

# Will Just-In-Time Inventory Techniques Dampen Recessions?

By Donald P. Morgan

In the past, fluctuations in inventories have been an important factor in business cycles, particularly in recessions. Indeed, one prominent analyst went so far as to assert: “Recessions *are* inventory swings” (Blinder). Recent signs, however, suggest the role of inventories in recessions may be diminishing. While recessions in the past were often foreshadowed by a rising inventory-sales ratio, the current recession was not. In fact, the inventory-sales ratio has declined noticeably since the last recession ended in 1982.

This unusual behavior in the inventory-sales ratio may be due to inventory management techniques adopted by some U.S. firms in the 1980s.

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With these techniques, firms reduce and control their inventories by producing just in time to sell. Many analysts claim these techniques—if prevalent and successful—may reduce the inventory swings that aggravated past recessions. This recession and future recessions may be milder as a result.

This article concludes that just-in-time techniques will dampen recessions. The first section of the article reviews the role of inventories in past recessions and considers signs this role may be changing. The second section discusses how firms reduce their inventories with just-in-time techniques and where such techniques are being applied. The third section presents evidence just-in-time techniques are affecting aggregate inventory behavior. The final section explores how recessions will be dampened by these techniques.

## **Inventories and Business Fluctuations**

Inventories figure in business fluctuations in part because inventory investment—the change in the level of inventories—is a component of GNP.<sup>1</sup> In fact, fluctuations in inventory investment play a disproportionate role in GNP fluctuations. While the level of inventory investment represents only about 1 percent of the level of GNP, changes in inventory investment from one quarter to the next usually account for about half of the corresponding changes in GNP.

### **The role of inventories in recessions**

Sharp drops in inventory investment have been especially important in recessions. During the 1973-75 recession, for example, inventory investment declined by \$78.1 billion from the onset of the recession—the business cycle peak—to the end of the recession—the business cycle trough. During the same period, GNP declined \$120.1 billion. Thus, about 65 percent of the decline in GNP was attributed to the decline in inventory investment. The prominent role of inventory investment in the 1973-75 recession was not unusual: on average over postwar recessions, declines in inventory investment accounted for about 80 percent of the decline in GNP.

The reason firms reduce inventories in recessions relates to the reason firms hold inventories in the first place. Businesses have historically held two or three months' worth of sales in inventory to protect against production halts or a sudden increase in sales. But of course sales decline during recessions, so firms' desired inventory stock falls proportionately. To reduce inventories, firms must then reduce inventory investment by scaling

back their production.

The sharp drop in inventory investment during recessions occurs because firms have typically failed to cut production promptly when sales decline. Instead, firms have maintained production for a time after sales declined, perhaps because firms expected sales to rebound quickly. In the meantime, however, inventories accumulated. By the time firms recognized a recession was underway and that sales would remain slow indefinitely, their warehouses were crowded with unwanted inventories. Firms were then forced to cut inventory investment dramatically to balance their inventories with the lower sales rate.

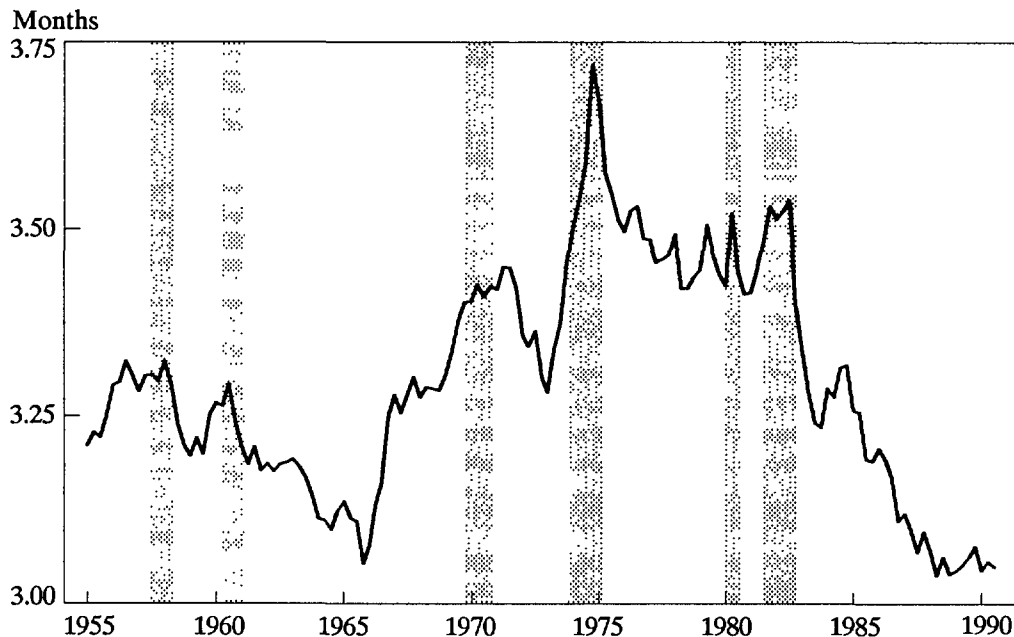
This inventory cycle of rising and then sharply falling inventory investment amplifies recessions. If firms cut production promptly when sales decline, they could prevent unwanted inventories from accumulating. In turn, firms would not need to eventually cut production so sharply, and the recession would be milder.

### **Evidence the inventory cycle may diminish**

The onset of an inventory cycle is usually signaled by a rise in the ratio of inventory to sales. This ratio measures the number of months' worth of sales held as inventories. For example, a firm with \$3 million of inventories in stock and sales of \$1 million per month would have an inventory-sales ratio of three months (\$3 million divided by \$1 million/month).

The inventory-sales ratio typically rises late in the expansion after sales fall and firms allow inventories to accumulate.<sup>2</sup> Only after firms finally cut production during the recession does the inventory-sales ratio itself begin falling. This behavior of the inventory-sales ratio is evident in Chart 1. The vertical bands in the chart denote recessions: the first vertical line in a band

**Chart 1**  
**Aggregate Inventory-Sales Ratio**



Source: Board of Governors of the Federal Reserve System.

Note: Vertical bands indicate recessions.

corresponds to a peak in business activity, and the second vertical line corresponds to a trough.<sup>3</sup>

In the 1981-82 recession, for example, the inventory-sales ratio began rising in the spring of 1981, before the peak in business activity in July. The inventory-sales ratio did not begin declining until near the trough, as firms cut production sufficiently to actually reduce their inventories.

The behavior in the inventory-sales ratio since the 1981-82 recession suggests the role of the inventory cycle may be diminishing. After beginning a sharp decline in 1982, the ratio reached an all-time low in 1988.<sup>4</sup> Moreover, the ratio merely leveled off rather than rising perceptibly as the current recession began in late 1990. As a result, firms may not need to reduce inventory investment as sharply as in past

recessions. If not, the current recession will be milder. And if the inventory-sales ratio remains low, the role of inventories in recessions may be permanently diminished.

### **The New Inventory Techniques**

Many analysts attribute the low inventory-sales ratio to inventory reduction techniques increasingly adopted by U.S. firms in the 1980s. With these techniques, firms reduce their inventories by purchasing just in time (JIT) to produce and producing just in time to sell. JIT was most widely adopted in the U.S. manufacturing sector in the 1980s, particularly in the automotive and computer industries.

## **Why do firms use JIT to reduce inventories?**

Firms prefer to reduce inventories because holding inventories is costly. Firms incur interest costs in holding inventories because firms could have held interest-bearing assets instead. Inventories also entail costs in the form of insurance, obsolescence, depreciation, pilfering, storage, and handling. Taken together, these various costs average close to 10 percent of the value of the inventory stock per year (Blinder and Maccini). Such high costs are a powerful incentive to reduce inventories.

But inventories are also beneficial to firms. Inventories of materials and supplies used in producing finished goods protect against various problems such as late deliveries or defects. Inventories of finished goods ensure that a firm can satisfy demand in the event of a sudden increase in sales or a production halt. In addition, inventories help firms hedge against inflation. Rapid inflation in the late 1970s and early 1980s motivated firms to stock up on inventories early—before prices rose.

Firms determine their ideal level of inventories by trading off the costs and benefits of inventories. The ideal level of inventories fell after 1983 because the costs of holding inventories rose and the benefits fell. Adding to the cost side were the record-high interest rates in the early 1980s. At the same time, the declining inflation rate after 1982 reduced one of the benefits of holding inventories.

Even if interest rates were to fall or inflation to rise, firms would be expected to hold lower inventories than before adopting JIT. According to just-in-time thinking, holding inventories against such problems as late deliveries or defects is a cost of inventories—not a benefit—because the problems are never solved. Thus, the just-in-time approach is to eliminate the problem, thereby enabling firms to lower inven-

ories permanently (Hay).

Another important factor motivating U.S. firms to reduce inventories in the 1980s was fierce competition from Japanese firms. Many analysts attribute the success of Japanese firms in U.S. markets in part to JIT (Celley and others; Kim and Schniederjans). The use of JIT reduced Japanese firms' inventory costs, which in turn helped Japanese firms undersell U.S. firms. In response to this challenge, U.S. firms sent representatives to Japan to learn how to reduce inventories with just-in-time techniques.<sup>5</sup>

## **How do firms lower inventories with JIT?**

Firms practicing JIT reduce inventories at all stages by purchasing just in time to produce and producing just in time to sell. These practices represent a drastic departure from traditional purchasing and production practices in the United States. Accordingly, firms adopting JIT must confront the problems the traditional practices were designed to accommodate.

To reduce inventories of materials and supplies, firms are changing their purchasing practices under JIT.<sup>6</sup> Traditional practices called for infrequent orders of large lots of materials and supplies, well in advance of when needed for production. Such practices were intended to minimize ordering and transportation costs and to allow time for late deliveries and inspection of goods upon arrival.

In contrast, just-in-time purchasing calls for frequent orders of small lots of material and supplies, just in time to produce. Upon delivery, materials and supplies are whisked directly onto the assembly line. For example, Hewlett-Packard orders materials and supplies in lots of just a few hours' worth of production, several times a day (Raia 1990).

Just-in-time purchasing requires rapid delivery by suppliers. To speed delivery, suppliers

are encouraged to locate near the buyer. For example, suppliers of General Motors' Buick division are all located within one shift (eight hours) of the manufacturing plant (Raia 1987). In addition, many suppliers are switching from trains to trucks as their primary delivery mode. Trucks are more economical than are trains when delivering small lots. Trucks are also more flexible, permitting delivery on shorter notice and permitting delivery directly to the assembly line to eliminate unnecessary handling.

To reduce inventories of finished goods, manufacturing firms are also changing their production practices under JIT. Traditional manufacturing practices called for production of large batches of goods, which were then stored as inventories until inspected and sold. These practices were intended to minimize the costs of setting up for a production run and to ensure an adequate supply of the finished goods in case of defects, strikes, or a surge in demand.

JIT entails frequent production runs of small batches. Ideally, manufacturers should produce goods continuously at roughly the same rate the goods are sold. That way, if sales decline, production declines in step to prevent inventories from accumulating. To provide for an increase in sales, on the other hand, manufacturers must maintain excess production capacity to avoid missing sales.

JIT also requires firms to reduce the time needed to set up for production of a particular good, in order to respond quickly to new orders. Setup times are being reduced in several ways. Manufacturers are installing more flexible machinery that can be quickly switched between production of different goods. For example, automobile makers are installing computer-aided machinery that is quickly reprogrammed to produce a variety of different components.<sup>7</sup> And instead of bolting machines to the floor, manufacturers are using quick-release clamps so machines can be moved quickly between

stations where different goods are produced.

Just-in-time purchasing and production both require improved quality control since firms hold smaller inventories against defects. To improve quality, manufacturers and their suppliers are using computer programs to control quality. These programs monitor the dimensions of goods produced and automatically halt production if the dimensions exceed the desired specification. In addition, the technique of ordering and producing in small lots improves quality because defects are detected sooner.

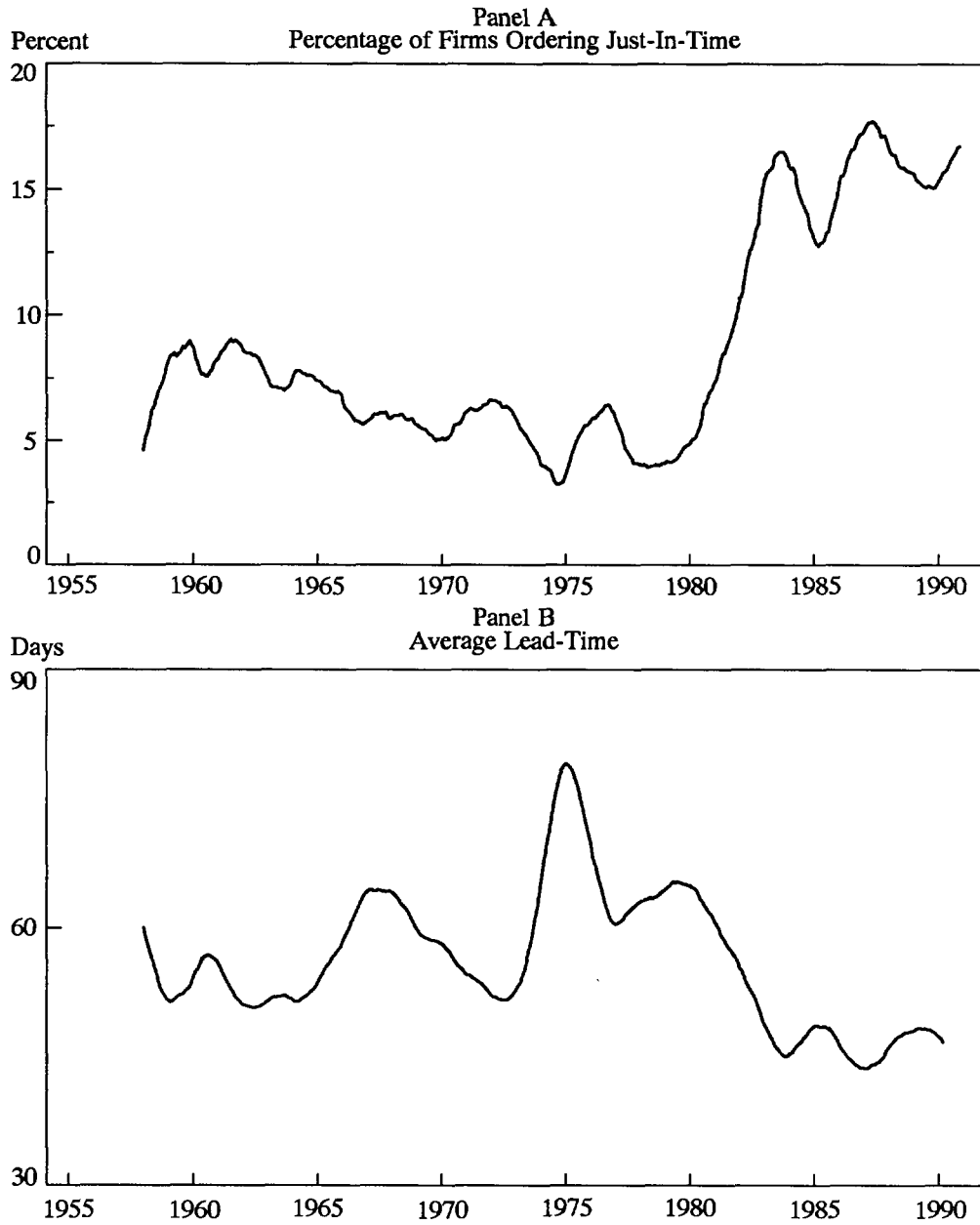
### **Where was JIT adopted in the 1980s?**

A strategy resembling JIT was practiced in the wholesale and retail trade sectors well before 1980 (Ackerman). While this strategy went under a different name—postponement—the principle was the same: postpone ordering as long as possible in order to minimize inventories (Kim and Schniederjans). Grocery store managers, for example, have long lived by this strategy because their stock in trade is perishable. If purchased too soon, food will rot in the warehouse before it is sold.

Under intense competition from Japanese firms, U.S. manufacturing firms began adopting just-in-time techniques in the 1980s (Mecimore and Weeks).<sup>8</sup> Within the manufacturing sector, adoption of JIT has been most visible at large companies in the automotive industry and the computer and office equipment industry—industries facing the fiercest competition from Japan. The Big Three of the auto industry—Ford, General Motors, and Chrysler—all began practicing JIT to some extent in the early 1980s. In the computing and office equipment industry, Hewlett-Packard, IBM, NCR, and Xerox also adopted just-in-time techniques in the early part of the decade (Zipkin; Im and Lee).

Beyond the few examples just noted, how many other manufacturing firms adopted JIT in

**Chart 2**  
**Just-In-Time Purchasing**



Source: National Association of Purchasing Managers.

the 1980s? Short of asking each and every firm, this question cannot be answered with certainty. Surveys suggest, however, that a sizable number of manufacturing firms have embraced just-in-time practices.<sup>9</sup> For example, the percentage of firms ordering materials and supplies just in time increased dramatically beginning around 1980 (Chart 2, Panel A).<sup>10</sup> On average, from 1956 to 1980 only about 5 percent of manufacturing firms were ordering JIT. By 1990 about 15 percent were doing so.

While the fraction of firms ordering JIT tripled in the 1980s, 15 percent is still a small share. As a practical matter, not all firms can completely eliminate inventories of materials and supplies by ordering just in time to produce. Many firms, however, appear to be at least reducing inventories by gradually reducing the lead time between ordering and production (Chart 2, Panel B).<sup>11</sup> The average lead time across manufacturing firms has fallen substantially since 1980. After cycling upward from 1960 to 1980, the average lead time was more than 60 days in 1980. Lead times then headed down after 1980. By 1990 the average lead time was only about 45 days.<sup>12</sup>

## **JIT Reduces Aggregate Inventories**

Skeptics assert that firms practicing JIT reduce their inventories by pushing them onto suppliers who may not be practicing JIT. If so, then JIT may amount to *just inventory transfers* at the aggregate level. Evidence against this possibility is the dramatic decline in inventory sales in the sector and industries where JIT was most widely applied in the 1980s.

### **Is JIT just redistributing inventories?**

Individual firms practicing JIT typically report substantial reductions in inventories. Hewlett-Packard, for example, reduced inven-

tories by more than 50 percent after adopting just-in-time practices. General Motors used just-in-time techniques to reduce inventory costs from \$8 billion to \$2 billion (Johnson).

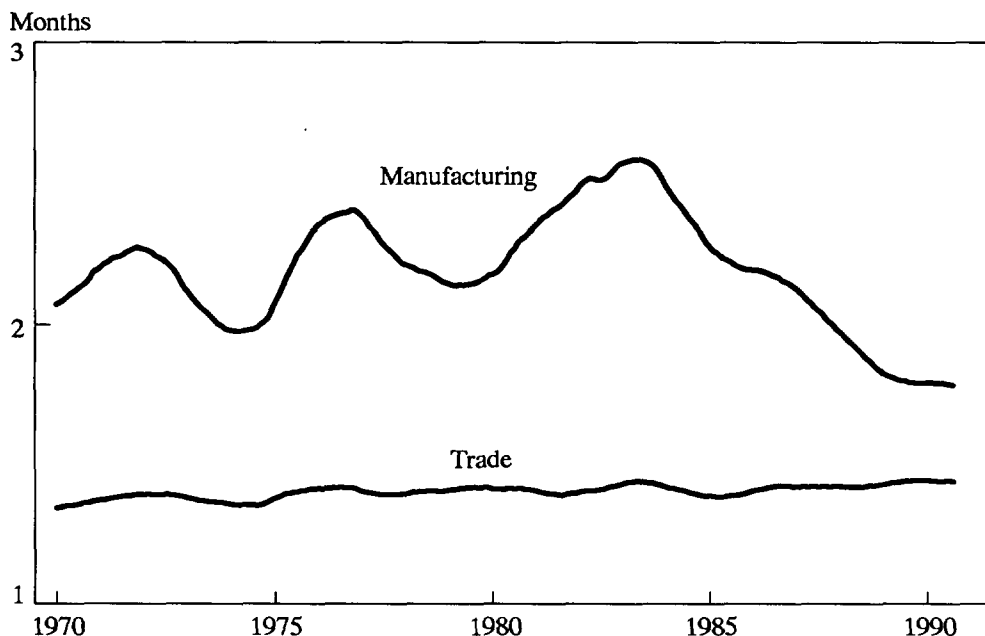
Are such firms just shunting their inventories onto their suppliers?<sup>13</sup> One survey found JIT was more prevalent among large firms than among the smaller companies that supply them.<sup>14</sup> A supplier not practicing JIT may hold larger inventories against the possibility of an unexpected, rush order from a JIT buyer. Suppliers may also inspect goods themselves and hold larger inventories against defects. If such practices are widespread, then JIT may merely be redistributing inventories from one firm to another.

Just-in-time buyers have an incentive not to force inventories onto suppliers because suppliers eventually pass their higher inventory costs back to the buyers. Suppliers can do so because they usually operate under long-term contracts that allow them to raise their prices when their costs increase (Hall).

Just-in-time buyers try to prevent shifting inventories onto suppliers with several measures. First, buyers often provide suppliers with forecasts of purchasing orders. Armed with a forecast, suppliers can time production of material and supplies so they are ready when the actual order arrives. Second, buyers can encourage suppliers to adopt genuine quality improvement programs. By improving quality, suppliers need not inspect each good before shipping and can hold smaller inventories against defects (Lorinez).

Most important, buyers can encourage suppliers to adopt just-in-time techniques themselves. Many automobile manufacturers, for example, weigh a prospective supplier's commitment to JIT before awarding a long-term contract to the supplier (Raia 1987). Suppliers practicing JIT can be relied on to purchase and produce materials and supplies just in time to fill the buyers' orders. In turn, buyers can order

Chart 3  
**Inventory-Sales Ratio by Sector**



Source: Board of Governors of the Federal Reserve System.

just in time to produce the final good. In this manner, inventories are reduced all the way down the production chain—from the smallest producer of materials and supplies to the largest producer of the final good.

### **Evidence JIT is reducing inventories**

Is there evidence JIT is reducing inventories? If JIT were merely redistributing inventories across companies, the aggregate inventory-sales ratio would not be expected to decline. But, as already noted, the ratio declined markedly after 1982.<sup>15</sup> Of course, some factor other than JIT may be reducing inventories. However, two pieces of evidence link the decline in inventories to JIT. First, the decline in the aggregate inventory-sales ratio stemmed entirely from the sector where JIT was newly

applied in the 1980s—manufacturing (Chart 3). Second, the decline in the manufacturing sector inventory-sales ratio was most dramatic in the industries where JIT was most visibly adopted—the computing and office equipment industry and the motor vehicle industry (Chart 4). This evidence suggests the adoption of just-in-time techniques by U.S. manufacturing firms in the 1980s has, in fact, reduced aggregate inventories. Smaller aggregate inventories imply lower inventory costs and a stronger competitive position for U.S. firms. From a broader perspective, the use of just-in-time techniques implies a more stable U.S. economy.

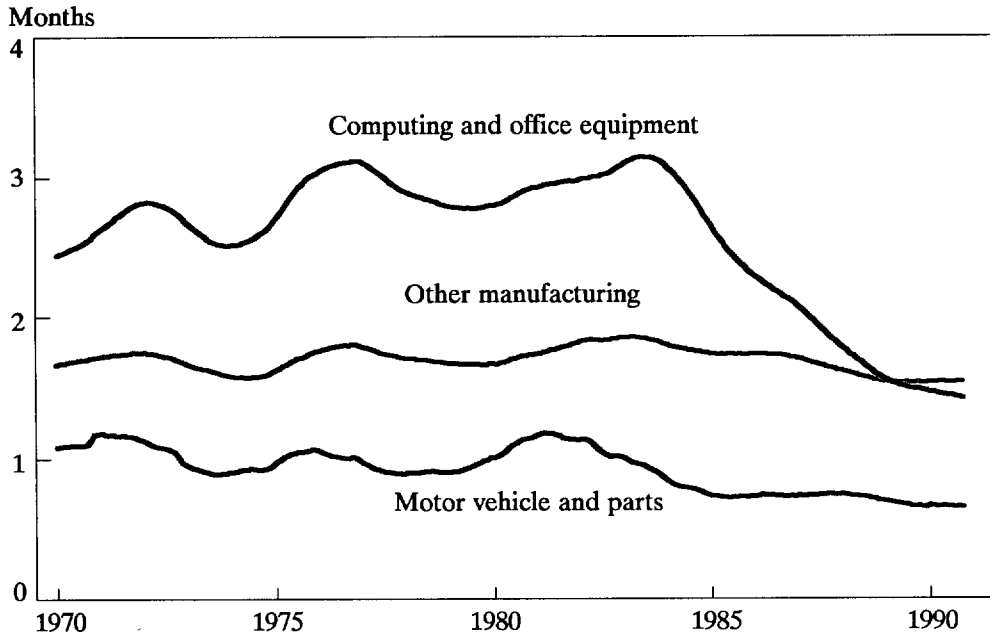
### **Implications of JIT for the Economy**

Inventory cycles have historically played a destabilizing role in the economy. By helping



Chart 4

## Inventory-Sales Ratio -- Selected Manufacturing Industries



Source: Board of Governors of the Federal Reserve System.

firms reduce and control their inventories, JIT can be expected to reduce inventory cycles. Reduced inventory cycles in turn will dampen, but not eliminate, recessions.

### JIT can dampen recessions

In the past, large swings in inventories have amplified the effect of a change in business sales on output. That is, the decline in production (the recession) following a decline in sales has been both deeper and longer because of large inventory cycles. The large inventory cycles of the past resulted because firms' desired ratio of inventory to sales was high and because firms were slow to adjust production to maintain the desired ratio (Dornbusch and Fischer).

An example helps illustrate how these factors influence the characteristics of a recession.

Suppose sales decline for an indefinite period because government spending declines. The depth of the ensuing recession depends on how deeply firms cut production, which in turn depends on how much firms must reduce inventories. If firms' desired ratio of inventory to sales is high, the decline in sales causes a large decline in firms' desired inventory stock. And if firms do not cut production promptly after sales decline, inventories will increase instead of decrease. Under these conditions, firms' warehouses soon swell with undesired inventories. As a result, production must eventually decline considerably more than the original decline in sales in order to eliminate the unwanted inventories. In this way, the inventory cycle deepens the recession.

The inventory cycle may also prolong the recession. Because of the buildup of unwanted

inventories, firms may need to postpone increasing production even after sales increase. If so, the inventory cycle delays the recovery, or prolongs the recession.<sup>16</sup>

JIT diminishes inventory cycles for two reasons. First, firms' desired inventory-sales ratio is lower under JIT. Thus, a given decline in sales causes a smaller decline in desired inventories. For example, if firms' desired inventory-sales ratio declines from three months to two months under JIT, then a decline in sales of \$1 billion would reduce desired inventories by only \$2 billion instead of \$3 billion. Second, because firms reduce production sooner after sales fall under JIT, fewer unwanted inventories accumulate. Therefore, a smaller cut in inventories is needed when firms finally cut production.

By diminishing inventory cycles, JIT dampens the effect of a decline in business sales on output, making the recession shallower and shorter. Production falls by less because firms wish to reduce inventories by less after sales decline. And firms need less time to eliminate unwanted inventories because they are smaller to start with. Thus, firms can increase production sooner after sales increase.

While the above discussion is merely hypothetical, there is real-world evidence suggesting JIT stabilizes output by stabilizing inventory investment. One researcher compared the variability of production and sales from 1957 to 1986 in seven industrial countries (West).<sup>17</sup> In the United States, production was about 30 percent more variable than sales. In general, he discovered production was more variable than sales in all but one country: Japan. In Japan—where JIT was most prevalent—production and sales were about equally variable.<sup>18</sup>

## **The power of JIT is limited**

While JIT may dampen recession by stabilizing inventory investment, JIT cannot eliminate recessions. Indeed, there is no evidence that fluctuations in inventory investment actually cause recessions (Blinder and Maccini). Most analysts think recessions result from other types of shocks to the economy, such as higher oil prices or reduced government spending. The inventory cycle following a shock only influences the depth and length of the recession caused by the shock. JIT may dampen a recession, but the recession may occur nevertheless.

Nor can JIT be relied on to prevent deep and long recessions. These characteristics of a recession depend on both the shock and the condition of the economy when the shock occurs. Hence, a severe recession could still result from a persistent shock to a weak economy. For example, a sustained increase in the price of oil in an economy laboring under a heavy debt burden could cause a severe recession. The most one can say is that the recession might have been even worse without JIT.

Saying so, however, invites a question: Will just-in-time techniques make the current recession milder? The answer depends on how prevalent the techniques are today. Unfortunately, evidence on that point is only suggestive. One small survey suggests reason for hope. In 1988, only 25 percent of the firms surveyed had just-in-time programs in place. Fully half of the firms, however, expected to be practicing JIT by 1990.<sup>19</sup> If the results of this survey are representative, then the new inventory techniques may be . . . just in time.

## Endnotes

<sup>1</sup> Only inventory investment is counted because GNP is intended to measure goods produced in the current quarter. The total stock of inventories is not counted because it includes goods produced in previous quarters.

<sup>2</sup> Because inventories are increasing due to a decline in sales, the rise in the inventory-sales ratio late in the expansion reflects unintended accumulation of inventories. In contrast, the rise in the inventory-sales ratio that sometimes occurs in the middle of expansions reflects intended accumulation of inventories in anticipation of faster sales (Dornbusch and Fischer).

<sup>3</sup> The dates of the peaks and troughs indicated in Chart 1 are determined by the National Bureau of Economic Research. These dates do not necessarily correspond to peaks and troughs in GNP.

<sup>4</sup> One might date the decline in the ratio back to 1975. However, this is an illusion created by the rise and fall in the inventory-sales ratio during the 1973-75 recession. Ignoring that spike, the ratio was trendless from 1976 to 1982 and began declining thereafter. The ratio declined from 3.5395 months in 1982:Q2 to 3.0379 months in 1988:Q2 and then leveled off at 3.0498 months in 1990:Q2. Before this decline, the nadir of the inventory-sales ratio was 3.0535 months in 1965:2.

<sup>5</sup> The case of Harley Davidson is illustrative. As Raia (1987) tells the story, the maker of rough-running motorcycles (known affectionately as hogs) was driven to the verge of bankruptcy in the early 1980s by its JIT practicing Japanese competitors. In response, Harley Davidson did as many companies do: it lobbied for and received temporary trade barriers to protect it from foreign competition. During the respite, however, Harley Davidson adopted JIT and then asked Congress to lift the trade barriers. So rare is the latter act that President Reagan himself flew to the company's headquarters in York, Pennsylvania, to commemorate the occasion.

<sup>6</sup> Unless other sources are indicated, the following comparison between traditional inventory practices and JIT practices is from Hay, and Mecimore and Weeks.

<sup>7</sup> While some firms use computers in practicing JIT, computers are not essential. All that is needed is some signal that inventories are low and more should be produced or purchased. Many firms just use empty containers as a signal while others use red and green lights. On the other hand, computer production techniques do not necessarily reduce inventories unless combined with the JIT principle of ordering just in time to produce and producing just in time to purchase (Sauers; Kim and Lee).

For a description of computer production techniques, see Johnson.

<sup>8</sup> Toyota developed JIT in the 1950s and 1960s, followed by other Japanese firms in the 1970s. Analysts have discussed many reasons JIT was practiced by Japanese manufacturers before their U.S. counterparts. One important reason is the closer physical and business relationship between Japanese firms and their suppliers. For example, they are physically closer (because Japan is smaller) and this fact expedites delivery. Another reason is that strikes are rarer in Japan, which reduces the need for inventories. In a pinch, however, U.S. manufacturers realized the superior highway system here might offset the greater distances suppliers must travel. And to the extent better roads were not enough, U.S. firms began relocating suppliers nearby. Finally, the decline in union membership in the United States facilitated JIT by, among other things, reducing the threat of strikes.

<sup>9</sup> In a survey conducted by the accounting firm Price Waterhouse, 37 percent of 210 manufacturing executives indicated their firms had applied JIT to some extent (Moscal).

<sup>10</sup> These data are from a monthly survey of 250 purchasing managers of manufacturing companies in all industries, across the country. They represent the percentage of managers indicating they were ordering "hand to mouth," which is interpreted here as "just in time." The data were smoothed slightly to highlight the trend.

<sup>11</sup> The data are actually a weighted average: lead-time multiplied by the percentage of firms reporting that lead time. The lead times used in the National Association of Purchasing Managers survey are 30 days, 60 days, 90 days, and 180 days or more. These data were also smoothed slightly to highlight the trend.

<sup>12</sup> The reduction in lead times would suggest that suppliers' delivery performance was improving. Surprisingly, the percentage of buyers reporting late deliveries was trendless in the 1980s (National Association of Purchasing Managers). Given the reduced lead times, however, the absence of deterioration can be taken as evidence of improvement. Further evidence of improvement is the fact late deliveries did not increase in the last stages of the expansion as in the past.

<sup>13</sup> For example, Raia (1987) noted a newspaper item suggesting the Detroit warehouse business was being revived by auto industry suppliers needing space to store larger inventories. The alleged revival came after the warehouse district was first decimated when automakers

themselves reduced inventories after adopting JIT. While this report was speculative, the possibility that JIT may just redistribute inventories is real (Hall).

<sup>14</sup> The survey found more than two-thirds (67 of 97) of small supplier companies were delivering to their customers on a just-in-time basis; fewer than half of the suppliers, however, had adopted JIT internally (Sheridan).

<sup>15</sup> The monthly disaggregated data in Chart 2 are available only back to 1967. The inventory-sales ratios differ from quarterly inventory-sales ratios shown in Chart 1 because two series use different sales figures. The Commerce Department survey from which these data obtain includes a sample of smaller companies (U.S. Department of Commerce).

<sup>16</sup> In fact, JIT can also smooth output by dampening the effect of an increase in sales. When sales increase, firms with high desired inventory-sales ratios will increase their inventory investment more than will firms with low desired inventory-sales ratios. Thus, the change in production resulting from the increase in sales will be smaller under JIT. This point is ignored here, in part, because changes in inventory investment figure less in expansions than in

recessions (Maccini).

<sup>17</sup> The countries were Canada, France, Italy, Japan, United Kingdom, United States, and West Germany.

<sup>18</sup> Closer to home, the 1980 recession in the United States illustrates how reduced inventory cycles dampen recessions. Inventory investment fell only \$1.8 billion during the recession itself, contributing only about 2 percent of the decline in GNP during the recession. This fact may help explain why the 1980 recession was much briefer and shallower than average (Blinder). But, of course, the small inventory cycle in 1980 was not likely due to JIT because U.S. firms were just beginning to adopt JIT at that time. Indeed, Blinder rejects the possibility that improved inventory control techniques explained the behavior of inventories in that episode and concludes instead that businesses were forewarned of recession in time to cut inventory investment early.

<sup>19</sup> The accounting firm Touche Ross conducted this survey of 200 manufacturers and distributors (*Traffic Management*).

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