PRODUCER SERVICES, PRODUCTIVITY, AND METROPOLITAN INCOME

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Abstract—It is frequently argued that significant productivity increases require a strong and expanding manufacturing sector, and that the rapid growth of the services sector has been a drag on productivity. It is argued here that in an increasingly information-oriented economy, producer services—whether performed within manufacturing firms or by independent, specialized enterprises—play a pivotal role in expanding the division of labor, which in turn generates greater productivity and increasing incomes. The study utilizes data from the 1987 economic censuses. The results confirm and reinforce earlier evidence that the density of metropolitan producer services has a highly significant and positive association with per capita metropolitan income (as well as per capita metropolitan earnings), even when the relationship is controlled for level of education and for metropolitan population size, each of which also makes a positive and significant contribution.

I. INTRODUCTION

It is frequently argued that significant productivity increases require a strong and expanding manufacturing sector and that the rapid rise in employment in services and the increasing proportion of white-collar workers within the manufacturing sector represent a drag on productivity (Thurow 1980, 1989; Rones 1986; Roach 1988). It will be argued here that this negative view is mistaken with respect to producer services, whether performed within manufacturing firms or by independent, specialized firms. Producer services increase productivity through their catalytic role in the overall reorganization of the production of goods and services. Attempts to measure the productivity of producer services in isolation would be misleading because such efforts would not reveal the nature and significance of interdependencies among firms and industries in manufacturing and in services or the ways in which technological progress affects the organization of goods and services production (Illeris 1989).

In a recent article, Hansen (1990) maintained that in an increasingly information-oriented economy, producer services play a pivotal role in expanding the division of labor, which in turn generates greater productivity and increasing incomes. In the empirical analysis, per capita income in U.S. metropolitan areas was

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the dependent variable. The independent variables included measures of producer services density, educational attainment, and population size. The producer services variable was derived from data in the 1982 economic censuses.

The present study, while similar to that previously reported, differs in two major respects. First, it utilizes data from the 1987 economic censuses and defines the producer services density variable in four different ways. Also, the analyses using 1987 data were replicated using per capita earnings, rather than per capita income, as the dependent variable. While it is preferable to use the earnings variable from a theoretical viewpoint, this approach further increases the relative importance of the producer services density variable.

II. PRODUCER SERVICES AND METROPOLITAN PRODUCTIVITY

Quantitative and qualitative enlargements of the division of labor take place both within manufacturing firms, as represented by their nonproduction payrolls, and by independent producer-services enterprises. These activities need to be considered in conjunction with one another because of the strong complementarities and substitutabilities between their outputs. In the past, an expanding division of labor was reflected primarily in the growth of service occupations within the manufacturing sector. More recently, however, work that formerly might have been carried out within manufacturing industries has gravitated toward specialized producer services firms. There are a number of reasons for this phenomenon (Gershuny 1987). For example, there has been considerable growth in the non-wage costs of manufacturing labor, and in many instances, workers have protected employment so that direct employment has become a fixed cost to many firms. Thus, employers have incentives to purchase services externally. Specialized producer services firms increasingly achieve economies of scale that make it more efficient for manufacturing firms to purchase services rather than to produce them internally. Moreover, technological progress creates ever more opportunities for service specializations, and the value of new products increasingly consists of add-on services. For example, approximately two-thirds of the value-added in the computer market consists of software and maintenance services—add-ons that tend to be provided by firms in the services sector rather than in manufacturing. Nonetheless, even though goods production involves greater use of service activities, it should be recognized that a high proportion of the sales of producer services firms are made to other firms in the services sector (Coffey and Bailly 1990; Goe 1990). Finally, it should be stressed that only a small part of the growth of producer services is accounted for by "unbundling," that is, a simple transfer of activities from

one sector to another. Rather, the most important explanation is structural change in the way that goods and services are produced (Kutscher 1988).

To the extent that wages and salaries correspond to marginal productivities, and to the extent that the growth of producer services expands the division of labor and productivity in the entire metropolitan economy, metropolitan areas with relatively high densities of producer services in the work force should have relatively high per capita incomes. Productivity increases through an expanding division of labor also have a qualitative dimension. Higher levels of skill and education in the work force induce higher-order producer services and other knowledge-intensive activities. However, the latter also make a place more attractive to skilled and educated workers (Coffey and Polèse 1989). Thus, producer services density and the level of skills and education could both be expected to be directly related to productivity and per capita income, though they would not account for all of the complex factors that raise productivity. In particular, productivity gains may be achieved from the expanding markets and divisions of labor associated with urbanization economies and localization economies, which are likely to increase with metropolitan population size. In view of these considerations, it is hypothesized that producer services density (including both nonproduction payroll outlays of manufacturing firms and the value of outputs of independent producer services enterprises), educational attainment, and metropolitan population size will each make a significant contribution to metropolitan productivity and income.

Before considering the empirical results in these regards, it should be pointed out that the definition of what constitutes independent producer services sectors has varied considerably (Goe and Shanahan 1990) and has included such activities as communications; finance, insurance and real estate; legal services; health services; advertising and marketing; data processing and computer programming; and engineering, accounting, research, and management services. In Hansen (1990), independent producer services were those activities classified as Business Services (SIC 73) in the 1982 Census of Service Industries. Although the present study uses this definition for comparative purposes, it also employs a different definition—based on SIC code revisions introduced in the 1987 Census of Service Industries—that includes both SIC 73 and SIC 87, the latter being Engineering, Accounting, Research, Management and Related Services. Some, but not all, of the SIC 87 activities in the 1987 Census of Service Industries were classified under SIC 73 in the 1982 Census of Service Industries. A detailed description of the revisions made in the SIC classifications of services sectors between the 1982 and 1987 Censuses of Service Industries is given in U.S. Bureau of the Census (1989).

It is clear that some sectors that have at times been regarded as producer services are not included here because of their ambiguous nature. For example, on the basis of microeconomic data, Goe (1990) found that whereas the sectors in SIC 73 and SIC 87 derived most of their revenue from indirect production activities, rather than from consumer activities, this was not the case for such sectors as banking, securities brokers, insurance carriers and agents, real estate, and legal services. On the other hand, biases might be introduced in some regions because producer services, broadly defined, tend to be concentrated in a relatively few very large metropolitan areas where they have access to highly qualified labor, research centers and universities, complementary producer services, and large local markets, particularly the corporate headquarters that have high demand for such services (Noyelle and Stanback 1984; Coffey and Bailly 1990). And in large metropolitan areas, these services are more likely to sell to producers than to consumers than would be the case in smaller metropolitan areas. Nevertheless, Illeris (1989) has found that even some nonmetropolitan areas have environmental advantages that attract and hold producer service enterprises that perform well in terms of long distance linkages. And Porterfield and Pulver (1991), on the basis of survey data obtained in Illinois, Iowa, Michigan, Minnesota, and Wisconsin, found that rural services producers exported only slightly less, on average, than did services producers located in the urbanized portions of metropolitan areas.

Although legal services are frequently included in analyses of producer services, they are excluded here because of evidence that in many instances they may be counterproductive. For example, it has been estimated that, in the mid-1980s, the redistributive perversities of the U.S. legal system reduced the GNP by 10 percent below its potential level (Magee 1989, 1991; Magee, Brock, and Young 1989).

Finally, Beyers (1991) has provided evidence that employment in the occupational categories that distinctively identify the producer services is widely scattered among many sectors of the economy. However, it should be recognized that the information base for identifying those activities that are actually productivity-enhancing services to producers is inadequate. The SIC scheme, even as revised in 1987, lacks consistency in distinguishing among the different markets for services and lacks sufficient categories to classify many enterprises according to their real functions in the economy (Goe and Shanahan 1990).

In view of the foregoing considerations, producer services are analyzed here in terms of the receipts of enterprises in SIC 73 and SIC 87, as well as manufacturers' nonproduction payroll outlays. These involve activities that can reasonably be regarded as producer services without a great deal of ambiguity concerning the actual function of various subsectors. And they provide a

reasonably accurate reflection of the productivity-enhancing expansion of the division of labor due to producer services.

III. EMPIRICAL ANALYSIS WITH PER CAPITA INCOME AS THE DEPENDENT VARIABLE

In Hansen (1990), the hypotheses set forth in the previous section were evaluated using data for the 240 U.S. Metropolitan Statistical Areas (MSAs) and Primary Metropolitan Statistical Areas (PMSAs) for which comparable data were available. The function including all of the hypothesized relations was

$$PCI = f(HIED, PSER, POP)$$

where PCI is metropolitan per capita income in 1983 (U.S. Bureau of the Census 1986), HIED is the proportion of persons 25-years old and over who had completed 16 or more years of school in 1980 (U.S. Bureau of the Census 1986), and PSER is the sum of manufacturers' nonproduction payroll outlays in 1982 (U.S. Bureau of the Census 1986) and producer services (SIC 73) receipts in 1982 (U.S. Bureau of the Census 1984) divided by MSA or PMSA private nonfarm employment in 1982 (U.S. Bureau of the Census 1986). The division by employment means that PSER represents the richness or density of producer services in the division of labor of the metropolitan economy. The function was estimated by OLS with all variables in log form. The results are shown in Table 1 as Equation (1).

The remaining equations in Table 1 are based on more recent data. They include 287 MSAs and PMSAs, 47 more than in the earlier analysis, though again some metropolitan areas could not be included because of disclosure restrictions with respect to the producer services data.

Equation (2) is the one most comparable with Equation (1). In Equation (2), PCI is metropolitan per capita income in 1987 (U.S. Department of Commerce 1989). HIED is defined as in Equation (1) because comparable data from the 1990 Census of Population were not yet available. POP is metropolitan population from the 1990 Census of Population (U.S. Bureau of the Census 1991b). PSER combines manufacturers' nonproduction payroll outlays in 1987 (U.S. Bureau of the Census 1991a) and SIC 73 receipts in 1987 (U.S. Bureau of the Census 1989), which are divided by private nonfarm employment in 1987. Employment data were obtained from Bureau of Economic Analysis, U.S. Department of Commerce, tapes.

TABLE 1
Regression Results for U.S. Metropolitan Areas, with Per Capita Income as the
Dependent Variable

	Intercept	HIED	PSER	POP	R ²	F-Value
(1) (n=240)	7.187* (54.64)	0.204* (9.03)	0.131* (7.72)	0.026* (3.24)	.513	83.14*
(2) (n=287)	9.244* (45.00)	0.149* (5.80)	0.132* (7.21)	0.055* (6.09)	.469	83.72*
(3) (n=287)	9.305* (47.68)	0.161* (6.47)	0.136* (8.08)	0.051* (5.72)	.490	90.77*
(4) (n=287)	9.467* (40.41)	0.115* (4.29)	0.152* (7.12)	0.051* (5.40)	.467	83.07*
(5) (n=287)	9.586* (43.42)	0.127* (4.98)	0.161* (8.26)	0.045* (4.86)	.494	92.32*

Notes: *Significant at the .01 level.

The numbers shown in parentheses are *t* - values.

Equation (3) differs from Equation (2) only in that the denominator in the PSER variable includes government employment, as well as private nonfarm employment, in view of the high level of demand for producer services by the public sector (Coffey and Bailly 1990).

Equations (4) and (5) differ from Equations (2) and (3), respectively, in that the independent producer services sector in the PSER variable in Equations (4) and (5) includes not only SIC 73 activities, but also those in SIC 87.

Table 1 presents the regression results for all five equations. The numbers in parentheses are *t* - values. All three independent variables were significant at the .01 level in all five equations. In all equations, the three independent variables accounted for approximately half of the variation in per capita metropolitan income, as indicated by the R² values. There was also a shift over time in the relative explanatory importance of the independent variables. Comparing Equation (1) from the earlier time period with Equation (2) from the later period, it can be seen that the coefficient for PSER remained virtually the same, while the coefficient for HIED decreased and that for POP increased. However, the coefficient for PSER becomes greater from Equation (2) to Equation (5), and in Equations (4) and (5), PSER has the highest *t*-value among the independent variables.

IV. EMPIRICAL ANALYSIS WITH PER CAPITA EARNINGS AS THE DEPENDENT VARIABLE

Although per capita income is typically used as an indicator of economic well-being and productivity, it partly reflects property and other unearned income that may originate in any region, which suggests that it would be preferable to use per capita earnings—which are generally earned from production in the region of residence—as the dependent variable. The data presented in Table 2 are similar to those in Table 1, except that 1987 per capita earnings (U.S. Department of Commerce, Bureau of Economic Analysis 1989) is the dependent variable, rather than per capita income.

Comparison of the results shown in Table 2 with those in Table 1 indicates that for the most part, the importance of PSER is considerably enhanced by the use of per capita earnings. In each of the four equations in Table 2, the R^2 -values are higher than the corresponding values in Table 1. In comparison with the results shown in Table 1, the coefficients for POP are lower in all equations, while those for HIED and PSER are greater in all equations. Finally, the t-value on PSER is the highest among independent variables in each of the four equations.¹

V. CONCLUSIONS

The results of this study confirm and reinforce earlier evidence that the density of metropolitan producer services—broadly defined to include the nonproduc-

TABLE 2
Regression Results for U.S. Metropolitan Areas, with Per Capita Earnings as the Dependent Variable

	Intercept	HIED	PSER	POP	R^2	F-Value
(2) n=287	9.450** (38.23)	0.194** (6.26)	0.214** (9.71)	0.039** (3.62)	.493	91.89**
(3) n=287	9.422** (39.79)	0.215** (7.12)	0.207** (10.13)	0.036** (3.33)	.504	96.06**
(4) n=287	9.760** (34.33)	0.142** (4.33)	0.241** (9.30)	0.033** (2.93)	.482	88.05**
(5) n=287	9.779** (36.20)	0.166** (5.31)	0.238** (9.98)	0.028* (2.52)	.500	94.46**

Notes: *Significant at the .05 level.

**Significant at the .01 level.

The numbers shown in parentheses are *t* - values.

tion payroll outlays of manufacturing firms and the value of sales of independent producer services enterprises—has a highly significant and positive association with metropolitan per capita income, even when the relationship is controlled for level of education and for metropolitan population size, each of which also makes a positive and significant contribution.

Equation (5) is the most complete in terms of what is included in the PSER variable, with all data being from 1987. Here PSER includes nonproduction payroll outlays of manufacturers, as well as both SIC 73 and SIC 87 receipts, in the numerator and both nonfarm private employment and government employment in the denominator. Among the independent variables in Equation (5), with per capita income as the dependent variable (Table 1), variation in PSER has the strongest degree of association with variation in the dependent variable. In Equation (5), with per capita earnings as the dependent variable (Table 2), the coefficient for PSER is considerably higher than it was in the previous case, and again variation in PSER has the strongest degree of association with variation in the dependent variable. Thus, although the use of per capita earnings is preferable on purely theoretical grounds, because it more clearly reflects income derived from local production, it also yields results that amplify the relative importance of PSER. The overall findings of this study indicate that insofar as income—and even more so, earnings—are related to marginal productivity, the growth of producer services has expanded the division of labor and productivity in the context of an increasingly information-oriented economy.

Finally, Bound and Johnson (1992) have shown that the major cause of the huge increase in the relative wages of highly educated workers in the 1980s was a shift in the skill structure of labor demand, brought about by biased technological change involving computers and other "high-tech" capital. Within manufacturing, this shift was associated with labor demand shifts from production workers toward nonproduction workers. Similar phenomena were no doubt driving the rapid growth of employment and income in information-intensive independent producer services (Kutscher 1988). Given the continuing growth in relative demand for highly educated labor, producer services density is likely to remain significantly associated with metropolitan productivity and per capita income.

ENDNOTE

1. It might be argued that the national-level results obtained here could reflect interregional wage differentials rather than productivity. For example, manufacturing growth has been rapid in the South, where the relative cost-of-living and nominal incomes tend to be low. If producer services growth took place

primarily in the Northeast and Midwest, where cost-of-living and wages are higher, then the empirical analysis would indicate a statistical relationship between producer services density and per capita income or earnings. However, Hansen (1990) presented regression results at the national and regional levels, which indicated that the PSER variable was significant *within* all regions except the South Atlantic. Similar results were obtained at the regional level in the present study and are available from the author.

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