The Economic Impact and Importance of Microbusinesses to the New England Economy*

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Introduction

Microbusinesses have played an increasingly important role in economic development throughout the United States. Microbusiness development has recently been recognized as one of the most promising economic development strategies, especially in low-income communities. Rural New England constitutes a good example of the strong role these businesses play in community economic development, because much of the business activity in rural areas centers on microbusinesses creating jobs locally, and providing goods and services to local residents.

Despite their importance for both rural communities and the overall economy, microbusinesses have largely been ignored and poorly understood by researchers and economic development professionals for years. The magnitude of the impact of these businesses has not yet been fully understood or quantified. Moreover, the incidence of microbusinesses might vary with specific characteristics of a location across the region, such as education, income, age, distance to a major road, rural/urban conditions, etc. In this respect, identification of factors contributing to microbusiness employment or incidence is of crucial importance to both policy makers and microentrepreneurs. This paper assesses the economic impact and importance of microbusinesses, and examines the determinants of microbusiness activity in the New England region to fill this gap.

What is a Microbusiness?

There are a variety of definitions for a microbusiness. The Association for Enterprise Opportunity (AEO) defines a microbusiness as a business with five or fewer employees, which requires $35,000 or less in startup capital, and does not have access to the traditional commercial banking sector. For the purpose of this study, a microbusiness is defined as a business with five or fewer employees, including the owner. Microbusinesses range from cleaning services and home childcare programs to designer textiles and specialty foods. They often employ members of the same family and sometimes grow into larger businesses that employ others in the community (AEO, 2002) and often become the primary creators of jobs (Birch, 1987).

Why are Microbusinesses Important to Rural Areas?

AEO estimates that there are over 20 million microbusinesses operating in the U.S., and microbusiness employment represents 16.6% of all private (non-farm) employment in the United States. There are 554 documented microbusiness development programs in the U.S., and an estimated 60% of these programs serve rural areas.

Microentrepreneurs in rural areas face challenges that urban entrepreneurs typically do not: limited access to substantial customer markets, low-income local markets, capital shortages, brain drain, and infrastructure deficits. These challenges, however, can also be viewed as an opportunity for entrepreneurial development. In response to the decline in manufacturing jobs, rural citizens have created their own economic opportunities through self-employment (Seymour, 2001).

Microbusinesses in New England

In the face of global competition, employment in natural resource-based industries in New England has been in a steady, long-term decline. However, the New England Region surpasses the nation in redistributing its employment from a manufacturing-based to a service-based economy over the past three decades (Flynn et al, 1999). Much of the business activity in rural New England focuses on providing goods and services to local residents. Many of these products and services are largely provided by microbusinesses.

The importance of microbusinesses to the New England economy is evident in the information presented in Table 1. Microbusinesses account for 86 percent of the total number of businesses in the region. In Maine and Vermont, the contribution is higher, with 88 percent and 87 percent, respectively. Though similar across all New England states, the contribution of microbusinesses to total nonfarm employment is the highest in Vermont and Maine, with 25 and 23 percent, respectively. Microbusinesses account for about one in every five jobs across the New England Region.

Table 1: Microbusinesses in Numbers and Employment, New England, 2000

State/Region	Number of Microbusinesses		Microbusiness Employment	
	Total	Percent of state/region[1]	Total[2]	Percent of state/region[3]
Connecticut	267,014	86%	353,645	19%
Maine	121,170	88%	158,095	23%
Massachusetts	505,482	86%	668,750	18%
New Hampshire	109,180	86%	144,318	21%
Rhode Island	75,334	86%	102,734	20%
Vermont	63,636	87%	84,939	25%
New England	1,141,816	86%	1,512,481	20%

[1] Percent of total number of businesses in the state/region
[2] Includes self-employed workers and the estimated employment for businesses with 1-4 employees
[3] Percent of total nonfarm employment in the state/region
Sources: Nonemployer Statistics, U.S. Census Bureau; County Business Patterns, U.S. Census Bureau; BEA (Bureau of Economic Analysis).

Table 2 shows the estimated contribution of microbusinesses to Gross State Product (GSP) for each New England state and the entire region for 2000. Gross State Product is defined as the total value of goods and services produced and is the state counterpart of the Nation's gross domestic product (GDP). GSP is an important measure of economic health and vitality.

Total GSP varies considerably across the region, from a low of $17.8 billion in Vermont to a high of $277.1 billion in Massachusetts. Microbusinesses contributed $55.6 billion to New England's GSP in 2000, with Vermont microbusinesses contributing $2.6 billion and Massachusetts microbusinesses contributing just over $21 billion. While there is some variability across states, microbusinesses in New England make a significant contribution to the region's total gross state product. About ten percent of New England's GSP was contributed by microbusinesses in 2000. The contribution ranged from a low of 7.6% in Massachusetts to a high of 14.6% in Vermont. In Maine, microbusinesses contributed 13.2 cents of every dollar of GSP generated in 2000.

Table 2: Estimated Direct Contribution of Microbusinesses to Total Gross State Product (GSP), New England, 2000

State/Region	GSP Contributed by Microbusinesses [1, 2]	Total GSP [1]	Microbusiness GSP as a Percentage of Total GSP
Connecticut	17.9	158.0	11.3
Maine	4.7	35.5	13.2
Massachusetts	21.1	277.1	7.6
New Hampshire	5.5	42.6	12.9
Rhode Island	3.8	33.5	11.3
Vermont	2.6	17.8	14.6
New England	55.6	564.5	9.8

[1] Expressed in billions of current dollars.
[2] Gross State Product figures are based on direct value-added estimates using IMPLAN.
Sources: BEA (Bureau of Economic Analysis), and IMPLAN.

Sectorial Composition of the Microbusiness Economy

Table 3 presents a comparison of the sectorial composition of the microbusiness (Micro-bus) economy with the makeup of the overall (All) economy in the New England region with respect to employment. The North American Industry Classification System (NAICS) code descriptions are provided in Table A.1. of the Appendix. Shaded areas represent *substantial* differences between the microbusiness economy and the overall economy.[2] Sectors where the percent of employment is higher in the microbusiness economy relative to the overall economy are shaded dark. Light shaded areas represent the sectors where the overall economy outpaces the microbusiness economy in percentage of employment.

Sectors where the percentage of employment is substantially higher in the microbusiness economy relative to the overall economy across states are: forestry, fishing and agricultural services (Maine), construction (all states), real estate and rental and leasing (all states), and professional and technical services (all states). Sectors in which the overall economy outpaces the microbusiness economy substantially in percentage of employment across states are: manufacturing (all states), retail trade (Maine, New Hampshire, and Vermont), educational services (Massachusetts), health care and social assistance (all states) and accommodation and food services (all states).

[2] A substantial difference is defined as a three-percentage point or more difference between the percentages computed for the microbusiness economy and overall economy.

Table 3: Percentage of Employment by Sector, New England States, 2000

State[1]	CT		ME		MA		NH		RI		VT	
Sector	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]
11	0.4	0.0	7.6	0.8	0.9	0.0	1.6	0.2	1.7	D[4]	2.8	0.2
21	0.1	0.1	0.1	D[4]	0.0	0.0	0.1	0.1	D[4]	D[4]	0.2	D[4]
22	0.1	0.1	0.2	0.6	0.1	0.4	0.1	0.6	D[4]	D[4]	0.2	D[4]
23	13.1	4.3	16.0	5.5	12.3	4.0	16.8	4.8	12.8	4.6	15.8	5.6
31-33	2.6	15.1	2.9	16.2	2.2	12.9	3.2	17.0	3.5	16.5	3.6	17.8
42	3.4	5.0	2.7	4.6	3.3	5.1	3.7	4.5	3.6	5.2	2.6	4.4
44-45	10.7	12.4	12.1	15.7	9.7	11.4	11.6	17.0	11.2	12.8	12.0	15.1
48-49	2.2	2.2	3.3	2.2	2.8	2.4	2.5	2.8	2.5	1.7	2.4	2.1
51	1.6	3.3	1.2	2.4	1.7	4.2	1.5	2.5	1.3	2.5	1.6	2.7
52	5.4	8.3	2.7	4.8	4.2	7.0	3.5	4.1	3.7	5.5	3.3	3.7
53	9.4	1.5	6.4	1.3	7.5	1.5	8.1	1.4	8.5	1.4	6.5	1.0
54	16.2	6.1	10.4	4.2	17.9	7.5	14.6	4.4	14.6	4.4	12.5	4.4
56	6.00	6.8	4.9	5.5	5.6	6.8	5.5	7.6	5.5	7.3	5.2	3.6
61	1.8	3.5	1.3	2.6	2.1	5.4	1.6	4.1	1.7	4.5	2.0	4.9
62	8.6	13.8	8.2	17.7	8.8	14.5	7.2	12.7	7.8	16.6	8.4	14.2
71	3.8	2.5	3.9	1.2	4.2	1.4	3.4	1.6	3.8	1.3	4.4	2.6
72	2.8	6.3	3.4	8.8	3.1	7.7	2.7	8.9	3.8	8.8	3.2	11.5
Other	11.9	8.0	13.0	D[4]	13.4	7.8	12.4	6.0	13.4	D[4]	13.2	D[4]

[1] CT: Connecticut, ME: Maine, MA: Massachusetts, NH: New Hampshire, RI: Rhode Island, VT: Vermont.
[2] Computed as: (Microbusiness employment in a sector/Total microbusiness employment in the state)*100.
[3] Computed as: (Employment in a sector/Total employment in the state)*100.
[4] Withheld to avoid disclosure.
Note: Dark (light) shaded areas represent sectors where the percent of employment is *substantially* higher in the microbusiness (overall economy) relative to the overall (microbusiness) economy.
Sources: Nonemployer Statistics, U.S. Census Bureau; County Business Patterns, U.S. Census Bureau.

The differences in the sectorial composition of businesses, shown in Table A.2 in the Appendix, occur in the same direction and similar magnitude as in the employment levels by sector. The information in Tables 3 and A.2 suggest that the percentage of number of businesses and employment in the microbusiness economy is highest in the service industries. On the other hand, the overall economy has a higher percentage of business numbers and employment levels in the product industries. This finding is observed consistently across all New England states.

Table 4 shows the percent of businesses and employment for the microbusiness economy and the overall economy for the entire New England region. This comparison

reveals that sectors where the percentage of number of businesses and employment is *substantially* higher in the microbusiness economy relative to the overall economy are: construction, real estate, rental and leasing, professional and technical services, and arts, entertainment and recreational services. The overall economy *substantially* outpaces the microbusiness economy in manufacturing, retail trade, health services, and accommodation and food services.

Table 4: Percentage of Businesses and Employment by Sector, New England Region, 2000

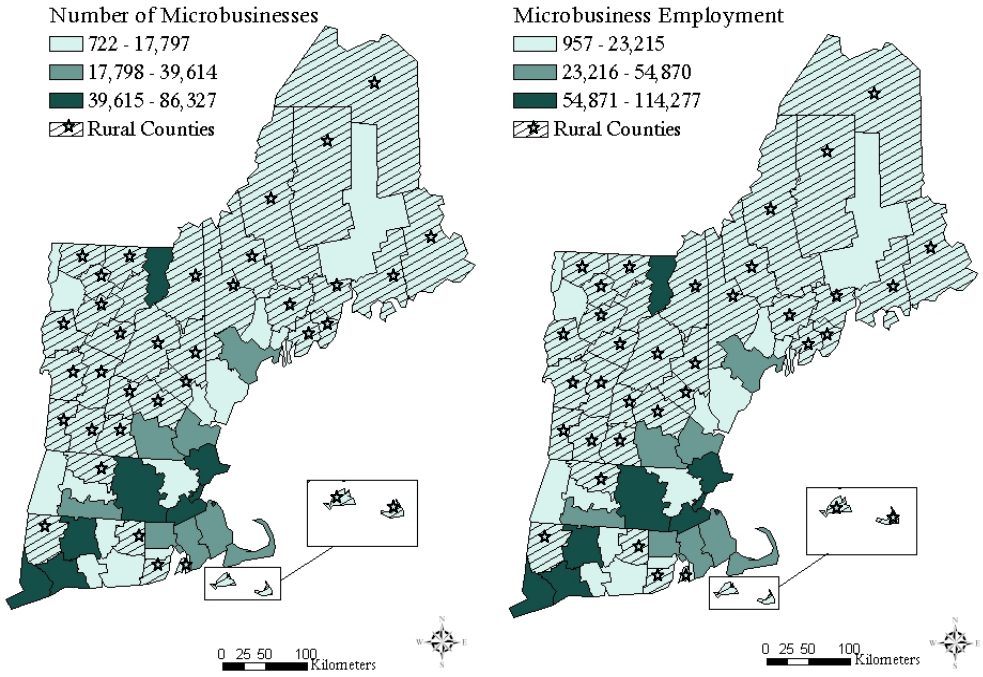
	Number of businesses		Employment	
Sector	Micro-bus[1]	All[2]	Micro-bus[1]	All[2]
11	2.1	0.4	1.7	D[3]
21	D[3]	0.1	D[3]	D[3]
22	D[3]	0.2	D[3]	D[3]
23	14.0	10.2	13.5	4.4
31-33	2.2	5.6	2.6	14.5
42	2.6	5.3	3.3	4.9
44-45	9.2	15.6	10.6	12.7
48-49	2.9	2.1	2.6	2.3
51	1.6	2.0	1.6	3.5
52	3.9	5.1	4.2	6.7
53	9.0	3.5	7.9	1.4
54	17.0	10.8	15.9	6.3
56	5.6	5.3	5.6	6.7
61	2.2	1.2	1.9	4.5
62	8.5	9.5	8.3	14.6
71	4.8	1.6	4.0	1.7
72	2.2	8.2	3.1	7.8
Other	12.0	13.2	13.0	D[3]

[1,2] The percent business and employment are computed using the same formulas for Table 3.
[3] Withheld to avoid disclosure.
Note: Dark (light) shaded areas represent sectors where the percent of employment is *substantially* higher in the microbusiness (overall economy) relative to the overall (microbusiness) economy.
Sources: Nonemployer Statistics, U.S. Census Bureau; County Business Patterns, U.S. Census Bureau.

Spatial Variation in the Number of Microbusiness and Microbusiness Employment

Figure 1 shows the variation in the number of microbusinesses and microbusiness employment across urban and rural counties in New England in 2000. It reveals that microbusinesses are larger in number in urban counties, and their contribution to total nonfarm employment is higher in rural counties.

Figure 1: Number of Microbusinesses and Microbusiness Employment in Rural vs. Urban Counties, New England, 2000



Another spatial pattern explored is the spatial variation of the percentage of microbusiness employment to total non-farm employment in relation to rurality, major cities and distance to a major road. This is displayed in Figure A.1 in the Appendix. A different pattern emerges with respect to rurality; microbusinesses contribute to total employment more in rural areas than urban areas. The pattern in relation to major cities indicates that the importance of microbusinesses to the employment base is higher in areas with a smaller number of major cities. Distance to a major road does not appear to have a clear relationship with the percentage of microbusiness employment to total non-farm employment.

The spatial pattern observed with respect to microbusiness employment and number of microbusinesses will also be explored by estimating an econometric model where rurality, number of major cities, and distance to major roads are used as independent variables in addition to several demographic and policy variables in explaining the variation of microbusiness incidence and importance.

Previous Studies

Microbusiness development has only recently been recognized as a rural development strategy that can offer rural communities hope for sustainability. Most of the studies on microbusinesses have focused on definition, description or policy. Only a few studies have examined the components of microbusinesses in an economic analysis context. The economic impact and importance studies reported here focus on home-based businesses as a form of self-employment, determinants of self-employment and new firm formation.

Home-based business, as an important type of microbusiness, has recently been touted as a form of community development for its potential to create an alternative income or supplemental income source for residents and for its economic multiplier effect on a community and the surrounding region. In a study which examined the contribution of home-based businesses to the economies of nine states in the U. S., Rowe et al. (1999) found that the impact of home-based business development was maximized when they sell their goods and services outside the local area, attracting new dollars, while purchasing most of their materials and services locally.

One of the responses to the rural distress (local job losses) due to globalization and labor saving technological change in the 1980s was self-employment. A study by Goetz (2003) addressed the increase in nonfarm full-time and part-time proprietor employment as part of a rural development trend. He found that over time proprietor employment had increased its share of total nonfarm employment to 18%. He also found that each proprietor, on average, earns less than the typical employed worker. Proprietor shares in all jobs are largest in rural counties, a finding that implies that the counties with the smallest population have the largest shares, regardless of whether they are adjacent or not to a metropolitan area.

A number of studies have investigated the determinants of self-employment. Robson (1998) found that regional rates of self-employment are positively related to the real value of net housing wealth, the share of national GDP of certain “self-employment friendly” industries and increases in the proportion of “older” workers in the work force. Robson also included long-term employment and educational attainment in his analysis. The author, however, did not find these variables to be significantly related to male self-employment rates.

Another study by Goetz and Rupasingha (2002) reported similar results regarding the determinants of growth in proprietor employment shares. This study found that counties had a greater change in the proprietors share of total employment if they had more owner occupied homes, higher median housing values, older populations, more construction and service employment shares, higher (state-level) income taxes, a higher natural amenities index and if they were rural. On the other hand, counties with more ethnic fractionalization, more female labor force participation, more per capita income, more bank deposits per capita, a higher initial share of proprietors, and more retail employment had a smaller change in the proprietors share of total employment.

The literature lacks studies that specifically focus on microbusiness and their economic contribution to rural communities. The recent studies by Goetz (2003) and Rowe et al. (1999) do focus on a specific segment of the microbusiness economy. However, these studies are insufficient in providing economic knowledge regarding the economic impact and importance of microbusinesses as well as the determinants of microbusiness activity.

The present study extends the above research to fill the gap in the economic literature regarding microenterprises. This study follows the methodology used in the entrepreneurship, microbusiness and home-based business studies to analyze microbusiness activity in the New England region.

Analytical Framework and Data

This paper employs two types of analyses to assess the economic impact and importance of microbusinesses to the New England economy. First, we estimate the total economic impact of microbusinesses including the direct, indirect and induced effects using the (Impact Analysis for Planning) IMPLAN model. Second, we estimate several econometric models in an attempt to explain the variation in the number of microbusinesses and microbusiness employment across New England counties.

Estimating the Economic Impact

Economic impact analysis is based on the Input-Output (I-O) model developed by Leontief (1951). The fundamental philosophy behind economic impact analysis is that changes in expenditures are multiplied throughout the economy. The concepts of *direct,*

indirect, and *induced* effects are integral to the calculation of economic impacts. *Direct effects* are the first round effects of an economic change. *Indirect effects* and *induced effects* include all other changes occurring in the economy resulting from an initial economic change. The *multiplier* expresses the total change in output from all sectors of the economy for every one dollar change in final demand in that sector.

Following the logic of I-O modeling with respect to multiplying the effects of an initial spending change in an economy, this paper estimates the direct, indirect and induced impacts of microbusiness employment in each New England state and the entire region. The output/employment ratios available in IMPLAN were used to adjust for the output per worker figures estimated for the microbusiness economy in each sector. Before this adjustment, total receipts by sector were estimated for each state. Since receipts for all microbusinesses were not available, Allen and Gabe's (2001) annual receipts estimations for Piscataquis County, Maine were used as a base for Maine. The overall economy output figures for each state available in IMPLAN were used to estimate the ratio of output in each sector relative to Maine. These ratios were multiplied by the base data for Maine to estimate the annual receipts for each sector in the other New England states. These computations are based on the assumption that the relationship between the microbusiness economy and the overall economy is similar across the New England states.

Annual receipts, estimated through the procedure described above, were used to estimate the output per worker in each sector for the microbusiness economy. After all the model adjustments were made, microbusiness employment was entered as a direct impact in each sector. The IMPLAN model then generated the employment, output and value added impacts and multipliers associated with microbusiness employment.

Empirical Models

One goal of this paper is to explain the variability of microbusiness incidence and importance in New England counties by regressing a set of variables on two different dependent variables: number of microbusinesses (NUM) and microbusiness employment (EMP). The models estimated, therefore, follow this general functional relationship:

(1) $\mathbf{log} Y_i = \beta' X_i$, where Y_i is the dependent variable, β is a vector of regression coefficients, and X_i is a vector of covariates for New England county i, where i=1,2…67.

In the case where the dependent variable is the number of microbusiness, a Log-Linear Model was estimated to account for possible nonlinear relationships. However, due to the nature of the data, i.e. counts over space, an alternative Poisson Model was also estimated. Similarly, Log-Linear and a Poisson models were estimated in the case where the dependent variable was microbusiness employment.[3]

Poisson regression models assume that the variance and the mean of the distribution of the dependent variable are equal and the observations are independent. The independence assumption is plausible, since microbusinesses are locally owned businesses, and therefore are started independent of microbusiness formations in other counties. The first assumption, however, might not hold due to other reasons, such as outliers in the data set, or dependence across observed values. Violation of the first assumption, and therefore under/overdispersion can be corrected for in the Poisson regression analysis context.

The general specification of Poisson models is shown below:

(2) $P(Y = y) = \frac{e^{-\lambda}\lambda^{y}}{y!}$ is the probability density function of a random variable Y with Poisson distribution, where the parameter λ is the mean value of the random variable Y, i.e. $E(Y) = \lambda$. This random variable takes on values from zero to infinity across integers. The basic model formulation is that the log of the mean of the Poisson random variable is a linear function of the independent variables. That is:

(3) $\mathbf{log}(E(Y)) = \mathbf{log}(\lambda) = \boldsymbol{\beta}' X_i$, where β is a vector of regression coefficients, X_i is a vector of covariates for county i, where i=1,2…67.

In some cases, the rate or incidence of an event needs to be modeled instead of the number of occurrences, i.e. we need to account for different spatial sizes. For such data, the Poisson regression model transforms to:

(4) $\mathbf{log}(E(Y)/N) = \mathbf{log}(\lambda/N) = \boldsymbol{\beta}' X_i$, where N can be the total number businesses, total employment or total population. The variable $\log(N)$, introduced with this transformation is used as an offset, a regression variable with a constant coefficient of 1 for each observation.

[3] Linear models were not estimated in this paper since both dependent variables, number of microbusinesses and microbusiness employment, only take on non-negative values.

In summary, the Poisson regression models estimated in this paper follow this general formulation:

$$(5)\ \mathbf{log}(E(Y_i)/N) = \beta_0 + \beta_1 RATIO_i + \beta_2 UNEMP_i + \beta_3 MEDVAL_i + \beta_4 COLLG_i + \beta_5 MEDAGE_i + \beta_6 FPERC_i + \beta_7 LGBUS_i + \beta_8 RURADJ_i + \beta_9 RURNADJ_i + \beta_{10} DISTANCE_i + \beta_{11} CITIES_i + \beta_{12} PCAPTR_i + \beta_{13} AGGR_i$$

where $Y_i = \{NUM_i, EMP_i\}$, the i subscript denotes the New England counties, and $i = 1,2,...,67$.

Description and Expected Signs of the Explanatory Variables

Drawing upon the previous literature on self-employment and entrepreneurship, this paper uses several variables in an attempt to explain microbusiness activity. These variables can be classified under three categories: demographic, spatial, and policy variables. Demographic variables include: relative returns to self-employment, unemployment rate, median housing value, education, median age, female labor force participation rate, and percent of large businesses in the county. Spatial variables include: rurality, number of major cities, and distance to a major road. Policy variables included in the analysis are per capita transfers and SBA micro-loans to businesses. A description of each variable, their expected signs, and summary statistics are listed in Table 4.

Considered in most entrepreneurship studies, greater returns to self-employment relative to wages (RATIO) is expected to have a positive effect on microbusiness activity. Higher unemployment rates (UNEMP) raise the odds of lay-offs and the relative returns to self-employment, which in turn increase self-employment. Median housing value (MEDVAL) is used as a proxy for wealth, following Goetz and Rupasingha (2003). Higher median housing values significantly improve the ability to secure supplemental loan financing.

Individuals with more education (COLLG) are more likely to become entrepreneurs (Goetz and Rupasingha, 2003; Robson, 1998a). In the literature, age (MEDAGE) has been found to positively influence self-employment rates (Robson, 1998a). The percentage of women in the total labor force (FPERC) was included to test whether or not female labor

participation rates influence microbusiness activity. The percent of large businesses (percentage of businesses that employ more than 50 employees) (LGBUS) is included to test for two possibilities: a higher number of large businesses might imply more employment opportunities, and therefore less self-employment. It might also imply that as the percent of large businesses increase, more outsourcing occurs stimulating microbusiness activity.

Rurality was found in two recent studies to have a positive impact on proprietorship densities (Goetz, 2002; Goetz and Rupasingha, 2003). Three measures of rurality are included in this analysis: urban counties (URBAN), rural counties that are adjacent to an urban area (RURADJ), and rural counties that are not adjacent to an urban area (RURNADJ). The base category is URBAN; therefore RURNADJ and RURADJ are included in the models. Both variables are expected to have positive signs. Distance to a major road (DISTANCE) could have a positive or negative influence on microbusiness activity. First, as the distance to a major road increases, isolation increases, and self-employment may rise. On the other hand, for some sectors, ease of transportation to major cities is important. As a result, distance might be a negative influence on microbusiness activity. The number of major cities in a county (CITIES) can be thought of as a measure of overall demand in the economy. Therefore we expect this variable to be positively related to microbusiness activity.

Per capita transfers (PCAPTR) is often considered a proxy measure for the degree of poverty in a county. Higher per capita transfers imply less employment opportunities, and therefore more people starting their own businesses to supplement their income or escape from poverty. Aggressiveness, defined as the average amount of micro-loans per worker (AGGR), is expected to capture the impact of financial capital availability on microbusiness activity. However, in our study, micro-loans are business loans of less than $100,000. These loans are typically given to both microbusinesses and larger businesses, which may result in either a positive or negative influence on microbusiness activity.

Table 4: Description and Summary Statistics of Explanatory Variables

Variable	Description	Expected Sign	Mean	Std. Dev.
NUM	Number of microbusinesses	N/A	17,048.2	22,709.7
EMP	Microbusiness employment	N/A	22,580.2	30,003.3
RATIO	Proprietor earnings / Wage and salary earning	+	0.67	0.12
UNEMP	Unemployment rate	+	4.81	7.89
MEDVAL	Median housing value	+	133,286.6	73,605.5
COLLG	Persons w/ college degree, %	+	26.70	2.26
MEDAGE	Median age	+	38.33	2.26
FPERC	Female ratio in labor force, rate	+/-	0.48	1.27
LGBUS	Large businesses, ratio in total	+/-	0.01	0.01
URBAN	Urban, DW	+/-	N/A	N/A
RURADJ	Rural, adjacent to urban, DW	+	N/A	N/A
RURNADJ	Rural, not adjacent to urban, DW	+	N/A	N/A
DISTANCE	Distance to a major road, ml	+/-	0.04	0.1010
CITIES	Number of major cities	+	2.48	4.1828
PCAPTR	Per capita transfers, $	+	4.16	0.7575
AGGR	Aggressiveness, $ per worker	+/-	0.73	1.0604

Sources: See text references.
N/A: Not Applicable.
DW: Dummy Variable.

Data

The data were collected from a variety of secondary public sources. Most of the data were available through the Internet. The data were collected for all 67 counties in New England. The data for all variables were collected for the year 2000 except for the micro-loan data. Micro-loan data were obtained for the year 2001, the closest year to 2000 that was available at the time of the study.

The Nonemployer Statistics (U.S. Census Bureau) provides data on the number and annual receipts of the self-employed by county and by sector. County Business Patterns (U.S. Census Bureau) supplies information on the number of businesses by employee size categories by county and by sector.

Total nonfarm employment figures by county, which are used to find the contribution of microbusinesses to total employment, were available through the Department of

Commerce's Bureau for Economic Analysis (BEA). BEA also provides data on per capita transfers, proprietor earnings, and wage and salary earnings.

County characteristics such as income level, education, population, unemployment, etc. were obtained from the U.S. Census Bureau. Spatial variables (distance to a major road, and number of major cities in the county) were available in the ESRI shape files provided with the ArcMap software. The rurality measures were taken from the BEAL Code calculations provided by U.S. Department of Agriculture. The micro-loan data were obtained upon request from the U.S. Small Business Administration.

Results

Economic Impact Analysis Results

Table 5 presents a summary of the overall economic impact including multipliers in terms of employment, output and value added for each New England state and the entire New England region for 2000. Microbusiness output and value added are computed by IMPLAN based on microbusiness employment. The multiplier effects work through output, and indirectly affect employment and value added.

The total economic impact associated with the microbusiness economy in the New England region is approximately 3.2 million jobs, $149.1 billion in output, and $96.3 billion in value added. The employment, output and value added multipliers associated with these impacts are 2.09, 1.76 and 1.73, respectively. For example, an employment multiplier of 2.09 implies that the microbusiness economy supports 1.09 additional jobs for every job in the microbusiness economy.

Total economic impact varies considerably across the New England states, which, to a large extent, is a reflection of the size of the state. For example, the greatest employment impact is found in Massachusetts, whereas the lowest employment impact is found in Vermont. The output impact and value added impact follow the same pattern.

The multipliers also vary by size of state. Massachusetts has the highest multipliers and Rhode Island has the lowest. As for the variation of multipliers, the output and value added multipliers do not show much variation across the New England states. Employment multipliers, on the other hand, show considerable variation across the states. The highest employment multipliers are observed in Massachusetts and Connecticut. The lowest are

found in Rhode Island and Maine, implying that the inter-sectoral linkages are not as strong in these smaller states.

Table 5: Economic Impact of the Microbusiness Economy, by State and Region, New England, 2000

Type	State[1]	CT	ME	MA	NH	RI	VT	NE
Employment	Direct	353,026	158,132	668,750	144,378	102,331	84,776	1,511,393
	Indirect	148,319	56,653	290,305	57,359	28,974	37,281	618,891
	Induced	251,420	79,360	510,904	84,781	45,524	50,717	1,022,705
	Total	752,764	294,145	1,469,959	286,518	176,829	172,773	3,152,989
	Multiplier	2.13	1.86	2.20	1.98	1.73	2.04	2.09
Output	Direct[2]	26,856	7,639	31,298	8,890	5,972	4,105	84,761
	Indirect[2]	8,425	2,275	9,904	2,737	1,422	1,397	26,160
	Induced[2]	12,802	3,018	14,906	3,717	1,987	1,758	38,188
	Total[2]	48,083	12,932	56,109	15,345	9,380	7,259	149,108
	Multiplier	1.79	1.69	1.79	1.73	1.57	1.77	1.76
Value Added	Direct[2]	17,993	4,669	21,125	5,538	3,849	2,458	55,631
	Indirect[2]	5,255	1,233	6,241	1,592	838	755	15,913
	Induced[2]	8,449	1,879	9,717	2,354	1,267	1,061	24,727
	Total[2]	31,697	7,781	37,082	9,484	5,954	4,273	96,271
	Multiplier	1.76	1.67	1.76	1.71	1.55	1.74	1.73

[1] CT: Connecticut, ME: Maine, MA: Massachusetts, NH: New Hampshire, RI: Rhode Island, VT: Vermont, NE: New England Region.
[2] Expressed in millions of dollars.

Empirical Model Results

Poisson models were estimated to relate demographic, spatial and policy variables to microbusiness incidence and importance, since they are more appropriate than either linear or log-liner models, in the case of count data. The results are listed in Table 6. Both models were estimated with an offset variable to control for county size. In the model where the dependent variable is the number of microbusinesses, the offset variable was specified as the total number of microbusinesses in the county. In the model where the dependent variable is microbusiness employment, the offset variable employed was total employment in the county.

Table 6: Estimation Results of Poisson Models with Scale[4]

Dependent Variable	NUM	EMP
INT	-0.06	-1.10
	(0.3)	(3.38)*
RATIO	-0.0167	-0.07
	(0.81)	(0.46)
MEDVAL	0.0000001	0.000001
	(3.54)*	(4.36)**
MEDAGE	-0.001	0.006
	(0.6)	(0.78)
COLLG	0.00016	-0.004
	(0.16)	(3.08)
UNEMP	0.001	-0.0107
	(0.24)	(0.72)
FPERC	0.02	0.0209
	(0.01)	(0.00)
PCAPTR	-0.0004	0.025
	(0.01)	(1.02)
LGBUS	-4.76	-44.16
	(91.16)***	(254.12)***
RURNADJ	0.004	-0.001
	(0.32)	(0.00)
RURADJ	0.01	0.003
	(4.86)**	(0.01)
CITIES	0.0004	0.0003
	(0.98)	(0.01)
DISTANCE	-0.05	-0.04
	(2.00)	(0.05)
AGGR	-0.002	-0.01
	(0.95)	(0.26)
SCALE	1.45	9.18
Goodness of Fit Measures		
Scaled Deviance	1.00	1.00
Scaled Pearson Chi-square	1.01	0.98
Log-likelihood	5,111,108	172,646

Values in parentheses are Chi-square values.
*, **, *** Indicate significance at the 10%, 5%, and 1% level, respectively.

[4] Poisson models with no scale, implying that the variance and the mean of the Poisson distribution are equal, were also estimated. However, this assumption did not hold in this study. Therefore, over-dispersion was corrected by introducing a scale parameter into the Poisson regression models. The results obtained from Poisson models estimated with no scale parameter are available from the authors upon request.

The Poisson regression model performs well for the dependent variable number of microbusinesses (NUM). The deviance measures are not significantly different from 1, which indicates adequate fit. This model actually measures the relationship of the explanatory variables to the ratio of number of microbusinesses to total number of businesses. The parameter estimate for median housing value (MEDVAL) was statistically significant and positive, as expected. The parameter estimate for the ratio of large businesses (LGBUS) was statistically significant and negative, indicating an inverse relationship between the incidence of large businesses and microbusiness activity. This might be a result of the demand effect mentioned earlier in the paper. The parameter estimate for rural counties adjacent to urban counties (RURADJ) was statistically significant and was positively related to (NUM). The rest of the variables in the model were not statistically significant at the .10 level or higher.

The Poisson regression model did not perform as well when the dependent variable was microbusiness employment (EMP). The deviance measure (SCALE) was very high, indicating that the overall model results are less statistically reliable. The parameter estimate for median housing value (MEDVAL) was positive and significant, while the parameter estimate for the ratio of large businesses (LGBUS) was negative and significant. The rest of the variables in the model were not statistically significant at the .10 level or higher.

Conclusions

The results of this study indicate that microbusinesses have a positive and substantial economic impact on communities throughout New England. The majority of the businesses in the region are microbusinesses, and they contribute 20 percent to the employment base in the region. Microbusinesses operate mostly in rural areas and contribute significantly to local economies despite the challenges they face. Microbusinesses are integral to rural economic development, and they are expected to play an increasingly important economic role in the New England region in the years to come.

This study revealed that the composition of the microbusiness economy differs from the makeup of the overall economy in New England in a number of ways. The microbusiness economy in the New England region is a heavily service-oriented economy. The percent of businesses and employment in the service industries are higher in the microbusiness economy relative to the overall economy. Product industries, on the other hand, contribute

more to the total number of businesses and employment in the overall economy. This was observed in all states, and across the region.

This study also quantified the contribution of microbusinesses to employment, output and value added in the New England region. The estimated impacts and the associated multipliers in terms of employment, output and value added indicate that microbusinesses contribute a great deal to the economies of the six New England states and the New England region. At the state level, there is little variation in the output and value added multipliers. However, there is considerable variation in the employment multipliers across states. The largest economic impacts and multipliers were observed in the larger states such as Massachusetts and Connecticut. The smallest economic impacts and multipliers were observed in the smaller states such as Rhode Island and Maine.

The incidence and importance of microbusinesses do not occur randomly across the New England counties. Overall, the models employed in the econometric analysis fit the data reasonably well as suggested by the Goodness-of-Fit statistics. However, the (NUM) model fit the data better than the (EMP) model. Even though not all of the variables were individually statistically significant, overall significance tests suggest that the variables used in the models were jointly significant in explaining the variation in microbusiness activity. Some socio-economic characteristics of the county were found to influence microbusiness activity across the region. Wealth as measured by median housing value, the presence of large businesses, and a measure of rurality, were each associated with statistically significant effects on the incidence or the importance of microbusinesses. On the other hand, none of the policy variables such as micro loan per worker and per capita transfers included in the econometric models were statistically significant in explaining the incidence or the importance of microbusinesses.

This paper provided valuable information on how microbusinesses impact the New England economy, and identified important factors that influence microbusiness activity in the region. The results of this study should help economic development officials and policy makers in New England formulate more effective rural economic development policies.

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APPENDIX

Table A.1: Major North American Industry Classification System (NAICS) Code Descriptions

NAICS Code	Sector Description
11	Forestry, fishing, hunting and agricultural support services
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and warehousing
51	Information
52	Finance and insurance
53	Real estate and rental and leasing
54	Professional, scientific and technical services
56	Administrative and support and waste management and remediation
61	Educational services
62	Health care and social assistance
71	Arts, entertainment and recreational services
72	Accommodation and food services
Other	All other businesses

Source: U.S. Census Bureau

Figure A.1: Percent of Microbusiness Employment to Total Non-Farm Employment, New England, 2000

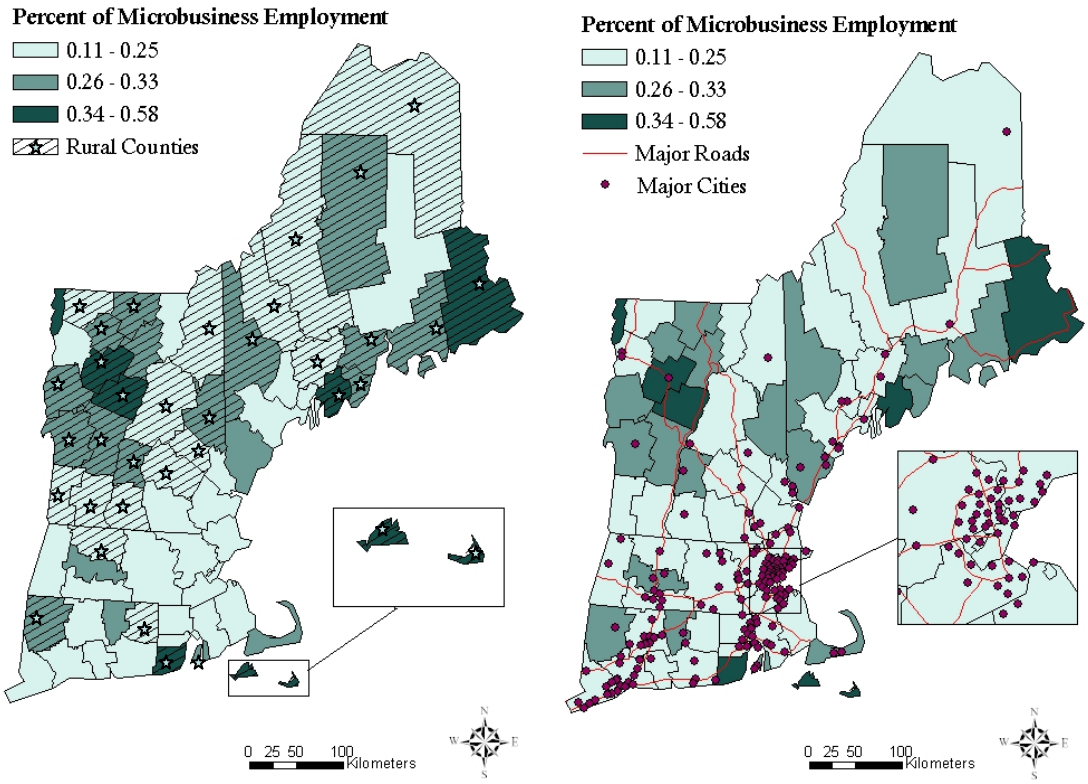

Table A.2: Percentage of Businesses by Sector, New England States, 2000

State[1]	CT		ME		MA		NH		RI		VT	
Sector	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]	Micro-bus[2]	All[3]
11	0.50	0.11	9.13	1.90	1.16	0.21	1.88	0.55	2.18	0.19	3.36	0.64
21	0.04	0.08	0.07	0.05	0.02	0.06	0.08	0.11	D[4]	0.08	0.14	0.27
22	0.07	0.15	0.15	0.28	0.11	0.14	0.13	0.27	D[4]	0.12	0.20	0.30
23	13.40	10.10	16.31	12.01	12.85	9.27	17.86	11.16	12.75	10.98	16.33	12.57
31-33	2.02	5.95	2.68	4.76	1.85	5.20	2.74	6.07	2.76	7.91	3.44	5.60
42	2.76	5.49	2.27	4.41	2.58	5.52	2.97	5.63	2.96	5.36	2.26	4.12
44-45	9.40	15.27	10.87	17.77	8.28	14.65	10.23	17.49	9.98	15.22	10.37	18.43
48-49	2.39	1.70	3.32	3.32	3.10	1.94	2.67	2.11	2.73	2.11	2.45	2.49
51	1.58	1.87	1.05	1.77	1.72	2.14	1.47	1.99	1.29	1.33	1.49	2.24
52	5.15	6.16	2.31	4.29	3.95	5.12	3.09	4.54	3.52	4.46	2.58	4.31
53	11.05	3.49	6.97	3.56	8.54	3.36	9.04	3.80	10.03	3.33	7.28	3.34
54	17.39	11.02	10.68	7.85	19.41	11.98	15.28	10.31	15.73	9.61	13.36	8.91
56	6.03	5.84	4.86	4.35	5.65	5.37	5.58	5.02	5.60	5.64	5.43	4.14
61	2.03	1.07	1.45	0.99	2.50	1.25	1.84	1.28	1.99	1.04	2.23	1.42
62	8.80	9.95	7.90	10.13	8.91	9.41	6.97	8.59	7.96	9.81	8.80	8.67
71	4.56	1.62	4.47	1.96	5.16	1.49	4.00	1.71	4.66	1.58	5.28	1.89
72	1.95	7.31	2.78	9.25	2.11	8.27	2.05	8.09	2.72	9.10	2.53	8.57
Other	10.87	12.82	12.72	11.35	12.10	14.61	12.11	11.29	13.02	12.13	12.49	12.09

[1] CT: Connecticut, ME: Maine, MA: Massachusetts, NH: New Hampshire, RI: Rhode Island, VT: Vermont.
[2,3] The percent business and employment are computed using the same formulas that were used in Table 3.
[4] Withheld to avoid disclosure.
Note: Dark (light) shaded areas represent sectors where the percent of employment is *substantially* higher in the microbusiness (overall economy) relative to the overall (microbusiness) economy.
Sources: Nonemployer Statistics, U.S. Census Bureau; County Business Patterns, U.S. Census Bureau.