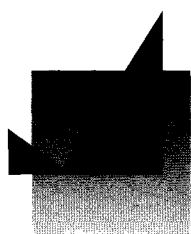


Trends and prospects for rural manufacturing

William A. Testa



Manufacturing has become the primary economic base for many nonmetropolitan counties in both the Midwest and in the rest of the nation. At the same time, services, retail, and other industries are abandoning remote counties and are centralizing their operations in urban areas (see Figure 1). While the farm sector's health has now stabilized following the downslide of the early 1980s, farm jobs—especially those as a full time occupation—continue to disappear as the average size of a farm needed to support today's American family continues to grow larger. In sum, as one writer has put it, "many small rural towns ... have been transformed from farm service centers into minor cogs in the national manufacturing system."¹

Manufacturing's importance to rural areas has been growing for several decades and it will probably continue to outpace other "basic" industry sectors in the rural Midwest. However, several forces of change, which began or continued to unfold in the 1980s and which are expected to continue into the 1990s, are not so favorable. These changes impacting rural manufacturing are threefold. First, manufacturing is undergoing a transition from traditional assembly line modes of production, that is, from "post-Fordism," to what is being called "flexible manufacturing" or "just-in-time." This change in the organization and mode of production is believed by some to favor urban locales over rural areas as production sites. Secondly, rural manufacturing differs from its urban counterpart in being more production oriented and

less service oriented in the particular activities that manufacturing companies perform. (Service activities of manufacturing companies include corporate headquarters, general administration, and R&D). However, because U.S. manufacturing companies are becoming more service oriented, it is expected that manufacturing in rural areas will not fare as well. Finally, ongoing negotiations among Mexico, Canada, and the United States are moving toward a tariff free trading area perhaps as early as 1993. As a result, low skill or low value added jobs (which tend to be found in rural areas) are those that are more likely to flee U.S. borders to Mexico.

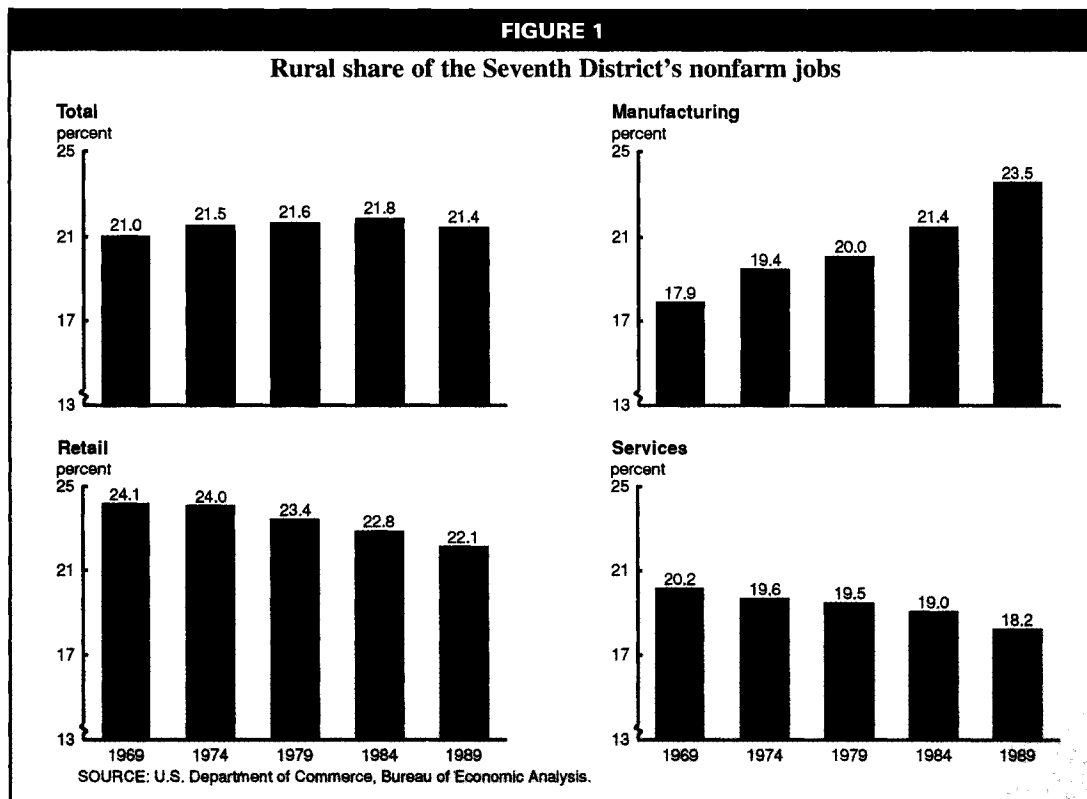
The changing economic base of nonmetropolitan counties

The primary challenge to rural areas during this century has been to replace jobs lost by the declining labor force needs of natural resource industries. As productivity climbs in farming and mining, or as natural resources are exhausted in forests and fisheries, the movement of labor into other sectors or the outright loss of jobs is the result.

In many regions, the decentralization of manufacturing from urban areas to rural areas has partly replaced jobs lost in other rural industries. Coupled with population decline in rural areas, per capita income in metropolitan and nonmetropolitan counties in the U.S. converged during most of this century.² On average, per

William A. Testa is senior regional economist and research officer at the Federal Reserve Bank of Chicago. Research assistance was provided by Virginia Carlson and David D. Weiss.

FIGURE 1



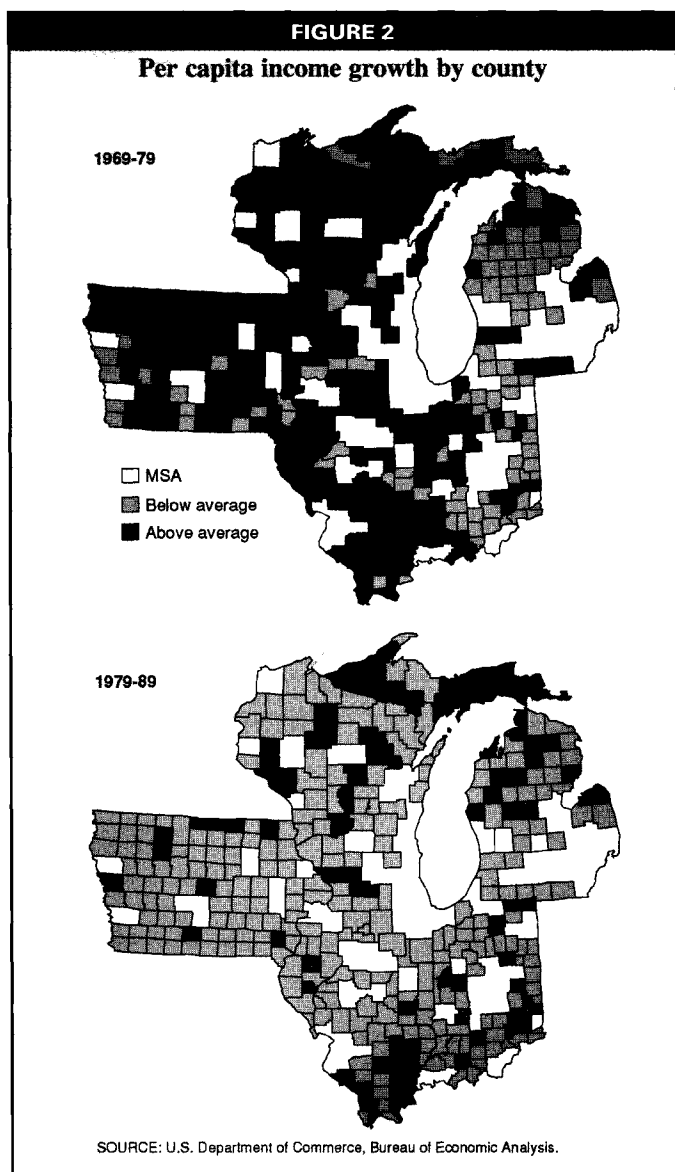
capita income growth in rural counties outperformed urban counties in the 1970s in the Seventh District states of Illinois, Indiana, Iowa, Michigan, and Wisconsin. Prosperity in natural resource industries during the 1970s, especially agriculture, was accompanied by stable or slightly growing employment in manufacturing.

The convergence of rural and urban per capita incomes in the Seventh District came to a halt during the 1980s as both agriculture and natural resource industries such as mining, energy production, and forestry fell on hard times (see Figure 2). Manufacturing located in urban and rural areas alike also suffered during the 1980s despite the fact that rural performance continued to outpace urban performance in job creation in both the Seventh District and the nation (see Figure 3).

Outperformance by rural counties (in the U.S.) in manufacturing job growth has been shown to date back at least to the 1950s and 1960s [Carlino (1985)]. Moreover, the contention that rural manufacturing job growth merely represents a urban spillover effect of manufacturing jobs to outlying counties has also been found to be either mistaken, inconclusive, or at least not pervasive from decade to decade

[Carlino (1985); Haynes and Machunda, (1987)]. Those rural counties that are not even adjacent to metropolitan areas have been found to be experiencing buoyant or above average manufacturing job growth. This experience was replicated in Seventh District states (see Table 1). From 1969 to 1990, the rate of job growth in nonadjacent nonmetropolitan counties exceeded not only growth in metropolitan counties but adjacent job growth as well.

The causes of this reorientation of manufacturing from large urban areas to rural areas are not difficult to trace. As U.S. factory productivity increased sharply during this century, manufacturing no longer required as many workers. More modest "factory neighborhoods" of workers could be gathered on a smaller scale in rural areas than those previously needed in large cities. In addition, the assembly line methods of production which gathered momentum following Henry Ford's success in automotive production required more space to organize production efficiently. Accordingly, the multistory urban factory increasingly gave way to one story sprawling production buildings. But this also meant that the cheaper land costs of suburban and rural sites



became more important in the production cost equation. Finally, the transportation system changed from rail lines converging on a central terminus—for example, Chicago—to a grid of interstate highways reaching deep into remote areas such as Appalachia and Texarkana. Rather than shipping manufactured goods from a central rail terminal such as Chicago, a remote branch plant could serve wide market areas almost as well. At the same time, the evolution away from producing heavy manufactured goods such as steel (which required bulky inputs of coal and ore), and toward lighter goods such as computers and plastics, also dispersed manufacturing toward rural locales because the

transportation penalty of remoteness was no longer so severe.

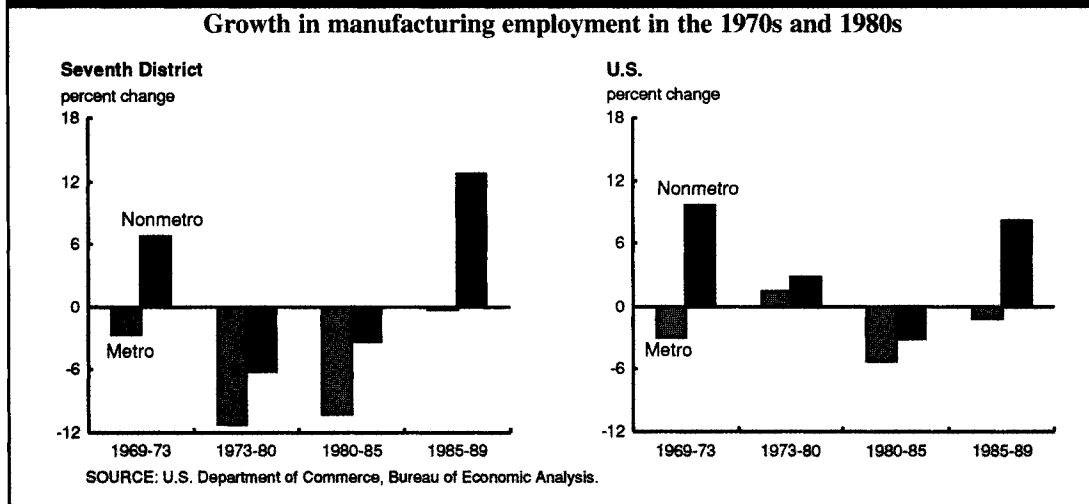
The upshot of these changes has been that, as manufacturing job growth in rural counties outpaced growth in the large urban areas, manufacturing has become a staple of the job composition in rural counties. In the Seventh District for example, manufacturing's share of total employment in non-metropolitan counties exceeds its share in metropolitan areas (see Figure 4). Rural counties in the Seventh District states have a larger share of manufacturing in comparison to their U.S. counterparts; manufacturing employment in rural District counties accounts for 19.2 percent of total employment versus 17.2 percent nationally.

Not all nonmetropolitan counties have fared well in the 1980s with regard to manufacturing job growth (see Figure 5). This suggests that active development policies in rural areas may be needed if this growth is to be realized. This is especially so owing to several trends that may be working against the rural edge in manufacturing: the movement toward flexible manufacturing, the further opening of the U.S.-Mexico border, and the increasing service orientation of U.S. manufacturing.

Manufacturing and services

Many of the same forces affecting the location decisions of service firms—especially the so called business services or producer services—also have a bearing on manufacturing companies. The reasons for this are that, aside from plant production activities, many activities of manufacturing companies are service activities such as research and development, design, management, sales, and distribution [Israilevich and Testa (1989)]. To varying degrees, manufacturing industries and companies can be thought of as an amalgam of service and production activities so that those locational forces that motivate service companies will, to varying degrees, also motivate manufacturing companies. By the same token,

FIGURE 3



service activities and production type or plant type activities will respond to differing location pulls. As a result, the service intensity of any particular manufacturing company or industry will help to determine its location preferences.

Service industries—especially the rapidly growing (and higher paying) “producer service industries” such as advertising, specialized finance, and management consulting—have thrived and concentrated in large urban areas rather than in rural counties [Testa (1992a)]. Similar to producer service jobs, nonproduction jobs of manufacturing companies have come to favor more urban areas over rural counties. A look at nonmetropolitan counties in the Seventh District shows that, in comparison to the 47 percent nonproduction payroll of manufacturers in the U.S., rural District counties hover at just over 30 percent in nonproduction payroll (see Figure 6).

According to recent studies, improvements in telecommunications technology such as facsimile machines, teleconferencing, and other fiber optics transmission have probably strengthened the advantages of large urban areas over rural counties. These improvements are proving to be complements rather than substitutes for centralized business service provision, that is, it is now easier to transmit or deliver services to remote locations; and more efficient to do so from a centralized and (usually) urban locale.

At the same time that producer service activities are growing in stature—especially in urban areas—the actual activities and jobs of manufacturing companies are becoming more service oriented. Production or so called blue collar jobs inside of manufacturing companies continue to dwindle at the same time that jobs such as R&D, clerical, computer programming and data processing, advertising, accounting, and strategic planning are becoming more plentiful. Nonproduction payroll by manufacturing companies in the United States has increased from 39 to 49 percent over the 1972-90 period.

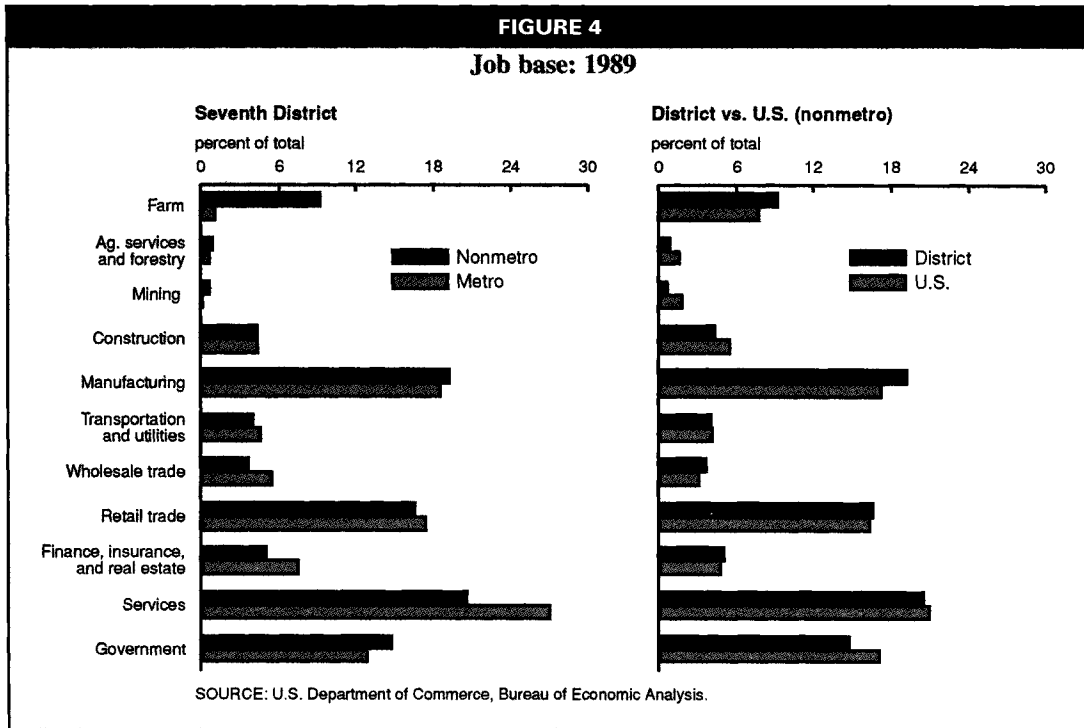
The trend toward greater service orientation among manufacturers, coupled with the impetus to concentrate service activities in large urban areas, have exerted a drag on the expansion of manufacturing employment in rural areas during the 1980s. Drawing on data from the Census Bureau from 1980 to 1988, McGranahan (1991) finds that a significant shift in job composition occurred in nonmetro-

TABLE 1

Job performance in manufacturing in Seventh District states (percent)

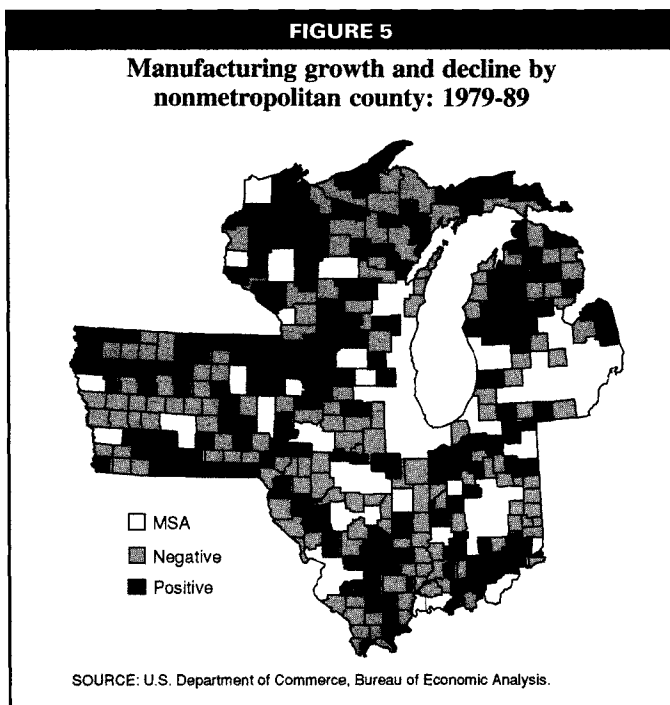
	1969-79	1979-90	1969-90
Metropolitan	-2.7	-17.8	-20.0
Nonmetropolitan			
Adjacent	8.6	-1.9	6.4
Nonadjacent	12.8	1.7	14.7

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.



politan versus metropolitan areas within the manufacturing sector. Within nonmetropolitan counties, management-research and support type jobs declined while production jobs increased slightly. In contrast, management-research jobs in metropolitan counties soared (by over 30

percent) while production jobs fell by over 10 percent. By implication, insofar as such production jobs are becoming a smaller share of employment in manufacturing, production activities will be less capable of buoying income and employment in nonmetropolitan counties.



Flexible manufacturing

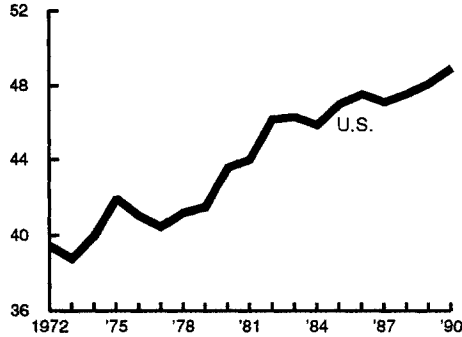
Manufacturing industries are reportedly changing their management and production methods towards “flexible manufacturing,” which is also referred to as “flexible specialization” or “just-in-time” [Piore and Sabel (1983); Scott (1986)]. The U.S. auto industry is perhaps the most prominent industry that has adopted new organizational techniques which are predicated on Japanese innovations. GM, Chrysler, and Ford have adopted these technologies through joint ventures with Japanese car makers (Toyota, Mitsubishi, and Mazda, respectively) and are now adopting many organizational changes throughout their firm or at least within divisions (for example, Saturn of GM). In addition, other U.S. industries,

FIGURE 6

Nonproduction payroll in manufacturing

Nonproduction payroll

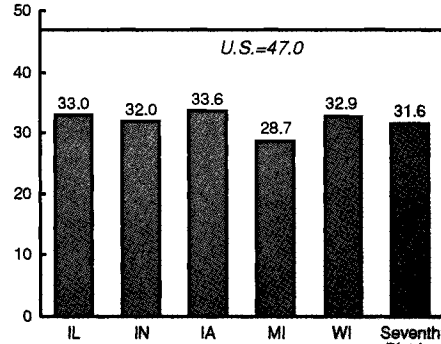
percent of total



SOURCES: U.S. Department of Commerce, Bureau of the Census, *Census of Manufactures, Annual Survey of Manufactures*.

Seventh District counties, 1987

percent of total payroll



including photocopiers, cameras, and calculators, have changed their relationships with suppliers following the Japanese prototype [Linge (1991)].

Many features have been used to characterize flexible manufacturing, and there is no universally accepted definition. Perhaps the most prominent characteristic is that flexible manufacturing involves smaller production runs and a more varied or customized product. However, the processes by which these results are achieved are equally descriptive of flexible manufacturing. Innovations in the organization of design and production allow this customized small batch production to be carried out quickly, at low cost, and with high quality.

Some of the organizational features include close relations between firms and their suppliers. In general, flexible firms maintain relationships with a smaller number of key suppliers. In addition, the supplier relationship can be characterized as closely knit and cooperative with regard to capital investment, sharing of technology, and input to design, rather than purely contractual in nature. Another key feature is the maintenance of "lean" inventories and the use of "just-in-time" delivery of inputs and parts.

With regard to labor, there is less hierarchy and more participatory organization of employees, ranging from the production line to management and sales activities. Often, employees are trained to perform many jobs rather than the single routinized activity which characterized many assembly lines of yesteryear. There is

also a technological side to flexible manufacturing. Flexible manufacturing systems equipment can change the production line set up (including tools and dies) in short order. These systems must be manned by highly skilled and trained workers.

Some analysts believe that the adoption of these production methods will work to the disadvantage of manufacturing in rural areas. For one reason, skilled and high wage labor tend to gravitate toward urban areas because skill demands are higher there. In addition, flexible manufacturing implies a smaller scale of operation so that there is a lesser need for cheap and plentiful rural land. Finally, the greater need for communication/innovation among employees in flexible firms, especially those that are highly innovative and technologically oriented, may favor urban areas where the flow and exchange of information can be conducted on a greater scale and at lower cost. Close proximity also promotes close and cooperative relations between assembly operations and key suppliers, and cuts down on delivery and inventory costs. Accordingly, manufacturing activity may tend to concentrate into centralized nodes rather than locating in isolated rural areas.

Despite these disadvantages, there is also a growing body of argument and evidence to suggest that rural areas will not necessarily wither because of the technological transition toward flexible manufacturing systems. First, the alleged benefits of close and dense proximity as it relates to flows of information may not

be universal. Experience in other countries such as the peripheral Jutland area of Denmark [Hansen (1991)] has illustrated that a critical mass of interlinked and cooperating manufacturers who practice flexible methods can be assembled in rural areas.³

Close physical proximity has also been cited as advantageous because it facilitates just-in-time delivery of parts and components from suppliers, and thereby economizes on delivery and inventory costs. However, a “growing separation of assembly plants from their subcontractors has also been facilitated by the parallel growth of specialist freight handling firms with national and international multimodal networks which have considerably reduced the tyranny of distance.”⁴ In comparison to most other industrialized nations, many rural regions of the Midwest have access to the interstate highway system which greatly shortens the time and distance from rural factories to their markets.

With regard to the skilled labor advantages of urbanized areas, the case can be argued that the new (flexible) production and organizational techniques actually favor rural areas over urban counties. That is partly because the need for flexibility in work assignments may be difficult to achieve in urban counties where the influence of strong labor unions may resist flexible work assignments. For example, in the American Midwest, Knudsen, et. al. (1991) report in a series of case studies that unions dislike “flexible labor cells” (where the labor resource is maximized in production) because they are viewed as threatening to the seniority system and are thought to be a device to encourage “speed up” of the work process. Indeed, the location decisions of many Japanese manufacturers (who were among the pioneers of flexible methods) such as Honda at Marysville and East Liberty, Ohio, and especially Toyota at Georgetown, Kentucky, have favored rural (less union oriented) locales.

Nor has it been established with certainty that there is any underlying rural skills deficit which would act as a labor supply impediment in the location decision of flexible manufacturers. Statistics reporting years of education completed do show that the adult population of U.S. nonmetropolitan counties is below the national average; but this does not necessarily reflect a shortage of skilled workers. Rather, the lower stock of educational attainment may

reflect a historical lack of skilled job opportunities in rural areas which has induced a migration of younger and educated workers out of rural areas and into large urban areas.

McGranahan and Ghelfi (1991) review the evidence of the rural economic stagnation of the 1980s against the backdrop of the increased national demand for educated workers during the 1980s. The authors conclude that lagging rural job growth was not driven by faltering labor supply in rural areas but rather that a surging demand for skilled workers occurred in *urban areas* which accelerated rural outmigration and widened the rural/urban wage gap. Furthermore, the educational gap between nonrural and rural areas is significantly larger for those with a college education than for those with a high school education [Swaim and Teixeira (1991)]; the latter is most likely to be the level of education which manufacturers would tend to demand of prospective production workers. Moreover, the authors report that the shortfall for high school completion rates of adults in rural areas has been falling—from 8.1 percentage points in 1971 to 4.4 percentage points by 1987.

Likewise, while national statistics report lagging academic achievements of rural students, there is much variation across regions, with the rural South largely accounting for the smallest percentage number of high school graduates. In the Midwest, Swaim and Teixeira (1991) report that high school drop out rates among 18-21 year olds in nonmetropolitan counties were below both metropolitan and nonmetropolitan counties of the Northeast, West, and South in 1985. High school graduation attainment rates for Seventh District states reveal that nonmetropolitan counties are not much different in producing high school graduates in comparison to both its own urban areas and to national averages.⁵

While these arguments suggest that the change toward flexible manufacturing need not be an insurmountable obstacle to continued manufacturing growth in rural areas, formal evidence to date indicates that it has already impeded rural manufacturing growth in selected industries.⁶ Barkley and Hirschberger (1992) have examined 106 metal working industries over the 1981-86 period. Their findings suggest that those industries that were restructuring toward flexible specialization were less likely to locate in rural locales, especially among the

more high technology or rapidly growing metal working industries. With regard to rural development policy, the authors caution that rural areas with competitive advantages will be those that are more amenable to flexible manufacturing characteristics such as good transportation, developed communications, high labor skills, and the absence of a labor force culture steeped in older and rigid manufacturing methods.

North American Free Trade Agreement (NAFTA)

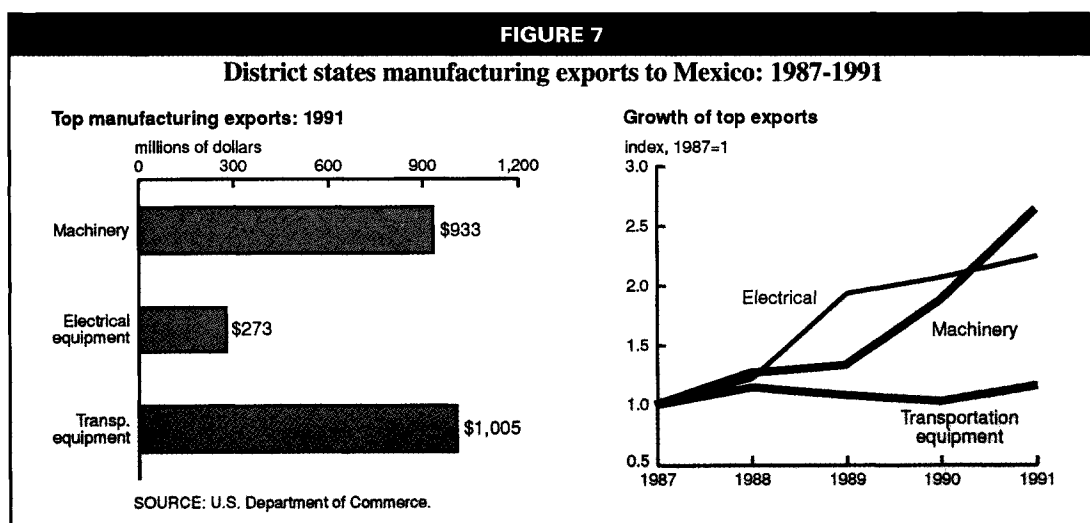
Despite the recent efforts of the aforementioned manufacturers to locate state of the art technology plants in rural areas, the particular types of manufacturing activity that have historically located in rural areas tend toward the lower skilled and production activities. Though it need not be the case, rural areas have been a haven for those manufacturers searching for low production costs [Norton and Rees (1979)]. That is, manufacturing in the U.S. has followed the so called spatial product cycle, which generalizes a manufacturing product's progress from inception to standardization. At inception, products are either new or are produced with innovative processes; at this stage, the products are produced initially near large urban areas where innovation allegedly has a stronghold. As the product and its production are routinized, standardized, and generally "de-skilled," and as the scale of production increases as the product gains wide market acceptance, the location of the production process is shifted out toward more rural locales (or overseas)

	1982	1985	1987	1989	1991
United States	11.64	12.96	13.40	14.31	15.45
Mexico	2.54	2.09	1.57	2.32	2.17

SOURCE: Bureau of Labor Statistics, Report 825.
*Includes all payments made directly to the worker, before payroll deductions, but including employer expenditures for legally required insurance programs and contractual and private benefit plans.

where production costs are lower (and needed skills or access to technology are fewer).

To the extent that this paradigm is accurate, it implies that the proposed NAFTA is less favorable for rural areas. Because average wages and labor skills in Mexico are lower, those U.S. jobs most likely to flee to Mexico would be the lower wage, lower skill, non-service type jobs—exactly those types that tend to concentrate in rural areas. Table 2 reflects the large wage differences between the nations for production workers (unadjusted for skill differences). The hourly wage premium for the U.S. as a whole is as large as 6 to 7 times that in Mexico. In all fairness, it should be noted that workers with certain production skills may not be available in Mexico at these lower wages. Moreover, the advantages of lower transportation costs and highly developed physical infrastructure favor U.S. locales. However, these advantages probably do not favor U.S. rural



locales over Mexico to the same extent as U.S. urban locales.

This is not to say that NAFTA will not be a net plus for rural counties, but rather that urban counties may be the greater beneficiaries. Mexico's tariffs on U.S. exports are two or three times greater than U.S. imports from Mexico so that Midwest manufacturing as a whole may gain from NAFTA passage.⁷ This is especially true given the surging economic growth and demand for imported capital goods which Mexico has recently displayed. From 1987 to 1991, nonelectrical machinery exports to Mexico from the Seventh District states increased by two and one-half times (to almost \$1 billion) while exports of electrical equipment increased by a multiple of 2.25. These capital goods are just the type of goods—machinery and electrical equipment—that concentrate in the Midwest and which could experience a further growth in demand arising from NAFTA's spur to Mexico's growth and development (see Figure 7). A rapidly developing Mexico will undoubtedly require growing machinery investments both for factories and for construction. Rural counties in the Midwest would tend to benefit as well, but these benefits would be diluted by the fact that machinery establishments are not highly concentrated in rural counties in the Seventh District, but instead tend to concentrate within the large metropolitan areas.⁸

Conclusion

Despite the possible negatives working to slow rural gains in manufacturing employment—increasing service orientation of manufacturing companies, the movement of lower skilled production jobs to foreign countries such as Mexico, and the adoption of flexible manufacturing methods by domestic compa-

nies—these forces have not been strong enough to hold back the tide of manufacturing growth in rural areas to date. Over the course of the 1980s, rural manufacturing in the Midwest continued to outpace urban counties. From 1985 to 1989, metropolitan counties' manufacturing jobs declined by 1.1 percent while rural counties gained by 8.2 percent. In the face of such a strong growth difference, it is difficult to imagine any reversal of fortunes. Moreover, increasing Midwest manufacturing growth in general shows little sign of abating during the remainder of the 1990s as export growth will continue to be strong while the region will suffer little of the fallout from America's defense reduction. As a result, the continuing stabilization, if not recovery, in many agriculturally oriented regions in the Midwest should continue to be helped along by rising manufacturing fortunes.

However, the experience of Seventh District states in the 1980s also suggests that not all rural counties will realize manufacturing job growth in the 1990s. Those who conduct development policies in rural areas will need to be aware of potential difficulties (such as those discussed above) in assisting the growth and expansion of manufacturing in rural areas.

In addition, not all manufacturing industries will find rural areas attractive. The experience of the 1980s shows widely divergent shifts in the Seventh District in the urban versus rural patterns of growth of establishments by individual manufacturing industries.⁹ For reasons such as these, some analysts have suggested developing information on the relative costs and productivity of individual industries in urban versus rural locations [Martin, et. al. (1991)]. The somewhat less sanguine outlook for rural manufacturing in the 1990s makes this idea more appealing as a way to concentrate scarce development dollars for maximum impact.

FOOTNOTES

¹See John Fraser Hart (1991), chapter 3, p. 32.

²See McGranahan and Ghelfi (1991).

³See Hansen (1991) for a discussion. Hansen cites Lego Co. (maker of the plastic toy blocks) and Bang & Olafsen Co. (maker of consumer electronics products) as examples of successful firms in Jutland. Also, see "Small, flexible plants may play crucial role in U.S. manufacturing," *Wall Street Journal*, January 13, 1993, p.1.

⁴See Linge (1991), p. 327.

⁵See Testa (1992b), p. 11.

⁶See also Glasmier (1991).

⁷See U.S. Dept. of Labor (1990).

⁸See Testa (1992b), p. 27.

⁹*Ibid.*

REFERENCES

- Barkley, David L., and Sylvain Hirschberger**, "Industrial restructuring: implications for the decentralization of manufacturing to nonmetropolitan areas," *Economic Development Quarterly*, Vol. 6, No. 1, 1992, pp. 64-79.
- Benjamin, Gary B.**, "Agriculture and the Great Lakes region," in William A. Testa, ed., *The Great Lakes Economy Looking North and South*, Federal Reserve Bank of Chicago, 1991 pp. 97-103.
- Carlino, G.A.**, "Declining city productivity and the growth of rural regions: a test of alternative explanations," *Journal of Urban Economics*, Vol. 18, 1985, pp. 11-27.
- Glasmier, Amy K.**, *The High Tech Potential: Economic Development in Rural America*, Center for Urban Policy Research, New Brunswick, NJ, 1991.
- Hansen, Niles**, "Factories in Danish fields: how high-wage, flexible production has succeeded in peripheral Jutland," *International Regional Science Review*, Vol. 14, No. 2, 1991, pp. 109-132.
- Hart, John Fraser**, "Population and the labor force," in William A. Testa, ed., *The Great Lakes Economy Looking North and South*, Federal Reserve Bank of Chicago, 1991, pp. 28-38.
- Haynes, Kingsley E., and Zachary B. Machunda**, "Spatial restructuring of manufacturing and employment growth in the rural Midwest: an analysis for Indiana," *Economic Geography*, Vol. 63, No. 4, 1987, pp. 319-333.
- Israilevich, Philip R., and William A. Testa**, "The geography of value added," *Economic Perspectives*, September/October 1989, pp. 2-12.
- Knudsen, Daniel C., Dennis Conway, F. Robert Jacobs, and Megan Blake**, *Flexible Manufacturing in the Midwest*, Institute for Development Strategies, Indiana University, 1991.
- Linge, G.J.R.**, "Just-in-time: more or less flexible?," *Economic Geography*, Vol. 64, 1991, pp. 316-322.
- Martin, Sheila A., Richard McHugh, and S.R. Johnson**, "The influence of location on productivity: manufacturing technology and rural and urban areas," paper presented at the North American Regional Science Association Meetings, New Orleans, LA, November 1991.
- McGranahan, David**, "Can the rural economy be competitive?," *Annual Agricultural Outlook Conference*, U.S. Dept. of Agriculture, Washington, D.C., December 5, 1991.
- McGranahan, David A., and Linda M. Ghelfi**, "The education crisis and rural stagnation in the 1980s," in *Education and Rural Economic Development, Strategies for the 1990s*, U.S. Dept. of Agriculture, Economic Research Service, September 1991, pp. 40-92.
- Norton, R.D.**, "Reindustrialization and economic development strategy," *Economic Development Quarterly*, No. 3, 1989, pp. 188-202.
- Norton, R.D., and John Rees**, "The product cycle and the spatial decentralization of American manufacturing," *Regional Studies*, Vol. 13, 1979, pp. 141-151.
- Piore M.J., and C.F. Sabel**, *The Second Industrial Divide*, Basic Books, New York, 1983.
- Scott, A.J.**, "Industrial organization and location: division of labor, the firm, and spatial process," *Economic Geography*, Vol. 62, 1986, pp. 215-231.
- Swaim, Paul L., and Roy A. Teixeira**, "Education and training policy: skill upgrading options for the rural work force," in *Education and Rural Economic Development: Strategies for the 1990s*, U.S. Department of Agriculture, 1991.
- Testa, William A.**, "Prospects for producer services in the Seventh District," *Economic Perspectives*, May/June 1992a, pp. 19-28.
- _____, "Trends and prospects for rural manufacturing," Federal Reserve Bank of Chicago, working paper, WP-92-12, 1992b.
- U.S. Department of Commerce, Bureau of the Census**, *County Business Patterns* (data base), various years.
- _____, *Census of Manufactures and Annual Survey of Manufactures*, various issues.
- U.S. Department of Labor**, "Industrial effects of a free trade agreement between Mexico and the U.S.A.," an INFORUM report to the United States Department of Labor, Sept. 15, 1990.
- U.S. Department of Labor, Bureau of Labor Statistics**, *International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing 1975-89*, Report 794, October 1990.