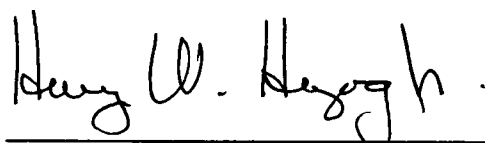


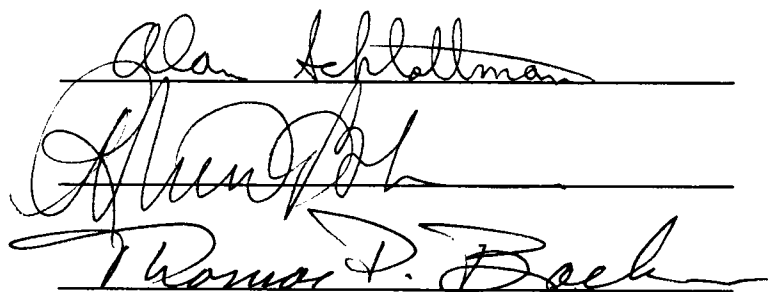
To the Graduate Council:

I am submitting herewith a dissertation written by Thomas G. Wier entitled "Service Sector Development in a Hierarchy of Central Places: a Regional Analysis of Seven Southern States." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.



Henry W. Herzog, Major Professor

We have read this dissertation
and recommend its acceptance:



Accepted for the Council:



Associate Vice Chancellor
and Dean of The Graduate School

SERVICE SECTOR DEVELOPMENT
IN A HIERARCHY OF CENTRAL PLACES:
A REGIONAL ANALYSIS OF SEVEN SOUTHERN STATES

A Dissertation
presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Thomas G. Wier

December, 1992

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DEDICATION

I dedicate this work to the people in my life who have made it possible.

To my mother for teaching me to seek my dreams and to have concern for others. To Margaret and Gene, the parents of my wife, who have given nothing but support in so many ways. To my wife Karen for paying the ultimate price for this work in accepting less than the husband she deserved so that I might forward my own personal goals. And to Elizabeth, our child, for being the greatest demonstration on earth of the existence of a kind and loving God.

ACKNOWLEDGMENTS

I would like to thank my major professor, Dr. Henry W. Herzog, for his assistance and comments. I would also like to express my appreciation to my other committee members, Dr. Alan Schlottmann, Dr. Robert Bohm, and Dr. Thomas Boehm. I would like to acknowledge the instrumental mentor role of Juan E. Gonzalez of the Tennessee Valley Authority and the supporting role of the remainder of the staff at TVA. Without the data, information services, financial support, and regional economic expertise of those at TVA this work would not have been possible.

ABSTRACT

Review of the service sector literature reveals a considerable lack of theoretical and methodological foundations pertaining to regional (and national) service sector development. This study is based on a regional economic model designed to analyze the role of spatial effects on regional service sector development. The synthesis of such a model represents a coupling of accepted microeconomic theory, regional economic theory, and the major theoretical elements which have been addressed in the service sector literature singularly, but not as a cohesive whole.

In the model, the service sector is not assumed to be homogeneous, but rather categorized into meaningful industry groupings. The service sector is divided into three mainly producer and three mainly consumer service categories of industries. The functional specifications incorporate the microeconomic distinction between the derived demand for producer services and direct demand for consumer services. A separate equation is derived for each of these service sector categories allowing differentiated impacts on sectoral growth to be honed down to those specific to each type of service.

The coupling of microeconomic theory with the regional methodology of central place theory form a powerful combination for an analysis of service sector development. Thus, after accounting for fluctuations in the national economy, the scale, density, and intensity of demand is estimated given local commercial and/or socioeconomic attributes for analysis of the effects of space and place scale. Characteristics of the central places, lower order places, and hinterlands are incorporated into the analysis by defining four strata of places and estimating separate equations for each. The hierarchical nature of central place theory is evident in the functional specification of demand for services in central places being a function of local characteristics, those of lower order places and those of its hinterland. Conversely, the hinterland represents those places lower in the hierarchy producing services as a function of local characteristics but also affected by associated higher order places. These linkages enable the determination of spatial impact.

These elements are incorporated into this study using pooled cross section and time series regression analysis on BEA economic area data from Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia for the period 1970-1989.

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CHAPTER I

INTRODUCTION, GOALS, AND CONTRIBUTION OF THE STUDY

Introduction

In the uniform plain of economic theory a firm comes into being at a location, draws workers, and generates earnings. If the firm is the only one on this uniform plain it does not consider the location or proximity of competitive firms or firms which will be customers. In reality we no longer are interested in the frontier economy. Modern firms choose locations with the proximity of competitors and the volume of customers, be they individuals or firms, in mind. Thus the development of regions occurs as the number, size, composition, and level of export activity of firms develop and as the number and demand level of consumers change. These changes are dependent upon the physical attributes of the region and time period as well, but given these attributes in a relatively homogeneous region and consistent time period, firms come into being or relocate based upon the composition of population, income, and composition of firms already in the region.

As this development occurs, income is used by persons for personal services and goods. Revenues of firms are spent on producer services as well as other

input factors. Over time, earnings, population, productivity, and output have increased. Increased income and population have expanded the demand for personal services and goods. The increase in service firms to fulfill this demand has multiplied the demand for producer services. Growth of producer service firms also increase the demand for services from their own industry, thus a positive feedback loop is created. Expanding goods production also increases the demand for producer services while increased productivity has decreased the number of employees necessary for goods production. During this period the production of goods also becomes more service oriented. In an increasingly complex world increasing financial, accounting, advertising, and legal expertise is needed just to maintain position in the marketplace. Distribution systems have also become increasingly more complex.

In an employment context, manufacturing jobs have only maintained an absolute level of employment in recent decades and thus lost ground in percent of total employment terms. In an earnings and output context, manufacturing is still increasing but far less than services as a whole and are thus losing ground in percent of total earnings and output. Services jobs have increased in both absolute terms and as a percentage of total employment. This is where disaggregation of

service firms becomes crucial. The huge disparity between employment in services as a whole and in manufacturing, as seen in Figure 1¹, is due to the vast number of consumer service workers and has been for decades. On the other hand, only in the 1980's has producer services employment expanded beyond that of the manufacturing sector. Producer services are defined as intermediate and distributive services (SIC Division E: Transportation, Communications, and Utilities & SIC Division F: Wholesale trade), finance insurance and real estate services (SIC Division H), and business and professional services (SIC Major Group 73: business services, SIC Major Group 81: legal services, SIC Major Group 89: miscellaneous services). Consumer services are

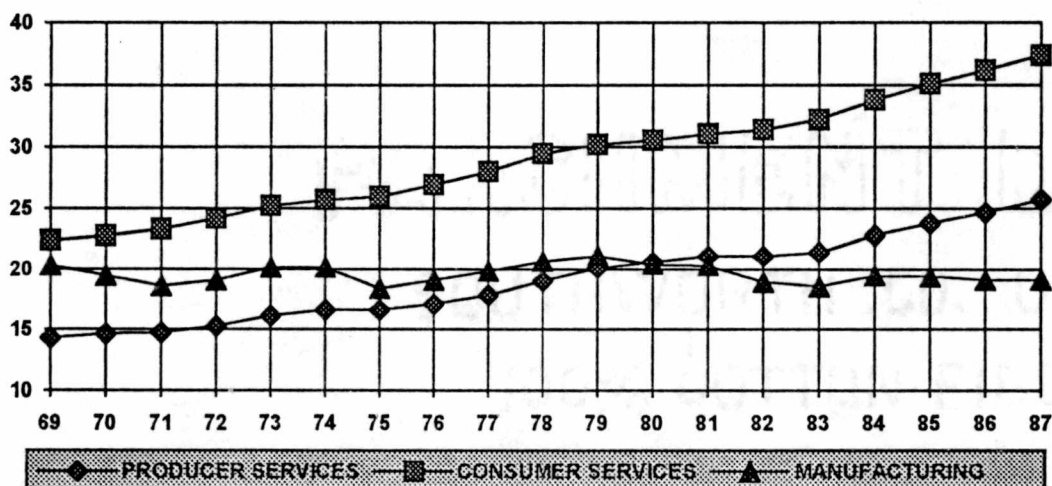


Figure 1 EMPLOYMENT IN SERVICES AND MANUFACTURING (IN MILLIONS)

¹ Employment figures are a product of the Bureau of Economic Analysis.

defined as social overhead services (SIC Major Group 80: health services, SIC Major Group 82: educational services, SIC Major Group 83: social services, SIC Major Group 86: membership organizations), personal services (SIC Division G: Retail trade, SIC Major Group 72: personal services, SIC Major Group 75: automotive repair, service, and garages, SIC Major Group 76: miscellaneous repair services, SIC Major Group 78: motion pictures), and exporting consumer services (SIC Major Group 70: hotels and lodging places, SIC Major Group 79: amusement and recreation, SIC Major Group 84: museums).

Producer service firms have lead in earnings², as seen in Figure 2, over manufacturing since the early eighties. Earnings in consumer services have been higher than manufacturing since 1977 and, as Figure 1 shows, they have employed a much greater proportion of workers for decades. In terms of output³, as seen in Figure 3, manufacturing and consumer services have stayed primarily even (with manufacturing having a slight edge) for the last two decades while producer services have increased steadily.

Increases in employment being grounded in service jobs have caused increased bifurcation and spacial reallocation of employment. Employment in services has

² Earnings figures are a product of the Bureau of Economic Analysis.

³ Product or output figures are a product of the Bureau of Economic Analysis.

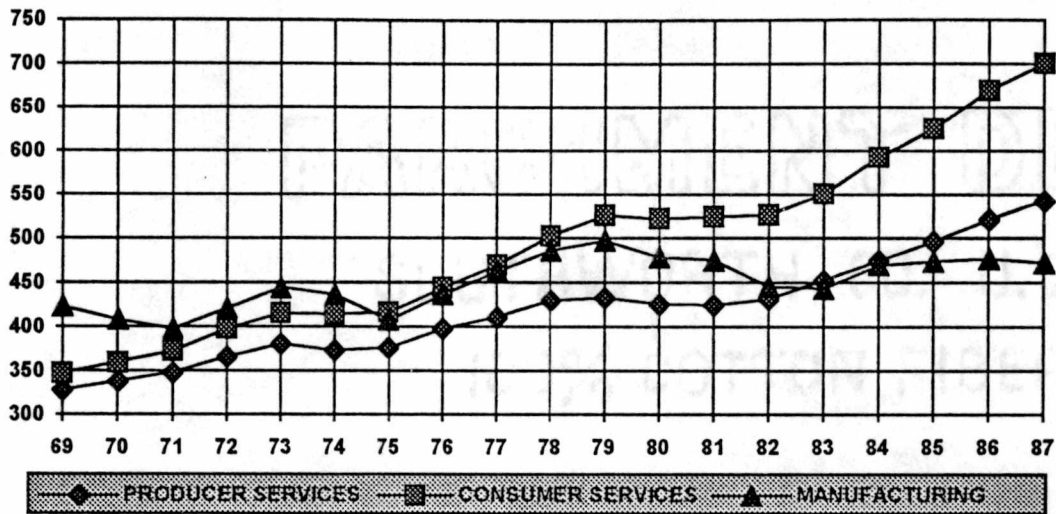


Figure 2 EARNINGS IN SERVICES AND MANUFACTURING (IN MILLIONS OF 1982 DOLLARS)

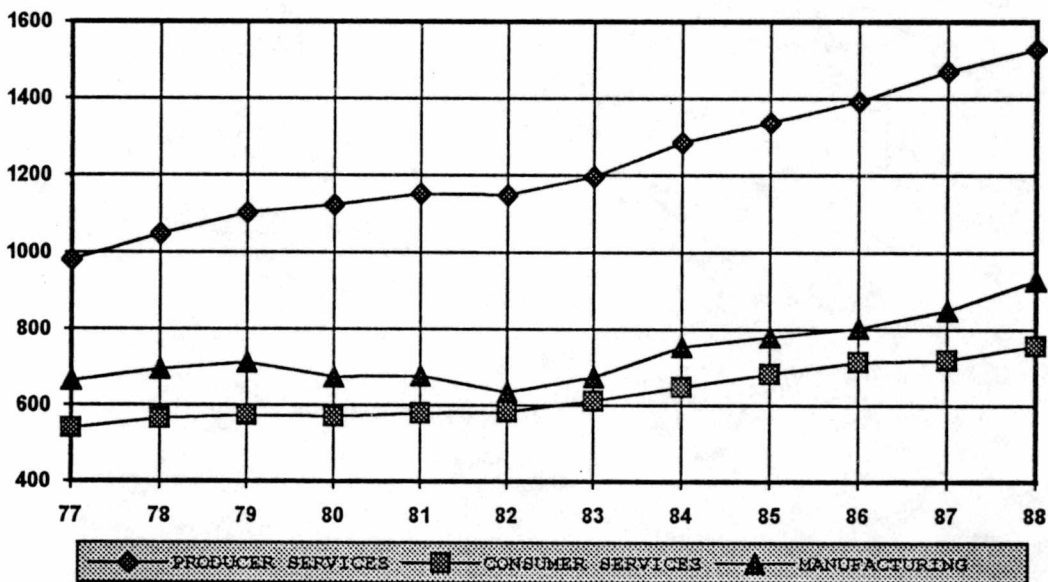


Figure 3 PRODUCT IN SERVICES AND MANUFACTURING (IN BILLIONS OF 1982 DOLLARS)

increased in two ways: in consumer service industries and in producer service industries. Figure 1, 4, and 5 demonstrate that consumer service jobs are typically labor intensive, low productivity, lower wage jobs. Producer services are in general higher income, high productivity professional and semi-professional jobs with some low level jobs included (employment in such positions as temporary workers are included under the producer service heading). The middle level service job is the exception and not the rule as in manufacturing. Thus on average the additional workers added to the economy will be highly trained and choose producer service jobs; or workers untrained or displaced will most likely not be trained or retrained and will thus "choose" consumer service jobs if manufacturing employment is not available.

Another aspect of service sector development, suggested by but not directly tested for in the literature, is that consumer services are driven by population and income in a service region and are therefore ubiquitous with respect to population while producer services are affected greatly by agglomeration economies and are thus drawn to higher central places. Thus the higher paying producer service jobs are drawn to metropolitan areas causing increased spatial differentiation in earnings.

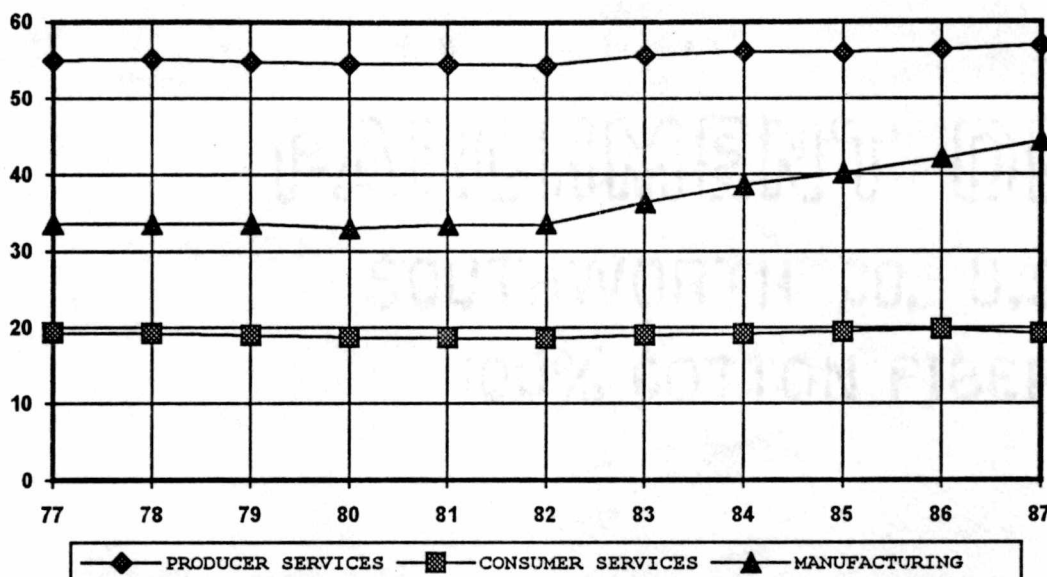


Figure 4 PRODUCTIVITY^A IN SERVICES AND MANUFACTURING (IN THOUSANDS OF 1982 DOLLARS)

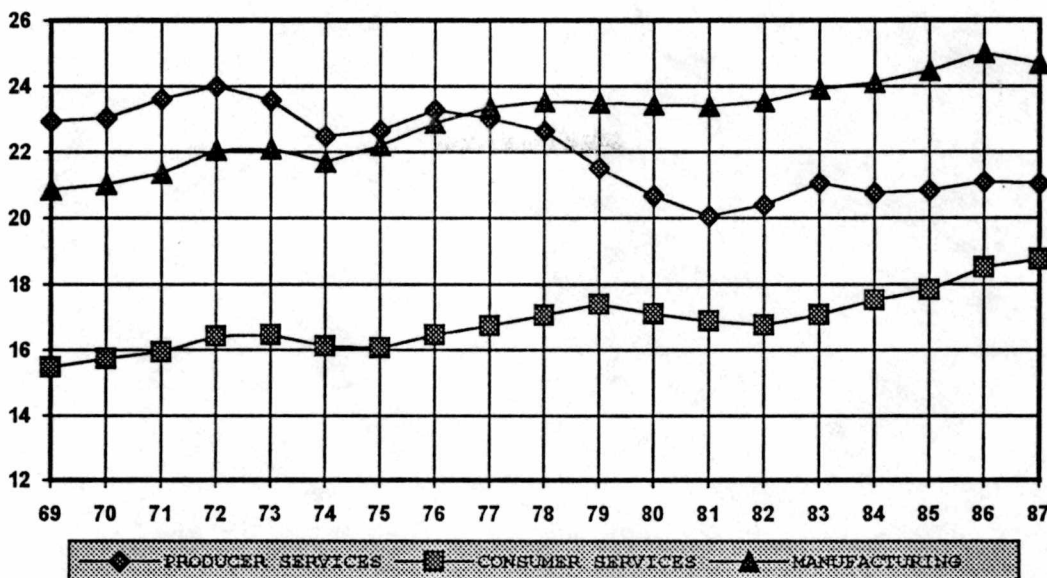


Figure 5 YEARLY EARNINGS PER WORKER IN SERVICES AND MANUFACTURING (IN THOUSANDS OF 1982 DOLLARS)

^A Productivity is measured by product per employee per year (in thousands of 1982 dollars) from Bureau of Economic Analysis Product and Employment figures.

Two basic activities have occurred in the economy which impact services. First, the national industrial complex has undergone a consistent change or restructuring into a system of greater regional division of labor as a result of the product life cycle. Manufacturing has become more specialized and decentralized according to regional orientations. The result of this increased decentralization of manufacturing is increased demand for consumer services nationwide and an attraction of regional producer service centers to the larger regional central places. Second, the economy has, as discussed above, in a developmental sense become more service oriented. The returns to higher service use have increased and the benefits have become more apparent and perceived as necessary. The pattern of regional development has slowly changed to include an increasing sector of service industries.

Given the extent of activity in the service sector in recent decades and the ramifications of this activity, it is obvious that some level of understanding of the underlying causes and implications of this activity would be demanded by society. This has been the focus of some literature but it is certainly in a nascent phase of development. The analysis that has been undertaken has gone in two directions. An examination of service industries may focus on *why* the industrial structure has

changed thus explaining service development or on **how** a changing industrial structure manifests itself in the service sector as regions develop.

When an examination of service industries focuses on **why** the industrial structure has changed, the analysis will necessitate an understanding of what specific events have occurred in industry to bring this change about. This analysis focuses on a taxonomy such as Walker's (see literature review) which is based upon the functions of workers in establishments, not on the type of output. In this analysis the function of each worker within a larger scheme or typology is examined to track changes in the modus operandi of modern business and industry. The analysis in this area has generally been conjecturally nonempirical or limited to a specific analysis of producer service firms in metropolitan areas. This is the emphasis of the majority of work done on the service sector to date. This work has been a quest, particularly for the British, for a "Theory of Service Development" and its place in overall regional development. The major conclusion desired from this work is the finding that a region with a faltering manufacturing base, such as Britain, may employ service industries as an economic base or may bolster weakness in manufacturing with an injection of producer service subsidies. The fact that this work is decidedly nonempirical or exclusively based

on metropolitan areas is dangerous in that the spatial impact on services is completely ignored.

What has emerged are numerous theories which are not readily testable for various reasons including the noncompatibility of existing data taxonomies. These theories include post-industrialism, deindustrialism, information society theory, the Marxist restructuring thesis, and externalization (or "unbundling").

Inferences have been extrapolated from this analysis by regional policy makers as to the role of services in regional development. This has led to the conclusion that services in general, and particularly producer services, may be a plausible focus for regional development plans since it is in this segment of the economy where growth is generally occurring, and specifically producer services due to their potential for exportation. An additional spur toward this end is the "clean" nature of service firms in an increasingly environment conscious world.

The questionable assumptions here are that service industries develop in a vacuum, are exportable by nature, and/or become footloose at some point of development and locate without regard to local characteristics. Regional economic theory suggests that firms do not develop or locate in a vacuum. Also, although the analysis of *major metropolitan areas* does demonstrate that high level

producer services have export potential, what does this mean for nonmajor metropolitan areas and nonmetropolitan places? And is this "exporting" occurring extra or intra regionally? That is, are these services being exported to other regions or merely being delivered to the metropolitan area's associated hinterland. Furthermore, if service industries do become footloose and choose to relocate (or locate new expansion locations) to an area which is targeting services why would a firm, particularly the most desired producer service firms, react to this request if the local economy does not provide the level of basic demand that a large metropolitan national service center such as New York does? If an examination of why the industrial structure has changed to include a larger role for service industries seems limited by available data, biased by interest, and/or dangerous in its application without methodical verification then what is suggested by review of the literature?

The other direction service analysis may go is to focus on how a changing industrial structure *manifests* itself in the service sector as regions develop. In this type of analysis commercial and socioeconomic factors which are suggested by existing theory to be associated with demand for and location of industry are assessed as to their correlation to this development. If this method

proves legitimate, that is if the correlation holds, then the developmental impacts of space on a region may be assessed given its local and hierarchical attributes (that is the attributes of associated places). Given that this analysis is based upon existing theory, the data (to a greater extent, that is at the very least on the national level) is available in the required form. The analysis and the hypotheses included in it are also empirically testable and its application to a given location is dependent upon the attributes of that place.

Goals and Contribution of the Study

Review of the literature suggests several major points which need to be addressed in a study of services--some of which have been addressed singularly but no study has included them as a whole. The first of these is service industry categorization. A few studies have been undertaken which propose new taxonomies or typologies for the entire economy, but that type of research is currently beyond the reach of the individual researcher due to data limitations. Beyond that, a restructuring of Bureau of Economic Analysis two-digit industries will allow for a more accurate examination of the determinants of growth in service industries. This approach will reduce the ambiguities of lumping all

services into a single sectoral category or the tedium of dealing with each two-digit industry group.

The second major point is the use of microeconomic and regional economic theory for a methodological base. The service literature seems to lack a coherent "theory of services". Production theory and basic microeconomic principles will go far toward setting up a model for the examination of development in modern service industries through the specification of development determinants, and therefore should be attempted.

The third major element in service sector development is central place theory. Central place theory allows for an accounting of agglomeration economies associated with the centralization of population and firms and the linkages of lower order places and hinterland nonmetropolitan areas with these central places. Studies have taken an account of agglomeration economies by examining a number of large metropolitan areas but this type of study fails to capture the true relation of central places with hinterland regions. Therefore, this analysis is limited for policy analysis for lower order and hinterland places. Thus central place theory, allied with existing economic theory, is key to a coherent regional development study.

Finally a study of this type will be required to account for local determinants of development potential. In the case of consumer services these will include the factors of direct demand for services (including the level of local infrastructure-as measured by a separation of the nonmetropolitan area into interstate highway corridor areas and pure hinterland areas), the interrelation of associated areas, and transportation costs. In the case of producer services these will include the factors of derived demand for service inputs by local firms (also including the level of local infrastructure-as measured by a separation of the nonmetropolitan area into interstate highway corridor areas and pure hinterland areas), the size and composition of local and associated markets of demanding firms, agglomeration and scale economies, as well as incidence of corporate headquarters and average transportation costs. A key element of the method used in this analysis will be the separation of consumer oriented vs. producer oriented activity. The specification of separate models will allow for separation of effects both across and within industries.

Given these attributes, this study will have two basic goals. The first goal is to test the validity of the theoretically expected impact of local and area place characteristics on service sector development. The

second goal (given the validity of the above theory), is to assess the impact of spatial separation and hierarchical scale on local service sector industrial development.

CHAPTER II

RELEVANT ANALYSIS FROM PREVIOUS SERVICE SECTOR STUDIES

This review is organized around the major issues in service sector growth and development as they have occurred in the literature to date. These service issues include: measurement, classification, relation to manufacturing, special role of producer services, the impact of service sector development on the spatial distribution of people and economic activity, and the service sector and regional development.

Service Sector Growth

There are few books specifically devoted to the development of a better understanding of the nature of, and method for analyzing, the "service sector". Those that are devoted to service sector analysis include: The Service Economy, (Fuchs, 1968), Understanding the Service Economy (Stanback, 1979), Services/The New Economy (Stanback et al., 1981), Services and Uneven Development (Marshall et al., 1988), and Service Industries (Daniels, 1985). A major topic in these works, as their titles suggest, is whether our economy has become service based.

This is not, however, the only topic. More importantly, they mark the beginning of the study of the economics of service industries. They point out problems in measuring employment versus output in service industries and attempted to dispel certain common misconceptions about the service sector in general.

The service sector of the U.S. economy has expanded rapidly in the last few decades while the manufacturing sector has remained stable in employment, and grown only slightly in earnings and output, the result being a larger share of the economy devoted to service employment, earnings, and output. Thus, service industries do make up the bulk of increases in employment but the level of manufacturing output and earnings is not receding. This is a misconception about the economy as a whole. There are other misconceptions concerning service industries specifically.

Stanback discusses four misconceptions in detail:

(1) Homogeneity of "services" (services are not a homogeneous body of industries), (2) limitations of scale economies (services are not necessarily limited by scale economies), (3) Output Measurement (productivity of service workers, quality and efficiency of services, and the service content of goods are all difficult to measure), (4) Spacelessness, (service industries are not

spaceless and are also not necessarily consumed locally) (Stanback, 1981, pp. 2-6).

Service Sector Measurement and Taxonomy

Stanback's analysis on the homogeneity misconception is pointed out by Richard A. Walker (1985) as a particularly important problem for economists interested in services. Walker states, "The lack of a systematic framework of analysis continues to dog the field. Many disparate phenomena are haphazardly loaded onto a single overburdened concept, 'services' (Walker, 1985, p. 42)." Several articles in the past six years were written in an attempt to overcome this problem of definition, particularly, the above article by Walker and a series of articles by W. J. Coffey and A. S. Bailly.

The Walker article is an alteration of the common perception of services in that it makes the point that services can no longer be defined merely in the context of being "non-goods". He advocates analyzing services and goods in an overall system of production. In this way Walker emphasizes the theory of service sector growth as an evolutionary theory. This new service thesis "forces us to reconsider the question of productive and unproductive labor (Walker, 1985, p. 44)." Given the intertwined nature of manufacturing and services in the modern economy a new taxonomy for the service sector

must be developed. Walker suggests a taxonomy based upon the notion of directly vs. indirectly productive labor. Using this mode of analysis Walker refutes the notion that we have evolved beyond capitalism into a Post-industrial period. He argues that "recent changes in the division of labor can be comprehended within a theory of capitalist development. The products, activities, and types of labor may change over time but the purpose of labor under capitalism remains the same: the generation and accumulation of surplus value (Walker, 1985, p. 45)". Walker's work is infused with Marxist rhetoric but the analysis is nonetheless groundbreaking. Walker begins with "disaggregation and analysis of concrete activities, or tasks of labor, in an economy still based on the production, exchange, and consumption of useful products, mostly in the form of commodities and chiefly in the shape of goods (emphasis added, Walker, 1985, 46)." In this analysis, Walker demystifies the service economy through a discussion of types of products, complex production and labor, circulation of goods and services, consumption, the effect of real time on production, consumption and circulation, and finally organization and management. Walker does not "rest on the ahistorical conclusion that industrialism still reigns (and therefore always will), without addressing the legitimate issues of change raised by the service theorists." He continues

with "an assessment of capitalist development that recognizes the growth of new types and products of labor (Walker, 1985, p. 71 & 72)".

Walker observes "in short, an enormous superstructure has been erected on the value and wealth generated by modern industry. The superstructure is often called the 'service economy' and invoked as a self-generating force, but it would collapse without its industrial foundation (Walker, 1985, p. 73)". With this in mind he reopens a discussion of base vs. superstructure or productive vs. unproductive labor, pointing out that the orthodox and the Marxist view can be equally unsatisfactory when they "restrict all productive labor to basic acts of hacking, bending, bolting, and hewing, and the like. The problem then, is how to mesh the distinction between productive and unproductive labor in the value sense with the many varieties of useful labor previously discussed (Walker, 1985, p. 73)". Walker tackles this problem by taking a structural approach which attempts to "recognize the broad spectrum of productive activities and the shadings across this spectrum from the most directly productive to the most indirectly productive labor (Walker, 1985, p. 74)."

Walker's structural analysis slices the labor of workers into four categories: Primary or direct labor,

Secondary or auxiliary and preparatory labor, Tertiary labor or circulation and management, and Quaternary labor or knowledge production and worker reproduction. Each category becomes more indirect in actual production of goods, but the connection remains. In this context, no labor is "unproductive" because all labor is included within a continuum of labor, the division of which makes increased productivity possible. In this way "industrialism creates new needs out of its own development, i.e., serves as its own stimulus to product innovation" (Walker, 1985, p. 80).

The typology described in this work has been removed from the Marxian rhetoric and expanded upon by A. S. Bailly and W. J. Coffey (1990). The taxonomy they envision would overcome the limitations of previous typologies. They suggest, in much the same spirit as Walker, that a Quaternary approach be taken. This system would recognize the interdependence between services and goods production.

A production system is composed of a set of establishments, the principal role of each of which is to fulfill one of four major functions:

- 1 FABRICATION: the transformation of raw materials or of semifinished products;
- 2 CIRCULATION: an intermediary role that facilitates the flow of materials, of goods, of persons, of information, or of finances;
- 3 DISTRIBUTION: the delivery of goods and services to the final demand sector;

4 REGULATION: intervention in the operation of a production system so as to maintain, modify, regulate, or control it. (Coffey and Bailly, 1990, p. 1610)

Note that this typology is far more complex than the manufacturing vs. service typology currently prevalent in data organization.

This alternative framework enables the three principle difficulties associated with conventional typologies to be avoided. First, services are not viewed as developing at the expense of primary or secondary activities; in other words, the structure of the economy is not viewed as a zero-sum game involving services and production. Second, the growth of service activities is not interpreted as involving a new stage of economic development, a 'postindustrial society', for example-a notion that is difficult to defend when one considers that the production and consumption of manufactured goods is continually expanding. Third, problems involving the extreme heterogeneity of the tertiary sector are partially circumvented. activities as different as teaching, retailing, public administration, data processing, transport, and the production and distribution of electricity have as a sole common denominator the fact that they are the residuals of primary and secondary activities.

In sum, the framework that we employ can avoid many of these fundamental difficulties because it is not a simple reclassification of tertiary activities. Rather, it represents a reconceptualization of the notion of economic structure on the basis of the role of individual establishment in the production system. By departing from the conventional forms of classification, this alternative typology emphasizes the coherence of each activity in the context of the entire system. (Coffey and Bailly, 1990, p. 1610 & 1611)

The concept of services as a supporting super-structure of the industrial economy, as describe by Walker and Coffey & Bailly, is an important addition to

theory. The problem is the data is not available in the form described above. The Bureau of Economic Analysis (BEA) does not have the resources or the inclination to divide the activities of American industry into such detailed dissaggregated categories. The BEA simply tallies the employees, earnings, or product by type of firm. This does not mean that the above research should be ignored or that it cannot be useful. What is required is an adjustment of BEA categories to lend a more intuitive feel for services activities and a mode of analysis which will be sensitive to the intertwined nature of the fabrication, circulation, distribution, and regulation functions in the modern economy.

The functions primarily performed by the conventional service sector are included in the circulation and distribution categories. Given this, the conventional service sector industries can be reorganized into more meaningful categories and the relationship between these categories can be observed as they relate particularly to those industries which are primarily involved in fabrication functions. In this way a model of service sector growth can be designed to overcome some of the limitations of previous theory without having data which conforms exactly to the highly restrictive typology envisioned by Coffey and Bailly.

Such a restructuring of BEA services categories was accomplished by Cocheba, Gilmer, and Mack (1985).

Cocheba, Gilmer, and Mack reorganized the BEA commercial industry aggregates into the alternative framework below in Figure 6.

The service sector was broken out in this manner by Cocheba et al, for analytical purposes. "The alternative categories provide more detail and more meaningful classifications for studying service sector growth (Cocheba et al, 1985, p. 24 & 25)." The sum of service employment remains the same as that of the normal SIC arrangement, but the goal here is achievement of a more intuitive feeling for the functions of the service industries.

The service industries which are included in the circulation function discussed above are producer services, intermediate services, finance, insurance, and real estate services(FIRE), and social overhead services. The service industries which are included in the distribution function are consumer services and household services.

These services industry categories are not perfectly within the typology which Coffey and Bailey envisioned because the service activities of all establishments are not included, such as accounting services in manufacturing firms. The separation of industries into a

BEA Commercial Industries

Transportation, communications, and utilities (TCU)
Trade, wholesale and retail
Finance, insurance, and real estate (FIRE)
Services
Government and government enterprise

Alternative Services Framework

Producer services

Finance, Insurance, and Real Estate (FIRE) (H)^A
Business Services (73)
Legal Services (81)
Miscellaneous Professional Services (89)
Membership Organizations (83)

Distributive Services

Transportation, Communication, and Public
Utilities (E)
Wholesale Trade (F)

Social Overhead Services

Health (80)
Education (82)
Social Services (86)

Mainly Consumer Services

Hotels and Lodging (70)
Personal (72)
Miscellaneous Repair (76)
Auto Repair (75)
Motion Pictures (78)
Amusements (79)
Museums (84)

Retail Trade (G)

Household Services (88)

Government and Government Enterprise

Figure 6 THE SERVICE SECTOR TAXONOMY OF COCHEBA, GILMER,
AND MACK

^A Standard industrial classification major group numbers and division letters are inclosed in parentheses.

taxonomy consistent with the categories of this typology will nevertheless be valuable analytically. The relationship between the fabrication function, particularly manufacturing, and services broken out into a more functional typology is important even though all types of work done within firms cannot at this time be divided into separate categories. Thus, a discussion of the relative performance, and interaction, of services and manufacturing is now in order.

Services and Manufacturing

Lois Plunkert (1990) described the sectoral changes in the U.S. economy which took place in the 80's. A number of insights into the service sector can be gleaned from this article due to the large role played by services in the 1980's. She points out that although services grew in the 80's, growth within the sector was uneven (again pointing to the misconception of homogeneity). She states, "1 new job in 4 was in business or health services, while some service sector industries even lost jobs--notably, communications, railroads, and water transportation" (Plunkert, 1990) She also points out that "this continued shift of jobs to the service economy was not at the expense of manufacturing output, which remained at about 23 percent of GNP over the

decade, while factory jobs dropped from 23 percent to 18 percent of employment (Plunkert, 1990, p. 3)."

The bulk of the paper then details the employment performance of each individual industry in the 1980's. Included in this discussion are several interesting tables. These include: The 20 fastest growing industries from 1979 to 89 (all but one are service industries), the twenty most rapidly declining industries from 1979 to 1989 (only three of which are service industries), and the 30 industries adding the most jobs from 1979 to 1989 (all but three of which are service industries)

Shirley Porterfield (1990) adds a caveat to this good news for service industry employment. In rural areas-the service sector offers more jobs, but at lower pay (Porterfield, 1990). This study emphasizes the difference between the wage earned in the declining industries vs. that earned in the increasing ones. The bottom line is that declining manufacturing and service jobs paid more than the increasing service sector jobs. Porterfield also concludes that the distribution of high-middle-low paying jobs changed very little overall, but that there is a shift of income from nonmetropolitan to metropolitan areas in that the bulk of high-paying jobs are in urban areas. This aspect of Porterfields analysis will be discussed further in a later section of this review.

How are these types of changes in manufacturing and services employment, earnings, and output explained? What is the cause of these apparent structural changes? This question has sparked much debate and the outcome includes: the post-industrial thesis, the information society thesis, the de-industrial thesis, and the restructuring thesis. An ancillary debate surrounds the "unbundling" of services. A discussion of each of these in turn should shed some light on the strains of conventional wisdom concerning these structural changes.

A post-industrial economy is one in which a majority of the workforce are engaged in service work, but...it also implies a social change and the prominence of a professional and technical elite in society.

Two main structural changes underlie this view of the development of service work. The first focuses on intermediate demand and the changing pattern of labor inputs to production. Specialist knowledge and skills of various kinds are argued to be key resources, and education and research leading sectors.

The second type of structural change in a post-industrial view of development is basically an extension of the Fisher-Clark model of the changing sectoral distribution of employment. This focuses on the Engel's law proposition that consumers spend proportionately more of their income on services as they become more affluent (Marshall, et al., 1988, p. 31 & 32).

"An 'information society' viewpoint extends this post-industrial analysis focusing on the role of information processing services in the economy and

highlighting the potential of emerging technologies to reduce the cost and improve the quality of information (OECD, 1981; Porat, 1977)."

In contrast to the sociological and occupational emphasis in much of the 'post-industrial' literature 'de-industrial' interpretations emphasize the economic and industrial aspects of structural change. However, de-industrialization is also problematic. At its simplest it can mean an absolute reduction in manufacturing employment (Thirwell, 1982), or a fall in its share of total employment (Blackaby, 1978), but frequently it has been used in ways which seek to signify the causes of manufacturing decline (Singh, 1977). One common connotation in the UK case is a competitive weakness in the manufacturing sector, and an associated failure to maintain a sufficient surplus of manufactured exports over imports. The important point, however, contrasting with post-industrial perspectives, is that the growth in services is not, in this view of economic change, a positive or progressive development. It has been argued that service employment growth, because much of it is in part-time work offering low wages, is no substitute for a decline in manufacturing jobs (Harris and Taylor, 1978).

The restructuring thesis was originally a Marxist approach, but the work of many non-Marxist authors has unhitched the Marxist baggage and integrated the

remainder with "knowledge of spatial differentiation in the world economy (Pinch, 1989, p. 906)".

Some key concepts from the restructuring literature can be summarized as follows.

1. Instead of areas or regions becoming more alike areas of the world are becoming increasingly differentiated along a number of dimensions.
2. This process of differentiation can best be understood in terms of the imperatives of capital accumulation. Spatial differentiation has become a resource used by capital in search of profit.
3. The need for profitability has led to the emergence of a new international division of labor. It is argued that, whereas in the past the economic health of regions was linked to their ability to specialize in all aspects of the production of particular commodities, in recent times the economic health of a regions is linked to their ability to specialize in particular stages of the production process of a wide range of commodities.
4. The evolution of this international division of labor has been the result of many factors, two of the most important being: first, the growth of multinational and multiproduct companies operating at a global level; and second, technological change permitting the separation and fragmentation of different stages of the production process into different regions.
5. Central to the emergence of these new spatial divisions of labor is the need for capitalist enterprises to control the labour process and to adapt to variations in labor supply, in terms of cost, skill level, and militancy.
6. There are a complex set of overlapping hierarchies of spatial divisions of labor in different areas. These hierarchies can best be understood by a historical perspective which examines various 'rounds of investment' over time.

7. The regional restructuring of economies involves more than a geographical transfer of employment, and includes a complex class restructuring based on the changing social relations of production.

8. Restructuring is the product of interactions between capital, labor, and the state. (Pinch, 1989, p. 906 & 907)

The 'unbundling' debate arises over a question in the deindustrialization vein. Is services employment truly growing or are service jobs being unbundled from manufacturing firms? As pointed out above, the Plunkert article suggests that service job growth is not at the expense of manufacturing jobs. This conclusion was affirmed in studies by Tschetter (1987), and Israilivich and Ramamohan (1991).

"The unbundling hypothesis is important because it raises questions about the type of growth in the service sector, and more importantly, whether the service sector is growing at all.

In the last few years, researchers have looked more closely at the service sector through the analysis of occupational shifts. The results indicate that unbundling plays a very small role in the expansion of the service sector. Researchers have shown that unbundling accounted for only about two percent of total employment growth in services (Israilivich & Ramamohan, 1991, p. 3)."

Each theory emphasizes a different aspect of structural change. The post-industrialist emphasize an evolutionary change in humanity which manifests itself in his or her consumption and labor patterns. The information society hypothesis is chiefly concerned with an evolution in technology. The deindustrialist insists

that the services boom is the result of a zero-sum de-evolution occurring in the manufacturing sector. This is contradicted by the unbundling hypothesis which claims that it is not a de-evolution but merely a statistical or employment accounting illusion caused by a change in business practices of firms. The Restructuralist emphasizes a global division of labor which results in increased regional specialization, a changing corporate structure, and regional investment based upon this spatial division of labor. Much of these theses have yet to be empirically tested and will make valuable hypotheses for testing in a growth model of services.

It has been demonstrated in the above literature and elsewhere that services are making up the lions share of employment and earnings growth, but the question of a service based economy remains. Can services be an engine of growth outside that role they play in the fabrication of goods? A discussion of the literature on that possibility is now in order.

Services: Basic (Exportable?) or Local

A growing number of economists are interested in the proposition that services are exportable and therefore basic to the economy. Among those interested economists Beyers and Alvine (1985), Stabler and Howe (1988), and Gilmer, Keil, and Mack (1987) have actually explored the

literature and/or developed methodologies to examine this proposition.

Beyers and Alvine (1985) reviewed the literature (including their own work) in this area and reported on economic base and input-output results for the Central Puget Sound region. Their findings were that: the Central Puget Sound region has extensive extraregional linkages in large metropolitan areas, that service firms are strongly linked with each other, and that development plans which focus only on attracting manufacturing firms may well be shortsighted.

Stabler and Howe (1988) backed up this analysis with an input-output study of Canada's four western provinces from 1974 to 1979. They conclude that services exports have increased at the margin "accounting for between at least one-quarter and perhaps as much as one-half of that proportion of real growth which could be attributable to an increase in exports from these economies (Stabler and Howe, p. 313, 1988)." They also observe that this export orientation is seemingly unrelated to the size of the firm and possibly to the size of the metropolitan location. Thus, Stabler and Howe imply that services do have a role in initiating regional economic development. Export performance of specific categories of services was not tested by Stabler and Howe. This information was derived by Gilmer, Keil, and Mack (1989).

Gilmer et al, "developed and applied a simple empirical methodology based on the location quotient to identify the existence, direction, and nature of service trade within a hierarchy of places (p. 217)." The results of this study were separated into results for different size categories or results for specific SMSA's in the Tennessee valley. The analyses for both breakouts led to similar results: "Of the sectors designated as potential exports (or import substitution), most fall into the group of producer services, a classification which is often targeted for development. This is appropriate in view of the argument that a good supply of business services is a prerequisite for regional growth especially in new lines of activity (Gilmer et al., 1987, p. 26)." This finding lends itself perfectly as a transition to a discussion of the special role of producer services in regional development and urbanization.

The Role of Services in Regional Development

There has been considerable interest in the regional science literature concerning the role of services in regional development. The thrust of this literature presumes that only producer services has a role in development but there are a few studies which examine the sector in its entirety to test this.

An econometric model was developed by Bohm, Herzog and Schlottman (1986) "for identifying trade and service sectors at the county level that possess 'development potential,' that is, appear to be underdeveloped relative to a complete array of local socioeconomic conditions (Bohm, et al, p. 41)." This analysis was applied to the Tennessee-Tombigbee corridor, which includes the westernmost section of the Tennessee Valley.

In this study the location of services firms were examined in relation to location factors. Both intra and extra county factors were considered. The intra county factors which were considered included:

- median family incomes
- percent of families below the poverty line
- population
- population squared
- population density
- percent of population in specific age cohorts
- percent of housing units that are owner occupied
- commuting ratio
- percent of population that are high school graduates
- unemployment rate

The extracounty factors were:

- number of miles to interstate exchange
- extracounty demand potential
- extracounty supply potential

Two models were then estimated. "For both models, the dependent variable is the number of establishments in a given two-digit trade or service sector at the county level. On the other hand, the models differ in both location factors and counties included within the

analysis (Bohm et al, p. 45)". The first model examined the impact of local socioeconomic conditions while the second also took into account the conditions of adjacent counties.

Within these two models, "positive residuals indicate development in excess of that 'expected' on the basis of local (or extracounty) conditions, while negative residuals indicate the reverse, i.e., an apparent shortfall of development vis-a-vis such conditions (Ibid, p. 47)."

The "results [of this study] suggest significant trade and service industry development potential" within the study area. Thus this location factor model of services and trade industry potential probed into the restructuring and 70's deconcentration discussed above to reveal a decided lack of participation in this decentralization by communities in the rural South.

A study by Coffey and McRae (1989) is the first concise examination of the service sector impact on regional development. This work is a general attempt to present all the issues involved. But, as with most work in this area, the result is not a test of the role of services in development or the relationships suggested by theory. Rather, this work reestablishes the obvious results of the literature presented in this review. What is included is an empirical discourse on the workings of

service growth in Canada, a review of the theory, a survey analysis on service exportability, and the following general policy conclusion, "the conventional wisdom concerning the capability of "footloose" service activities to enhance the economic development prospects of peripheral regions is unjustifiably optimistic (Coffey and McRae, 1989)."

The thrust for regional development of this work and of all others implies or assumes that only producer oriented services appear to be capable of impacting development in a meaningful way. Therefore a specific discussion of this portion of the service sector is warranted.

The Special Role of Producer Services

A special note on definition is called for in any discussion of producer services. Every study or book on producer services is likely to include its own definition of producer services. These definitions may range from as wide a definition as: intermediate services, FIRE services, and producer services industries (as discussed above in Gilmer 1988); to as narrow as miscellaneous business services (SIC 73). The wide definition is most common and for purposes of uniformity should be considered the working definition of "producer services".

A key issue in the economics of the service sector is the special role of producer services in economic development and change. Producer services in particular are being scrutinized as a potential source of regional economic development. It has been established that there is a high correlation between "producer services and an expanding division of labor, productivity, and per capita income (Hansen, 1990, p. 475)." This correlation begs a number of questions. To what extent are producer services "basic"? Are producer services firms truly footloose or are they actually tied to regional industry? If so then which comes first, particularly, do producer services firms draw manufacturing firms or are producer services drawn by manufacturing? The answer to these questions are key to development policy. Emphases on producer services in a regional development plan only makes sense if producer services firms can stand on their own through exports, be substituted for imports, or draw new manufacturing into the region. The correlation between producer services and development has led to a good deal of research, but the analysis remains in an infant stage. This is partially due to the dirth of statistical information on services and regional divisions and also because of the relative youth of the subject.

One route which has been taken in an attempt to gain insight into the relationship between producer services and development is to analyze how the type of manufacturing can effect the level of producer services in an area. Cocheba, Gilmer, and Mack (1986) examined slow growth in the Tennessee Valley service sector. The second half of the paper examined the manufacturing base of the Valley with this question in mind, "Can this low-wage, standardized manufacturing base, which is weak in corporate overhead employment, be tied to the shortage of producer services in the Valley?" To test this hypothesis they estimated a linear equation "using ordinary least squares to test whether an increase in corporate overhead employment leads to an increase in producer services (Cocheba et al, 1986, p. 59)". The answer was yes and thus, the results indicated that regions in which branch plants predominate do inhibit growth in business, FIRE, and legal services.

Another study in this vein is an examination of the role of producer services firms in a declining manufacturing region (Harrington and Lombard, 1989). The findings of this study supported the producer services export hypothesis but not all had a high proportion of exports and none had a high enough proportion of export business to survive on it alone.

The role of services in rural economic development is addressed by Lloyd Bender (1987). Bender addresses the issue of "whether services will continue to be centralized in large cities, or whether changes in communications, transportation, and information processing technologies mean that services are footloose and decentralizing (Bender, 1987, p. 62)". Bender points out that service employment has increased in rural economies but he suggests that traditional theory explains this growth. The increase in services is due to increases in manufacturing and increases in non-employment income. He also points out that services are not decentralizing in rural communities but are actually "being centralized in the more urbanized areas within non-metropolitan regions (Bender, 1987, p.)".

Empirical analysis is added to these arguments in a study on the role of telecommunications in producer services development which suggests that information intensive producer services do not induce regional development and may actually reduce it (Kirn et al, 1990). Kirn and his associates observed that producer services are not decentralizing into rural communities because of limited socioeconomic conditions and that the advent of telecommunications technology has actually made it easier for urban firms to serve rural markets directly or through branch offices.

This analysis brings out the issue of a relationship between producer services firms and metropolitan areas. Particularly, this analysis points out the possibility that a role for producer services in regional development is a metropolitan vs. nonmetropolitan issue. Thus, an overview of the relationship between metropolitan and non-metropolitan earnings, employment, and output is appropriate at this point. This discussion will then naturally lead into a discussion of the role of producer services in urbanization.

Metropolitan vs. Nonmetropolitan Development

Historical Trends

A series of studies on the shifting pattern of growth of metropolitan and nonmetropolitan areas were undertaken by Daniel H. Garnick from 1983 to 1989⁴. The stated purpose of the original study was to aid in an understanding of the widely advertised growth reversal between metropolitan and nonmetropolitan areas in 1970's.

In the first of Garnick's studies(1983) he points out that population in the 1950's and 60's moved from redundant nonmetropolitan farm and mining employment to metropolitan industrial jobs. He also observes that after this shift occurred earnings growth in the 1970's was

⁴Many other authors have published on this issue but the work by Garnick was updated every few years in the same format and thus incorporates much of this literature giving a consistent historical perspective.

higher in nonmetropolitan regions than in metropolitan areas. Garnick explains that by the mid 60's extractive industries were growing again and that manufacturing and nonextractive industries were moving out of the metropolitan areas. Thus the rise in nonmetropolitan income and the subsequent population shift in the 70's makes perfect sense in this historical context.

Garnick then observes higher earnings and personal income growth in metropolitan areas than in nonmetropolitan areas for the 1979 to 81 period. He suggested that population would not rebound completely into metro areas due to a loose relationship between earnings and migration.

Two years later (1985) Garnick updated his 1983 study. In this work he emphasized the reversal of earnings and income in the early eighties. It is in this work that Garnick points out specifically the role of services in a metropolitan vs. nonmetropolitan context. In this context Garnick states,

"The growth industries thus far in the 1980's, apart from high-technology and defense related industries, have been the service industries, particularly producer services, which concentrate in major metro areas. Conversely, the laggard and decreasing industries, apart from durable manufactures, were farms, coal mining, oil and gas extraction, metal mining, and other natural resource-related industries-all of which are concentrated in nonmetro areas and had contributed significantly to the higher growth

rates of those areas in the 1970's. These industrial patterns account for much of the shift in favor of metro areas in the 1980's (Garnick, 1985, pp. 36&37)."

In his final study updating the analysis of growth in metro/nonmetro areas Garnick observes the leading role of services and states, "Increasingly the prime mover in the fortunes of metro areas is the concentration and growth of higher paid jobs-particularly in the financial, professional, and business services industries (Garnick, 1989, p, 37)." He sums up and concludes his update with the following paragraph:

"Manufacturing employment once the governing source of growth for most metro areas, no longer plays that role except in a few areas where new products are developed or during production startups in aerospace and defense industries. Government, services, and headquarters operations increasingly account for the growth of metro areas. At the same time advances in telecommunications increasingly allow for the negation of the old paradigm for many services-location of their production in the vicinity of consumption (Garnick 1989, p. 38)."

Services in the Metropolitan vs. Nonmetropolitan Context

As addressed above, Shirley Porterfield (1990) emphasized the rural impact of shifts in employment from manufacturing to services. Her stated purpose was "to answer two questions. First, if the industrial structure had held constant during 1981-86, would the average worker be better off or worse off in terms of annual pay

than he or she actually was? Second, did the shift in industrial structure over this period contribute to a changing distribution of earned income? (Porterfield, 1990, p. 2)." She concludes that, given a constant industrial structure, the worker is worse off.

Porterfield also concludes that the distribution of high-middle-low paying jobs changed very little overall, but that there is a shift of income from nonmetropolitan to metropolitan areas in that the bulk of high-paying jobs are in urban areas.

Several studies have been undertaken in an attempt to explain the limitations on growth in service industries in nonmetropolitan regions. One conclusion is that regions which rely heavily upon low-wage and low-skill, branch plant manufacturing are at a disadvantage in attracting high growth producer service jobs (Srinivasan, 1988; Gilmer, 1986). Other attributes of nonmetropolitan areas which retard growth have also been examined (Parker, 1991; Kirn et al, 1990). Some of the major nonmetropolitan attributes cited include: isolation, distance from markets, small size, smaller pools of skilled labor, and a lack of agglomeration economies. P. W. Daniels (1987, p. 5) argues that "the availability at the local level of the kind of information and advice provided by producer services is vital for the future economic performance of lagging

areas." The difficulty as Daniels points out, is that "the cost of obtaining them (travel time to meetings, frequency of contact, telecommunication charges, the possibility of delays caused by the inability of the client and supplier to meet as often as required, or simply lack of knowledge) may be a sufficient deterrent to limit utilization or, more seriously, to prevent use altogether and so cause firms to grow more slowly or even to cease production because of their inability to compete with those firms located in cities with more immediate access to a comprehensive pool of intermediate services." Thus a lack of services exacerbates the problem of a lack of services. The reverse is also true. In metropolitan areas the existence of high level service firms create opportunities for other service firms.

Another way of approaching the topic of services in a metro vs nonmetro context is to examine the determinants of metropolitan firm location. Wheeler (1988, p. 75) did a study of the corporate role of large metropolitan areas in the United States. He used this information specifically to analyze "job growth in services and finance, insurance, and real estate (FIRE).

"One may conclude from this analysis that significant recent growth in services and FIRE employment-the core of the new metropolitan economies-stems from one of three, or a combination of three, primary factors. First, we note that the role of the concentration of corporate headquarters in the major,

diversified metropolitan economies. The second, factor... is the corporate satellite effect in which these jobs are being attracted to large metropolitan areas that may be viewed as satellites of dominant corporate cores. The third factor... is the disproportionate allurements of a Sunbelt location for subsidiaries (Wheeler, 1988, p. 84 & 85)."

This work delineates the major trends in firm location and the impact this has on metropolitan service employment. A more exact accounting of determinants was compiled in a work by Breandan O'Huallachain.

O'Huallachain's (1989, p. 85) thesis is that

"an eclectic combination of forces favors spatial concentration. These include: (a) a market penetration effect causing large cities to experience the largest absolute job growth, (b) rapid technological change in products and processes leading to a reassertion of the product life cycle emphasis on agglomeration due to demand for skilled labor, (c) a business climate of government deregulation that has created market uncertainty and increased reliance on external economies of scale, (d) institutional and infrastructure constraints that favor established industry locations, (e) increasing efficiency in communications systems allowing markets to be served at increasing distance, and (f) the emergence of many specialized small service enterprises that rely on external economies generated in large urban areas."

It appears that a major factor in the growth and development of the service sector is a trend upward in the central place hierarchy. This factor along with the definition of "services", the relation of manufacturing to service growth, and the potentially basic nature of

some services must be taken into account when a method of analysis is chosen and a model is developed.

CHAPTER III

ANALYTICAL FRAMEWORK

Introduction

Review of the service sector literature reveals an absence of theoretical and methodological foundation for examining regional (and national) service sector development. This study is a presentation of a set of regional economic models designed for analysis of service sector growth. These models bring together the major theoretical elements which have been addressed in the literature singularly, using basic microeconomic and regional economic theory as a methodological foundation. The goal of this analysis is to examine the specific impacts of a number of factors which are either common elements in non-service sector (mainly manufacturing) analysis or which have been suggested in the literature to have an impact on service sector development. The factors included in the models of consumer services are: the pattern of demand by consumers in an economic area, the population of surrounding places, the agglomeration of people, and the relative cost of transport. The factors included in the models of producer services are: the pattern of demand by firms in an economic area, the service demanding firms in surrounding places,

agglomeration of demanding firms, economies of scale in supplying and demanding firms, proportion of area employment in corporate headquarters, and the relative cost of transport. The impact that these factors have on relatively homogeneous groups of service industries in and across strata of different sized places will be examined. This examination should shed some light on the role of producer services in industrial development and the role of consumer services in local and tourism based development, and thus their overall impact on regional growth.

Taxonomy

The analytical framework of this study is composed of: (1) an alternative sectoral taxonomy of industries, (2) a hierarchical stratification of places within BEA economic areas⁵, (3) an individual direct or derived demand function, (4) a spatial demand function, and (5) several industrial composition variables indicated by studies discussed in the literature review. These elements are combined to form a hierarchical demand equation which may be used to assess the impacts of the

⁵ Bureau of Economic Analysis Economic Areas are defined spheres of influence for each metropolitan area in the United States. These areas include some or all of the following types of places: metropolitan places which may include several counties, Subsidiary metropolitan places which may include several counties but are more likely one county which has a metropolitan place within the greater sphere of influence of a major metropolitan area, and nonmetropolitan counties which are hinterland places associated with a metropolitan service area.

aforementioned factors on specific service industry activity.

In the models the service sector is not assumed to be homogeneous, but is rather categorized into the taxonomy of industries in table two.

Alternative Service Sector Taxonomy

The separation of consumer oriented services from those oriented to producers is an important distinction for developing a taxonomy of services. The distinction between retail and wholesale trade is immediately evident but the greatest impact is in breaking up the Bureau of Economic Analysis' "Division I-Services". Thusly lawyers, advertising executives, accountants, architects, etc. are separated from barbers, salespeople, chefs, and doctors. The additional delineation of separate subcategories of services within consumer and producer categories allows for distinction of types of demand by individuals and firms. An equation is derived for each of the six service sector categories described in figure 7 allowing for differences in spatial, scalar, and socioeconomic impacts on sectoral growth to be discovered for each type of service. These impacts are demonstrated through a hierarchical stratification of places coupled with an equation specification which accounts for the effect of strata in an area on one another.

PRODUCER SERVICES
(demand derived from the demand
for the output of other industries)

Business and Professional Services

Business Services (73)^A

Legal Services (81)

Miscellaneous Professional Services (89)

Finance, Insurance, and Real Estate (FIRE) (H)

Intermediate / Distributive Services

Transportation, Communication, and Public
Utilities (E)

Wholesale Trade (F)

CONSUMER SERVICES
(directly demanded by persons)

Personal Services

Retail Trade (G)

Personal services (72)

Miscellaneous Repair (76)

Auto Repair (75)

Motion Pictures (78)

Social Overhead Services

Health (80)

Education (82)

Membership Organizations (83)

Social Services (86)

Exporting Consumer Services

Amusements (79)

Museums (84)

Hotels and Lodging (70)

Figure 7 ALTERNATIVE SERVICE FRAMEWORK

^A Standard industrial classification industry numbers and section letters are inclosed in parentheses. SIC manuals are available through the Executive Office of the President-Office of Management and Budget. Contact the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402 for orders. A more detailed discussion of the industries included in each group can be found in the Industry Definitions Appendix at the end of this study.

Hierarchical strata

The coupling of microeconomic theory with the regional method of central place theory forms a powerful combination for the examination of service development.

The works of geographer William Christaller and economist August Losch focused upon the pattern of land use as places develop; the work which they pioneered is generally referred to as central place theory⁶. A great deal of additional analysis was done more recently to quantify the relationships of places by geographer Brian Berry. The central premise in this theory is that differing levels of services will be provided locally depending upon the level of the local area in a hierarchy of places. Low level services should be available everywhere, middle level services should be available in middle level places and above, and high level services will most likely be available only in the highest of central places. Thus centralized places develop as centers of hierarchically ordered service provision.

The hierarchical nature of central place theory in the models developed here is evident in the specification of demand for services in metropolitan central places, for example, being a function of local characteristics and those of lower order places and the hinterland.

⁶ The contributions to central place theory made by William Christaller are found in a book titled Central Places in Southern Germany published in 1966. The work of August Losch is found in a book titled The Economics of Location published in 1944. The analysis by Brian Berry is more recent and is ongoing. The major study by Berry on the topic is a book titled Market Centers and Retail Location published in 1988.

Conversely, lower order places and the hinterland produce services as a function of local characteristics but are also *affected* by the magnitude of places with which they are associated. Characteristics of higher order places, lower order places, and hinterlands are incorporated into the analysis by the county stratum definitions found in Figure 8. Thus each county in the seven states included in this study is defined as belonging in a particular strata of place. The county is defined as a pure hinterland if it is among those counties which are not located in a metropolian area or submetropolitan area as defined by the Bureau of Economic Analysis (BEA), or located along an interstate highway. If the county is located on an interstate highway then it is included in the corridor stratum. The counties included in the metropolitan and subsidiary metropolitan stratum are defined by the BEA.

Metropolitan Places: BEA metropolitan area counties,

Submetropolitan Places: BEA subsidiary metropolitan area counties,

Interstate Corridor Places: counties bisected by an interstate highway,

Hinterland Places: the remaining counties of the nonmetropolitan area.

Figure 8 DEFINITIONS OF CENTRAL PLACE STRATUM

By stratifying the data this way the hierarchical interrelatedness of places can be modeled. Figure 9 lists the stratified BEA areas included in the study and Figure 10 is a map of these areas. Figure 11 is an example of a representative BEA area with the counties involved broken into the four stratum types.

A model of each of the four stratum is run for all six service categories in the taxonomy. Thus, for example, personal service development is examined in and across metropolitan, submetropolitan, corridor, and hinterland areas. In this way the spatial and scalar impacts are built into the models. The specific equational derivation begins with the "atomistic" or individual demand functions described below.

Theoretical Equations

Individual Demand Functions

As stated above one goal of this study is to begin with a theoretical and methodological base grounded in economic theory. This framework couples the microeconomic theory of direct and derived demand with the regional economic theory of spatial demand and central place analysis. The individual consumer will be assumed to be driven to demand services personally in a way consistent with that described by a direct demand

VIRGINIA

- 21^A Roanoke-Lynchburg
- 22 Richmond
- 23 Norfolk-Virginia Beach-Newport News

NORTH CAROLINA

- 24 Rocky Mount-Wilson-Greenville
- 25 Wilmington
- 26 Fayetteville
- 27 Raleigh-Durham
- 28 Greensboro-Winston-Salem-High Point
- 29 Charlotte
- 30 Ashville

GEORGIA

- 35 Augusta
- 36 Atlanta
- 37 Columbus
- 38 Macon
- 39 Savannah
- 40 Albany

ALABAMA

- 47 Mobile
- 48 Montgomery
- 49 Birmingham
- 50 Huntsville-Florence

TENNESSEE

- 51 Chattanooga
- 52 Johnson City-Kingsport-Bristol (TN/VA)
- 53 Knoxville
- 54 Nashville
- 55 Memphis

KENTUCKY

- 56 Paducah
- 57 Louisville
- 58 Lexington

MISSISSIPPI

- 112 Jackson

Figure 9 THE 29 STRATIFIED BEA ECONOMIC AREAS INCLUDED
IN THE STUDY FROM SEVEN SOUTHERN STATES

^A Bureau of Economic Analysis economic area numbers (delineated by the Regional Economic Analysis Division) are included for the economic areas included in the services hierarchy in each of the seven states. Though each of these areas is named for the central metropolitan area, each one is stratified as discussed above into each of the four stratum.

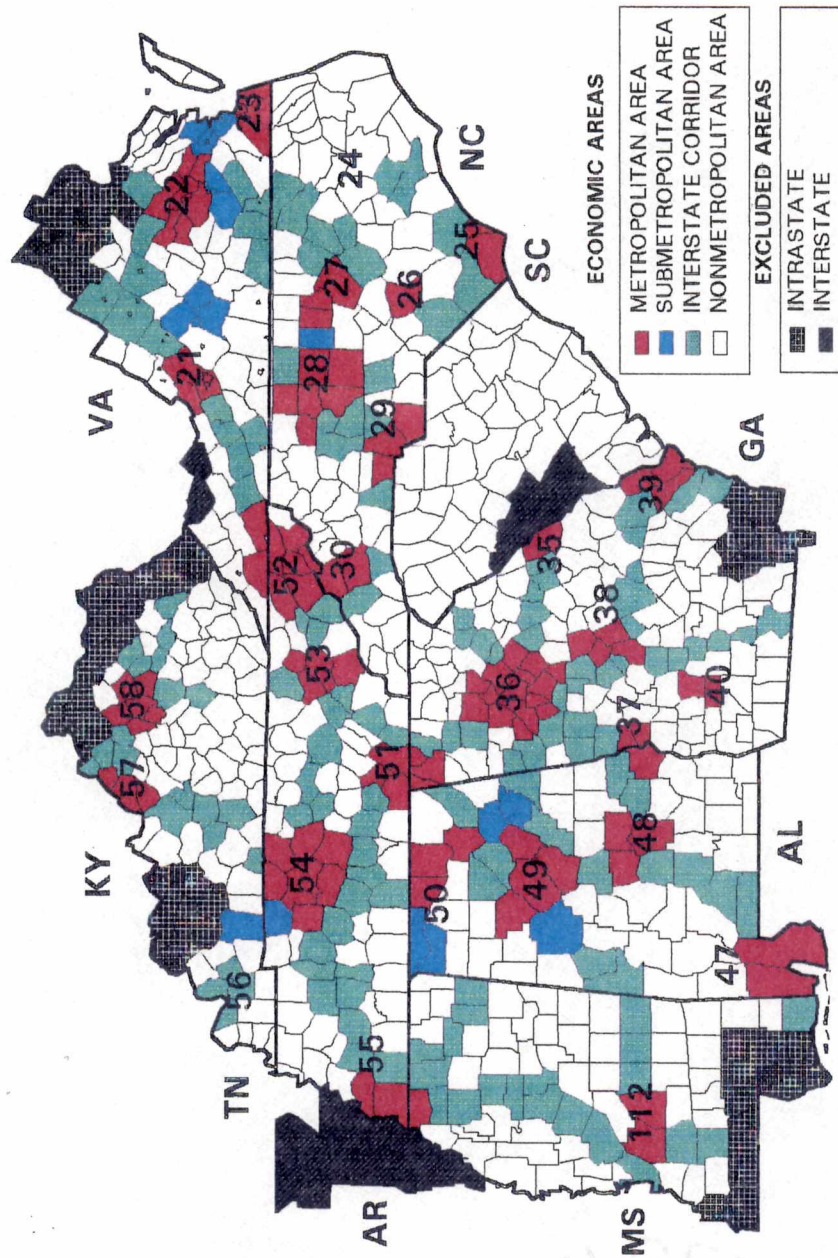


Figure 10 MAP OF THE 29 BEA AREAS IN THE SEVEN STATE SERVICES HIERARCHY

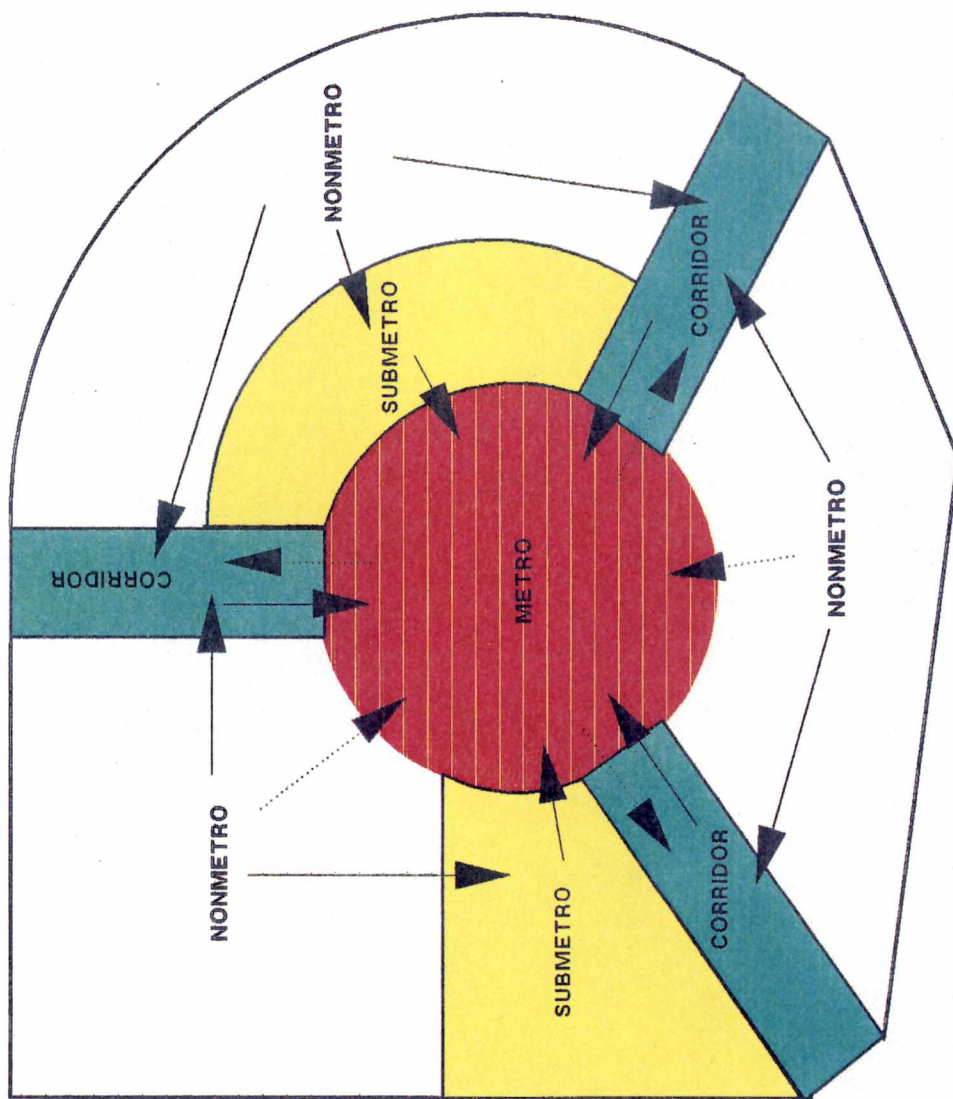


Figure 11 MAP OF A REPRESENTATIVE STRATIFIED BEA ECONOMIC AREA

function⁷. The individual firm will be assumed to be driven to demand service inputs organizationally in a way consistent with that described by a derived demand function.

The Direct Demand Function:

$$\text{Demand for X} = f(P^X, P^Y, \text{Income}) \quad (\text{eq. 1})$$

P^X is equal to the price of the service.

P^Y is equal to the price of all other goods and services.

Income is equal to the income of the consumer.

The prices represent the cost of goods and services in the budget context of the individuals income. The demand for service output, and thus service industry growth, is assumed to be inversely related to price level and directly related to income. This atomistic demand function will be joined with a spatial demand function to form a hierarchical demand equation for consumer service demand after the discussion below on atomistic producer service demand.

⁷Tastes and preferences are generally included in the individuals demand function. In this stratified county level context these variables will be assumed to be systematically invariable across economic areas.

The Derived Demand Function for Inputs:

Derived demand for X as an input into firm Y's
production process = $f(p^Y, p^X, p^K, p^L)$ (eq. 2)

p^Y is equal to the price of the demanding firms
output.

p^X is equal to the price of exogenous (service)
inputs.

p^K is equal to the price of endogenous capital
inputs.

p^L is equal to price of endogenous labor inputs.

The input costs from the derived demand function demonstrate the costs associated with business development. The demand for service inputs are assumed to vary directly with capital and labor inputs and thus the development of service industries will vary directly with the development of demanding firms. Given this relationship, producer services growth is expected to vary inversely to the prices of capital and labor (interest and wage rates).

These atomistic functions may then be formed into hierarchical demand equations by combining their elements with those of a spatial demand function.

The Spatial Demand Function

The spatial demand function measures the viable output of an area based upon the market area defined for

a given enterprise through price level, transport costs, and market "density"⁸.

$$\text{Spatial demand for } X = f(p^X, \text{Transfer cost, Market})$$

(eq. 3)

Service transfer costs, unlike those associated with physical goods, are mainly a function of travel by individuals along the demand hierarchy for delivery or acceptance of these services. Given the multicounty definitional form of the method and the dirth of regional data, a method for generating a proxy for these costs must be developed.

Assuming a circular market area the average distance from the central place to the outer edge of the BEA economic area may be determined by deriving the radius from the census land area. The radius of the land area can be used to develop an index of average driving distance across each economic area's hierarchy of places. This cross-sectional index may then be interacted with a deflated (personal consumption expenditure deflator, PCED) version of the DRI national index of transportation

⁸The use of the term density here is suggestive of a "per square mile" measure. The literature is not clear on what the exact definition of "density" is but appears to merely mean the number of demanders in the market area. The actual impact of the market on spacial demand requires a more precise dissection of effects. Therefore, this study includes a specific analysis of market in which the scale (or number of demanders), intensity (or income/earnings per demander), and density (or number of demanders per square mile) of demanders is examined.

cost⁹ (TPI) to create a new measure of average transfer costs for service activity in an economic area. Based upon this data, the Index of Average Transport Cost (IATC) is calculated thusly:

$$IATC = \left(\frac{\sqrt{AREA}}{\frac{\sum \sqrt{AREA}}{29}} \right) \cdot TPI / PCED^{10} \quad (eq.4)$$

For all services the local market is measured by three factors: scale, density, and intensity. Market scale is represented by the size of the local population for consumer services. For producer services the scale measure is the number of service demanding firms. These variables both represent a comparative measure of place size. The statistic for consumer market density is population per square mile; producer market density is represented by firms per square mile. Market intensity is measured with per capita income for consumers or earnings per firm for producers,. Thus, the actual size, relative density, and individual intensity of the market is included and examined for impact on service

⁹The personal consumption expenditure deflator and the index of transportation costs are both products of DRI/McGraw-Hill and were taken from their May 1992 Review of The U.S. Economy.

¹⁰The square root, or radius of the area, is divided by the average radius to index the average driving distance in the economic area. This measure is a proxy for relative distance between places in the area. The transportation price index represents the cost of travel across that distance over time and is deflated to expunge inflational variation from consideration. The product of these two statistics is a relative cost of service transport which varies cross-sectionally and in time-series.

development through the spatial demand component. The expected impact of all three measures of market is positive. Development potential is expected to expand with scale, density, and intensity of market.

The market for consumer or producer services in a spatial context is not, however, merely a function of local factors. It is also a function of the characteristics of surrounding places. The scale of higher level associated places can be expected to have an impact on the local market. Those individuals or firms who travel up the hierarchy from associated places below to consume higher level services in the local market must likewise be included in the spatial context. Thus the scale of places above and below is also included in the market component of the spatial demand function. With the spatial market defined this way, local effects may be determined while also examining the effects of interactions with other places along the hierarchy.

Associated places may have differing impacts on development potential. Places above may pull lower level places along through a complementary "locomotive" effect or they may compete away demand and thus diminish demand locally. The central place may be a regional manufacturing center and thus create a situation whereby surrounding places could develop a service sector niche

through the linkage with that place. It is in this way that the areas surrounding Atlanta, Georgia could be expected to be more highly developed than those surrounding Paducah, Kentucky. This linkage, like that of train cars attached to a locomotive engine, will be examined to determine how service industries are affected in different place strata by the scale of the adjacent strata. Thus the relationship between higher level places and the local market will be expected to vary with strata and service category.

A model of the spatial and hierarchical scale effects on service sector development begins to take shape when the determinants of atomistic individual demand by consumers or producers is combined with determinants of viable market area found in the spatial demand function. There are however, additional aspects of service demand previously examined in the literature which should also be considered in a complete study.

Industrial Composition

Review of the service sector literature reveals two determinants of service development beyond the standard theory presented above which should be added to this discourse to capture the scale of development potential. The first is an accounting for the corporate headquarters

affect on the demand for producer services. It has been demonstrated that a lack of corporate headquarter activity diminishes the development potential of a place (Gilmer, et al, 1987). This aspect is therefore included in the models so that the composition of market density is correctly specified as a determinant of development potential. The exact measure of headquarter activity included will be the percentage of total employment made up of headquarter activity in the hierarchical strata.

The other variables needed for a complete market specification account for the impact of economies of scale. The scale of both demanding and supplying firms will be an important consideration in delineating the industrial composition of the market of firms. There are conflicting theoretical and empirical studies on the affects of firm scale on service supplying industries. The inclusion of a variable to measure these impacts in a spatial context is thus necessary for the advancement of service sector theory.

The derived nature of demand for producer services has been relatively ignored in the literature and thus the possible impacts of the scale of demanding firms on service development has also been ignored. Attempts have been made to explain service development through externalization or "unbundling" of service tasks out of

the industrial process. This assertion, coupled with increased productivity in manufacturing and industry, suggest that demanding firm size (in employment terms) should be inversely related with service development. On the other hand, if the assertion of the empirical work done in this area is correct and externalization is not a driving force in service development, then the scale of employment in industry should be positively related to producer service growth. To further this analysis both scale variable types have been included.

Limitations on Regional Data

The individual demand function assumes a reaction to the price of the service and/or to the general price level of other goods. The spatial demand function also assumes a given price level of X . There is no regional price data available thus it must be assumed that regional price levels vary with national prices. Given this assumption all monetary variables will be defined in constant dollars and thus price will be factored out of the hierarchical demand function.

Another impact of the limitations of regional economic data is that there is no county level output data at the two digit SIC level. The demand functions discussed above determine output and thus a proxy is

necessary if they are to be used. Earnings consistently represent approximately 80% of the dollar value of output and are instrumental in estimating regional output. Thus earnings may be assumed to vary with output and will be used as a proxy.

Given these considerations and the theoretical elements developed above, a hierarchical demand equation may now be constructed. That is, the atomistic elements from equations (1) or (2) can be combined with the spatial elements from equation (3) and the additional theoretical elements from the literature into a direct or derived "hierarchical demand equation".

Equations For Estimation

The Equation of Hierarchical Direct Demand

The equations estimated for consumer service industries have the following general form.

$$E_C = f(\text{Population}^A, \text{Population}^L, \text{Population density}^L, \text{Per capita income}^L, \text{Population}^B, \text{Transfer costs}) \quad (\text{eq. 5})$$

Where:

E_C are the earnings in a particular consumer service category (proxy for output);

Population^A is the population of the market area above the local strata in the hierarchy;

Population^L is the population in the local strata;

$\text{Population density}^L$ is the population density in the local strata;

Per capita income^L is the per capita income in the local strata;
Population^B is the population of the strata which make up the market area below the local stratum in the demand hierarchy;
Transfer cost is the relative cost of moving consumers to the market for services or transferring service workers to the consumer (Transfer costs for services are represented by the IATC presented in equation (4)).

The scale of population in the stratum or strata above is expected to have either a complementary or competitive effect on service industry development. The level of development in a higher level place may pull along lower levels as a train engine "locomotes" the other train cars along a track toward a destination. This effect which represents the heightened development of a place due to its association with a more highly developed metropolitan area will be referred to as the "locomotive effect". Another possibility is that higher level areas may compete with lower strata and thus diminish service development. Thus the sign on population^A is expected to demonstrate this variable relationship between the strata in each service industry.

The scale of local population is expected to impact consumer services development directly and forcefully in a positive manner. Population^L is expected to be a major determinant of development and is thus expected to

consistently come in with a positive sign and high significance.

The local population density is expected to demonstrate the impacts of agglomeration and should positively relate to service development. Thus, as population and income are more closely packed into a market area the theory suggests that the demand for consumer services should rise.

The local per capita income is also expected to be a strong indicator of consumer service development and is thus expected to have a highly significant positive result.

The population in the combined lower stratum represents the pool of demanders of higher level services in the strata above. Thus, the impact of population^B on local service development is expected to be consistently positive.

The relative cost of transport should represent a diminishing force on the local market area and a reduction in the market area of services which are provided to the local stratum from higher stratum. Thus, if the demand for a particular service industry is driven locally then a negative sign on transport costs is expected. If a particular service is provided in a higher strata and local demand for that service is

reduced due to increased travel cost (either due to distance or increased expense), then demand for that service provided locally may actually increase. Thus, in this case a positive sign is expected. The sign on transport costs should demonstrate which effect dominates.

The Equation of Hierarchical Derived Demand

An equation can also be constructed for the estimation of a derived demand function for producer services development in a hierarchy of places incorporating the above theory and literature. This equation has the following general form.

$$E_p = f(\text{Interest rate}^N, \text{Wage}^L, \text{Firms}^A, \text{Firms}^L, \text{Firm Density}^L, \text{Earnings per firm}^L, \text{Firms}^B, \text{Firm Scale}^d, \text{Firm Scale}^S, \text{Corporate Headquarters}^L, \text{Transport Cost}) \text{ (eq. 5)}$$

Where:

- E_p are the earnings in a particular producer service category (proxy for output);
- Interest rate^N is equal to the national AAA Bond Rate and represents the cost of capital;
- Wage^L is the average wage¹¹ paid to workers within service demanding industrial firms including mining, construction, manufacturing, and service industries in the local strata;
- Firms^A are service demanding firms in the combined strata above the local strata;
- Firms^L are the service demanding firms in the local strata;

¹¹ The wage is generated by dividing the payroll in a particular industry (according to Employment Security Data) by employment in that industry in the local area.

Firm density^L is equal to the number of service demanding firms per square mile in the local area;
 Earnings per firm^L are the earnings of the average service demanding firm in the local strata;
 Firms^B are the service demanding firms in the combined strata which make up the demand zone below the local strata;
 Firm Scale^d is the size (in employment terms) of the average service demanding firm in the local strata;
 Firm Scale^s is the size (in employment terms) of the average service supplying firm in the local strata;
 Corporate headquarters^L is the percentage of firms in the local Strata which are corporate headquarters;
 Transport cost is the index of average transport cost discussed above (IATC defined in eq. (4)).

Producer services demanded by *firms* are expected to be inversely related to the costs of capital (interest) and labor (wages). Producer services are also demanded by individuals. The presumption is that, at least at some level along the hierarchy, the dominant demand will be that of firms. The wage variable is instrumental to income, the dominant consumer demand variable, and thus in areas where the demand of firms is not dominant a polar shift in sign from negative to positive can be expected. When these effects are near equal then the significance will likely be affected.

The interest rate as a measure of the cost of capital is expected to vary inversely not only with firm oriented demand but also with individuals demand for

services due to wealth and financial effects. Thus the interest rate variable can be expected to strongly and consistently have an inverse relationship with the development of producer service output while wage and firm variables will be expected to weaken when demand dominance shifts from firms to individual consumers.

Service demanding firms in the strata above the local area, just as population in the case of direct demand by consumers, may either compliment the service sector in the local area or compete business away. If the complimentary "locomotive" effect is dominant then the sign on Firms^A will be expected to be positive. If the competitive effect dominates then the sign will be expected to be negative.

The number of local service demanding firms (as a measure of the scale of market place), the density of these local service demanding firms (measured by firms per square mile of land area), and the intensity of these firms (measured by earnings per firm) are expected to consistently have positive and highly significant impacts on the development of producer services locally.

The number of firms in the accumulated strata below the local area represent the level of nonlocal market which is available to demand higher level services in the

local stratum. The theory suggests that the impact of this demand should be positive.

The average scale of service demanding firms (in employment terms) is used as a measure of the effects of economies of scale on service demand. The expectation is that as firms increase in size they will become greater demanders of service sector inputs. Thus the sign on Firm Scale^d is expected to be positive. Likewise, the average scale of service supplying firms (in employment terms) is used as a measure of the effects of economies of scale on service provision. The expectation is that as firms increase in size they can more efficiently provide services and thus services may increase in proportion to other inputs into production. Thus the expected sign on Firm Scale^s is also positive.

The percentage of local service demanding firms which are corporate headquarters in the local strata represents the higher than average producer service demand of a headquarter versus branch plant or outlet. Thus a positive sign is expected.

Transport costs, as discussed above, should represent a diminishing local market area and a reduction in the market area of higher level services. Thus, if the demand for a particular service industry is driven locally then a negative sign on transport costs is

expected. If a particular service is provided in a higher strata and local demand for that service from higher levels is reduced due to increased travel cost (either due to distance or increased expense), then demand for that service in the local area may actually increase. Thus, in this case a positive sign is expected. The sign on transport costs should demonstrate which effect dominates.

Theoretical Propositions

Consumer Services Model

The theory used to develop the analytical framework discussed above suggests the following propositions for consumers service industries.

1. HIERARCHICAL DEMAND: A major assumption in central place theory is that, with population dispersed across the entire economic area, demand accumulates from outside in; from ubiquitous local demand (such as demand for haircuts) to hierarchically ordered demand (such as the demand for symphony performances). This proposition can be tested by the "Population Below" variable. If it is positive and significant then local service provision is dependent upon demand accumulating from below. This result will demonstrate

that in all applicable strata the level of services provided locally, beyond those which are ubiquitous, is dependent upon the demand which accumulates from the lower strata.

2. HIGHER ORDER EFFECT: High order places may either compete services away from intermediate level places (a negative result on population above) or create a locomotive effect, pulling along low order places (a positive impact).
3. AGGLOMERATION EFFECT: Population density in individual strata should represent agglomeration economies and therefore is expected to positively affect service growth.
4. TRANSPORT COST EFFECT: Transportation costs should decrease the viable market area of consumer service firms and, thus, decrease the output of service firms. It is possible that a relatively high transport cost can cause a severing of the hierarchical relationship of service provision between places. This would be demonstrated by a positive sign on transport cost. Given the cumulative demand density assumed in this (consumer driven) model, no such counterbalancing affect will be expected to ensue (a differing expectation will be in force for producer services).

Producer Services Model

The theory used to develop the analytical framework discussed above suggests the following propositions for producer service industries.

1. HIERARCHICAL DEMAND: Firm density in the entire economic area radiates outward from high metropolitan density to low dispersed density in the hinterland, inverse to the more consistent demand density of consumer services. Thus, the "Firms Above" variable will be expected to perform strongly while the "Firms Below" variable is not expected to demonstrate hierarchical demand which accumulates from below. Producer services are expected to demonstrate development potential which radiates out from the highest strata to lower level places.
2. FACTOR COST EFFECTS: The interest rate will be expected to be inversely related to producer service development no matter what force, firms or individual consumers, drives the industry demand. The wage rate will be expected to be inversely related to producer service development when firms drive demand but directly related when individual consumers do.
3. HIGHER ORDER EFFECT: High order places may either pull services away from intermediate level places (a

negative result on firms above) or create a locomotive effect, pulling along low order places (a positive impact).

4. AGGLOMERATION EFFECT: Firm density in individual strata should represent agglomeration economies and therefore is expected to positively affect service growth.
5. ECONOMIES OF SCALE EFFECT (DEMANDING FIRMS): Economies of scale in large firms will be expected to induce greater output and thus increase the derived demand for service inputs, therefore a positive relation is expected from demanding firm scale.
6. ECONOMIES OF SCALE EFFECT (SUPPLYING FIRMS): Economies of scale in large service firms will be expected to induce increasing service output, therefore a positive relation is expected from supplying firm scale.
7. CORPORATE HEADQUARTERS EFFECT: The greater the incidence of corporate headquarters in an area the greater the expected demand for producer service in that area; the literature suggests that this will be a particularly important variable for producer service development in nonmetropolitan areas in the South.
8. TRANSPORT COST EFFECT: The effect of increased transportation costs are expected to negatively impact the demand for producer services from the Metropolitan

stratum in the same way that consumer services are affected. But, given the "Center out" demand density discussed above in proposition 1., transportation costs are expected to break the hierarchical linkage in producer service provision between the metropolitan and lower level strata, and thus are expected to be directly related to nonmetropolitan development of producer services.

9. CONSUMER DEMAND EFFECT: The demand for producer services in the metropolitan area is assumed to be driven by firm based demand. However, at some point in the hierarchy a shift is expected from firm based to consumer based demand. This effect will manifest itself through the non significance of firm oriented variables and a shift in significance or a switch in sign on the wage variable.

CHAPTER IV

EMPIRICAL RESULTS

Econometric Modeling Technique

The hierarchical demand equations discussed in the previous chapter were econometrically estimated allowing the impact of spatial separation, hierarchical scale, and socioeconomic variation on service sector development to be assessed.

The individual models for each service industry were estimated using pooled cross-section and time-series data with dummy variables for each economic area. This method of pooling data allows for creation of a central place data set which may be used to generate a particularly detailed picture of service sector development. The discontinuous chain of places is filled into more of a continuum with the addition of twenty years of time-series growth between each cross-section. The dummies were determined to be statistically significant with an F-test. Thus they are necessary to describe exogenous

factors, such as topography, which could not be captured in the model¹².

The equations were estimated using linear ordinary least squares. The nature of a stratified data set brings in the possibility of some cross-strata effects from simultaneity. The effects of simultaneity are examined in an appendix wherein a seemingly unrelated regression is run on the sample of economic areas which have all four strata.¹³

The results and analysis of these econometric estimations are presented below.

Data

The data used to generate the models in this study are derived from the following sources.

Earnings:	Bureau of Economic Analysis Data Series 2 digit breakout of industries for a time series of 20 years (70-89)
Employment:	Bureau of Economic Analysis Data Series 2 digit breakout of industries for a time series of 20 years (70-89)

¹²The significance of the dummy variables accounts for some of the fit represented in the correlation coefficients. Without the dummies the average correlation coefficient is approximately .85 as opposed to the approximate .95 reported with these variables included. However, a correlation coefficient of .85 in a cross-sectional study suggests a good fit and the fact that individual dummies for each cross-section only account for approximately ten percent of the variation in output is a strong indication of the strength of the model specified.

¹³This data set is problematic in that all economic areas do not contain all strata (see map Figure 6). Thus in a simultaneous process the X'X matrix will not be full rank and thus could not be inverted. OLS estimation was run for the main study rather than abandon a strata and misspecify some economic areas, or throw out a number of economic areas throughout the seven state area.

Payroll: Employment Security Data Series
 2 digit breakout of industries for a time
 series of 20 years (70-89)

Firm Units: Employment Security Data Series
 2 digit breakout of industries for a time
 series of 20 years (70-89)

AAA Bond
 Rate: DRI/McGraw Hill
 Time Series of 20 years (70-89)

PCED¹⁴: DRI/McGraw Hill
 Time Series of 20 years (70-89)

Transport
 price index: DRI/McGraw Hill
 Time Series of 20 years (70-89)

Land Area: U.S. Census
 Cross Section compiled from county areas

Corporate
 Headquarters: Dunn and Bradstreet Data Series
 2 digit breakout of industries for an
 interpolated time series of 20 years (70-
 89 from 71,83, and 89)

General Results

Consumer Services Model

The overall fit of the model, as seen in tables 1 through 3 below, is consistently strong with an average adjusted R^2 of .96 ranging from .89 to .99. Local population, per capita income, population below, and transport costs consistently come in with correct sign and extremely high significance. The results on

¹⁴ Personal consumption expenditures deflator.

population above and local population density depend upon the strata and industry. These results demonstrate that consumer services are both ubiquitously and hierarchically provided.

Personal services

Personal service firms, as seen in table 1, in all demand strata are positively affected by the pool of demanders below them in the hierarchy. Corridor personal service firms however are negatively affected by a large associated metropolitan area. This suggests a competitive effect between metropolitan and lower order central places (any positive affects are negated in the submetro areas as well); as associated metropolitan areas grow some personal service demand may be competed away from the associated lower order strata. A significant relationship between submetropolitan and associated metropolitan strata does not occur perhaps due to conflicting competitive and "locomotive" effects of large metropolitan areas.

Population density in the metropolitan and submetropolitan strata is not significantly associated with growth of personal services while it has a positive and highly significant impact on nonmetropolitan areas. This suggests that personal services are more influenced

TABLE 1
DETERMINANTS OF PERSONAL SERVICES DEVELOPMENT
(OLS ESTIMATES)

ECONOMIC AREA STRATA				
INDEPENDENT VARIABLES	EXPECTED SIGN	METROPOLITAN	SUBMETROPOLITAN	CORRIDOR HINTERLAND
POPULATION				
ABOVE	(VAR)	(N/A)	-0.034	-0.045 (***)
LOCAL	(+)	1.996 (***) ^A	0.906 (***)	1.218 (***)
BELOW	(+)	0.824 (***)	0.244 (***)	0.171 (***)
LOCAL POP.				N/A
DENSITY(10 ⁻⁶)	(+)	-.57	.08	.88 (***)
LOCAL PER				4.61 (***)
CAPITA INCOME	(+)	0.465 (***)	1.153 (***)	0.215 (***)
TRANSPORT				3,751.6 (***)
COST(10 ⁻³)	(-)	-589.27 (***)	-112.72 (***)	-157.07 (***)
N		540 ^B	140	560
CORRELATION				-206.31 (***)
COEFFICIENT	ADJ. R ²	(.99)	(.98)	580 (.99)

^A Estimated coefficients are accompanied in the table by the significance levels which are in parenthesis. The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The sample size for each stratum is calculated by multiplying the number of cross section stratum by the 20 years of time series. There is a different sample size for each stratum of place because all stratum do not exist in each of the cross sections, for example only seven BEA areas in the seven states have submetropolitan stratum thus a sample size of 140.

TABLE 2
DETERMINANTS OF SOCIAL OVERHEAD SERVICES DEVELOPMENT
(OLS ESTIMATES)

ECONOMIC AREA STRATA				
INDEPENDENT VARIABLES	EXPECTED SIGN	METROPOLITAN	SUBMETROPOLITAN	CORRIDOR
				HINTERLAND
POPULATION				
ABOVE	(VAR)	N/A	-0.01 A	
LOCAL	(+)	0.909 (***)	1.178 (***)	-0.072 (***)
BELOW	(+)	1.437 (***)	0.193 (***)	1.67 (***)
LOCAL POP.				-0.033
DENSITY(10 ⁻⁶)	(+)	1.09 (**)	-1.08 (**)	-1.78 (***)
LOCAL PER				
CAPITA INCOME	(+)	2.267 (***)	2.58 (***)	0.349 (***)
TRANSPORT				
COST (10 ⁻³)	(-)	-264.43 (***)	-32.87 (**)	-24.41 (***)
N		540 ^B	140	560
CORRELATION				
COEFFICIENT	ADJ. R ²	.98	.97	.97

A Estimated coefficients are accompanied in the table by the significance levels which are in parenthesis. The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

B The sample size for each stratum is calculated by multiplying the number of cross section stratum by the 20 years of time series. There is a different sample size for each stratum of place because all stratum do not exist in each of the cross sections, for example only seven BEA areas in the seven states have submetropolitan stratum thus a sample size of 140.

TABLE 3
DETERMINANTS OF EXPORT CONSUMER SERVICES DEVELOPMENT
(OLS ESTIMATES)

ECONOMIC AREA STRATA				
INDEPENDENT VARIABLES	EXPECTED SIGN	METROPOLITAN	SUBMETROPOLITAN	CORRIDOR HINTERLAND
POPULATION				
ABOVE	(VAR)	N/A	-0.01 (***)	-0.005 (***)
LOCAL	(+)	0.309 (***) ^A	0.068 (***)	0.079 (***)
BELOW	(+)	0.103 (***)	0.013 (**)	-0.01
LOCAL POP.				
DENSITY(10 ⁻⁶)	(+)	-0.40 (***)	-0.022	.114 (*)
LOCAL PER				
CAPITA INCOME	(+)	0.095 (***)	0.150 (***)	0.012 (**)
TRANSPORT				
COST(10 ⁻³)	(-)	-37.70 (***)	-1.46	-8.87 (***)
N		540 ^B	140	560
CORRELATION				
COEFFICIENT	ADJ. R ²	.97	.92	.89
				.96

^A Estimated coefficients are accompanied in the table by the significance levels which are in parenthesis. The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The sample size for each stratum is calculated by multiplying the number of cross section stratum by the 20 years of time series. There is a different sample size for each stratum of place because all stratum do not exist in each of the cross sections, for example only seven BEA areas in the seven states have submetropolitan stratum thus a sample size of 140.

by scale and intensity factors in the already densely populated metropolitan areas. Conversely, growth of personal services is highly dependent on agglomeration economies in the more sparsely populated nonmetro areas.

Transportation costs negatively impact development of personal services in all zones suggesting an across the board reduction in demand zone thus reducing overall output due to shrinking demand.

Social overhead services

The scale of higher order places has the same impact on social overhead services as on personal services development discussed above. The scale of the associated metropolitan area is not significantly related to submetropolitan areas-probably due to counterbalancing competitive and "locomotive" effects; corridor areas are negatively impacted by associated metropolitan competition in social overhead services. On the other hand, development of social overhead services in pure hinterland areas is highly dependent on the scale of higher order places. Also, a strong pool of demanders lower in the hierarchy is key to strong social overhead services in the metropolitan and subsidiary metropolitan strata while the corridor strata is unaffected by hinterland growth.

Local population density has a strong positive impact on metropolitan growth while the remaining strata are actually debilitated by increasing density. This effect will be discussed in the section on proposition testing.

The impact of transport costs on social overhead services is significantly negative in all strata except in the corridor area. The intermediate order corridor strata seem to benefit significantly from increased travel cost, most likely competing away social overhead (mostly medical) services from more distant metropolitan areas.

Export consumer services

Metropolitan and submetropolitan export consumer firms benefit greatly from large hinterlands as demonstrated again by the positive high significance of population below in all metro and submetropolitan areas. Corridor areas are again unaffected by hinterland development. Given the travel route role of corridor areas this nonsignificant result is not surprising. The provision of export services in corridor areas is most likely delivered to travelers between metropolitan areas. Strong metro areas significantly draw away export consumer services from submetropolitan and corridor

places as demonstrated by the negative and significant population above result. Hinterland export consumer services on the other hand are unaffected by higher order places.

Increasing local population density appears to damage the development of export consumer services in metropolitan and hinterland areas. Submetropolitan areas remain unaffected by density; while corridor areas benefit. In a tourism context the above results make sense. Increased population density in the already dense primary metropolitan area and in the sparsely populated hinterland would negatively impact the attraction of both types of areas. The lower order subsidiary metropolitan places would generally be expected to trade positive and negative benefits. While the corridor area would be most likely to benefit from increased local density and scale given the "travel route" role these areas play in tourism.

Transportation costs have a highly significant negative impact on export consumer services in all areas except submetropolitan suggesting a reduction in tourism and a shrinking viable market demand area.

Producer Services Model

The overall fit of the model, as seen in tables 4 through 6, is consistently strong with an average adjusted R^2 of .96 ranging from .90 to .99. The interest rate, as expected, performs well in every zone in each model with metropolitan intermediate services being the only exception. The strata scale variable, which measures the number of demanding firms in the local strata, performs flawlessly as a determinant of service development in all producer service categories. However, earnings per firm and the average wage in demanding firms only consistently perform as expected in metropolitan strata (depending on the industry) suggesting strong consumer oriented demand in all strata other than the primary metropolitan areas and a tradeoff between development and intensity.

The demand density variable consistently comes in with high significance and negative sign with nonsignificant results in metropolitan business and professional and FIRE services being the only exceptions. This result occurs in opposition to the accepted theory developed in the theoretical framework above. In the test of the agglomeration or density proposition below additional examination will be necessary to explain this result.

TABLE 4
DETERMINANTS OF BUSINESS AND PROFESSIONAL SERVICES DEVELOPMENT
(OLS ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
INTEREST RATE	(-)	-5,523 (***) ^A	-3,126 (.0001)	-2,763 (.0001)	-2,925 (.0001)
WAGE RATE	(VAR)	-17 (***)	-.724 (.43)	-0.35 (.0003)	0.027 (.9)
FIRMS					
ABOVE	(+)	N/A	.885	1.08 (***)	2.02 (***)
LOCAL	(+)	86.5 (***)	18 (***)	16.7 (***)	9.4 (***)
BELOW	(+)	-24 (***)	-1.4	0.322	N/A
LOCAL FIRM					
DENSITY(10 ⁻⁶)	(+)	17.26	-8.50 (*)	-22.20(.01)	-22.39(*)
LOCAL EARN'S					
PER FIRM	(+)	2,420 (***)	39.0 (***)	-4 (.4)	11.7 (**)
FIRM SCALE					
DEMANDING	(+)	-29,373 (***)	4.8 (***)	888 (.0001)	627 (***)
SUPPLYING	(+)	8,544 (***)	629 (***)	-41 (.002)	177.5 (***)
CORPORATE					
HEADQUARTERS	(+)	-3.78 (**)	.035	-0.345 (.04)	-0.44 (**)
TRANSPORT					
COST(10 ⁻³)	(-)	-25.93	16.76	-7.62 (.4)	4.81
N		540 ^B	140	560	580
CORRELATION					
COEFFICIENT	ADJUSTED R ²	.96	.90	.94	.93

^A Estimated coefficients are accompanied in the table by the significance levels which are in parenthesis. The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

TABLE 5
DETERMINANTS OF INTERMEDIATE/DISTRIBUTIVE SERVICES DEVELOPMENT
(OLS ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
INTEREST RATE	(-)	5,660 (**) ^A	-1,581 (***)	-2120 (***)	-2,783 (***)
WAGE RATE	(VAR)	-10 (.**)	0.18	-0.3 (***)	0.5
FIRMS					
ABOVE	(+)	N/A	-1.11 (*)	2.16 (***)	1.57 (***)
LOCAL	(+)	126 (***)	27.45 (***)	17.6 (***)	17.8 (***)
BELOW	(+)	-28 (***)	-1.76 (**)	-0.25	N/A
LOCAL FIRM					
DENSITY(10 ⁻⁶)	(+)	-90.42 (**)	-27.22 (***)	-34.09 (***)	-33.54 (***)
LOCAL EARN'S					
PER FIRM	(+)	2,167 (***)	9.88	-8.8 (*)	-15.5 (***)
FIRM SCALE					
DEMANDING	(+)	-26,002 (***)	5.66 (***)	682 (***)	1,151 (***)
SUPPLYING	(+)	13,890 (*)	1,618 (**)	1,538 (***)	4,294 (***)
CORPORATE					
HEADQUARTERS	(+)	1.5	.53 (**)	.55 (***)	-0.024
TRANSPORT					
COST(10 ⁻³)	(-)	44.13	26.71 (**)	46.48 (***)	92.52 (***)
N		540 ^B	140	560	580
CORRELATION					
COEFFICIENT	R ²	.99	.98	.98	.98

^A Estimated coefficients are accompanied in the table by the significance levels which are in parenthesis. The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

TABLE 6
DETERMINANTS OF FINANCE, INSURANCE, AND REAL ESTATE SERVICES DEVELOPMENT
(OLS ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
INTEREST RATE	(-)	-2,719 (*) ^A	-891.5 (.0001)	-1,108 (.0001)	-796 (***)
WAGE RATE	(VAR)	-6.3 (***)	0.13 (.7)	-0.05 (.15)	0.2 (*)
FIRMS					
ABOVE	(+)	N/A	-0.4 (*)	0.22 (***)	0.88 (***)
LOCAL	(+)	42.88 (***)	4.5 (***)	6.84 (***)	3.85 (***)
BELOW	(+)	-9.75 (***)	1.37 (***)	-0.02	N/A
LOCAL FIRM					
DENSITY(10 ⁻⁶)	(+)	1.21	-6.82 (***)	-16.30 (***)	-23.72 (***)
LOCAL EARN'S					
PER FIRM	(+)	823.3 (***)	7.26 (**)	-0.4	-1.23
FIRM SCALE					
DEMANDING	(+)	-9,793 (***)	5.44	113.95 (***)	133.4 (***)
SUPPLYING	(+)	13,837 (***)	1,559.6 (***)	979.7 (***)	1,335 (***)
CORPORATE					
HEADQUARTERS	(+)	-2.58 (***)	0.19 (**)	-0.2 (***)	-0.08
TRANSPORT					
COST(10 ⁻³)	(-)	-6,617	2,948	11,192 (***)	9,454 (**)
N		540 ^B	140	560	580
CORRELATION					
COEFFICIENT	R ²	.98	.98	.98	.98

^A Estimated coefficients are accompanied in the table by the significance levels which are in parenthesis. The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

The results on the scale of production in producer service *supplying* firms variable come in positive and significant as expected, in all industries and strata with corridor business and professional services being the only exception. The results on scale of production of all producer service *demanding* firms also comes in as expected in all non-primary metropolitan areas with a nonsignificant result in submetropolitan FIRE services being the only exception.

The implications of a consistently negative and significant result on metropolitan demanding firms will be discussed below in the proposition testing and conclusions sections.

The other factors affecting service development perform differently in given industries and stratum and are thus discussed below by industry.

Business and Professional Services

The wage rate in submetropolitan and hinterland strata is not a significant factor in service sector development. The above results suggest a strong consumer oriented demand effect on business and professional services development in these non primary metropolitan places. Metropolitan and corridor places do demonstrate strong firm based negative reactions to wage increases. It is likely that primary metropolitan areas provide high

level services while corridor areas maintain branch offices delivering lower level services to the outlying areas.

Increased intensity of firms, measured by earnings per firm, is a strong indicator of development in all strata except interstate corridor areas. The corridor area may be experiencing a tradeoff between increased firm intensity (and density) and overall strata development which will be discussed in the section on the agglomeration effect.

Firms in associated higher level places do appear to pull along corridor and hinterland area development while not significantly affecting submetropolitan development. This result is likely due to a countering competitive effect from associated primary metropolitan places. Increasing scale of lower order places does appear to negatively impact the metropolitan strata. This suggests that as lower order places grow, some urban activity is competed away. A similar effect is not felt in non primary metropolitan places. Corridor and submetropolitan places are not significantly affected by lower order firm scale. Thus suggesting a "center out", high to low density development of producer services unlike the hierarchically accumulating demand of consumers.

Firm density in the already dense metropolitan strata is not a significant factor in business and professional service growth. In lower order places however there is a strong negative impact. Thus additional analysis is necessary to determine a cause for this relationship (see AGGLOMERATION ECONOMIES in the section below on the testing of propositions).

The scale of B&P service *supplying* firms in all strata except corridor areas is positively related to industry growth. The scale of *demanding* firms is directly related to development in all strata but metropolitan. The debilitation of metro services by firm size suggests self provision and will be discussed in the tests of propositions section below.

The impact of increasing corporate headquarter employment on business and professional services is negative in all strata other than submetropolitan areas (in which the impact is nonsignificant). This suggests that areas with high headquarter employment may have a higher level of internal service provision which stifles the development of local independent business and professional services.

There are no demonstrated affects of transport costs on business and professional services in this model. In this age of telecommunications and intense corporate demand for specialized expertise B&P services appear

immune to diminished market area due to transport effects as in consumer services. Also, lower order places do not appear to have a "local provision" advantage created by a more distant central place as in the other producer services.

Intermediate Services

The wage rate performs in the same manner for this industry as in business and professional services. Again, this suggests strong consumer driven demand for intermediate services in the submetropolitan and hinterland strata.

Earnings per firm is again positively related to metropolitan development but the other strata are quite different in this industry. Firm intensity is insignificant to submetropolitan area growth and inversely related to nonmetropolitan development. This inverse relationship suggests that a tradeoff exists between individual firm intensity and overall growth of the industry. Thus as the earnings of individual firms increase the number (and density) of firms must decrease thus causing overall industry growth to diminish in earnings terms (this may or may not be the case in output terms, but for regional development impact local earnings is likely to be much more important).

The nonmetropolitan areas are again positively impacted by metropolitan scale. Submetropolitan areas are more strongly impacted by the scale of the primary metropolitan place than in B&P services above and have intermediate services competed away as metropolitan scale increases. All metropolitan areas seem to lose intermediate services business to nonmetropolitan areas as they develop, while corridor areas are unaffected by hinterland growth.

The measure of local firm density is significantly inverse in its relation to intermediate service development. Thus additional analysis is necessary to determine a cause for this relationship (see agglomeration effect in the section below on the testing of propositions).

The development of intermediate services is directly related to the scale of service supplying firms in all stratum. The scale of demanding firms is only positively related to development in non primary metropolitan strata. There again appears to be a greater incidence of self provision of services as demanding firm scale increases.

Corporate headquarters employment has no significant affect on intermediate service in the highest and lowest strata. The middle strata, submetropolitan and corridor, are significantly affected in a direct way. Apparently

the development of greater corporate headquarters bolsters the development of intermediate services in these intermediate strata while positive and negative effects are balanced in the metropolitan and hinterland strata.

The effect of transport costs on intermediate services development in the metropolitan stratum is not significant. The remainder of the economic area is positively affected by transport cost suggesting a severing of local provision from the more distant metropolitan firms as costs increase.

Finance, Insurance, and Real Estate

The primary metropolitan order is the only stratum demonstrating the negative wage rate result associated with firm based demand (the corridor area is negative but only at the fifteen percent confidence level). The impact in submetropolitan and corridor areas is insignificant suggesting a mixed demand base. While the impact is positive in hinterland areas, suggesting FIRE services provision based predominantly on individual consumer demand.

The impact of increasing earnings per firm is positive in both metropolitan and submetropolitan areas. The nonmetropolitan areas are not significantly affected.

Submetropolitan FIRE services appear to be competed away as the scale of the associated metropolitan place increases. Nonmetropolitan places are positively locomoted by development in associated higher level places.

Firm density in the already dense metropolitan strata is not a significant determinant of FIRE services growth. In all lower order strata however there is a strong inverse relationship. Thus additional analysis is necessary to determine a cause for this relationship (see AGGLOMERATION ECONOMIES in the section below on the testing of propositions).

The development of FIRE services is directly related to the scale of service supplying firms in all stratum. The scale of demanding firms is only positively related to development in non metropolitan strata. There again appears to be a greater incidence of self provision of services as demanding firm scale increases in primary metropolitan areas causing an overall negative relationship. The same effect seems to be occurring in submetropolitan areas but only strongly enough to cause results to be insignificant.

Corporate headquarters affect the development of FIRE services in a negative way in the metropolitan and corridor strata, while benefiting development in submetropolitan areas. The hinterland is not

significantly affected. Fire services in the metropolitan and corridor areas may be demanded from national service centers for provision of the least cost or most comprehensive service in finance and insurance by larger "corporate headquarters" firms as it is demonstrated below (in the section on CONSUMER BASED DEMAND) that these strata have the strongest firm driven demand for services.

The impact of transport costs on both metropolitan strata FIRE services development is not significant. The nonmetropolitan remainder of the economic area is positively affected by transport cost suggesting a severing of local provision from the more distant metropolitan firms as costs increase.

Testing of Propositions

Consumer Services Model

Consumer service development should be a function of personal demand for services; therefore, a function based on income and population in a demand strata should perform well. Thus, not only should there be high R^2 's but also strong significance and compliance to expected sign on population and income variables. The results may now be interpreted as to compliance with the theoretical propositions developed in the analytical framework chapter above.

The functional fit of the consumer service model is very good with average adjusted R^2 's of .964. The population and income variables measuring scale and intensity of local demand come in exactly as expected in all stratum in all industries. The density measure does not come in as the theory suggests but the counteractive effects acting upon it are discussed below.

HIERARCHICAL DEMAND

Population density in the South is much more evenly dispersed across the entire economic area than in the rest of the country¹⁵. The ratio of population in metropolitan areas to population in nonmetropolitan areas is split at fifty percent in each (as opposed to the national ratio of 75/25). Thus demand density is more dispersed than in the nation as a whole. Overall demand is assumed to accumulate, building up from outside ubiquitous local demand to interior hierarchically ordered demand. This proposition can be tested by the "Population Below" variable. If it is positive and significant then local service provision is dependent upon demand accumulating from below.

This result is affirmed completely, that is across all stratum, for the personal services industry. In metropolitan and submetropolitan areas it is also

¹⁵1990 Economic Outlook, Valley Resource Center, Tennessee Valley Authority

affirmed for the other consumer service industries (social overhead and export consumer services).

Hierarchical demand is not affirmed, rather population in hinterland areas is insignificant, for corridor social overhead and export consumer services. It is logical that a corridor area would not depend on hinterland areas for the tourism role of export consumer services but rather on tourism traffic on the interstate. Why the scale of hinterland population does not affect the growth of social overhead services is somewhat less apparent unless the pattern of supply of (the predominantly health care oriented) social overhead services is dispersed more like producer services with higher level places providing the majority of services.

HIGHER ORDER EFFECT

High order markets, as represented by population in higher order strata, may either compete ubiquitous service provision away from or create a "locomotive effect" on hierarchical services in lower order places.

In the case of personal and social overhead services, increasing the scale of higher order places: has a neutral impact on submetropolitan places, a negative impact on corridor places, and results in positive affects on the hinterland. This suggests that there are counterbalancing positive and negative effects

in the submetropolitan stratum which is likely to be very closely associated with the central metro place.

Corridor places, on the other hand, are clearly affected in an adverse way by higher level scale development.

This suggests a competitive advantage on the part of higher order places given the interstate location of corridor areas. The hinterland is clearly pulled along in a locomotive fashion by higher level development.

In the case of export consumer services the result is somewhat different. In this case a strong negative affect is felt by both submetropolitan and corridor places as higher order strata develop. The hinterland, on the other hand, still experiences the same "locomotive" effect from higher order places. In the tourism context suggested by this category of services, the highest order place competes with the closely associated submetropolitan and corridor areas, but, its proximity complements the surrounding "rural" hinterland.

AGGLOMERATION EFFECT

Population density, or population per square mile, in individual stratum should represent agglomeration economies and therefore is expected to positively affect service growth.

The result on population density in personal services is insignificant for metro and submetropolitan

areas. For nonmetropolitan areas the result is as expected; positive and significant. This suggests that population density is not a significant factor in personal service growth in the already densely populated metropolitan places (see discussion on this proposition in the producer services section below). Personal services development in nonmetropolitan places, however, does experience concomitant growth as the area becomes more densely populated.

In social overhead services the result is quite different. In the primary metropolitan area the affect is still positive, but in all other strata the net impact of increased population density is negative. Discovering the underlying cause for these negative results requires some additional analysis set up to diagnose the affects at work here. The earnings scale of the service industry, total earnings, is used as the dependent variable in these models. When the dependent variable is shifted to the intensity of firms, earnings per firm, the result of increased density is positive. This is the expected result suggested by the theory spelled out above. When the dependent variable is shifted to the rank scale, or number of service firms, of the local strata the result of increased density is negative. The combination of these results demonstrates that several forces are at work here. As population becomes

increasingly more dense the earnings of individual firms increases, but the number of firms necessary and viable is reduced. Social overhead services, in all but primary metropolitan places, appears to be impacted by increased population density through a reduction in the viable number of firms while the firms which remain flourish with the net earnings scale impact being negative.

The results for export consumer services demonstrate the same negative affects but only in the highest and lowest strata. In the submetropolitan strata the affects appear counterbalanced. In the corridor the net affect is positive. The logic behind these tourism driven results are discussed above in the general results section.

TRANSPORT COST EFFECT

Theory suggests that transportation costs should decrease the viable market area of consumer firms and thus decrease their output. It is possible that a heavy enough transport cost can cause a severing of the hierarchical relationship of service provision between places. This would be demonstrated by a positive sign on transport cost. Given the cumulative demand density assumed in this (consumer driven) model, no counterbalancing incidence affect will be expected to

ensue (a different expectation will be in force for producer services).

The result for all industries and stratum other than corridor social overhead and submetropolitan export consumer services complies with the theoretical assumptions. The social overhead services, which are dominated by health care services, result for corridor strata does indicate however a severing of the dependence of nonmetropolitan places on the higher order services of metro places as distance and/or costs increase. The nonsignificant export consumer service result in submetropolitan areas seems to suggest a counterbalancing of local demand area and metropolitan competition effects.

Producer Services Model

Producer service development is assumed at some level to be a function of the activity of *firms* in the BEA area, thus a model based upon determinants of local induced demand for service inputs in a spatial demand context should perform well.

The fit of the model appears strong with an average adjusted R^2 of .965. The results on the scale variable, the number of local service demanding firms, in all industries and strata come in as expected.

HIERARCHICAL DEMAND

Firm density in the entire economic area radiates outward from high metropolitan density to low dispersed density in the hinterland, thus demand radiates from inside out; somewhat inverse to the consistent demand density of consumer services and the assumptions of central place theory. Thus, the "Firms Above" variable will be expected to perform strongly while "Firms Below" is not expected to demonstrate hierarchically ordered demand for producer services.

The result of firm scale in higher level areas on nonmetropolitan areas is positive and highly significant suggesting a strong "locomotive effect" from higher to lower order places (see the discussion of the locomotive effect in the section on the higher order effect below). The result on submetropolitan places is insignificant for B&P services and weakly negative for intermediate and FIRE services. This again suggests a competitive impact of primary metropolitan development on subsidiary metropolitan places.

The impact of development in lower order places on higher order stratum is somewhat different for each industry category. In metropolitan places all producer service categories are negatively impacted by lower order growth suggesting dominant competitive effects. In submetropolitan areas B&P services are not significantly

affected, intermediate services are negatively impacted, and FIRE services are positively impacted. In corridor areas the impact of hinterland growth is not significant in any producer service industry, demonstrating an apparent lack of interstratum linkage at the lowest level. This result would be consistent with the results reported below suggesting a greater consumer driven demand for services at the hinterland level.

FACTOR COST EFFECTS

The theory suggests that the interest rate will be inversely related to producer service development no matter what force, firms or individual consumers, drives the industry demand. The wage rate however will be expected to be inversely related to producer service development when firms drive demand, directly related when individual consumers do, and nonsignificant when neither dominates.

The results on the interest rate do perform as expected in all industries and strata except for metropolitan intermediate services which exhibits a positive correlation. The results on the wage rate suggests that firm driven demand dominates in metropolitan areas in all industries, neither type dominates in submetropolitan places, industry growth in corridor strata is driven by firm based demand, and while

hinterland development in B&P and intermediate services is not dominated by either force the demand for FIRE services is dominated by consumers. This result suggests that firm based demand for producer services in the South is most strongly felt in metropolitan and corridor areas, although consumer based demand does not dominate in any but hinterland FIRE services.

HIGHER ORDER EFFECT

High order places may either compete ubiquitous service provision away from lower level places (a negative result on firms above), or create a "locomotive effect", pulling along low order places (a positive impact).

There is a demonstrated "locomotive effect" of metropolitan firm growth on nonmetropolitan producer service growth in all producer service industries. The impact of primary metropolitan places on associated subsidiary metropolitan places depends upon the industry. In B&P services the locomotive impact is likely counterbalanced by a competitive effect causing a nonsignificant result. In intermediate and FIRE services the competitive effect dominates causing a negative result.

AGGLOMERATION EFFECT

The regional development theory discussed above suggests that firm density in an individual strata should represent agglomeration economies and therefore is expected to positively affect the scale of service growth.

This result never occurs in any strata of place for any producer service industry. What is impacted by increased density as theory suggests is the intensity of individual service firms. The earnings per service firm is expanded with increased overall firm density. The rank scale ,or overall number of service firms, however, is diminished. In all but metropolitan B&P and FIRE services the diminished stratum scale effect dominates causing the overall impact of increased service demanding firm density on earnings scale to be negative.

The result on metropolitan B&P and FIRE services is nonsignificant suggesting a trade off of effects. Thus the increased earnings of remaining service firms compensates for their diminished number.

ECONOMIES OF SCALE EFFECT (DEMANDING FIRMS)

Economies of scale in large service demanding firms will be expected to induce greater output thus increase the derived demand for service inputs. Therefore, a

positive relation between industry development and demanding firm scale is suggested by the theory.

The theoretical result does occur predominantly in non primary metropolitan areas. The result in the metropolitan stratum is different however. The affect of large firms on all producer service industries in the metropolitan strata is negative. This suggests that large metropolitan firms are more likely to provide for their own producer service needs internally. The measure of increasing scale of service demanding which is more likely in lower order places does affirm the theoretical assumption.

ECONOMIES OF SCALE EFFECT(SUPPLYING FIRMS)

Economies of scale in large service providing firms will be expected to induce increased demand for service inputs due to lower prices, therefore a positive relation is expected from supplying firm scale.

The microeconomic principle of economies of production scale is affirmed in this model in all producer service industries and strata with corridor B&P service being the only exception.

CORPORATE HEADQUARTERS EFFECT

The literature¹⁶ suggests that the greater the incidence of corporate headquarters in an area the greater the expected demand for producer service in that area. The limited development of producer services in the South has been explained by demonstrating a limited level of corporate headquarters activity. Therefore this variable will be expected to be particularly important for examining producer service development in these models.

The conclusion found in the literature is affirmed for intermediate services in the submetropolitan and corridor strata and for FIRE services in the corridor strata only. Otherwise, the affect is not significant or, in many cases, negative. Particularly, business and professional services in all strata other than submetropolitan and FIRE services in the metropolitan and corridor strata are inversely related to headquarters activity. This suggests that, although the South is low in both services and headquarter activity, a correlation exists without causation. The activity of corporate headquarters appears to be a double edged sword which creates demand for intermediate services but which very well may demand higher level business, professional, and financial services from national service centers outside

¹⁶see Cocheba, et al (1985) in the bibliography.

the local region or provide them for themselves internally.

TRANSPORT COST EFFECT

Given the centrifugal demand density of producing firms, transportation costs are expected to break the hierarchical linkage in producer service provision between metro and hinterland. Thus, transport costs are expected to be directly related to nonmetropolitan development of producer services.

This result did not hold for business and professional services in any stratum. The positive impacts were felt enough to cause a nonsignificant results. The same nonsignificant result occurred in primary metropolitan intermediate services and both metropolitan strata in FIRE services. The remaining strata in intermediate and FIRE services did experience the expected positive transportation cost impact on local service provision.

CONSUMER DEMAND EFFECT

The demand for producer services in the metropolitan area is assumed to be driven by firm based demand. However, at some point in the hierarchy a shift is expected from firm based to consumer based demand. This effect will be expected to manifest itself through the

nonsignificance of firm oriented variables and a shift in significance or a switch in sign on the wage variable.

The wage variable as discussed above does shift in sign and significance in a way suggestive of strong consumer oriented service demand in subsidiary metropolitan and hinterland areas. The problem with detection of consumer oriented demand through impacts on firm demand variables is that the two types of demand are likely to be collinear with respect to these types of variables.

CHAPTER V

CONCLUSIONS AND POLICY IMPLICATIONS

General Conclusions

There are several conclusions which can be drawn from the results and tests of propositions presented above. Overall, the framework applied combines the theoretical elements suggested by the existing theory and literature with a regionally disaggregated method of estimation. This framework makes it possible to test the validity of the individual concepts at work in the debate on the role of the service sector in regional development policy. Some prevailing theory is shown to be unacceptable when applied to the service sector. Some theory which has not been applied to services is shown to be important from a policy perspective. What follows are general conclusions which will then be examined for policy implications.

The results presented in the previous chapter demonstrate that consumer services development in general is determined in the manner expected from a classical central place theory perspective, as opposed to producer services which are not. Consumer services are provided ubiquitously by local firms in all strata, but higher

order services are cumulatively provided along a hierarchy of places¹⁷; producer services are not. Whereas individual consumers atomistically demand services throughout the area, the majority of *firm based demand* for producer services is supplied and demanded by firms located in the metropolitan area, with a secondary bastion of lower order producer services located in corridor areas.

What impact does this difference in demand density have on economic development? Economic base theory suggests that the only economic activity which affects growth is that which results in exports across regional boundaries. This assumption resurrects the primary question of regional economics, "how is the region defined?". This is important because it defines the term "export". If "region" is defined as a county then consumer services which are ubiquitously provided may well be exported across county lines. The problem with this definition is that it is likely that ubiquitous exports travel both ways and overall trade between adjacent counties to a lesser or greater extent equals out. If "region" is defined as a particular stratum of places then this ubiquitous provision is no longer considered basic, but, those services which are

¹⁷The scale of the hinterland stratum does not, however, affect the development of corridor social overhead and export consumer services in a way consistent with hierarchical demand.

hierarchically provided are. This type of provision occurs in some industries in all six service categories, and thus under this definition all of these services are basic. If "region" is defined as the entire economic area, then only those services which can be demonstrated to have a strong enough market to reach beyond the boundaries of influence of a particular metropolitan area can be considered basic.

The export consumer services of a particular county, such as Sevier county Tennessee where Dollywood is located, may be considered basic by the officials in that county if those services consistently pull in earnings for county residents from consumers which reside in adjacent counties. The services of a regional medical center in a metropolitan central place may be considered basic if it also serves the residents of the hinterland counties. The problem with these regional definitions is that the general level of earnings in the economic area which Sevier county depends upon and the level of hierarchical medical services available to the hinterland are both dependent upon the overall development of the entire economic area. With the region defined as the economic area, the only truly basic services are those which have a strong enough competitive advantage to attract demand from across economic area boundaries. The economic areas are defined by the Bureau of Economic

Analysis as those counties under the gravitational influence of a given central metropolitan area. Thus, their assumption is that most commerce is directed from the hinterland inward toward the central metropolitan area. If a service providing firm is to become basic then it must be assumed that characteristics of the product of that firm are such that the service is generally unavailable elsewhere or perceived as superior to similar services available in other areas. The basic personal and social overhead services located in an economic area do not display this type of market. There are exceptions such as well known medical centers, the Mayo Clinic for example, which service the extremely specialized needs of patients from across the country, and the highly publicized personal and retail services of major metropolitan centers, such as New York City. These services are general exceptions and, from a policy perspective, are most likely not within the influence of policy makers.

Manufactured goods have long been considered basic by nature and it seems obvious that local services which are demanded as inputs into these goods are also basic by nature. Thus, depending upon the definition of region, the least arguable definition of an exportable service is one which is demanded as an input by firms which produce regionally exported goods. The producer services, as

defined in this study, which have been demonstrated to be predominantly demanded by firms are by definition included in this regionally exporting group. It is likely that producer service firms which export across economic area boundaries to become inputs into production by firms located outside the economic area are affected by local factors in the same way that nonexporting local firms are; especially, given the likely dependence of these exporting firms on local firms for the majority of their business. If this assumption were not true, why then would the firm choose not to relocate?

The ability of lower level places to support firm based demand is highly dependent on the type of metropolitan place associated with it. As metropolitan places expand in scale the firm based service demand that does exist in associated subsidiary metropolitan areas is to some degree competed away. Conversely, the level of firm based demand in nonmetropolitan areas is dependent on the locomotive effect of this metropolitan expansion. It appears then that firm based demand is only viable as it radiates out from the metropolitan area. Thus, nonmetropolitan places surrounding Atlanta, Georgia have much greater development potential than those surrounding Paducah, Kentucky. As urbanization occurs with increased population density in the metropolitan area, the costs of land use and the mix of industries changes creating an

environment for cost savings and comparative advantage in the associated nonmetropolitan strata.

Another conclusion of this study is that the most common of all elements in industrial location theory is not applicable to the service sector, particularly in strata other than primary metropolitan areas. Agglomeration economies do not increase the overall development of service sector industries. Although individual firms are expanded, the number of viable firms is diminished causing a net negative impact on development. What is good for the individual firm is not necessarily good in the aggregate. This is a very important policy distinction.

Also, transportation costs affect producer service firms differently than consumer service firms. Although consumer service demand is diminished by increased travel distance or expense, high level producer services (Business & Professional services) are completely unaffected. Thus, in this age of telecommunications and information technology it is unlikely that these innovations alone make firm based services footloose. Rather, they likely makes it possible to supply these services over a greater distance from existing urban service centers. In fact development in the metropolitan strata is unaffected by transport costs in all three categories of producer services. Lower level producer

services in nonmetropolitan areas are positively affected by transport costs but it is more likely that this affect is driven in conjunction with consumer based demand for producer services. Thus, given the deminishing impact of distance and travel costs and the advent of telecommunications technology, it appears that the tendency toward urban agglomeration is increasing.

Corridor areas, as mentioned above, do seem to be a secondary bastion of producer service provision and an intermediate level of place over pure hinterland areas in hierarchical provision of consumer services. This result is an affirmation of the importance of the role of infrastructure in regional development, not only in manufacturing but also in services provision.

Policy Implications

The original impetus for this study was to examine the validity of targeting the service sector in regional development plans either to make an area more attractive to firms of a basic nature or to provide an expanded economic base directly. The conclusions of this study suggest that this policy is flawed. Other studies have demonstrated that the export potential of producer services make them a part of the economic base and thus expansionary to the overall economy. Given this conclusion, this study reveals that the nature of these

services make them particularly difficult to affect with policy.

This study assumes that it is only those producer services which are based upon the demand of firms which are basic. Producer services based upon consumer demand are unlikely to be any more suited to export than the other consumer services examined above. Thus, it is only those services which are demanded as inputs by exporting firms which should be targeted. Firm based demand for services appears to be located in primary metropolitan and to a lesser extent in corridor areas (given their infrastructural advantage). All areas other than primary metropolitan do exhibit strong consumer based nonexportive demand for services. Those areas which do demonstrate some firm based demand for producer services are highly dependent on the primary metropolitan strata for locomotive impact on local service growth. This locomotive effect is obviously beyond the scope of policy impact directly. A local or regional policy official can not reattach his or her area with a larger metropolitan place, but he or she could encourage changes in the planning relationship between his or her area and its associated metropolitan area to discover industries which might demand more producer services from his or her area if the costs of land use and the mix of industries

creates an environment for cost savings and comparative advantage for location in the nonmetropolitan areas.

It appears that the increased density of people and firms which does represent the first step in regional development is instrumental in overall service sector attrition. That is, in the period when density is increasing in developing areas, fewer more streamlined firms are necessary for service provision. Such a period seems a poor time to expand the ranks of service industries. Thus a coordinated policy effort throughout the economic area is even more crucial.

This study also demonstrates that metropolitan producer service firms are unaffected by space (transport costs). Given the recent surge in technology at a time when producer service firms are targeted for location in developing areas, metropolitan firms can service outlying areas without moving. Thus, high level producer service firms may remain or locate in urban service centers which are already densely populated with service demanding firms and still provide services to outlying areas which do not have sufficient demand to support local provision.

These factors demonstrate that the industrial climate in developing areas is "unnatural" for producer service firms, thus the deck is stacked against a policy which attempts to target service provision of firm based

demand in these areas through location of new firms or relocation of firms from outside the area.

To some degree this is a "chicken or egg?" problem. What is needed for firm-based service development is a base of firms. There are positive feedback effects from service firms on service demand; but which comes first, the service firm or the firms they service? From a locational perspective, if it is firm based demand which is basic, why would service firms locate without a solid base of firms already in place? And, if the firms are already in place, why would service firms need to be enticed by policy? The conclusion here is that a place such as Paducah does not become an Atlanta, but rather develops into a larger Paducah. At the same time Atlanta develops into a larger Atlanta. A solid base of producer service firms supplying output in response to firm-based demand develops simultaneously with a solid foundation of service demanding firms. Thus, policy makers should make certain that the service sector develops in concert with the industrial sector but, the likelihood that policy induced service firms could drive an economy or make it more competitive is slim.

Even though the numbers indicate that producer services are expanding, exportable, basic, and perhaps even footloose, there is no reason to expect them to locate away from the areas in which they developed. It

is in these urban, regional, national, or international service centers where the industrial climate is conducive to continued existence, expansion, and exportation across economic area boundaries.

The original policy prescription of targeting services is demonstrated to be flawed, but this study does reveal an alternative policy which could be pursued in its place. The results of this study suggest that coordinated development policy in the total economic area would be beneficial for all stratum.

The basic conclusions of this study are that the demand for and supply of high level producer services are located in the metropolitan stratum, development in lower stratum is highly dependent on the scale of this metropolitan service center, agglomeration of service industries causes overall market attrition in numbers of firms and in earnings in services, and that these urban producer services are immune to the expected negative impacts of transport costs. The result of these conclusions is that as services continue to grow, while the remainder of the economy merely holds position, a greater attraction of population toward these growth industries will increase urban problems and further reduce the potential for rural development. Given these conclusions, it is in the best interest of the metropolitan places to coordinate their development plans

with the associated nonmetropolitan areas to create an economic area wide development effort. Such an effort would reduce the strain on the social services infrastructure of urban places, reduce the attrition of service firms due to increasing agglomeration, and aid in the development of the hinterland-in which a great deal of demanders of metropolitan consumer services reside.

Given the conclusion that exportable producer services are generally demanded as inputs, are dependent on the local market for the majority of their business, and that exporting is best defined as that which crosses the economic area boundary, it is important to note that service firms (with the broad definition of services outlined above) have always demanded more services themselves than has the manufacturing sector. Therefore, rather than chasing footloose producer service firms and/or smokestacks for local location, it appears that an examination of the local level of service imports might yield a greater return. This self examination could target cross-strata import substitution for a greater influence on local development (possibly through a combined effort with counties in the same stratum).

For maximum development in service industries it appears that for the local level of development to be effectively impacted a concerted policy coordination in the entire economic area will be required; considering

the conclusion that development in the lower level stratum depends upon the locomotive effect of the metropolitan stratum. Policy makers in the metropolitan strata could create a better overall prospectus for enticing firms which are interested in the attributes of more urban areas by directly influencing local producer service firms, which would continue to serve the metro area, to relocate into associated nonmetropolitan areas. Thus allowing the infrastructural advantage of the corridor areas and the direct cost advantage of hinterland locations to advance the overall development of the entire economic area. This would help reduce the burden on the metropolitan areas social infrastructure which is so often observed as an indicator of local amenities by firms which are considering location in the metropolitan stratum.

If increased agglomeration in the market causes the number of firms and earnings in service industries to decrease, then dispersed location throughout the economic area will likely reduce this tendency. It would also serve to reduce migration from the hinterland into the metropolitan service center which is the basal cause of increased market density in the urban area. policy coordination across the entire economic area again appears advantageous for all stratum.

Thus, if metropolitan policy makers wish to decrease the problems associated with increasing agglomeration, such as increased crime rates and over burdened public services, which reduce the social amenities associated with new business location, a coordinated policy with nonmetropolitan areas which encourages dispersed location seems logical. If nonmetropolitan policy makers wish to decrease the problems associated with a metropolitan population shift and reduced competitiveness in service industries given modern business technology, a stratum wide coordinated policy of import substitution and an economic area wide coordinated policy of dispersed location seems key to future nonmetropolitan development.

REFERENCES

- Andrikopoulos, A., J. Brox, and E. Carvalho. "Shift-Share Analysis and the Potential of Predicting Regional Growth Patterns." Growth and Change 21, no. 1 (winter 1990): 1-10.
- Bailly, A., L. Boulianne, D. Maillat, M. Ray, and L. Thevoz. "Services and Production: For a Reassessment of Economic Sectors." The Annals of Regional Science 21, no. 2 (July 1987): 45-59.
- Bailly, A., D. Maillat, and W. Coffey. "Service Activities and Regional Development: Some European Examples." Environment and Planning A 19, no. 5 (may 1987): 653-68.
- Barkley, D. "The Decentralization of High-Technology Manufacturing to Nonmetropolitan Areas." Growth and Change 19, no. 1 (Winter 1988): 13-30.
- Bender, Lloyd. "The Role of Services in Rural Development Policies." Land Economics 63, no. 1 (february 1987): 62-71.
- Berry, Brian J. L., Parr, J.B., with Epstein, Ghosh, and Smith. Market Centers and Retail Location. Englewood Cliffs, N.J.: Prentice Hall, 1988 (Formerly The Geography of Market Centers and Retail Distribution, 1967)
- Beyers, W., and M. Alvine. "Export Services in Postindustrial Society." Papers of the Regional Science Association 57 (1985): 33-45.
- Blackeby, F. (editor) De-Industrialisation. London, England: Heineman, 1978.
- Bohm, R., H. Herzog, and A. Schlottman. "Trade and Service Sector Development in the Rural South." The Review of Regional Studies 16, no. 2 (spring 1986): 41- 9.
- Bray, L. "An Econometric Model of Employment Growth in the Construction, Commerce, and Government Sectors of a Regional Economy: An Application to the Tennessee Valley." (unpublished TVA Working Paper)
- Christaller, William Die zentralen Orte in Suddeutschland. Jena, Germany: Fischer. English translation by C.Baskin: The Central Places of

Southern Germany. Englewood Cliffs, N.J.: Prentice-Hall Inc., 1966.

- Cocheba, D., R. Gilmer, and R. Mack. "Data Refinement Recommendations and Their Impact on a Study of the Tennessee Valley." Growth and Change 16, no. 4 (October 1985): 20-42.
- Coffey, W., and A. Bailley. "Service Activities and the Evolution of Production Systems: An International Comparison." Environment and Planning A 22 (1990): 1607-20.
- Coffey, W., and J. McRae. Service Industries in Regional Development, 1-145. Halifax, Nova Scotia: The Institute for Research on Public Policy, 1989.
- Daniels, P. Service Industries: A Geographical Appraisal, 1-322. London, England: Methuen, 1985.
- Dierx, A. H. "Metropolitan Agglomeration and Sectoral Aggregation." Journal of Regional Science 28, no. 3 (august 1988): 405-13.
- Fuchs, V. The Service Economy , 1-280. New York, New York: National Bureau of Economic Research (Distributed by Columbia University Press), 1968.
- Garnick, D. H. "Shifting Patterns in the Growth of Metropolitan and Nonmetropolitan Areas." Survey of Current Business 63, no. 5 (may 1983): 39-44.
- _____. "Shifting Balances in U.S. Metropolitan and Nonmetropolitan Area Growth." International Regional Science Review 9, no. 3 (december 1984): 257-73.
- _____. "Patterns of Growth in Metropolitan and Nonmetropolitan Areas: An Update." Survey of Current Business 65, no. 5 (may 1985): 33-8.
- _____. "Growth in Metropolitan and Nonmetropolitan Areas: An Update." Survey of Current Business 69, no.4 (april 1989): 37-8.
- Gilmer, R., S. Keil, and R. Mack. "Export Potential of Services in the Tennessee Valley." Regional Science Perspectives 17 (1987): 18-33.

- _____. "The Service Sector in a Hierarchy of Rural Places: Potential for Export Activity." Land Economics 65, no. 3 (August 1989): 217-27.
- Hansen, Niles. "Do Producer Services Induce Regional Economic Development?" Journal of Regional Science 30, no. 4 (November 1990): 465-76.
- Harrington, J., and J. Lombard. "Producer Service Firms in a Declining Manufacturing Region." Environment and Planning A 21 (1989): 65-79.
- Holden, D. R., J. K. Swales, and A. G. M. Nairn. "The Repeated Use of Shift-share: A Structural Explanation of Regional Growth?" Environment and Planning A 19 (1987): 1233-50.
- Israilevich, P., and R. Mahidhara. "Hog Butchers No Longer: 20 Years of Employment Change in Chicago." Economic Perspectives: Federal Reserve Bank of Chicago, march/april 1991, 2-13.
- Keil, S., and R. Mack. "Identifying Export Potential in the Service Sector." Growth and Change 17, no. 2 (April 1986): 1-10.
- Kirn, Thomas, Richard S. Conway, Jr, and William B. Beyers. "Producer Services Development and the Role of Telecommunications: A Case Study in Rural Washington." Growth and Change 21, no. 4 (fall 1990): 33-50.
- Leven, Charles. "Analyzing the Transformation of Tennessee's Economic Geography." Survey of Business 22, no. 3 (spring 1987): 25-31.
- Losch, August Die raumliche Ordnung der Wirtschaft, Jena, Germany: Fisher. English translation of the second German edition (1944) by W.H. Woglom and W.F. Stolper: The Economics of Location. New Haven, Conn.: Yale University Press, 1954.
- Marshall, J. N. "Services in a Postindustrial Economy." Environment and Planning 17 (1985): 1155-67.
- Marshall, J. N., P. Damesick, and P. Wood. "Understanding the Location and Role of Producer Services in the United Kingdom." Environment and Planning A 19, no. 5 (may 1987): 575-96.

- Marshall, J., P. Wood, P. Daniels, J. McKinnon, J. Bachtler, P. Damesick, N. Thrift, A. Gillespie, A. Green, and A. Leyshon. Services and Uneven Development, 1-307. New York, New York: Oxford University Press, 1988.
- Marshall, J. N., and C. Jaeger. "Service Activities and Uneven Spatial Development in Britain and Its European Partners: Determinist Fallacies and New Options." Environment and Planning a 22 (1990): 1337-54.
- Moriarty, B. M. "The Distributed Lag Between Metropolitan-area Employment and Population Growth." Journal of Regional Science 16, no. 2 (August 1976): 195-212.
- Morris, J. "Producer Services and the Regions: The Case of Large Accountancy Firms." Environment and Planning a 20 (1988): 741-59.
- O Huallachain, Breandan. "Agglomeration of Services in American Metropolitan Areas ." Growth and Change 20, no. 3 (summer 1989).
- O'Farrell, P. "Producer Services and Regional Development." Environment and Planning a 22 (1990): 1141-54.
- O'Farrell, P. N., and D. M. Hitchens. "Producer Services and Regional Development: Key Conceptual Issues of Taxonomy and Quality Measurement." Regional Studies 24, no. 2 (april 1990): 362-80.
- OECD. "Information Activities, Electronics and Telecommunications Policy: Impact on Employment Growth and Trade." i, Paris, France, 1981.
- Parker, Timothy. "Nonmetro Job Growth Lags Its Apparent Potential." Rural Development Perspectives, october- january 1991, 15-9.
- Peck, John, and Brian Shappell. "The Income Impact of the Shift to Service Industry: A Case Study." Economic Development Review 4, no. 2 (summer 1986): 11-5.

- Pinch, S. P. "The Restructuring Hypothesis and the Study of Public Services." Environment and Planning a 21 (1989): 905-26.
- Porat, M. "The Information Economy: Definition and Measurement." Office of Telecoms, Washington, D.C. 1977.
- Porterfield, S. "Service Sector Offers More Jobs, Lower Pay." Rural Development Perspectives, june-september 1990, 2-7.
- Singh, A. "U.K. Industry and the World Economy: A Case of Deindustrialisation." Cambridge Journal of Economics 2 (1977): 113-36.
- Srinivasan, Aruna. "Mississippi: A Dual Economy." Economic Review (Federal Reserve Bank of Atlanta) 73, no. 1 (january 1988): 50-7.
- Stabler, J., and E. Howe. "Service Exports and Regional Growth in the Postindustrial Era." Journal of Regional Science 28, no. 3 (1988): 303-15.
- Stanback, T., P. Bearse, T. Noyelle, and R. Karesek. Services: The New Economy, 1- 156. Totowa, New Jersey: Allenheld, Osman & Co. Publishers, Inc., 1981.
- Thirwell, A. "Deindustrialisation in the U.K." Lloyds Bank Review, April 1982, 22- 37.
- Tschetter, John. "Producer Services Industries: Why Are They Growing So Rapidly?" Monthly Labor Review, december 1987, 31-40.
- Walker, R. "Is There a Service Economy?" Science and Society 49 (1985): 42-83.
- Wheeler, J. "The Corporate Role of Large Metropolitan Areas in the United States." Growth and Change 9, no. 2 (Spring 1988): 75-86.

APPENDIX

SIMULTANEITY AND HIERARCHICAL DEMAND

The examination of a system of equations which represents the parts of a greater whole, such as the strata in an economic area, suggest the possibility of some impact of simultaneity. It may be necessary to consider the impact of socioeconomic and industrial composition conditions in a particular stratum simultaneously with each of the others.

The following tables are comparable in form to Tables 1-6 above. The method used to generate these results is a Zellner seemingly unrelated regression (SUR). A caveat is necessary before these results may be interpreted. The study presented above takes four stratum into consideration, while only seven economic areas have all four individual stratum. Thus, a SUR regression cannot be run for the full sample because the sample size of each strata is not equal, thus causing the associated $X'X$ matrix to be of less than full rank and therefore uninvertible. The following results represent an estimation of the model described above with a sample limited to those seven complete economic areas so that the rank requirements of a simultaneous equation estimation hold.

Due to this limited sample the results cannot be directly compared. The system weighted model fit of the

SUR systems are not significantly different from the average individual correlation coefficients in the OLS estimations and there appears to be no systematic difference in the results. The individual differences in the results cannot be designated as resulting from simultaneity or from sample limitation. However, these results are generated using a simultaneous method, and do demonstrate that the model retains its robustness.

TABLE A-1
DETERMINANTS OF PERSONAL SERVICES DEVELOPMENT
(SUR ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
POPULATION					
ABOVE	(VAR)	N/A	-0.006	0.05	-0.02
LOCAL	(+)	2.57 (***) ^A	1.23 (***)	1.73 (***)	0.32 (**)
BELOW	(+)	0.57 (***)	0.17 (***)	-0.45 (**)	N/A
LOCAL POP. DENSITY (10 ⁻⁶)	(+)	- .384 (**)	- .565	- .099	14.86 (***)
LOCAL PER					
CAPITA INCOME	(+)	1.02 (***)	1.06 (***)	0.34 (***)	960.25
TRANSPORT					
COST (10 ⁻³)	(-)	-590.13 (***)	-113.72 (***)	-143.74 (***)	-16.38 (***)
N		140 ^B	140	140	140
CORRELATION		(SYSTEM			
COEFFICIENT	R ²	WEIGHTED)	.99 ^C		

^A The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

^C The measure for correlation in a "seemingly unrelated" regression is a system weighted R² which represents the correlation for the entire system of equations

TABLE A-2
DETERMINANTS OF SOCIAL OVERHEAD SERVICES DEVELOPMENT
(SUR ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
POPULATION	(VAR)				
ABOVE	(+)	N/A	-0.04	-0.03	-0.05 (*)
LOCAL	(+)	3.08 (***) ^A	1.05 (***)	1.7 (***)	2.02 (***)
BELOW	(+)	1.16 (***)	0.28 (***)	0.007	N/A
LOCAL POP.					
DENSITY (10 ⁻⁶)	(+)	-9.55 (***)	-.52	-1.61 (**)	-4.19 (***)
LOCAL PER					
CAPITA INCOME	(+)	1.84 (***)	2.07 (***)	0.21 (**)	3,527 (***)
TRANSPORT					
COST (10 ⁻³)	(-)	-338.83 (***)	-46.59 (***)	-57.36 (**)	-81.80 (***)
N		140 ^B	140	140	140
CORRELATION		(SYSTEM			
COEFFICIENT	R ²	WEIGHTED) .98 ^C			

^A The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

^C The measure for correlation in a "seemingly unrelated" regression is a system weighted R² which represents the correlation for the entire system of equations.

TABLE A-3
DETERMINANTS OF EXPORT CONSUMER SERVICES DEVELOPMENT
(SUR ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
POPULATION					
ABOVE	(VAR)	N/A	-0.008 (**)	0.015 (*)	-0.055 (***)
LOCAL	(+)	.7 (***) ^A	0.08 (***)	0.23 (***)	0.21 (***)
BELOW	(+)	.07 (*)	0.01 (**)	-0.12 (***)	N/A
LOCAL POP.					
DENSITY (10 ⁻⁶)	(+)	-3.40 (***)	-.057	-.098	-.269
LOCAL PER					
CAPITA INCOME	(+)	0.28 (***)	0.13 (***)	0.008	2,442 (***)
TRANSPORT					
COST (10 ⁻³)	(-)	-63.77 (***)	-1.83	-9.32 (**)	-7.99 (***)
N		140 ^B	140	140	140
CORRELATION		(SYSTEM			
COEFFICIENT	R ²	WEIGHTED)	.97 ^C		

^A The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1. The estimated coefficients of the cross-sectional dummy variables and their signs and significances have been excluded for the sake of brevity.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

^C The measure for correlation in a "seemingly unrelated" regression is a system weighted R² which represents the correlation for the entire system of equations.

TABLE A-4
DETERMINANTS OF BUSINESS AND PROFESSIONAL SERVICES DEVELOPMENT
(SUR ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
INTEREST RATE	(-)	-11,743 (***) ^A	-3,104 (***)	-52.6	-2,596 (***)
WAGE RATE	(VAR)	-23.74 (***)	-0.34	-0.6	-1.02 (**)
FIRMS					
ABOVE	(+)	N/A	0.96	3.2 (***)	0.98 (**)
LOCAL	(+)	63.88 (***)	16.16 (***)	23.88 (***)	4.52 (**)
BELOW	(+)	14.4 (***)	-1.02	0.04	N/A
LOCAL FIRM					
DENSITY(10 ⁻⁶)	(+)	45.07	-9.36 (**)	48.74 (***)	28.34 (*)
LOCAL EARN'S					
PER FIRM	(+)	349.68	40.05 (***)	39.4 (***)	32.7 (**)
FIRM SCALE					
DEMANDING	(+)	10,242	3.87 (***)	1,870.87 (***)	220.24
SUPPLYING	(+)	8,769 (***)	647.6 (***)	-140.27	71.08 (**)
CORPORATE					
HEADQUARTERS	(+)	-0.12	0.06	-0.36	-0.1
TRANSPORT					
COST(10 ⁻³)	(-)	-215.44 (**)	15.37	-62.82 (***)	-13.96
N		140 ^B	140	140	140
CORRELATION		(SYSTEM			
COEFFICIENT	R ²	WEIGHTED) .96 ^C			

^A The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

^C The measure for correlation in a "seemingly unrelated" regression is a system weighted R² which represents the correlation for the entire system of equations.

TABLE A-5
DETERMINANTS OF INTERMEDIATE SERVICES DEVELOPMENT
(SUR ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
INTEREST RATE	(-)	1,025.9 ^A	-1,603 (***)	-661.44	-2,003 (***)
WAGE RATE	(VAR)	-0.73	0.215	0.45	0.9
FIRMS					
ABOVE	(+)	N/A	-1.06 (*)	2.4 (***)	1.3 (**)
LOCAL	(+)	69.5 (***)	27.55 (***)	30.18 (***)	11.02 (***)
BELOW	(+)	21.73 (***)	-1.54 (*)	-2.77 (*)	N/A
LOCAL FIRM					
DENSITY(10 ⁻⁶)	(+)	-113.71 (**)	-29.71 (***)	-8.03	-45.42 (**)
LOCAL EARN'S					
PER FIRM	(+)	337.73	10.27	2.12	-16.47
FIRM SCALE					
DEMANDING	(+)	6,070	5.47 (***)	1,662.6 (***)	851.03 (***)
SUPPLYING	(+)	10,454	1,297 (*)	2,236 (***)	1,663.4 (***)
CORPORATE					
HEADQUARTERS	(+)	4.28 (***)	0.55 (**)	0.57 (**)	0.87 (***)
TRANSPORT					
COST(10 ⁻³)	(-)	-38.31	24.66 (*)	31.96 (*)	8.10
N		140 ^B	140	140	140
CORRELATION		(SYSTEM			
COEFFICIENT	R ²	WEIGHTED)	.99 ^C		

^A The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1.

^B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

^C The measure for correlation in a "seemingly unrelated" regression is a system weighted R² which represents the correlation for the entire system of equations.

TABLE A-6
DETERMINANTS OF FINANCE, INSURANCE, AND REAL ESTATE SERVICES DEVELOPMENT
(SUR ESTIMATES)

INDEPENDENT VARIABLES	EXPECTED SIGN	ECONOMIC AREA STRATA			
		METROPOLITAN	SUBMETROPOLITAN	CORRIDOR	HINTERLAND
INTEREST RATE	(-)	-454.04 A	-878.9 (***)	-1,190 (***)	-654.96 (***)
WAGE RATE	(VAR)	-7.67 (**)	0.12	0.24	0.33
FIRMS					
ABOVE	(+)	N/A	-0.45 (**)	-0.009	0.52 (**)
LOCAL	(+)	23.55 (***)	5.33 (***)	9.1 (***)	2.6 (***)
BELOW	(+)	6.93 (***)	1.18 (***)	-2.06 (***)	N/A
LOCAL FIRM					
DENSITY(10 ⁻⁶)	(+)	163.94 (***)	-6.93 (***)	1.36	-22.67 (***)
LOCAL EARN'S					
PER FIRM	(+)	-662.4 (***)	7.5 (**)	-2.2	-15.47 (**)
FIRM SCALE					
DEMANDING	(+)	18,415 (***)	8.16 (**)	316.08 (*)	198.35 (**)
SUPPLYING	(+)	21,076 (***)	1,500 (***)	1,404 (***)	1,364 (***)
CORPORATE					
HEADQUARTERS	(+)	-0.24	0.2 (**)	-0.24 (*)	0.17 (*)
TRANSPORT					
COST(10 ⁻³)	(-)	-115.02 (*)	2.07	13.66	11.63 (*)
N		140 ^B	140	140	140
CORRELATION		(SYSTEM			
COEFFICIENT	R ²	WEIGHTED)	.98 ^C		

A The level of each significant variable is represented by (***) if it is less than or equal to .01, (**) if it is between .01 and .05, (*) if it is between .05 and .1.

B The stratum sample size is calculated by multiplying the number of cross section stratum by the 20 years of time series.

C The measure for correlation in a "seemingly unrelated" regression is a system weighted R² which represents the correlation for the entire system of equations.

SERVICE SECTOR INDUSTRY DEFINITIONS

The service sector taxonomy developed above in chapter 3, and displayed in figure 7, includes many individual industries. These industries have been divided into 6 subcategories or sectors which have demand characteristics in common. The definitions of each subcategory, in terms of individual industries included in each, are listed below.

CONSUMER SERVICES INDUSTRIES

Personal Services

This subcategory of services includes:

1. Retail trade which includes establishments engaged in selling merchandise for personal or household consumption, and rendering services incidental to the sale of the goods.
2. Personal services which includes establishments engaged in providing services generally involving the care of the person or his apparel, such as laundries, dry cleaning plants, portrait photographic studios, and beauty and barber shops.
3. Miscellaneous repair which includes minor repair such as television, radio, watch and jewelry, upholstery, etc.

4. Auto repair includes establishments primarily engaged in furnishing automotive repair, rental, leasing and parking services to the general public.
5. Motion pictures includes establishments producing and distributing motion pictures, exhibiting motion pictures in commercially operated theaters, and furnishing services to the motion picture industry. The term "motion pictures" includes similar productions for television or other media using film, tape or other means.

Social Overhead Services

This subcategory of services includes:

1. Health services include establishments primarily engaged in furnishing medical, surgical, and other health services to persons.
- 2 Educational services includes establishments furnishing formal academic or technical courses, correspondence schools, commercial and trade schools, and libraries.
3. Social services and membership organizations provide social and rehabilitation services to those personal with social or personal problems requiring special services and to the handicapped and the disadvantaged;

and soliciting funds to be used directly for these and related services.

Exporting Consumer Services

This subcategory of services includes:

1. Amusements which includes establishments engaged in providing amusement or entertainment on payment of a fee or admission charge, except motion pictures theaters.
2. Museums include museums, art galleries, and botanical and zoological gardens, which are not operated commercially. Receipts or funding of these establishments are not primarily from admission charges. These establishments are of historical, educational, or cultural interest.
3. Hotels and lodging includes commercial and institutional establishments engaged in furnishing lodging, or lodging and meals, and camping space and camping facilities, on a fee basis.

PRODUCER SERVICE INDUSTRIES

Business and Professional Services

This subcategory of services includes:

1. Business services includes establishments primarily engaged in rendering services to business

establishments on a fee or contract basis, such as advertising, mailing services; building maintenance services; employment service; management and consulting services; protective services; equipment rental and leasing; commercial research, development, and testing; photofinishing; and personnel supply services.

2. Legal services which are self explanatory.
3. Miscellaneous professional services includes establishments engaged in performing services, not elsewhere classified, such as those rendered by engineers, architects, accountants, artists, lecturers, and writers. This subcategory also includes noncommercial establishments primarily engaged in educational, scientific and research activities.

Finance, Insurance, and Real Estate

This subcategory of services includes:

1. Finance establishments including banks and trust companies, credit agencies other than banks, holding companies, other investment companies, brokers and dealers in securities and commodity contracts, and security and commodity exchanges.

2. Insurance carriers of all types of insurance, and insurance agents and brokers.
3. Real estate owners, lessors, lessees, buyers, sellers, agents, and developers of real estate.

Intermediate/Distributive Services

This subcategory of services includes:

1. Transportation, communications, and utilities which includes establishments providing to the general public or to other business enterprises passenger and freight transportation, communication services, electricity, gas, steam, water, or sanitary services, and the U.S. Postal Service.
2. Wholesale trade includes establishments or places of business primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, farm, or professional business users; or to other wholesalers; or acting as agents or brokers in buying merchandise for or selling merchandise to such persons or companies.

VITA

Thomas G. Wier was born in Fort Worth, Texas on July 19, 1964. He Graduated there from Eastern Hills High School. He received his Bachelor of Science and Master of Science Degrees in Economics from Texas Christian University, also in Fort Worth, Texas. He is happily married to Karen Cariker Wier and has a daughter, born on Valentines Day of 1990, named Grace Elizabeth Wier. In August of 1989 he began graduate studies at The University of Tennessee, Knoxville where he received a PhD. in the fall of 1992.