Published Weekly by
AMERICAN INSTITUTE
for ECONOMIC RESEARCH
Great Barrington, Massachusetts 01230

RESEARCH
REPORTS

Vol. XLIV No. 3 January 17, 1977

Capacity Utilization

During periods ~~in which~~ ~~general~~ business activity ~~has expanded~~ ~~for some time~~, economists ~~have begun~~ to question how long the expansion might last. This exercise began in earnest during the past few months, perhaps because of the ~~apparent~~ recent "pause" in the current business-cycle expansion. One factor that ~~in the short run~~ limits the amount by which output can increase ~~and the economy expand~~ is the amount of unused, and therefore available ~~to be tapped~~, manufacturing capacity. If manufacturers were ~~to~~ operating at full capacity, output could not ~~increase further until~~ capacity did likewise.

In attempting to estimate the amount of unused manufacturing capability, economists have developed capacity utilization series. Such series are measures of the proportion of capacity in use at a given time, and they are estimated by dividing output during a particular period by estimated total capacity during that period. In this article we shall describe some of the problems associated with, and limitations of, capacity utilization series.

Definitions

We begin by designating what is meant by "output" and "capacity." "Output" is widely understood; it is the volume produced by a particular unit during a given period of time. The unit might be a person, a machine, a factory, a company, an industry, or a combination of industries. The time period might be a day, a week, a month, a year, or some other duration. Most production series are on a weekly or monthly basis.

Accurately measuring output becomes progressively more difficult the larger the producing unit. The output of a machine, a factory, or even a small company during a given period of time can be measured accurately with comparatively little trouble. The output of large corporations, industries, or groups of industries can be measured only with substantial effort. Therefore, ~~such~~ production figures for large segments of the economy usually are estimates derived from sample surveys. Size is not the only factor contributing to difficulties in measuring output. Even a single machine might have only a part in the production of an item or of several different items. If not by prices, how does one arrive at a single measure of several different items? To illustrate, what is the ~~single~~ total of, say, 3 irons, 2 televisions, and 8 refrigerators? If prices are used, one encounters the problem of ~~changing~~ purchasing power of the currency and the fact that many component items have no separate price.

"Capacity" is much more difficult to define, and even more difficult to measure. Capacity refers to the total volume of output that could be produced with the existing stock of machinery and equipment during a given period of time. The key phrase is "could be produced." There are two ways that this has been designated, and each provides a different estimate of capacity. The engineering designation is that total capacity is equal to the volume that can be produced if all machinery and equipment were operating 24 hours a day, 7 days a week, except for required maintenance. Inasmuch as most manufacturers hardly ever operate at this rate, this designation of capacity seldom is used.

The more common designation of capacity is the amount that could be produced under "normal operating conditions." This designation is vague; it raises the question, What is normal? According to James F. Ragan, "it seems to be based on the notion of average or typical conditions." He designates capacity as "the maximum producible output when plants and equipment are operated the average amount of time producing the normal mix of output."* This designation also is vague; inasmuch as "average" and "normal" are not fixed conditions. Therefore the volumes associated with those conditions of operation are not standard amounts. One analyst might estimate "average" time and "normal" mix to be different from those estimates by someone else.

In addition to the problem of designating capacity is the problem of measuring it. Unless a unit is operating at full capacity, such capacity cannot be measured directly but must be estimated. Many factors might influence one's estimate of capacity. A machine may be uneconomical to use at a given price for the product, but at a higher price it could be used profitably. Would one consider such idle machines to reflect unused capacity? Would the regular use of a second or third work shift be "normal"? If such shifts were added in order to meet an increased demand, would production be above "normal," or above capacity? Quite clearly, accurately estimating manufacturing capacity is a major statistical challenge.

Capacity Utilization Series

Widely followed capacity-utilization-rate series are provided by four organizations, the Wharton School, the Bureau of Economic Analysis (BEA), McGraw-Hill, and the Federal Reserve Board (FRB). Each organization has a different method for estimating capacity; therefore, each utilization-rate series ~~is different~~.

The Wharton School uses the "trend-through-peaks" method for estimating capacity. By this method, the utilization rate for an industry is set at 100 percent at all major production peaks. This provides ~~a useful~~ hindsight chart in that the estimates for capacity are known to have been producible. However, there are three major flaws to this method: (1) Each peak in production is assumed to have occurred at full capacity, which may or may not

*"Measuring Capacity Utilization in Manufacturing," *Quarterly Review*, Federal Reserve Bank of New York, Winter 1976.

have been the situation. (2) Capacity increases between peaks is assumed to have been added in equal installments, but such increases probably have not occurred in equal amounts. (3) Because the next production peak is unknown, current capacity is estimated by an extrapolation from the most recent trend. Once a new peak is known to have occurred, all the historical data are changed. Such faults in the Wharton School index ~~highly~~ limit its usefulness for analyzing current capacity utilization.

The capacity-utilization-rate series published by the BEA and by McGraw-Hill are similar. Both organizations estimate capacity from results of company surveys. ~~They~~ ask company representatives the actual operating rates and the preferred operating rates for the preceding period. The major difference in the two methods is the size of the survey. McGraw-Hill surveys primarily the larger companies, whereas the BEA survey is more comprehensive. The major objection to these series is the subjectiveness of the surveys. Each company representative may have a different method for calculating the rate at which his company is operating. Therefore, two similar companies operating at the same rate might report different operating rates, depending on the person answering the survey.

The Federal Reserve Board constructs its capacity estimates from three measures: (1) an estimate of the gross stock of capital goods, (2) the McGraw-Hill index of capacity, and (3) the FRB index of industrial production divided by another McGraw-Hill rate-of-operations series. These three measures are combined statistically and adjusted to obtain what Federal Reserve Board economists believe is a more accurate estimate of capacity.

However, the FRB capacity utilization rates also have their flaws. George Perry, in *Brookings Papers on Economic Activity* (1973), asserted that the major objection to the FRB indexes is that they rely on "historical statistical relationships that are simple at best and that may change substantially." Therefore, these relationships must be reestimated frequently in order to reduce the errors that develop as the economy changes.

There are other problems with the FRB indexes. Because the Federal Reserve Board uses McGraw-Hill indexes based on company surveys, inaccuracies in the McGraw-Hill series are reflected in the FRB indexes. Other inaccuracies involve the estimates of the stock of capital goods. Such estimates are in constant dollars, which reduces (but does not eliminate) errors associated with price changes. Moreover, an increasing portion of capital spending during recent years has been made to obtain mandated environmental and safety equipment. Such equipment does not increase the capacity to produce, but the Federal Reserve Board does not adjust the capital spending data for such expenditures. Therefore, the FRB estimate of productive capacity based on capital stock and spending during recent years probably is larger than it ~~should~~ be.

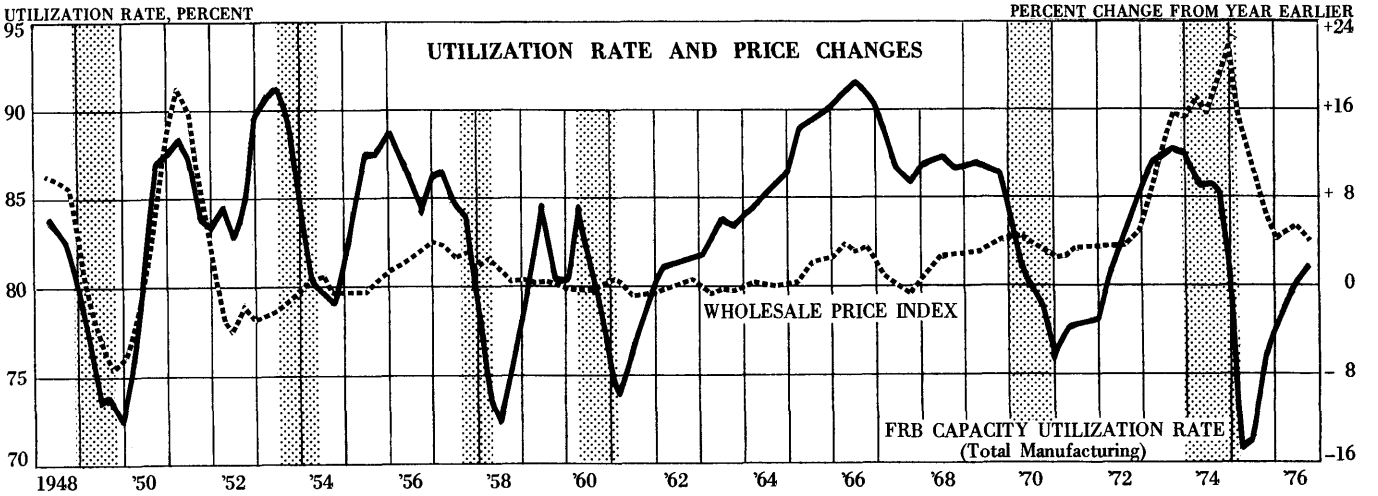
The four organizations listed above publish capacity utilization rates for total manufacturing. Furthermore, the Federal Reserve Board publishes separate capacity utilization rates for the primary-processing and advanced-processing components and for industrial materials. McGraw-Hill publishes capacity utilization rates for individual industries.

Because of the aforementioned problems, capacity utilization rates have little use. Clearly, estimates of capacity utilization rates for *total manufacturing* are "rough" at best. Furthermore, even if such rates were reasonably accurate, total manufacturing encompasses so many industries that such rates reveal nothing about developing production "bottlenecks" within the economy. Some industries might be operating at, or near, capacity, while others would be operating well below capacity, but one could not ascertain this from total capacity-utilization-rate data.

Capacity and Prices

With reference to current economic developments, many economists recently have asserted that large increases in prices should not be expected until capacity utilization rises substantially above recent levels. The accompanying chart shows the Federal Reserve Board's capacity utilization rate for total manufacturing and the percent change from a year earlier of the Wholesale Price Index (WPI). Note that although there *seems to be* some correlation between trends in these two series, specific levels of capacity utilization have not been associated with constant specific rates of price increases. Furthermore, not even the trends of these series are closely correlated. For example, the capacity utilization rate decreased from a peak of 91.6 percent during the second quarter of 1966 to a trough of 76.3 percent during the fourth quarter of 1970. However, the change in wholesale prices from a year earlier was only slightly smaller at the end of the period than at the beginning of it.

The absence of a close correlation between these series may be attributable to a number of factors other than the rate of capacity utilization. In particular, increases in



general price levels in the long run are primarily the result of inflating (the creation of excess purchasing media). In the short run, price changes may be affected by changes in wage rates, inventory levels, costs of raw materials, costs of substitute products, actions of cartels, the weather, and other things in addition to the capacity to produce.

The lack of correlation between capacity utilization and the rate of price changes also might be attributable to inaccuracies in the capacity utilization series and/or to differences among the items included in the two series. With reference to the latter point, the WPI probably does not measure the price levels of only the items produced by the industries reflected in the capacity utilization series. Whatever the reason, the absence of close correlation between these series strongly suggests that rates of price changes cannot be forecast from rates of capacity utilization.

CARTER'S CABINET
NEW FACES, OLD IDEAS

The November issue of *Playboy* contains this remark by Hamilton Jordan, personnel coordinator for Jimmy Carter: "If, after the inauguration, you find a Cy Vance as Secretary of State and Zbigniew Brzezinski as head of national security, then I would say we failed. And I'd quit. But that's not going to happen. You're going to see new faces, new ideas. The government is going to be run by people you have never heard of." Since then, President-elect Carter has selected his cabinet and some of his advisers. Perhaps readers have noted that Mr. Carter has designated Cyrus Vance to be Secretary of State and Zbigniew Brzezinski to be the head of the National Security Council. (Incidentally, Mr. Jordan has not quit.) As has been pointed out in many newspaper editorials, only a few "new faces" are in evidence. More importantly, however, there probably will be even fewer "new ideas." New programs, yes, but they will reflect the old ideas of the "left-liberal establishment."

Of the 18 people chosen for positions under President-elect Carter, 13 have had experience in the Federal Government. Only Cecil Andrus, Juanita M. Kreps, F. Ray Marshall, Griffen Bell, and Bert Lance have not. (The accompanying table shows the positions to which these persons have been appointed.) A recent *Wall Street Journal* editorial pointed out, "An incoming President needs all the help he can get." The editors wrote further, "Mr. Carter was foolish in promising [new faces], and sensible in not following through." We also do not question the need for experienced advisers. However, in view of the disastrous results of past policies, we do wonder about the type of experience the new advisers have.

The accompanying table reveals that half of the 18 listed advisers to President Ford and eight of those appointed by Mr. Carter are members of the CFR (Council on Foreign Relations). According to its 1975-76 Annual Report, this nonprofit, nonpartisan organization was formed in 1921 to promote "a better and wider understanding of international affairs through the free interchange of ideas." As of August 1976 there were 1,725 members of the CFR under the chairmanship of David Rockefeller. The Annual Report also states: "Election to Council membership is based on an estimate of the candidates' special intellectual interest, experience, expertise, and involvement in international affairs, *their active interest in and capacity for contribution to the work of the Council,* and their standing in their own professional communities." [Emphasis added.] Therefore, we assume that CFR members generally accept most of the views of the "Rockefeller establishment." Such ideas have been a major basis for Government policy at least since President Kennedy's administration.

Readers should note that the individuals holding four of the more important positions (Vice President, and Secretaries of State, Treasury and Defense) under both President Ford and Mr. Carter are CFR members. Moreover, the positions most closely related to international affairs are dominated by such members. In addition to the four positions listed, the Directors of the National Security Council and the Central Intelligence Agency under both President Ford and Mr. Carter are CFR members. Therefore, the thrust of foreign policy under Mr. Carter probably will be quite similar to that under President Ford.

Another organization that may influence President-elect Carter's foreign policies is the Trilateral Commission,

CABINET POSITIONS

Position	*President Ford*	*President Carter*
Vice President	Nelson Rockefeller*	Walter Mondale*
Secretary of		
State	Henry A. Kissinger*	Cyrus R. Vance*†
Treasury	William E. Simon*	W. Michael Blumenthal*†
Defense	Donald H. Rumsfeld*	Harold Brown*
Interior	Thomas S. Kleppe	Cecil Andrus
Agriculture	John A. Knebel	Bob Bergland
Commerce	Elliot L. Richardson*†	Juanita M. Kreps
Labor	W. J. Usery, Jr.	F. Ray Marshall
Health, Education and Welfare	F. David Mathews	Joseph A. Califano, Jr.*
Housing and Urban Development	Carla A. Hills	Patricia Roberts Harris*
Transportation	William T. Coleman, Jr.*	Brock Adams
Attorney General	Edward H. Levi	Griffin B. Bell
Ambassador to the United Nations	William W. Scranton	Andrew Young
Director of		
Office of Management & Budget	James T. Lynn*	Bert Lance
National Security Council	Lt. Gen. Brent Scowcroft*	Zbigniew Brzezinski*†
Council of Economic Advisers	Alan Greenspan	Charles L. Shultze
Central Intelligence Agency	George Bush*	Theodore C. Sorensen*
Energy Adviser	Frank G. Zarb	James R. Schlesinger

*Members of the Council on Foreign Relations (CFR). †Director or former director of CFR.

which was formed in 1973 for the purpose of fostering closer relations among Japan, Western Europe, and the United States. The membership of this organization reveals that it also is tied closely to the "Eastern establishment." Among its members are Messrs. Carter, Mondale, Vance, Brown, and Brzezinski. Mr. Carter has asserted, "Membership on this commission has provided me with a splendid learning opportunity, and many of the other members have helped me in my study of foreign affairs." We would expect that Mr. Carter will rely on such help in making his foreign affairs decisions.

An examination of the ideas of three top appointees may shed some light on things to come. According to a recent article in *U.S. News & World Report*, Cyrus Vance, as Secretary of State, would continue to seek detente with the Soviet Union, would offer to limit U.S. cruise missiles in order to reach a SALT Agreement (Strategic Arms Limitation Treaty), would pressure "white-minority governments" in southern Africa to adopt black-majority rule, would negotiate to surrender sovereignty of the Panama Canal to Panama while retaining U.S. control of the Canal, would be more generous to developing countries, and would attempt to establish relations with Communist Vietnam. In other words, one can expect more "liberal" policies.

As Secretary of Treasury, W. Michael Blumenthal reportedly will favor a larger role for the Federal Government in stimulating economic activity, the stock-piling of some raw materials that supposedly would help stabilize the incomes of developing countries, and the further reduction of the use of gold as a monetary reserve. In spite of favoring increased Government spending, Mr. Blumenthal has reported that the Federal budget can be balanced within 4 years. He supports increased economic "stimulus" in order to create more jobs and to reduce the need for public-service jobs.

A former associate of Dr. Harold Brown stated that Dr. Brown "believes that technology can solve anything, with little regard as to whether the solution can be used by the soldier in the field." If this assessment is accurate, we would expect Dr. Brown to favor advanced weaponry, such as the B-1 bomber and the cruise missile. On the other hand, he stated in 1969 that "a properly designed agreement to limit strategic forces can better insure the security of the United States and the Soviet Union." Therefore, he may be willing to "sacrifice" the cruise missile to obtain a SALT II agreement.

If the views of these three top cabinet appointees reflect substantially those of the remainder of Mr. Carter's advisers, one should expect more Government spending and larger budget deficits, increased loans and other aid to developing countries, more "giving in" to the demands of Soviet leaders, more attempts to redistribute income and direct economic activity, and a further weakening of the strength and independence of the United States. Nearly nonexistent is the chance that Mr. Carter's advisers will support policies that might restore a sound monetary system. Progress toward the removal of economic distortions during the past few years most probably will end, and further economic distortions probably will develop.

"Liberal" policies have been tried in the past and have failed. America has paid dearly for experimenting with such policies. We hope, but do not expect, that Mr. Carter's experienced advisers take note of this bitter experience and steer the Nation clear of another repetition.

STATISTICAL INDICATORS

No new data were reported for any of the primary leading or coincident indicators. The percentages of these groups appraised as expanding cyclically remain 58 and 100, respectively.

Among the primary lagging indicators, the ratio of consumer installment debt to personal income decreased during November. However, the trend of this series has been upward since October 1975, and this series remains appraised as expanding cyclically. The percentage of primary laggers so appraised remains 84.

Recent adverse changes in the leading indicators have raised doubt that the expansion of general business activity will continue. However, there is not sufficient evidence at this time to warrant the conclusion that a business-cycle contraction will begin soon.

SUPPLY

INDUSTRIAL PRODUCTION

Production of steel, automobiles, and electric power (1) in the 1- and 4-week periods ended on the indicated dates in the current year and (2) in the corresponding periods of earlier years was as follows:

Steel	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*
Ingots (million tons)						
1 week: January 8	2.15	2.69	2.85	2.59	2.15	2.12
4 weeks: January 8	8.13	10.70	11.42	10.04	8.12	8.31
Automobiles						
Vehicles (thousands)						
1 week: January 8	180	170	90	116	154	181p
4 weeks: January 8	501	588	407	281	392	560p
Electric Power						
Kilowatt-hours (billions)						
1 week: January 8	32.4	34.3	34.7	36.4	36.0	40.4
4 weeks: January 8	125.0	139.7	139.6	140.9	150.9	163.7

Percent change from 4 weeks a year earlier: +6.2

p Preliminary.

DEMAND

RETAIL SALES

Estimates of retail sales during the most recent week and 4 weeks compare with such sales during the corresponding periods a year earlier as follows:

Period	*Percent change*
Week ended January 8	+ 8
Four weeks ended January 8	+ 9

PRICES

COMMODITIES PRICES

	1976		*1977*
Index	*Jan. 5*	*Dec. 27*	*Jan. 3*
Spot-market, 22 commodities*	491	523	526
Commodity-futures	613	770	770
Steel-scrap	$70.83	$70.17	$72.17

*For the preceding Tuesday.

Note: The indexes are, respectively, those of the U.S. Bureau of Labor Statistics, Dow-Jones, and *Iron Age*. The spot-market and future indexes are converted so that their August 1939 daily averages equal 100. The steel-scrap index is a composite price for No. 1 heavy melting scrap.

PRICE OF GOLD

	1976	*1977*	
	Jan. 15	*Jan. 6*	*Jan. 13*
Final Fixing in London	$132.50	$132.60	$132.20

Research Reports is published weekly at Great Barrington, Massachusetts 01230 by American Institute for Economic Research, a nonprofit, scientific, educational, and charitable organization. Second class postage paid at Great Barrington, Massachusetts 01230. Sustaining membership: $9 per quarter or $35 per year.