potential problem with this measure is that to be included, an establishment needs to have at least one employee during the year.

Creative Class measure

The creative class measure is based on McGranahan and Wojan (2007). McGranahan and Wojan refined Florida’s (2002) original creative class measure. Florida used broad occupational titles, confounding less skilled with high skill occupations. The creative class measure can be accessed at www.ers.usda.gov/Data/CreativeClassCodes.

Growth measures

The change in the number of establishment (Δ EST) is from the County Business Patterns (CBP) files, and is measured as the change in number of establishments (1990 – 2000) over private sector employment in 1990. This measure excludes all farm businesses, but includes all establishments with at least one employee. Change in the number of jobs (Δ EMP) is from the U.S. Bureau of Economic Analysis (BEA) Regional Economic Information System (REIS) files, and includes full- and part-time jobs. The measure is calculated as the natural log of the ratio of jobs in 2000 to jobs in 1990.

Covariates

Five sets of control measures are included to reflect conditions at the beginning of the decade. Industry structure (I) was measured by the proportion of jobs in farming, mining, manufacturing, recreation, and business services. These data are from the Census of Population.

Labor market characteristics (LM) are measured by the employment rate of the population (age 16-64), the natural log of median household income (1990), and the proportion of the population (age 25-44) with a college degree. These variables are also from the Census of Population.

The influence of natural amenities (NA) on economic growth is measured with a landscape vector from McGranahan (2008). The percent of land in forest (and its square), the log of percent of county area comprised of surface water, and a topography proxy are included in the measure. Two climate measures from McGranahan (1999) are also included in the regressions: average January and July temperature. Both variables are standardized.

Settlement characteristics (S) include the percent of the work force commuting out of the county (1990) and the natural log of population density (1990). Both of the variables are from the Census of Population.

The relationship between growth and demographic characteristics (D) is measured with percent of the population (age 8-17), and the percent of the population over 62 (1990). Other demographic variables included the proportions of the population Black, Hispanic, and Native American in 1990.

Institutional factors may influence economic growth. The proportion of the population aged 18-24 enrolled in post-secondary school in 1990 measured the potential influence of colleges or universities on growth. Military bases may also play an important role in some local economies. The proportion of the population age 20-24 in the armed forces (1990) measures their influence.

Finally, change measures from the previous decade were also included for establishments (ΔEST_{-1}), employment (ΔEMP_{-1}), and population (ΔPOP_{-1}).

Statistical considerations

The model was simultaneously estimated for metropolitan and nonmetropolitan counties, based on the assumption that the effects of local factors on economic growth may vary across these classifications. Standard errors were calculated using a spatial heteroskedastic-autocorrelation consistent covariance estimator (Kelejian and Prucha, 2007).

Appendix B. Industry cluster analysis and value chain identification in Tennessee, 2001.

The source of competitive advantage for industry clusters is in local qualities, such as shared knowledge, relationships, and motivation, which are more difficult for distant competitors to obtain (St. John and Pouder, 2006). Industry clusters are built around core export oriented firms that bring new wealth into a region and help drive regional economic growth (Stimson, Stough, and Roberts, 2006; Barkley and Henry, 1997; St. John and Pouder, 2006). Gibbs and Bernat (1997) characterize industry clusters as firms in similar industries seeking comparative advantage by co-locating near natural resources, large markets, or labor pools. Cluster interactions promote competition between industries while maintaining avenues of cooperation. Industry clusters also influence competition by fostering innovation, research, and development, which in turn supports future productivity growth and stimulates new business formation. These actions further facilitate additional rounds of interaction, which advance the core industry sectors and reinforce the cluster itself (Porter, 1998).

Businesses in clusters benefit by gaining greater access to suppliers and customized support service while building a framework for companies to work together meeting common needs and promoting common interests (CCED, 2008). In many aspects, cluster members enjoy the benefits of scale economies without sacrificing autonomy (Porter, 1998). The resulting agglomeration of competing but collaborating industries in a region are arranged into horizontal and vertical relationships involving similar resource and/or labor needs, and rely on a shared formulation of specialized economic industries (Fujita and Thisse, 2002).

The literature cites numerous methods for identifying and analyzing industry clusters. Qualitative approaches use techniques such as interviews, focus groups, and surveys to learn about supply chain structures (Stimson, Stough, and Roberts, 2006). Quantitative approaches typically analyze industrial sector data to measure industry size and change, as measured by employment, wage earnings, the number of establishments, and related dynamics (Stimson, Stough, and Roberts, 2006). Quantitative methods include the analysis of input–output linkages and location quotients (Stimson, Stough, and Roberts, 2006; Feser and Bergman, 2000; Feser and Isserman, 2007; Barkley and Henry, 1997). Recent attention has also applied exploratory spatial data analysis techniques to identify and analyze the geographic distribution of regional clusters (Gibbs and Bernat, 1997).

This study uses a nonparametric clustering procedure developed by Feser and Bergman (2000), Feser, Sweeney, and Renski (2005), Feser (2005), and Feser and Isserman (2007), and to identify Tennessee industry clusters in 2001. Feser and Bergman (2000) originally proposed a step–wise algorithm to identify industry clusters. Their approach used input–output purchase and sales transaction data to determine significant inter-sector linkages that mutually defined exclusive industry clusters. Recent studies Feser (2005) and by Feser and Isserman (2007) extended this approach by applying Ward’s (1963) hierarchal clustering algorithm to construct a series of industry clusters based on a nonparametric matching procedure. Feser and Isserman’s (2007) procedure identifies a reduced number

of value chains that are essentially groups of industries with highly similar, and therefore, linked sectors. Sales and purchases of intermediate and final products between sectors determine linkages between sectors. An input–output transaction matrix of industry purchasing and sales patterns calculate pairwise correlations to compare industry linkages along four dimensions, thereby identifying sectors whose economic linkages with each other are stronger than linkages with sectors outside of the group.

Define sets $S_{i(j)}$ and $B_{i(j)}$, where $S_{i(j)}$ is the set of supplier industries to industry $i(j)$ and $B_{i(j)}$ is the set of purchasing industries (buyers) from industry $i(j)$. Given S and B , define:

$$(1) \quad \begin{aligned} I_{ij}^{SS} &= S_i \cap S_j, & U_{ij}^{SS} &= S_i \cup S_j, \\ I_{ij}^{BB} &= B_i \cap B_j, & U_{ij}^{BB} &= B_i \cup B_j, \\ I_{ij}^{SB} &= S_i \cap B_j, & U_{ij}^{SB} &= S_i \cup B_j, \\ I_{ij}^{BS} &= B_i \cap S_j, & U_{ij}^{BS} &= B_i \cup S_j, \end{aligned}$$

where I and U are sets of buyer and/or supplier intersection and unions, respectively. From these relationships, the following measures are constructed;

$$(2) \quad R_{ij}^{SS} = \frac{I_{ij}^{SS}}{U_{ij}^{SS}}, \quad R_{ij}^{BB} = \frac{I_{ij}^{BB}}{U_{ij}^{BB}}, \quad R_{ij}^{SB} = \frac{I_{ij}^{SB}}{U_{ij}^{SB}}, \quad \text{and} \quad R_{ij}^{BS} = \frac{I_{ij}^{BS}}{U_{ij}^{BS}}.$$

These ratios measure the strength of the linkage shared between sectors i and j along four dimensions. R^{SS} is the number of supplier industries that sectors i and j have in common over the total number of supplier industries to i and j . Larger values of R^{SS} indicate a stronger value chain linkage between i and j because of joint sourcing from the same suppliers. Likewise, R^{BB} is the share of common buyer industries. R^{SB} and R^{BS} measure second level relationships between sector pairs, and increase as one industry's suppliers become another industry's buyers. The maximum value of these measures is chosen to construct an n by n intersectoral linkage matrix, with (i,j) elements,

$$R_{ij}^{MAX} = \text{MAX}(R_{ij}^{SS}, R_{ij}^{BB}, R_{ij}^{BS}, R_{ij}^{SB}).$$

Feser (2005) and Feser and Isserman (2007) suggest several adjustments in constructing R^{MAX} , which are followed here. Some sectors are eliminated from the value chain analysis including null sets (i.e., a sector was not present in any county), local consumer and personal services, retail trade, primary and secondary schools, and government enterprise sectors (Table 1). Also, following Feser and Isserman (2007), a linkage threshold of 0.02 was set for purchases, and 0.01 for sales. The threshold essentially requires that sector j must represent at least 2% of sector i 's total intermediate input purchases to be considered one of i 's key suppliers. Likewise, j must account for at least 1% of i 's intermediate sales to be considered one of i 's key buyers (Feser 2005). Once this step is completed, sectors such as wholesale trade, information, legal services, advertising, finance, and insurance are defined as “enabling industries”. Enabling industries are assigned a weight of 0.01, which reduces their influence in the calculation of the R_{ij} measures. This allows distinct or unique linkages between sectors to define value chains rather than the joint consumption of similar mixes of producer services, while still entirely including the linkages with producer services. The weighting scheme is obviously ad hoc, but it moderates linkages between industries i and general enabling

industries to emphasize more concretely the linkage among more specialized industries (Feser, 2005). In this application suggested by Feser and Isserman (2007), a sensitivity analysis was performed to determine the extent to which the weights influenced value chain identification, and which combinations produced the cluster with statistically strong connections (discussed below).

The next step of the analysis includes identifying sectors with few linkages with other sectors. These sectors are either insular (i.e., “with” themselves; sectors with no purchases or sales to other sectors) or have connections with primarily local serving industries. In network analysis, these sectors are called “singletons”, and were eliminated from the linkage matrix prior to applying Ward’s cluster analysis (Ward, 1963).

Ward’s cluster algorithm produces the value chains in the final phase of the first step of this analysis. The reduced \mathbf{R}^{MAX} matrix is converted to a “dissimilarity” (or “distance” matrix, \mathbf{D}) matrix, and used in Ward’s clustering method. We used the simple distance measure $d_{ij} = (1 - R_{ij}^{MAX})$ as the basis for the dissimilarity matrix. The larger d_{ij} is, the less closely related sales and purchases are between sectors, and the less likely sectors i and j will be included the same cluster. It is important to note that every industry in a county is linked at some level to every other industry, with the strength of that linkage ranging from $R_{ij}^{MAX} = 0$ (no joint buyers or suppliers) to $R_{ij}^{MAX} = 1$ (identical buyer and supplier linkages). Industries making up the clusters have stronger linkages than other identified groups, but it is still the case that any given industry may have reasonably tight linkages with other sectors defining specific value chains.

Feser (2005) suggests an ad hoc Z test as a cutoff point to determine cluster

membership: $Z_{ij} = \frac{\bar{r}_{ij} - \text{mean}(\bar{r}_{ij})}{s.d.(\bar{r}_{ij})}$, with \bar{r}_{ij} the average value of the maximum linkage

between sector i and the set of primary sectors in core cluster j . The critical Z value was set to 1.96 (e.g., a 95% confidence interval). Lastly, it is important to note that cluster membership is not mutually exclusive. That is, a sector may belong to a value chain in more than one cluster. In this analysis, Tennessee input-output data from IMPLAN (year 2001) was used to benchmark value chains in the base year (2001) of the regression model.

There are several methods useful for determining how many clusters aptly describe a particular data set. The pseudo Hotelling’s T^2 value is used to determine the optimal number of industry clusters following analysis of the linkage matrix with Ward’s algorithm (Milligan and Cooper, 1985).

Data used in the industry cluster analysis

Tennessee (IMPLAN) (2001) gross absorption coefficients (GACs) were used to construct the input–output transaction matrix, which served as the base for the industry clustering procedure. The GACs contain information for 509 intersectoral purchases and sales. Sector employment information was also gathered from the 2001 and 2006

IMPLAN files, as well as employee compensation, and the value added for each sector. Eliminating local retail and personal serving sectors, singletons, and government industries reduced the transactions matrix (R) to a 447 by 447 dissimilarity matrix (D) evaluated by Ward's cluster algorithm.

Results

Three candidate cluster population were identified, each with 19, 43, and 46 clusters. Clusters were too aggregated using 19 as a membership value, making it difficult to discern any particular relational patterns between sectors. The second and third candidates – 43 and 46 numbers of clusters – produced memberships that were easily discernable with relatively strong linkages. The lower, more parsimonious value (43 clusters) was used in the analysis.

Ten (10) of the identified 43 clusters are presented in Appendix Table 3. These clusters were selected because based on statistical and subjective criteria. For statistical reasons, the reported clusters posted the strongest linkages between member sectors. On subjective grounds, a relational pattern between sector members seems apparent. That is, the members of these clusters make intuitive sense. Of the 33 clusters not reported, many were relatively “small” (with less than 5 members), or a discernable linkage pattern that made intuitive sense was not evident.

For more details, visit <http://trend.ag.utk.edu/business.html>

Appendix C. Regression model analyzing firm birth and entrepreneurs in Tennessee, 2001 - 2006.

Based on the 10 identified industry clusters, we test whether a given cluster influenced the probability a particular sector belonging to an industry cluster emerged between 2001 – 2006. We assume the entrepreneur will start a business in a given county when the (discounted) expected revenue earned in that county exceeds expected (discounted) costs. Guimarães, Figueiredo, and Woodward’s (2004) random profit maximization model is modified to represent this decision framework. Expected profit (π) for the entrepreneur is:

$$(3) \quad \pi = \alpha E + \mathbf{x}' \boldsymbol{\beta} + e,$$

where e is a random component of profit; E a proxy for entrepreneurial activity in a location; $\boldsymbol{\beta}$ are unknown parameters; and \mathbf{x} a vector of location-specific characteristics, including community attributes represented by input and product markets (M), agglomeration economies, labor attributes, infrastructure, fiscal characteristics, and social capital that may influence profits.

Let $M = 1$ when the expected profit from starting a business in a county is positive. The decision to locate a new business in a county is a random event because of the random components of profit, with,

$$(4) \quad \begin{aligned} \Pr[M = 1] &= \Pr[\alpha E_i + \mathbf{x}' \boldsymbol{\beta} > -e], \\ &= \Pr[-e < \alpha E + \mathbf{x}' \boldsymbol{\beta}], \\ &= F[\alpha E + \mathbf{x}' \boldsymbol{\beta}], \end{aligned}$$

where F is the cumulative density function of the random component of expected profit. The most common strategy to untangle this decision structure is to specify F as the cumulative density function of the standard normal or logistic distribution, which forms the binary probit or logit model. In this paper, we specify the decision to start a business with the logit model.

Logit Minimum Distance Estimator

The logit specification used to estimate the factors influencing the decision start a new business follows Amemiya and Nold’s (1975) modification of Berkson’s (1944) minimum distance (MD) logit estimator⁵. This model is used because individual firm, births in any given industry cluster are observed at an aggregate county level.

Let M_t be an indicator variable taking the value of 1 with probability;

$$(5) \quad \Pr[M_t = 1] = P_t = [1 + \exp(-\mathbf{x}'_t \boldsymbol{\beta} - \alpha E_t + v_t)]^{-1},$$

and zero with probability $1 - P_t$, where v_t is a random disturbance, and t indexes counties. The model is different from the usual logit specification because v_t is included in the right-hand side of (5). In the aggregate, $M_t = 1$ implies that the probability of a firm start-up in a given cluster is 100%.

⁵ See also Maddala (1983) for a treatment similar to Berkson (1944). The literature also refers to this estimator as a minimum chi square estimator.

Amemiya and Nold (1975) interpret the random variable v_t as a proxy for other independent variables omitted from the model. When a constant equal to one is included in \mathbf{x}_t , the expected value of v_t is zero. The variance of v_t is a constant (σ^2) because there is usually little information about the variation of the omitted variables across t . There are n sectors in an industry cluster in the t th county (n_t) with observations on whether a firm appeared in one of those sectors between 2001 and 2006, denoted as $M_t(1), M_t(2), \dots, M_t(n_t)$. Aggregating across the number of sectors ($i = 1, \dots, n$) in an industry cluster in the t th county, the proportion (p) of sectors experiencing a firm birth representing that sector,

$$(6) \quad p_t = n_t^{-1} \sum_{i=1}^{i=n_t} M_t(i).$$

Rearranging (5) suggests an estimable linear equation,

$$(7) \quad z_t = \alpha E_t + \mathbf{x}'_t \boldsymbol{\beta} + v_t + u_t,$$

where $z_t = \ln[p_t(1 - p_t)^{-1}]$ (the log-odds of a firm associated with a given industry cluster appearing in county t) and $u_t = (p_t - P_t) P_t^{-1} (1 - P_t)^{-1}$. The same P_t applies to every sector in a given cluster in a county once v_t is realized⁶. This allows P_t to be an unknown parameter instead of a random variable, and u_t a random variable with $E[u_t] = 0$ and $\text{Var}[u_t] = [n_t P_t (1 - P_t)]^{-1}$.

The correlation between u_t and v_t is zero because the conditional mean of u_t is zero, given $E[v_t] = 0$. Equation (12) can be estimated as a linear regression with heteroskedastic disturbances, with the variance of the t th county given by $\text{Var}[v_t] + \text{Var}[u_t] = \sigma^2 + [n_t P_t (1 - P_t)]^{-1}$. Amemiya and Nold (1975) suggest the following steps to estimate $\boldsymbol{\beta}$ and σ^2 . First, estimate equation (7) using Ordinary Least Squares (OLS). Second, estimate $\text{Var}[v_t]$ with,

$$(8) \quad \hat{\sigma}^2 = T^{-1} (\mathbf{z} - \alpha \mathbf{E} - \mathbf{x} \hat{\boldsymbol{\beta}}_{OLS})' (\mathbf{z} - \alpha \mathbf{E} - \mathbf{x} \hat{\boldsymbol{\beta}}_{OLS}) - T^{-1} \sum_{t=1}^T (n_t p_t [1 - p_t])^{-1}.$$

The composite residual for county t is then estimated as $\text{Var}[v_t] + \text{Var}[u_t] = \hat{\sigma}^2 + [n_t p_t (1 - p_t)]^{-1}$, which is used in the Feasible Generalized Least Squares (FGLS) estimator, $\hat{\boldsymbol{\beta}}_{FGLS} = (\mathbf{X}' \hat{\mathbf{V}} \mathbf{X})^{-1} \mathbf{X}' \hat{\mathbf{V}} \mathbf{z}$, with $\hat{\mathbf{V}} = \text{diag}[\hat{\sigma}^2 + (n_t p_t (1 - p_t))^{-1}]$. The covariance of the modified minimum distance logit estimator is $\text{cov}(\hat{\boldsymbol{\beta}}_{FGLS}) = (\mathbf{X}' \hat{\mathbf{V}} \mathbf{X})^{-1}$. Standard errors were calculated using a spatial heteroskedastic-autocorrelation consistent covariance estimator (Kelejian and Prucha, 2007).

Covariates included in the firm birth regressions

We hypothesized that a county's propensity to have entrepreneurs, members of the creative class, and the interaction between these two measures would positively influence the likelihood of new firm start-ups from 2001 to 2006 across all sectors. On the other hand, our expectations were more relaxed with respect to industry cluster-specific regression. The probability of a firm start-up in a given sector was modeled as a function of the ratio of the number of nonfarm proprietors to nonfarm employment in 2000, the percent of the population falling into the "creative class" category (in 2000), and the

⁶ Berkson's (1944) minimum chi square estimator omits v_t . Estimates of the parameters are consistent when v_t is omitted, but they are less efficient, and the covariance matrix of the parameters will be underestimated.

interaction between these variables. Additional control variables are listed in Appendix Table 4. Sources of these variables follow those listed in the regional growth regressions (Appendix Table 1).

Appendix Table 1. Growth, entrepreneurs, and creative class regression covariates, and means (N = 816).

<u>Variable</u>	<u>Label</u>	<u>Data source</u>	<u>Mean</u>	<u>Std Error</u>
pcc90revise_ssm	Creative class (cc), 1990	Economic Research Service	0.0033	0.0016
entr8890avm	Entrepreneur measure I (eship1), 1988-1990 average.	McGranahan, Wojan, and Lambert (2008)	-0.0398	0.0022
pcc90xentr8890m	cc x eship1		-0.0005	0.0001
estempcbp90m	Entrepreneur measure II (eship2)	McGranahan, Wojan, and Lambert (2008)	0.0306	0.0012
pcc90xestempm	cc x eship2		-0.0001	0.0001
ldens90	ln(population density) 1990	Area Resource Files	6.0960	0.0326
c90commu	1990 percent commuting	Area Resource Files	35.0703	0.6267
landvectrxc	Topography	McGranahan (2008)	7.6531	0.0345
jantemz	January temperature (z score)	Economic Research Service	0.7293	0.0152
jultemz	July temperature (z score)	Economic Research Service	0.0157	0.0160
lfet1664	Employment rate, 16 - 64, 1990	Area Resource Files	66.4816	0.2529
lmedy90	ln(median household income) 1990	Area Resource Files	3.0513	0.0087
ppb61001	% estabs. Agriculture 1990	County Business Patterns	4.1304	0.1297
ppb61004	% estabs. mining ,1990	County Business Patterns	1.2406	0.1296
c90dmfgdur	% manuf. estabs., durables, 1990	County Business Patterns	0.1310	0.0021
c90dmfgnd	% manuf. estabs., non-durables, 1990	County Business Patterns	0.1387	0.0026
c90bus	% estabs. business support services, 1990	County Business Patterns	4.6451	0.0834
c90recre	% estabs. Recreational services, 1990	County Business Patterns	5.9205	0.0926
pop90817	% population 8 - 17, 1990	Census Files	16.6829	0.0703
pop9062o	% population, 62+, 1990	Census Files	16.5481	0.1264
pctai90	% american indian, 1990	Area Resource Files	0.4218	0.0662
pctbl90	% black, 1990	Area Resource Files	20.9049	0.6730
pcths90	% hispanic, 1990	Area Resource Files	0.7113	0.0294
c90pmil2024	% in military, 20 - 24, 1990	Census Files	1.7255	0.2368
collenroll1824	% enrolled in college, 18 - 24, 1990	Census Files	22.6968	0.4143
nest8190empcbp	[Estabs. 1990-Estabs. 1990]/Total employment, 1981	County Business Patterns	0.0305	0.0012
lemp8090	ln(employment, 1990/employment, 1980)	BEA/REIS	0.1303	0.0067
lpop8090	ln(population, 1990/population, 1980)	Area Resource Files	4.6492	0.0046

Appendix Table 2. Growth, entrepreneurs, and creative class regressions.

	Metropolitan counties in the Southeast region, 1990 - 2000							
	-----Employment-----				-----Establishments-----			
	Self Employment		Establishments/job		Self Employment		Establishments/job	
	β	Prob(t)	β	Prob(t)	β	Prob(t)	β	Prob(t)
Local Resources								
Creative class (cc), 1990	0.954	0.206	0.340	0.639	-0.133	0.394	-0.105	0.449
Entrepreneurship, 1988-1990	0.552*	0.090	1.501	0.243	0.193***	0.008	0.604***	0.002
Creative*Entrepreneurship	5.966*	0.094	8.984	0.494	-0.505	0.545	-2.816	0.352
Settlement								
Population Density (ln) 1990	-0.023	0.305	-0.022	0.296	-0.008**	0.014	-0.008**	0.013
% Commuting	0.000	0.616	0.000	0.912	0.000	0.961	0.000	0.768
Natural Amenities								
Topography	0.019	0.178	0.027*	0.073	0.000	0.891	0.001	0.552
Jan temperature	-0.029	0.524	-0.036	0.436	0.016***	0.004	0.015***	0.009
July temperature	-0.014	0.587	-0.022	0.410	0.008**	0.024	0.005	0.165
Labor Market								
Employment rate, age 16 - 64, 1990	0.000	0.952	0.000	0.919	-0.001	0.300	0.000	0.601
Median household income (ln) 1990	-0.270*	0.099	-0.242	0.121	0.027	0.235	0.023	0.294
Industry (%)								
Agriculture 1990	0.025	0.187	0.025	0.143	0.001	0.287	0.000	0.699
Mining ,1990	-0.019	0.118	-0.017	0.118	0.000	0.772	0.000	0.979
Manufacturing, durables, 1990	-0.057	0.855	0.171	0.648	-0.034	0.407	0.014	0.748
Manufacturing, non-durables, 1990	0.051	0.878	0.180	0.662	-0.004	0.934	0.016	0.706
Business support services, 1990	0.006	0.484	0.009	0.367	0.002	0.258	0.003	0.105
Recreational services, 1990	0.007	0.195	0.007	0.209	0.001	0.491	0.000	0.671
Demography, 1990 (%)								
Population, age 8 - 17	0.009	0.549	0.016	0.292	-0.002	0.400	-0.001	0.565
Population, age 62+	-0.015**	0.027	-0.013**	0.035	-0.002**	0.035	-0.002**	0.028
American Indian	-0.016	0.163	-0.020	0.142	0.012	0.136	0.010	0.166
Black	0.002	0.233	0.002	0.326	0.000	0.649	0.000	0.626
Hispanic	0.005	0.767	0.009	0.615	-0.001	0.781	0.000	0.868
Institutions (%)								
Military, age 20 - 24	-0.005*	0.051	-0.005**	0.043	0.000	0.236	-0.001	0.145
Enrolled in college, age 18 - 24	-0.002	0.252	-0.001	0.424	0.000	0.653	0.000	0.822
Change, 1980-1990								
Establishments per 1980 job	0.728*	0.094	0.610*	0.086	0.170	0.159	0.109	0.342
Jobs	0.348***	0.000	0.403***	0.000	0.019	0.200	0.032**	0.044
Population	0.053	0.617	0.077	0.470	-0.001	0.873	0.001	0.922

Notes: *, **, ***, significant at the 10%, 5%, and 1% levels. States included in the regression; Alabama, Georgia, Kentucky, Tennessee, Mississippi, Virginia, Arkansas, North Carolina, and South Carolina.

Appendix Table 2. Growth, entrepreneurs, and creative class regressions.

	Non-Metropolitan counties in the Southeast region, 1990 - 2000							
	-----Employment-----				-----Establishments-----			
	Self Employment		Establishments/job		Self Employment		Establishments/job	
	β	Prob(t)	β	Prob(t)	β	Prob(t)	β	Prob(t)
Local Resources	0.591	0.124	0.233	0.567	0.184*	0.062	-0.306**	0.037
Creative class (cc), 1990	0.728***	0.000	0.539**	0.023	0.244***	0.001	0.482***	0.000
Entrepreneurship, 1988-1990	2.611	0.454	6.815	0.273	2.924**	0.019	8.275***	0.002
Creative*Entrepreneurship								
Settlement	0.011	0.302	0.008	0.439	-0.004*	0.083	-0.003	0.268
Population Density (ln) 1990	0.000	0.588	0.001*	0.070	0.000	0.798	0.000	0.758
% Commuting								
Natural Amenities	0.005	0.371	0.008	0.175	0.001	0.576	0.002*	0.091
Topography	0.053***	0.000	0.041***	0.004	-0.001	0.718	-0.006	0.153
Jan temperature	-0.001	0.895	-0.004	0.709	0.003*	0.095	0.002	0.369
July temperature								
Labor Market	-0.001	0.651	-0.001	0.598	0.000	0.615	0.000	0.421
Employment rate, age 16 - 64, 1990	-0.018	0.738	-0.042	0.433	-0.002	0.906	0.000	0.973
Median household income (ln) 1990								
Industry (%)	0.000	0.908	0.001	0.728	0.000	0.998	0.000	0.728
Agriculture 1990	-0.005***	0.002	-0.007***	0.000	0.000	0.487	-0.001	0.122
Mining ,1990	0.053	0.633	0.022	0.851	-0.033	0.133	-0.024	0.296
Manufacturing, durables, 1990	-0.197**	0.042	-0.259***	0.008	0.011	0.530	0.010	0.614
Manufacturing, non-durables, 1990	0.001	0.873	0.001	0.882	0.001	0.491	0.001	0.326
Business support services, 1990	0.002	0.540	0.001	0.602	-0.001	0.482	0.000	0.520
Recreational services, 1990								
Demography, 1990 (%)	-0.003	0.554	-0.001	0.839	0.001	0.295	0.002	0.123
Population, age 8 - 17	-0.007***	0.009	-0.005*	0.054	-0.001	0.199	0.000	0.744
Population, age 62+	0.002	0.169	0.001	0.406	0.000	0.469	0.000**	0.039
American Indian	-0.001***	0.003	-0.002***	0.000	0.000	0.774	0.000***	0.003
Black	0.018**	0.010	0.017**	0.014	-0.001	0.615	-0.001	0.494
Hispanic								
Institutions (%)	-0.004***	0.000	-0.005***	0.000	0.000	0.409	0.000	0.680
Military, age 20 - 24	0.000	0.892	0.000	0.952	0.000	0.109	0.000**	0.046
Enrolled in college, age 18 - 24								
Change, 1980-1990	0.242	0.454	0.405	0.238	-0.138	0.157	-0.176*	0.055
Establishments per 1980 job	-0.025	0.656	-0.008	0.900	-0.008	0.556	0.006	0.635
Jobs	0.452***	0.000	0.487***	0.000	0.151**	0.026	0.157**	0.028
Population	0.591	0.124	0.233	0.567	0.184*	0.062	-0.306**	0.037

Notes: *, **, ***, significant at the 10%, 5%, and 1% levels. States included in the regression; Alabama, Georgia, Kentucky, Tennessee, Mississippi, Virginia, Arkansas, North Carolina, and South Carolina.

Appendix Table 3. Tennessee industry clusters and associated value chains, 2001

Agriculture	Construction	Textiles	Forestry
Agriculture and forestry support activities	Agriculture and forestry support activities	Narrow fabric mills and schiffli embroidery	Reconstituted wood product manufacturing
Logging	Pipeline transportation	Cut and sew apparel manufacturing	Pulp mills
Forest nurseries, forest products, and timber	Environmental and other technical consulting	Nonwoven fabric mills	Paper and paperboard mills
Hunting and trapping	Other maintenance and repair construction	Fabric coating mills	Wood windows and door manufacturing
Waste management and remediation services	Maintenance and repair of highways, streets,	Upholstered household furniture manufacturing	Veneer and plywood manufacturing
Other accommodations	Water, sewer, and pipeline construction	Other apparel knitting mills	Cut stock, resawing lumber, and planing
Other ambulatory health care services	Highway, street, bridge, and tunnel construct	Other hosiery and sock mills	Wood preservation
Hospitals	Manufacturing and industrial buildings	Knit fabric mills	Wood container and pallet manufacturing
Veterinary services	Commercial and institutional buildings	Other miscellaneous textile product mills	Hunting and trapping
Animal production, except cattle and poultry	Telecommunications	Broadwoven fabric mills	Logging
Cattle ranching and farming	New multifamily housing structures	Curtain and linen mills	Sawmills
Pipeline transportation	Other new construction	Carpet and rug mills	Forest nurseries, forest products, and timber
Rail transportation	New residential 1-unit structures, nonfarm	Textile bag and canvas mills	
Air transportation	Maintenance and repair of nonresidential bldgs.	Textile and fabric finishing mills	
Transit and ground passenger transportation	New farm housing units and additions		
Insurance carriers	New residential additions and alterations, no		
Insurance agencies, brokerages, and related	Architectural and engineering services		
Sand, gravel, clay, and refractory mining			
Greenhouse and nursery production			
Cotton farming			
Grain farming			
All other crop farming			
Tree nut farming			
Oilseed farming			
Vegetable and melon farming			
Tobacco farming			
Fruit farming			

Appendix Table 3. Tennessee industry clusters and associated value chains, 2001 (continued)

Cement /ceramics	Retail	Electricity	Industrial machinery
Other concrete product manufacturing	Securities, commodity contracts, investments	Industrial process variable instruments	Heating equipment, except warm air furnaces
Concrete pipe manufacturing	Real estate	Semiconductors and related device manufacturi	Fluid power pump and motor manufacturing
Other nonmetallic mineral mining	Warehousing and storage	Miscellaneous electrical equipment manufactur	Fluid power cylinder and actuator manuf.
Sand, gravel, clay, and refractory mining	Accounting and bookkeeping services	Electromedical apparatus manufacturing	Plastics and rubber industry machinery
Brick and structural clay tile manufacturing	Offices of physicians, dentists	Relay and industrial control manufacturing	Food product machinery manufacturing
Ceramic wall and floor tile manufacturing	Nursing and residential care facilities	Printing machinery and equipment manufacturin	Ball and roller bearing manufacturing
Glass container manufacturing	Legal services	Automatic environmental control manufacturing	Welding and soldering equipment manufacturing
Gypsum product manufacturing	Museums, historical sites, zoos, and parks	Audio and video equipment manufacturing	AC, refrigeration, and forced air heating
Miscellaneous nonmetallic mineral products	Other educational services	Business support services	Overhead cranes, hoists, and monorail systems
Concrete block and brick manufacturing	Colleges, universities, and junior colleges	Search, detection, and navigation instruments	Farm machinery and equipment manufacturing
Porcelain electrical supply manufacturing	Grantmaking and giving and social advocacy	Office machinery manufacturing	Machine shops
Clay refractory and other structural clay	Civic, social, professional and similar organ	Irradiation apparatus manufacturing	Motor and generator manufacturing
Ready-mix concrete manufacturing	Specialized design services	Computer terminal manufacturing	Scales, balances, and miscellaneous general
Cut stone and stone product manuf.	Promoters of performing arts and sports	Photographic and photocopying equipment manuf.	Hardware manufacturing
Vitreous china plumbing fixture manuf.	Independent artists, writers, and performers	Aircraft manufacturing	Industrial and commercial fan and blower manu.
Asphalt paving mixture and block manuf.	Performing arts companies	Other communications equipment manufacturing	Industrial truck, trailer, and stacker manufa
Nonclay refractory manufacturing	Photographic services	All other electronic component manufacturing	Motor vehicle parts manufacturing
	Ophthalmic goods manufacturing	Electronic computer manufacturing	Paper industry machinery manufacturing
	Computer systems design services	Other computer peripheral equipment manufactu	Measuring and dispensing pump manufacturing
	Scenic and sightseeing transportation	Electricity and signal testing instruments	Speed changers and mechanical power transmiss
	Other support services	Broadcast and wireless communications equip.	Sawmill and woodworking machinery
	Information services	Telephone apparatus manufacturing	Construction machinery manufacturing
	Management of companies and enterprises	Electronic equipment repair and maintenance	Other engine equipment manufacturing
	Motion picture and video industries		Air and gas compressor manufacturing
	Advertising and related services		Turbine and turbine generator set units manuf
	Funds, trusts, and other financial vehicles		Mining machinery and equipment manufacturing
	Monetary authorities and depository credit		Pump and pumping equipment manufacturing
	Insurance carriers		
	Machinery and equipment rental and leasing		
	Wholesale trade		
	Other amusement, gambling, and recreation		
	Travel arrangement and reservation services		
	Motor vehicle and parts dealers		
	Furniture and home furnishings stores		
	Electronics and appliance stores		
	Building material and garden supply stores		
	Food and beverage stores		
	Health and personal care stores		
	Gasoline stations		
	Clothing and clothing accessories stores		
	Sporting goods, hobby, book and music stores		
	General merchandise stores		
	Miscellaneous store retailers		

Appendix Table 4. Control variables used in the firm birth regressions for Tennessee, 2001 – 2006.

<u>Variable</u>	<u>Mean</u>	<u>Std Error</u>
Entre (self-employed), 2000	0.2363	0.0102
Creative class, 2000	0.1524	0.0054
Entre X Creative Class	0.0023	0.0005
Metropolitan county	0.7263	0.0460
% employed in manufacturing, 2000	26.5450	0.7424
% employed in agriculture/forestry, 2000	2.5577	0.1597
% employed in recreational industry, 2000	7.2150	0.3030
% employed in business services, 2000	7.0448	0.3390
Change in establishments (1990 – 2000)/Employment, 1990	0.0139	0.0015
% unemployed, 2000	5.6302	0.1323
Change in employment, 1990 - 2000	0.1756	0.0096
Log of median household income, 2000	10.3724	0.0196
% commuting to work in adjacent county	39.3995	1.5994
Log of population density, 2000	8.0217	0.0861
Change in employment, 1990 - 2000	4.7727	0.0086
% black	7.3254	1.0875
% Hispanic	1.5756	0.1279
% age 8 – 17, 2000	13.7790	0.1190
% population over 62, 2000	16.5918	0.2827
Land characteristics	4.6725	0.0013

Notes: N = 95 counties.

Appendix Table 5. Value Chains for Tennessee Firm Births, 2001-2006

Value Chain	Entrepreneurship and Creativity	Estimate	t - value
All sectors	Entrepreneurs	0.738	2.778
	Creative Class	-0.539	-0.443
	Entre x C.C.	-3.095	-0.484
Agriculture	Entrepreneurs	-0.339	-0.534
	Creative Class	-0.563	-0.147
	Entre x C.C.	-0.144	-0.008
Cement	Entrepreneurs	-0.918	-0.644
	Creative Class	-3.153	-0.507
	Entre x C.C.	-21.864	-0.847
Construction	Entrepreneurs	1.947	2.638
	Creative Class	-0.598	-0.167
	Entre x C.C.	7.982	0.385
Electricity	Entrepreneurs	-2.203	-1.682
	Creative Class	2.139	0.595
	Entre x C.C.	-20.026	-0.847
Forestry	Entrepreneurs	1.156	1.852
	Creative Class	-1.645	-0.468
	Entre x C.C.	25.34	1.899
Industrial Machinery	Entrepreneurs	1.855	2.28
	Creative Class	-4.957	-0.908
	Entre x C.C.	-44.25	-2.413
Metal	Entrepreneurs	-2.533	-1.108
	Creative Class	-0.084	-0.011
	Entre x C.C.	74.268	2.15
Paper	Entrepreneurs	-1.279	-1.659
	Creative Class	14.61	3.66
	Entre x C.C.	-0.427	-0.02
Retail	Entrepreneurs	0.92	1.62
	Creative Class	-2.593	-0.842
	Entre x C.C.	18.363	1.498
Textiles	Entrepreneurs	-0.87	-0.723
	Creative Class	-12.479	-1.627
	Entre x C.C.	47.548	1.593
Wood Products	Entrepreneurs	-0.085	-0.055
	Creative Class	13.23	1.423
	Entre x C.C.	-52.005	-1.213

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