What Can Output Measures Tell Us About Deindustrialization in the Nation and its Regions?

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Much has been written about the so-called deindustrialization of the U.S. economy and its many manifestations, including plant closings and layoffs, an enormous merchandise trade deficit, and increased foreign ownership of U.S. assets. These issues have prompted calls for policies to protect U.S. manufacturing from foreign competition. But while *employment* statistics document a clear shift of U.S. jobs from the manufacturing industries to the service industries, *output* data show little sign that the United States is losing its industrial base. For the nation's industrial base to decline, the real value of manufacturing output would have to grow less rapidly over time than real GNP. But this has not been the case at all. In fact, the

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real value of manufactured goods has grown in step with real GNP.

The same cannot be said, however, for all regions of the country. Even though the nation does not seem to have deindustrialized in terms of output, some of the nation's regions apparently have. The industrial belt of the Northeast and Midwest has been hit hardest by the forces of deindustrialization. Unlike the nation as a whole, many states in the industrial core have seen the share of their jobs *and* the share of their real gross state product originating in manufacturing decline over time.

All three states in the Third Federal Reserve District, Pennsylvania, New Jersey, and Delaware, are among those whose manufacturing shares of jobs and real output have declined over time. Officials of these states have expressed justifiable concern about the hardship for those workers who have been displaced by the decline in manufacturing jobs. They have also voiced much concern about the loss of the region's industrial base. Although this transition in the region's economic structure has caused some serious problems, a mitigating factor is that the shift to services should make the region's economy less vulnerable to business downturns.

HAS THE U.S. ECONOMY DEINDUSTRIALIZED?

There are two approaches to measuring deindustrialization, motivated, to some extent, by different concerns. Preoccupying many participants in the deindustrialization debate has been the shift of jobs away from the manufacturing industries to the service industries--a shift that has intensified since 1967. An important source of concern about this shift in employment has to do with its implications for the distribution of income. Some fear that America's middle class is being squeezed by the shift, as former middle-income workers in manufacturing are forced into lower-paying service jobs.[1] Studies emphasizing the changing distribution of income have looked at the shift of *employment* away from the manufacturing industries to the service industries and have concluded that the nation has deindustrialized.[2]

Others are concerned that the shift to services means that the United States is becoming increasingly dependent on foreign suppliers to meet its demands for manufactured goods. But studies that have looked at *the proportion of real GNP* originating in manufacturing have found little evidence of deindustrialization.[3] There is evidence, however, that the country's problem with competitiveness has occurred not because of deindustrialization, but because the U.S. demand for manufactured goods has grown so rapidly.[4]

The Shift of Employment to Services. Most studies of employment growth divide the economy into three major sectors: private goods-producing, private service-producing, and

[1] The bulk of the findings shows that the proportion of households with middle income has declined while the fraction with higher and lower income has increased. See, for example, Katherine Bradbury, "The Shrinking Middle Class," Federal Reserve Bank of Boston *New England Economic Review* (September/October 1986) pp. 41-55.

[2] See, for example, Barry Bluestone and Bennett Harrison, *The Deindustrialization of America* (Basic Books, Inc., 1982).

[3] See, for example, Molly McUsic, "U.S. Manufacturing: Any Cause for Alarm?" Federal Reserve Bank of Boston *New England Economic Review* (January/February 1987) pp. 3-17; Michael F. Bryan, "Is Manufacturing Disappearing?" Federal Reserve Bank of Cleveland *Economic Commentary* (July 15, 1985); Robert H. Schnorbus and Alenka S. Giese, "Is the Seventh District's Economy Deindustrializing?" Federal Reserve Bank of Chicago *Economic Perspectives* (November/December 1987) pp. 3-9; and Ronald E. Kutscher and Valerie A. Personick, "Deindustrialization and the Shift to Services," *Monthly Labor Review* (June 1986) pp. 3-13.

[4] See Paul Krugman and George Hatsopoulos, "The Problem of U.S. Competitiveness in Manufacturing," Federal Reserve Bank of Boston *New England Economic Review* (January/February 1987) pp. 18-29; and Behzad Diba, "Private-Sector Decisions and the U.S. Trade Deficit," this *Business Review* (September/October 1988) pp. 15-24.

government. The private goods-producing sector, whose products are tangible, includes mining, construction, and manufacturing. The private service-producing sector, whose products are generally intangible, includes transportation, communications, utilities, wholesale and retail trade, the FIRE group (finance, insurance, and real estate), and the broad category of "other services." Included in this last category are business, health, and legal services, private education, hotels and motels, domestic help, nonprofit institutions, and numerous smaller sub-categories.

The share of total nonagricultural employment originating in the private goods-producing industries has declined over the past two decades, falling from 35.4 percent in 1967 to 24.8 percent in 1986. The manufacturing industries are largely responsible for this drop. In 1967, manufacturing accounted for 29.6 percent of total U.S. employment, but by 1986 its share had fallen to 19.1 percent (Table 1).

Manufacturing isn't the only sector to have experienced a declining share of employment. Government's share fell also, though much more modestly, slipping from 17.3 percent in 1967 to 16.8 percent by 1986. The slack in employment, then, has been taken up by the private service-producing sector, where employment increased from 47.3 percent in 1967 to 58.5 percent by 1986.

Within the private service-producing sector, the other-services category leads all others in employment growth. In 1967, employment in other services accounted for 15.3 percent of total nonagricultural employment. By 1986, the other-services share of employment had grown to 23.2 percent, making it the single-largest category of employment. Because of this rapid growth, when people talk about the growth of "services," it is usually the other-services category that they mean.

Production Measures Show Little Evidence of Deindustrialization. Focusing attention only on the decline in manufacturing employment and the rapid growth in some service industries could result in misleading conclusions about the nation's industrial base. When analyzing the deindustrialization issue, it is important to look at the production of manufactured goods together with employment in the manufacturing industries. A decline in the number or percentage of people employed in manufacturing need not signify deindustrialization if manufacturing's share of

TABLE 1

U.S. Manufacturing Has Declined in Terms of Employment

Shares of Nonagricultural Employment by Industry Group, 1967 and 1986

(In percent)

	1967	1986
Goods-Producing	**35.4**	**24.8**
Mining	0.9	0.8
Construction	4.9	4.9
Manufacturing	29.6	19.1
Private Service-Producing	**47.3**	**58.5**
Transportation, Communications, & Utilities	6.5	5.3
Wholesale Trade	5.6	5.8
Retail Trade	15.1	17.9
Finance, Insurance, & Real Estate	4.8	6.3
Other Services	15.3	23.2
Government	**17.3**	**16.8**

SOURCE: Bureau of Labor Statistics
NOTE: Columns may not add to 100 percent due to rounding.

real GNP has remained constant. Using production rather than employment as the criterion shows that the nation is not deindustrializing. While manufacturing's share of employment has fallen more than 10 percentage points, its share of real output has declined hardly at all. The share of real GNP originating in manufacturing stood at 21.6 percent in 1986, little changed from its 21.9 percent share in 1967 (Table 2).[5]

Recently, a number of researchers have questioned the accuracy of the data on which this conclusion is based. At issue is whether the Commerce Department's technique for estimating real GNP originating by sector masks a decline in manufacturing's share. (See *Difficulties of Measuring Manufacturing's Share of Output*, p. 26.) This dispute is far from settled. But even adjusting for these concerns, any decline in manufacturing's share of real GNP has been minimal and certainly not as severe as the drop in manufacturing's share of employment.

Productivity Increases in Manufacturing. How could manufacturing's share of real GNP remain essentially constant at about 22 percent over time when its share of employment has declined? The answer is that manufacturing's growth in productivity (output per man-hour) has greatly exceeded the average for the entire economy during the past 20 years. For the 20-year period ending in 1986, manufacturing productivity increased at about a 3 percent average annual rate, far exceeding the 1.1 percent rate for the entire economy. Equity issues aside, the overall decline in manufacturing employment is actually a strength of the national economy because it is based on relatively rapid productivity growth in manufacturing. The nation has benefited because the manufacturing industries now provide goods to the rest of the economy more efficiently than before.

Since changes in productivity can alter the employment mix in the economy, many analysts have found it more appropriate to define

TABLE 2
In Terms of Output the U.S. Economy Has Not Deindustrialized

Shares of Real Output by Industry Group, 1967 and 1986
(In percent)

	1967	1986
Goods-Producing	**38.5**	**32.0**
Agriculture	2.9	2.6
Mining	5.3	3.1
Construction	8.4	4.7
Manufacturing	21.9	21.6
Private Service-Producing	**46.7**	**56.5**
Transportation	4.2	3.5
Communications	1.4	2.7
Utilities	2.2	2.8
Wholesale Trade	5.9	7.6
Retail Trade	8.9	9.8
Finance, Insurance, & Real Estate	12.4	14.5
Other Services	11.7	15.6
Government	**14.2**	**11.0**

SOURCE: U.S. Department of Commerce
NOTE: Columns may not add to 100 percent because of statistical discrepancy and omission of the "rest of world" sector.

[5] Despite the stability of the manufacturing share of GNP, the share of GNP originating in the private goods-producing industries declined substantially between 1967 and 1986 because of mining and construction. The share of real GNP originating in the mining industries fell from 5.3 percent in 1967 to 3.1 percent by 1986. Similarly, the share of GNP originating in the construction industries fell from 8.4 percent in 1967 to 4.7 percent in 1986.

deindustrialization in terms of *output* rather than *employment*. Under this definition the nation has not deindustrialized and its industrial base has not been eroded because the share of real GNP originating in manufacturing has not declined over time.

SOME REGIONS HAVE DEINDUSTRIALIZED

What is true of the nation in terms of deindustrialization is not necessarily true of each region. Individual regions often specialize in the mix of goods or services they produce. For instance, wheat and corn farming tends to be concentrated in the Plains states. Because many of the states in the Northeast and Midwest have historically tended to specialize in the production of manufactured goods, this broad geographic area is commonly referred to as the "industrial belt" or "industrial core."

Much has been written about the fact that some regions, such as the industrial belt and its sub-regions, have lost manufacturing employment, while others, such as the Southeast, have gained manufacturing jobs. But little is known about whether these regions and others have experienced similar gains or losses in the share of their output accounted for by manufacturing. While the value of manufactured goods for various geographic areas (Census regions, states, metropolitan areas, and counties) has been available for some time, an overall measure of aggregate regional output, comparable to GNP for the nation, has not been available. Consequently, analysis of deindustrialization at the regional, state, or local level had to rely on employment data. But as we have just seen, a complete picture of deindustrialization at the regional level is lacking without comparison to aggregate regional production measures.

New Output Data Reveal Regional Gainers and Losers. In June 1988, the Commerce Department began issuing an annual gross state product (GSP) series of aggregate production for each state, analogous to GNP for the nation. This series, which begins in 1967, makes it possible to examine, for the very first time, the pattern of real output originating in manufacturing at the state or regional level.[6]

What these data reveal about state and regional deviations from the national picture is quite striking. Unlike the nation, 15 of the 48 contiguous states experienced deindustrialization in terms of real output, or real GSP, during the 1967-86 period.[7] Ten of these states are located in the industrial core of the United States, extending from New York in the Northeast, southward to Maryland, east to New Jersey, and west to Illinois. (See Figure 1, p. 20.)

Among individual states, West Virginia experienced an 8.6-percentage-point decline in its share of real output originating in manufacturing, the largest decline for any state in the nation. (See Table 3, p. 21.) Eight other industrial-belt states also showed large percentage-point declines in their share of real GSP originating in manufacturing. They are New York, New Jersey, Pennsylvania, Maryland, Illinois, Delaware, Indiana, and Michigan.[8]

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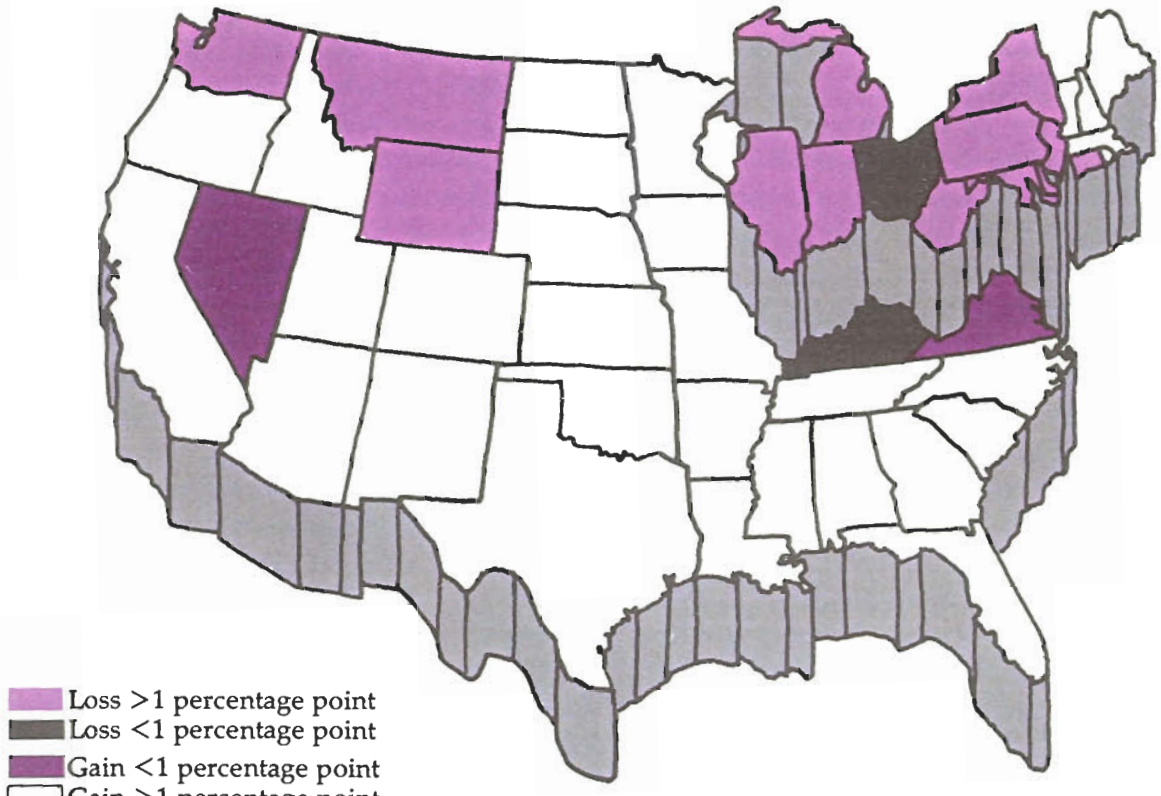
[6] Vernon Renshaw, Edward A. Trott, Jr., and Howard L. Friedenberg, "Gross State Product by Industry, 1963-86," *Survey of Current Business 67* (May 1988) pp. 30-43.

[7] Owing to a lack of state price deflators, the real GSP estimates reported in this article are based on national price deflators by industry. Differences from the national average across states, especially in prices of energy and real estate and in state and local taxes, might influence the findings.

[8] A few states far from the industrial belt also showed declines in their share of real GSP originating in manufacturing between 1967 and 1986. Wyoming historically has had a small percentage (around 3 to 4 percent) of its output originate in manufacturing. The "large" percentage drop for Wyoming appears to be due simply to its having a small manufacturing base to begin with and having experienced some absolute decline. The drop in manufacturing's share of GSP in both Montana and Washington is somewhat more serious. Part of the decline in manufacturing's share of GSP in both states is related to large drops in the lumber and wood products industries. Washington also experienced a decline in its primary metals industries, a phenomenon common to the industrial-belt states.

FIGURE 1
Deindustrialization Is Concentrated in the Industrial Core



That manufacturing's share of real GNP has remained constant for the nation while many of the industrial-belt states have deindustrialized in terms of real output implies that other states in the nation must have experienced increasing shares of real manufacturing output over time. Thirty-three states and the District of Columbia are among the gainers, with many of the largest being the Southeast and Plains states. Mississippi, with an 11.1-percentage-point gain, experienced the biggest increase. Arkansas and South Carolina both had gains of more than 7 percentage points. The New England states did quite well; only Connecticut showed a loss, of almost 6 percentage points, in its share of real output originating in manufacturing. New Hampshire had a gain of almost 8 percentage points and Vermont's was slightly over 4 percentage points.

Why Have Some States Deindustrialized? Historically, manufacturing activity has tended to concentrate geographically in industrial-belt cities as a way to hold down costs. The standard explanation has been that a firm located in an industrial-belt city would be closer both to its suppliers and to its markets and thus be able to keep transportation costs down. In addition, by locating in an industrial-belt city, a firm can keep training costs down by dipping into a highly skilled labor pool that exists be-

TABLE 3

Deindustrialization: Some Gain and Others Lose

Change in the Share of Real Output Originating in Manufacturing, by State
1967-1986

(In percentage points)

GAINERS		LOSERS	
1. Mississippi	11.1	49. West Virginia	-8.60
2. New Hampshire	7.82	48. Connecticut	-5.94
3. Arkansas	7.31	47. New Jersey	-5.81
4. South Carolina	7.02	46. Pennsylvania	-5.79
5. Iowa	6.80	45. Maryland	-4.55
6. South Dakota	6.33	44. Montana	-3.81
7. Minnesota	6.16	43. Illinois	-3.05
8. Oklahoma	5.73	42. New York	-2.07
9. Idaho	5.23	41. Delaware	-1.76
10. Utah	4.77	40. Indiana	-1.68
11. Arizona	4.73	39. Michigan	-1.56
12. Vermont	4.10	38. Washington	-1.50
13. New Mexico	4.05	37. Wyoming	-1.20
14. Wisconsin	3.63	36. Ohio	-0.90
15. Tennessee	3.62	35. Kentucky	-0.88
16. Kansas	3.53		
17. North Dakota	3.52		
18. North Carolina	3.45		
19. Louisiana	3.43		
20. Colorado	3.33		
21. Nebraska	2.81		
22. Georgia	2.45		
23. Texas	2.32		
24. Oregon	2.25		
25. California	2.20		
26. Missouri	2.19		
27. Massachusetts	2.06		
28. Alabama	1.84		
29. Rhode Island	1.54		
30. Florida	1.41		
31. Maine	1.13		
32. Nevada	0.96		
33. Virginia	0.87		
34. D.C.	0.51		

SOURCE: U.S. Department of Commerce

cause of the level of industrial activity already in place. While other costs of production, such as rents and wages, tended to be higher in the industrial belt, these higher costs were more than offset by the lower training and transportation costs for many firms.

But innovations in transportation, communications, and production technologies have reduced the cost-saving advantages of the industrial- belt states. For example, miniaturization and the development of lightweight materials have reduced incentives to locate in an industrial-belt state for the advantage of lower transportation costs. Similarly, the substitution of electronic operations for labor-intensive mechanical processes makes it less necessary for firms to locate in an industrial-belt state in order to benefit from its large pool of skilled labor.[9]

While innovations like these have diminished the industrial belt's ability to attract firms, they have not reduced the higher wages and rents found in these states. As a result, manufacturing has been shifting its location from the relatively high-cost states of the industrial belt to the relatively low-cost ones outside the industrial core. This suggests that what the national economy is experiencing is more a deconcentration of industrial activity than a process of deindustrialization. The states of the industrial belt region, however, are themselves experiencing deindustrialization.

The Tri-state Region. The tri-state region comprising Pennsylvania, New Jersey, and Delaware is located on the eastern end of the industrial belt. As one might expect, output originating in the tri-state area's manufacturing sector fell from 29.8 percent in 1967 to 24.0 percent in 1986 (Table 4). All three states participated in the decline. In Pennsylvania, the share of real GSP originating in manufacturing fell from 30.9 percent in 1967 to 25.1 percent by 1986. Manufacturing's share of real GSP fell also in New Jersey, slipping from 28.0 percent in 1967 to 22.2 percent in 1986. In Delaware, the share declined from 32.0 percent in 1967 to 30.3 percent in 1986, although it held up much better through the mid-1980s than the shares in Pennsylvania and New Jersey. All of Delaware's decline in manufacturing share apparently occurred after 1984.

As far as can be determined, the tri-state decline in manufacturing's share of real GSP is not generally due to any shortfall in the region's productivity growth. Between 1967 and 1986, worker productivity in the region grew at about the same pace as in the nation.[10] The region's declining share of manufacturing output is largely related to the greater manufacturing job losses here than in the U.S. as a whole. Compared to the nation, the tri-state region experienced more plant closings and layoffs; between 1967 and 1986, it lost, on average, about 1.7 percent of its manufacturing jobs each year. Within the region, Pennsylvania lost, on average, 2.1 percent of its manufactur-

[9] See D. Garnich and J. Renshaw, "Competing Hypotheses on the Outlook for Cities and Regions: What the Data Reveal and Conceal," *Papers, Regional Science Association* 45 (1980) pp. 105-24, and Gerald Carlino, "Declining City Productivity and the Growth of Rural Regions: A Test of Alternative Explanations," *Journal of Urban Economics* 18 (January 1985) pp. 11-27.

[10] The common measure of productivity is computed using man-hours for all manufacturing workers—data that are not available at the state level. Man-hours for manufacturing production workers are available for most industries in Pennsylvania and New Jersey, but not for Delaware. These data, however, are not consistently available at the tri-state level for tobacco products, lumber and wood products, and transportation equipment. Therefore, output per man-hour for production workers in the remaining industries is calculated for the region (Pennsylvania and New Jersey) and for the nation. Assuming that the region has the same mix of the remaining industries as the nation, both the region and the nation had about the same annual rate of productivity growth from 1967 to 1986—3.62 percent for the region, against 3.76 percent for the nation.

TABLE 4

The Tri-State Region Deindustrializes

Shares of Real Output by Area and Industry Group, 1967 and 1986

(In percent)

	TRI-STATE		PA		NJ		DE	
	1967	1986	1967	1986	1967	1986	1967	1986
GOODS-PRODUCING	**41.0**	**30.4**	**42.5**	**31.9**	**38.3**	**27.8**	**43.5**	**37.8**
Agriculture	1.2	1.3	1.4	1.6	0.8	0.7	2.4	2.7
Mining	1.3	0.7	2.1	1.3	0.1	0.1	0.1	0.0
Construction	8.7	4.4	8.1	3.9	9.4	4.8	9.0	4.8
Manufacturing	29.8	24.0	30.9	25.1	28.0	22.2	32.0	30.3
PRIVATE SERVICE-PRODUCING	**48.2**	**60.5**	**47.0**	**58.9**	**50.6**	**63.0**	**43.0**	**52.3**
Transportation, Communications, & Utilities	8.5	10.1	8.6	10.1	8.4	10.2	8.3	7.6
Wholesale Trade	5.8	8.3	5.9	7.3	5.7	9.7	3.4	6.3
Retail Trade	9.0	9.4	9.1	9.6	8.9	9.2	9.4	8.7
Finance, Insurance, & Real Estate	12.7	15.9	11.6	14.8	14.7	17.1	10.9	16.7
Other Services	12.2	16.8	11.8	17.1	12.9	16.8	11.0	13.0
GOVERNMENT	**10.8**	**9.2**	**10.5**	**9.1**	**11.1**	**9.2**	**13.4**	**10.0**

SOURCE: U.S. Department of Commerce

NOTE: Columns may not add to 100 percent due to rounding.

ing jobs each year between 1967 and 1986. New Jersey lost 1.3 percent and Delaware gave up only 0.2 percent. By 1986, the region had 28 percent fewer manufacturing jobs than in 1967. Manufacturing jobs in the nation, however, fell hardly at all during this period, experiencing only a 0.1 percent average annual decline. By 1986, there were only 2.3 percent fewer manufacturing workers in the nation than in 1967.

The region's share of real output originating in the other-services category increased markedly between 1967 and 1986, rising to 16.8 percent from 12.2 percent. The gains in service output were matched by gains in service employment. In absolute terms, while the region lost 702,000 manufacturing jobs between 1967 and 1986, it gained well over a million service jobs. In the nation, employment in other services grew at a 4.5 percent compound average annual rate between 1967 and 1986, while in the region it grew at a slightly slower 4.1 percent because of slower growth in Pennsylvania.

Service employment growth was fastest in Delaware, at a 5 percent average annual rate, followed by 4.6 percent growth in New Jersey and 3.7 percent growth in Pennsylvania.

DEINDUSTRIALIZATION IMPLICATIONS FOR THE REGION

The shift of tri-state employment and output to services has raised some concern about the loss of the region's industrial base, or what is sometimes called its "export base." According to one view, a region earns its living by exporting manufactured goods to outside customers who provide a steady inflow of revenue in return. Activities such as services simply serve the region's market and are there as a result of the income the region has obtained through its exports of manufactured goods. That is, the nonmanufacturing industries, such as services, are seen as passive participants in a region's growth, whereas manufacturing is viewed as the prime mover. This view is often summed up as follows: a region can't get rich by "taking in its own washing"; it must sell something to others in order to get more income.[11]

Many Services Can Be Exported. While it is true that a region's manufacturing output is more exportable than its services, it is not true that its services cannot be exported at all. In fact, over time the share of a region's services that are exportable seems to be growing.[12] Exportable services in the tri-state area include education, health, legal, and various business services (advertising, computer software and data processing, management services, credit reporting and collection, consulting, and research and development). All are exported to other regions. For example, Philadelphia has many leading colleges and universities that draw students from all over the world. And Delaware has become a leading center for the credit card operations of banks from other parts of the country.

Services Increase the Stability of the Local Economy. Despite the difficulties encountered in the transition, the shift to services may make the tri-state regional economy less vulnerable to business downturns. Many services fill basic household and business needs that are required regardless of general business conditions. Also, most services are time-intensive rather than goods-intensive, so there are no large levels of unsold inventories that would necessitate layoffs when the economy slows.

In each of the last four recessions, service output actually increased in the tri-state region while manufacturing output declined (Figure 2). The same pattern is true of employment during recessions. Since employment has shifted away from the volatile manufacturing sector toward the more stable service sector, this should help dampen the impact of recessions on the tri-state economy.[13]

[11] The export-base view has been criticized as too narrow. See Edgar Hoover and Frank Giarratani, *An Introduction to Regional Economics* (Alfred A. Knopf, 1984), pp. 316-45. See also Lynn E. Browne, "Taking in Each Other's Laundry--The Service Economy," Federal Reserve Bank of Boston *New England Economic Review* (July/August 1986) pp. 20-31; U.S. Congress, Office of Technology Assessment, *Paying the Bill: Manufacturing and America's Trade Deficit* (June 1988); and Randy Eberts and John Swinton, "Has Manufacturing's Presence in the Economy Diminished?" Federal Reserve Bank of Cleveland *Economic Commentary* (January 1, 1988).

[12] Jack C. Stabler and Eric C. Howe, "Service Exports and Regional Growth in the Post-industrial Era," *Journal of Regional Science* 28 (August 1988) pp. 303-16. The authors use export data from Canada's four western provinces to show that the provinces' export bases had not been diminished, because the importance of service exports increased substantially between 1974 and 1979.

[13] John M.L. Gruenstein, "The Philadelphia Area Economy: Faster Growth in the 1980s?" this *Business Review* (September/October 1985) pp. 13-23.

CONCLUSION

Is the nation deindustrializing? The short answer appears to be no. The long answer is that the United States is experiencing not a deindustrialization but a deconcentration of industrial activity. From the beginning of the industrial revolution until World War II, states in the manufacturing belt enjoyed an industrial hegemony over the rest of the nation. But manufacturing activity has been shifting its location from the industrial belt to peripheral or nonbelt states for some time.

The causes of deconcentration of manufacturing activity are not yet completely understood. One popular view is that technical innovations in production, communications, and transportation technologies have made it possible for manufacturing to shift its location from the relatively high-cost states of the industrial belt to relatively low-cost ones outside the industrial core. In addition, faster population growth in areas other than the industrial-belt states, such as the South and Southwest, has led manufacturers to shift their locations closer to growing markets.

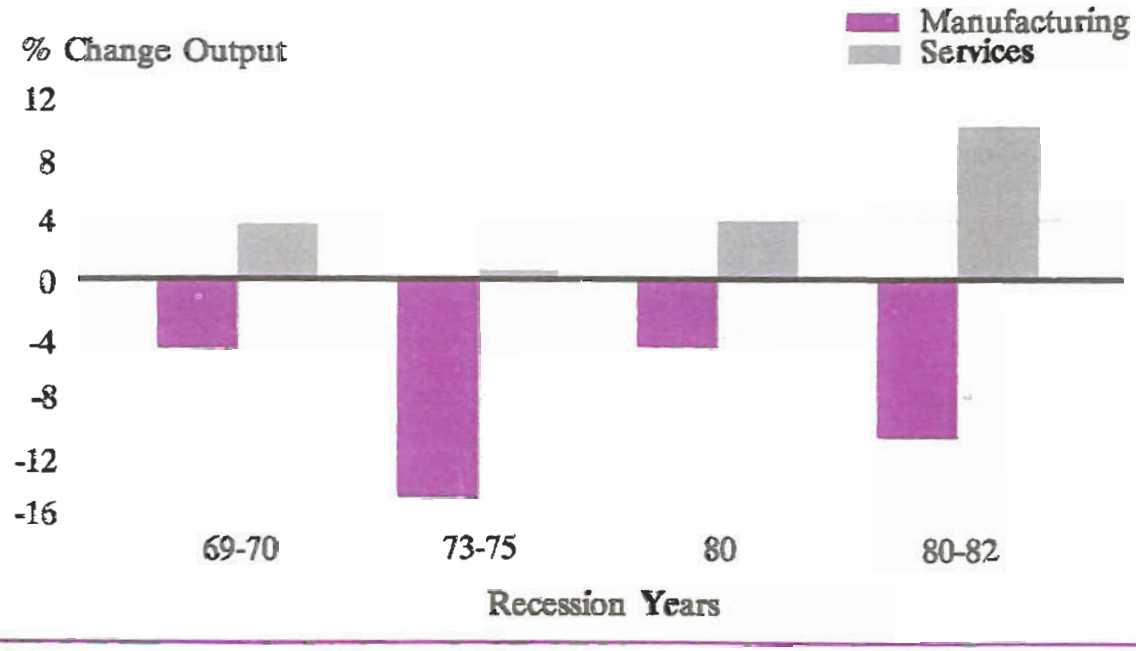
These technology-based forces are probably too strong to be reversed, or even contained, by public policies. However, evidence suggests that expenditures by local government on education and transportation systems can influence an area's growth.[14] In addition, national policy could be fashioned to ease the transition for people who have been displaced by the interregional dispersion of manufacturing activity.

[14] See Gerald Carlino and Edwin S. Mills, "The Determinants of County Growth," *Journal of Regional Science* 27 (February 1987) pp. 39-54, and "Do Public Policies Affect Growth?" this *Business Review* (July/August 1985) pp. 3-16.

FIGURE 2

Service Output Performs Better Than Manufacturing Output During Business Downturns

(Percent change of output for tri-state economy)



Difficulties of Measuring Manufacturing's Share of Output

Lawrence Mishel, an economist with the Economic Policy Institute, has questioned the Commerce Department data showing that manufacturing's share of real GNP has held steady over time.[a] Among his criticisms is that the price indexes used by the Commerce Department's Bureau of Economic Analysis (BEA) to deflate intermediate inputs used in manufacturing do not reflect prices of imported components. The problem stems from the fact that while the BEA does have a measure of *current-dollar* value added in manufacturing, it lacks the price indexes that are needed to compute *constant-dollar* value added. Therefore, it must somehow estimate constant-dollar value added originating in manufacturing. The procedure the BEA uses to compute constant-dollar value added can be summarized as follows. First, it estimates the current-dollar value of inputs used by manufactures (I_e) as the difference between current-dollar gross output originating in manufacturing (GO) and current-dollar value added in manufacturing (VA):

$$I_e = GO - VA$$

GO is taken from the Census of Manufactures and is equal to the value of shipments plus changes in business inventories. VA is from a number of sources and is equal to factor incomes plus indirect business taxes and capital consumption allowances.[b]

In the second step, the BEA obtains an estimate of constant-dollar value added in manufacturing (RVA_e) using:

$$RVA_e = \frac{GO}{PPI_o} - \frac{I_e}{PPI_i}$$

That is, the BEA deflates GO using a *domestically* based producer price index for manufacturing output, PPI_o, and it deflates I_e using a *domestically* based producer price index for manufacturing inputs, PPI_i. Constant-dollar inputs are subtracted from constant-dollar gross output originating in manufacturing to obtain an estimate of constant-dollar value added by manufacturing. The method is called double-deflation by the Commerce Department.

Mishel is concerned that if prices of imported components fell relative to domestically produced components during the 1980s, then U.S. manufacturing firms may have substituted foreign for the relatively more expensive domestic components, which would not be reflected in the PPI_i because this index includes prices only of domestically produced inputs. As a result, the PPI_i may overstate actual input price inflation for manufactures and therefore understate constant-dollar I_e for manu-

[a] Lawrence Mishel, *Manufacturing Numbers: How Inaccurate Statistics Conceal U.S. Industrial Decline* (Washington, D.C.: Economic Policy Institute, 1988), and "Of Manufacturing's Mismeasurement," *The New York Times*, November 27, 1988; and Nicholas Perna, "The Shift from Manufacturing to Services: A Concerned View," Federal Reserve Bank of Boston *New England Economic Review* (January/February 1987) pp. 30-38.

[b] See "GNP by Industry: Summary of Sources and Methods," *Survey of Current Business* 67 (July 1988) pp. 82-83 for details on data sources and methods.

facturing firms during the 1980s. But if constant-dollar I_e is understated for manufacturing, this will lead to an overestimation both of constant-dollar value added in manufacturing and of manufacturing's share of real GNP during the 1980s relative to earlier years.

Mishel is also concerned about numerous other adjustments made by the BEA to the industry data for certain years that create additional uncertainty about the gross product originating series.

The BEA has recently addressed these issues.[c] While admitting that a number of important issues have been raised, the BEA believes that its estimates of the growth of gross product originating in manufacturing compare favorably with other estimates of manufacturing growth. For example, the BEA finds that its estimates are in broad agreement with the growth of the Federal Reserve Board's index of industrial production.

But as the BEA concludes, the lack of data may keep us from resolving the issue about whether manufacturing output's contribution to GNP has remained at a constant ratio over the last 20 years. However, if there has been any deindustrialization in terms of output, it certainly has not been as severe as deindustrialization in terms of employment.

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[c] "Gross Product by Industry: Comments on Recent Criticisms," *Survey of Current Business* 68 (July 1988) pp. 132-33.