

Regional Creative Destruction: Production Organization, Globalization, and the Economic Transformation of the Midwest*

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Abstract: This article examines the role of new forms of production organization in the process of regional economic transformation. I argue that there is a geographic or regional element to the transformative forces which Schumpeter identified as *gales of creative destruction* as new forms of production organization transform older regions. I question a central theme of recent geographic theory, that new forms of production organization are the province of newly emerging regions, while older manufacturing regions remain trapped in older, outmoded forms. The research explores these issues through the lens of the Industrial Midwest, a region depicted as beset by chronic economic decline and as being locked into outmoded forms of production organization. The data are drawn from a survey of Midwest manufacturers and field research consisting of site visits and personal interviews at a sample of manufacturing plants. The main findings of the research indicate that there has been a high rate of adoption and diffusion of new forms of work and production organization in the Midwest and that this shift has been accelerated by globalization, particularly by the influx of transplant manufacturers who have transferred new production systems to the region. The research also suggests that the region's broader economic recovery is to some degree linked to the adoption and diffusion of these new forms of production organization. The key findings indicate that new forms of production organization have taken root in this older industrial region, contributing to its economic transformation.

Key words: regional economic transformation, production organization, creative destruction, Industrial Midwest.

Welcome to the new Midwest. Hammered by foreign competition during the 1980s, and left for dead only five years ago, America's heartland is booming. ("America's Heartland: The Midwest's Role in the Global Economy," 1994)

Recent contributions to economic geography and to the social sciences more

broadly have focused attention on the changing organization of production in advanced industrial economies (Piore and Sabel 1984; Lazonick 1990, 1991; Kenney and Florida 1993) and the spatial implications

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of such transformations (Storper and Walker 1989; Sayer and Walker 1992). According to an increasingly influential line of thought, and one that has been particularly important in economic geography, such changes have registered themselves in a new economic landscape, as traditional mass-production industries (Hounshell 1984) and mass-production regions are supplanted by *new industrial spaces* (Scott 1988) composed mainly of flexible small-firm networks (Piore and Sabel 1984; Scott 1988; Saxenian 1994). These new industrial spaces are located at considerable geographic remove from the traditional regional manufacturing cores of the advanced industrial countries, which are seen as geographic repositories of an outmoded *Fordist* model of mass production. A central assumption of this perspective is that new forms of production organization are the province of newly emerging regions, while traditional manufacturing regions are essentially trapped in older, outmoded forms of production organization. Moreover, the notion that economic change occurs through and is reflected in regional shifts is deeply embedded in economic geography and regional theory, from notions of the product cycle (Vernon 1966, 1977; Markusen 1985) to the spatial division of labor (Froebel, Heinrichs, and Kreye 1980; Massey 1984), as firms optimize on factors of production by seeking out less costly and less restrictive locations.

In this article, I question this view and suggest that the process of economic transformation need not be confined to new regions. I argue that the process of economic transformation is sufficiently powerful that it can—and in fact does—register itself in older regions, giving rise to a process of *regional economic transformation*. In more formal language, I argue that there is a geographic or regional element to the strong transformative forces which Schumpeter (1934, 1942) identified as *gales of creative destruction*, which “incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one” (Schumpeter 1942, 83).

For Schumpeter, the process of creative destruction extends across the industrial structure, involving both the creation of new industries through technological and organizational changes and, just as importantly, the underlying transformation of existing industries as they too are swept up by deep changes in technology and production organization. I argue that the process of creative destruction extends to regional phenomena as well, as new technologies and new forms of production organization not only register themselves in new regions, but inform and shape the reconstitution and revitalization of existing regions. It is important to distinguish the view advanced here from an older theory that argued that older metropolitan areas can function as *incubators* of new ideas and innovations, and that as such they can, and frequently do, give rise to new industries (Duncan and Lieberman 1970; Thompson 1962, 1965). I argue here that older regions can be the sites of deeper and more fundamental changes in production organization—changes which run to the core of the industrial, organizational, and institutional fabric of those regions. This emphasis on transformations in the underlying production systems and organizational fabric of regions is of special relevance today, when a large body of contemporary theorizing emphasizes the institutional rigidities (Olson 1982) and so-called *lock-in* effects (Arthur 1988, 1990a, 1990b) that constrain and limit the process of regional change.

To explore this issue, this article examines the economic transformation of the Industrial Midwest. Stretching from Buffalo, New York, and Pittsburgh, Pennsylvania, through Ohio, Indiana, Illinois, Michigan, and into Minnesota and Wisconsin, this great industrial belt developed as an integrated industrial complex producing huge quantities of steel, automobiles, machine tools, and later consumer electronic products, fueling the tremendous economic and industrial development of the United States during the late nineteenth and early twentieth centuries (Meyer 1983, 1989; Page and Walker 1991). Further-

more, the Midwest is typically portrayed as the paradigmatic example of a declining mass-production industrial region (see Scott 1988). In their study of deindustrialization, Bluestone and Harrison (1982) predicted a secular decline of Midwestern industry, as large corporations shifted capital out of older industrial regions to newly industrializing economies and the developing world. A report by the Joint Economic Committee of the U.S. Congress (1986) proclaimed the emergence of a *bi-coastal economy*, characterized by booming coastal economies and a sorely lagging middle. This influential body of literature arrived at the consensus that the Industrial Midwest would face long-term, secular, and chronic disinvestment and deindustrialization (Bluestone and Harrison 1982) as a result of its own internal organizational rigidities and *institutional sclerosis* (Olson 1982), a shift of traditional industries to low-wage locations (Crandall 1993), the rise of a postindustrial service economy (Bell 1973), and the emergence of new industrial spaces in the United States and elsewhere around the world (Scott 1988).

In contrast to this view, the central argument advanced here is informed by three key points. First, even though the deindustrialization thesis of Bluestone and Harrison (1982) has been accepted almost as an article of faith and the decline of manufacturing in the Midwest during the 1970s and 1980s duly noted, the industrial economy of the Midwest has recently enjoyed a pronounced revitalization, with substantial improvement in key indicators of economic performance, output, manufacturing investment, and productivity since the mid-1980s (Council of Great Lakes Governors 1994).

Second, in contrast to the prevailing view that new forms of production organization tend to arise in new regions whereas older regions tend to be locked into outmoded technologies and forms of production organization, new forms of production organization are being adopted in and are thus transforming the traditional Midwestern core. As the following pages will show, the Midwest industrial base is engaged in a

shift from mass production to a new model of production organization characterized by a cluster of organizational techniques (e.g., the use of work teams, continuous improvement, the integration of suppliers into the product development process, and other organizational factors), which function collectively to harness intellectual and physical resources at all levels of the firm as well as the broader production system (Nonaka and Takeuchi 1995; Osterman 1994; Womack, Jones, and Roos 1991; Florida 1991; Kenney and Florida 1993; Florida and Kenney 1993; Lazonick 1990, 1991; Zuboff 1989). Furthermore, most arguments in the literature identify strategic changes in the organization of production and make generalizations about their geographic locations yet inadequately explore the *extent* and *effects* of the adoption of these strategies.¹ The research presented here seeks to draw a connection between the two, arguing that changes in the organization of production are related at least in part to regional economic performance.

Third, the adoption of new forms of production organization has been accelerated by the global integration of the Midwest economy, particularly through increased foreign direct manufacturing investment. On the one hand, mounting foreign competition has encouraged domestic manufacturers, particularly larger firms, to pursue new forms of production organization to increase their performance and competitiveness in global markets, and moreover to induce these practices through their supply chains. On the other hand, the establishment of transplant manufacturing facilities by leading foreign manufacturing companies has resulted in the transfer of new manufacturing technology and production organization to key Midwest locations, has accelerated the diffusion of these practices through supplier complexes, and has set in motion powerful demonstration and learning effects for local companies. In this context,

¹ I would like to thank one of the referees for making this point.

the process of economic transformation is underpinned by a strong relationship between globalization (via foreign direct investment) and new production organization (see Fig. 1). Foreign direct investment in the form of transplant manufacturing establishments increases the level and demands of competition, forcing all producers to improve their performance, and facilitates the transfer of new production organization. Knowledge of new forms of production organization spreads through the regional economy via imitation as regional manufacturers become suppliers to transplants, through joint ventures between transplants and local firms, through the regular flow of information between transplants and their local suppliers and clients, and through the normal rotation of personnel. The diffusion of new forms of production organization, spurred by transplants, then conditions productivity improvement across the regional manufacturing base, setting in motion a virtuous cycle of imitation, adaptation, and improvement.

Before proceeding to the discussion of research design and findings, it is important to highlight the contribution this article seeks to make. I am concerned here primarily with the underlying process of economic transformation, or regional creative destruction, as an organizational and spatial process. I seek to shed light on the processes by which older

regions, in this case the Industrial Midwest, adopt new forms of production organization and thus overcome the institutional rigidities and lock-in effects that the literature suggests are almost completely binding and contribute to long-term economic decay. Thus, the primary focus is on the adoption and diffusion of new forms of industrial and production organization as an organizational and spatial process. I am secondarily concerned with the broader process of regional economic recovery, in particular whether the adoption of new forms of production organization is a contributing factor to improved regional economic performance. This secondary interest is motivated by two factors. First, the literature suggests that the tendency for older regions to become locked into older forms of production organization is a key factor in the economic decay of those regions. Second, the Industrial Midwest has been inaccurately portrayed as a region undergoing long-term, secular, and irreversible economic decline, based to a large degree on its outmoded Fordist organizational configuration and inability to inculcate new and more advanced modes of production organization.

The remainder of this article is organized as follows. After describing the research design for the study, I briefly review a number of competing explanations of the Midwest's economic fortunes in light

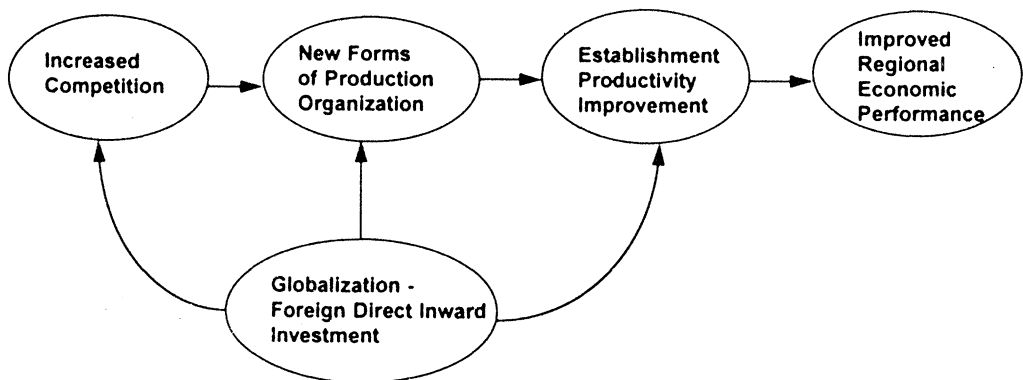


Figure 1. Relationship between new production organization, foreign direct investment, and economic performance.

of the region's actual economic performance. I then turn to the role of new forms of production organization in the Midwest economic transformation, outlining the extent of adoption and diffusion of new forms of production organization among the region's manufacturing base. This section explores the major factors that have spurred the shift to new forms of production organization and emphasizes the connection between foreign direct manufacturing investment, particularly transplant manufacturing companies, and the adoption and diffusion of these practices. The concluding section outlines the major findings and their relevance for regional theory and economic geography.

Research Design and Methodology

The research effort combined an analysis of existing published secondary source data with that of primary data from field research, personal interviews, and survey research. The secondary data analysis provided an overall picture of the changes in the industrial base and the economy of the Industrial Midwest. This analysis explored key trends in output, investment, productivity, value-added, employment, unionization, wages, and other relevant variables over a 20-year period using data from federal, state, and business sources. The performance of the Midwest economy was compared to that of other U.S. regions, to the nation as a whole, and, where possible, to the advanced industrial nations. The region's integration into the global economy was also examined, through an analysis of data on trade and foreign direct investment from the World Bank, the Organization for Economic Cooperation and Development (OECD), United Nations, and the U.S. Department of Commerce.

Because conventional published data are largely unsuited to examining the relationship between new forms of production organization and the process of regional economic transformation, the

bulk of the research effort involved the collection of primary data. An initial round of field research was undertaken to provide a general picture of the shift to new forms of production organization, of the key factors underpinning that shift, and of its overall effect on the region's economy. Both in-person and phone interviews were conducted with leading business officials, manufacturing managers, and regional economic development policymakers. These interviews explored the changing structure of the Midwest industrial base and the key factors at work in this transformation. Site visits and extensive interviews were also conducted with major regional policymaking bodies, and a day-long focus group with regional manufacturers was organized in Chicago by the Council of Great Lakes' Governors. Site visits and personal interviews were conducted with government, business, labor, and academic experts in selected Midwest cities and metropolitan areas, including Cleveland, Ohio; Battle Creek and Grand Rapids, Michigan; Chicago, Illinois; Minneapolis, Minnesota; and Pittsburgh, Pennsylvania.

The research then collected information on the role of larger, *hub* manufacturing establishments in the process of economic transformation. This aspect of the research focused on the adoption and diffusion of new forms of production organization by such establishments and their role in the diffusion of such practices throughout the region. Since no list of hub manufacturing establishments existed, one was compiled from published sources, including a list of winners of the Malcolm Baldrige Award for corporate quality given by the U.S. Department of Commerce and the larger list of manufacturing establishments certified under *ISO 9000* standards, and by conducting phone interviews with recognized manufacturing experts. After cross-checking the manufacturing plants from these lists and interviews, 50 candidate sites for more extensive field research were identified. From this list, access was obtained to 12 U.S.-owned manufacturing establishments as sites for intensive field research consisting

of day-long factory visits and extensive personal interviews with plant management, human resources managers, purchasing managers, and where possible union officials and line workers. These facilities included two electronic components facilities, two automotive assembly plants, two steel-making facilities, a machine tool plant, a chemical processing plant, two medical device manufacturers, a producer of packaging materials, and one other manufacturer. A field research protocol was developed and pretested on a small group of plants. The field research instrument obtained information on firm characteristics, the organization of production (use of work teams, number of job classifications, levels of management, employee training, continuous improvement, statistical process control, and so forth), supplier relations, business climate factors, and the role of government in economic development. More than 100 interviews (an average of more than 10 interviews per establishment) were conducted with plant managers, human resources managers, purchasing officials, factory workers, and union representatives.

Although the field research provided detailed information on the production practices and impacts of a small sample of larger hub establishments, it was unable to provide reliable information on the adoption and diffusion of new forms of production organization by the much broader base of small and medium-size manufacturing establishments. A mailed survey was used to collect data on the adoption and diffusion of new forms of production organization by small and medium size manufacturers in the Industrial Midwest. The survey instrument obtained information on firm characteristics (age, sales, number of employees, major products), human resources and management practices (employee training, incentive schemes, and wages), manufacturing practices (quality-control instruments, statistical process control, and just-in-time inventory), buyer-supplier relations, and the effect of government policies on manufacturing firms. Since the field research provided reliable information on the region's

larger manufacturing establishments, the survey population was drawn from the total population of roughly 19,000 manufacturing establishments of 50–500 employees in Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, and the extreme western counties of New York (around Buffalo) and Pennsylvania (the greater Pittsburgh area), as listed by Dun and Bradstreet. The Dun and Bradstreet population was checked for representativeness against the U.S. census data for state or geographic area, two-digit SIC code, and employment size, and was found not only representative, but in most instances quite comparable to the Census data in its coverage. A stratified random sample of roughly 2,000 manufacturing establishments was drawn up, with the stratification designed to ensure that the sample was representative of the population along three criteria: state or geographic area, industrial sector (two-digit SIC code), and firm size as measured by number of employees (Table 1). Addresses and contacts were obtained from the *Dun's Market Identifiers System* from Dun and Bradstreet (1992).

The survey was designed in accordance with the *total design method* (Dillman 1978), consisting of an initial mailing, follow-up postcard, a second questionnaire mailing, and a follow-up telephone call to encourage response. Surveys were mailed to 1,933 firms and generated 193 useable responses, for a response rate of 10 percent. While this response rate is low, the survey does provide useful descriptive information on the broad contours of the region's industrial base and on the adoption and diffusion of new forms of production organization. Follow-up telephone interviews indicated that the main reasons for nonresponse were the length of the survey instrument and the time demands on the management of small and medium-size firms. The average firm that responded to the survey was a privately held multiplant company with 179 full-time employees and sales of \$27.7 million. Approximately 80 percent of survey respondents were finished-product manufacturers. The average wage rate for production workers was \$11.00 per hour, and roughly 40 percent were unionized.

Table 1
 Representativeness of Midwest Manufacturing Survey

	Population (Dun & Bradstreet) (%)	Survey Sample (%)	Survey Response (%)
Employment (Establishment)			
50–99	49.2	46.8	32.1
100–249	37.5	38.8	44.7
250–499	13.3	14.4	13.3
SIC (Establishment)			
27	6.4	6.9	4.6
34	11.8	13.0	13.8
35	13.6	14.3	9.2
39	8.4	5.6	7.6
Other	69.6	59.2	64.6

Source: Dun & Bradstreet (1992); Midwest Manufacturing Survey, Center for Economic Development, Carnegie Mellon University, 1993.

To test the representativeness of the survey respondents, the profile of the respondents was compared to that of both the total population and the overall sample by size and sector or SIC code (Table 1). The survey response was slightly biased toward medium-size firms, those in the 100–249 employment size range. Most of this difference came, however, from a lower proportional response in the smallest size group, those in the 50–99 employment size range. The survey response share was virtually identical to that of the population as a whole in the largest size category, establishments with 250–499 employees. The survey response was fairly representative of the sectoral distribution of Midwest manufacturing, in terms of the largest and most significant sectors of Midwestern industry (SICs 27, 34, 35, and 39). Furthermore, it is important to note that the survey results are used to provide insights into the level of adoption and diffusion of new forms of production organization for the sample as a whole, and not for subgroups (by sector, size, or geography) of that sample population.

Economic Performance of the Midwest

Before proceeding to the core discussion of the adoption of new modes of

production organization in the Midwest, it is useful and important to provide some understanding of the nature of the economic recovery that has occurred in the region over the past decade or so.

In contrast to widespread predictions of decline, economic conditions in the Midwest have improved considerably. Key measures of economic performance—output, productivity, investment, and employment—indicate that the region has experienced a substantial economic recovery (Table 2). In 1989, the Industrial Midwest produced more than \$235 billion in manufacturing output, roughly one-quarter of the national total, and more than \$800 billion in total output (measured as gross state product), roughly one-fifth of the national total. The region posted a 15 percent increase in output between 1987 and 1989, and expanded at a 4.9 percent annual rate in 1993 compared to a 3 percent rate for the nation as a whole. The region's manufacturing output increased by 16 percent between 1982 and 1987, after declining by more than 25 percent in real terms between 1977 and 1982. The Midwest's economic recovery is also evident in the improvement of its unemployment rate. In 1982, the region's unemployment rate was 12 percent, significantly higher than the

Table 2
Trends in Key Economic Indicators for the Industrial Midwest, 1977–1990

	1977	1982	1987	1990	Percentage Change		
					1977–82	1982–87	1987–90
Output (\$billions)	754.6	648.8	780.0	819.0	-14.1	20.8	5.0
	<i>425.0</i>	<i>581.5</i>	<i>823.4</i>	<i>994.8</i>	36.8	41.6	20.8
Manufacturing output (\$billions)	248.0	175.8	203.9	204.5	-29.1	15.9	0.3
	<i>139.7</i>	<i>157.7</i>	<i>215.3</i>	<i>248.4</i>	12.9	36.5	15.4
Manufacturing value-added (\$billions)	301.5	223.1	274.1	281.0	-26.0	22.8	2.5
	<i>169.8</i>	<i>200.1</i>	<i>289.4</i>	<i>323.8</i>	17.9	44.6	11.9
Manufacturing value-added per employee (\$thousands)	56.8	49.7	60.1	58.4	-12.5	20.9	-2.9
	<i>32.0</i>	<i>44.6</i>	<i>63.5</i>	<i>70.9</i>	39.3	42.3	11.7
Capital expenditures (\$millions)	23.1	17.9	20.0	20.6	-22.6	11.7	3.0
	<i>13.0</i>	<i>16.1</i>	<i>21.1</i>	<i>25.0</i>	23.3	31.5	18.5

Notes: Figures in the top row for each variable are in constant 1985 dollars. Figures in italics represent nominal dollars.

Sources: Output and manufacturing output: U.S. Department of Commerce (1993); manufacturing value-added and capital expenditures: U.S. Department of Commerce (1977, 1982, 1987, 1990).

national rate of 9.7 percent. A decade later, in 1992, the region's unemployment rate was 6.6 percent, better than the national rate of 7.4 percent.

The Industrial Midwest has made considerable gains in productivity. From 1982 to 1987, productivity (measured as manufactured output per production worker hour) grew by 5.7 percent in real terms, a significant turnaround from the 1977–82 period, when manufacturing productivity declined by 4.5 percent in real terms. These trends are similar when the analysis is extended to cover the eight Great Lakes states. Between 1986 and 1988, productivity in the eight Great Lakes states increased by roughly 15 percent—6 percent faster than Japan (9 percent), and considerably better than the United States (-1 percent) and Germany (-2 percent).² A Federal Reserve Bank of Chicago study (1994) found Midwestern manufacturers to be roughly 20 percent more efficient than their national counterparts.

A central argument of the deindustrial-

ization thesis was that the United States, and older industrial regions in particular, were experiencing “widespread and systematic disinvestment” and a shift in capital away from productive investment in plant and equipment (Bluestone and Harrison 1982). The recovery of Midwest industry has been driven in part, however, by substantial real increases in the level of investment in plant and equipment. Capital expenditures in the Midwest grew at a rate of nearly 12 percent in real terms from 1982 to 1987, outpacing the national trend, which registered a 10.4 percent decline. The Federal Reserve Bank of Chicago study (1994) found that capital expenditures per worker were 9 percent higher in the Midwest than for the rest of the nation between 1986 and 1990. The study also found that investment per worker was 16 percent higher in the Midwest transportation sector and 22 percent higher in the region's steel industry.

Explanations for the Midwest's Industrial Recovery

There are a number of potential explanations for the economic recovery of the Industrial Midwest: (1) a shift from traditional manufacturing sectors to new

² Regional productivity growth is measured here as a simple, unweighted average for the eight Great Lakes states. National productivity growth is adapted from OECD (1992).

high-technology industries and services, (2) productivity improvement from employment reductions and declining wage rates, (3) increased trade and exports to other nations, and (4) the transformation of the region's production system. The remainder of this section examines the first three of these theories, while the next section is devoted to developing a deeper understanding of the adoption and diffusion of new modes of production organization in the region.

Sectoral Shift

Although the Midwest has certainly generated both service and high-technology employment, the region's industrial base remains firmly anchored in manufacturing. Manufacturing continues to comprise a greater share of the Midwest economy (25 percent) than for the nation as a whole (18.7 percent). Furthermore, the Midwest has the highest level of manufacturing output per capita of any region in the country, producing \$5,043 in manufacturing output per person in 1989 compared to \$3,891 for the United States as a whole. In 1990, the Midwest, which is home to 18 percent of the nation's population, accounted for 24 percent of the nation's manufacturing employment. Between 1977 and 1989, the Midwest's share of the nation's manufacturing jobs declined only slightly, from 27 to 24 percent. More than one-third of the Midwest's manufacturing employment remains concentrated in heavy manufacturing sectors such as primary and fabricated metals, industrial machinery, and transportation equipment.

Furthermore, a study by the First National Bank of Chicago (1990) found that five core Midwestern states—Ohio, Indiana, Michigan, Illinois, and Wisconsin—account for a disproportionate share of total national employment in the automotive-related sectors. The analysis used employment coefficients to compare regional employment to national trends, and found that these five core Midwestern states had more than three times the

national concentration of motor vehicle manufacturing and roughly twice the national level in primary and fabricated metals, rubber and plastics, and industrial machinery. The study noted that whereas manufacturing's share of total employment for the five-state region declined between 1980 and 1988, the ratio of the region's concentration of manufacturing relative to the nation actually increased from a coefficient of 1.25 to 1.27, noting that: "Although this move was small, it illustrates that the region did not lose manufacturers relative to the nation over the 1980s" (First National Bank of Chicago 1990, 6).

Downsizing and Wage Reduction

Although many Midwestern manufacturers have reduced the size of their operations and manufacturing employment in the region has declined, the combination of downsizing and layoffs does not provide a full explanation for the region's economic transformation. The Midwest experienced a 15 percent decline in manufacturing employment between 1977 and 1982. Employment losses related to manufacturing have subsided since then, however, with manufacturing employment registering 2 percent growth from 1982 to 1987. Furthermore, in 1990, the average annual manufacturing wage in the eight Great Lakes states was \$30,671, roughly 6 percent higher than the national average. The Midwest also retained relatively high levels of unionization in manufacturing. As of 1988, more than a third (35.7 percent) of all national union membership in manufacturing remained concentrated in the six core Midwest states; that figure rises to more than half (57 percent) for the eight Great Lakes states. During a period of declining unionization both nationally and internationally, the Midwest experienced only a modest decline in the unionized percentage of its manufacturing work force, from 40 percent in 1984 to 37 percent in 1988. It is important to point out here that the earlier period of employment and wage

reductions is likely to provide some part of the explanation behind the region's improved productivity and performance. There is no doubt that a considerable share of regional manufacturers in key industries undertook a strategy of eliminating excess capacity, scuttling older technology, and cutting employment and reducing wages to improve their productivity and performance. While clearly a part of the picture, the downsizing argument fails to account for the full scope of the region's substantial productivity gains and economic improvement.

International Trade Performance

A recent study (Federal Reserve Bank of Chicago 1993) notes the improved trade and export performance of the region; and the *Wall Street Journal* proclaimed that the region "propelled America back to first place as the world's leading exporter" ("Rust Removers" 1992). A host of recent studies have highlighted the increasing importance of globalization of markets and technology (Porter 1990; Dicken 1992); and others suggest that regions are increasingly important nodes of integration into the global economy (Ohmae 1993, 1995; Federal Reserve Bank of Chicago 1993; Wolfe 1994).

Although the Midwest has certainly reversed its long history of producing almost exclusively for domestic markets, it is doubtful that exports and trade alone account for the region's considerably improved economic performance. In 1991, the six core Midwest states exported more than \$65 billion in goods, 19 percent of the national total. From 1989 to 1990, the value of export trade for the Industrial Midwest grew by 13.4 percent, twice as fast as the national rate of 6.7 percent.

Although the trade performance of the Industrial Midwest is a considerable improvement over its historic pattern and is better than the United States as a whole, the region lags in comparison to other advanced industrial nations. The Midwest's level of exports as a share of total output (or gross regional product) is

slightly better than that for the United States, but significantly less than Japan, Germany, France, and Canada (see Fig. 2). To provide a better picture of the relation between exports and economic growth, Figure 3 presents a scatterplot of exports per capita and output per capita (Fig. 3). The Industrial Midwest ranks in the middle of the pack here, ahead of the United States and in the same general area as the United Kingdom, Italy, France, Norway, and Japan, but well behind Germany, Sweden, the Netherlands, and Switzerland. It should be noted that the European statistics are dominated by trade between members of the European Community.

The survey of Midwest manufacturers obtained information on the export destinations of the region's small and medium-size firms. These findings indicate that the majority of the region's small and medium-size firms continue to produce mainly for regional and domestic markets. Overall, 40 percent of survey respondents reported that the Midwest region was their key market. This is most likely to stem from the fact that the region's industrial base is heavily comprised of suppliers. In fact, the survey data indicate that the primary end-user or customer locations for Midwest manufacturers are Ohio, Illinois, Michigan, and Wisconsin. According to the survey data, the main destinations for export activity were Canada (5 percent), Japan (5 percent), Mexico

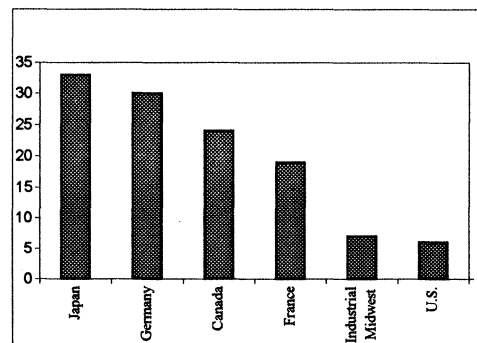


Figure 2. Exports as share of output, 1989.
Source: World Bank (1992).

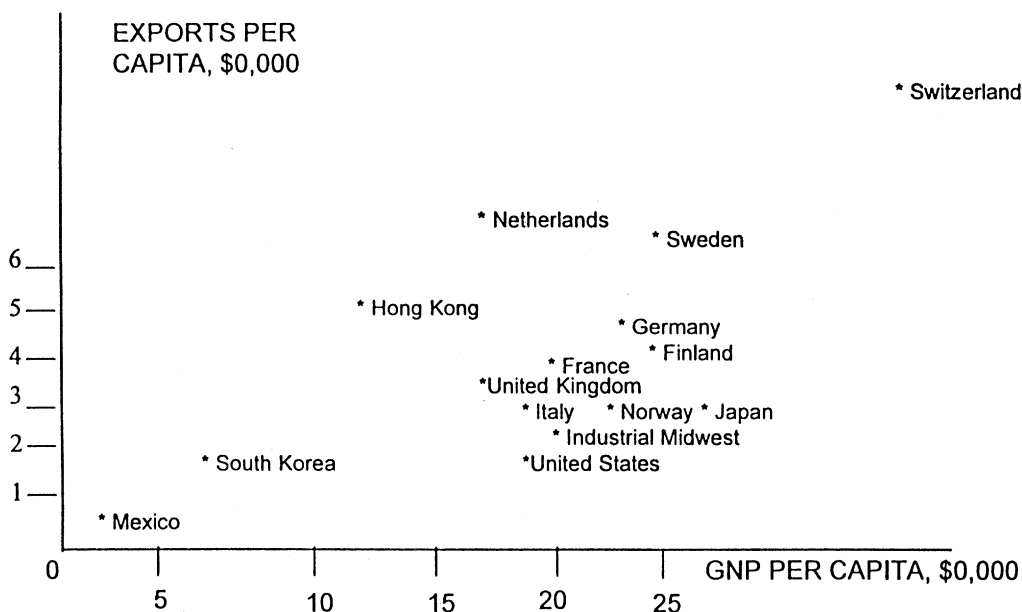


Figure 3. GNP and exports per capita, 1991. Source: World Bank (1992).

(4 percent), Germany (4 percent), and the United Kingdom (4 percent). In short, the region's manufacturing base is just beginning to make the transition from being regionally and domestically focused producers to a greater level of integration into the global economy. While the region's improved trade performance is likely to have played some role in the region's recovery, it cannot account for the full breadth of the region's economic turnaround.

A review of the relevant data on economic performance clearly indicates that the Industrial Midwest has experienced significant economic recovery. Furthermore, while existing explanations that emphasize the role of changes in industrial structure, corporate downsizing, and wage reductions, or increased trade and export performance, capture elements of the region's turnaround, they fail to provide a complete explanation for the region's industrial revival. What other factors may help to complete the explanation for the economic transformation and recovery of the Industrial Midwest? And, more impor-

tantly, to what extent has the region undergone a deeper and more fundamental process of economic transformation and regional creative destruction, characterized by a shift from older Fordist modes of production organization to new high-performance production systems that harness the knowledge and capabilities of the entire work force? The next section turns to these questions.

Shift to New Forms of Production Organization

The literature tends to view older industrial regions as having considerable organizational and institutional rigidity and as essentially being locked into older, outmoded forms of production organization, and hence virtually unable to make the transition to new forms of production organization. In contrast to this view, the argument advanced here is that the Midwest is undergoing the regional equivalent of what Schumpeter referred to as creative destruction, as new forms of

production organization work to transform its historic industrial base.

The data from the Midwest Manufacturers' Survey provide considerable evidence of adoption and diffusion of new forms of production organization across the regional manufacturing base (see Table 3). Roughly one-third of respondents report the use of self-directed work teams, more than two-thirds report the use of quality teams with production workers, and more than half compensate workers for extra time spent working in quality teams. Thirty-seven percent of respondents report that they rotate workers across functional assignments, and 30 percent utilize a formal incentive system for workers engaged in continuous improvement activities. More than half (54 percent) of the respondents report that they had established a total quality management (TQM) program. In addition, more than half use statistical process control, and almost half use a just-in-time system for inventory control and production scheduling. Survey respondents report a 69 percent rate of capacity utilization, and roughly half operate on a round-the-clock basis. Furthermore, the survey respondents report an R&D-to-sales ratio of 11.5 percent, indicating that

small and medium-size manufacturers are increasingly a source of innovation and technology development in the Industrial Midwest. These results compare favorably with the findings of a 1993 survey of a random sample of roughly 800 U.S. manufacturing establishments (Osterman 1994), which found that roughly 35 percent of U.S. manufacturing plants report the use of teams, 55 percent rotate workers between teams, and 45 percent make use of quality circles. The data from the Midwest Manufacturers' Survey thus indicate a clear trend toward the adoption and diffusion of new forms of production organization among respondent manufacturers.

While it would be useful to be able to examine the effects of high-performance work and production systems on establishment productivity and performance, such analyses are fraught with difficulty and tend to lead to unreliable conclusions. Two recent, careful studies have found a fairly strong relationship between adoption of a bundle or cluster of high-performance practices and establishment productivity, but these studies have been done on relatively small samples of comparable plants in the same sector (MacDuffie 1994; Ichniowski, Shaw, and

Table 3

Adoption of High-Performance Production Organization by Midwest Manufacturers

Characteristic	Percentage	Number of Firms	<i>N</i>
Production organization			
Self-directed work teams	32	61	189
Quality teams	65	125	193
Worker rotation	82	146	179
Incentive system for continuous improvement	27	53	193
Total quality management (TQM)	52	97	187
Statistical process control (SPC)	55	105	190
Just-in-time (JIT) inventory control	48	90	186
Supplier relations			
Production to customer order	82	154	187
Just-in-time delivery	39	71	184
Involvement in customer production design	90	172	191
Customer evaluation certification	64	120	188
Involvement of suppliers in product design	51	98	191
Evaluation of suppliers	75	188	183

Source: Midwest Manufacturing survey, Center for Economic Development, Carnegie Mellon University, 1993.

Prennushi 1993). MacDuffie's analysis of an international sample of automotive assembly plants done for the MIT International Motor Vehicle Program found that the use of an integrated system of innovative work system and human resources practices had a positive effect on plant performance. Ichniowski, Shaw, and Prennushi (1993) examined the impact of human resource management practices on productivity among a sample of steel finishing lines. Using a panel data set of monthly observations of the work practices and productivity, they found that combinations of human resource management practices had a greater effect on productivity improvement over time than did the sum of component effects due to individual practices.

The Midwest Manufacturers' Survey collected data on the economic performance of manufacturing establishments, and a number of analyses were conducted to probe the relationship between adoption of high-performance work and production systems and establishment performance. These data provide some evidence of a performance payback from high-performance production organization. It is important to point out here, however, that data limitations and measurement issues make it virtually impossible to accurately gauge the effect of new production organization on establishment productivity and performance across a wide, cross-industry sample like this one. First, because of differences in the production process, it is extremely difficult to compare organizational performance accurately or even to devise reliable measures of organizational performance across dissimilar industries. Second, it is very hard to control for the independent effects of adoption of high-performance management practices on performance across very different industries. Third, considerable differences among sectors in the adoption and diffusion of high-performance practices make it difficult to assess the effects of such practices on establishment performance across industries. In some sectors, like autos and metal fabrica-

tion, adoption of high-performance work and production systems is extensive and a basic precondition of competitiveness. In these industries, it will be hard to distinguish any performance effect associated with the adoption of high-performance practices, since basically everyone is doing it. In other industries, such as instruments and electrical machinery, the rate of adoption of high-performance practices is low, and in some instances nonexistent. Given the survey coverage and response rate, it is unlikely that sectoral analyses would generate reliable findings on this issue. The small number of responses in any sector make it virtually impossible to estimate the performance effects of new production organization on a disaggregated basis. Thus, it must remain for future empirical studies of particular sectors to provide a better statistical gauge of the effects of high-performance work and production systems on manufacturing performance.

These caveats notwithstanding it is important to point out that a significant number of survey respondents are realizing substantial performance paybacks from the adoption of high-performance production organization and that larger manufacturing establishments that were the subject of field research and interviews also report that they are realizing considerable performance payoffs from high-performance production systems. Xerox, for example, noted significant plant-level productivity gains associated with its company-wide efforts at quality production and at deploying new systems of work and production organization, which according to its chief executive officer function to harness the "group social mind" of its work force. Xerox also reduced its number of suppliers and has worked closely with them to implement innovative work and production organization (site visit and personal interviews conducted by Richard Florida 1993). Steelcase, the world's leading manufacturer of office furniture systems, noted that efforts to institute new production systems that encourage continuous im-

provement and organizational learning and emphasize quality production have generated considerable productivity pay-backs (site visits and personal interviews conducted by Richard Florida 1992–94). Motorola has also realized considerable performance gains from its efforts to implement quality production and to work closely with suppliers to move new forms of production organization through the supply chain (personal interviews by Richard Florida 1992–94).

The findings of the field research and personal interviews provide additional insight into the motivation for adopting new forms of production organization. A considerable number of large plants indicate that new forms of production organization underpin their own improved competitiveness and in some cases were a key factor in their very survival. A Big Three automotive transmission plant, for example, was able to avoid imminent closure by shifting to new production organization. The plant restructured its production process, reducing the number of job classifications, introducing self-directed teams, and decentralizing the decision-making process to harness the knowledge and full capabilities of factory workers. The plant instituted an extensive training program involving basic statistics, production-related skills, and group processes and established a “pay-for-knowledge” system to reward workers for developing new capabilities. The plant also transformed its relationships with its principal suppliers, emphasizing quality and delivery as well as price. As a result of these efforts, productivity increased by nearly 60 percent and management of the parent company reversed its decision to close the plant (site visit and personal interview by Richard Florida and the Midwest research team, April 1993).

In short, the findings of both the survey research and the field research indicate that new forms of work and production organization have diffused widely throughout the Midwest manufacturing base. The evidence provided by the field research and interviews suggests a connection between

adoption of high-performance practices and establishment productivity and performance, though the survey data are unable to adequately address this point.

Role of Hub Firms

The role of larger manufacturing establishments frequently goes beyond their individual experiences with new production systems or their individual productivity and performance records. Indeed, larger manufacturing establishments typically act as *hubs* in broader production complexes. In doing so, they function to accelerate the diffusion of new forms of production organization through their supplier networks. Close, interactive, and codependent relationships between these hubs and their suppliers play an important role in the transfer and diffusion of new manufacturing technologies and organizational practices. Furthermore, larger hub establishments encourage and assist in the adoption of high-performance practices by their suppliers as a vehicle for productivity improvement and continuous cost reduction.

Data from the Midwest Manufacturers' Survey provide clear evidence of a shift toward more codependent and interactive supplier relations. A large share of survey respondents report that they deliver according to a just-in-time schedule: 80 percent produce on customer order, and fully 40 percent make daily deliveries to their main customers. Eighty-two percent of survey respondents report that they interact with their customers in the early stages of product design, and 62 percent report that their customers evaluate them for certification. Furthermore, the survey suggests a high degree of concentration and integration between survey respondents and their suppliers, with roughly 30 percent of their production inputs coming from the same state and another 35 percent coming from the Midwest states. Fifty-one percent of survey respondents involve their suppliers in the design and development of new products, and 50 percent evaluate their suppliers at least

once every two years. The survey data thus suggest the development of close and interactive supplier relationships in the Midwest, which is both an indication of a shift to new forms of production organization in its own right and represents an important mechanism for enhancing the diffusion of such practices through the region's manufacturing base.

The personal interviews with larger manufacturers obtained their assessment of the adoption and diffusion of new production systems through their own supplier bases. These establishments were asked to provide a rough estimate of the percentage of their regional supplier base that had made or was in the process of making the transition to new forms of production organization. The results here, though subjective, are nonetheless revealing. Overall, larger manufacturers indicated that between 5 and 10 percent of their regional supplier base had made the full transition to new forms of production organization. They further noted that between one-half and two-thirds of their regional supplier base is engaged in the process of transformation. In their view, between 10 and 25 percent of the supplier base was not engaged in the shift to new forms of production organization, preferring to remain organized along traditional lines (site visits and personal interviews by Richard Florida 1993–94). The consensus view expressed in these interviews was that the Industrial Midwest had experienced a significant improvement in manufacturing capabilities over the past five years, and that a significant number of suppliers are engaged in the shift to new forms of production organization.

Globalization

The findings of the field research and interviews indicate that the adoption of new production organization has been accelerated by the integration of the Midwest into the global economy, and especially heightened by foreign competition and rising foreign direct investment in manufacturing. Automotive and elec-

tronics manufacturers noted the competitive effect of highly efficient, high-quality Asian producers. Xerox specifically noted both the effect of competition in the low-end copier market from Canon and Ricoh and also the importance of its Japanese sister company, Fuji-Xerox, in helping to inform and structure its early quality efforts (site visits and personal interviews by Richard Florida 1992–94). A significant number of companies also noted the need to adopt these practices to expand into rapidly growing foreign markets. Global competition has thus played an important role by providing incentives to large manufacturers to pursue new forms of production organization to increase their performance and competitiveness in global markets.

Moreover, the key to understanding the connection between globalization and the shift to new forms of production organization lies in the phenomenon of transplant manufacturing facilities. A growing body of research notes that transplant companies and foreign direct manufacturing investment in general are important sources of economic transformation and productivity improvement and economic growth across the advanced industrial nations (Graham and Krugman 1991). The sales generated from foreign direct investment total more than \$6 trillion, a figure that exceeded world exports of \$4 trillion in 1992 (United Nations 1993). An OECD study (1994) of 15 advanced industrial nations found that foreign-owned companies are typically more efficient than domestic firms in both absolute levels and rates of productivity growth, and that productivity gains result from more advanced technology than domestic industries, or from adding capacity, while productivity increases at domestically owned companies more often result from downsizing and layoffs. Furthermore, an important study by the McKinsey Global Institute (1993) found that foreign direct investment affects productivity by accelerating the transfer of world-class technology and production organization, noting that: "Transplants

from leading-edge producers: (1) directly contribute to higher levels of domestic productivity, (2) prove that leading-edge productivity can be achieved with local labor and many local inputs, (3) put competitive pressure on other domestic producers, and (4) transfer knowledge of best-practices to other domestic producers through the natural movement of personnel" (McKinsey Global Institute 1993, 27).

The Midwest is home to a large and growing body of foreign direct manufacturing investment. Between 1981 and 1989, the *gross book value* of foreign investment in the Midwest increased from \$22.1 to \$71.0 billion, an increase of 135 percent in real terms. Foreign investment in the Midwest is heavily concentrated in high value-added manufacturing sectors, particularly industrial machinery, chemicals, automotive assembly and automotive component parts, and steel. Furthermore, the Midwest has a particularly large concentration of Japanese transplant manufacturing facilities, especially in the automotive-related industries. The Midwest is home to 498 Japanese-affiliated plants, 40 percent of the national total. More than half of all Japanese foreign direct investment in automotive-related industries is concentrated in four Midwest states: Ohio, Indiana, Michigan, and Illinois (see Florida and Kenney 1991a). Japanese investment has provided more than \$7 billion to modernize the region's steel industry (Florida and Kenney 1992), resulting in the establishment of technologically advanced steel finishing and galvanizing capabilities in the region.

Transplant factories of leading foreign manufacturing companies have played a key role in the transfer of state-of-the-art manufacturing technology and production organization to the Midwest locations, accelerated the diffusion of these practices through supplier complexes, and created powerful demonstration and learning effects for local companies. In previous research conducted jointly with Martin Kenney on the Japanese automotive-related transplants (Florida and Kenney

1991a, 1991b; Kenney and Florida 1993), the majority of which are located in the Industrial Midwest, we found a high rate of adoption of advanced forms of production organization. The results of that research indicate that more than three-quarters of respondents to the 1988 Japanese transplants survey (Florida and Kenney 1991a; Kenney and Florida 1993) organized work in teams, 71 percent used self-directed teams, 81 percent rotated workers within these teams, 62 percent rotated workers among teams, and 44 percent made use of quality circles. A more recent 1994 cross-industry survey of Japanese transplants conducted jointly with Davis Jenkins confirms these trends (Florida and Jenkins 1996). The results of that survey further indicate that the automotive-related industries that are mainly concentrated in and around the Midwest show the highest rate of adoption of high-performance production organization. Transplants have brought new production organization to even extremely traditional industries like steel, which have experienced great resistance to new work and production systems (Florida and Kenney 1992). For example, at LSE, the LTV-Sumitomo joint venture in Cleveland, and at I/N Tek, a joint venture between Inland Steel and Nippon Steel, management and labor have agreed to implement new work systems that reduce job classifications to a minimum, remove front-line supervisors, structure work in teams, and empower workers to engage in continuous improvement and make decisions typically reserved for management.

Transplants have also stimulated the diffusion of state-of-the-art management practices into the U.S. industrial base. Transplants, particularly those in the automotive industry, work with their suppliers to help them adopt new forms of production organization. Toyota and Honda have set up supplier support programs to encourage and facilitate the adoption of new forms of production organization among their suppliers (site visits and personal interviews by Richard Florida 1988-94). The results

of a recent survey of U.S. suppliers to Japanese automotive transplants conducted jointly with Davis Jenkins indicate an extremely high level of adoption of new forms of production organization by those U.S. suppliers (Florida and Jenkins 1996).

Institutional Barriers to New Production Organization

Although the shift to new forms of production organization is clearly occurring, the research identified three factors that have impeded adoption and diffusion of new forms of production organization. First, a significant number of larger, *hub* manufacturing establishments remain locked into traditional production systems. In particular, a number of hubs continue to organize their supply chains along traditional mass-production lines focusing mainly on cost reduction and using erratic production scheduling, which requires suppliers to hold large inventories. The respondents to the Midwest Manufacturers' Survey report that just 30 percent of their major customers provide them with stable production schedules, and fully 70 percent of survey respondents report that a just-in-time supply system simply transfers inventory down the supply chain.

Second, existing banking and financial practices constitute another impediment to the adoption and diffusion of new forms of production organization. The financial system is a key element of the broader economic environment, sending strong signals to manufacturers via its loan requirements. Roughly 28 percent of respondents to the Midwest Manufacturers' Survey report that banks require inventory to be held as collateral on loans, thus creating a sizeable barrier to the just-in-time inventory and supply practices.

Third, the existing, largely Fordist public policy regime comprises an additional barrier to the adoption and diffusion of new forms of production organization. The Midwest Manufacturers' Survey data indicate that fully half of all respondents are unsat-

isfied with current government efforts to improve the regional manufacturing base. The survey asked manufacturing establishments to rate the effectiveness of various forms of government assistance, such as infrastructure development, industrial revenue bonds, tax abatements and regulatory relief, technology development, trade and export assistance, and industrial modernization. Overall, survey respondents consistently rated direct government assistance programs in marketing, site development, and technology transfer as the *least effective* functions of government. In the field research and interviews, manufacturing establishments, particularly those that have implemented new forms of production organization, were highly critical of government policies that seek to transfer new manufacturing technology or engage in industrial modernization assistance. Many of these manufacturers explicitly noted that they *do not want* government advice on how to organize their factories—a fact that runs directly counter to a major recent drift in regional development policy (see Shapira 1990; Rosenfeld 1992). Manufacturers also noted a contradiction in the existing environmental policy regime that favors clean-up technology and end-of-the-pipe solutions over efforts to introduce new production processes that could simultaneously improve productivity and prevent pollution. In other words, elements of the existing Fordist policy regime are in effect creating market failures, comprising an unnecessary barrier to the adoption and diffusion of new forms of production organization. This stems from the simple fact that the existing policy regime and the broader business climate it helps to inform grew up over the past century in conjunction with and to support the needs of mass-production organization. Simply put, this Fordist policy regime has not yet adjusted to the demands of new forms of production organization. This is suggestive of a *lag* between the rise of new forms of production organization and changes in government policy regimes and the broader regional business climate—a subject that clearly warrants further research.

These factors notwithstanding, the research provides considerable quantitative and qualitative evidence of the adoption and diffusion of new forms of production organization among manufacturers in the Industrial Midwest. The process of regional economic transformation is spatially uneven, characterized by clusters of manufacturing establishments and supplier complexes characterized by significantly higher rates of penetration of new forms of production organization than the regional and national norms. The qualitative evidence also suggests that changes in the underlying organization of production contribute to improved economic performance. Still, it is important to point out that at this stage and with currently available data, it is impossible to provide a precise quantitative estimate of the effect of changes in production organization on economic performance. It is indeed likely that some part of the explanation for increased economic growth comes simply from increased demand and from the productivity improvements provided by downsizing. It is equally important, however, to point out that such gains are likely to account for only a small portion of the total explanation and that, given the leveling effects of global competition, such strategies are likely to be effective only in the short run. In any event, the main thrust of the evidence clearly confirms the central hypothesis: that new forms of production organization are not limited to new regions, that such practices can take root and flourish in older regions, and that they can play an important role in the reconstitution and revival of those regions as well.

Conclusions

Processes of economic restructuring and transformation—and in particular the emergence of new forms of production organization—need not be confined to new regions. The strong transformative forces that Schumpeter identified as *gales of creative destruction* have a geographic or regional element as new technologies

and new forms of organization not only register themselves in new industries, but inform the reconstitution and revitalization of existing industries, or in this case regions, as well. The research presented here has explored these issues through an empirical examination of recent trends in the Industrial Midwest, a region that the literature has depicted as beset by chronic economic decline stemming in large measure from its being locked into old, outmoded forms of production organization.

The findings suggest two main conclusions. First, the Midwest is going through a deep and fundamental process of economic transformation, or regional creative destruction. The Midwest manufacturing base is shifting from traditional Fordist modes of production organization to new and more advanced or high-performance modes of production organization, characterized by a relatively high rate of adoption and diffusion of new forms of production organization, such as work teams, continuous improvement, and codependent supplier relations. This process of regional economic transformation is spatially uneven, occurring at higher rates in distinct geographic pockets within the region.

Second, the adoption of new forms of production organization across the region's manufacturing base has been accelerated by the global integration of the Midwest economy, particularly by increased levels of foreign direct investment in manufacturing. Escalating foreign competition has encouraged hub establishments to pursue new forms of production organization to increase their competitiveness and to push new and innovative production practices through their supply chains. The influx of a large number of transplant manufacturing facilities has stimulated the transfer of new forms of production organization, accelerated the diffusion of these practices through supplier relationships, and created demonstration and learning effects for regional manufacturing establishments.

In addition, the findings provide some

evidence that the adoption of new forms of production organization has contributed to the region's broader economic recovery to some degree. Here it is important to point out that conventional explanations that stress a shift in the region's industrial structure, corporate downsizing, and declining wages or improved trade and export performance fail to provide a complete explanation for the region's pronounced economic recovery, though they do account for aspects of that turnaround. The underlying shift in the region to new and more advanced forms of production organization adds an important piece to the evolving understanding of the engines underlying the region's economic recovery. The qualitative evidence clearly suggests a connection between changes in production organization and economic performance, though the survey data are not able to address this point. It remains, however, for further empirical research focused on particular sectors where performance measures can be strictly controlled to subject this claim to more rigorous quantitative testing.

At bottom, these findings raise questions for economic geography and regional theory. The research presented here clearly indicates that older regions can become focal points for new production systems. This contradicts the widely accepted belief, advanced in a huge body of literature, that older regions are inexorably doomed to disinvestment, deindustrialization, and decline (Bluestone and Harrison 1982; Massey 1984). Furthermore, it also contradicts the more recent, but nonetheless widely held, conviction that new forms of production organization are the province of new regions (Scott 1988; Saxenian 1994). The overall thrust of this research thus calls for some rethinking and revision of existing theories of regional growth and decline. The idea that old regions decline because they are locked into old institutional practices, while new regions grow because they are home to that which is new, fails to capture the full breadth of regional economic dynamics. Simply put, simplistic meta-

phors of regional growth and decline, which served theory so well in the past, can no longer account for the full richness of regional economic transformation—an ongoing, evolutionary process in which many, varied outcomes are possible.

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