MAY/JUNE 1993

ECONOMIC PERSPECTIVES

A review from the
Federal Reserve Bank
of Chicago

How lean manufacturing changes the way we understand the manufacturing sector

A listing of Bank Structure Conference audio tapes

Economic development policy in the 1990s—are state economic development agencies ready?

Proceedings available:
Shaping the Great Lakes Economy

Recent trends in corporate leverage

Conference announcement:
Cost Effective Control of Urban Smog

FEDERAL RESERVE BANK
OF CHICAGO

Contents

ECONOMIC PERSPECTIVES May/June 1993 Volume XVII, Issue 3

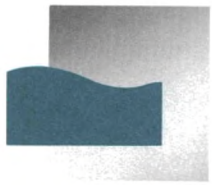
ECONOMIC PERSPECTIVES is published by the Research Department of the Federal Reserve Bank of Chicago. The views expressed are the authors' and do not necessarily reflect the views of the management of the Federal Reserve Bank.

Single-copy subscriptions are available free of charge. Please send requests for single- and multiple-copy subscriptions, back issues, and address changes to Public Information Center, Federal Reserve Bank of Chicago, P.O. Box 834, Chicago, Illinois 60690-0834, or telephone (312) 322-5111.

ISSN 0164-0682

How lean manufacturing changes the way we understand the manufacturing sector

Thomas H. Klier



Manufacturing is currently undergoing a transition from a mass production system to a lean production system which emphasizes quality and speedy response to market conditions using technologically advanced equipment and a flexible organization of the production process. This new manufacturing system has achieved remarkable productivity advances. The success or failure of the Midwest's manufacturing sector in climbing on board this revolution will be central to the region's future prosperity due to the historic role of manufacturing in shaping the region's economy. Successful adaptation to lean manufacturing is likely to require significant changes in both the management of factories and the structure of the economy, such as changes in worker training, job performance, public infrastructure, and perhaps the location of factories and jobs.

These changes are the focus of this article. First, I briefly summarize the main features of lean manufacturing. The next section concentrates on the effects of the introduction of lean manufacturing. I will discuss several aspects of the new manufacturing system: management-labor relationships, worker training, location decisions, and product development. Finally, I discuss policy implications of the change in manufacturing systems. To illustrate, examples from the auto industry will be used throughout the article because it has greatly influenced the way many other businesses organize their factories. However, it is important to note that specific applications of lean manufacturing vary according to industry and firm. Thus, the picture described in this article is necessarily a general one.

Features of lean manufacturing

Lean manufacturing features teamwork and participatory management. Tasks are performed by teams in which each member can do any of the team's tasks, including maintenance, inspection, and machine setup. Lean manufacturing encourages worker participation and discourages managerial authoritarianism.

In designing the production process, lean manufacturing gives top priority to quality control. This is different from the so called Fordist approach to manufacturing originated by Henry Ford (see Table 1). This approach introduced interchangeable parts and the moving assembly line to the manufacturing process and dominated most of the world's manufacturing from the mid-1950s through 1980. Lean manufacturing regards large inventory stocks as a source of costs and problems rather than a solution. With lower in process inventories, quality problems of a particular assembly operation become apparent faster. Continuous improvement of operations also is central to the lean manufacturing philosophy, with most of these improvements the result of suggestions from the factory floor.

Lean manufacturing systems are designed to turn out small batches of customized products on relatively short notice and at low cost. That makes it necessary to provide flexibility and quick setup capability in a factory, for example,

Thomas H. Klier is a regional economist at the Federal Reserve Bank of Chicago. The author would like to thank William Testa and Carolyn McMullen for helpful comments.

TABLE 1

Fordist versus lean manufacturing

Fordist	Lean manufacturing
Job definition	
Specialization; narrowly defined, repetitive steps	Teamwork; multiple responsibilities
Quality control	
Separate function	Built into production process and each job description
Production process	
Continuous operation of one process	Flexible adjustments possible
Inventory	
Large	Lean
Management	
Hierarchical	Participatory

by reducing the time needed to change dies. As a result, lean manufacturing requires a different process flow design and plant layout than traditional manufacturing, usually occupying much less floor space. However, lean inventories plus the need for flexibility place great strains on the flow of materials. To address these requirements, Toyota pioneered the use of the "kanban" method for moving parts and materials across the factory. Using this method, each container transporting parts downstream in the production process carries a card. As the parts are depleted, the card is sent back to the previous production stage where it signals the need to produce more of these parts. By maintaining a continuous, tightly controlled, but decentralized, flow of parts and materials, lean manufacturing allows flexible adaption of the production line to changes in the demand for the final product.

Finally, lean manufacturing enables a short design cycle by taking an integrated approach to the various steps of manufacturing; market assessment, product design, engineering, component sourcing, and final assembly are integrated into one decisionmaking unit rather than dealt with sequentially.

Lean manufacturing comes to North America

Expanding the geographic boundaries of lean manufacturing has become one of the hallmarks of Japanese auto companies as their so called transplants have been remarkably successful in North America and Europe. In 1982, Honda of America began to assemble automobiles in Marysville, Ohio. By 1991, seven Japanese transplants produced almost 1.4 million cars in the United States. Honda can now produce cars in North America as efficiently as those made in Japan; and Nissan's Sunderland plant in England is referred to as one of the most efficient car plants in Europe.[1]

While changes in the production system were pioneered and successfully transplanted by Japanese producers, American auto manufacturers have been adopting the new manufacturing techniques in order to compete effectively internationally.[2] The Big Three have made strong gains in manufacturing productivity during the last few years. By one account, Ford has improved its assembly productivity by 36 percent since 1980.[3] Specifically, some Ford plants have all but erased the labor cost advantage enjoyed by the most efficient Japanese auto producers; among these is Chicago's Taurus plant. Chrysler, in turn, has improved its assembly productivity by 33 percent since 1980. GM has increased the productivity of its assembly operations by 11 percent since 1980; most notably in the launch of its Saturn line in 1991. Recent gains in market share experienced by the Big Three may well be related to improvements in manufacturing efficiency.[4]

Management-labor relationships

One of the characteristics of lean manufacturing is its emphasis on constant improvement in operations. Most of the improvements are actually suggested by the factory workers. However, for an employee suggestion system to be effective, it must be embedded in cooperative management-labor relations since workers would not have an incentive to increase productivity if the end result was only that some of them lost their jobs. That requires a switch from the decades old practice of dividing work into simple, repetitive tasks carried out by workers who were not greatly respected by their bosses nor trusted to perform without being prodded and closely supervised (see Box 1). In a lean manufacturing environment, management treats workers primarily as assets, not as costs. The potential benefits of cooperative management-labor relationships are well known. For example, Luk Inc., a small

BOX 1

The case of NUMMI

New United Motor Manufacturing (NUMMI), the GM-Toyota joint venture in Fremont, California, serves as an excellent case study for the adaptation of lean manufacturing techniques to the United States. GM opened this assembly plant in 1963. It became known for its abysmal productivity and quality records, as well as a very confrontational relationship with the UAW local, and was subsequently closed in 1982. In 1984, the plant reopened as a joint venture between Toyota and General Motors. At its opening, 85 percent of NUMMI's hourly workers came from GM's previous work force. Within two years, its productivity was higher than that at any other GM factory and more than twice as high as it had been under GM management. In fact, it was almost as high as Toyota's Japanese factories. The same was true of quality.

According to a recent study, the main factor in turning NUMMI around was a new management approach.[1] Under the old, Fordist style of manufacturing, Taylorist time and motion studies were implemented by means of a hierarchical, authoritarian style of management.[2] More than 80 industrial engineers would measure in minute detail the activities of workers and then standardize and accelerate their tasks. Supervisors would impose these standards on workers who were never consulted. Under lean manufacturing at NUMMI, Taylor's scientific management techniques are combined with participatory labor-management relations. The work force was divided into 350 teams, consisting of five to seven people and a team leader. Team members were taught Taylor's techniques for describing and analyzing physical tasks. Team members now design all the team's jobs, time each other with stopwatches, and explore ways to improve their performance. The results are compared across teams of different shifts. In addition, team members are trained to do each other's jobs and regularly rotate tasks. The surprising turnaround at NUMMI is ascribed to the fact that Toyota could persuade workers that they are the key element to the factory's success. NUMMI management won workers' trust and commitment by instituting a no lay off policy, as well as implementing extensive training and maintaining constant consultation with the workers.[3]

[1]Adler (1993).

[2]In his 1911 book, Frederick Taylor argued that the productivity of physical labor could be increased by measuring in great detail the activities of workers, and then standardizing and accelerating their tasks.

[3]At the start of NUMMI, it was agreed to not lay people off, except in the most dire straits and then only after managers' pay was cut along with other expenses. This agreement became part of the UAW contract with NUMMI. It was put to test in the late 1980s when production at NUMMI fell sharply. Capacity utilization fell to about 60 percent and about 10 percent of the work force were idle. The idle workers were rotated into four week training programs, at full pay, until production picked up around eight months later. See Uchitelle (1993).

company that makes clutch plates for manual shift cars in Wooster, Ohio, introduced such a new work ethic. Its 340 employees are now encouraged to constantly search for ways to improve output and quality. As a result, Luk improved productivity at its plant to the extent that it could overtake the market leader which had shifted its production to Brazil, in an attempt to economize on labor costs. Luk's constant improvements to its efficiency rendered the foreign operation of its competitor unsuccessful.[5]

In another example, Eaton Corp. instituted teams on the factory floor and encouraged workers to improve incrementally the products they make and the processes used to make them. A system of bonuses serves as an incentive to solicit suggestions. The company's productivity rose by 3 percent a year over the last decade; that compares to an average increase of 1.9 percent for all U.S. manufacturers. Some of that increase in productivity was the result of conventional belt tightening efforts; Eaton closed four plants in 1991 and laid off 807 workers. However, due to improved management-labor relationships and productivity gains at its Lincoln, Illinois, plant, Eaton relocated 70 jobs from Mexico.[6]

Worker training

Under lean manufacturing, a worker also maintains the equipment, cleans up the work area upon completion of other duties, and performs quality control functions. If the worker spots a flaw in the production process, the group leader is alerted. The manufacturing error is then corrected instantly, either while the car is still moving on the assembly line or after the line has been stopped by the group leader. Of course, shutting down the assembly line to

correct defects requires highly skilled line workers who must be able to recognize and correct defects in order to restart the assembly line quickly. Whirlpool Corp. decided to teach its workers how to improve quality and productivity at a tooling and plating shop in Benton Harbor, Michigan. In addition to implementing a system of financial incentives to reward productivity gains, Whirlpool focused on improving the skills of its employees. It set up a new training center at its plant that offers interactive computer lessons on everything from general math skills to learning how to handle gauges and other tools. Workers from the Benton Harbor shop went to see the assembly plant for washing machines to learn how the parts they produce are put into the final product. With this understanding, they were able to make adjustments that helped the line flow more smoothly. As a result, the Benton Harbor plant's productivity has surged more than 19 percent since 1988.[7]

Higher demands on workers' education and skills raise the barriers of landing a manufacturing job. For example, in order to apply at a Carrier Corp. compressor plant in Arkadelphia, Arkansas, one must be a high school graduate or have a general education diploma. Applicants take a standardized state test; only those scoring in the top third advance. The applicants who advance past the interviews take a six week course prior to receiving a job offer. Five nights a week for three hours, they learn blueprint reading, math such as fractions and metric calculations, statistical process control methods, some computer skills, and how to solve problems in dealing with fellow workers. Successful completion of the training sessions virtually guarantees a job at the plant.[8]

Location decisions

Recent evidence indicates that automobile manufacturing is reviving in the Midwest (see Table 2). Rubenstein (1992) refers to two structural trends. First, increasing fragmentation of the market for passenger cars since 1960 reduced the need for branch plants; that is, plants producing identical models at centers of demand for regional distribution. Of the four West Coast passenger car assembly plants in operation 10 years ago, only NUMMI's Fremont, California, plant still operates. A fair amount of geographical restructuring of the automobile industry has also occurred within the Midwest over that time period. GM alone closed seven and opened four plants in the Midwest during the last 10 years.[9] Surprisingly, the age of an existing assembly plant does not seem to increase its likelihood of being shut down. Ford Motor Company, for example, has not opened a single new assembly plant for passenger cars in the U.S. in the last decade, yet

TABLE 2

U.S. car production by state
(percent of U.S. total)

Model year	IL	IN	MI	OH	WI	Midwest[1]	Midwest without transplants[2]
1991	9.5	0.9	31.9	16.7	1.8	60.8	46.5
1990	9.2	0.2	32.0	13.5	3.4	58.3	46.4
1989	7.6	—	32.6	11.9	4.7	56.8	48.8
1988	5.9	—	35.8	12.5	5.8	60.0	52.5
1987	7.8	—	34.0	12.5	3.6	57.9	53.4
1986	6.7	—	32.5	11.5	3.8	54.5	52.1
1985	6.4	—	29.0	9.8	4.6	49.8	47.8
1984	6.6	—	28.2	10.7	6.1	51.6	50.2
1983	6.8	—	33.3	8.8	5.2	54.1	53.5
1982	5.7	—	36.0	5.9	2.0	49.6	49.6
1981	6.1	—	30.4	4.3	4.8	45.6	45.6

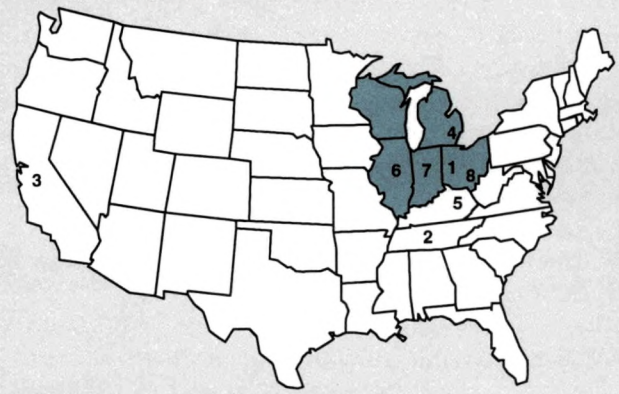
[1]Midwest is defined as Illinois, Indiana, Michigan, Ohio, and Wisconsin.
[2]Transplants refer to U.S. facilities of foreign auto assemblers, including joint ventures.
SOURCE: *Ward's Automotive Yearbook*, 1982-1992.

it currently ranks as the most productive of the Big Three.[10] The results of a study by Rees, et al. (1986) on the spread of automated technology in the American machinery industry support the same conclusion and suggest an explanation. It reports that older plants are more likely users of new production technologies than newer plants; evidence for a continuous retooling process taking place in the more established industrial areas of the country.[11]

Second, nearly all of the Japanese transplants have located in the Midwest, in proximity to the indigenous automobile industry's supplier industry (see Figure 1). In fact, that development is responsible to a large extent for the revival of automobile manufacturing in the Midwest. In model year 1992, transplants produced 23.5 percent of all the automobiles in the Midwest, up from 3.4 percent in model year 1983.

FIGURE 1

Japanese auto plants in the U.S.



Legend

1 Honda - Marysville, OH	**5 Toyota** - Georgetown, KY
2 Nissan - Smyrna, TN	**6 Mitsubishi-Chrysler** - Normal, IL
3 Toyota-GM - Fremont, CA	**7 Fuji-Isuzu** - Lafayette, IN
4 Mazda - Flat Rock, MI	**8 Honda** - East Liberty, OH

SOURCE: *Ward's Automotive Yearbook*, 1992.

However, the sites chosen by the Japanese were not traditionally associated with motor vehicle assembly. Note in Table 2 the southward shift of automobile assembly; losses in Wisconsin's share of automobile assembly were compensated by gains in Illinois and Ohio. The location of transplant assembly plants on mostly rural greenfield sites is generally seen as the result of the perception that flexible work assignments may be difficult to implement in urban locales where the influence of strong labor unions may resist such changes.[12] Japanese plants desire low cost locations, which avoid strong union centers yet have access to an adequate labor pool (Rubenstein, 1992). Accordingly, a complex pattern of industrial growth and decline emerged in the Midwest.[13]

In a lean manufacturing environment, the location of suppliers seems to be influenced by the need for a tightly controlled flow of parts and materials, including a timely supply of materials from outside suppliers.[14] It is therefore no surprise to find relationships between car assemblers and suppliers to be characterized by high levels of communication and mutual commitment. These close relationships may help to explain the fact that lean manufacturing assemblers have chosen to buy directly from only a small number of "first tier" suppliers. Mair, et al. (1988) analyze the effect of lean manufacturing on the locational pattern of supplier operations for Japanese transplants in North America. They find existing geographical patterns of transplant locations to be a direct result of the desire of Japanese automobile producers to transfer lean manufacturing techniques to North America. Rubenstein (1988) and Rubenstein and Reid (1987) analyze the changing supplier distribution of American motor vehicle parts suppliers. Their sample consists of about 1,000 suppliers from Ohio. They cannot establish a clear cut effect of lean manufacturing on location, yet they do find a change from the long term locational pattern of auto supplier companies which prevailed until the 1970s. With the introduction of a tiered supplier structure, increased cooperation, and longer term contracts between car assemblers and suppliers, first tier suppliers are found to locate new plants near their customers' assembly plants. However, there are also countervailing pressures. The pressure to reduce production costs leads to geographical dispersion, especially for lower tier suppliers; that often means setting up shop in a nonunionized rural area, or even a low wage foreign country.

Product development

Under lean manufacturing, the development process is not the sum of the individual work of a large number of narrowly focused specialists.

Instead, the development of an automobile is guided by a team which includes members from marketing, design, research, logistics, production planning, engineering, and sales. The team stays together for the life of the model and its leader has a range of real decisionmaking powers within the organization of the company. Chrysler's recent introduction of its LH-cars illustrates the benefits of this approach.[15] The LH-car was developed in 39 months with a technical staff of 740, as compared with the development of the K-car, which was introduced in the early 1980s and took 54 months and a technical staff of 2,000.[16] Development of the K-car followed the sequential process of Fordist manufacturing.

The lean development process also relies on contributions from parts suppliers. Chrysler received almost 4,000 suggestions from its suppliers in the development of the LH-car, saving $156 million.[17] Instead of being played against each other in competitive bidding, supplier companies now enter into long term contracts with producers. As part of the new sourcing relations, the supplier may need to develop a component, or subsystem, with the assembler merely giving final approval of the part. Therefore, rather than produce parts according to predetermined specifications, outside suppliers must increasingly conduct product research and development both on their own and in consultation with assemblers. Turning over complete component systems to suppliers enabled Chrysler to drastically reduce the number of vendors with which it does business. It now deals with 230 parts and materials suppliers in producing its new LH-platform using the lean manufacturing system.[18] That compares to 456 suppliers for the 1992 version of the Chrysler New Yorker, a car introduced in 1988 and built according to the Fordist system.[19]

Implications for economic development policy

This article has highlighted some dramatic changes to the auto industry brought about by the introduction of lean manufacturing techniques. If other Midwest manufacturing industries are to compete globally, they must follow the lead of the Midwest auto makers and parts suppliers and adopt the more efficient lean manufacturing standards. What are the implications of these changes for the direction of regional economic development policy? The main goal has to be to ease the transition and sustain the changeover to lean production in autos and broadening it to other manufacturing sectors. However, since there will be a multitude of adjustments, which vary from industry to industry, and even plant to plant, there is no single or simple policy measure that can address all of the necessary adjustments. Rather, in many instances policymakers will have to rely on a well-chosen array of customized policy measures.[20]

First, the creation and upgrading of labor skills is a major requirement for lean manufacturing operations. Successful implementation of lean manufacturing in factories rests on the ability to enhance skills and responsibilities of assembly line workers within a team oriented management approach. This will require job training programs that teach how to improve quality and cooperative management in order to successfully harness ideas for improving the production process. Policy measures include apprenticeship programs, vocational training schemes, and part-time enrollment in local universities. Training on the job can be used to improve the skills of the workforce during low capacity utilization periods. For example, when NUMMI experienced weak demand for its products during the late 1980s it put idle workers on job training programs. The state government of California subsidized some of the cost, justifying the outlay with the argument that unemployment would have been more expensive.[21]

Second, within individual states, efforts have been made to support the adaptation of lean manufacturing technologies. For example, in 1989 Pennsylvania instituted a "Manufacturing Innovation Networks" program that supports the growth of lean manufacturing networks by means of eight industrial resource centers. These regional centers introduce smaller and medium sized manufacturers to leading manufacturing process technology. The centers are overseen by independent boards and the programs are customized to local identity and economic conditions. Since 1988, industrial resource centers have worked with about 10 percent of Pennsylvania's manufacturers (Greenberg, 1992). Other programs, like Michigan's Technology Centers or Ohio's Edison Technology Centers are more broadly targeted and serve as an intermediary organization for technology development in specific industries. The main objective of these programs is to share both information and knowledge on the application of lean manufacturing techniques. A national economic strategy in support of commercial

research and development and manufacturing excellence has been proposed by the National Center for Manufacturing Sciences. It launched an initiative called the Manufacturing Application and Education Center Network. It represents a collaboration among state governments, academic institutions, economic development organizations, and industry. Funding for the centers is equally split among the federal and state governments and private industry. Of the planned 150 centers, three are currently in operation. Each center will be tailored to address regional industrial needs and will provide manufacturers with access to new technologies and equipment, better business practices and new materials and products.[22]

Third, international competition and direct foreign investment in the U.S. have been important elements supporting the introduction of lean manufacturing techniques into North America. The success of the Japanese transplants has shown the ability to transfer manufacturing technology internationally. Fostering openness to trade and investment are therefore crucial for the Midwest's and nation's success in an environment where advances in manufacturing technology are being made around the world.

Last, but not least, lean inventories render frequent timely deliveries of parts and materials crucially important for the successful application of lean manufacturing. That places great emphasis on a well designed and maintained system of public transportation infrastructure.

FOOTNOTES

[1]The Economist Newspaper (1992), survey p. 6.

[2]In developing the lean manufacturing system, Japanese companies, most notably Toyota, were influenced by their own analysis of the Fordist system as well as the quality enhancing ideas of American consultant W. Edwards Deming.

[3]White (1992).

[4]After reaching 30 percent in 1991 and 1992, the Japanese share of U.S. car sales fell to 27 percent in the first two months of 1993, while the Big Three's market share rose three percentage points to 68 percent (Miller and Mitchell 1993).

[5]Uchitelle (1993). No information is available on changes in the overall employment level at Luk; however, employees who are not adjusting to the new job requirements end up with a smaller degree of job security.

[6]O'Boyle (1992).

[7]Wartzmann (1992).

[8]Norton (1993).

[9]In December 1991, GM announced that as part of its corporate restructuring it would close 21 factories, including 6 final assembly plants. Since then it has only identified 2 of the 6: the minivan plant in Tarrytown, New Jersey, and its Willow Run plant near Ypsilanti, Michigan. See Treece (1992).

[10]White (1992).

[11]Rees, et al. (1986), p. 215. The authors explain this finding with the fact that most of the new technologies are discrete units that can be introduced into an existing plant in an incremental fashion.

[12]See Linge (1991) and Testa (1993).

[13]Rubenstein (1991), p. 129.

[14]According to newspaper reports, Saturn Corp. will charge suppliers who disrupt the production process by sending inferior or mislabeled parts $500 per minute for the delays they cause. The policy went into effect November 1, 1992. See Frame (1992).

[15]Ford was the first of the Big Three to successfully implement the team approach in developing the Taurus, launched in 1985. As part of the recent major corporate reorganization taking place at GM, all new development projects are being carried out by teams as of January 1993. Models created by these teams are not scheduled to appear on the market until at least 1996, however (Levin 1993).

[16]Stertz (1992).

[17]Stertz (1992).

[18]Platform refers to the structural underbody of a car. For example the Dodge Intrepid, Chrysler Concorde, and Eagle Vision are separate models, yet are all LH-platform vehicles.

[19]Ward's (1992), p. 53.

[20]See Ettlinger (1992) and Scott (1992).

[21]Uchitelle (1993).

[22]National Center (1992).

REFERENCES

Adler, Paul S., "Time-and-motion regained," *Harvard Business Review*, January/February 1993, pp. 97- 108.

Economist Newspaper, NA, Incorporated, The, "Survey: the car industry," *The Economist*, October 17, 1992.

Ettlinger, Nancy, "Modes of corporate organization and the geography of development," *Papers in Regional Science*, Vol. 71, No. 2, 1992, pp. 107-126.

Frame, Phil, "Saturn to fine suppliers $500/ minute for delays," *Automotive News*, December 21, 1992, p. 1.

Greenberg, Andrew T., "Technology and entrepreneurship," *Shaping the Great Lakes Economy*, conference proceedings, Federal Reserve Bank of Chicago, 1993, pp. 28-30.

Levin, Doron P., "How G.M. is losing its hold on the crucial family sedan," *New York Times*, March 7, 1993, Section 3, p. 5.

Linge, G.J.R., "Just-in-time: more or less flexible?," *Economic Geography*, Vol. 67, No. 4, 1991, pp. 316-332.

Mair, Andrew, Richard Florida, and Martin Kenney, "The new geography of automobile production: Japanese transplants in North America," *Economic Geography*, Vol. 64, No. 4, 1988, pp. 352-373.

Miller, Krystal, and Jacqueline Mitchell, "Stalling out," *Wall Street Journal*, March 4, 1993, p. A1.

National Center for Manufacturing Sciences, "NCMS teaching factory network offers states a vital tool for economic development," *Focus*, December 1992, pp. 4-5.

Norton, Erle, "Future factories," *Wall Street Journal*, January 13, 1993, p. A1.

O'Boyle, Thomas F., "Working together," *Wall Street Journal*, June 5, 1992. p. A1.

Rees, J., R. Briggs, and R. Oakey, "The adoption of new technology in the American machinery industry," in John Rees, ed., *Technology, Regions, and Policy*, Rowman & Littlefield, Totowa, N.J., 1986, pp. 187-217.

Rubenstein, James M., *The changing U.S. auto industry: a geographical analysis*, Routledge, New York, 1992.

_____, "The impact of Japanese investment in the United States," in C.M. Law, ed., *Restructuring the Global Automobile Industry: National and Regional Impacts*, Routledge, London, 1991, pp. 114-142.

_____, "Changing distribution of American motor vehicle-parts suppliers," *Geographical Review*, Vol. 78, No. 3, 1988, pp. 288-298.

Rubenstein, James M., and Neil Reid, "Ohio's motor vehicle industry—industrial change and geographical implication," Miami University, geographical research paper, No. 1, 1987.

Scott, Allen J., "The collective order of flexible production agglomerations: lessons for local economic development policy and strategic choice," *Economic Geography*, Vol. 68. No. 3, 1992, pp. 219-233.

Stertz, Bradley A., "Importing solutions," *Wall Street Journal*, October 1, 1992, p. A1.

Taylor, Frederick, *The Principles of Scientific Management*, Harper, New York, 1911.

Testa, William, "Trends and prospects for rural manufacturing," *Economic Perspectives*, Federal Reserve Bank of Chicago, March/April 1993, pp. 27-36.

Treece, James B., "The plants GM will probably padlock," *Business Week*, December 14, 1992, pp. 34-35.

Uchitelle, Louis, "Stanching the loss of good jobs," *New York Times*, January 31, 1993, Section 3, p. 1.

Ward's Communications, *Ward's Automotive Yearbook*, Detroit, 1982 through 1992.

Wartzmann, Rick, "Sharing gains," *Wall Street Journal*, May 4, 1992, p. A1.

White, Joseph B., "GM's labor cost disadvantage to Ford is placed at $4 billion a year by study," *Wall Street Journal*, October 6, 1992, p. A2.

Cassette tapes are available for FDICIA: An Appraisal
The 29th Annual Conference on Bank Structure and Competition
May 6 & 7, 1993

FDICIA: *An Appraisal*

Thursday Sessions

(May 6, 1993)

FRB300
Welcoming Remarks (Silas Keehn)
Keynote Address (Alan Greenspan)

FRB301*
FDICIA: Renaissance or Requiem?
(Moderator: Edward C. Ettin) Richard S. Carnell, Richard L. Thomas, William M. Isaac, Harrison Young, and George G. Kaufman

FRB302
Luncheon Presentation (John G. Heimann)

FRB303
Systemic Risk in Interbank Markets
(Moderator: Herbert L. Baer, Jr.) Merton H. Miller, Mark C. Brickell, Wendy L. Gramm, and Patrick M. Parkinson

FRB304*
Banking after FDICIA (Moderator: Stuart I. Greenbaum) Future Directions in Regulation (Karen D. Shaw); An Empirical Analysis of the Costs of Regulatory Compliance (Anjan V. Thakor and Jess C. Beltz); New Private Sector Deposit Insurance (Warren G. Heller); The Costs of Rejecting Universal Banking (Charles W. Calomiris)

To order tapes, at $12.00 each, please contact:
FRB Cassettes
c/o Teach'em
160 E. Illinois Street
Chicago, Illinois 60611

To order by phone:
Toll-free (outside Illinois): 800-225-3775
In Illinois: 312-467-0424

Friday Sessions

(May 7, 1993)

FRB305
Session A: Estimating BIF Losses
(Moderator: Wayne Passmore) Estimating BIF Losses: Secrets to Accurate Forecasting (Bert Ely); BIF Loss Exposure: a Simple Actuarial Approach (George E. French); Estimating BIF Losses: a Discussion of Various Methods (Philip F. Bartholomew)

FRB306
Session B: The Response of Banks to Capital Shocks
(Moderator: George G. Kaufman) Bank Capital and Bank Growth (Herbert L. Baer, Jr., and John N. McElravey); Bank Capital and Portfolio Composition (Diana Hancock and James A. Wilcox); The Implications of Capital Requirements for Bank Behavior and the Macroeconomy: the Japanese Experience (Ryoichi Shinagawa)

FRB307
Session C: A Closer Look at Bank Mergers
(Moderator: Douglas D. Evanoff) The Strategy of a Merger: Fleet and Bank of New England (Dwight B. Crane and Jane C. Linder); The Efficiency Effects of Bank Mergers: a Case Study Approach (Stephen A. Rhoades)

FRB308
Session D: Banking Crises—a Global Perspective
(Moderator: Elijah Brewer III) Japanese Banking: the Current Situation, How We Got Here, What Can Be Done? (Thomas F. Cargill); Financial Crisis and Financial Reform in Argentina (Geoffrey P. Miller), The Banking Crises in the Scandinavian Countries (Sigbjorn Atle Berg)

FRB309
Luncheon Panel: The Outlook for Banking: Is the Crisis Over? (Moderator: Silas Keehn) L. William Seidman, George M. Salem, and Edward J. Kane

**2 cassettes per session.*

Economic development policy in the 1990s—are state economic development agencies ready?

Richard H. Mattoon

"State and local economic development strategies typically evolve incrementally, without an underlying economic theory, except that more jobs are good and less jobs are bad."—Beaumont and Hovey[1]

The rules for economic development are changing in response to a new economic development landscape characterized by global markets, the rapid pace of innovation, and increasingly mobile capital. The new economy features firms that compete through technology and export growth. States are trying to find new ways to capture economic growth and to adapt to upheaval and restructuring. While state and local economic development agencies have been quick to establish new programs to meet the changes in economic activity, they are increasingly short on resources. Economic development agencies have been among the first to be slashed during budget crunches.[2] In part, agencies have been the target of budget cuts because of the perception that the vast number of existing development programs have failed to produce significant results. In response to recent budget cuts, development agencies have, partly out of necessity, invested time and effort to articulate new ideas for guiding current and future programs and policies.

Changing directions in economic development strategy is not new to the states. Historically, states have adopted diverse strategies in rapid succession from industrial recruitment to small business incubators and high tech industry development to the current emphasis on key industry clusters. The somewhat erratic record of past development strategies places the current strategic thinking under close and critical scrutiny.

This article will examine how state economic development programs—especially those in the Seventh District—are responding to fiscal pressures and to the current wisdom concerning economic development in the 1990s. The article concludes with a critical look at what may be missing from some of these new strategies and how formal evaluation of development programs may provide the key to understanding the value of current and future development efforts.

Economic development policy in the 1990s

A variety of forces have led states to reexamine their economic development strategies. Chief among these forces are the severe fiscal pressures which have plagued the states since the start of the 1990s. With Medicaid and prison expenditures accounting for a larger slice of the budgetary pie, discretionary programs such as economic development have offered ready targets for budget cuts. In fiscally strapped states like Illinois and Michigan, the state economic development agencies have seen the state funded portions of their budgets cut by more than 70 percent since FY90.

While budget cuts may have precipitated a hard look at economic development programs, the new strategies emerging from these reduc-

Richard H. Mattoon is a regional economist at the Federal Reserve Bank of Chicago. He wishes to thank William A. Testa and David R. Allardice for their comments and guidance on previous drafts.

tions also reflect new paradigms for successful economic development. These new paradigms tend to reject programs emphasizing industrial recruitment and related tax abatement and subsidy strategies and instead emphasize those government programs that enhance private industry productivity and innovation. In particular, they stress the state's role in creating a sound foundation for economic growth by supporting broad based factors such as infrastructure and education rather than targeting assistance to individual firms.

Many refashioned state development strategies start by rejecting previous development programs. Often this critique is borrowed from so called third wave theories of the evolution of development strategies which have been articulated by the Corporation for Enterprise Development (CfED).[3] According to CfED, economic development policy can be conceptualized in three waves. The first wave consisted of industrial recruitment strategies and was particularly prominent from the 1950s to the 1970s. The first wave ended because global trends toward more open markets and changing technology made it possible for branch manufacturing plants to locate in countries other than the U.S. When even low cost U.S. states could be undercut by cheaper and sometimes more productive foreign locales, the value of "smokestack chasing" as an economic development strategy was called into question.

This era was supplanted by second wave policies characterized by emphasis on home grown economic development activities. The idea here was to improve the productive inputs of the local economy. Economic advantage could be established through a skilled work force, available technology and capital, and modern telecommunications. Economic development success stories consisted of regions where local advantages had been identified and home grown industries had sprung up. In these cases, the basis for supporting high growth industry was to push development policy down to the most grass roots level. The idea was that economic development occurred only when local actors such as businesses and nonprofit groups were empowered through policies which placed resources and decisionmaking in their hands.[4] However, while the second wave's capacity building policies did a better job at understanding the new dynamics of economic growth, they too stumbled when it came to leveraging significant economic growth on a large scale.

This has led to a third wave in development policy which primarily examines the institutions through which development policy is carried out. As described by Scott Fosler of the Committee for Economic Development:

> "The transition from the second to the third wave ... involves important changes in organization: policy continues to focus on internal development, but new organizational approaches are used to pursue that objective."[5]

The third wave blames the uneven success of second wave policies on a "deficient public technology." In second wave policy, when a development problem was discovered, the natural response was to create a program to fill the gap. The problem was that the new programs were often provider driven and not customer driven. Fundamental to third wave principles is to make certain that customer demand drives program design and objectives. To ensure this, the customer must be willing to invest time and resources in the program. Government would then have feedback to measure the effectiveness of existing programs and would no longer create programs that fail to meet customer needs. If there is no real demand for the program it would be eliminated. This was often not the case in the second wave. Other improvements in the technology of government suggested by third wave analysts include devising programs which encourage competition among suppliers and ultimately leverage resources from sources other than government. As such, if the public technology for delivering these services could be enhanced, better performance could be achieved.

In order to improve on the delivery and design of economic development programs the structure of government itself would need to change. All agencies of state and local government would need to recognize that their programs can contribute to economic growth strategies. Coordination between different levels of government and between agencies would be essential in structuring a better system for delivering development programs. Without better coordination and cooperation between agencies with as diverse missions as education, transpor-

tation, and economic development, to name just a few, the various pieces of economic development could not be put into place to really support private sector economic growth.

Third wave theory has been bolstered by the ideas of a series of popular policy critics including Michael Porter, Robert Reich, and Peter Eisinger.[6] These analysts have identified the fundamental changes occurring in the economy and accordingly set new directions for government to cope with these changes. In their work, themes such as the globalization of commerce, the rapid pace of innovation, the need for human capital and worker training, and the importance of an entrepreneurial climate are stressed. For most of these policy critics, economic growth is part of a turbulent process in which constant innovation and technological breakthroughs create new markets for the best firms. Firms that fail to innovate are doomed to fall by the wayside as competitors throughout the world overtake them. The overarching policy prescription for government is to complement private sector economic changes by broadly supporting the building blocks of growth. Fundamental to this view is the idea that government's role should establish a solid foundation for economic growth through a sound physical and social infrastructure. Less emphasis is placed on specific programs and more emphasis is placed on the broader understanding of a region's economy and how it creates wealth and raises productivity. Broad concerns include establishing a base for economic development through an appropriate and well funded education and training system, stable regulatory policies, and a solid infrastructure. The issue here is one of scope; the new development strategy expands far beyond the purview of a traditional economic development department and instead cuts across all services provided by all departments of state government.[7]

Another thread running through this process oriented approach is that economic development is driven by decisions made by the private sector. State programs should accordingly reflect the needs of private industry and should therefore get specific information from industry. Accurate information about industry needs will only be revealed when industry itself decides to commit its own resources to a government sponsored program. For example, government money can be used to encourage active participation in industry trade associations or to create associations where none exists, but the direction of the association must be charted by members of the industry and not the government.

These new policy prescriptions are designed to support an economy driven by technological change, innovation, and a constant process of identifying and exploiting new markets. The identification of these forces as the engines of the capitalist economy have their intellectual roots in the works of Joseph Schumpeter.[8] Schumpeter was among the first to stress that technological progress is the most important driver of the capitalist economy. Through innovation in products, production, transportation, and entry to new markets, firms drive economic growth. This innovation is not costless; Schumpeter also coined the phrase "creative destruction" to describe what happens to those firms left behind in an innovation driven economy. For Schumpeter, a critical question in trying to determine the best organizational structure for innovation was whether small or large firms were best suited to innovation. Through his research, Schumpeter found both large and small firms had certain advantages which might position them to innovate effectively, and this ambivalence over what organizational form is best able to innovate continues today. Such questions highlight government's key role in economic development. In addition to supporting basic inputs such as physical infrastructure and skilled workers, government must set the market conditions and rules which will best spur technological progress.

How are the states changing their development strategies?

In many states, elements of these new paradigms are finding their way into development strategies. States appear to be willing to embrace these models of economic growth based on technology, innovation, and global markets to define their economic development programs. This section begins with a discussion of the State of Oregon because it has achieved perhaps the most profound changes in direction in accord with the new development ideas. Then, using Oregon for comparison, the development strategies of the five states of the Seventh Federal Reserve District—Illinois, Indiana, Iowa, Michigan, and Wisconsin—are reviewed.

Oregon—relying on benchmarks

Oregon's approach is unique in that it developed a strategic plan for the state's economy in accord with comprehensive third wave thinking. The state has chosen to implement its strategic plan by establishing specific benchmarks for a wide range of social and economic goals. Quantifiable goals are to be achieved by specific dates and are intended to provide Oregon with the economic underpinnings to successfully compete in the future. This process also corresponds with much of the recent interest in adapting the total quality management (TQM) standards developed by the private sector to the public sector. Like the private sector, government agencies must have the proper incentives if they are expected to meet quantitative goals. In Oregon, budgetary incentives ensure that the operations of all state agencies respond to these benchmarks.

The Oregon plan clearly contains two elements of the new economic development theory: the state's program is designed to strengthen the foundation of the economy more than it is designed to benefit specific companies; and the plan recognizes that it is a function of all agencies of government to contribute to economic growth. In all, Oregon has set 155 quantifiable benchmarks. Thirty of the goals are considered critical and receive special attention. These goals are very specific and set intermediate and final benchmarks for the state's economy and overall quality of life (see Table 1).

To encourage agencies to support benchmarks, agency heads are required to develop concrete mission statements relating to the benchmarks and to budget resources to achieve specific benchmarks. This process is then further reinforced by specifically linking the budget planning structure to the benchmarks. This occurs by first requiring all state agencies to reduce 1992 spending by 20 percent. Second, the agencies are able to recover the missing 20 percent only through two means. The first 10 percent can be recovered by proving that the additional appropriation is related to an essential service performed by the agency. The second 10 percent can be recovered only if the agency is able to demonstrate that the spending will support one of the critical benchmarks. Restoring this second 10 percent requires the approval of a designated manager who is appointed by the Governor to oversee one of the critical benchmarks. Agencies can present joint proposals in order to receive funding.[9]

The hope is that, through the benchmarks, Oregon will establish an economic foundation

TABLE 1

Benchmarks for the Oregon economy

Intermediate	1990	1995
Percentage of lumber and wood products employees in value added manufacturing	28%	39%
National ranking in workers' compensation costs	8	20-25
Industrial land that is suitable for development	?	100%
Taxes as a percentage of U.S. average	90%	90-100%
Spending for public facilities as a percent of gross state product	2.1%	3%
High schoolers in technical education	9%	18%
Babies born to drug free mothers	89%	95%
Teen pregnancy rate per 1,000 females	19.5%	9.8%

Final	1990	2010
Per capita income as a percentage of U.S. average		
Portland	103%	115%
All other areas	85%	106%
Manufacturing employees in industries other than the state's largest	71%	80%
Manufactured goods sold overseas	22%	50%
Oregonians working outside of Portland	55%	55%
Adults proficient at written and quantitative skills	35%	65%
Adults with good health practices	46%	75%
International ranking of 12th graders' math ability	12th out 0f 15	1st

that will lead to future and sustainable economic growth by focusing government activities on necessary and appropriate activities. As a related strategy, the state has reoriented its direct economic development strategy to serve whole sectors of the economy rather than specific firms. By adopting a sectoral strategy, Oregon hopes to overcome three weaknesses that it found in traditional economic development plans. First, sectoral strategies overcome the lack of sufficient scale common in many previous development efforts. Traditional development programs are designed to help a handful of specific firms, not entire industries. Second, traditional state run programs tend not to be responsive to the competitive needs of firms because few programs represent true collaborations with business. Finally, the sectoral approach attempts to provide services that improve the performance of firms in global markets. An example of this sectoral approach is the establishment of the quasi-public Wood Products Competitiveness Corporation. This corporation is intended to bring together all participants in the wood products industry, from suppliers of raw materials to producers of final products, to identify challenges and opportunities for the industry. The corporation is also expected to provide information to the state on policy improvements which might be needed. State funds have also been used to establish associations for software and biotechnology firms. State funds have been channeled into research and development consortia for computer related parallel processing research.[10]

Seventh District states

In contrast to Oregon, the five Seventh District states have been more conservative in embracing change. Massive budget cuts in the state economic development departments in Illinois and Michigan have left those states groping for a new paradigm to redefine the role and mission of their development efforts. In Indiana, Iowa, and Wisconsin, a two track approach is being used in which long range development strategies are planned in harmony with the internal capacity building suggested by the new development paradigms, but short term development efforts still utilize business recruitment strategies.

Michigan—a program wholesaler

The Michigan Department of Commerce is going through a process of redefining its mission.[11] Following a two year reduction of more than 70 percent of its $82 million state budget, the department has adopted a strategy that emphasizes working with broadly defined groups of economic actors rather than specific firms. The groups are seen as customers of economic development and include community development officials, industry and trade associations, governmental units, and local economic developers. This strategy has three stated missions. First is to safeguard the state's quality of life. Second is to work with local communities and developers to retain or expand business growth and investment by removing regulatory and other barriers to private investment. Third is to promote an economic development environment where all participants have access to resources, information, and systems which encourage profitable businesses. A final strategy is to take advantage of existing, but underutilized, public infrastructure by trying to channel new investments into communities around the state with underutilized capacity.

Michigan, similar to other states, is making the transition from what David Osborne[12] has termed being a program retailer to a program wholesaler. The distinction is that "retail" programs tend to be suited to the individual firm while the "wholesale" approach tends to address problems in a whole industry with a particular eye toward leveraging the resources of the industry to both stretch and channel the impact of government dollars. In trying such an approach there is a basic recognition that state economic development dollars alone are simply insufficient to create sweeping changes in industries and the economy. However, if state money can trigger private investment by promoting efficient markets, significant economic development can occur.

This new policy direction is also evident in specific programs with a clear emphasis on building up the roots of the economy. For example, the state has launched "Build Michigan," a large infrastructure program focusing on roads, bridges, ports, airports, and rail lines. The program is designed to leverage nearly $3.5 billion in federal transportation money over a five year period.[13] Similarly, the state is launching a $25 million, employer driven adult

training program. This innovative program matches potential employers who have guaranteed that they will hire program graduates with individuals who successfully complete the training. The providers of the training are paid only half of each student's total training cost until the trainee has a new or upgraded job and has worked twelve weeks.[14] This assures that both employer and employee are satisfied with the training by building a feedback loop directly into the process. This type of enhancement of human capital, driven by industry needs, is characteristic of the new direction in economic development policy.

Finally, Michigan is trying to leverage resources and provide more information to industry through joint departmental programs, such as the Environmental Services Division. The division is a joint service of the Department of Commerce and the Department of Natural Resources and is designed to provide technical assistance to Michigan businesses in the area of waste reduction, recyclable product opportunities, site reclamation, and permit processing. These programs are all designed to help establish a strong foundation for economic development by working with industry to promote a sound economic base rather than by targeting the particular needs of an individual firm.

Illinois—a focus on clusters

The Illinois Department of Commerce and Community Affairs has undergone an 80 percent reduction in its general fund based budget authority. The department has responded by beginning a process which will redefine its role and which will focus on new directions in economic development for Illinois. As a first step in this approach, a study was commissioned to analyze both the state's economy and economic development policies and to assess Illinois' capacity to compete. The report, conducted by SRI International and DRI/McGraw-Hill, identifies government's most effective role in development as having shifted from targeting specific industries and using tax and trade policies for creating advantage toward supporting economic foundations and creating a level playing field for tax and trade policy. Success in the new economy will be measured by a higher standard of living rather than job creation alone.

Part of this new approach evaluates government's role in the state's economy and, as a related function, streamlines those existing programs which slow the ability of companies to respond to change. In the SRI report, these broad programs are designed to support industry clusters.[15] Clusters are defined as concentrations of competing, complementary, and interdependent firms across several industries, including suppliers, service providers, and final product manufacturers. These are both large and small firms which are strengthened by being able to share a common economic foundation. This can include specialized labor, supply and support services, access to capital and technology resources, economies of scale, and ease of communications. Clusters are seen as the source of global competitive advantage. As such, economic development policies have to support the vitality of all aspects of the cluster rather than targeting support to just one industry in the cluster. For Illinois, 12 key industry clusters were identified (see Table 2).

Iowa—the state as a product

While Iowa is borrowing from the new economic paradigms in looking to the future, it is unwilling to completely abandon the use of recruitment strategies from the past. In Iowa's recent planning document, *Positioning Iowa for the 21st Century: A 20 Year Economic Development Vision* (1991), the change in the method and scope of economic development is evident. By 1989, Iowa's planning documents began to take on a distinctly third wave flavor when the emphasis for measuring success was shifted from direct job creation to improving the standard of living and building the fundamental capacity of the state to grow. The need to increase productivity received particular attention. State strategies called for investing in human and physical capital, creating an environment which would encourage business investment, and keeping pace with technology.

To take advantage of the new theory on economic development, the report suggests that Iowa view itself as a product. This approach focuses on discovering strategies which will make Iowa a more appealing product than is available in either national or international markets. The emphasis is on the whole economy rather than tax incentives for individual firms. As the report puts it, "The job of state

TABLE 2

Illinois' key industry clusters

	Employment 1990	Employment concentration	Output	Projected annual growth in output 1990-2000
	(thousands)	*(U.S.=100)*	*(millions of 1977$)*	*(percent)*
Agriculture and food processing	191.5	113	20,711.8	2.0
Business and personal travel	454.5	94	9,252.0	3.8
Coal mining	13.1	167	2,018.5	1.4
Consumer appliances and electronics	16.8	188	1,533.2	2.1
Electrical equipment	84.0	139	4,923.1	5.8
Export services	1,105.5	110	40,738.8	3.3
Health services and biomedical products	446.2	106	13,239.5	3.5
Industrial machinery	142.7	187	8,695.3	4.4
Manufactured inputs	251.3	144	27,627.0	2.6
Telecommunications equipment	35.9	116	3,228.7	4.4
Transportation and distribution	205.7	121	9,046.8	2.8
Transportation equipment	50.9	64	5,156.0	4.3

government, in this instance, is one of making policy that enhances our strengths, helps overcome critical weaknesses, and finds and exploits our own special areas of competitive advantage. In essence, the state must make every effort to insure that Iowa will continue to be—and be seen as—a good buy."[16]

In implementing this competitive advantage strategy, two parallel avenues are suggested. These avenues are termed supply side and demand side approaches to economic development and have meaning similar to that described in the work of Eisinger (1988). The supply side approaches are characterized as traditional incentive based policies aimed at lowering business operating costs to attract business. By the 1980s, these supply side incentives had become quite intricate and usually were finely targeted. However, their effectiveness was increasingly questioned. Because incentives were being offered in virtually all states, their effect on business location decisions was being diluted. Given this, supply side policies are most effective for the first state to offer them, according to the Iowa report; however, they cannot be abandoned as they are expected by private firms as part of an expansion or relocation deal.

A longer term but possibly more effective approach is found in demand side policies. Demand side policies focus on the local economy and are designed to help generate economic opportunities within the state. These policies are designed to help existing companies grow, often by easing access to capital and streamlining regulatory burdens. The measure of success of these efforts is not job creation but rather wealth creation. These policies assume that by assisting wealth creating industries, jobs will follow. Most of the recent thinking in economic development strategy has focused on the demand side. Government can accomplish this by making key, critical investments which can improve productivity and unlock the economy's potential to meet new and expanding markets.

In devising a development plan for the future, Iowa intends to use both strategies. Supply side activities will continue because other states (and, increasingly, other nations) will continue to offer incentives as a method for attracting investment. However, it is the demand side strategies which will ultimately differentiate Iowa's economy and lead to the more sustainable competitive advantage which Porter and other economic development theorists favor.

Wisconsin—building internal capacity

Wisconsin moved to restructure its approach to development earlier than many of its

counterparts. In 1984, the state conducted a survey of state businesses to gauge their satisfaction with the state's business climate. Not only were the results worse than had been expected, but 65 percent of the respondents actually indicated that they had "suffered" at the hands of Wisconsin's government.[17] In response to the perception that the state was creating such a negative business climate, the Wisconsin Strategic Development Commission was launched in 1985. From the beginning, the commission was not structured to propose specific programs for economic development, but rather to establish a strategic guide for development policy in the state.

A critical aspect of the development commission's work was to establish three "strategic objectives" for the state by which to measure economic development progress. The three benchmarks were:

- to create 150,000 new jobs between 1985-1990;
- to achieve an unemployment rate of 5 percent or two percentage points below the national average, whichever is less; and
- to stimulate growth in per capita disposable income of 3.5 percent annually.[18]

These measures have been recalibrated for 1990-1995. The job growth benchmark has been fine tuned to focus on nonfarm wage and salary growth (success over this period will require a 5.1 percent growth in this broad job category). The unemployment benchmark remains at 5 percent or less and the goal for real per capita income growth has been set at 6.8 percent over the five year period. While the job growth benchmark for the 1985-1990 period was exceeded and the unemployment benchmark was essentially met, the income growth figure fell below target.

In addition to benchmarking, the council adopted a set of principles to guide the state's economic development efforts. These principles recognize the nature of global markets and the inability of states to completely control their economic futures. With this in mind the three principles established are:

- to recognize that, while the role of the state government is limited, state actions can be decisive in shaping the way a state economy adjusts to the world economy;
- for state government officials to recognize the fundamental importance of a market driven private sector and for the private sector to recognize the role of state government in assisting and supporting development; and
- for the state to conceive a strategy which identifies priority actions, gives cohesion to government actions, and avoids policies that may be harmful to the economy.[19]

While the bulk of Wisconsin's policies appear to be focused on building internal capacity, the state has still not abandoned recruitment strategies. The state's "Forward Wisconsin" program plays an active role in recruiting out of state businesses to Wisconsin and leaves the impression that, much like Iowa, the state has chosen to use both supply and demand economic development policies in pursuing economic development in the 1990s. However, it is worth noting that "Forward Wisconsin" frames the state's business advantages in terms of the quality of the Wisconsin work force and business environment. This strategy is based on offering a sound foundation for business location, not simply providing tax breaks and cheap labor.

Indiana—bridging the old and new

Indiana's approach to formulating development strategy is similar to that of Wisconsin. The state has not abandoned traditional recruitment and retention strategies as illustrated by the state's recent bidding efforts which won the state the United Airlines repair and maintenance facility.[20] However, Indiana's recruitment advertising also stresses the state's home grown, quality oriented advantages over offering the lowest cost operating environment.

Similar to Wisconsin, the state has established an organization which is charged with having a long range vision for state economic development. In 1985, the Indiana Economic Development Council was established as a private, not-for-profit corporation charged with helping to define economic development strategy. The legislation establishing the council defined three broad missions:

- to update, revise, and manage the state's strategic planning process to adapt to changes in society and in the economy;
- to establish and coordinate the operation of programs commonly available to all citizens of Indiana; and

- to evaluate and analyze the state's economy and economic development efforts to determine the direction of future public and private actions, and report and make recommendations to the governor with respect to the state's economy.

The council functions with a board comprised of 72 members, an executive committee of 15 members, and a full-time staff of five. The organization is driven by a broad based consensus approach with both the executive committee and the board being drawn from diverse interests. Its structure is nonpartisan, allowing long range development planning to be accomplished in a less political atmosphere.[21]

The contribution of this approach is to split the state's economic development activities into short term supply side measures, such as business attraction through abatements and tax breaks, and longer term demand side programs which will allow the state to adopt those strategies in the areas of infrastructure and education which are essential to future prosperity.

Events this year bear this out. By midyear, the Indiana Economic Development Council will be releasing a major update to the state's long range development plan. This is coupled with Governor Bayh's renewed emphasis on economic development efforts which has already produced a statewide development summit held in December 1992 and created a development cabinet comprised of senior policymakers. Other longer term programs include increasing capital availability for small business, export promotion, and increased work force training. In the meantime, while these more long term measures are pursued, short term strategies still focus on incentives. The "Indiana edge" program would allow Indiana to match incentives offered by other states in order to attract or keep firms creating new jobs in Indiana.[22]

Evaluating the new directions in economic development policy

As these examples show, these six states have moved at various speeds to revise their economic development efforts to reflect the new paradigms for economic development. While these new paradigms appear to accurately describe the new economic geography of the world, are their policy prescriptions well suited to state governments? How can state policymakers be certain that these new development strategies are better than their predecessors?

Many believe that an evaluation mechanism is needed to judge the success of these new programs.[23] What made it so easy to discard previous development programs was the perception that they did not work. Too often there was simply too little follow up to know whether a program had in fact had the intended impact. As a report from the Urban Institute points out, "... effective performance monitoring systems have not been developed and used by most economic development agencies."[24] The report notes that even when states have tried to evaluate the effectiveness of economic development efforts, it has been on a sporadic basis with such ad hoc measures as future employment projections and occasional client surveys.

In order to know if the adoption of programs under this new paradigm are justified, intermediate and final benchmarks need to be formally established to judge programmatic success or failure. As such, Oregon's approach is a step in this direction. By defining specific goals, the state can determine whether a program is contributing to these objectives. Otherwise states can end up accepting the logic behind the new paradigms without knowing whether associated programs are reaching desired outcomes.

The Urban Institute suggests a set of monitoring procedures to insure the proper evaluation of programs. First, monitoring should rely heavily on client based assessment of performance. Second, the procedures should be incorporated into the normal operations of the development agency so that regular reports can be generated and problems can be identified and corrected early. Third, intermediate and final benchmarks are needed to insure that the program is on the right course. The intermediate benchmarks are particularly critical since they can identify intermediate steps which are required along the way to reach final objectives. For example, if a final benchmark identifies the need to raise productivity, intermediate benchmarks might include expanded worker training and equipment investment. Since it may take months or even years to achieve the final goal of increased productivity, it is critical to know whether firms are taking the necessary intermediate steps which will lead to the final benchmark.

In including evaluation as a critical component of economic development strategy, the focus will be on quality of public service. This is a departure from previous evaluation efforts which have emphasized activity levels (such as the number of programs conducted or newsletters sent) or budget targets (such as actual expenses compared to budgeted expenses or the amount of activity per employee). While this knowledge can be informative, it is not related to the success of a particular program in meeting a specific benchmark. It also does not provide managers with direction to correct programs which may not be reaching desired goals.

Other potential problems emerge when trying to adapt the policy prescriptions of the new development paradigms to existing state government structure. To begin, the new paradigms favor long range investment in the productive factors of the state's economy. Building up a state's physical and human capital will take years and even decades. Third wave critics have noted that long term economic development strategies have been difficult to pursue given the traditional structure of state and local government. The election cycle of governors and state legislators calls into question whether the states can carry out long range investment, particularly if the investment's political payoff occurs years after the elected official is out of office. Continuity has not been one of the hallmarks of economic development policy as many governors have used economic development offices to pursue specific short term advantages rather than to coordinate a long range investment strategy for the state. The political gain which can be accrued by luring a major facility with thousands of jobs to a state still outweighs a job training program which will improve the state's human capital availability five or ten years down the road. To partially overcome this, Indiana and Wisconsin have established strategic planning bodies which are able to identify where future development programs will be needed. While this will increase planning continuity it does not invest these planning bodies with the authority to develop actual programs.

More fundamental is whether the structure of state government can be adapted to support broad based efforts which cut across agency boundaries. While the new paradigms call for economic development efforts which cut across all government agency boundaries, developing such a shared vision may take time to breach existing interdepartmental barriers. Traditionally, economic development departments were set up to address the economic development needs and/or business interests within the state. Other departments were established to address other state needs. With the growing recognition that successful economic development requires the participation of all agencies of government, a growing challenge is whether other agencies of government will be willing to take on explicitly economic development goals as part of their mission. For example, will state education agencies be willing to support vocational education programs needed to strengthen the economy? Will environmental and tax departments recognize their role in promoting the economy as well as protecting the environment and maximizing the revenue intake for the state? Part of the third wave critique is that previous development efforts have failed to achieve sufficient scale in part because they have not coordinated the resources of government with those of the private sector. Whether government structure can change to improve cooperation will be a critical test.

While Oregon's benchmarking program specifically establishes a system of incentives for departments to adjust their mission and behaviors, other states are leaving it up to the state development agency to cajole other departments to join the economic development parade. With smaller budgets and fewer programs, state development agencies will be at a relative disadvantage with larger agencies. Therefore, they will need to act more as a facilitator of development than as a direct participant. More time will need to be spent convincing other departments to launch economic development efforts than launching such efforts themselves. Other alternatives which might overcome this obstacle include establishing a development supraagency with the power to compel other agencies to adopt policies which encourage development goals or simply allowing the governor to establish development as a clear goal of the state. For example, in Indiana, an economic development cabinet has been created to improve policy planning and coordination.

Similarly, it is unclear whether states will be able to abandon those past development strategies which are widely considered to be ineffective and costly. While tax incentive and abate-

ment strategies have been condemned as inefficient, it is still likely that states will continue to pour resources into questionable attraction and retention strategies as a defensive response (unless all other states agree to simultaneously end these programs.) Iowa's acceptance of both supply and demand economic development strategies grudgingly recognizes the need to continue these questionable policies. The problem is that as long as everyone else continues to provide such incentives, the political cost of ending these incentives is very heavy. Furthermore some development professionals argue that incentives may still be the best policy for poorer regions lacking the physical and human capital levels of other regions. These analysts argue that the building block strategies can be adopted once these region have secured a certain threshold of economic activity.

There is also the question of the capacity of government to absorb some of the functions being thrust upon it. Many analysts are asking government to absorb investment risk, particularly in high technology industries which have potentially large, but highly uncertain future returns.[25] Whether state government will have the patience and the capacity to provide these ventures with resources which are unavailable in the private market remains an open question. Furthermore, policymakers should be careful that in establishing programs to address a failure in private markets, they do not end up inadvertently discouraging private sector solutions. It is equally important that the root of the "market failure" is understood and that a government response is appropriate. In some cases, the hesitance of the private market to invest may be well founded and can be a signal for government to avoid a similar mistake.

Government may need to be more farsighted in adapting to economic change. As the development gurus of the 1990s point out, the new innovation driven economy will be less stable. To succeed, government policies will need to abandon efforts to protect significant but declining industries and instead develop an effective transition for redeploying these available resources. The ability of government to anticipate industry changes and have an effective transition policy for declining industries will be another test of government's ability to adapt to economic change. Programs which stress retraining displaced workers will need more attention. As a related issue, an increasing body of research stresses the link between economic development and wise use of environmental resources. The concept of sustainable development is likely to become a more common feature of long range development strategies. As the link between environmental policies and economic growth continues to strengthen, development policies will be pressured to include measures to promote the responsible stewardship of natural resources.

Finally, there is one wild card which the states need to consider. With the Clinton Administration's arrival in Washington, it is possible that more funding and support for the types of programs suggested by these new paradigms will be forthcoming. Promoters of these new paradigms such as Robert Reich have been tapped as cabinet members in the new Administration. Furthermore, during his tenure as Governor of Arkansas, Clinton created an economic development strategy for the state which relied heavily on the ideas contained in these paradigms. It is likely that national policy will be supportive and complementary to those states that are trying to recast their economic development efforts along these lines.

State development agencies are entering a new era. With smaller budgets and a new conception of the engines of future economic growth, these agencies are developing new ways of doing business. As always, the success or failure of these strategies remains to be seen, but if the theory of growth presented in these new paradigms is right, the states may be on the right track.

FOOTNOTES

[1]Eisinger (1988), p. 31.

[2]National Council for Urban Economic Development (1992), pp. 4-5.

[3]For more on the third wave, see Ross and Friedman (1990), pp. 3-10.

[4]Toft (1992), pp. 1-3.

[5]Ross and Friedman (1990), p. 7.

[6]The major works by these three authors on economic

development policy are: Michael E. Porter, *The Comparative Advantage of Nations*, The Free Press, New York, (1990); Robert B. Reich, *The Work of Nations*, Knopf, New York, (1991); and Peter K. Eisinger, *The Rise of the Entrepreneurial State*, The University of Wisconsin Press, Madison, (1988).

[7]Zehner (1992), pp. 1-2.

[8]For a review of Schumpeter's writings in this area, see Scherer (1992), pp. 1416-1433, and Schumpeter (1942).

[9]Proffer (1992), pp. 33-35.

[10]Cortright (1991).

[11]Michigan Department of Commerce (1991).

[12]Osborne (1988), pp. 259-260.

[13]Byington (1993), p. 36.

[14]Ibid.

[15]Illinois Department of Commerce and Community Affairs, *Economic Leadership in Illinois: New Approaches for the 1990s*, prepared by SRI International and DRI/McGraw-Hill, (1992), pp. ES1-ES3.

[16]Iowa Department of Economic Development (1991), p. 25.

[17]Eisinger (1988), pp. 136-137.

[18]Wisconsin Strategic Planning Council (1990), p. 2.

[19]WSPC, p. 3.

[20]Crain Communications Inc. (1991), p. 8. In all, the city offered $111.5 million in incentives to win a four city competition for the UAL maintenance facility. Combined with state incentives, the total package is expected to top $200 million.

[21]Indiana Economic Development Council, Inc. (1992), pp. 1-3.

[22]State Policy Research, Inc. (1993), p. 5.

[23]A session at the "State and local economic development strategy summit" sponsored by the University of Minnesota's Humphrey Institute and the National Conference of State Legislatures specifically addressed this topic. The conference was held December 3-5, 1992 in Minneapolis.

[24]Hatry, Fall, Singer, and Liner (1992), p. 1.

[25]Greenberg (1993), pp. 28-30.

REFERENCES

Byington, Marge, "Development activities in Michigan," *Shaping the Great Lakes Economy*, Federal Reserve Bank of Chicago, 1993, pp. 36-37.

Cortright, Joseph, *Third wave economic development in Oregon*, Oregon Joint Legislative Committee on Trade and Economic Development, December 1991.

Crain Communications Inc., "UAL taps Indianapolis for maintenance hub," *Crain's Chicago Business*, October 28, 1991, p. 8.

Eisinger, Peter K., *The Rise of the Entrepreneurial State*, The University of Wisconsin Press, Madison, 1988.

Greenberg, Andrew T., "Technology and entrepreneurship," *Shaping the Great Lakes Economy*, Federal Reserve Bank of Chicago, 1993, pp. 28-30.

Hatry, Harry, Mark Fall, Thomas Singer, and E. Blaine Liner, *Monitoring the Outcomes of Economic Development Programs: A Manual*, The Urban Institute Press, Washington, D.C., 1992.

Illinois Department of Commerce and Community Affairs, *Economic Leadership in Illinois: New Approaches for the 1990s*, Springfield, 1992.

Indiana Economic Development Council, Inc., *Corporate Profile*, Indianapolis, January 1992.

Iowa Department of Economic Development, *Positioning Iowa for the 21st Century: A 20 Year Economic Development Vision*, Des Moines, 1991.

Michigan Department of Commerce, *Economic Development Mission Statement*, Lansing, 1991.

National Council for Urban Economic Development, "Economic development budgets face state axes," *Economic Developments*, March 15, 1992. pp. 4-5.

Osborne, David, *Laboratories of Democracy*, Harvard Business School Press, Boston, 1988.

Porter, Michael E., *The Comparative Advantage of Nations*, The Free Press, New York, 1990.

Proffer, Lanny, "Benchmarks to a better Oregon," *State Legislatures*, National Conference of State Legislatures, July 1992, pp. 33-35

Reich, Robert B., *The Work of Nations*, Knopf, New York, 1991.

Ross, Doug, and Robert E. Friedman, "The emerging third wave: new economic development strategies in the 90s," *The Entrepreneurial Economy Review*, Corporation for Enterprise Development, Autumn 1990, Vol. 9, No. 1, pp. 3-10.

Scherer, F.M., "Schumpeter and plausible capitalism," *Journal of Economic Literature*, Vol. 30, September 1992, pp. 1416-1433.

Schumpeter, Joseph, *Capitalism, Socialism, and Democracy*, Harper, New York, 1942.

State Policy Research, Inc., *State Budget & Tax News*, Vol. 12, No. 5, March 2, 1993, p. 5.

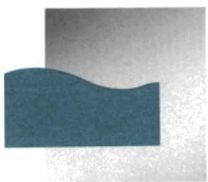
Toft, Graham, "Making waves: a critique of the third wave," *Indiana Economic Development Council*, Indianapolis, 1992, pp. 1-3.

Wisconsin Strategic Planning Council, *Report Number 2*, Madison, February 1990.

Zehner, Andrew L., "What the gurus are saying about economic competitiveness," *Indiana Economic Development Council*, Indianapolis, 1992.

Recent trends in corporate leverage

Paula R. Worthington



Many analysts have voiced concerns about the indebtedness of U.S. corporations during the last several years. These analysts believed that the debt buildup of the 1980s would leave firms in precarious financial condition if and when the next cyclical downturn arrived; higher debt burdens would prove difficult to manage when revenues and cash flows fell in a recession. Some of these concerns have indeed been borne out in the most recent cycle, as many firms found their debt servicing needs remained high while funds available to meet those needs tapered off. Analysts have also argued that firms have recently taken great strides in reducing their debt burdens and "restructuring their balance sheets." In this article, I examine some aggregate data for the U.S. nonfinancial corporate sector and consider several aspects of the changes in corporate debt burdens in recent years. In particular, after presenting some evidence of the debt buildup of the 1980s and its subsequent slowdown, I focus on the balance sheet restructuring that began in 1990 and continues to the present.

The article's findings are briefly stated. I find that total debt growth has indeed slowed, though its short and long term components have moved in opposite directions in recent quarters. Various debt to asset and debt to income ratios have fallen noticeably in recent quarters, though typically they have failed to retrace much of their buildup during the 1980s. Flow measures of indebtedness, such as interest expense to cash flow ratios, have shown much larger decreases, and I find that the principal factor explaining these decreases is the drop in interest rates experienced in both the short and long term ends of the rate structure. Cash flow growth and debt level reduction, by comparison, have contributed only a modest amount to the observed decrease in these ratios. This suggests that firms have indeed experienced a decrease in their debt burdens, but that this is due more to the effects of monetary policy than to explicit restructuring efforts on the part of firms themselves. Furthermore, this analysis suggests that debt burdens remain historically high, so that future interest rate increases may return many firms to situations in which cash flow may be inadequate to service outstanding debt. The consequences of the 1980s debt buildup will remain an economic force well into the decade of the 1990s.

The rest of this article is organized as follows. In the following section, I define and describe the measures of leverage used in this article; Box 1 describes in more detail the data sources used. The article's third section documents the debt buildup of the 1980s and its recent slowdown using simple figures and growth rates; I also briefly discuss the notion of "optimal capital structure" in that section. The fourth section looks at the balance sheet restructuring process in some detail and presents the main results of the article. The fifth section concludes.

Measures of indebtedness

Numerous financial ratios may be constructed to develop a sense of the extent of indebtedness in the U.S. nonfinancial corporate sector.

Paula R. Worthington is a senior economist at the Federal Reserve Bank of Chicago. The author gratefully acknowledges helpful comments from Carolyn McMullen, Kathryn Moran, and Steven Strongin.

BOX 1

Data sources and definitions

Most of the data used in this article are taken from the *Flow of Funds* (*Flows*) data collected by the Federal Reserve Board (Board); exceptions are noted in the text. *Flows* data have been published by the Board on a regular basis since 1947. The data are intended to describe the financial activities of the aggregate U.S. economy and its constituent sectors and to permit matching to income and product data summarizing real resource flows in the economy. The Board's publication, *Introduction to Flow of Funds*, contains good background information on this data source.

This article uses data pertaining only to the nonfinancial, nonfarm corporate sector, and all data are in nominal dollars. I use data from 1959:Q1 through 1992:Q3, the last quarter for which complete data are available. I refer to 1992:Q3 as the current quarter throughout the article. Two of the series used in the article, trade debt and trade credit, experienced changes in reporting methods and variable definitions over the studied time period, so in the following paragraphs I describe the changes and how I adjusted the series to ensure comparability over time.

Trade debt

In the fourth quarter of 1974, the *Flows* series labelled "trade debt" displays a huge (32.8 percent) drop from its 1974:Q3 level. This decline reflects a change in the source data used by the Board to construct the trade debt series. To get a consistent series, then, I must adjust the data for 1974:Q3 and earlier quarters to match the later period definitions and sources.

Through 1974:Q3, the Board relied on the Securities and Exchange Commission's (SEC) data on working capital of nonfinancial corporations for the "notes and accounts payable" component of trade debt.[1] From 1974:Q4 forward, the Board has used an alternative series, called "payables," developed by the Federal Trade Commission (FTC) and the Board. The payables series, both old and new, is not part of the *Flows* data and instead is available (through 1986 only) in the Board's *Annual Statistical Digest*. These two alternative payables series can be easily spliced at 1974:Q4, because both are available for that quarter only (Board of Governors, July 1978). The series are quite different in levels: the old series reports a value of $402.3 billion, while the new one reports one of $272.3 billion. However, since I lack data for the other components of the trade debt series, I cannot simply splice the payables series and then adjust the trade debt series in turn. Instead, I assume that between 1974:Q3 and 1974:Q4 the percentage change in trade debt equals the percentage change in payables, where I use the adjusted payables data. This gives me an adjusted level of trade debt for 1974:Q3. For 1972:Q2 and earlier quarters, I assume that the percentage change in the unadjusted trade debt series equals the percentage change in the adjusted trade debt series. These two assumptions permit me to compute an adjusted trade debt series for the quarters before 1974:Q4.

Trade credit

The *Flows* series labeled "trade credit" exhibits similar behavior to that of trade debt: a break in the series occurs in 1974:Q4 as the Board switches from one data source to another. Prior to 1974:Q4, the "accounts receivable" component of trade credit was derived from the SEC data mentioned above. From 1974:Q4 onwards, that component was derived from series prepared by the Board and the FTC. Like the payables series discussed above, the receivables series can be easily spliced at 1974:Q4, the quarter for which both series are available; in addition, the receivables series is not part of the *Flows* data but is published (through 1986) in the *Annual Statistical Digest*. To compute an adjusted trade credit series, I need additional data on consumer credit because trade credit is defined as the difference between receivables and consumer credit (see Footnote 1 of this Box). Thus, to obtain an adjusted series for 1984:Q3 and earlier, I proceed as follows. First, I use the published (unadjusted) *Flows* data to compute an unadjusted receivables series as the sum of trade credit and consumer credit. Next, I adjust the receivables series by assuming that the percentage change in receivables between any two quarters is the same for both the adjusted and the unadjusted data. Finally, I compute an adjusted trade credit series for 1974:Q3 and earlier by setting adjusted trade credit equal to the difference between the adjusted receivables series and the original (unadjusted) consumer credit series. An alternative method more comparable to the one used for trade debt yields very similar results.[2]

---

[1]For a discussion of the components of all *Flows* series, see Board of Governors (1971).

[2]Under the alternative method, I compute adjusted receivables for 1974:Q3 only by assuming that the percentage changes in adjusted and unadjusted receivables between 1974:Q3 and 1974:Q4 are equal. I then compute adjusted trade credit for 1974:Q3 as unadjusted trade credit plus adjusted receivables less unadjusted receivables. For 1974:Q2 and earlier, I assume that the percentage changes in the adjusted and unadjusted trade credit services are equal.

I consider three types of ratios in this article. First, I examine a short term assets to liabilities ratio. Next, I consider a debt to income ratio, and finally I look at ratios of interest payments to cash flow. The remainder of this subsection defines and describes each ratio in turn (Box 1 contains additional information on data sources and definitions).

Ratios of assets to liabilities measure the solvency and/or liquidity of a firm or sector. I use the ratio of short term liabilities to short term assets, which is just the reciprocal of the current ratio.[1] This ratio is a good measure of liquidity since short term assets are those that could be quickly used to meet the short term liabilities faced by the sector.

The second ratio I examine is the ratio of total debt outstanding to the flow of gross domestic product for the nonfinancial sector (NFGDP); similar ratios are commonly used in discussions of government and household sector indebtedness [Friedman (1982) and Eugeni (1993)]. Shoven and Waldfogel (1990) refer to such measures as "hybrid" financial ratios, because they compare stocks to flows. Such ratios offer a rule of thumb measure of indebtedness by comparing a sector's flow of total income to its total debt; the ratio essentially measures how quickly the sector's underlying assets would generate the income needed to repay the debt.

Finally, I examine the ratio of interest payments to cash flow, a liquidity measure which compares the current flow of debt servicing obligations with the current flow of cash available to meet those obligations. The denominator of the ratio, cash flow, is defined as the sum of before tax profits, depreciation, and interest payments, while the numerator is simply interest payments.[2] Appropriate interest payments measures are not directly available, so I construct proxies as follows. Short term interest payments are computed as the product of the six month commercial paper rate and short term debt outstanding; long term interest payments are computed as the product of the corporate AAA bond rate and long term debt outstanding; and total interest payments are computed as the sum of short and long term payments. These proxies assume that firms can and do "roll over" their debt, both short and long term, each time period (quarter or year). This implies that when rates are rising, these proxies may overstate the increase in the debt servicing burden, since firms will not choose to refinance existing debt at the newly higher rates. On the other hand, when rates are falling, these proxies may overstate the decrease in the burden, since firms cannot refinance all of their debt immediately following a rate decline. These proxies also ignore the fact that not all nonfinancial corporations have the same credit rating, so that the rates paid for a given maturity issue will differ across firms. Despite these shortcomings, these measures can provide an idea of both the level and change in debt burdens.[3]

The debt buildup of the 1980s and its recent slowdown

Many studies have documented the leveraging boom of the 1980s and have analyzed its sources and consequences.[4] At year end 1980, U.S. nonfinancial corporations had a total of $875.0 billion in total debt outstanding, while by year end 1990, they had $2,273.4 billion, an increase of nearly 160 percent. During that same time period, the sector experienced growth of only 96 percent in nominal NFGDP. Table 1 presents the annualized growth rates for NFGDP, total debt, long term debt, and short term debt over several time periods. The Table clearly shows that total debt growth exceeded income growth over the 1980s and that both short and long derm debt grew vigorously over the decade.

Financial analysts disagree on whether this increase in debt relative to NFGDP (and other measures) was "good" or "bad." Evaluating the welfare consequences of particular capital structures requires a theory of optimal capital structure, and many theories and arguments have been proposed. Analysts tend to agree on the factors that determine the optimal capital structure but rarely agree on their relative importance. For example, corporate tax rates, expected bankruptcy costs, liquidity of asset markets, and the extent and nature of information based problems, such as adverse selection and moral hazard, will all

TABLE 1

Annualized growth rates

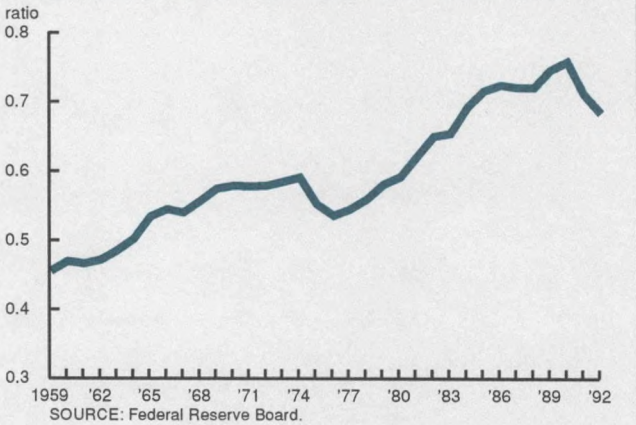
	NFGDP	Total debt	Long term debt	Short term debt
1980-1990	.070	.100	.093	.112
1983-1990	.066	.108	.114	.100
1984-1990	.058	.099	.112	.082

SOURCE: *Flow of Funds,* Federal Reserve System, various years.

influence firms' choices of debt and equity. A comprehensive treatment of these factors and consideration of their behavior over the 1980s is beyond the scope of this article; hence, in what follows, I remain agnostic as to the welfare consequences of increases and decreases in corporate leverage. Instead, I simply document recent trends and attempt to identify which factors have been most important in recent quarters in corporate balance sheet restructuring.

FIGURE 1

Ratio of short term liabilities to short term assets



SOURCE: Federal Reserve Board.

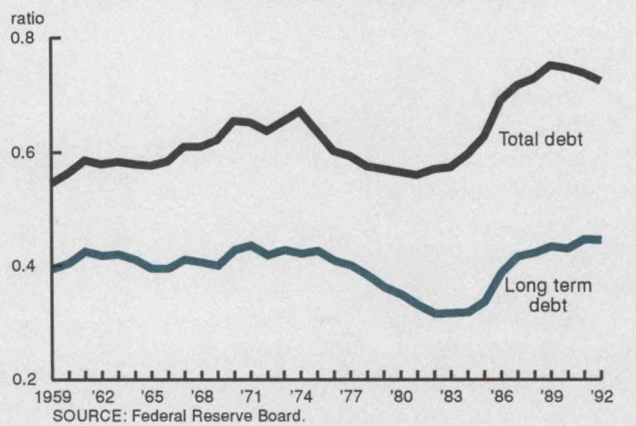
To properly evaluate whether the increased debt levels really represented increases in indebtedness, one needs to consider the ratios defined in the previous section. Figures 1 through 3 depict the patterns in three sets of ratios since 1959, and together they tell a story of substantial increases in leverage over the 1980s. For example, the ratio of short term liabilities to short term assets (STL/STA), which is shown in Figure 1, rose from .593 at the beginning of the 1980s to a peak of .760 in 1990:Q1. Since then, the ratio has fallen to .687, corresponding to a current ratio of 1.46 and bringing the ratio back to 1984 levels. The ratio's decline reflects actual reductions in current liabilities and somewhat modest growth in current assets.

The ratio of debt outstanding to NFGDP, depicted in Figure 2, displays a pattern similar to that of the STL/STA ratio. The total debt to NFGDP ratio rose throughout the 1980s, peaking in 1991:Q1 at .751; the ratio has since fallen to .718. Much of this ratio's recent decline reflects decreases in short term debt outstanding; if only long term debt is used in the ratio's numerator, the ratio has not declined but has only leveled off, reflecting recent moves by corporations out of short term into long term debt.

Figure 3 presents the interest payments to cash flow ratios, and all three ratios tell similar stories: burdens grew in the late 1970s and early 1980s, as interest rates reached historically high levels. During the 1980s, these measures remained high by historical standards, though they varied quite a bit from year to year. Each of the ratios was higher by the end of 1990 than it had been at the end of 1980, though the 1990 ratios were below the decade peaks of 1982. Furthermore, the most recent data indicate a continued, pronounced decline in these interest burden measures from their local peaks in late 1990 and early 1991, with the short term interest burden falling much more than the long term burden. To interpret these patterns properly, recall that the sources of the high interest burdens were quite different between the early 1980s and early 1990s. In the early 1980s, the source was high interest rates; in the early 1990s, the source was high debt levels. For example, consider the short term measure, which equalled .085 in 1980, with short term debt outstanding of $332.3 billion and an average six month commercial paper rate of 14.5 percent. By 1990, the ratio had risen to .107, because outstanding short term debt had

FIGURE 2

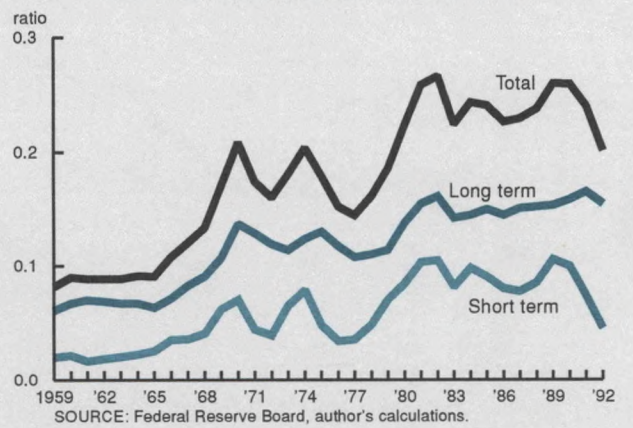
Ratios of debt to gross domestic product



SOURCE: Federal Reserve Board.

FIGURE 3

Ratios of interest payments to cash flow



SOURCE: Federal Reserve Board, author's calculations.

increased to $959.7 billion although the six month commercial paper rate was significantly lower, at 7.7 percent.

Balance sheet restructuring

The ratios presented in the previous section suggest that firms have begun to reverse their debt positions, with particularly noticeable decreases in debt servicing burdens and short term debt levels and ratios. A natural question, then, is when the restructuring process will be over. However, answering this question requires forecasting and understanding corporate preferences regarding optimal capital structure, both of which are beyond the scope of this article. Rather, in this section, I ask three distinct but related questions. Each question emphasizes a different perspective on the leverage issue and, as a consequence, analyzes different leverage measures.

How valuable are two more years of restructuring?

If the restructuring process continues for another two years as it has for recent quarters, what will corporate balance sheets look like? That is, exactly how much will the corporate sector have lightened its debt burden? Since different leverage measures peak in different quarters and exhibit somewhat different patterns around their peaks, I will use the recent business cycle peak date, 1990:Q3, as a common reference point.

Consider the entries in Table 2 below. For two of the ratios discussed in the previous section, STL to STA and debt to NFGDP, I compare their 1990:Q3 value to their current value, and then calculate what their value would be eight quarters from now (1994:Q3) if they decrease at the same rate as they have since 1990:Q3.[5] For example, consider the column labeled STL/STA. This ratio equaled .755 in 1990:Q3 and has declined to .687 in the most recent quarter. If that rate of decrease were to continue, in two years the ratio would reach .619, just above its 1981:Q3 value. Thus, in two more years, firms would have retraced much of the 1980s increase in this ratio. On the other hand, eight more quarters of debt load reduction at rates already experienced would bring the debt to NFGDP ratio only to 1987:Q4 levels. The difference between the two measures reflects the fact that firms have been exchanging short term for long term debt in recent quarters; consequently, short term leverage measures have decreased substantially, while long term and total measures have decreased only moderately if at all.

What factors have contributed to the decreased debt burden?

Figure 3 clearly indicates that debt servicing burdens have decreased since 1990; what are the sources of these decreases? This section attempts to disentangle the contributions of the three key factors that determine these burdens, namely the amount of debt outstanding, the level of interest rates, and the level of cash flow. In recent quarters, short term debt levels have fallen, while long term debt has risen, just slightly pulling up the total; interest rates have fallen, short term more than long term; and the noninterest

TABLE 2

Peak, current, and extrapolated values of selected financial ratios[1]

	STL/STA	DEBT/NFGDP
Peak value	.755	.742
Current value	.687	.718
Extrapolated value	.619	.694
Comparison date	1981:Q3	1987:Q4
Comparison value	.617	.696

[1]Peak value is for 1990:Q3, and current value is for 1992:Q3.

payments components of cash flow (pretax profits and depreciation) have risen. This section presents some numbers to quantify the contribution of these factors.

Table 3 presents values for three interest payments to cash flow ratios under various assumptions about outstanding debt, cash flow, and interest rates. The top portion of the table simply reports the actual values of the three ratios in 1990:Q3 and 1992:Q3 and the change over that time period.[6] For example, the short term measure fell from .098 to .040, for a change of .058, over this time period. Similarly, the long term measure fell from .158 to .150, and the total measure from .255 to .190.

TABLE 3

Interest payments to cash flow ratios

	Short term interest payments	Long term interest payments	Total interest payments
Actual value in 1990:Q3	.098	.158	.255
Actual value in 1992:Q3	.040	.150	.190
Change from 1990:Q3 ratio[1]	.058	.008	.065
Debt levels at 1992:Q3 values, interest rates and cash flow at 1990:Q3 values	.088	.172	.260
Change from 1990:Q3 ratio[1]	.010	–.014	–.005
Debt levels and cash flow at 1992:Q3 values, interest rates at 1990:Q3 values	.084	.164	.248
Change from 1990:Q3 ratio[1]	.014	–.006	.007

[1]Change is computed as the 1990:Q3 ratio minus the 1992:Q3 ratio.

Now consider the importance of debt level reduction in reducing these debt servicing ratios. The Table's first column reports that if debt levels are held at their current 1992:Q3 values while cash flow and interest rates are held fixed at their 1990:Q3 values, the short term debt servicing burden would have equalled .088 in 1992:Q3, instead of its actual .040. Thus, debt level changes alone explain only .010 (= .098 – .088) of the improvement in the ratio. The second column reports that, under the same assumptions of unchanged cash flow and interest rates but current debt levels, the long term debt burden would have equalled .172, compared to its actual .150 value in 1992:Q3. In this case, debt level changes have actually increased the debt servicing burden, contributing –.014 (= .158 – .172) to the ratio's decrease. The third level reports a similar calculation for the total interest payments servicing cash flow ratio.

Now turn to the joint roles of debt level reduction and cash flow growth.[7] The Table reports that the short term ratio would have equalled .084 in 1992:Q3 if debt levels and cash flow were at their actual 1992:Q3 levels while interest rates remained at their 1990:Q3 values. Thus, debt level changes and cash flow growth accounted for only .014 of the change in the short term ratio, out of a total change of .058. It is clear that rate reduction has been responsible for most of the improvement in this short term service ratio. Similarly, debt level changes and cash flow growth together accounted for –.006 of the decrease in the long term ratio and .007 of that in the total ratio, out of total changes of .008 and .065, respectively. Again, the importance of rate reduction is clear. Further, these numbers suggest why the previous section's exercise would be of limited interest for these debt servicing ratios. Measuring the effects of eight more quarters of reduction in debt burdens is not that interesting in this case, since most of the action has come from extensive rate reduction, especially short term, which is not likely to continue through 1994.

Table 3 suggests that corporations have not restructured much by actually reducing their debt levels. Instead, their debt burdens have become lighter because of extensive rate reductions and modest cash flow growth in the last eight quarters. Given that future sizeable rate reductions are unlikely in the present economic environment and that firms have shown little interest in outright debt level reduction, this puts the burden on cash flow growth to be the driving force behind future debt servicing burden reduction.

What impact will growth have on the debt burden?

The last part of this section presents some estimates of the quantitative impact of prospective cash flow and output growth on two measures of the debt burden. I consider the debt to NFGDP ratio and the previous section's interest payments to cash flow ratio based on total interest payments. Tables 4A and 4B present estimates of the impact of three alternative growth rates on these two debt burden measures, under alternative assumptions about the future growth of debt outstanding. All of the calculations as-

sume that short term debt growth is zero and that the only debt growth, if any, is long term.

Table 4A shows that if NFGDP grows at an annual rate of 3 percent over the next four quarters and if total debt outstanding does not change at all, then the ratio of debt to NFGDP will fall from .718 to .697 over the next year, bringing the economy nearly back to the 1987:Q4 value of that ratio. If NFGDP grows at 3 percent but long term debt outstanding also rises, for example by 1.5 percent, then the debt to NFGDP ratio will fall only to .707, near the 1988:Q2 value. Faster output growth means more progress in decreasing the debt to NFGDP ratio, while adding more debt retards such progress. The third column, in which NFGDP is assumed to grow by 7 percent and debt is unchanged, brings the ratio back only to 1986:Q3 levels. Thus, healthy output growth will act to decrease this ratio, but even the most robust case considered will bring the ratio back to 1986 levels, which were still high by historical standards (recall Figure 2).

Table 4B shows similar calculations to assess the impact of cash flow growth on the interest payments to cash flow ratio. I assume that rates are unchanged from their 1992:Q3 levels and that any growth in total debt outstanding is in long term debt, leaving short term debt unchanged. The Table shows that cash flow growth lowers the ratio and that faster cash flow growth (less debt accumulation) translates into faster debt burden reduction. However, the magnitude of the reductions is quite modest in all six cases considered; all would leave the interest payments to cash flow ratio close to its 1979 level. (Recall from Figure 3 that by 1979, debt servicing burdens were high by historical standards but would rise even further as interest rates continued to climb.) Thus, future cash flow growth is likely to have only moderate effects on debt servicing burdens. This is consistent with Table 3's numbers, which suggested that recent cash flow growth has contributed only modestly to recent decreases in debt servicing burdens.

TABLE 4A

Impact of future output growth on debt to NFGDP[1]

Output growth rate	3%	5%	7%
Current value	.718 [1989:Q1]	.718 [1989:Q1]	.718 [1989:Q1]
Value in 1993:Q3			
Debt growth=0	.697 [1987:Q4]	.684 [1987:Q1]	.671 [1986:Q3]
Debt growth= one-half of output growth	.707 [1988:Q2]	.701 [1988:Q1]	.694 [1987:Q4]

[1]Dates in brackets denote most recent quarter with ratio at or near that level.

Conclusions

This article has presented some evidence on the extent of financial restructuring undertaken by U.S. nonfinancial corporations in the last two to three years. Measures of the debt burden that focus on stocks of debt outstanding have declined in recent quarters, especially those that focus on short term assets and liabilities. However, "flow" measures of the debt burden have decreased much more significantly, primarily because of a benign interest rate climate. Thus, the recent decreases in corporate sector leverage should not be attributed so much to the explicit shedding of corporate debt but rather to the recent easing of monetary policy. Further, any substantial future interest rate increases may leave many firms nearly as vulnerable as they were before the recent recession. The burden of future balance sheet restructuring will likely be borne by simple economic growth: as growth

TABLE 4B

Impact of future cash flow growth on total interest payments to cash flow[1]

Cash flow growth rate	3%	5%	7%
Current value	.190 [1979:Q3]	.190 [1979:Q3]	.190 [1979:Q3]
Value 1993:Q3			
Debt growth=0	.185 [1979:Q3]	.182 [1979:Q3]	.179 [1979:Q3]
Long term debt growth=one-half of cash flow growth	.187 [1979:Q3]	.186 [1979:Q3]	.184 [1979:Q3]

[1]Dates in brackets denote most recent quarter with ratio at or near that level.

picks up, firms will expand output and revenues faster than debt, thus decreasing their debt loads in a relative sense. The consequences of the 1980s debt buildup will stay with the economy well into the decade of the 1990s.

FOOTNOTES

[1]Short term assets are the sum of cash and equivalents, trade credit, and inventories; short term liabilities are the sum of short term debt, trade debt, and profits taxes payable.

[2]This cash flow measure has been used by other authors studying leverage issues; for example, see Bernanke and Campbell (1988), Bernanke, Campbell, and Whited (1990), Warshawsky (1990), Blair and Litan (1990), and Lee (1990). Alternative cash flow measures, such as after tax measures that may exclude dividends, are appropriate for studying other issues, for example, the sensitivity of fixed investment spending to movements in internal funds; see Fazzari, Hubbard, and Petersen (1988) and Morck, Shleifer, and Vishny (1990) for examples.

[3]If the net interest payments measure from National Income and Product Accounts is used instead of these proxies, very similar patterns emerge.

[4]For example, see the articles in Shoven and Waldfogel (1990); Bernanke and Campbell (1988); and Bernanke, Campbell, and Whited (1990); for the view that the debt buildup was not large by historical standards, see McKenzie and Klein (1992).

[5]For reasons that will become clear in the following section, I do not examine the interest payments to cash flow ratios here.

[6]The change is reported as the 1990:Q3 value minus the 1992:Q3 value.

[7]In this section, cash flow growth denotes growth in the sum of pretax profits and depreciation.

REFERENCES

Bernanke, Ben S., and John Y. Campbell, "Is there a corporate debt crisis?," *Brookings Papers on Economic Activity*, 1988:1, pp. 83-125.

Bernanke, Ben S., John Y. Campbell, and Toni M. Whited, "U.S. corporate leverage: developments in 1987 and 1988," *Brookings Papers on Economic Activity*, 1990:1, pp. 255-278.

Blair, Margaret M., and Robert E. Litan, "Corporate leverage and leveraged buyouts in the eighties," in John B. Shoven and Joel Waldfogel, eds., *Debt, taxes, and corporate restructuring*, Washington, D.C. , Brookings, 1990.

Board of Governors of the Federal Reserve System, *Introduction to flow of funds*, June 1980.

_____, "Working capital of nonfinancial corporations," *Federal Reserve Bulletin*, July 1978.

_____, "Flow of funds accounts: data sources and derivations," preliminary draft, 1971.

Eugeni, Francesca, "Consumer debt and home equity borrowing," *Economic Perspectives*, March/April 1993, pp. 2-14.

Fazzari, Steven M., R. Glenn Hubbard, and Bruce C. Petersen, "Financing constraints and corporate investment," *Brookings Papers on Economic Activity*, 1988:1, pp. 141-195.

Friedman, Benjamin M., "Debt and economic activity in the United States," in Benjamin M. Friedman, ed., *The changing roles of debt and equity in financing U.S. capital formation*, University of Chicago Press, 1982.

Lee, William, "Corporate leverage and the consequences of macroeconomic instability," Federal Reserve Bank of New York, research paper, No. 9012, May 1990.

McKenzie, Richard B., and Christina Klein, "The 1980s: a decade of debt?," Center for the Study of American Business, policy study, No. 114, October 1992.

Morck, Randall, Andrei Shleifer, and Robert Vishny, "The stock market and investment: is the market a sideshow?," *Brookings Papers on Economic Activity*, 1990:2, pp. 157-202.

Shoven, John B., and Joel Waldfogel, "Introduction and summary," in John B. Shoven and Joel Waldfogel, eds., *Debt, taxes, and corporate restructuring*, Washington, D.C., Brookings, 1990.

Warshawsky, Mark, "Is there a corporate debt crisis? another look," Federal Reserve Board of Governors, working paper, January 1990.

Cost Effective Control of
Urban Smog

June 7 and 8, 1993

In conjunction with the Workshop on Market-Based Approaches to Environmental Policy and the Chicago Council on Foreign Relations, the Federal Reserve Bank of Chicago will hold a two day conference on June 7 and June 8, 1993. Meetings will take place at the Federal Reserve Bank. The conference will promote the exchange of ideas and information among the region's business community and policymakers so that the Midwest region can comply with clean air mandates (especially regarding urban ozone) with a minimum of regulatory burden and growth retardation.

Highlights of the program

- Keynote sessions addressing the challenges facing the Chicago area and other regions will be delivered by Samuel Skinner, president of Commonwealth Edison Co., and Mary Gade, director of the Illinois EPA.

- George E. Tolley, professor of economics at the University of Chicago, will report on the status of current research regarding urban ozone abatement.

- Sessions will report on both ongoing planning and experience to date with emissions trading systems. Speakers will include James D. Boyd, executive officer at the California Air Resources Board, Praveen K. Amar, senior program manager for the Northeast States for Coordinated Air Use Management, and Kelly Robinson of Rutgers University.

- A report addressing "Cost effectiveness of remote sensing and enhanced inspection and maintenance" will be presented by Winston Harrington of Resources for the Future and Virginia D. McConnell of the University of Maryland. Discussants of the report will include Wynn Van Bussmann, corporate economist for Chrysler, and Andrew Plummer, deputy director for improvement programming at the Chicago Area Transportation Study.

- Daniel Dudek, senior economist at the Environmental Defense Fund, will present a paper on "Incentive systems and the car." Discussants will include Thomas F. Walton, director of economic policy analysis at General Motors Corporation, along with Elmer Johnson of the firm of Kirkland and Ellis.

- A panel of industry leaders from the Midwest will respond to the challenges of complying with Clean Air Act regulations and will also react to proposals for market based systems of compliance.

- John Spengler of the Harvard School of Public Health will address the "Health impacts of urban ozone emissions."

If you would like to receive an invitation to the conference, please write or phone:

Sandy Blazina
Public Affairs Department
Federal Reserve Bank of Chicago
P.O. Box 834
Chicago, Illinois 60690-0834
Telephone: 312-322-5114
FAX: 312-322-5515

ECONOMIC PERSPECTIVES

Public Information Center
Federal Reserve Bank of Chicago
P.O. Box 834
Chicago, Illinois 60690-0834

Do Not Forward
Address Correction Requested
Return Postage Guaranteed

Mailing label corrections or deletions:
Make changes or mark **Delete From Mailing List** on the label and fax the label to: 312-322-2341, or mail to: ATTN: Mail Services, Federal Reserve Bank of Chicago, P.O. Box 834, Chicago, Illinois 60690-0834

FEDERAL RESERVE BANK
OF CHICAGO