

# Can Services Be a Source of Export-Led Growth? Evidence From the Fourth District

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## Introduction

The U.S. labor market is currently undergoing dramatic structural change as service jobs rapidly replace manufacturing jobs. In 1960, manufacturing jobs clearly dominated the labor force, claiming 42 percent of total employment, compared with 11 percent for the service sector. Today, service-sector jobs (not including trade or transportation) claim 23 percent of employment, roughly the same percentage as manufacturing jobs.

The change in employment composition within cities in the Fourth Federal Reserve District is even more pronounced. As this trend continues both locally and nationally, it is important to know whether services can sustain an economy in the same way manufacturing has done. More specifically, can the service sector pull new dollars into the local economy by exporting services?

Interest in the exportability of services stems from the widely held view that the vigor of regional and national economies is linked to the health of their export sectors. Trade among regions of a country plays much the same role in regional health as does international trade in the growth of national economies. When viewed within this export-base model of regional growth, the relative decline of manufacturing employment raises several issues related to the prospects and process of future regional growth. Is the export base vanishing, reducing the potential for further regional growth? Are there other sectors that could be transformed into part of a regional export base?

This paper explores the exportability of services in order to address these questions. First, the service sector and exportation methods are described, particularly for those service industries most likely to be exported directly. Employment in service industries, particularly business services, is growing faster than employment in most other sectors of the economy, and faster in the Fourth District than in the U.S. Two possible explanations for this growth suggest that trade in services may increase: services may be exported directly to consumers out of the region, or they may be exported indirectly, embodied in exported manufactured goods. Differences in consumption of services among cities are not part of the export base, while direct exports are.

Service-sector export activity can be measured indirectly by estimating the variation across the U.S. in the relative concentration of service employment in local economies. Under various assumptions discussed below, large variations in the location quotients of a service activity across cities can be indicative of trade across areas. This technique allows identification of highly traded service industries and offers evidence of strengths and weaknesses in individual service industries in the four largest MSAs (metropolitan statistical areas) in the Fourth District: Cincinnati, Cleveland, Columbus, and Pittsburgh.

### I. What Are Services and How and Why Are They Exported?

Kendrick (1986) states that "...the distinguishing characteristic of service-producing versus goods-producing industries is that service outputs are intangible and cannot be stored." Although this definition encompasses many more economic activities than those usually classified as services, it captures the essence of what services have in common. In the discussion that follows, the term "services" refers specifically to the aggregate of lodging places, personal services, business services, health services and hospitals, repair services, recreational services, legal services, educational services and schools, engineering services, accounting services, and social services. These comprise standard industrial classification (SIC) codes 70 through 89.

Some discussions of the service sector include many or all of the other industries that are commonly considered to comprise the "service-producing" sector: communication; utilities; finance, insurance, and real estate; wholesale and retail trade; and administration. This paper takes a narrower definition of services for two reasons. First, most of the growth in the service-producing sector of late has been in the narrower class of services, particularly in business services, which seem particularly amenable to export activity. Second, the data that were available for this study cover only this portion of the service sector.

This paper concentrates on professional and business services (also called the "producer" services), which together account for more than a third of employment in services. The professional services include legal, accounting, engineering, and educational services. Business services include services normally rendered to places of business rather than to final consumers, and comprise the following: advertising; services to buildings; computer and data processing services; management, consulting, and public relations services; equipment rental and leasing; credit reporting and collection agencies; direct mail advertising services; blueprinting and photocopying services; commercial photography, art, and graphics; stenographic and duplicating services; personnel supply agencies; and commercial research and development.

As is evident from this list, these activities often require a face-to-face meeting, or at least telephone contact, between supplier and consumer. In many cases they are done at the behest or on the premises of the consumer, so that the services are not storable. Although these features imply that services cannot be exported by the same means as manufactured goods (for example, shipping by rail or truck), they do not eliminate the possibility of service-sector exports.

There are two ways to export services directly: activities may be transported and sold to persons outside the area, or individuals may travel to the area to purchase services. Sometimes consultants visit their clients; other times clients travel to consultants. Data is transmitted to programmers or to a distant mainframe computer. Construction equipment is transported to leasers.

Establishing the possibility that services may be transported addresses only one side of the issue: the necessary condition. The other side of the question is, why would they be traded? The export-base growth model, the simplest explanation for the existence of regional trade, is based on production economies of scale. If large-scale production reduces average production cost for some products, the minimum efficient scale (MES) may exceed the needs of the surrounding community. Then, welfare of all the communities will be maximized by specialization and trade among communities. Each community produces a subset of the products with scale economies, and this becomes their export base. The communities use proceeds from exports to import goods that are not produced locally. Regional growth is the result of expansion of the export base. Products with no economies of scale (that is, in which MES is small relative to local demand) are produced and consumed locally. The prevalence of interregional and international trade in manufactured goods is assumed to stem from larger MES in manufacturing than in service production.

This export-base growth model is the source of the conventional view of the service-producing sector as one that grows only as a result of a healthy manufacturing sector and that does not generate "new" income for an area. The manufacturing sector, characterized by larger firms, generates income for the area through the sale of goods outside the region or country. Services, on the other hand, are provided by small local companies, and merely recycle within the local economy the income created by the manufacturing sector.

This perception of the service sector as dependent upon the manufacturing sector, however, has changed recently. To the extent that technological changes increase the MES of service provision, we can expect increases in service-sector trade. And, although they are not storable, services can be exported directly and consequently have the potential to spur local economic expansion. The question centers on the extent to which services are, and will be, traded relative to the manufacturing sector.

## II. Changing Industrial Composition of Employment in the U.S. and Ohio

This section begins with a description of recent changes in the composition of employment in the United States and in the Fourth District, focusing particularly on employment growth in the services and their components. The rest of the section considers the reasons to expect growth in service-sector employment and to link growth with trade in services.

the service industries in the U.S., in Ohio, and in the four largest cities of the Fourth District.

The relative growth of services in Ohio since 1970 came in two phases. Until 1983, shrinkage of manufacturing employment in Ohio, combined with modest (but below national-average) service growth, led to increases in the service industries' share of employment. However, since late 1983/early 1984, above-average growth in business services in Ohio has led to growth above the national average for the state's service industries as a whole. Even though the state's share of employment in the service industries now nearly matches that of the U.S., Ohio's 1986 rate of service-industry job creation of 7.1 percent continues to exceed the U.S. rate of 5.6 percent.

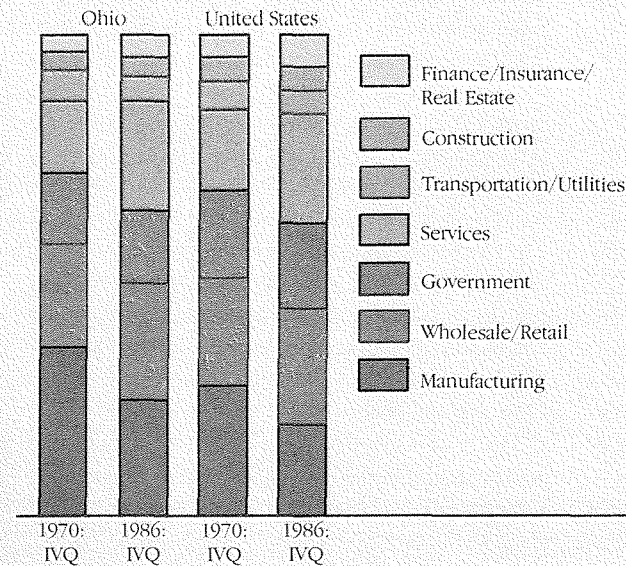
Because manufacturing was heavily concentrated in Ohio, the decline in manufacturing employment since 1970 was particularly dramatic here: employment share shrank from 37 to 24 percent. This resulted from the net elimination of almost a quarter of the state's manufacturing jobs and from the growth of other sectors, particularly the service industries.

Where is this recent growth taking place? Nationally, the two largest components of services are health services and business services, which together account for more than half of total service-industry employment. Health services supplied 38 percent of the growth in services until 1982. Since then, it has supplied only 17 percent of service-sector growth and has not increased its share of national employment. In contrast, business services contributed 22 percent of service growth until 1982 and 38 percent of growth since then. Thus, although health services were an important source of service growth through the 1970s and early 1980s, the mid-1980s have seen a rapid expansion of employment in business services.

Ohio has consistently kept pace with the growth of health services, maintaining an edge over the U.S. in percent employed in that industry. In contrast, throughout the 1970s and early 1980s, the state lagged the U.S. in the level and growth of business service employment, but now exceeds the national pace of expansion. In 1986, the growth of business services in the state was 13.1 percent, compared to 8.5 percent for the U.S.

Patterns of growth vary somewhat among MSAs within the Fourth District. Pittsburgh and Cleveland have the largest proportion of employment in the service sector. The strongest similarity among the four MSAs is the widening gap between their expansion in services and that of the U.S. (which includes rural areas) since 1984. Because services tend to be concentrated in urban areas, a city that only matches, instead of exceeds, the national average in service employment probably has a relative lack of services.

Industrial Composition of Employment in Ohio and the U.S.: 1970 and 1986



SOURCE: U.S. Bureau of Labor Statistics.

FIGURE 1

Figure 1 summarizes the changes in industrial composition of the work force in Ohio and in the nation. Overall, Ohio employment since 1970 has become more similar to that of the nation as a whole. Ohio entered the 1970s with only 15 percent of its employment in the service industries, compared to 17 percent for the U.S. By 1986, Ohio had almost matched the national figure of 23 percent of the labor force employed in the service industries. Since 1970, the number of jobs in U.S. service industries has doubled. In contrast, the manufacturing industries gained no jobs, so manufacturing's share of total U.S. employment fell from 28 to 19 percent. In the U.S. and in Ohio, the number of service jobs now almost equals or exceeds the number of manufacturing jobs.

But the relative growth of services in Ohio and in the major cities of the Fourth District followed a different pattern than in the U.S. At first, the region lagged behind national growth; now it appears to be catching up. Table 1 summarizes the pattern of growth of employment in

Summary of Service Employment Growth, 1970-1986

	Total Employment 1986 <sup>1</sup>	% of Total 1986	Average Annual Growth Rate			
			1970-79	1980-84	1985	1986
<b>United States</b>						
Total	100,167	100.0	2.7	1.1	4.8	4.2
Manufacturing	19,186	19.2	1.0	-1.1	-0.2	0.2
Services	23,072	23.0	4.5	3.8	6.1	5.6
Health	6,586	6.6	5.6	3.8	3.5	4.4
Business	4,809	4.8	6.3	7.0	10.6	8.5
<b>Ohio</b>						
Total	4,475	100.0	1.6	-0.6	5.2	5.0
Manufacturing	1,109	24.8	-0.2	-2.8	0.0	-0.7
Services	999	22.3	4.0	2.2	6.4	7.1
Health	344	7.7	5.5	3.5	3.9	5.1
Business	192	4.3	n.a.	5.8	11.8	13.1
<b>Cincinnati</b>						
Total	651	100.0	2.0	0.0	6.5	6.2
Manufacturing	148	22.7	0.2	-2.7	3.5	0.1
Services	155	23.8	4.7	2.9	7.2	8.5
Health	49	7.5	n.a.	n.a.	1.7	4.6
Business	35	5.4	n.a.	n.a.	12.5	14.0
<b>Cleveland</b>						
Total	881	100.0	0.8	-1.2	4.0	4.3
Manufacturing	206	23.4	-0.8	-4.3	-1.7	-0.7
Services	224	25.4	3.2	0.9	6.5	7.0
Health	72	8.2	n.a.	n.a.	5.0	6.1
Business	50	5.7	n.a.	n.a.	13.9	8.9
<b>Columbus</b>						
Total	630	100.0	2.6	0.7	7.3	6.7
Manufacturing	106	16.8	0.2	-1.8	1.3	-0.1
Services	146	23.2	5.5	4.1	7.7	9.3
Health	38	6.0	n.a.	n.a.	6.3	5.1
Business	32	5.1	n.a.	n.a.	7.9	15.3
<b>Pittsburgh</b>						
Total	842	100.0	n.a.	-1.9	3.5	3.3
Manufacturing	129	15.3	n.a.	-8.1	-4.8	-6.7
Services	253	30.0	n.a.	3.6	4.7	4.5
Health	80	9.5	n.a.	3.5	4.1	2.7
Business	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

1. In thousands.  
n.a.: not available.

SOURCE: Bureau of Labor Statistics Employment and Earnings Reports.

TABLE 1

In the four largest MSAs in the District, business service growth has risen sharply since 1984. In 1983, the proportion of people employed in business services in Cincinnati, Cleveland, and Columbus almost equaled the national average. As of the end of 1986, all three cities had 18 to 20 percent more employees than the national average in this sector.

This recent growth in the service industries (particularly in business services) has been dramatic, and service employment growth can be expected to continue to exceed manufac-

turing growth for four reasons: increasing affluence, increased standardization, lower delivery costs, and technological changes that raise the relative cost of small-scale internal provision.

In general, employment growth in manufacturing has been limited by rapid productivity increases, not by decline in demand for its output. Measured in terms of its share of gross national product (GNP), manufacturing has not shrunk. This has meant greater affluence for consumers, who have spent an increasing portion of

their wealth on services due to a high income elasticity of demand for services. Consumers who are already affluent tend to spend disproportionately more of further increases in income on the purchase of services, rather than on agricultural products or manufactured goods. Beeson and Bryan (1986) argue that just as increasing productivity in nonmanufactured goods (for example, agriculture) in the early twentieth century was associated with a shift toward manufacturing in consumption and employment, so an increase in manufacturing productivity now leads to the service boom. The growth of services is a sign of our increased affluence.

Certainly, the growth of health and personal services fits the pattern of increased affluence, but how does this explain the expansion of business services? Affluence may have shifted consumption toward final products whose component industries tend to use business services most. For instance, an increasingly litigious society needs more legal photocopy shops for its attorneys. Or, increased demand for differentiated or luxury goods will raise demand for advertising services, because luxuries and differentiated products are advertised more heavily than are essentials or standardized goods. While this explanation predicts growth in the service sector, it does not predict increases in service-sector trade.

The other three explanations for growth (standardization, falling delivery costs, and technological change) have implications for trade because they suggest that the production of services is now increasingly subject to economies of scale. That is, larger size may now enhance efficiency in service provision.

First, management and other technologies have become specialized and routinized to the extent that there are new economies of scale in consolidating them across company lines. Stanback, et al. (1981) suggest that increased specialization found in large firms leads to routinization of functions. Once routine, these functions can be separated from other functions of management. Firms with consistent demand for the service may still provide it internally. Firms with intermittent demand will purchase the service as needed from vendors who specialize in its routine provision.

To accelerate the process, information, transportation, and communication have become less costly, reducing the necessity for essential components of management to be located near the scene of production, either geographically or within the same firm.

Furthermore, technological changes may have raised the relative cost of providing intermittent or small amounts of services internally. Business services provide a way to purchase some portion of the services of an indivisible

technology, or to meet peak loads (for example, due to seasonal, cyclical, or unanticipated demand growth). The complexity or the larger efficient scale of new products used by businesses could make it more economical to contract out for services rather than provide them internally, especially for small establishments. Examples are the use of external computer time-sharing, data processing, and photocopying services, as well as the use of temporary personnel.

Taken together, these three points suggest that net costs to separation of components of management and production processes have fallen; that is, scale economies have risen in business service provision. This may explain why between 1975 and 1984 (according to County Business Pattern Data), large (more than 100 employees) establishments' share of employment in business services rose from 44 to 49 percent. In addition, the Census of Services notes that the percentage of business service establishments that were part of firms with three or more establishments rose from 4.7 in 1972 to 11.4 in 1982. An increase in the MES of service provision makes services more similar to manufacturing. In particular, it makes trade more likely.

Business service growth comprises two elements: growth of employment because of increased production of services, and increased outsourcing of services formerly provided internally (that is, transfer of employment to service firms). During 1975 to 1984, while the size of business service establishments grew, large manufacturing establishments decreased their employment share from 74 to 63 percent, and the average size of manufacturing establishments shrank from 60 to 55 employees. The decline in the average size of manufacturing establishments should increase demand for business services; of course, outsourcing of business services may also be a source of the decline.

Growth resulting from increased demand for business services could be due to the increased affluence previously mentioned, or to increased productivity of services (assuming a highly price-sensitive demand). Unfortunately, the intangible nature of services makes it difficult to measure productivity of these industries. Service output (work performed) is difficult to distinguish from input (person-hours). Thus, usual attempts to measure productivity changes have detected only small or negative improvements in the service sector. However, the purchasers of services provide a clue to the direction of changes in productivity. If management acts to maximize profits, their purchase of a service (as opposed to internal provision) indicates that they consider the purchase to be the least-cost alternative. It follows, then, that increasing demand may

be the strongest available evidence of increasing productivity in business services.

The strength of service-sector employment growth in the Fourth District may be due to catch-up growth of locally consumed services or to establishment of service exports to non-local consumers. Although growth is encouraging for the region in either case, only growth due to exports adds to the economic base of the region.

### III. The Regional Economic Base and Measurement of Service Export Activity

Three explanations for service-sector growth suggest that many services may be increasingly exportable from one location to another. Thus, a region (or city or country) could become a service exporter as part of its economic base. Export activity may be direct (sales of services across boundaries) or indirect (sales of goods containing embodied services across boundaries). Because of the regional specialization of economic activity, and because business services are purchased primarily as intermediate goods, differences in local production of business services are related to differences in the regional concentration of other industries, as well as to direct export activity.

If a region's export industries are intensive users of services, that region indirectly exports services. But these are exports consistent with the old view of services as a secondary, supporting sector, rather than as an independent part of the economic base. Services that are primarily exported indirectly do not attract "new" dollars into the region directly, unless they attract other producers by making the region more competitive. This is one reason for the concern that services are not a viable part of an economic export base for a region (see, for example, Cohen and Zysman [1987] and Perna [1987]). For policy purposes, identification of potential indirect exports may be less relevant than identification of direct exports.

Alternatively, expansion in the market for business services outside the firm implies the potential both for nonlocal provision of services, and for incentives for the formation of direct service-exporting companies. In this case, services are clearly part of the economic base of the area.

Services may be traded across city, regional, or national boundaries. In 1981, the United States was a net exporter of business services. The growing importance of international trade in services has been recognized by the Conference Board, which recently issued a report emphasizing the need for lower import restrictions for services among our trade partners (Basche [1986]).

Keil and Mack (1986) suggest that a useful measure of the export potential of an industry is the extent to which employment share (relative to the national average) varies among cities. Local employment share divided by national share is called the location quotient. In their framework, if location quotients for an industry vary strongly among cities, the cities with larger shares are probably exporting that industry to cities (or, perhaps, countries) with smaller quotients. Cities use the proceeds to purchase the products of industries in which they have low location quotients.

If export activity is heavy in an industry, one would expect to see many cities with very little employment in the industry, and others with heavy concentrations of jobs in the industry. If little export activity occurs, all cities will have about the same percentage of employment in the industry. Thus, a service industry with a high variance of location quotients across areas is likely to be an industry with trade activity and, therefore, export potential. Of course, the products of such an industry are also likely to be imported (and, thus, to be a source of dollar outflow) for many cities.

Exports per capita (based on size of the city's labor force) of industry  $i$  in city  $j$  ( $X_{ij}$ ) are defined as quantity produced ( $Q_{ij}$ ), minus local consumption ( $C_{ij}$ ), all in per capita terms:

$$(1) \quad X_{ij} = Q_{ij} - C_{ij}.$$

Keil and Mack measure  $Q_{ij}$  by employment in industry  $i$  as a proportion of total employment in city  $j$  divided by the industry average employment share across the nation's cities. This is defined as the location quotient for industry  $i$  in city  $j$  ( $L_{ij}$ ). Two assumptions are made. First, labor productivity is constant across cities and industries (that is,  $Q_{ij}/L_{ij} = Q/L$ , for all  $i, j$ ). Second, all consumption patterns are constant across cities (that is,  $C_{ij} = C_i$ , for all  $j$ ), so:

$$(2) \quad X_{ij} = L_{ij} \cdot (Q/L) - C_i.$$

Under these assumptions, we can take the sample variance of each side for each industry  $i$  as follows:

$$(3) \quad s_i^2(X_{ij}) = (Q/L)^2 \cdot s_i^2(L_{ij}).$$

If industry  $i$  is characterized by a high trade volume, some cities thus will have high imports ( $X_{ij} \ll 0$ ) and others will have high exports ( $X_{ij} \gg 0$ ). Therefore, the variance of the  $X_{ij}$ 's for industry  $i$  across cities will be high. On the other hand, if little of an industry's product is traded, all  $X_{ij}$ 's will be of similar size, so their variance across cities will be small for the industry.

If the two assumptions of identical productivity and consumption patterns across regions hold, variation in the relative size of the labor force in industries across cities is directly

Business Service Industry Consumption in 1981

Disposition of Total Receipts	All Industries	Business Services		
Intermediate demand	47.6%	82.0%		
Final demand	52.4	18.0		
Personal consumption	32.8	8.6		
Inventory and investment	8.9	0.0		
Net exports	0.6	1.5		
Government purchases	10.1	7.8		
Total	100.0%	100.0%		
Industry	Share of Final Demand	Share of all Industries Total Output <sup>1</sup>	Share of Business Services Intermediate Output <sup>2</sup>	Relative Use of Business Services <sup>3</sup>
Oil, mining, agriculture, ordnance and forestry	0.6	7.3	1.8	0.3
Construction	11.8	7.4	15.3	2.1*
Nondurable manufacturing	15.3	19.3	14.0	0.7
Durable manufacturing	15.6	16.7	10.3	0.6
Transportation	3.0	3.6	2.9	0.8
Communication	1.6	1.6	1.5	0.9
Utilities	2.8	4.2	0.7	0.2
Wholesale and retail trade	15.1	11.0	21.9	2.0*
Finance and insurance	3.9	3.8	7.0	1.8*
Real estate	11.3	8.8	3.8	0.5
Hotels, personal and repair services	1.9	1.3	1.5	1.2
Business services	1.9	5.3	8.1	1.5
Eating and drinking places	3.8	2.5	2.2	0.9
Automobile and recreation services	5.1	2.0	2.3	1.2
Health and professional services	9.8	5.1	5.9	1.2
Government enterprises	0.4	0.5	0.6	1.2
Total	100.0	100.0	100.0	

1. Total measured output by enterprises in each industry, including double counting due to use of output as intermediate goods by other enterprises.

2. Total consumption of business services as an intermediate good by each industry.

3. This is the number in the third column divided by the number in the second column. Numbers over 1.0 indicate greater-than-average use of business services as an intermediate good; numbers below 1.0 indicate less-than-average use of business services.

\*Industry with relative use greater than 1.7.

SOURCE: Planting, Mark A., "Input-Output Accounts of the U.S. Economy, 1981," *Survey of Current Business*, vol. 67, no. 1, January 1987.

TABLE 2

related to variation in trade activity among cities for that industry. If the two assumptions do not hold, the variations in the location quotients may not be detecting trade activity. The remainder of this section and the next section explore the plausibility of these assumptions.

Differences in the relative cost of local factors of production can lead to differences in location quotients among areas. Because of cost-minimizing substitution among inputs by service providers, such differences cause variation in the labor input even if quantity produced does not vary. Conversely, if labor is more productive in one industry than in another, variation in employment will understate the relative value of exports in the more productive industry. (However, to the extent that the focus of the exercise is to identify employment creation by export activ-

ity, this bias is appropriate.) A related problem arises if there are systematic biases in the way labor input is measured. For example, industries with more variation in their use of part-time labor may appear to have more export activity by this measure than one where the full-time/part-time ratio is consistent among most employers.

It is difficult to account for regional differences in service-sector productivity, because service-sector output is not available. National level estimates use income accounts, which are not available for regions. As a first attempt to check the plausibility of the equal productivity assumption, the results that follow (based on employment) were compared to calculations based on variation in receipts. Differences were negligible.

#### IV. Differences in Consumption of Services Among Areas

Differences in regional concentration of services may be related to consumption patterns of cities' residents and businesses, rather than to direct export activity. Most variations in personal services location quotients are probably due to variation in city residents' consumption. For example, regional differences in the taste for hairdressing or in climate could generate nonexport-based variations in location quotients. For this reason, the analysis below excludes personal services.

Controlling for variation due to indirect exports (differences in consumption by cities' businesses) is more problematic. The technique applied below does not distinguish between direct and indirect export activity. However, if the users of services are regionally dispersed, indirect exports are likely to be a smaller portion of total exports than if the users tend to be concentrated geographically.

Table 2 presents national consumption patterns for business services in 1981, the latest year available. The upper panel compares the disposition of total output, as measured by receipts, of all domestic industries to that of business services. On average, about half (47.6 percent) of the output of U.S. firms is purchased by other firms as an input to their own production. The other half is produced for final demand, primarily personal consumption (about 33 percent of the total) and government purchases (10.1 percent of the total). Investment and inventory changes consume another 8.9 percent, while net exports were less than 1 percent of total output.

The pattern for business services is markedly different. Intermediate demand consumes 82.0 percent of total output, with the remainder fairly evenly split between personal consumption and the government. In short, the demand for business services is indeed primarily a derived demand from that for other industries. Thus, variation in the level of personal consumption is not likely to be a significant source of variation in the provision of business services. It is also interesting to note that the U.S. balance of trade in business services, although small (only 1.5 percent of business service output), is better than the average for U.S. industries.

The second panel of table 2 indicates which industries are the largest consumers of business services. Two factors are important in the level of consumption: the relative size of the consuming industry and its relative use of business services. The first column of the table compares industries by their share of output consumed as final demand. The second column shows each industry's share of total output, which includes products sold to other firms as intermediate goods. The third column lists the share of the

total output of business services consumed by each industry.

Four industries emerge as heavy (double-digit) users of business services: wholesale and retail trade; construction; durable manufacturing; and nondurable manufacturing. The trade industries alone use almost 22 percent of the output of business services, not only because the sector is large, but also because the industries have a high relative use of these services. Construction also combines the influences of large industry and heavy use. In contrast, manufacturing firms are below-average users of business services. However, because of the size of the sector, they consume 24 percent of the output of business service firms.

Of the four largest consumers of business services, the top two (construction and trade) are very regionally dispersed, one is somewhat dispersed (nondurable manufacturing), and one is fairly concentrated (durable manufacturing). Construction and wholesale and retail trade have two features in common: seasonal demand and small establishment sizes. Their prominence is consistent with the hypothesis that business services provide smoothing and scale economies to their customers. Thus, by this cursory analysis, the evidence is somewhat mixed. Some of the regional variation in service employment no doubt derives from regional variation in manufacturing consumption. Nevertheless, much of the regional concentration of services is probably due to direct exports, and therefore is a viable part of an economic export base.

#### V. Signs of Service Export Activity by Industry

Which service industries are characterized by the most trade activity? Unfortunately, statistics on the service sector are not plentiful. However, in 1982 the U.S. Department of Commerce conducted an economic census of the service sector. From that snapshot of services in the U.S. and in Fourth District cities, we can get some indication of our service industry strengths and weaknesses. Because much of the most interesting growth in services took place after 1982, the conclusions we can reach about current strengths and export activity from these data are at best limited. The data allow identification of the baseline distribution of industries. However, it is not clear whether subsequent growth took place in those industries the region lacked or in those industries showing relative strength.

Table 3 ranks three- and four-digit hotel and producer service industries by the standard deviation of employment location quotients across MSAs in 1982. The data used are employment totals in taxable (that is, for-profit)



Service Industry Export Activity Among MSAs in 1982

Service Industry	Percent of Total Employment <sup>1</sup>	Export Activity Group <sup>2</sup>	Standard Deviation of Location Quotients
Research and development laboratories	0.06	High	0.192
Schools and educational services, not elsewhere classified	0.02	High	0.161
Hotels, motels, and lodging places	1.26	M-High	0.106
Direct mail advertising services	0.06	M-High	0.100
Surveying services	0.03	Moderate	0.076
Interior designing	0.02	Moderate	0.075
Engineering services	0.61	Moderate	0.074
Testing laboratories and facilities	0.04	Moderate	0.073
Commercial photography, art and graphics	0.08	Moderate	0.071
Correspondence and vocational schools	0.05	Moderate	0.066
Stenographic and reproduction services	0.03	Moderate	0.065
Commercial sports and recreation	0.53	Moderate	0.063
Blueprinting and photocopying	0.03	Moderate	0.061
Photographic finishing labs	0.09	Moderate	0.059
Advertising services	0.23	Moderate	0.056
Computer and data processing services	0.55	Moderate	0.056
Equipment rental and leasing services	0.19	Moderate	0.054
Architectural services	0.14	Moderate	0.052
Management and public relations consulting	0.55	M-Low	0.045
Personnel supply services	0.86	M-Low	0.042
Credit reporting and collection agencies	0.08	M-Low	0.038
Detective agencies and protection services	0.47	Low	0.031
Other repair shops and related services	0.25	Low	0.028
Legal services	0.83	Low	0.028
Services to dwellings and other buildings	0.81	Low	0.026
Electrical and electronic repair shops	0.13	Low	0.023
Accounting, audit, and bookkeeping services	0.47	Low	0.018

1. Industry employment as a percent of total employment in all industries in all U.S. MSAs.

2. Export activity group is a somewhat arbitrary grouping of the industries on the basis of standard deviation of the location quotients in that industry across all U.S. MSAs (shown in the last two columns). The following service industries were excluded from this analysis: trailering parks and camps; all health services; bowling alleys and billiards and pool establishments; telephone answering services; other services; photographic portrait studios; funeral services and crematories; automotive services; automobile parking; all personal services; reupholstery and furniture repair; other health services; other business services, not elsewhere classified; auto rental and leasing without drivers.

SOURCES: U.S. Department of Commerce, Census of Service Industries 1982 (service industry employment by city); Department of Commerce County Business Patterns 1982 (total employment by city).

TABLE 3

establishments by industry and MSA from the 1982 U.S. Department of Commerce Census of Services. Personal services are excluded from the analysis because variations are probably due primarily to variations in demographic characteristics. Health services are excluded because these data omit the tax-exempt sector and hospitals, which are both important employers in health services.

The industries are grouped from high evidence of export activity to low export activity, based on the standard deviation of location quotients for the industry. At the top of the list are research and development laboratories and private technical schools, reflecting the inherent exportability of knowledge (although the variation in research and development employment may be due to indirect exports).

The large variance in employment by hotels, motels, and other lodging places among MSAs reflects the variation in the extent of tourism and convention activity among cities. On the other hand, at the bottom of the list are legal services and accounting, audit, and bookkeeping services. Most of the output of these two industries is probably consumed locally.

For comparison, table 4 presents standard deviations for two-digit manufacturing industries. The higher level of aggregation in these data should tend to reduce variation. Nevertheless, the standard deviations of location quotients among MSAs of these industries are, in general, higher than those of the service industries. Application of the same export activity groupings used in table 3 puts more than half (10 of 19) of the manufacturing industries in the high

or moderately high categories, compared to four of the 27 service industries included. There is, however, considerable overlap in the ranges covered by the standard deviations in services and manufacturing.

For example, three service industries (R&D labs, schools not elsewhere classified, and hotels) show more evidence of export activity to other regions than does primary metals. Thus, while the more traditional view of manufacturing as inherently export industries and services as inherently local industries has some validity, a subset of service industries is at least as geographically concentrated as the bulk of manufacturing industries.

The pattern of export activity across MSAs in the District shows no strong consistency, except perhaps for the lack of concentration in the most heavily traded industries. Each city has a unique pattern of strengths, which is to be expected if the proximity of cities increases the probability that they trade heavily with one another. Cleveland's concentration in private, for-profit schools and educational services, not elsewhere classified, is the only entry from the high or moderately high exportability groups. A few industries appear more than once. For instance, personnel supply services is prominent in three of the four cities. Management and public relations consulting; detective and protection agen-

**Manufacturing Industry Export Activity Among MSAs in 1982**

Manufacturing Industry (SIC)	Percent of Total Employment <sup>1</sup>	Export Activity Group <sup>2</sup>	Standard Deviation of Location Quotients
Petroleum and coal (29)	0.12	High	0.250
Textile mill products (22)	0.53	High	0.237
Leather and leather products (31)	0.15	High	0.213
Furniture and fixtures (25)	0.36	High	0.151
Lumber and wood products (24)	0.29	High	0.145
Instruments and related products (38)	0.75	High	0.131
Primary metals (33)	0.85	M-High	0.105
Miscellaneous manufacturing (39)	0.42	M-High	0.101
Paper and allied products (26)	0.56	M-High	0.094
Transportation equipment (37)	1.43	M-High	0.088
Apparel and other textile products (23)	1.17	Moderate	0.082
Stone, clay, and glass products (32)	0.49	Moderate	0.078
Chemical and allied products (28)	0.99	Moderate	0.078
Rubber and miscellaneous plastics (30)	0.69	Moderate	0.061
Electrical and electronic equipment (36)	2.31	Moderate	0.055
Food and kindred products (20)	1.63	Moderate	0.050
Nonelectrical machinery (35)	2.63	Moderate	0.049
Fabricated metal products (34)	1.87	M-Low	0.042
Printing and publishing (27)	1.68	Low	0.033

1. Industry employment as a percent of total employment in all U.S. MSAs.

2. Export activity group is relative to the service industry standard deviations, as defined in the text and in table 3.

SOURCES: U.S. Department of Commerce, Census of Manufactures 1982 (manufacturing industry employment by city); Department of Commerce County Business Patterns 1982 (total employment by city).

**TABLE 4**

**VI. Exportability and the Strengths and Weaknesses of the Service Sector in the District**

Does the Fourth District export services? This section examines evidence on the extent of concentration of Fourth District MSAs in export-intensive service industries.

Table 5 shows the industries in which the four major MSAs in the District were particularly strong. Also listed are the exportability group of each industry and the estimated number of jobs over the national average.

cies; and accounting, audit, and bookkeeping services each appear twice. These are the only cases of repetition.

Personnel supply services consists of two main components: employment agencies and temporary help suppliers. From 1982 to 1984, temporary employment was the fastest-growing industry, with more than 50,000 employees in the U.S. (see Carey and Hazelbaker [1986]). Although many of the jobs are low-skill (laborer and clerical positions), there are two high-skill sectors of the market: engineering and technical.

Fourth District Service Industry Employment Surpluses by MSA in 1982

	Export Activity Group <sup>1</sup>	Employment Surplus <sup>2</sup>
<b>Cincinnati</b>		
Commercial photography, art and graphics	Moderate	220
Commercial sports and recreation	Moderate	230
Photographic finishing labs	Moderate	270
Management and public relations consulting	M-Low	300
Personnel supply services	M-Low	1,550
Services to dwellings and other buildings	Low	570
<b>Cleveland</b>		
Schools and educational services, not elsewhere classified	High	230
Stenographic and reproduction services	Moderate	220
Personnel supply services	M-Low	1,150
Detective agencies and protection services	Low	860
Other repair shops and related services	Low	550
Accounting, audit, and bookkeeping services	Low	610
<b>Columbus</b>		
Architectural services	Moderate	400
Management and public relations consulting	M-Low	1,960
Credit reporting and collection agencies	M-Low	1,330
Other repair shops and related services	Low	540
Services to dwellings and other buildings	Low	250
<b>Pittsburgh</b>		
Engineering services	Moderate	5,810
Testing laboratories and facilities	Moderate	370
Personnel supply services	M-Low	1,010
Detective agencies and protection services	Low	840

1. Export activity group is a grouping of industries by the standard deviation of the location quotients in that industry across all U.S. MSAs. See table 1 and text for explanation.

2. Surpluses are rounded to the nearest 10. Only industries with employment surpluses of more than 200 are included.

SOURCES: U.S. Department of Commerce, Census of Service Industries 1982 (service industry employment by city); Department of Commerce County Business Patterns 1982 (total employment by city).

TABLE 5

Temporary work affords workers an opportunity for flexible schedules and experimentation with positions. It allows employers to adjust to temporary employment needs due to seasonal or cyclical fluctuations, to employee absences, or to demand shifts of dubious permanence. The size of the industry in these Fourth District cities may indicate that local employers were more hesitant about adding permanent personnel than were others nationally. On the other hand, it may have signaled the beginning of growth: that is, as an indication of positions soon to be added to permanent staff.

If the prominence of personnel supply services results from the high-skill sectors, it may signal that the engineering and technical schools in Cleveland, Columbus, and Pittsburgh produce a concentration of technically skilled people who export some of their services to areas without such schools.

The most striking entry among the surpluses is engineering services in Pittsburgh; these exports generate about 5,800 jobs for the

city's economy, over and above the jobs demanded for the local economy. Also of interest is the concentration by some of the cities in industries that are not, in general, characterized by export activity. In particular, Cleveland and Columbus show evidence of concentration in accounting, audit, and bookkeeping services, although this industry ranks the lowest in signs of export activity of all 27 industries analyzed. Perhaps this signals the beginning of a trend toward trade in these industries.

Patterns of consistency across cities are much stronger in the region's service employment deficits. Table 6 shows the industries in which the four MSAs were apparently net importers. In general, these four large cities import legal, research, hotel, computing, and engineering services. R&D labs and legal services both employ significantly fewer people than the national average in all four major Fourth District MSAs. The following industries appear three times on the lists: engineering services; computer

**Fourth District Service Industry Employment Deficits by MSA in 1982**

	Export Activity Group <sup>1</sup>	Employment Deficit <sup>2</sup>
<b>Cincinnati</b>		
Research and development laboratories	High	240
Hotels, motels, and lodging places	M-High	680
Engineering services	Moderate	740
Computer and data processing services	Moderate	610
Architectural services	Moderate	280
Legal services	Low	1,700
Accounting, audit, and bookkeeping services	Low	410
<b>Cleveland</b>		
Research and development laboratories	High	220
Hotels, motels, and lodging places	M-High	3,080
Engineering services	Moderate	490
Computer and data processing services	Moderate	1,280
Equipment rental and leasing services	Moderate	300
Management and public relations consulting	M-Low	990
Legal services	Low	550
Services to dwellings and other buildings	Low	990
<b>Columbus</b>		
Research and development laboratories	High	240
Engineering services	Moderate	490
Commercial sports and recreation	Moderate	480
Personnel supply services	M-Low	490
Detective agencies and protection services	Low	1,840
Legal services	Low	360
<b>Pittsburgh</b>		
Research and development laboratories	High	480
Hotels, motels, and lodging places	M-High	3,070
Commercial sports and recreation	Moderate	1,210
Computer and data processing services	Moderate	1,440
Equipment rental and leasing services	Moderate	440
Architectural services	Moderate	420
Management and public relations consulting	M-Low	350
Other repair shops and related services	Low	200
Legal services	Low	1,800
Services to dwellings and other buildings	Low	1,000
Accounting, audit, and bookkeeping services	Low	400

1. Export activity group is a grouping of industries by the standard deviation of the location quotients in that industry across all U.S. MSAs. See table 1 and text for explanation.

2. Deficits are rounded to the nearest 10. Only industries with employment deficits of more than 200 are included.

SOURCES: U.S. Department of Commerce, Census of Service Industries 1982 (service industry employment by city); Department of Commerce County Business Patterns 1982 (total employment by city).

**TABLE 6**

and data processing services; and hotels, motels, and other lodging places.

Hotels, in particular, stand out as a major deficit in Cleveland and Pittsburgh. This suggests that these cities "import" conventions and tourism; that is, people leave these cities to vacation or to attend conventions. The lack of local engineering services employment in Cincinnati, Cleveland, and Columbus may be due to imports of those services from Pittsburgh. The regional deficits in computer and data processing services employment suggest heavy importation

of these services or slowness to begin using them (that is, deficient local demand), as of 1982. This deficit is particularly troubling because between 1974 and 1984, employment nationwide in this industry grew by 250 percent.

**VII. Conclusion**

The major points of this paper may be summarized as follows:

1. The composition of employment in the United States and in the Fourth Dis-

trict is shifting toward services. The Fourth District currently exceeds the nation in the growth of services as a whole and in the fast-growing business services.

2. Increased minimum efficient scale (MES) for the provision of producer services may be a basic reason for their growth. This implies that trade in services may increase, although as of 1982, there was apparently less trade in producer services than in manufacturing. Services, to the extent that they are exported directly to consumers outside a region, are viable members of the regional economic base.

3. In the producer services (in 1982), the four largest cities in the Fourth District each specialized in a different combination of services; only personnel supply services was an industry of concentration for more than two cities. The largest concentration was engineering services in Pittsburgh, which generated about 5,800 extra jobs.

4. Fourth District import patterns were more consistent across cities; employment deficits were pronounced in legal, research, hotel, computing, and engineering services for at least three cities out of four.

This information is particularly relevant to the Fourth District because of the recent national and regional decline in manufacturing employment. Can we expect the service industries to replace lost manufacturing dollars? If economies of scale rise in the services, interregional and international trade in services should continue to grow. There is no reason to expect dollars drawn into a region by services sales to have a smaller impact on wealth than dollars earned through manufacturing activity (assuming that income earned from service firms is spent similarly to that from manufacturing firms). The recent growth in services in the Fourth District suggests that they may be able to replace some of the lost manufacturing dollars, but it is unclear just how much replacement any region, and the Fourth District in particular, can expect.

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