Measuring Capacity Utilization in Manufacturing

by James F. Ragan

Capacity utilization rates play an important role in evaluating economic activity. They have been used, along with other factors, to explain the behavior of investment, inflation, productivity, profits, and output. In addition, information on capacity utilization can aid businessmen and economists in assessing current economic conditions and forecasting future activity. Unfortunately, alternative measures of capacity utilization do not always tell the same story. There are frequent discrepancies between the levels of the various series as well as discrepancies in their movements. The purpose of this article is twofold: (1) to examine how well alternative measures of capacity utilization seem to reflect the current availability of unused capital stock and (2) to assess the current capacity situation in manufacturing.

There are four principal measures of capacity utilization in manufacturing—those of the Wharton School, the Board of Governors of the Federal Reserve System (FRB), the Bureau of Economic Analysis (BEA), and McGraw-Hill.[1] After a general discussion of the concept of capacity, each of these measures is critically evaluated. All have flaws but, provided one is aware of their particular biases and shortcomings, valuable information can still be gleaned from them. While there is no one "best" measure for all purposes, overall the FRB utilization rate probably reflects current utilization of capital stock most accurately, provided that the statistical relationships on which it is based are kept up to date. Finally, based on present utilization rates, the prospects for capacity problems in manufacturing over the next year or so appear remote. This is true for key manufacturing subsectors as well as for aggregate manufacturing.

Capacity—an elusive concept

Capacity refers to the quantity of output that can be produced in a fixed period of time, given the existing stock of capital. There are, however, a number of interpretations for the expression "can be produced". The engineering interpretation relates to the quantity of output that could be turned out if, apart from required maintenance, plants and equipment were operated around the clock seven days a week. Since most plants and equipment are operated only a fraction of that time, a more common interpretation of capacity refers to the maximum quantity of output producible under "normal conditions". While the concept of normality is admittedly vague, it seems to be based on the notion of average or typical conditions. According to this interpretation, capacity describes the maximum producible output when plants and equipment are operated the average amount of time producing the normal mix of output.[2] One difficulty with this approach is that the view of what is normal changes over time.

[1] For purposes of comparison, all four measures reviewed here refer to manufacturing utilization The Wharton School and McGraw-Hill also publish utilization rates for a broader industrial classification, which includes mining and utilities In each instance, the criticisms raised at the manufacturing level carry over to the industrial level Utilization rates are available at more disaggregated levels as well The FRB publishes utilization rates for both primary- and advanced-processing manufacturing and also releases a separate index for the materials sector Finally, Wharton, McGraw-Hill, and BEA utilization rates are available for individual manufacturing industries

[2] Specifying the output mix is important for any definition of capacity The rate and duration of machine breakdowns frequently depend on what is being produced, and the longer a machine is down the less that can be produced

As workers have gained shorter workweeks and greater vacation time, the "normal operating period" has apparently contracted. Furthermore, as discussed later, the concept of normal production seems to change over the business cycle.

Capacity has also been defined from a cost perspective.[3] Some view capacity as the level of output where average per unit cost is at a minimum, while others see it as the level beyond which the cost of producing additional ouput rises sharply. A practical problem with the cost approach is that few firms maintain suitable cost data. Furthermore, studies of the relationship between costs and output suggest that for some products there may be no unique level of output for which average cost is smallest. Instead, per unit costs may be about constant over wide ranges of production. And for some other products, unit costs do not show signs of rising even at very high levels of output.[4]

The McGraw-Hill and BEA measures of capacity are tied to "normal" conditions. Although capacity is not actually defined by McGraw-Hill and the BEA, most companies surveyed by them indicate that this is the concept they had in mind.[5] Since the FRB utilization rate is constructed from that of McGraw-Hill, it too is linked to "normal" conditions. The Wharton utilization rate, in contrast, is based on an entirely different concept: observed production peaks. Capacity is assumed to equal output at production peaks, and between peaks capacity is estimated by linear interpolation.

A second distinguishing feature of Wharton capacity is that it is a function of labor availability. Since production depends on labor as well as capital, production peaks are influenced by the supply of labor[6] The other three indexes of capacity are entirely capital oriented, i.e., they address the question of how much output can be produced with a given stock of capital, assuming labor, raw materials, and parts are all readily available. Thus, the Wharton measure of capacity is related to labor availability; the others are not.

Because the concepts of capacity differ, as do the construction techniques, it is not meaningful to compare values of alternative utilization measures. The Wharton utilization rate, for example, has always exceeded the McGraw-Hill rate, frequently by 8 percentage points or more (see the chart). Clearly then, a Wharton value of, say, 90 percent indicates lower capacity utilization than does a McGraw-Hill reading of 90 percent. Furthermore, a given value of utilization means very little *per se*. Only by comparing this value with past values of the same measure, especially those of previous troughs and peaks, is it possible to assess the degree of capacity utilization.

Finally, since shortages and bottlenecks in key industries may effectively limit production, in spite of substantial unused capacity elsewhere, it is clear that conditions in the economy cannot be fully described without considering utilization rates in important subsectors. For this reason, industry utilization rates will, in the final section, also be examined. International conditions are relevant as well. For one thing, production in the United States is less likely to be constrained the more readily firms can import goods, materials, and energy from abroad. Aggregate utilization rates cannot, therefore, completely characterize an economy's capacity situation; they are most valuable when supplemented with additional information. Bearing in mind these limitations, the principal measures of utilization in manufacturing are reviewed in the following section.

An analysis of four measures of manufacturing utilization[7]

The Wharton index of capacity is based on the "trend-through-peaks" method.[8] Output, as measured by the Federal Reserve Board's series on industrial production, is plotted for each of the major manufacturing industries, e g., primary metals, electrical machinery, and chemicals. Successive cyclical peaks are then joined together with straight line segments. The resulting series of connected linear segments is the industry's capacity measure. To obtain the industry's utilization rate, output is simply divided by capacity. The utilization rate for all manufacturing is derived by summing the industry utilization rates, each weighted by the fraction of total national income contributed by the industry at full employment.

Because of the computational method employed, an industry's utilization rate equals 100 percent at all major production peaks.[9] This is both a strength and a weakness of the Wharton technique. On the positive side, capacity values are attainable. At each of the

3 See de Leeuw [2] and Edmonson [4]

4 See Walters [17]

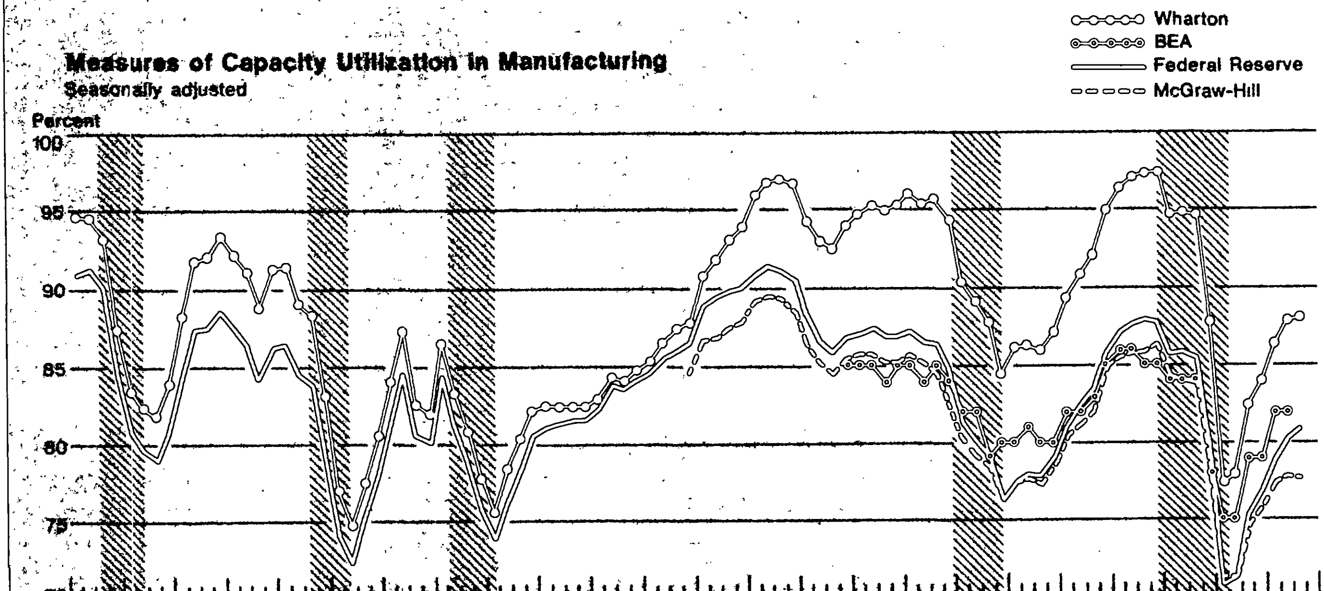
5 See Matulis [13] and Hertzberg, Jacobs, and Trevathan [7]

6 Furthermore, production functions containing labor as an input are sometimes used to adjust the Wharton index

7 There exist several other measures of capacity utilization, but none are more than a few years old With so few observations, it is difficult to say much about these series

8 See Klein and Summers [9], Klein and Preston [8], and Adams and Summers [1]

9 Not all production peaks are associated with utilization rates of 100 percent If a peak is judged to be "weak", i e , associated with unused capacity, the capacity line will lie above the peak, and capacity utilization will be less than 100 percent



Note: Shaded areas represent periods of recession as defined by the National Bureau of Economic Research except for the latest recession, which is tentatively judged to have ended in March 1975.

Sources: Wharton Econometric Forecasting Associates; Board of Governors of the Federal Reserve System; McGraw-Hill Publications Company, Department of Economics; United States Department of Commerce, Bureau of Economic Analysis (BEA).

major peaks, the Wharton value of potential output is known to be producible; indeed, this is the level of output actually observed. Furthermore, output never exceeds Wharton capacity but may, and sometimes does, exceed alternative measures of capacity.[10] Thus, a capacity value of 100 percent has special meaning for the Wharton index, and only for the Wharton index.

Assigning a capacity value of 100 percent to the major peaks does, however, have a serious drawback: there is no way to determine intensity of production at different peaks. Instead, capacity utilization is assumed to be identical at every major peak, an assumption that is highly questionable. Another criticism of the Wharton technique is that it is not completely objective. Whether or not a production peak is one of full capacity is sometimes difficult to determine. In such situations, outside information, e.g., engineering data and industry surveys, is consulted. Still, the choice may not be obvious.

The Wharton approach has also been faulted for its assumption that capacity growth between peaks can be represented by a straight line. Presumably, capacity growth is related to productive investment, which need not occur in equal increments each quarter. Better estimates of capacity could probably be derived by introducing investment data.

The final and most serious shortcoming of the Wharton capacity measure is that, because the next production peak is not known, the current rate of capacity growth can only be estimated. This is generally accomplished by extrapolating the capacity index at its current slope. If the projected and actual growth rates differ, however, the error will accumulate over time. If projected capacity growth exceeds actual growth, the utilization rate will become increasingly downward biased; if actual exceeds projected growth, an upward bias will develop. As the next major peak is approached, the error will be corrected, but the revision required may be substantial. For example, the aggregate industrial utilization rate for the first quarter of 1962 was estimated to be 94 percent in 1962-I, 92 percent in 1963-I, 85 percent in 1965-I, and 82.8 percent in 1967-I.[11] Thus, in five years the estimate of

[10] For example, in 1973 production in the automotive industry was running at 111 5 percent of capacity, according to the McGraw-Hill index

[11] See Summers [16, page 33] The numbers cited are for the industrial sector, which includes mining and utilities as well as manufacturing Separate numbers for the manufacturing sector were not reported

capacity utilization was lowered by 11.2 percentage points. It is difficult to place much confidence in current Wharton estimates of capacity utilization, knowing they could be revised drastically in the future.

The FRB's index of capacity utilization overcomes most of the Wharton weaknesses but contains a flaw of its own. The actual method of constructing this index is quite complicated. Without elaborating on the Board's technique,[12] suffice it to say that the FRB index is derived from three series: (a) the December McGraw-Hill operating rate series (to be discussed later), (b) a separate and independent McGraw-Hill capacity series, computed from surveys of annual changes in capacity, and (c) a capital stock series based on census data deflated for price changes.

The main criticism leveled at the FRB index is that it relies on "historic statistical relationships that are simple at best and that may change substantially".[13] Consequently, these relationships need to be continually reestimated. Otherwise, a bias is likely to develop. The recent FRB révisions make this clear.[14] Based on the statistical relationships which the Board estimated in 1971, capacity utilization in 1976-III was originally placed at 73.6 percent, which was low by historical standards. But, when the statistical relationships for capacity were reestimated this year, substantially different results emerged. The Board now estimates capacity utilization for 1976-III to be 80.9 percent, which is about midway between the historical high and historical low of the new series. Thus, the Board has revised considerably its assessment of current capacity utilization.

Perhaps the main reason for this change is that the Board does not distinguish between spending which augments capacity and spending which does not. In recent years an increasing proportion of capital spending has been for environmental and safety factors, which do not add to capacity.[15] Consequently, in this decade, additions to capital stock increased capacity by a lesser amount on average than was true over the previous two decades. Therefore, using the pre-1971 relationship between capacity and capital stock resulted in capacity being overstated in recent years and capacity utilization being understated.

Prior to the recent revision, the FRB utilization rate had been drifting lower, away from the other three measures of capacity utilization. The Board's revised numbers, on the other hand, have no discernible bias, which suggests that the FRB technique can provide reasonable estimates of utilization. It is essential, however, that a given statistical relationship not be extrapolated too far beyond the sample period.

The final two measures of capacity utilization—the BEA and McGraw-Hill operating rates—are closely related. Both are based on company surveys, and both seem to measure the same concept of capacity.[16] Each spring, McGraw-Hill asks companies: (1) what percentage of their capacity was used the previous December and (2) how much they expect to add to capacity in the current year. Additions to capacity are assumed to occur in equal monthly increments. Given the December operating rate, the projected monthly changes in capacity, and monthly output data (as recorded by the FRB production index), the operating rate can be estimated for each month of the subsequent year.[17]

The operating rate series are "bench marked" annually, which should prevent any measurement errors from piling up. Bench marking is accomplished by averaging the operating rate calculated in December

[12] Construction of the FRB index is detailed by de Leeuw [3], Enzler [5], and Raddock and Forest [15]. Briefly, the FRB December value of output is divided by the McGraw-Hill operating rate to generate a preliminary estimate of capacity output. This capacity output measure is divided both by the annual McGraw-Hill capacity series and by the capital stock series derived from census data. These two ratios are then each estimated as a function of one or more time trends, and this process generates two separate estimates of capacity. These two estimates are averaged to provide a new and "smoother" capacity series, which is hopefully less subject to measurement errors than the individual series. Next, the new capacity series is interpolated, yielding quarterly and monthly estimates of capacity. This process is currently undertaken at the industry level. (Prior to the recent FRB revisions, capacity had been computed for only two sectors: primary processing and advanced processing.) Capacity is then aggregated across industries, using value-added weights. Finally, the FRB production index is divided by capacity to yield capacity utilization.

[13] Perry [14, page 707].

[14] For a discussion of these revisions, see Raddock and Forest [15].

[15] According to McGraw-Hill [10] and [12], air and water pollution control as a percentage of manufacturers' capital spending rose steadily from 2.8 percent in 1967 to 9.1 percent in 1975. Expenditures for worker protection have also become substantial. In 1972, the first year for which McGraw-Hill has data, they accounted for 3.0 percent of capital spending, and current projections indicate that in 1976 the percentage will reach 3.3 percent.

[16] According to Hertzberg, Jacobs, and Trevathan [7], both operating rates are based on the concept of "maximum practical capacity". This is defined to be the maximum physical quantity of output that can be produced under "normal conditions", i.e., assuming "the usual number of hours per shift, shifts per day, days per week, overtime, vacation, and downtime for repair and maintenance".

[17] This technique is described in general terms by Gang [6], the computational procedure is detailed by McGraw-Hill [11]. McGraw-Hill calculates the operating rate in a given month (OR_2) as a percentage of the previous month's operating rate (OR_1). They then link the change in operating rate to the former month's value but do so in an imprecise manner. In their example, the operating rate in the initial month is 68.0 percent, and in the second month it is 1.0 percent higher, i.e., $OR_2/OR_1 = 1.010$. OR_2 is then estimated to be 68.0 percent + 1.0 percent = 69.0 percent. In reality, $OR_2 = 1.010 \times 68.0$ percent = 68.68 percent or, rounding as McGraw-Hill does to the nearest 0.5 percentage point, 68.5 percent. Thus, by acting as if *percentage* and *percentage point* changes were one and the same, McGraw-Hill introduces a slight measurement error.

with the value actually reported in the subsequent spring survey. The series are also revised each year, to take into account recent information on actual as opposed to expected additions to capacity. Annual end-of-year operating rates are available from 1954, and monthly operating rates from September 1964. The all-manufacturing operating rate is obtained by weighting industry operating rates with 1967 value-added weights.

The BEA asks companies what percentage of their capacity was in use during the final month of the quarter.[18] These surveys were conducted semiannually between 1965 and 1967 and then, in March 1968, switched to a quarterly basis. Operating rates are published for eleven manufacturing industries, for durables and nondurables, for primary and advanced processing, for asset size (three categories), and for all manufacturing. The all-manufacturing operating rate is obtained by weighting industry operating rates with 1969 capacity weights.

Table 1

Magnitudes of Recent Cyclical Swings for Various Manufacturing Utilization Rates

In percentage points

Series	1968-69 peak to 1970-71 trough	1970-71 trough to 1973 peak	1973 peak to 1975 trough	Total movement 1968-75
Wharton . .	11 5	13 1	20 1	44 7
FRB	11.1	11 5	16 9	39.5
$M\text{-}H_{1/4}$*	9 5	10 2	15 2	34 9
$M\text{-}H_{mo}$ †	9 0	9 0	16 0	34.0
BEA	6	7	11	24

* $M\text{-}H_{1/4}$ is the quarterly average of monthly McGraw-Hill operating rates

† $M\text{-}H_{mo}$ is the value of the McGraw-Hill operating rate in the final month of the quarter.

Sources. Wharton Econometric Forecasting Associates; Board of Governors of the Federal Reserve System (FRB), McGraw-Hill Publications Company, Department of Economics; United States Department of Commerce, Bureau of Economic Analysis (BEA)

Cyclical differences in capacity utilization rates

The various measures of capacity utilization differ in their cyclical behavior. In particular, there is considerable disparity concerning the magnitude of cyclical swings—movements from peaks to troughs or from troughs to peaks. Table 1 compares recent cyclical movements of the various utilization rates. The Wharton and FRB measures capture average conditions throughout the quarter. So does the quarterly McGraw-Hill measure, which is the average of monthly operating rates. The BEA operating rate, on the other hand, reflects conditions in the final month of the quarter—March, June, September, or December. Hence, the timing of this operating rate differs somewhat from that of the other utilization measures. To see whether this timing difference is important, an end-of-quarter McGraw-Hill operating rate was also constructed. The difference between the two McGraw-Hill operating rates is therefore a measure of the effect of timing.

For all three time periods considered, the cyclical swings are smallest for the BEA operating rate. This cannot be attributed to a difference in timing since, for all three cyclical swings, the difference between McGraw-Hill quarterly average and end-of-quarter operating rates is about 1 percentage point or less. Next to BEA, the McGraw-Hill operating rates exhibit the least amount of cyclical variation.

The BEA and McGraw-Hill operating rates are both based on surveys of the percentage of capacity which firms report they are operating One possible explanation for these operating rates having smaller cyclical swings is that survey respondents change their concept of capacity over the cycle. When conditions are slack, firms may forget about, or at least fail to consider explicitly, marginal plants and equipment. When conditions tighten and firms are pushed to increase production, they "rediscover" these marginal facilities. Secondly, as conditions tighten, extra shifts may be added. If some firms calculate their operating rate on the basis of a single shift when only one shift is run but on the basis of two shifts when two shifts are run, production will vary over the cycle by a greater percentage than the reported operating rate. In either case, the reported cyclical swing will be more compressed than the actual swing. Research by Perry indicates that operating rates based on survey response do indeed contain such a cyclical bias.[19]

Because the BEA and McGraw-Hill operating rates are derived from surveys, they are biased toward showing too little cyclical variation. The magnitude of bias

[18] The BEA technique is described by Hertzberg, Jacobs, and Trevathan [7]

[19] See Perry [14, page 711] If the capital stock remains unchanged, an increase in output should have no immediate impact on capacity When the Wharton and FRB measures of capacity were examined, there was in fact no relationship between changes in output and changes in capacity If, on the other hand, survey respondents "rediscover" capacity as output expands, there should exist a positive relationship between changes in output and changes in *reported capacity* When the McGraw-Hill measure of capacity was used, a positive and statistically significant relationship did appear, each 10 percent increase in current output led to a 2 3 percent increase in reported capacity, even after the impact of changes in capital stock was netted out Thus, operating rates constructed from surveys apparently contain a cyclical bias, reported swings in capacity utilization are less than actual swings

differs, however. The McGraw-Hill cyclical swings are not very far below those of the FRB; the BEA cyclical swings are. Thus, the McGraw-Hill operating rate apparently contains less of a cyclical bias than the BEA operating rate. One reason for this may be the difference in sampling techniques[20]

Large firms are oversampled in the McGraw-Hill survey, and small firms are undersampled. The BEA, on the other hand, has a somewhat more representative selection of firms. Thus, if the operating rate varies more over the cycle for large firms than for small firms, the McGraw-Hill operating rate should exhibit greater variation than the BEA operating rate. Does the operating rate vary more for large firms? Apparently it does, as Table 2 demonstrates. For total manufacturing, as well as for the durables and nondurables subsectors, there is a tendency for swings in capacity utilization to be greater in large companies. McGraw-Hill's oversampling of large firms therefore causes its operating rate to overstate the amplitude of cyclical swings, and this offsets a portion of the survey-response bias, which caused the amplitude of cyclical swings to be understated. In other words, McGraw-Hill's large-firm bias negates some of the bias arising from firms "losing" capacity in recessions and "finding" it in recoveries. The BEA operating rate, in contrast, has less of a sampling bias with which to cancel its survey-response bias. As a result, the BEA has a larger cyclical bias than McGraw-Hill.[21]

To summarize, none of the major indexes of capacity utilization are without fault. Because the Wharton index is incapable of determining the current rate of capacity growth, its current estimates of capacity utilization are unreliable; they may be drastically revised in the future. The FRB index appears to be reasonably reliable as long as the statistical relationships on which it is based are kept up to date When a given statistical relationship is extrapolated very far, however, a bias is likely to emerge The BEA operating rate contains a cyclical bias, causing it to vary much less over the cycle than the other measures of capacity utilization. Finally, the McGraw-Hill operating rate contains two cyclical biases. These are partially offsetting, however, so that the McGraw-Hill cyclical bias is less severe than the BEA bias. While all four measures of capacity utilization contain flaws, the FRB measure is perhaps the best when it comes to estimating how much of the economy's aggregate capital stock is currently being utilized Unlike the McGraw-Hill and BEA rates, the FRB measure has no apparent cyclical bias. Furthermore, its current values seem more reliable than those of Wharton

The current situation

Having discussed the various measures of capacity utilization, a final question remains: What is the current capacity situation in manufacturing? Now that the

[20] Another reason for expecting some divergence between McGraw-Hill and BEA operating rates is that they do not rely on survey data to the same extent The McGraw-Hill value is derived from an annual survey of capacity utilization as well as from figures on industrial production, the BEA value comes exclusively from a quarterly survey

[21] From the perspective of current analysis, the McGraw-Hill operating rate has another advantage over the BEA rate its values are released much sooner For example, the BEA 1976-II figures were not available until September 29, whereas those of McGraw-Hill were released on July 23

Table 2
Magnitudes of Cyclical Swings in the BEA Operating Rate
By firm size,* in percentage points

Industry	1968-69 peak to 1970-71 trough	1970-71 trough to 1973 peak	1973 peak to 1975 trough	1975 trough to 1976-II	Total movement 1968-1976-II
Total manufacturing					
Large firms	8	9	13	9	39
Small firms	7	7	9	5	28
Durables manufacturing					
Large firms	12	13	14	11	50
Small firms	9	10	13	6	38
Nondurables manufacturing					
Large firms	4	5	14	6	29
Small firms	5	5	6	3	19

* Large firms company assets of $100 0 million and over, small firms company assets of under $10 0 million

Source United States Department of Commerce, Bureau of Economic Analysis

FRB utilization numbers have been revised, there emerges something approaching a consensus among utilization measures. All four manufacturing series indicate that approximately 40-60 percent of the decline in utilization over the 1973-75 period has been recouped (see Table 3). By historical standards as well, present capacity utilization appears to be somewhere around midrange The current McGraw-Hill and FRB values indicate that capacity utilization is slightly closer to the historical lows than to the historical highs of their series; the current Wharton and BEA values indicate the reverse. On an aggregate level then, the manufacturing sector appears to possess ample unused capacity. But, as noted earlier, it is important to consider utilization at more disaggregative levels as well. Capacity constraints could develop in certain subsectors despite abundant capacity elsewhere.

Disaggregation reveals that capacity is not a problem in either durables or nondurables manufacturing. The rebound in capacity utilization from the 1975 trough has been somewhat stronger percentagewise in the durables sector according to BEA, somewhat stronger in nondurables according to Wharton, and about equally strong in both sectors according to McGraw-Hill. But, while there is some discrepancy as to the relative rebound in the two sectors, one conclusion that does emerge is that neither sector is currently approaching capacity.

The FRB utilization rates are not available for the durables and nondurables categories but are available along stage-of-processing lines. According to these numbers, considerable untapped capacity remains in both the primary-processing and advanced-processing sectors. Since 1975, utilization rates in both sectors have regained just over half of the decline registered between 1973 and 1975.

The Board also publishes a separate series on utilization in the materials sector because of "the strategic importance of materials capacity in limiting overall industrial production".[22] According to this index, materials capacity remains ample. As of 1976-III, just under 50 percent of the reduction in utilization between 1973 and 1975 had been regained (see Table 4). The increase in utilization has been relatively stronger in the nondurables sector, but there still remains substantial capacity there. Indeed, utilization in nondurables is lower now than it was last spring.

The finding of substantial unused capacity in manufacturing seems to hold at the industry level as well While the latest (1976-II) BEA readings suggested possible tightness in the automotive industry, recent data on automobile production and sales indicate that auto-

[22] Raddock and Forest [15, page 899]

Table 3

Past and Current Capacity Utilization Rates

Series*	Historical high	Historical low	Current value	1973 peak	1975 trough
Wharton	97.5	74.7	88.0	97.5	77.4
FRB	91.6	70.9	80.9	87.8	70.9
McGraw-Hill .	89.5	71.3	77.7	86.5	71.3
BEA	86	75	82	86	75

* The Wharton historical series runs from 1947-I to 1976-III, the FRB series from 1948-I to 1976-III, the McGraw-Hill series from 1964-IV to 1976-III, and the BEA series from 1967-IV to 1976-II

Table 4

Past and Current Federal Reserve Board Capacity Utilization Rates for Industrial Materials

Series run from 1967-I to 1976-III

Sector	Historical high	Historical low	Current value	1973 peak	1975 trough
Total	92.9	70.7	81.3	92.9	70.7
Durables	92.3	64.6	78.3	92.3	64.6
Basic metals ...	97.5	67.0	81.7	97.5	67.0
Nondurables . ..	94.0	69.9	85.2	93.9	69.9
Textiles	93.9	60.1	81.9	93.9	60.1
Paper	99.5	73.5	90.2	99.5	73.5
Chemicals	93.2	67.2	83.0	93.2	67.2

Table 5

Past and Current McGraw-Hill Capacity Utilization Rates

Monthly series run from September 1964 to October 1976

Selected industries	Historical high	Historical low	Current value	1973 peak	1975 trough
Machinery	94.5	71.0	74.5	86.0	71.0
Electrical machinery .	93.5	60.5	71.0	82.5	60.5
Fabricated metals	91.0	67.5	76.5	81.5	68.0
Chemicals	85.5	68.5	77.5	85.5	68.5
Paper	95.0	70.5	82.5	94.5	70.5
Rubber and plastics ..	103.5	66.5	93.5	97.0	66.5
Petroleum refinery ...	98.0	85.5	88.0	97.5	85.5
Nonferrous metals	101.5	60.0	83.0	90.5	60.0
Textiles	98.0	62.0	79.5	91.5	62.0

motive capacity should prove sufficient over the coming year. According to McGraw-Hill, no industry faces impending capacity constraints. At first sight, the 88 percent utilization rate in petroleum refining might appear high, but utilization in this industry is always above the manufacturing average. The utilization rate for petroleum refining has never fallen below 85.5 percent, and has reached 98 percent (see Table 5). Rubber and plastics is the only other manufacturing industry to have a McGraw-Hill operating rate above 83 percent in October, but its high current rate appears related to the recent rubber strike. As soon as the strike ended, companies sought to catch up on lost production, and the operating rate for the rubber and plastics industry shot up 11 percentage points. Once the backlog of orders is reduced to more normal levels, however, the operating rate is likely to decline. Moreover, its current value is still 10 points below its all-time high. Although capacity utilization in the nonferrous metals industry is not too far below its 1973 peak, it remains well below its historical high.

Last spring some forecasts were made that capacity problems might soon develop in a number of key industries. Among the industries most frequently mentioned were paper, textiles, chemicals, and steel. Since that time, capacity in a majority of these industries has been expanding faster than production. According to monthly McGraw-Hill operating rates, capacity utilization in the paper industry declined from 89.0 percent earlier this year to 82.5 percent in October. Capacity utilization in textiles fell from 84.5 percent to 79.5 percent, and capacity utilization in chemicals fell from 80.5 percent to 77.5 percent. While capacity utilization in the steel industry generally increased over the first eight months of the year, it declined in September and again in October. With new orders for capital goods not picking up as expected, demand for structural steel remains soft. Only the market for sheet steel has been strong, and that is because of the pickup in automobile production. Yet even for sheet steel, no capacity problems are anticipated in the near future. Thus, since last spring the threat of impending capacity shortages seems to have dissipated.

The conclusion to be drawn is that the manufacturing sector is operating considerably below its productive limits. How long before capacity will become a problem depends on future rates of production as well as on the rate at which capacity-augmenting investment is undertaken. But, at least for the near term, production is unlikely to be hindered by capacity constraints. While not ruling out the possibility of bottlenecks in isolated product lines, capacity throughout the manufacturing sector should prove to be ample over the next year or so.

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