Working Paper 8607

PRODUCTIVITY GROWTH AND THE DECLINE OF MANUFACTURING IN LARGE METROPOLITAN AREAS: 1959-78.

By Patricia E. Beeson

Patricia E. Beeson is a visiting economist at the Federal Reserve Bank of Cleveland, and an assistant professor of economics at the University of Pittsburgh. The author would like to thank Michael Fogarty, Gary Garofalo, and Devinder Malhotra for the use of their capital stock series, and to thank Katherine Barnum and Ralph Day for their research assistance.

July 1986

Federal Reserve Bank of Cleveland

Productivity Growth and the Decline of Manufacturing in Large Metropolitan Areas: 1959–78.

I. Introduction

For a number of years, manufacturing activity in the United States has been shifting out of large metropolitan areas into the smaller metropolitan areas and rural areas, as well as shifting out of the traditional Manufacturing Belt region into the South and West.' According to work done by Carlino (1985), the decline of the large metropolitan centers appears to be independent of the broader regional shifts, in that it is not simply a movement from the urban areas of the North to rural areas of the South and West. Rather, Carlino finds that the 'Rural Renaissance' is occurring throughout the U.S., with the large manufacturing centers of the North losing not just to the South and West but also to their own hinterland.

This movement of manufacturing activity has been particularly devastating for the large standard metropolitan statistical areas (SMSAs) of the traditional Manufacturing Belt region. During the period 1959–78, manufacturing employment in these SMSAs fell by 8 percent compared with a national increase of 23 percent. These large metropolitan areas are often characterized as areas with a deteriorating infrastructure, an aging capital stock, an unfavorable industry mix, and what Olson (1981) refers to as 'institutional sclerosis' (the inefficiency that is introduced into the economy by special interest groups whose power increases as the cities mature). In addition, the spatial structure of these cities was determined by transportation and communication technologies that may now be outdated and, as a result, may not be the most efficient given current technologies.

All of these factors suggest that the productivity of these old, large metropolitan areas may have declined relative to smaller, more recently developed, areas of the country. If this is true, it could help to partially explain the some of the movement of the manufacturing industry in the United States in recent years.

This paper uses a Denison-Jorgenson-Kendrick growth-accounting framework to examine the role of productivity differences in explaining the decline of manufacturing activity in large metropolitan areas relative to the rest of the country, with special attention given to the decline of the large metropolitan areas of the Manufacturing Belt. A recent study by Hulten and Schwab (1984) used a similar approach to examine the decline of the Manufacturing Belt relative to the rest of the country, but did not distinguish between metropolitan and nonmetropolitan areas.

The findings of this study indicate that during the period 1959-78 differences in productivity growth did not contribute to the relatively slow growth of output (as measured in terms of real value added) in large metropolitan areas across the nation. In fact, productivity growth was slightly higher in the large metropolitan areas. The primary source of the relative decline in productivity is found to be a relatively low rate of capital accumulation. This was also true at the regional level, with the exception of the South, where a lower growth rate of productivity was a major contributor to the lower growth rate of real value added in the large metropolitan areas relative to the rest of the region.

A closer examination of the relative positon of the large metropolitan areas of the Manufacturing Belt indicates that, while the growth rate of productivity during the period is slightly higher than average, the level of productivity in these cities is lower than productivity in almost every other area of the country. This finding is consistent with a decline in the relative

productivity of these cities prior to 1959.

The organization of this paper is as follows. In Section II, a model of relative productivity and firm location is developed. The sources of growth framework used to examine differences in productivity is developed in Section III, and the data used in the calculations are described in Section IV. Section V contains a discussion of the results of the sources of growth analysis.

II. PRODUCTIVITY AND FIRM LOCATION

A decline in the relative productivity of large metropolitan areas could potentially explain part of the relative decline in their manufacturing production in recent years. The impact of a change in relative productivity on firm location can be seen in a simple model of firm location. Assume that both capital and labor are homogeneous and completely mobile across locations. Firms are assumed to produce a composite commodity, V, subject to constant returns to scale using capital, labor, and land.' Firm productivity is also assumed to be a function of its location, s. All firms are assumed to sell to a national market, hence, the price of V is independent of location and assumed to equal 1. The firm's profits are then characterized by the following function:

$$\pi = V(K,L,N;s) - p_K K - rL - wN \tag{1}$$

where K, L, and N are capital, land, and labor, repectively; p_K, r, and w are the respective factor prices. Differentiating logarithmically with respect to location, and imposing the equilibrium condition that profits be equalized across locations, yields

$$\frac{\partial \ln V}{\partial s} = \Theta_w \frac{d\ln w}{ds} + \Theta_r \frac{d\ln r}{ds} + \Theta_{pk} \frac{d\ln p_k}{ds}, \tag{2}$$

where $\partial \ln V/\partial s$ is the Hicks neutral shift of the cost function with respect to location, and Θ_w, Θ_r and Θ_{pk} are the cost shares of the respective inputs. Equation 2 states that, in equilibrium, the productivity advantage to firms in one location will be exactly offset by some combination of higher factor costs. This model indicates that firms in large urban areas with relatively high wages and land rents can still compete with firms in other locations if there is a productivity advantage associated with the location.[3]

This equilibrium can be disturbed by any exogenous change that affects the relative costs or productivity of large urban areas. At the existing relative wage and rental rates, a change in technology that favored firms located outside the large SMSAs would result in higher profits at these locations. The higher profits would then attract firms from the large urban areas, driving up wages and land rents in the more remote locations relative to the large SMSAs. Firms would continue to relocate away from the large metropolitan areas until wages and rents adjust to the point where firms are once again indifferent between the two locations. If there has been an increase in the productivity of firms in other locations compared with those in large metropolitan areas, this could then explain the relocation of manufacturing activity to smaller cities and rural locations.

There are, however, other factors that may explain the observed movement of the manufacturing sector. The movement of markets, improved transportation systems, changes in unionization rates and tax policies have all been cited as factors that may have contributed to the relocation of manufacturing. While acknowledging the potential importance of these other factors in explaining the decline of large metropolitan areas as manufacturing centers, the analysis that follows focuses on the role of relative productivity changes in the decline.

III. METHODOLOGY

This paper uses a Denison–Jorgenson–Kendrick growth-accounting framework to examine the hypothesis that the decline in the importance of the large metropolitan areas as manufacturing centers is related to a decline of their productivity relative to the rest of the country. Using this framework, total factor productivity (hereafter referred to as TFP) can be calculated either from the firm's locational equilibrium condition (equation 5) or directly from the production function. This paper uses the latter approach. Production is assumed to be characterized by constant returns to scale and by Hicks neutral technical change over time, t, and across locations, s. For the purpose of estimation, production is assumed to be characterized by the following value-added production function,[4]

(3) $$V = V(K,N;s,t)$$

Logarithmically differentiating equation 3 with respect to time yields

(4) $$\frac{d\ln V}{dt} = \frac{\partial \ln V}{\partial \ln K}\frac{d\ln K}{dt} + \frac{\partial \ln V}{\partial \ln N}\frac{d\ln N}{dt} + \frac{\partial \ln V}{at}$$

or

(5) $$TFP_t = \frac{d\ln V}{dt} - S_K \frac{d\ln K}{dt} - S_N \frac{d\ln N}{dt}$$

where TFP_t is the Hicks' neutral shift of the production function over time; s_K and s_N are the output elasticities of capital and labor, respectively Under the assumption that factors are paid in accordance with their marginal products, s_K and s_N are also equal to the income shares of the respective inputs.

Similarly differentiating equation 3 with respect to location, s, yields

(6) $$TFP_s = \frac{d\ln V}{ds} - S_K \frac{d\ln K}{ds} - S_N \frac{d\ln N}{ds},$$

Where TFP_S is the Hicks' neutral shift of the production function across locations.

All the elements of equations 5 and 6 are observable with the exceptions of TFP, and TFP_S, the changes in productivity over time and across

locations. These can be inferred as residuals, which implies that they will contain measurement error in addition to the changes in productivity that they are intended to measure.

These continuous changes can be approximated using discrete data as follows:

$$(7) \qquad TFP_t = \ln V_t - \ln V_{t-1} - .5(S_{Kt}+S_{Kt-1})(\ln K_t - \ln K_{t-1}) - .5(S_{Nt}+S_{Nt-1})(\ln N_t - \ln N_{t-1})$$

and

$$(8) \qquad TFP_{ij} = \ln V_i - \ln V_j - .5(S_{Ki}+S_{Kj})(\ln K_i - \ln K_j) - .5(S_{Ni}+S_{Nj})(\ln N_i - \ln N_j);$$

where i and j refer to locations.

IV. DATA

The sample used in this study covers the period 1959–78 and includes the 48 contiguous states (less New England) and the 45 SMSAs discussed below. All metropolitan area data have been adjusted to make them consistent with the 1977 SMSA definitions.[5] The primary data sources are the Census of Manufactures (COM) and the Annual Survey of Manufactures (ASM).

For the purposes of this study, 'Large Metropolitan Areas' are defined to be SMSAs in which value added in manufacturing exceeded $2 billion in 1978. There are 57 such SMSAs in the United States. Of these 57, twelve were omitted from the analysis due to problems related to data availability.' The remaining 45 SMSAs used in the analysis are listed, by region, in table 1, and their shares of regional value added are shown in table 2. Since none of the large SMSAs of New England are represented in the sample, this region was omitted from the analysis. The contribution of the other omitted SMSAs to their region's output is relatively small.'

As a group, the 45 large SMSAs used in this study accounted for 48 percent of total value added in manufacturing in the U.S. (less New England) in 1978. This represents a decline from their previous 55 percent share in 1959. This decline in share was captured primarily by the smaller SMSAs. There was virtually no change in the share of value added in the nonrnetropolitan areas, until the last period when they experienced a slight gain.

Table 2 displays regional differences in the distribution of value added between the large SMSAs, the smaller SMSAs and the nonmetropolitan areas. In contrast to the South and West North Central (WNC) regions where only about one-third of the regional value added was produced in the large SMSAs, the large SMSAs in the West accounted for almost three quarters of the regional value added. In addition, the large SMSAs' share of value added in the West was fairly constant over the period while their share declined in other regions.

During the period examined, the smaller SMSAs increased their share of value added in all regions, but the corresponding losers of shares of value added varied regionally. In the WNC and Manufacturing Belt, these gains came almost entirely at the expense of the large SMSAs, while in the South and West the relative growth of the smaller SMSAs was associated with a decline in the shares of the nonmetropolitan areas, as well as in the shares of the large SMSAs.

Several data transformations were required in order to make the data comparable with that used in other estimates of productivity growth (notably those done by Hulten and Schwab [1984] and the BLS estimates). Two adjustments were made to the value-added data reported in the COM and ASM. First, data from the NIPA were used to adjust the Census values for purchased services. The Census value-added data include the value of purchased services, but the employment and capital data do not reflect the inputs used

to produce these services. The inclusion of these purchased services in the measure of output would then lead to an overestimate of the growth of TFP, since purchased services as a percent of value added have been increasing over time. The assumption made when adjusting the Census value-added data was that the ratio of purchased services to value added is the same in all locations and is equal to the national average.[8]

The second adjustment to the raw Census value-added data was the conversion of the values to 1972 dollars. Since there are no regional price deflators available that cover the entire sample, all data were deflated using the BEA manufacturing price deflator for the United States. The implict assumption is that all manufacturing goods are sold in national markets.

The labor input (N) is measured as a Divisia index of production and nonproduction worker hours and is computed by weighting each type of labor by its share of payroll expenses. Data on production worker hours are from CCM and ASM. Nonproduction worker hours were computed using data from the same source assuming that each nonproduction worker works 2000 hours per year. Labor income, which is used to calculate the factor shares, is adjusted to include nonwage compensation using NIPA data. Again, it is assumed that there is no regional variation in the ratio of wage to nonwage compensation.

The capital stock data (K) for states and SMSAs are those constructed by Garofalo and Malhotra, and by Fogarty and Garofalo, respectively, (some minor adjustments were made to the state series to make them consistent with the SMSA series).[9] Both series were constructed using a perpetual inventory technique. They include both structures and equipment and are in 1972 dollars.[10]

The data for the large SMSAs were constructed directly from the data sources discussed above. Data for the rest of the region were constructed by subtracting the SMSA data from either the U.S. totals or the regional totals

that, in turn, were constructed by aggregating the state data to the appropriate level.

V. THE SOURCES OF METROPOLITAN GROWTH

The growth of real value added in the large SMSAs, and in other areas of the country, was allocated to input growth and productivity growth using equation 5 and the data described above. The results of this allocation for the period 1959–78 and for the subperiods 1959–65, 1965–73 and 1973–78, for the United States and for geographical regions are presented in table 3.

As anticipated, the growth rate of real value added was consistently lower for the large metropolitan areas than for the rest of the country during all of the time periods examined. For the United States as a whole, the smaller SMSAs and rural areas had a growth rate of real value added that was 40 percent higher than that of the large metropolitan areas. Across more narrowly defined regions, the growth rate disparity between the large metropolitan areas and the rest of the region was also apparent. There was, however, a considerable amount of variation across regions in the growth rate differentials. In the traditional Manufacturing Belt region, the difference in growth rates was 48 percent while, in the West, the growth rate difference was only 13 percent.

The sources of growth were also different for these large SMSAs in comparison to the rest of the country. Total factor productivity growth (TFP) accounted for 70 percent of the growth of the large SMSAs, while capital accumulation and increased labor accounted for equal shares of the remaining 30 percent of the growth of real value added. In the rest of the country, the growth of real value added was accounted for equally by TFP, capital accumulation and increases in labor.

The factors that have contributed to the relatively slow growth of real value added of manufacturing in large metropolitan areas are addressed in table 4. In this table, the growth rates for the large SMSAs are subtracted from those of the rest of the country and region, so that positive numbers indicate a lower growth rate for the large SMSAs. For the United States as a whole, the primary source of the difference in growth rates between the large SMSAs and the rest of the country was a lower rate of capital accumulation in the large SMSAs. Differences in productivity growth were negligible and, in fact, productivity growth was slightly higher in the large SMSAs than in the rest of the country. This indicates that, in general, the decline in the importance of these SMSAs as manufacturing centers cannot be attributed to a relative decline in their productivity during the period 1959–78. This is also true at the regional level, with the exception of the South. The South is the only region in which a substantial portion (38 percent) of the slower growth rate of value added in the large SMSAs can be attributed to a relatively slower growth rate of productivity.

The Decline of the Manufacturing Belt SMSAs

During the period 1959–78, the old, large metropolitan areas in the Manufacturing Belt had a growth rate of real value added well below the growth rates for large SMSAs in other regions and all other areas, including the rest of the Manufacturing Belt. As discussed above, this decline in output in the manufacturing belt cities can not be attributed to a relative decline in their productivity during the period 1959–78. In fact, productivity growth in these SMSAs was 2.4 percent per year- a growth rate higher than that in any other region, except the West North Central (WNC).

This high growth rate of productivity during a period of relative decline may well be the result of the closing of the least efficient firms (or

the laying off of marginal workers and machinery) in these cities during the the period observed. If all firms are not equally efficient, and if the least efficient firms are the first to close, a change in relative costs in a region could lead to an increase in the average measured productivity of an area.

While it is clear that a relative decline in productivity during the period 1959-78 is not responsible for the output decline in large SMSAs, it is still possible that a relative decline in the productivity of these cities occurred prior to 1959, and the movement of manufacturing activity that we observed during the period 1959-78 was in response to the earlier decline. Unfortunately, data are not available to examine this question directly. Instead, the productivity levels of other areas relative to the large SMSAs of the Manufacturing Belt were calculated in the hopes of shedding some light on the relative position of these cities. The idea is that, if these areas had experienced a relative decline in productivity prior to 1959, it might be reflected in lower levels of productivity in the large SMSAs in the Manufacturing Belt for the period 1959-78. The productivity of other areas relative to that of large SMSAs in the Manufacturing Belt was calculated according to equation 6 and the results are presented in table 5.

The numbers in table 5 are consistent with a relative decline in productivity of the large SMSAs in the Manufacturing Belt prior to 1959. The level of productivity in these cities is lower than that for large SMSAs located in all other regions of the country. The productivity levels of the large SMSAs in the Manufacturing Belt are also lower than the productivity levels in smaller SMSAs and rural areas in almost every region, including their own.

While the data are consistent with an earlier decline in productivity in these SMSAs, they are also consistent with other hypotheses. For example, the initial dominance of these large SMSAs in the Manufacturing Belt could have

been due to their locational advantage in relation to materials sources, markets, transportation systems, etc., rather than to a productivity advantage. If this were the case, it is possible that productivity levels have always been lower in these SMSAs than in the rest of the country. The currently lower productivity levels would then not be the result of a previous decline and one would have to look elsewhere for the source of the decline.

It should be noted that if this were the case, the advantage would have to be large enough to offset not only the lower productivity levels of firms in these SMSAs but also the higher wages and land-rents traditionally found there. Unfortunately, there is little data available to evaluate the importance of a locational advantage relative to a productivity advantage in the historical dominance of these cities as manufacturing centers in the U.S.

VI. SUMMARY AND CONCLUSIONS

The analysis presented in this paper indicates that the relatively slow growth of value added in the large SMSAs of the country during the period 1959-78 is due primarily to a relatively low rate of capital accumulation, rather than a relatively low rate of productivity growth. Only in the South did a relative decline in the growth rate of productivity during the period 1959-78 contribute to the decline of large metropolitan areas relative to the rest of the region. There is some evidence, however, to support the hypothesis that the current decline in the output of the large metropolitan areas in the Manufacturing Belt may be related to a decline in the relative productivity of these areas prior to 1959.

APPENDIX A:

The Treatment of Purchased Services

Value added reported in the Census of Manufactures (COM) and the Annual Survey of Manufactures (ASM) include the value of purchased services. Since the data for capital and labor do not reflect the inputs used to produce these services, their inclusion would lead to an overestimation not only of the level of TFP but also the growth rate of TFP, since purchased services were increasing as a percent of value added throughout the time period studied. In 1959, purchased services were approximately 12.5 percent of VA by 1978 their share had increased to 21 percent (these estimates assume that the difference between GDP and VA is a good approximation of purchased services [see below]). The data used in this study was adjusted to correct for purchased services, using the ratio of GDP from the NIPA to census VA for US manufacturing.

GDP differs from VA in the following ways. First, purchased services, company-level depreciation, and business taxes are excluded from GDP, but are included in VA. The Census Bureau estimated that in 1977 these three items accounted for 23.5 percent of VA (see ASM 1978 Appendix A). The division among the three components is not known. Second, excise and sales taxes are included in GDP but excluded from VA. The Census Bureau estimated that in 1977 these accounted for approximately 4 percent of GDP (ibid). Finally, slightly different estimates are used to calculate the compensation of employees, capital depreciation and the value of inventories. Each of these accounted for 1-2 percent of the discrepancy between GDP and VA. Many of the items in the last two categories are offsetting so that, in 1977, VA exceeded GDP by approximately 21 percent. This paper follows the lead of others and assumes that the difference between VA and GDP is a good approximation of purchased services.

Sources of Potential Biases in the Estimates of TFP

The assumption that the ratio of purchased services to VA is the same in metropolitan and nonmetropolitan areas, if incorrect, may bias the estimates of relative TFP. The percent of VA attributable to purchased services may differ for several reasons. First, the percent of purchased services varies across industries. Therefore, if industry mix is different in metropolitan and nonmetropolitan areas, the percent of purchased services will also vary between these two areas. Second, firms in the same industry may purchase more services depending on whether they are located in a metropolitan or a nonmetropolitan area. The theory of agglomeration economies suggests that it is probably the case that firms in urban areas purchase services from outside that firms in more rural locations would provide internally because the demand for some services may not be high enough in rural areas to support specialized business service firms.

When doing cross-city or urban/rural comparisons of productivity levels, differences in purchased services would bias the estimates toward higher estimates of productivity in larger urban areas, if indeed, purchased services increase as a percent of value added as city size increases. The direction of the bias is not as clear, however, when one is doing a comparison of the growth rates of productivity. When doing comparisons of growth rates, the direction of the bias will depend not on the absolute difference in purchased services between areas, but on how these differences change over time. That is, purchased services may always be increasing as a percent of value added as city size increases, and this would lead to a consistent overestimate of the productivity advantages of larger cities. But for this to result in an overestimate of the productivity growth of large cities, relative to smaller cities, would require that purchased services as a percent of value added is increasing more rapidly in the large cities than in the small cities. Since there is no a priori reason to expect that purchased services

are increasing more or less rapidly in urban rather than rural areas, the direction of the bias is unclear.

The second adjustment to value added was the conversion to constant dollars using the price index for U.S. manufacturing. Output prices, however, may vary across regions and between urban and rural locations. To the extent that they do, the estimates of productivity will be affected. Output prices may vary if there are differences in industry mix, or if all manufactured goods are not sold in national markets and the regional market prices differ. As with the purchased services, the bias in the levels of productivity would be related to differences in the level of prices, while differences in the growth rate of productivity would be related to differences in the growth rate of output prices across regions. In the absence of regional output price data, one cannot evaluate whether or not a bias exists, or which direction of bias is likely.

TABLE 1: LARGE SMSAs INCLUDED IN THE SAMPLE BY REGION

MANUFACTURING BELT

Akron, Ohio
Allentown, PA
Buffalo, NY
Canton, OH
Chicago, IL
Cincinnati, OH
Cleveland, OH
Dayton, OH
Detroit, MI
Grand Rapids, MI
Indianapolis, IN
Jersey City NJ
Milwaukee, WI
Newark, NJ
New York, NY
Philadelphia, PA
Pittsburgh, PA
Rochester, NY
Youngstown, OH

WEST NORTH CENTRAL

Kansas City, MO
Minneapolis, MN
St. Louis, MO

SOUTH

Altanta, GA
Baltimore, MD
Birmingham, AL
Charlotte, NC
Dallas, TX
Greensboro, NC
Houston, TX
Louisville, KY
Memphis, TN
Miami, FL
Nashville, TN

WEST

Anaheim, CA
Denver, CO
Los Angeles, CA
Phoenix, AZ
Portland, OR
Riverside, CA
San Diego, CA
San Francisco, CA
Seattle, WA

* Large SMSAs are defined to be those with value added in manufacturing exceeding $2 billion in 1978.

TABLE 2: SHARES OF VALUE ADDED IN LARGE SMSAs[b], SMALLER SMSAs AND NON-METROPOLIAN AREAS, BY REGION

	MB[a]	SOUTH	WEST	WNC	U.S.
Share of Value Added in Large SMSAs					
1959	62.2%	34.9%	73.7%	35.7%	55.3%
1965	60.0%	33.0%	73.3%	36.1%	53.3%
1973	57.7%	30.4%	71.8%	32.7%	50.0%
1978	55.7%	29.7%	71.1%	31.8%	48.2%
Share of Value Added Smaller SMSAs					
1959	19.7%	21.9%	8.0%	16.0%	18.2%
1965	21.0%	25.2%	11.9%	15.8%	20.2%
1973	24.6%	32.2%	13.8%	17.0%	24.3%
1978	26.2%	30.9%	14.6%	18.7%	25.0%
Share of Value Added Non-Metropolitan Areas					
1959	18.1%	43.2%	18.3%	48.3%	26.5%
1965	19.0%	41.2%	14.8%	48.1%	26.5%
1973	17.7%	37.4%	14.4%	150.3%	25.7%
1978	18.1%	39.4%	14.3%	49.5%	26.8%

[a] Manufacturing Belt

[b] Large SMSAs are those listed in table 1.

TABLE 3: TFP GROWTH: LARGE SMSAs RELATIVE TO THE REST OF THE REGION

	MB[a]		SOUTH		WEST		WNC		U.S.		U.S.
Growth Rate	SMSAs[b]	Other	SMSAs	Other	SMSAs	Other	SMSAs	Other	SMSAs	Other	Total
Real Value Added (DQ)											
1959-65	4.50	6.03	6.01	7.84	5.40	4.82	6.25	5.98	4.94	6.32	5.54
1965-73	2.20	3.42	4.48	6.73	5.03	6.57	3.31	5.20	3.21	5.02	4.05
1973-78	-.17	1.46	2.93	3.90	3.12	3.64	1.85	2.65	1.18	2.68	1.91
1959-78	2.30	3.73	4.70	6.34	4.65	5.29	3.98	4.82	3.22	4.81	3.96
Capital (DK)[c]											
1959-65	-.19	.84	1.49	2.14	.86	1.60	.23	.49	.14	1.28	.60
1965-73	.48	1.41	2.26	2.85	1.21	2.20	.81	1.33	.85	1.96	1.33
1973-78	.24	.90	2.14	2.56	.99	2.20	.58	1.43	.65	1.68	1.13
1959-78	.21	1.10	1.98	2.55	1.04	2.02	.55	1.06	.57	1.67	1.05
Labor (DL)[c]											
1959-65	.47	.36	1.44	2.08	1.08	1.18	1.39	1.26	.78	1.13	.94
1965-73	-.37	1.13	1.52	2.17	1.26	1.63	.22	1.18	.28	1.63	.95
1973-78	-1.12	-.26	.94	.87	2.24	2.01	.63	1.00	.10	.53	.33
1959-78	-.30	.52	1.34	1.80	1.46	1.61	.74	1.16	.39	1.17	.78
Total Factor Productivity (TFP)											
1959-65	4.21	4.83	3.07	3.62	3.46	2.00	4.62	4.22	4.01	3.91	4.00
1965-73	2.08	.87	1.05	1.71	2.56	2.74	2.28	2.69	2.08	1.45	1.77
1973-78	.72	.83	-.15	.48	-.11	-.58	.65	2.20	.44	.46	.45
1959-78	2.40	2.11	1.37	1.99	2.14	1.65	2.69	2.61	2.26	1.96	2.13

[a] Manufacturing Belt

[b] large SMSAs

[c] weighted by shares

TABLE 4: SOURCES OF SLOWDOWN OF GROWTH IN LARGE METRO AREAS RELATIVE TO REGION

	M.B."	South	West	WNC	U.S.
1959-65					
DQ	1.53	1.83	-.58	-.27	1.38
DK[b]	1.03	.65	.78	.26	1.14
DL[b]	-.11	.64	.10	-.13	.35
TFP	.62	.55	-1.46	-.40	-.10
1965-73					
DQ	1.22	1.89	1.54	1.89	1.81
DK	.93	.59	.99	.52	1.11
DL	1.50	.65	.37	.96	1.35
TFP	-1.21	.65	.18	.41	-.63
1973-78					
DQ	1.63	.87	.52	.80	1.50
DK	.66	.42	1.21	.85	1.03
DL	.86	-.07	-.23	.37	.43
TFP	.11	.62	-.47	-.45	.02
1959-78					
DQ	1.43	1.64	.64	.84	1.59
DK	.89	.57	.98	.51	1.11
DL	.82	.46	.15	.42	.78
TFP	-.39	.62	-.49	-.08	-.30

"Manufacturing Belt

[b]Weighted by share

(negative signs indicate a higher growth rate for the large SMSAs)

TABLE 5: TFP LEVELS - RELATIVE TO MANUFACTURING BELT SMSAs

	M.B.[a] SMSAs[b]	M.B. Other	South SMSAs	South Other	West SMSAs	West Other	WNC SMSAs	WNC Other	U.S.[c] SMSAs	U.S.[c] Other
1959	100.0	106.6	112.0	92.9	111.0	109.5	107.8	107.8	103.6	102.2
1960	100.0	105.2	111.0	92.3	113.9	103.0	110.9	106.5	104.2	100.2
1961	100.0	106.7	111.1	93.7	112.2	108.3	112.2	108.1	104.1	101.9
1962	100.0	106.8	109.7	91.5	113.1	104.0	112.9	107.8	104.2	100.7
1963	100.0	106.8	107.6	92.3	111.6	102.4	108.1	105.8	103.5	101.2
1964	100.0	101.8	106.8	89.6	108.9	100.9	107.0	105.3	102.8	97.2
1965	100.0	110.4	105.3	88.6	107.0	95.7	107.3	105.0	102.4	100.5
1966	100.0	104.2	102.4	87.8	106.5	94.1	108.3	106.2	102.0	97.2
1967	100.0	102.1	101.5	89.4	107.5	96.7	106.3	106.2	102.0	97.0
1968	100.0	100.4	100.0	89.2	109.0	99.1	110.1	108.3	102.3	96.3
1969	100.0	101.4	97.3	87.5	109.1	100.9	106.6	106.0	101.7	95.7
1970	100.0	101.1	99.4	91.2	106.9	100.1	107.6	107.5	101.7	97.4
1971	100.0	100.4	101.4	89.7	107.6	97.6	109.4	109.5	102.2	96.4
1972	100.0	102.6	100.6	89.2	108.2	102.1	109.1	109.1	102.2	97.5
1973	100.0	102.1	99.5	89.3	110.1	105.3	108.8	110.3	102.3	97.9
1974	100.0	102.3	104.3	95.7	109.7	107.3	109.4	110.7	103.2	100.6
1975	100.0	102.6	103.9	96.3	110.5	106.5	106.6	111.9	103.2	101.2
1976	100.0	104.9	101.3	92.1	107.4	104.8	108.7	111.4	102.3	100.1
1977	100.0	102.9	100.0	92.1	108.1	100.1	109.5	110.0	102.3	98.6
1978	100.0	103.5	98.1	91.4	106.3	102.2	108.8	109.3	101.5	98.7
Average										
1959-1965	100.0	106.3	109.1	91.6	111.1	103.4	109.5	106.6	103.5	100.6
1965-1973	100.0	101.7	100.3	89.2	108.1	99.5	108.3	107.9	102.1	96.9
1973-1978	100.0	103.2	101.5	93.5	108.4	104.2	108.6	110.6	102.5	99.8
1959-1978	100.0	103.7	103.7	91.1	109.2	102.0	108.8	108.1	102.7	98.3

[a] Manufacturing Belt

[b] Large SMSAs

[c] U.S. less New England

FOOTNOTES

In this study, the Manufacturing Belt is defined to be the Mid-Atlantic and East North Central census regions, plus Delaware (this definition is consistent with that of Perloff, et al [1960]). The South includes the East South Central, West South Central and South Atlantic regions, less Delaware. The West includes the Pacific and Mountain divisions. WNC is the West North Central division.

2. Agglomeration economies are assumed to be external to the firm and reflected in the Hicks' neutral shift parameter.

3. The extent to which these higher factor costs are reflected in wages or rents will depend in part on the household trade-off of land for other commodities.

4. This value added specification assumes that intermediate inputs are separable from capital and labor and is not required for the growth accounting approach. This assumption may not be valid (see Berndt [1974]), but is necessitated by data availability. In addition, land has been omitted as a factor of production, also due to data constraints.

5. The omitted SMSAs are Albany, NY; Baton Rouge, LA; Beaumont, TX; Boston, MA; Fort Wayne, IN; Gary, IN; Hartford, CN; Nassau, NY; New Brunswick, NJ; Providence, RI; and Syracuse, NY.

6. The inability to adjust the data for boundary changes is the primary reason for the absence of New England SMSAs in the sample.

7. The omitted large SMSAs accounted for 7 percent of VA in the Manufacturing Belt, 1.5 percent in the South and 0 percent in the West and WNC regions.

8. This assumption was also made by Hulten and Schwab (1984). The implications are discussed in the Appendix.

9. See Garofalo and Malhotra (1985) for a discussion of the methods used to construct the capital-stock series.

10. This differs from Hulten and Schwab in that they included land in their capital stock measure. However, land was simply allocated using national proportions.

REFERENCES

Berndt, Ernst R., "Energy Prices Increases and the Productivity Slowdown in United States Manufacturing," in The Decline in Productivity Growth, Boston: Federal Reserve Bank of Boston, Conference series no. 22, June 1980.

Carlino, Gerald A., "Declining City Productivity and the Growth of Rural Regions: A Test of Alternative Explanations," Journal of Urban Economics 1985, vol.18, No. 1, pp.11-27.

Denison, Edward F., Accounting for Slower Economic Growth: The United States in the 1970s Washington: The Brookings Institution, 1979.

Garofalo, Gasper A. and Devinder M. Malhotra, "The Impact of Changes in Input Prices on Net Investment in U.S. Manufacturing," Atlantic Economic Journal, 1985, vol. 13, no. 4, pp. 52-63.

Hulten, Charles R. and Robert M. Schwab, "Regional Productivity Growth in U.S. Manufacturing: 1951-78," American Economic Review, March 1984, vol. 74, no. 1, pp. 152-62.

Jorgenson, Dale W. and Grilliches, Zvi, "The Explanation of Productivity Change," Review of Economic Studies, July 1967, vol. 34, pp.249-83.

Kendrick, John W., "Productivity Trends and the Recent Slowdown: Historical Perspective, Causal Factors, and Policy Options," in William Fellner,ed. Contemporary Economic Problems, Washington: American Enterprise Institute, 1979.

Kendrick, John W. and Grossman, Elliot S., Productivity in the United States: Trends and Cycles. Baltimore: The Johns Hopkins University Press, 1980.

Olson, Mancur, The Rise and Decline of Nations: Economic Growth, Staqflation, and Social Rigidities, New Haven: Yale University Press, 1982.

Perloff, Harvey S., Dunn, Edgar S., Lampard, Eric E., and Muth, Richard F., Regions, Resources, and Economic Growth, Baltimore: The Johns Hopkins Press, 1960

U.S. Department of Commerce, Bureau of the Census, Annual Survey of Manufactures, Washington, various years.

_____, Census of Manufactures, Washington, various years.

_____, Bureau of Economic Analysis, The National Income and Product Accounts of the United States, 1929-78, Statistical Tables, Washington, 1981.