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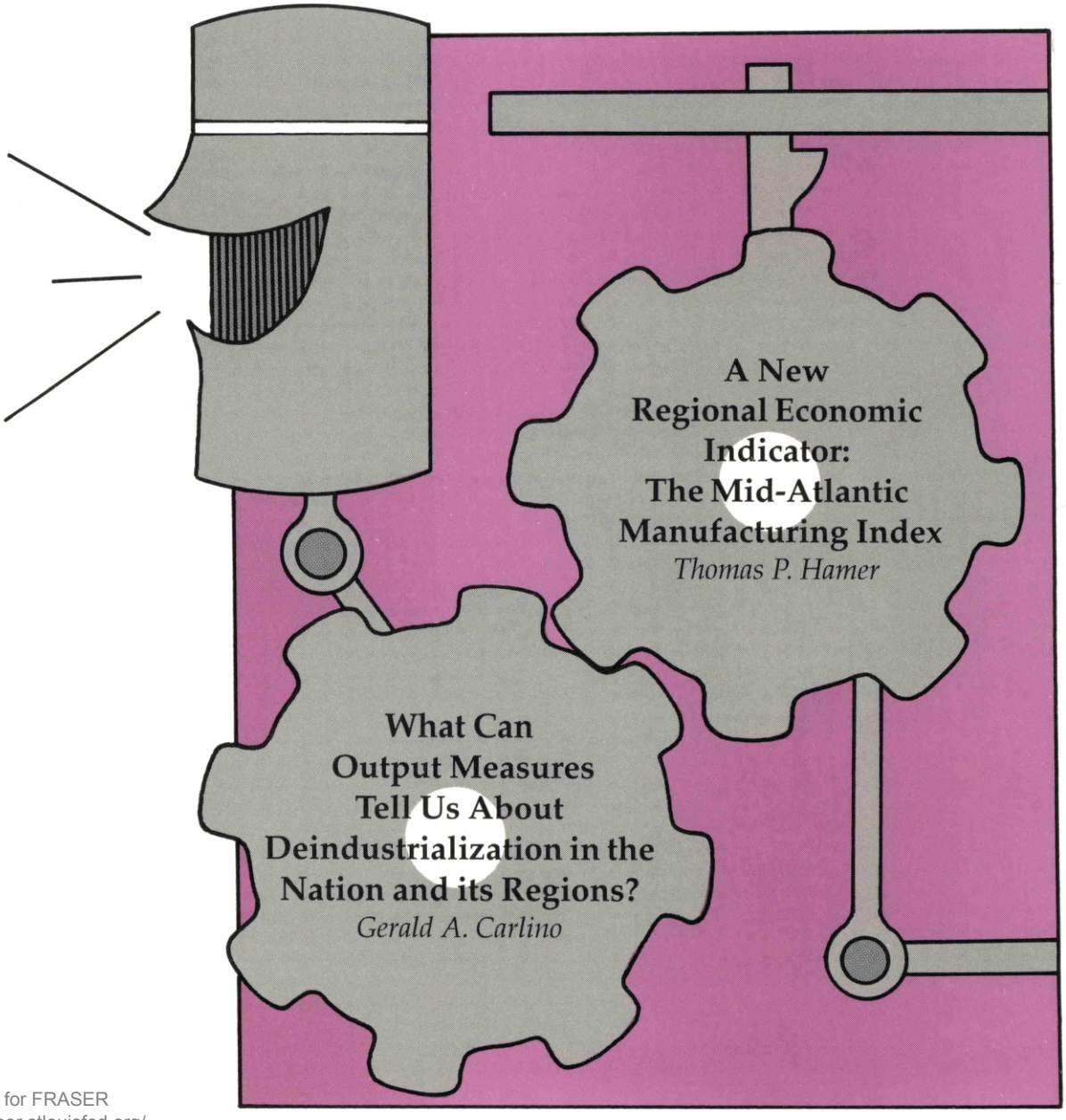

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A New Regional Economic Indicator: The Mid-Atlantic Manufacturing Index

*Thomas P. Hamer**

Despite the omnipresence of McDonald's and Burger King, the U.S. economy is not homogeneous. Economic performance varies from region to region for many reasons--including differences in the mix of industries, in investment patterns, in population growth, and in climate. The first five years of the current economic expansion provide ample evidence of these regional variations. From December 1982 to December 1987, employment surged 21.7 percent in California and 31.9 percent in Florida, while in Louisiana and Oklahoma, two "oil patch" states, it fell 5.4 percent and 7.0 percent, respectively.

In the face of such wide divergences, information about the nation alone is not sufficient for business and government planners. Bankers, retailers, real estate agents, construction contractors, and many others in the private

*Thomas P. Hamer is Associate Professor of Economics and Director of the Center for Economic Data Analysis at Glassboro State College in Glassboro, New Jersey. He constructed the Mid-Atlantic Manufacturing Index during the spring of 1988 while at the Federal Reserve Bank of Philadelphia under the College's Externship Program. The author thanks Jack Siler, who was responsible for much of the computer programming.

sector need information about the regional and local markets they serve. In the public sector, budget analysts who project tax revenues, welfare administrators who estimate needs, and economic development officials who seek to attract firms need local data for responding to changing regional conditions. Moreover, these planners need current information. Yet much of the regional and local economic data is published with a lag of more than a year.

In 1988 the Federal Reserve Bank of Philadelphia developed a monthly index of manufacturing production for the Mid-Atlantic region. With the publication of this index, the Philadelphia Fed joins company with the Federal Reserve Banks of Cleveland, Chicago, Dallas, and Richmond, which have recently begun to publish comparable manufacturing production indexes. (See *Manufacturing Production Indexes in the Federal Reserve System.)* These new indexes promise to be valuable tools for evaluating regional economic activity in a timely manner.

WHY FOCUS ON MANUFACTURING PRODUCTION?

With the much publicized decline in manufacturing employment over the past decade, it would be tempting to conclude that manufacturing activity is no longer a very important barometer of the economy. But a look at other measures of manufacturing activity shows that such a conclusion is not warranted. The U.S. Department of Commerce calculates that the constant-dollar value of manufactured goods hovered around 22 percent of gross national product from 1950 to 1985.[1] In other words, the output from U.S. factories continues to represent a sizable proportion of national economic activity. Moreover, the relative constancy of the manufacturing share indicates that the U.S. economy still possesses a strong industrial base.

For some regions and states, the manufacturing sector is significantly more important than it is for the nation. In 1986, it accounted for about one-third of the real gross state product (GSP) in five states: Michigan (34.7 percent), Indiana (33.1 percent), Ohio (32.9 percent), New Hampshire (32.8 percent), and North Carolina (32.8 percent).[2] These percentages point to the importance of having comparable regional manufacturing production indexes for assessing how well a region's manufacturing sector is performing and the extent to which regional performances differ. The indexes can be helpful also in investigations of deindustrialization in some of the heaviest manufacturing states.[3] The Midwest Manufacturing Index has already been used for this purpose by the Federal Reserve Bank of Chicago.[4]

Besides the fact that manufacturing constitutes a sizable proportion of U.S. output, the fact that it fluctuates with the business cycle to a greater degree than the service sector makes it an important sector to monitor both nationally and regionally. Business firms are vitally interested in knowing the onset of recession and recovery. Although turning points in manufacturing are not expected to precede turning

[1] U.S. Congress and U.S. Office of Technology Assessment, *Technology and American Economic Transition: Choices for the Future*, Summary (May 1988) p. 25. There is some reason to believe, however, that this estimated proportion may be too high. See the above and Lawrence Mishel, *Manufacturing Numbers: How Inaccurate Statistics Conceal U.S. Industrial Decline* (Washington, D.C.: Economic Policy Institute, 1988). For a reply, see U.S. Department of Commerce, Bureau of Economic Analysis, "Gross Product by Industry: Comments on Recent Criticisms," *Survey of Current Business* (July 1988) pp. 132-33.

[2] U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts, *Gross State Product by Industry*, 1963-1986 (price-adjusted values: 1982=100) (May 1988).

[3] See the companion article by Gerald A. Carlino in this *Business Review*.

[4] 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.

Manufacturing Production Indexes in the Federal Reserve System

The Federal Reserve System has maintained a longstanding interest in manufacturing production indexes. At the national level, the Federal Reserve Board publishes a monthly index of industrial production and separate indexes for manufacturing, mining, and utilities. Various Federal Reserve Banks also share a long tradition of interest in regional manufacturing indexes. In October 1963, the Federal Reserve Bank of Boston adopted a methodology that used the national industrial production index and enabled the timely publication of a manufacturing index for the six states in its district. The New England index was discontinued in June 1985. In the early 1970s the Federal Reserve Bank of San Francisco generated indexes for several industries using the Cobb-Douglas production function and employing three inputs instead of the usual two. The estimation of the production function was costly, however, and publication of the indexes has not continued in recent years.

The Federal Reserve Bank of Atlanta began publishing a manufacturing production index in June 1970 using an improved methodology very similar to that described in the Appendix. This method, which is more cost effective than that employed by the San Francisco Fed, has been adopted by several Federal Reserve Banks. Unfortunately, the Atlanta Fed's publication of the regional index and a separate index for Georgia has been discontinued.

In 1983, the Federal Reserve Bank of Dallas adopted the Atlanta Fed's methodology to produce the Texas Industrial Production Index. Although this index includes mining and utilities, a separate index for manufacturing is also calculated. The latest revision is benchmarked to gross state product data instead of the state value-added data used for the other indexes.

Since early 1987, the Federal Reserve Bank of Cleveland has published the Ohio Manufacturing Index. Like the one for Texas, this index is for a single state and follows the Atlanta Fed's methodology. More recently, a Midwest Manufacturing Index for the states of Illinois, Indiana, Iowa, Michigan, and Wisconsin was developed by the Chicago Fed using the same technique. And most recently, the Fed of Richmond began publication of a newly developed monthly index of manufacturing production for its district, as well as separate indexes for its five states--Maryland, North Carolina, South Carolina, Virginia, and West Virginia--and three major industries. Except for some modification for the individual state indexes, the same methodology is employed. This methodology is now used in the Mid-Atlantic Manufacturing Index, the fifth such index to be published regularly. The rapid increase in the number of indexes indicates the new importance attached to understanding regional changes in economic activity. The Research Department of the Federal Reserve Bank of Philadelphia will publish monthly updates of the index that will be available on request.

points in the general economy, timely data on manufacturing activity can be useful in providing early evidence that a downturn or recovery is under way. The use of manufacturing data makes business cycle turning points more perceptible, since the downturns and upturns are steeper in manufacturing than in the economy in general. A timely regional index of manufacturing production activity is useful also in assessing the severity of a recession and the robustness and completeness of a recovery.

GETTING A HANDLE ON MANUFACTURING PRODUCTION

Since it is published monthly with little delay, employment in manufacturing establishments has been the commonly used measure of regional manufacturing activity. However,

manufacturing employment alone is a deficient measure of production. Although the number of employees is often cited as an indicator of output levels, the number of labor hours is a better measure, since the length of the workweek can vary. More important, labor is only one factor in the production process. The other major factor is capital, or what is often referred to as plant and equipment. The use of more machinery with more sophisticated technology increases the productivity of labor. If labor productivity is rising, employment gains understate the increase in manufacturing production. If labor productivity rises sufficiently, the level of employment or number of hours worked in manufacturing could even decline while production levels are rising.

The truest measure of industrial output is the actual count of what is produced--for example, the number of cars from an automobile plant or loaves of bread from a bakery. Some individual industries publish these kinds of statistics, and some of them are used in the Federal Reserve Board's industrial production index for the U.S. economy. However, these data are seldom available on a state or regional basis. Also, it is impossible simply to add together such diverse units to measure the total output of our factories. Economists therefore express aggregate production in terms of value added.

The U.S. Department of Commerce reports data on the value added by various manufacturing industries for each state in its publication, the *Annual Survey of Manufactures.* These value-added data form the basis for most of the regional manufacturing production indexes. In principle, the value added by any manufacturing plant equals the value of its output less the cost of products purchased from other firms. For example, the value added by a book printing facility would equal the value of the books produced less the cost of paper, ink, and glue. Since the value-added data are published in current dollars, however, any increase in value added from a plant can be the result either of increased production or increased prices. To eliminate the effect of changing prices on changes in the value added, analysts use the industry price index to deflate the number reported by the Department of Commerce. The result is the final, useful measure of output--which is real value added, or value added in constant dollars.

If the value-added data were published monthly on a timely basis, they would provide a direct measure of changes in manufacturing output for each state. Unfortunately, the value-added data are published only annually and with a considerable time delay. For this reason, regional production indexes are based on estimates of the changes in value added that are calculated from monthly measures of the amounts of labor and capital employed in the production process, which are reported in a more timely manner. For labor, the number of hours worked provides a measure of the physical input of labor. Measurements of the physical capital are more difficult to obtain, but a commonly used proxy or indicator of the capital input is the amount of kilowatt hours of electricity used by manufacturing firms. The labor data and kilowatt hour data are available monthly and with little delay. Using these monthly data, a regional index can be generated within 60 days after the month to which it refers.[5] Such an indicator can provide valuable early information on the regional economy.

THE MID-ATLANTIC INDEX--HOW IS IT GENERATED AND WHAT CAN IT TELL US?

The new Mid-Atlantic index covers the four states of Delaware, New Jersey, New York, and Pennsylvania.[6] These adjacent states are

[5] The Federal Reserve Board is able to release its monthly national industrial production index 15 days after the month to which it refers. Revised estimates are published 30, 60, and 90 days thereafter. Annual and occasional major revisions of the index are also published.

linked by a transportation system that supports well-integrated markets for a wide variety of goods and services. The large numbers of workers commuting across state lines in the Philadelphia, Trenton, New York City, and Wilmington metropolitan areas attest to the economic integration among these states. Also, three of the four states--New Jersey, New York, and Pennsylvania--constitute the Middle Atlantic Census Division.

How the Index Is Generated. The new Mid-Atlantic Manufacturing Index is a composite of monthly indexes for 19 separate industries, which are based on the sum of calculated real value added contributed by labor and capital, seasonally adjusted.[7] (See the *Appendix* for details.) The value added for each industry is calculated in 1982 dollars so that changes in the index will reflect only changes in real output and not changes in prices. For each industry the calculated real value added is indexed so that the average monthly value for 1982 equals 100. The composite index is the weighted average of these 19 industry indexes with the weights determined by each industry's contribution to real value added in the base year, 1982.

What the Index Can Tell Us. The Mid-Atlantic Manufacturing Index provides us with a new and more comprehensive measure with which to analyze manufacturing activity in the region over time and compare it with the nation and other regions. Take, for example, a regional analyst seeking to assess the health of regional manufacturing in the latter part of 1981. As Figure 1 (p. 8) indicates, the Mid-Atlantic Index, had it been in existence then, would have declined sharply, indicating that a contraction was under way locally. (The vertical bars in Figure 1 depict recessions.) Continued monitoring of the index would have shown that the bottom occurred in the last several months of 1982. The index would have signaled a robust recovery throughout 1983, and in 1984 and 1985 the regional analyst would have detected a slowdown or pause as the index flattened out. Continued tracking of the index in 1986, 1987, and 1988 would have shown the analyst a resumption of the upward trend but with a more erratic pattern.

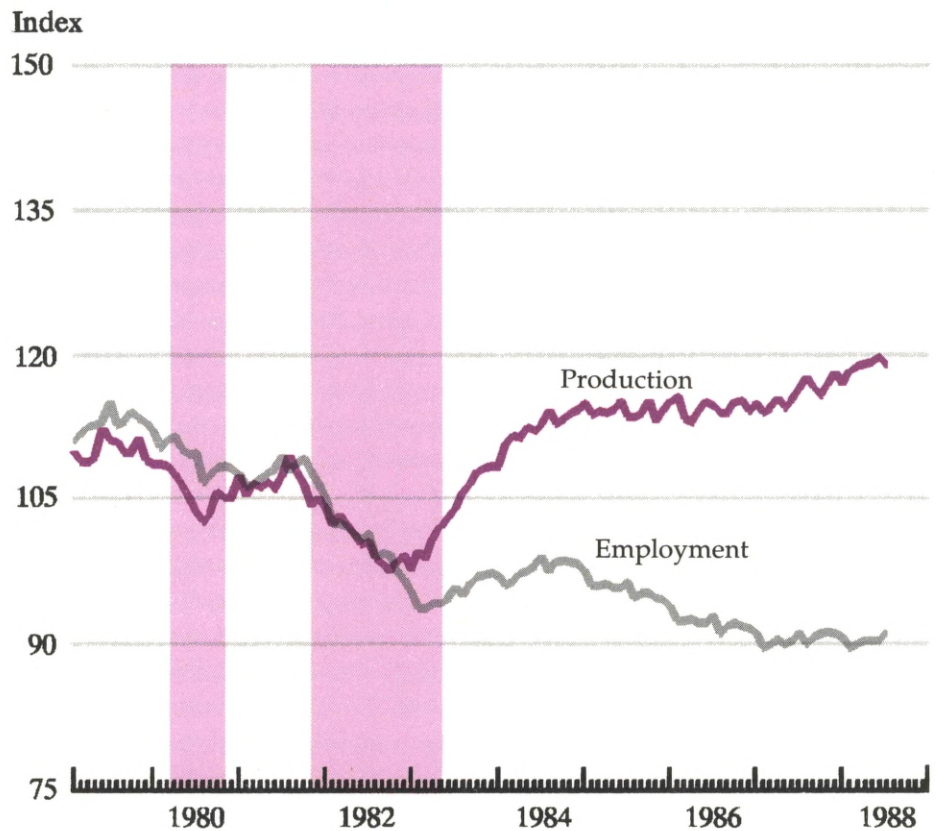
For the most part, analysts have been confined to using employment as an indicator of manufacturing production. Figure 1 shows how misleading this can be. An employment index of the 19 industries covered by the Mid-Atlantic index shows a decline of 5.5 percent from November 1982 to June 1988. During this same period of expansion, the manufacturing index, which takes into account the use of capital, shows an increase of 20.1 percent. This difference between employment and production is accounted for by increases in labor pro-

[6] It has proven impossible to construct an index for only the Third Federal Reserve District, which includes the eastern two-thirds of Pennsylvania, the southern part of New Jersey, and the entire state of Delaware. First, data for manufacturing value added, employment, and average weekly hours are available only for entire states. Second, the kilowatt hour data are collected by the Federal Reserve Banks within the boundaries of their districts. Thus, the kilowatt hour data for the Philadelphia District do not include western Pennsylvania and northern New Jersey. The historical kilowatt hour data for western Pennsylvania were provided by the Federal Reserve Bank of Cleveland. Because historical electricity data cannot be obtained for northern New Jersey separately, Districts Two and Three have been combined. By this combination, electricity, value-added, and employment data are available for the entire four states; however, the electricity data also include Fairfield County in Connecticut, part of the New York Fed's district.

[7] The 19 industries are the so-called two-digit SIC manufacturing industries: food and kindred products; textile mill products; apparel and other textile products; lumber and wood products; furniture and fixtures; paper and allied products; printing and publishing; chemicals and allied products; petroleum and coal products; rubber and miscellaneous plastics products; leather and leather products; stone, clay, and glass products; primary metal industries; fabricated metal products; machinery, except electrical; electric and electronic equipment; transportation equipment; instruments and related products; and miscellaneous manufacturing industries. The tobacco products industry was omitted, owing to lack of data.

FIGURE 1

The Mid-Atlantic Region's Manufacturing Output Has Grown While Employment Has Fallen



ductivity over this period. We do not have an official regional data series on productivity, but at the national level the annual average growth in the productivity of manufacturing workers is estimated to have been 1.5 percent for the period 1979-82 and 4.5 percent for the period 1982-87.[8] In this latter period of rapid productivity growth, the manufacturing production index for the Mid-Atlantic region diverged sharply from the employment index (Figure 1).

Within the Third District, the gap between output and employment growth has been apparent for some time in the Philadelphia Fed's *Business Outlook Survey*. From 1984 through 1986, respondents were generally reporting increases in output but declines in employment, a clear case of productivity growth. In the past, we have been able to check the survey responses only with actual employment growth

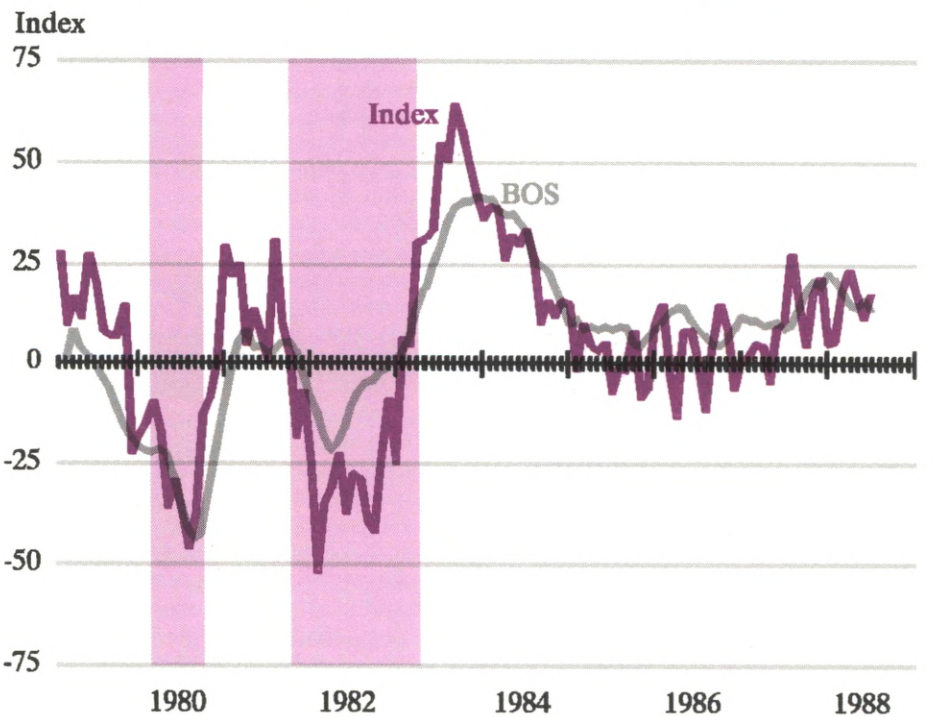
[8] These calculations are based on the Bureau of Labor Statistics' indexes of productivity, hourly compensation, and unit costs (quarterly, seasonally adjusted).

rates, but the new manufacturing index allows us to make some comparisons between survey responses and actual output.[9] Changes in the manufacturing index and the survey responses are quite consistent. (See *Manufacturing Index Supports the Business Outlook Survey Results.*)

Relative to the Nation... When we compare manufacturing activity in the Mid-Atlantic region to activity in the nation, we see both similarities and differences. Even though the Mid-Atlantic index and the manufacturing portion of the Federal Reserve Board's indus-

[9] See John Bell and Theodore Crone, "Charting the Course of the Economy: What Can Local Manufacturers Tell Us?" this *Business Review* (July-August 1986) pp. 3-16.

The Mid-Atlantic Index Supports the *Business Outlook Survey* Results



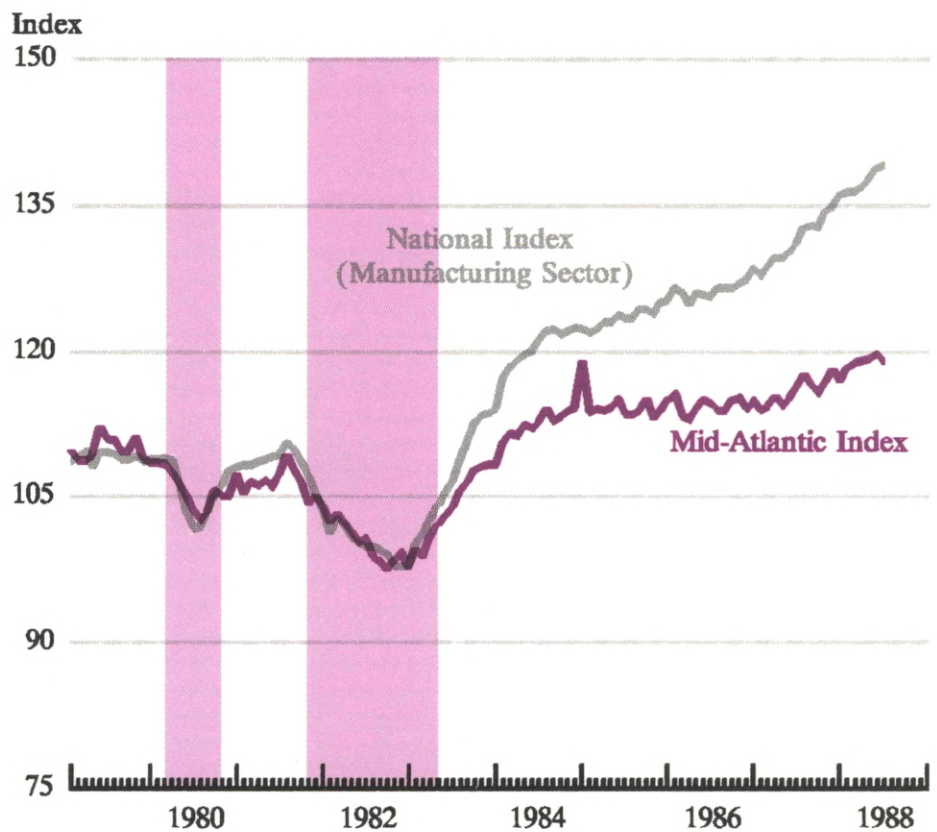
The Federal Reserve Bank of Philadelphia provides another indicator of regional manufacturing activity with its monthly *Business Outlook Survey* (BOS). Respondents to this survey indicate whether their activity was up or down from the previous month. A diffusion index is calculated by subtracting the percentage of respondents reporting a decrease from the percentage reporting an increase. Although the BOS covers only the larger manufacturing employers within the Third Federal Reserve District, the historical patterns of the two indicators are similar. Since the diffusion index from the BOS is based on the percentage of respondents who report increases or decreases in activity, the proper comparison is between the diffusion index from the BOS and percentage changes in the manufacturing index. The graph compares the six-month moving average of the diffusion index with the six-month moving average of monthly percentage changes in the Mid-Atlantic Manufacturing Index.

trial production index are calculated differently, they show the same basic pattern of decline and expansion over the past 10 years (Figure 2). From the late 1970s through the 1981-82 recession, the pattern was almost identical. In the current period of expansion, both indexes showed the robust growth typical of the manufacturing sector in the early recovery phase of the business cycle. The tapering off of growth beginning about mid-1984 is also typical, but the slowdown was more severe in the Mid-Atlantic region than in the nation as a whole. More recently, growth has revived in the region, although at a slower pace than in the nation. Thus, the recovery in manufacturing has been less robust and complete in this region than in the nation.

...And Relative to Other Regions. Four

FIGURE 2

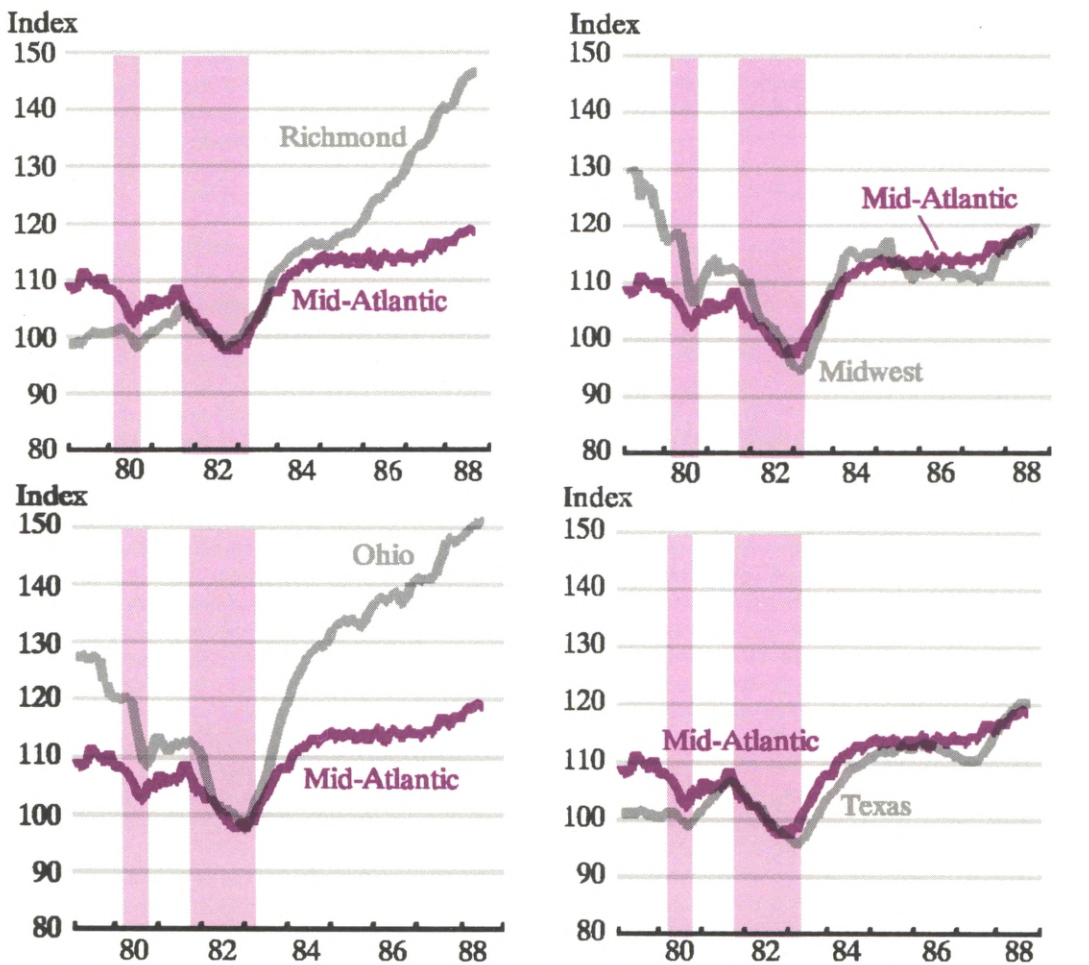
Manufacturing's Recovery: Less Robust for the Region Than for the Nation



other indexes currently calculated by Federal Reserve Banks using the same basic methodology as the Mid-Atlantic index allow us to compare the recent patterns of manufacturing activity. The Cleveland Fed's Ohio Manufacturing Index, displayed in Figure 3, indicates more pronounced fluctuations in recent years. From January 1979 to November 1982, the trough of the most recent national recession, the Ohio index dropped almost 24 percent while the Mid-Atlantic index declined somewhat more than 9 percent. The recovery was also more dramatic, with the Ohio index rising 55 percent by June 1988 while the Mid-Atlantic index climbed only 20 percent. Both indexes are currently above the high points reached in 1979. Thus, the manufacturing sector in Ohio was much more volatile than that in the Mid-

FIGURE 3

The Mid-Atlantic Index Compared With Other FRB Indexes



Atlantic region.

Chicago's Midwest Manufacturing Index also paints a picture of precipitous decline during the last two recessions, with a drop of 26 percent from January 1979 to November 1982 (Figure 3). However, the Midwest recovery has been slightly stronger than the Mid-Atlantic recovery: the Midwest index rose 26 percent between November 1982 and June 1988. In contrast to the Ohio and Mid-Atlantic indexes, the Midwest index has not returned to levels reached at the end of the 1970s.

Richmond's index for Fifth District manufacturing indicates a regional economy with a strong growth trend that was less affected by the recent recession than other regions (Figure 3). From its peak in August 1981 to its trough in November 1982, the index declined only 6 percent. As in the other regions, a strong recovery was followed by a slowdown in 1984 and 1985. However, the growth beginning in 1986 has been stronger than it was in the Midwest and Mid-Atlantic regions. By mid-1988, the index had risen 47 percent above its November 1982 level.

The manufacturing component of the Dallas Fed's Texas Industrial Production Index exhibits a more distinctive pattern in the recovery period (Figure 3).[10] Like Richmond's, the Texas index peaked in the summer of 1981 and recorded a moderate decline, of 9 percent, through November 1982. Like the other indexes, Dallas's showed the regional recovery tapering off in 1984; however, beginning in early 1986, this pause turned into a decline, as a plunge in world oil prices hurt the Texas economy. Not until April 1987 did Texas manufacturing resume its expansion. Indexes for other regions would undoubtedly reveal other patterns. The ability to identify these differing patterns is a primary advantage of regional indexes.

SUMMARY

Where has the level of manufacturing activity been in the Mid-Atlantic region and where is it now? The new Mid-Atlantic Manufacturing Index provides some answers. Although measures of manufacturing employment have always been available, this new index is constructed in a way that combines a measure of industry's use of capital with a measure of employment. Updated on a monthly basis, this new indicator complements a variety of other economic data available on states and regions. It gives us another tool for comparing the Mid-Atlantic economy with that of the nation and other regions.

[10] The Texas Manufacturing Index shown in Figure 3 is the revised version benchmarked to gross state product data.

APPENDIX

Calculation Methodology and Equations

The methodology employed in the Mid-Atlantic Manufacturing Index follows the pioneering work of the Federal Reserve Bank of Atlanta. This technique is currently employed by the Federal Reserve Banks of Chicago, Cleveland, Dallas, and Richmond. First, a separate index is constructed for each industry. As a basis for the calculations, it is assumed that manufacturing firms maximize profits in competitive markets, use only labor and capital in producing their products, and experience constant returns to scale. It can be shown that:

(1) $VA = P_l L + P_k K$

where

VA is value added
P_l is the unit price of labor
L is units of labor
P_k is the unit price of capital, and
K is units of capital.

Thus, each industry index is based upon the simple identity that the output, or real value added, equals the sum of the contributions attributable to labor and capital.

Since collecting data for the unit prices of labor and capital would be a costly undertaking, transformations are made to reduce the amount of data that must be collected:

$(L/VA)(VA/L) = 1$ and
$(K/VA)(VA/K) = 1$, so
$VA = (L/VA)(VA/L)(P_l L) + (K/VA)(VA/K)(P_k K)$, and then
$VA = (P_l L/VA)(VA/L)L + (P_k K/VA)(VA/K)K$

where

$P_l L/VA$ is the share of value added attributable to labor, called S_l
VA/L is the productivity of labor, called Q_l
$P_k K/VA$ is the share of value added attributable to capital, called S_k
and VA/K is the productivity of capital, called Q_k

The usable equation is then:

(2) $VA = (S_l)(Q_l)L + (S_k)(Q_k)K$

For each of 19 two-digit SIC manufacturing industries, monthly data for the labor input (employment times average weekly hours) are first summed for the four states covered by the Mid-Atlantic Index and then summed to provide an annual number for labor (L). Electric kilowatt hour usage is employed as a proxy for capital (K) in equation (2). These monthly kilowatt hour data are collected by the Federal Reserve Banks. From publications of the U.S. Bureau of the Census, the *Annual Survey of Manufactures,* and the *1982 Census of Manufactures,* annual data are obtained for calculating the relative contributions of labor and capital to value added and productivity. The annual payroll divided by the value added for each industry provides the share of value added attributed to labor (S_l). By assumption, the share attributed to capital (S_k) is one minus labor's share.

The value-added numbers are divided by the implicit price deflators for each industry, which have a base year of 1982. The price-adjusted value added divided by the labor hours and the price-adjusted value added divided by the kilowatt hour usage equal the productivities for labor (Q_l) and capital (Q_k).

From the annual numbers, monthly values for shares and productivity are interpolated for the intervening months and extrapolated for the months after the last annual published observations. The annual values are assumed to be for July of each year. Monthly interpolations are made with increments that equal one-twelfth of the change from July to July for both shares and productivity. The monthly extrapolations for both shares and productivity are made with increments equal to the average monthly increment from the year of the first annual observation, 1979, to the most recent annual observation.

The derived monthly values for shares and productivity are combined with the seasonally adjusted monthly values for labor hours and kilowatt hours in equation (2) to calculate the price-adjusted value added for each of the 19 manufacturing industries. The value added is then divided by the average monthly value for 1982 to derive an index. The final composite index is the weighted average of the 19 indexes based on 1982 weights for value added by each industry.

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

*Gerald A. Carlino**

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

*Gerald A. Carlino is a Senior Economist and Research Adviser in the Urban and Regional Section of the Philadelphia Fed's Research Department.

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

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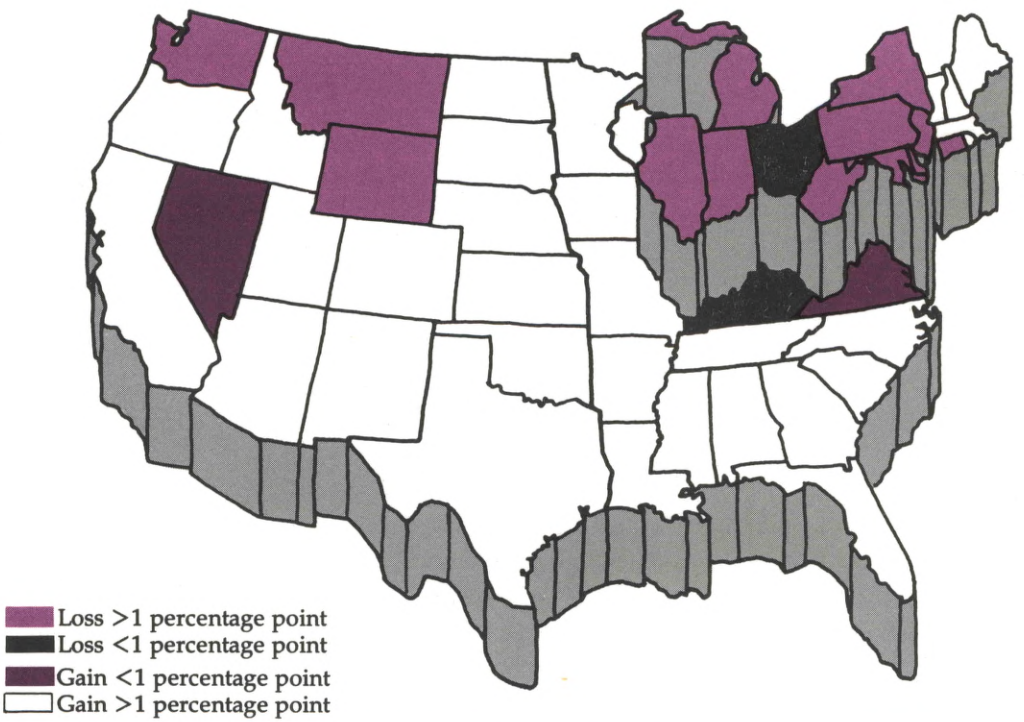
[6] Vernon Renshaw, Edward A. Trott, Jr., and Howard L. Friedenberg, "Gross State Product by Industry, 1963-86," *Survey of Current Business 67* (May 1988) pp. 30-43.

[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.

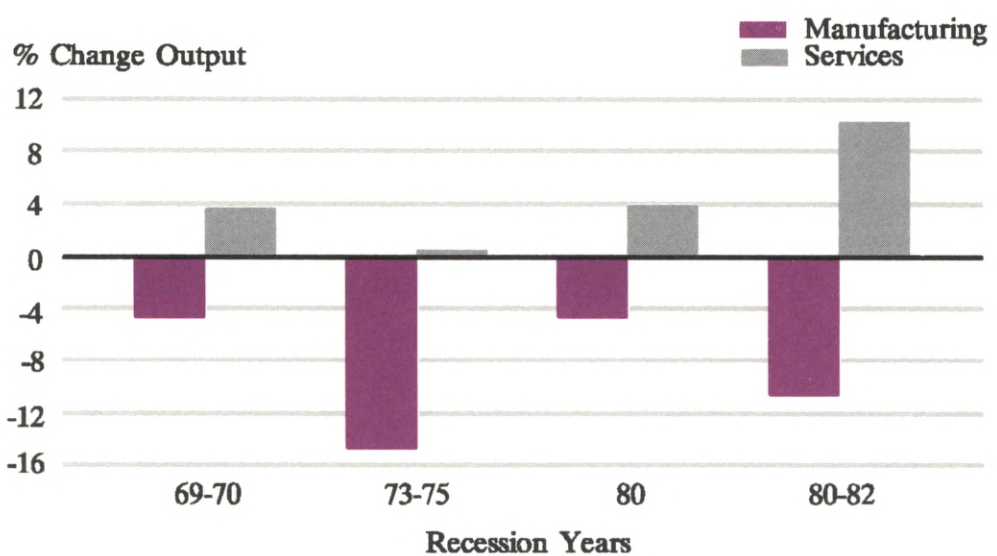
These technology-based forces are probably too strong to be reversed, or even contained, by public policies. However, evidence suggests that expenditures by local government on education and transportation systems can influence an area's growth.[14] In addition, national policy could be fashioned to 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-

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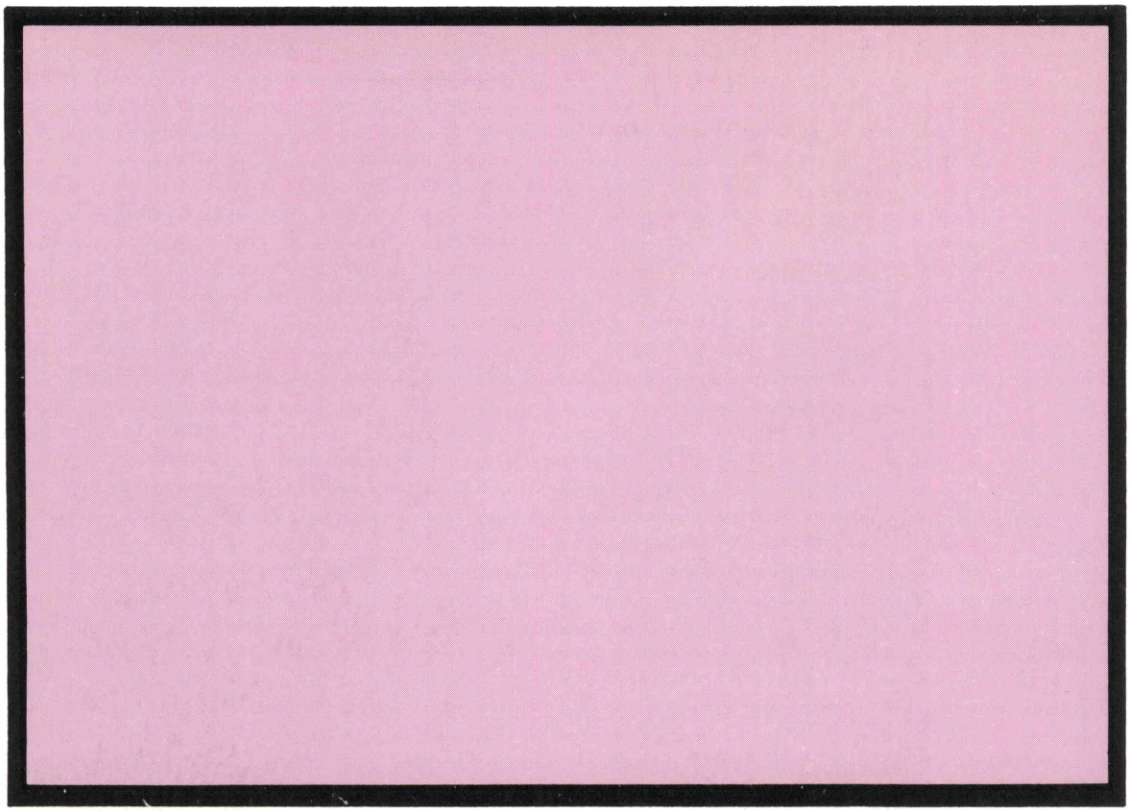
[c] "Gross Product by Industry: Comments on Recent Criticisms," *Survey of Current Business* 68 (July 1988) pp. 132-33.



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