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LOCATION PATTERNS OF BUSINESS SERVICES EMPLOYMENT

Robert Kirk*

Introduction

The study of the location patterns of business services employment is important for three reasons: (1) business services employment has been growing faster than total employment, (2) regional analysts have devoted relatively little attention to determinants of the location of business services employment, and (3) business services employment may play a crucial role in the development of state and local governmental job creation strategies.

In this paper business services employment is defined and its recent rate of growth at the national level is documented. Location patterns are identified by a model that explains differentials in business services employment among metropolitan areas. The multiple regression analysis is cross-sectional and the data base is drawn primarily from *County Business Patterns,* 1980. The econometric results and their policy implications are discussed.

Definition of Business Services Employment

The services industries have been studied in a variety of contexts. Fuchs has studied differential productivity growth between goods and services production [7]. Simon has considered the effect of the productivity differential on the increase in the ratio of urban to rural population [14]. Bergsman and others have related industrial clustering to urbanization economies which are measured by per capita employment in high order business services, including advertising, financial and legal services, data processing, etc. [2]. Bearse has studied the diffusion of business services [1]. In each case, services were defined differently according to the questions asked.

Greenfield has identified a list of producer services industries classified by using analyses of revenue and distribution of output between intermediate and final demands from input-output tables [8]. The list is shown in Appendix A. I use a narrower definition. For this paper, business services are defined by SIC code and consist of SIC73 (business services), SIC81 (legal services), and SIC89 (miscellaneous services). The industries that constitute these SIC codes are listed in Appendix B. In Greenfield's classification as shown in Appendix A, nine-tenths of employment in engineering and architectural, and accounting, auditing, and bookkeeping are allocated to producer services. All of advertising and miscellaneous business services and one-half of legal services employment are allocated to producer services. Without an input-

* Department of Economics, Indiana University — Purdue University of Indianapolis

output table for each metropolitan area used in the empirical analysis of this paper, there is no simple way to allocate legal services employment between firms' intermediate demand and final demand.

Growth in Business Services Employment

Why is the study of the location patterns of business services employment important? From 1970-80 at the national level the rate of growth in each of the SIC codes which define business services has exceeded the rate in total employment as illustrated in Table 1.

Table 1. Percent Distribution and Rates of Growth

Sector	Percent distribution, 1970	Percent change, 1970-80
Total employment		30.7
Manufacturing	34.5	7.0
Business services (SIC73)	2.8	83.6
Legal services (SIC81)	0.4	112.0
Miscellaneous services (SIC89)	1.0	56.7

Source: *1970 and 1980 County Business Patterns, U.S. Summary*

Although these SIC codes represent a small proportion of the total employment, their growth rates are impressive and deserve attention.

Another factor that motivates the study of location of business services employment is the increased attention given by state and local governments to economic development and job creation. The recession of 1979-82 in the Midwest has induced government officials to design new development strategies. Much of their attention continues to be directed at the manufacturing sector. Is this strategy too narrowly specified? Should the role of business services be given increased attention?

Model

An economic force that has contributed to the differential rate of growth between business services and manufacturing employment identified in Table 1 is the differential rate of growth in labor productivity between goods and services production as indicated in Table 2.

Table 2. Annual Average Rates of Change in Labor Productivity by Selected Sectors, 1958-76.

SIC	Sector	Output per hr. (1967 = 100)
351	Engines, turbines and generators	3.9
354	Metalworking machinery	1.6
3573	Computers	4.2
365	Radio and television receiving sets	6.9
367	Electronic components	4.2
371	Motor vehicles	3.6
384	Medical and dental instruments	3.2
73	Business services	1.8
81,89	Legal services and miscellaneous services	0.1

Source: U.S. Department of Labor, *Time Series Data for Input-Output Industries,* Bureau of Labor Statistics Bulletin 2018 (1979).

To produce equal amounts of increased output of both goods and services, more employment is required in business services than in manufacturing because of the lower labor productivity in services.

Carter has studied the changing structure of the U.S. economy by analyzing input-output tables from 1939-61 [6]. She notes a decrease in total labor requirements to produce a given amount of final demand which implies an increase in labor productivity [6, pp.36-7]. She also found a slight increase in the total volume of intermediate inputs required to produce a given final demand, and interprets this result as an increase in specialization. Most of the increased use of intermediate inputs is in the form of general inputs — inputs required by all industries. Examples include energy, transportation, trade, communications, and other services. Business services, as defined in this paper, are found in the other services category.

Extent of market. Carter's observations suggest some hypotheses about determinants of metropolitan differentials in business services employment. Carter notes an increase in specialization as evidenced by an increase in the total volume of intermediate inputs. As suggested by Stigler, labor specialization is directly related to the extent of the market [15]. Therefore, hypothesis #1 relates the increase in intermediate inputs (of which business services is a component), specialization of labor, and extent of market: a direct relationship exists between business services employment and the extent of the metropolitan area's market.

Transfer of function. As Carter points out, growth of employment in business services is based on two factors: (1) actual increases in the total volume of services performed, and (2) the transfer of service functions from firms primarily engaged in manufacturing to firms engaged in specialized service

functions [6, p.65]. Under what conditions would the firm decide to "contract out" a function? Assuming cost minimization, if the firm can achieve a lower cost by contracting out the function, it has an incentive to do so. On the other hand there are costs to the firm associated with the contracting out.

Williamson refers to "transactional failures" in the operation of markets for intermediate goods [19]. He suggests that in an increasingly interdependent world in which program execution is based on contingencies that cannot be predicted perfectly, coordinating activity is required to achieve agreement about the assumptions used as the basis for action. By keeping the function internal to the firm, there can be a "convergence of expectations" [19, p.120]. By contracting-out, convergence of expectation might be lost.

When the function is transferred external to the firm, uncertainty arises. In a Knightian sense, uncertainty can be converted into risk by keeping the function internal to the firm [9, p.233]. When a "contracting out" of function occurs, the costs of performing the function through a market transaction are apparently less than the "transactional failures" and uncertainty associated with the externalization.

Economies of scale. Economies of scale is a reason for the transfer of a function. Economies of scale may be conceptualized in three forms: 1) internal scale economies — economies internal to the firm; 2) localization economies — economies which are external to the firm but internal to the industry; and 3) urbanization economies — economies which are external to industries but internal to the metropolitan area.

If a firm is large it may be able to incorporate many of the business service functions within its own organizational structure because scale economies can be achieved within the firm. On the other hand, it may be possible to achieve internal economies of scale in technical production with small firms, but not in other business services-type functions of the firm such as advertising, marketing, and data processing. These functions may be externalized and performed by a specialized business service firm. The average cost of the business service function to the original firm can be reduced, and its total average cost (the sum of the average costs for the various functions such as technical production and business services) decreased as illustrated in Figure 1 [13, p.88].

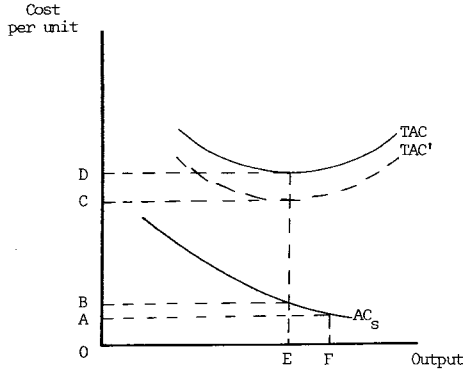

Figure 1. External economies of scale

In Figure 1, AC is the average cost curve for the firm supplying the specialized business services function. Given expansion of the industry, the average cost for the specialized firm falls from OB to OA and, as a result, the total average cost curve of the original externalizing firm shifts downward to TAC'.

Since the observational unit in this paper is the SMSA, we can only make inferences about the relationship between business services employment and the existence of external economies of scale. An industry characterized by a large proportion of small firms would be expected to externalize functions to a greater extent than one not so characterized. The high-fashion garment industry in New York City has been a classic example.

As Mills observes, "Although examples are easy to come by, economists to date have paid relatively little attention to the spatial aspects of scale economies [12, p.8]. A classic analysis of the role of economies of scale that are external to the firm as a basis for the clustering of certain manufacturing industries was Lichtenberg's study of "external-economy industries" in New York City [10]. A characteristic of external-economy industries was single-plant firms which tended to be small in size as measured by average number of employees per establishment [10, p.57].

More recent work on the role of external economies as a determinant of location is from the analysis of plant mobility by Miller [11]. Selected plant characteristics for three categories of movers — intrastate, intraregional, and interregional — were compared using the Dun and Bradstreet DMI files. Miller states: "The degree of significance, however, indicates that there is most likely a strong relationship between distance and only two variables: ownership and employment size" [11, p.29]. Small, noncorporate establishment relocation involved short-distance moves (from urban core to fringe locations, for example) so the firm could remain close to suppliers and services (i.e., to take advantage of external economies of scale). On the other hand, larger, corporate headquarters and plant relocation involved long-distance moves. The implication was that external economies were a less important determinant of the move. Thus, the above discussion suggests hypothesis #2: a positive relationship exists between business services employment and the proportion of manufacturing establishments in the metropolitan area that are single-unit ones.

Industrial structure. Metropolitan areas differ in their industrial composition and may be classified in a variety of ways. One basis has been export specialization. Traditionally, manufacturing has been the major export sector for many metropolitan areas. If a metropolitan area's economy is manufacturing oriented (an above-average proportion of total employment or value-added in manufacturing) then it would be expected to have a below average proportion of total employment in business services. Therefore, hypothesis #3 is: an inverse relationship exists between business services employment and the proportion of total employment in manufacturing in the metropolitan area.

Urban heirarchy. Metropolitan areas have also been classified on position of the area in a hierarchy of central places. Is the area a national, regional, or sub-regional nodal center, for example? Correlates of position include population size, degree of diversification, and presence of corporate headquarters offices. In these offices, employees are processing information for decision-making rather than processing material inputs into material outputs. Decision-making involves planning, purchasing, financial policy and accounting, personnel, and legal matters. Therefore, hypothesis #4 is: a direct relationship exists between business services employment and the presence of a corporate decision-making role in the metropolitan area.

Hypothesis #4 focused on the private sector. There is a corresponding urban hierarchy for the public sector. Washington, D.C. and state capitals contain offices where employees are processing information for decision-making which involves planning, purchasing, financial policy and accounting, personnel, and legal matters too. Therefore, hypothesis #5 is: a direct relationship exists between business services employment and the presence of a public administrative role in the metropolitan area as indicated by the area being a national or state capital.

Complementary goods. Two components of SIC73 are computer and data processing services, and management consulting and public relations services. These services are closely related to "high-tech" industries. There are a variety of definitions of high-tech, and as Browne suggests, ". . . high technology is more a concept than a set of industries defined by SIC codes" [4, p.20]. A narrow definition is used in this study and consists of the industries listed in Table 3 by SIC code.

Table 3. High Technology Industries, by SIC code.

Industry	SIC Code
Drugs	283
Office and computing machines	357
Communication equipment	356
Electronics	367
Engineering and scientific instruments	381
Measuring and controlling devices	382
Optical instruments and lenses	383
Medical instruments and supplies	384
Photographic equipment and supplies	386

As Browne indicates, the difference between the manufacture of computers and computer-related services industries is not distinct [5, pp.5-6]. Some computer manufacturing firms only manufacture computers, while others design software packages and peripheral equipment, and sell access to computers as well. A firm that provides time-sharing is classified in the business services industry. If it attracts a customer who might otherwise have

purchased a computer for in-house use from a manufacturer, then the time-sharing firm is competing with the manufacturer. Thus, the relationship between the computer manufacturer and the time-sharing firm is one of substitution rather than complementarity. However, in this study it is hypothesized that the complementarity dominates the substitutability. Therefore, hypothesis #6 is: a direct relationship exists between business services and the presence of high technology industries in the metropolitan area.

The model consists of the following equation:

$$\left(\frac{BUS}{P}\right)_i = \beta_o + \beta_1(\overset{+}{M})_i + \beta_2(\overset{+}{EXT})_i + \beta_3\left(\frac{\overline{NMf}}{N}\right)_i$$

$$+ \beta_4(\overset{+}{ADM})_i + \beta_5(\overset{+}{CAP})_i + \beta_6(\overset{+}{TECH})_i + \epsilon_i$$

where i is the ith metropolitan area, and

$\frac{BUS}{P}$ = Business services employment per 1000 population, 1980.

M = Extent of the market. Estimated by number of 4-digit SIC codes, 1980.

EXT = External economies of scale. Estimated by the proportion of the establishments in the manufacturing sector that are in the four-digit "externality-type industries," 1980.

$\frac{NMf}{N}$ = Industrial structure. Estimated by proportion of total employment in manufacturing, 1980.

ADM = Urban hierarchy, private sector, Estimated by administrative and auxiliary manufacturing employment per 100 manufacturing employees, 1980.

CAP = Urban heirarchy, [public sector]. Estimated by a dummy variable: 1 = state or national capitol, 0 = non-state or non-national capitol.

TECH = Complementary goods. Estimated by the number of establishments in the 3-digit high technology SIC codes, 1980.

The expected signs are shown above the variables.

Data

Employment in the two-digit SIC business services codes was taken from *County Business Patterns, 1980.* To treat the problem of possible heteroskedasticity in the dependent variable, I have redefined it by dividing business services employment by population to account for the variation in population size among SMSAs. The 1980 SMSA population was taken from the *1980 Census of Population, Supplementary Report S1-5,* Table 4. The data source for extent of the market, external economies of scale, industrial structure, urban hierarchy (private sector), and complementary goods was *County Business Patterns, 1980.* "Externality-type industries" was delineated nationally by two criteria: (1) more than 75 percent of the establishments were single-

unit ones, and (2) there were more than 1,000 establishments at the four-digit level. There were 67 externality-type industries identified.

Estimated Model

The empirical results are based on 100 of the largest (by population) SMSAs in 1980. SMSAs in the New England states were excluded because of data incompatibilities between the definition of SMSAs in New England (one-county based) and the county-based *County Business Patterns* employment data. The excluded SMSAs were Bridgeport, Hartford, New Haven, Boston, Springfield, and Providence.

The estimated model is:

Variable	Parameter estimate	t-statistic
Intercept	1926.34	4.92*
M	0.4998	1.95
EXT	1.3685	1.44
NMf/N	-3.3671	-5.39*
ADM	0.2806	1.99*
CAP	319.49	2.15*
TECH	1.7812	4.50*

* significance level of .05 Adjusted $R^2 = .57$ N = 100

With six independent variables in the model, there is a problem of possible multicollinearity. Plots of the independent variables were analyzed. The table of correlation coefficients was studied. Finally, the SAS collinearity diagnostics (analysis of the proportions of the variances of the coefficients associated with each characteristic root) was examined. It was concluded that one of the variables was not contributing much information beyond that conveyed by another variable. Specifically, ADM (urban hierarchy) and M (extent of the market) were highly positively correlated. Therefore, ADM was excluded from the model on the basis of multicollinearity. Also, the plots showed that Washington, D.C. was consistently an outlier — an atypical observation. Therefore, a dummy variable was added to the model, with a 1 assigned to Washington, D.C. and a 0 to all other SMSAs.

The resulting "best equation" model is:

Variable	Parameter estimate	t-statistic	Beta coefficient
Intercept	1705.14	4.62*	0
M	0.6250	2.92*	0.2298
EXT	1.7778	1.99*	0.1400
NMf/N	-2.6871	-4.69*	-0.3066
CAP	264.23	1.88**	0.1230
TECH	1.6700	4.53*	0.3632
WASH	2281.03	4.08*	0.2640

* significance level of .05 Adjusted $R^2 = .62$ N = 100
** significance level of .10

Economic Results

All independent variables were significant at the five percent level except CAP (urban hierarchy, public sector — state capitol) which was significant at the ten percent level. The estimated parameters had the expected signs. The beta coefficients indicate that the complementary goods variable (TECH) measuring the presence of high tech industries was the most important followed by the industrial structure variable (NMf/N), the dummy variable (WASH) for Washington, D.C., the extent of the market (M), the externalities variable (EXTER), and the urban hierarchy, public sector variable (CAP) respectively. The model explains a high degree of the differential in business services employment per 1000 population among metropolitan areas.

Conclusions and Future Studies

Determinants of differentials in business services employment among metropolitan areas have been identified by a cross-sectional analysis. From a policy point of view, the complementary relationship between business services employment and the presence of high technology industries is important. Often, economic development strategies focus exclusively on the attraction of high technology manufacturing activities. However, given the complementary relationships a broadened approach to economic development is called for in which the role of business services is included.

For future study a time-series approach is suggested to examine the role of business services employment in the process of economic development or decline. For example, do business services function as the economic base from which new export industries are derived — in a long-run Blumenfeld sense [3]? We have much to learn about the role of business services; this paper represents one contribution in an area that deserves more attention.

APPENDIX A

Employment in Producer Services

Industry

Transportation (¾)*
Communications (¼)
Wholesale trade
Finance, insurance, and real estate (½)
Advertising
Miscellaneous business services
Industrial medical
Legal (½)
Engineering and architectural (9/10)
Accounting, auditing, and bookkeeping (9/10)
Miscellaneous professional services (¾)
Government (⅓)

* Ratios in parentheses indicate proportion of total employment allocated by Greenfield to producer services.

Source: Greenfield, *Manpower and the Growth of Producer Services,* p. 22.

APPENDIX B

Components of Business Services

SIC Industry

73 Business Services
- advertising
- consumer credit reporting agencies
- mailing, reproduction, commercial art and photography, and stenographic services
- news syndicates
- personnel supply services
- computer and data processing services
- commercial research and development laboratories
- management, consulting, and public relations services
- detective agencies
- equipment rental and leasing services
- photofinishing laboratories

81 Legal Services

89 Miscellaneous Services
- engineering, architectural, and surveying services
- noncommercial education, scientific, and research
- accounting, auditing, and bookkeeping services

Source: *Standard Industrial Classification Manual, 1972.* Executive Office of the President: Office of Management and Budget (Washington, D.C., U.S. Government Printing Office).

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