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Industrial Production and Capacity Utilization: A Revision

The Federal Reserve has revised the index of industrial production (IP) and the related measures of capacity and utilization for the period 1992 to date. For the third quarter of 1998, the revision places the production index at 131.7 percent of output in 1992, compared with 128.2 percent reported previously (table 1).¹ The revision places the capacity index at 161.5 percent of output in 1992, compared with 158.1 percent reported previously. As a result, the rate of industrial capacity utilization—the ratio of production to capacity—was revised up 0.4 percentage point, to 81.5 percent, in the third quarter of 1998.

The updated measures reflect both the typical incorporation of newly available, more comprehensive source data and the introduction of modifications in the methods used to compile selected series. The statistical revisions are principally derived from the inclusion of the 1996 Annual Survey of Manufactures and the 1997 Survey of Plant Capacity and affect data since 1994. The changes in methods were introduced beginning in 1992.

Growth in the output and capacity of high-technology industries is now estimated to have been more rapid than previously shown. Outside of the high-technology industries, revisions to the individual output indexes were largely offsetting and had little net effect on total IP through 1997 (chart 1).

Production by Market Groups

The increases in total IP are now about the same in 1993 and 1994 as was shown previously, but are faster in 1995–98 (table 3). The revised annual rate of growth has averaged 4.5 percent since 1994, 0.8 percentage point higher than previously shown; the upward revision to growth from 1996 forward was close to 1 percentage point per year. The index continues to show the same pattern of output growth since 1992: No quarter shows a decrease in output, but gains were slower between the second quarter of 1995 and the first quarter of 1996 and again beginning with the first quarter of 1998. The latest slowing reflects the effects of the economic turmoil in Asia.

Among major market groups, the expansion of output was pervasive and substantial in 1996 and 1997, with strength concentrated in business equipment, consumer durables, and related materials; only the production of defense and space equipment declined in these years. The production of nondurable consumer products advanced relatively slowly; the solid growth in the consumer chemical products industry was offset by declines in apparel production from 1995 to the present. In 1998, growth was slower in the production of consumer goods, business equipment other than information processing equipment, and both durable and nondurable materials. The output of information processing and related equipment continued to increase strongly, and the output of construction supplies accelerated after having risen slowly in 1997. The output of energy products and materials also picked up, on balance, a move reflecting the unusual weather patterns since last fall. The output of defense and space equipment edged up after years of substantial declines.

1. The figures for August through October 1998 are subject to further revision in the upcoming monthly statistical releases.

Production by Industry Groups

During the past two years, growth among the broad industry groups continued to be concentrated in durable manufacturing, which advanced 11.0 percent in 1997 before easing to a 4.2 percent annual rate in the first three quarters of 1998. The relatively rapid expansion in this sector has been supported over the years by the sustained rapid increases in the output of computers, semiconductors and related electronic components, and communications equipment. According to the revised index, the annual rate of growth of production in these high-technology industries averaged nearly 40 percent from 1994 to 1997, substantially higher than previously shown (table 4). The growth of output of other manufacturing industries, which revised little on balance over the 1994–97 period, advanced 3.0 percent over the four quarters of 1996 and 4.3 percent during 1997 before edging down in 1998. In 1998, the economic troubles in Asia have, either through more imports or less exports, reduced the domestic production of iron and steel, semiconductors, some chemicals, and other internationally traded goods. However, the revised series for civilian aircraft shows stronger growth in the first half of 1998 than was shown previously.

Capacity

The revisions to capacity and utilization reflect the new IP indexes, updated estimates of manufacturing capital input, new information provided mainly by trade associations on physical capacity and utilization for selected industries, and preliminary results of the 1997 Survey of Plant Capacity conducted by the Bureau of the Census, which yielded utilization rates for manufacturing industries in the fourth quarter of 1997.

As was the case with the IP index, the rate of growth of manufacturing capacity was revised upward from 1995 forward (table 5). The annual rate of capacity growth in manufacturing, which jumped to about 5-1/2 percent in 1995 and 1996, has slowed to 5 percent in the last two years. The rapid growth and upward revisions were again concentrated in durable manufacturing, especially in the high-technology industries. The capacity increase in these industries peaked at 46.3 percent over the course of 1996 and then decelerated to 34.8 percent in 1998. The rest of manufacturing increased capacity approximately 3 percent in 1995 and 1996 and then gradually lowered the rate of capacity growth to an estimated 2.6 percent in 1998. The capacity expansion in mining and utilities was considerably slower. In particular, the North American Electric Reliability Council reduced its estimate of generating capacity for the winter of 1997 and projects increases in capacity that fall short of probable increases in demand. Moreover, the drop in world demand for crude oil and its low price have led to a sharp drop in work in domestic oil fields.

Capacity Utilization

In 1997 and 1998, the upward revisions to manufacturing capacity were relatively smaller than the revisions to output; consequently, the rate of manufacturing capacity utilization—the ratio of output to capacity—was revised up 0.3 percentage point in the fourth quarter of 1997 and 0.6 percentage point in the third quarter of 1998 (table 6). The largest upward revision in utilization was in the transportation equipment industry. Utilization in manufacturing in the third quarter of this year was 80.3 percent, a level 0.8 percentage point less than the 1967–97 average. Although revised in opposite directions, the rates in both primary- and advanced-processing industries fell more than 2 percentage points over the first three quarters of 1998. The utilization rate for computers, communications equipment, and semiconductors declined to 76.9 percent. In contrast to the general easing in manufacturing utilization rates, the rate rose further for petroleum products, to 96.8 percent. The low price of crude oil pushed refining activity toward capacity limits.

The capacity utilization rate for mining was revised downward 2.2 percentage points in the third quarter and was nearly a percentage point below its long-term average. Although utilization at gas utilities was also revised downward to a below-average level, the rate of utilization in electric utilities was revised upward to 98 percent, its highest level since 1970. Strong summer demand for air conditioning due to high temperatures forced some utilities to limit their supply of electricity to industrial companies.

ASPECTS OF THE REVISION

The revision incorporates the updating of the comprehensive annual data and of the revised monthly source data used in the estimation of production, capacity, and utilization. More up-to-date results were obtained from the 1996 Annual Survey of Manufactures, the 1997 Survey of Plant Capacity, other annual industry reports, recent information on prices, and revised monthly source data on physical products and on labor and electricity inputs. With the differences between the new annual and monthly source data in hand, productivity relationships were revised and applied to the individual monthly source data to determine the final individual production indexes. Along with updating the individual production series and seasonal factors, the annual value-added weights used in aggregating the indexes to market and industry groups were also updated.

Changes to Individual Production Series

The industry and market structures of the index of industrial production now comprise 267 individual series, up from 264 at the time of the last annual revision; they have been altered only a little for the period since 1992.

New indexes were developed to measure production in the electronic components industry. Previously, two indexes—one for TV tubes and another for semiconductors and other components—covered SIC 367. Four new indexes now cover electronic components other than TV tubes: (1) semiconductors and related devices, SIC 3674; (2) printed circuit boards, SIC 3672; (3) other electronic components, SIC 3675–8 and part of 3679; (4) printed circuit assemblies and loaded boards, part of SIC 3679. The new monthly quantity index for semiconductors and related devices is constructed from detailed information on physical quantities and average unit values for about 300 distinct devices. The estimates of U.S. production are primarily derived from the Census Bureau's Current Industrial Reports for Semiconductors and the World Semiconductor Trade Statistics monthly survey, issued by the U.S. Semiconductor Industry Association. Detailed information on MOS memory and microprocessor chips are obtained from Dataquest, Inc. and MicroDesign Resources, respectively. The other three series are derived from monthly Bureau of Labor Statistics data on worker hours and productivity trends determined by annual data. The new series appear in the industry structure of the IP index in the subgroup, Electronic Components, SIC 367, and in the market structure in Equipment Parts, a subgroup within durable materials.

Other changes to individual series included revised IP series for coal, lawn and garden equipment, and completed commercial aircraft. The coal series had been based directly on tonnage production. However, the quality of U.S. coal varies by region. A ton of coal from Appalachia provides more heat expressed in British thermal units than a ton of lignite from North Dakota, Texas, or Louisiana. The growth in coal production over the past decade or so has been concentrated in subbituminous coal, which is extracted by surface mining at low cost in Wyoming and West Montana and is relatively low in Btu content. Thus, the revised index of coal production weights the tonnage produced in an area by the Btu content typical of a ton of coal mined in that region.

In the case of aircraft, the goal is for IP to reflect actual aircraft assembly operations. Previously, the production indexes for aircraft were based on production worker hours and used productivity assumptions that were developed from historical trends and estimates of planned commercial aircraft completions. Now, the productivity estimates for commercial aircraft will be revised monthly as data on actual completions (deliveries plus the change in stock) of commercial aircraft become available. The productivity assumption applied to current-period production worker hours will be based on an approximate production measure equal to a forward-looking ten-month moving average of actual completions augmented by future planned completions. The estimates of military aircraft productivity were also improved, using annual information on planned completions.

Using data for production of lawn and garden tractors, mowers, rotary tillers, and snow throwers from Stark's Component Ledger, the staff developed a physical product series for lawn and garden equipment, SIC 3524. The data represent output for the three-month period from the third month of a given calendar quarter through the

second month of the following quarter. Through 1992, the monthly indicator for this series remains production worker hours.

Weights

The IP index is an annually weighted Fisher index.² The annual value-added weights for the aggregation of IP and capacity utilization, which are derived from annual estimates of industry value added, were updated and extrapolated. The Annual Survey of Manufactures as well as revenue and expense data reported by the Department of Energy and the American Gas Association provided industry value-added data for manufacturing and utilities through 1996. The latest value-added data for mining comes from the Census of Mineral Industries for 1992. The weights are expressed as unit value added. Generally, the unit value-added measures track broad changes in corresponding producer prices. The weights required for aggregating IP in the most recent period are (1) estimated from available data on producer prices through the most recent year and (2) extrapolated for the following year, given the persistence of many relative price trends.

Revised Monthly Data

The monthly physical product data that are used to measure the monthly movements of many IP indexes have been updated to capture data that became available after the closing of the regular four-month reporting window. Monthly data on production-worker hours or sales of electric power in kilowatt-hours to industry groups, along with estimates of trends in output per worker-hour or kilowatt-hour, are used to indicate the monthly change in output for many individual IP indexes. The Bureau of Labor Statistics benchmark of the employment data for March 1997 was incorporated in this revision. Revised data on the sales of electricity to industries since 1992 were incorporated as well. The monthly kilowatt-hour sales figures were benchmarked to data on the annual use of electric power reported in the Annual Survey of Manufactures. Data through 1996 were available for this revision; they resulted in an average upward revision in industrial use of electric power of 0.3 percentage point per year over the 1994 to 1996 period (table 8). Seasonal factors for the electric power series have been reestimated using data through May 1998.³

This revision also introduced an improvement in the adjustment of monthly electric power data for systematic influences of the weather. Electric power use by establishments in fifty three-digit SIC industries are used as monthly indicators for production in forty-two component IP series. At times, unusual hot or cold temperatures appeared to cause the use of electricity to rise or fall independently of their use in production. Staff research indicated that the usual seasonal adjustment techniques did not adequately capture the influence of the weather on electric power usage in thirteen industries, which are used to infer production for almost 16 percent of IP. The new adjustment procedure uses data on heating and cooling degree days to model the effects of weather more accurately in those industries.

Measurement of Capacity

To construct an individual capacity index, we first calculate preliminary, implied end-of-the-year indexes of capacity by dividing a production index by a utilization rate obtained from a survey for that end-of-year period. These ratios are expressed, like the indexes of industrial production, as percentages of production in 1992, and they give the general level and trend of the capacity estimates.

The Census Bureau's survey is the source of utilization rates for most manufacturing industries. The available results of the Survey of Plant Capacity suggested that trends in manufacturing utilization rates were roughly in line in the 1990s with those previously estimated by the Federal Reserve. However, dividing the

2. The aggregation procedures are described in Carol Corrado, Charles Gilbert, and Richard Raddock, "Industrial Production and Capacity Utilization: Historical Revision and Recent Developments," Federal Reserve Bulletin, vol.83 (February 1997), pp.67-92.

3. Seasonal factors for the worker hours were based on data through October; factors for the monthly physical product series were based on data through June or later in the summer.

industrial production indexes for high-technology industries, which were generally revised substantially upward, by the Census utilization rates yielded a noticeable upward revision of capacity in those industries.

Once the preliminary implied capacity indexes are calculated, measures of physical capacity or of capital input are used to estimate and extrapolate the annual movements of the capacity indexes. For most manufacturing industries, physical measures of capacity are lacking; in these cases, the annual growth in the capacity estimates is related to the growth in an industry's capital input. The capital input measures are developed principally from investment data reported in the Annual Survey of Manufactures; revised BEA estimates of business investment and deflators by asset type through mid 1998 were also incorporated.

Data Availability and Publication Changes

These data were revised from 1992 forward. One new market group is being published with this revision: Semiconductors, printed circuit boards, and other electronic components.

Files containing the revised data and the text and tables from this release are available on the internet and through the Economic Bulletin Board of the Department of Commerce. Files containing all of the historical data for these series can be found under "Statistics:Releases and historical data" at <http://www.federalreserve.gov>, the Board's World Wide Web site. For information about the Economic Bulletin Board of the Department of Commerce, call 202-482-1986.

Diskettes containing either historical data (through 1985) or more recent data (1986 to those most recently published in the G.17 statistical release) are available from Publications Services, Board of Governors of the Federal Reserve System, Washington, DC 20551 (202-452-3245).

A document with printed tables of the revised estimates of series shown in the G.17 release is also available upon written request to the Industrial Output Section, Mail Stop 82, Division of Research and Statistics, Board of Governors of the Federal Reserve System, Washington, DC 20551.

1. Industrial production, capacity, and utilization

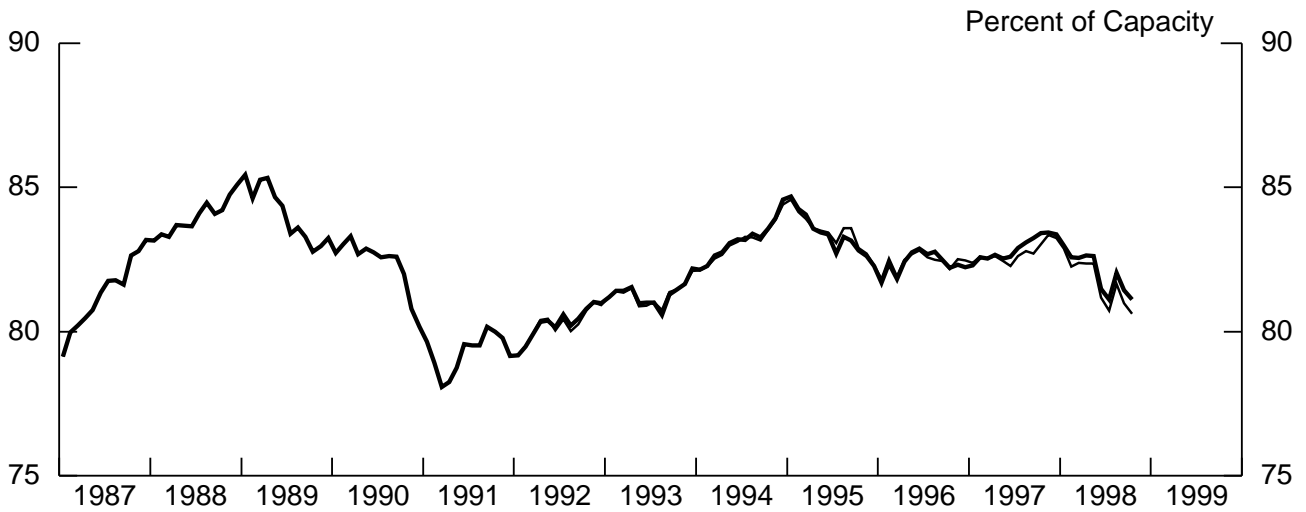
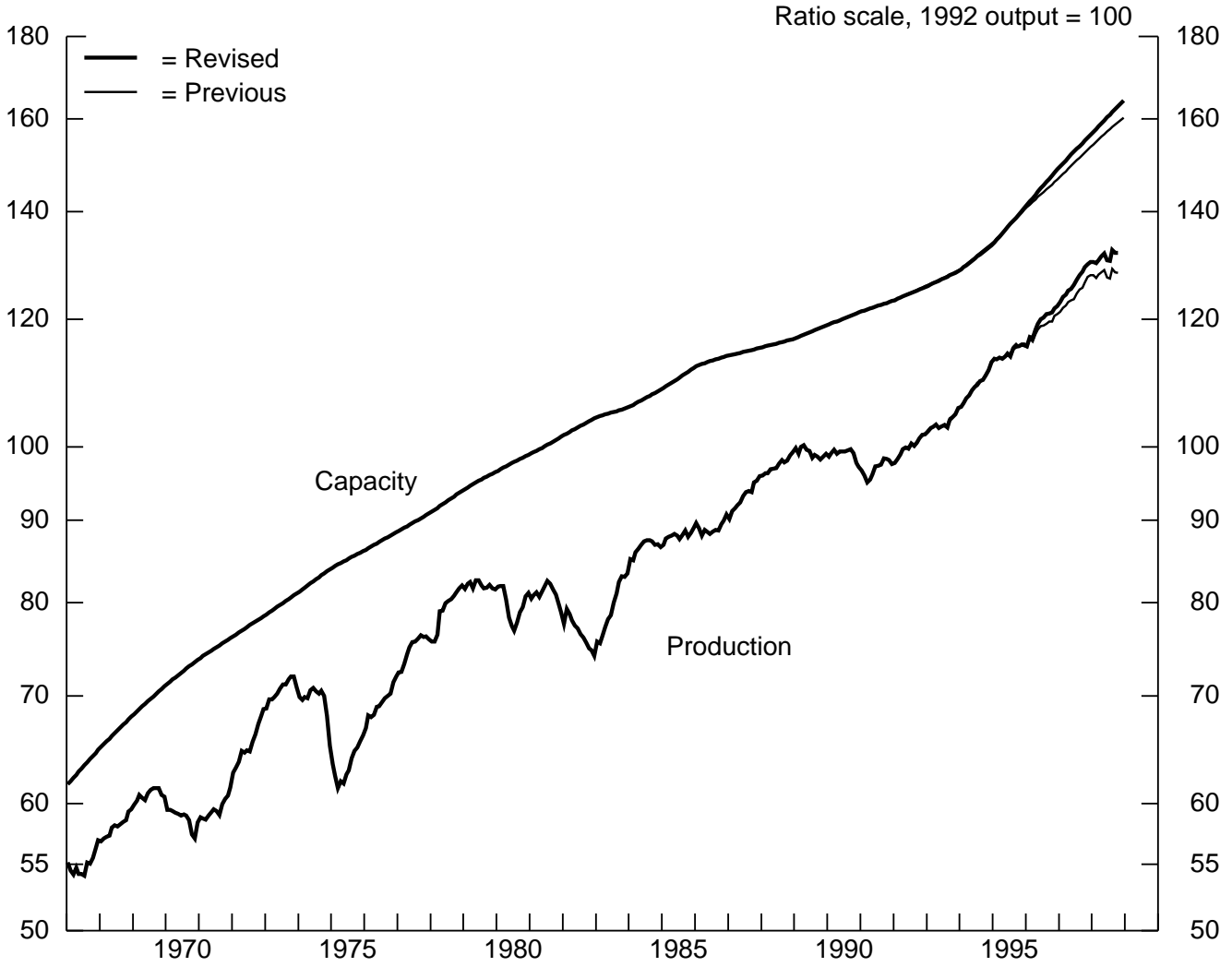


Table 1
INDUSTRIAL PRODUCTION, CAPACITY AND UTILIZATION: 1987-1998¹

TOTAL INDUSTRY

Seasonally adjusted

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Q1	Q2	Q3	Q4	Annual ²
Industrial Production, Percent Change																	
1987	-6	1.2	.4	.4	.4	.9	.6	.1	-1	1.4	.3	.6	4.2	6.7	5.6	7.1	4.6
1988	.1	.3	.0	.6	.1	.1	.7	.5	-4	.3	.8	.5	3.2	3.1	3.9	3.6	4.5
1989	.6	-8	.9	.2	-6	-2	-1.0	.4	-2	-5	.4	.5	3.8	.5	-4.4	-1	1.8
1990	-5	.5	.5	-6	.4	.0	.0	.2	.1	-6	-1.3	-6	2.0	.6	1.0	-5.8	-2
1991	-5	-8	-9	.3	.8	1.2	.1	.1	1.0	-1	-1	-6	-8.3	1.5	6.2	1.1	-2.0
1992	.2	.6	.7	.7	.2	-1	.8	-3	.4	.6	.5	.1	1.3	6.1	2.7	4.6	3.1
1993	.5	.5	.2	.4	-5	.2	.2	-4	1.0	.4	.5	.8	4.3	1.5	1.2	6.4	3.5
1994	.2	.5	.7	.4	.7	.5	.3	.5	.2	.7	.8	1.1	6.1	7.1	5.2	7.6	5.4
1995	.5	-1	.2	-1	.3	.4	-3	1.1	.3	.0	.2	.0	6.3	1.3	3.5	3.0	4.9
1996	-2	1.3	-2	1.2	.9	.7	.2	.5	.1	.1	.6	.3	2.8	9.6	5.5	3.5	4.5
1997	.5	.7	.4	.6	.3	.5	.7	.6	.5	.6	.5	.3	6.6	6.0	7.2	6.6	6.0
1998	.0	-1	.4	.5	.4	-9	-1	1.6	-4	.0			1.6	2.8	1.2		
Industrial Production																	
1987	90.2	91.2	91.6	92.0	92.4	93.2	93.7	93.8	93.7	95.0	95.3	95.9	91.0	92.5	93.8	95.4	93.2
1988	95.9	96.2	96.3	96.8	96.9	97.0	97.6	98.1	97.8	98.0	98.8	99.3	96.1	96.9	97.8	98.7	97.4
1989	99.8	99.0	100.0	100.2	99.6	99.4	98.4	98.8	98.6	98.2	98.6	99.0	99.6	99.7	98.6	98.6	99.1
1990	98.6	99.1	99.6	99.0	99.4	99.3	99.3	99.5	99.6	99.1	97.7	97.2	99.1	99.2	99.5	98.0	98.9
1991	96.7	95.9	95.0	95.4	96.1	97.2	97.3	97.4	98.4	98.3	98.1	97.5	95.9	96.2	97.7	98.0	97.0
1992	97.7	98.2	98.9	99.6	99.9	99.7	100.5	100.2	100.6	101.2	101.7	101.8	98.3	99.8	100.4	101.5	100.0
1993	102.3	102.7	102.9	103.3	102.7	103.0	103.2	102.8	103.9	104.3	104.8	105.7	102.6	103.0	103.3	104.9	103.5
1994	105.9	106.4	107.2	107.6	108.4	108.9	109.3	109.8	110.0	110.8	111.6	112.9	106.5	108.3	109.7	111.7	109.1
1995	113.4	113.4	113.6	113.4	113.8	114.3	113.9	115.1	115.4	115.5	115.7	115.8	113.5	113.8	114.8	115.7	114.4
1996	115.5	117.0	116.8	118.2	119.2	120.0	120.3	120.9	121.1	121.2	121.9	122.3	116.5	119.2	120.8	121.8	119.5
1997	123.0	123.9	124.4	125.1	125.5	126.1	127.0	127.8	128.5	129.3	129.9	130.3	123.7	125.6	127.8	129.8	126.8
1998	130.3	130.2	130.7	131.3	131.9	130.6	130.5	132.5	132.0	132.0			130.4	131.3	131.7		
Capacity																	
1987	114.0	114.1	114.2	114.3	114.4	114.5	114.6	114.7	114.9	115.0	115.1	115.2	114.1	114.4	114.7	115.1	114.6
1988	115.3	115.5	115.6	115.7	115.8	115.9	116.0	116.2	116.3	116.4	116.5	116.7	115.5	115.8	116.2	116.5	116.0
1989	116.8	117.0	117.2	117.4	117.6	117.8	118.0	118.2	118.4	118.6	118.8	119.0	117.0	117.6	118.2	118.8	117.9
1990	119.2	119.3	119.5	119.7	119.9	120.1	120.2	120.4	120.6	120.8	121.0	121.2	119.3	119.9	120.4	121.0	120.2
1991	121.4	121.6	121.7	121.9	122.1	122.2	122.4	122.6	122.7	122.9	123.0	123.2	121.6	122.1	122.6	123.0	122.3
1992	123.4	123.6	123.8	124.0	124.2	124.5	124.7	124.9	125.1	125.3	125.5	125.7	123.6	124.2	124.9	125.5	124.5
1993	125.9	126.2	126.4	126.6	126.9	127.1	127.4	127.6	127.8	128.1	128.3	128.6	126.2	126.9	127.6	128.3	127.2
1994	128.9	129.3	129.7	130.1	130.5	130.9	131.3	131.7	132.1	132.6	133.0	133.4	129.3	130.5	131.7	133.0	131.1
1995	133.9	134.5	135.1	135.7	136.4	137.0	137.6	138.2	138.8	139.5	140.1	140.8	134.5	136.4	138.2	140.1	137.3
1996	141.4	142.1	142.8	143.4	144.1	144.8	145.5	146.1	146.8	147.4	148.1	148.8	142.1	144.1	146.1	148.1	145.1
1997	149.4	150.1	150.7	151.3	152.0	152.6	153.2	153.8	154.4	155.0	155.7	156.3	150.1	152.0	153.8	155.7	152.9
1998	157.0	157.6	158.3	158.9	159.6	160.3	160.9	161.5	162.2	162.8			157.6	159.6	161.5		
Utilization																	
1987	79.1	80.0	80.2	80.5	80.7	81.4	81.8	81.8	81.6	82.6	82.8	83.2	79.8	80.8	81.7	82.9	81.3
1988	83.2	83.4	83.3	83.7	83.7	83.6	84.1	84.5	84.1	84.2	84.8	85.1	83.3	83.7	84.2	84.7	84.0
1989	85.4	84.6	85.3	85.3	84.7	84.4	83.4	83.6	83.3	82.8	83.0	83.2	85.1	84.8	83.4	83.0	84.1
1990	82.7	83.0	83.3	82.7	82.9	82.7	82.6	82.6	82.6	82.0	80.8	80.2	83.0	82.8	82.6	81.0	82.3
1991	79.6	78.9	78.1	78.2	78.7	79.6	79.5	79.5	80.2	80.0	79.8	79.2	78.9	78.8	79.7	79.6	79.3
1992	79.2	79.5	79.9	80.3	80.4	80.1	80.6	80.2	80.4	80.8	81.0	81.0	79.5	80.3	80.4	80.9	80.3
1993	81.2	81.4	81.4	81.5	81.0	81.0	81.0	80.6	81.3	81.4	81.7	82.2	81.3	81.2	81.0	81.8	81.3
1994	82.1	82.3	82.6	82.7	83.1	83.2	83.2	83.4	83.3	83.5	83.9	84.6	82.4	83.0	83.3	84.0	83.2
1995	84.7	84.3	84.1	83.5	83.4	83.4	82.7	83.3	83.1	82.8	82.6	82.3	84.3	83.5	83.1	82.6	83.4
1996	81.7	82.4	81.8	82.4	82.7	82.9	82.7	82.8	82.5	82.2	82.3	82.2	82.0	82.7	82.7	82.2	82.4
1997	82.3	82.6	82.5	82.7	82.6	82.6	82.9	83.1	83.2	83.4	83.4	83.4	82.5	82.6	83.1	83.4	82.9
1998	83.0	82.6	82.6	82.6	82.6	81.5	81.1	82.0	81.4	81.1			82.7	82.3	81.5		

1. Estimates from August 1998 through October 1998 are subject to further revision in the upcoming monthly releases.
2. Annual averages of industrial production are calculated from not seasonally adjusted indexes.

Table 2
INDUSTRIAL PRODUCTION, CAPACITY AND UTILIZATION: 1987–1998¹

MANUFACTURING

Seasonally adjusted

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Q1	Q2	Q3	Q4	Annual ²
Industrial Production, Percent Change																	
1987	-.8	1.6	.2	.5	.3	1.0	.7	-.2	.1	1.3	.5	.6	5.0	7.0	5.5	7.6	5.3
1988	-.2	.4	-.1	1.0	-.1	.0	.7	.3	.2	.2	.9	.6	2.3	4.1	3.7	5.2	4.7
1989	.9	-1.2	.8	.1	-.7	.0	-1.1	.3	-.3	-.6	.4	.1	4.3	-.7	-4.5	-1.4	1.9
1990	-.2	.9	.3	-.8	.4	-.1	.0	.3	-.1	-.6	-1.3	-.6	2.9	-.1	.8	-6.3	-.5
1991	-.9	-.7	-1.1	.3	.7	1.4	.2	.2	1.1	-.1	-.2	-.5	-9.7	1.2	7.8	1.7	-2.4
1992	.3	.7	.8	.6	.4	.0	.7	-.2	.3	.5	.6	-.1	2.7	6.8	3.4	4.0	4.0
1993	.9	.2	.2	.6	-.4	.0	.2	-.5	1.2	.4	.5	.9	4.9	2.1	.5	6.9	3.7
1994	.1	.6	.9	.7	.8	.2	.5	.6	.3	.8	.9	1.1	6.3	8.8	5.8	9.2	6.0
1995	.6	-.2	.2	-.1	1.1	.5	-.5	.9	.7	.1	.1	.1	6.7	1.1	2.9	3.8	5.4
1996	-.3	1.3	-.3	1.4	1.0	.8	.5	.5	.2	.0	.7	.4	2.1	10.6	7.0	3.9	4.7
1997	.5	.9	.5	.6	.3	.7	.7	.8	.4	.6	.8	.3	7.2	6.6	7.7	7.5	6.8
1998	.1	-.1	.3	.6	.3	-1.2	-.1	1.7	-.5	.4			2.4	2.5	.7		
Industrial Production																	
1987	89.6	91.0	91.2	91.6	91.9	92.8	93.4	93.3	93.4	94.6	95.1	95.6	90.6	92.1	93.4	95.1	92.8
1988	95.4	95.8	95.7	96.7	96.6	96.6	97.3	97.5	97.7	97.9	98.9	99.4	95.6	96.6	97.5	98.7	97.1
1989	100.3	99.1	99.9	100.0	99.4	99.4	98.3	98.7	98.4	97.8	98.2	98.3	99.8	99.6	98.5	98.1	99.0
1990	98.1	99.0	99.3	98.6	99.0	98.9	98.8	99.1	99.0	98.4	97.2	96.6	98.8	98.8	99.0	97.4	98.5
1991	95.8	95.1	94.1	94.4	95.0	96.3	96.6	96.8	97.8	97.8	97.6	97.1	95.0	95.2	97.0	97.5	96.2
1992	97.4	98.1	98.9	99.5	99.9	99.9	100.6	100.4	100.7	101.2	101.8	101.7	98.1	99.7	100.6	101.6	100.0
1993	102.6	102.8	103.0	103.6	103.2	103.2	103.4	102.9	104.1	104.5	105.1	106.0	102.8	103.3	103.5	105.2	103.7
1994	106.1	106.7	107.6	108.4	109.3	109.5	110.1	110.7	111.1	112.0	113.0	114.3	106.8	109.1	110.7	113.1	109.9
1995	115.0	114.8	115.1	115.0	115.1	115.7	115.1	116.2	117.0	117.1	117.2	117.3	115.0	115.3	116.1	117.2	115.9
1996	116.9	118.4	118.1	119.7	120.9	121.8	122.4	123.0	123.3	123.3	124.2	124.7	117.8	120.8	122.9	124.1	121.4
1997	125.3	126.4	127.0	127.7	128.1	129.0	129.8	130.8	131.4	132.2	133.3	133.7	126.2	128.3	130.7	133.1	129.7
1998	133.8	133.7	134.1	134.9	135.4	133.7	133.6	135.9	135.3	135.7			133.8	134.7	134.9		
Capacity																	
1987	113.2	113.4	113.6	113.8	113.9	114.1	114.2	114.4	114.6	114.7	114.9	115.0	113.4	113.9	114.4	114.9	114.1
1988	115.2	115.3	115.4	115.6	115.7	115.8	116.0	116.1	116.3	116.5	116.6	116.8	115.3	115.7	116.1	116.6	115.9
1989	117.0	117.3	117.5	117.8	118.0	118.3	118.5	118.7	119.0	119.2	119.5	119.7	117.3	118.0	118.7	119.5	118.4
1990	119.9	120.1	120.3	120.5	120.7	120.9	121.1	121.3	121.5	121.7	122.0	122.2	120.1	120.7	121.3	122.0	121.0
1991	122.4	122.6	122.8	123.0	123.1	123.3	123.5	123.7	123.8	124.0	124.2	124.3	122.6	123.1	123.7	124.2	123.4
1992	124.5	124.8	125.0	125.2	125.5	125.7	125.9	126.2	126.4	126.6	126.9	127.1	124.8	125.5	126.2	126.9	125.8
1993	127.4	127.6	127.9	128.2	128.4	128.7	129.0	129.3	129.5	129.8	130.1	130.3	127.6	128.4	129.3	130.1	128.8
1994	130.7	131.1	131.6	132.0	132.5	132.9	133.4	133.8	134.3	134.8	135.2	135.7	131.1	132.5	133.8	135.2	133.2
1995	136.3	137.0	137.7	138.4	139.1	139.8	140.5	141.2	141.9	142.6	143.4	144.2	137.0	139.1	141.2	143.4	140.2
1996	144.9	145.7	146.4	147.2	148.0	148.8	149.5	150.3	151.0	151.8	152.5	153.3	145.7	148.0	150.3	152.5	149.1
1997	154.1	154.8	155.5	156.2	157.0	157.8	158.4	159.1	159.9	160.6	161.3	162.1	154.8	157.0	159.1	161.3	158.1
1998	162.8	163.5	164.3	165.1	165.8	166.6	167.3	168.1	168.8	169.5			163.5	165.8	168.1		
Utilization																	
1987	79.1	80.2	80.3	80.6	80.7	81.4	81.8	81.5	81.5	82.5	82.8	83.1	79.9	80.9	81.6	82.8	81.3
1988	82.9	83.1	82.9	83.7	83.5	83.4	83.8	84.0	84.0	84.1	84.8	85.1	83.0	83.5	83.9	84.7	83.8
1989	85.7	84.5	85.0	85.0	84.2	84.1	83.0	83.1	82.7	82.1	82.2	82.1	85.1	84.4	82.9	82.1	83.6
1990	81.8	82.5	82.6	81.8	82.0	81.8	81.6	81.7	81.5	80.9	79.7	79.0	82.3	81.9	81.6	79.9	81.4
1991	78.2	77.5	76.6	76.8	77.1	78.1	78.2	78.2	79.0	78.9	78.6	78.1	77.5	77.3	78.5	78.5	77.9
1992	78.2	78.6	79.1	79.4	79.6	79.5	79.9	79.6	79.7	79.9	80.2	80.0	78.6	79.5	79.7	80.1	79.5
1993	80.5	80.6	80.5	80.8	80.4	80.1	80.1	79.6	80.4	80.5	80.8	81.4	80.5	80.4	80.0	80.9	80.5
1994	81.2	81.4	81.8	82.2	82.5	82.4	82.6	82.8	82.7	83.1	83.6	84.2	81.5	82.4	82.7	83.6	82.5
1995	84.4	83.8	83.6	83.1	82.8	82.7	81.9	82.3	82.4	82.1	81.7	81.3	83.9	82.9	82.2	81.7	82.7
1996	80.7	81.3	80.6	81.3	81.7	81.9	81.9	81.8	81.6	81.2	81.4	81.3	80.9	81.6	81.8	81.3	81.4
1997	81.3	81.7	81.7	81.7	81.6	81.7	81.9	82.2	82.2	82.3	82.6	82.5	81.6	81.7	82.1	82.5	82.0
1998	82.2	81.8	81.6	81.7	81.6	80.2	79.8	80.9	80.1	80.1			81.8	81.2	80.3		

1. Estimates from August 1998 through October 1998 are subject to further revision in the upcoming monthly releases.
2. Annual averages of industrial production are calculated from not seasonally adjusted indexes.

Table 3
RATES OF GROWTH IN INDUSTRIAL PRODUCTION, BY MAJOR MARKET GROUPS, 1994–1998¹

Item	Revised growth rate (percent)					Difference between revised and earlier growth rates (percentage points)				
	1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Total index	6.5	3.5	5.3	6.6	1.9	.0	.3	1.1	.9	.9
Products, total	4.7	2.1	4.2	5.0	2.5	.1	.3	.3	.3	1.4
Final products	4.8	2.6	4.4	5.6	2.4	.2	.3	.4	.5	1.7
Consumer goods	4.3	1.3	2.2	2.7	-.4	-.1	-.4	-.2	-.1	.5
Durable	6.5	.3	2.3	6.5	.9	-.3	-.3	-1.1	.5	1.5
Automotive products	5.4	-2.4	2.0	9.3	-6.6	-.6	-.4	.4	.6	-.9
Autos and trucks	5.2	-4.7	2.5	12.3	-14.1	-1.0	-.5	.9	1.2	-1.0
Autos	5.8	-7.3	-3.8	3.4	-7.0	-.8	-.4	.0	-.3	-.3
Trucks	3.0	1.3	8.1	15.7	-17.0	-1.4	-.3	.2	-.2	-.2
Auto parts and allied goods	5.6	1.8	1.0	4.7	6.7	.0	-.1	-.3	-.3	-.4
Other durable goods	7.4	2.5	2.6	4.3	7.1	-.1	-.3	-2.2	.4	3.7
Appliances and electronics	14.4	9.0	8.9	11.8	16.6	.9	.1	1.0	4.1	-.5
Appliances and air cond.	2.7	-2.0	-.2	-.5	9.5	-.6	-4.1	-2.1	.4	-1.4
Home electronics	28.1	20.1	18.3	24.2	23.4	2.9	4.7	3.0	5.2	-1.0
Carpeting and furniture	5.8	-3.0	3.0	2.4	3.2	.3	-1.6	-2.4	-.1	2.4
Miscellaneous	3.5	1.1	-1.7	.9	3.6	-.8	.0	-4.2	-1.9	5.8
Nondurable	3.7	1.6	2.2	1.7	-.7	-.1	-.4	.1	-.3	.3
Nonenergy	4.9	.9	2.1	1.7	-1.7	-.1	-.4	.2	-.3	.1
Foods and tobacco	6.6	-.3	1.4	1.3	-.8	-.2	-.7	-.4	-.3	-.2
Clothing	4.1	-3.5	-.2	-2.0	-4.4	-.2	1.9	3.9	-.6	.2
Chemical products	5.3	5.1	4.9	2.9	-1.3	.1	-.2	.2	-1.2	.0
Paper products	-.5	2.1	1.9	3.8	-3.7	-.1	-1.6	-.5	1.0	1.3
Energy products	-4.2	6.3	2.3	1.6	6.5	-.1	.0	-.4	-.4	2.3
Fuels	-2.2	1.4	3.5	1.8	2.1	.1	.1	.2	.0	-1.1
Utilities	-5.1	8.6	1.8	1.5	8.7	-.1	-.2	-.8	-.4	4.0
Equipment, total	5.8	4.6	8.0	10.4	6.6	.7	1.5	1.2	1.6	3.4
Business equipment	9.4	7.0	9.8	13.1	9.0	.8	1.6	1.5	2.3	4.3
Information processing & related	13.4	14.9	16.5	16.2	15.3	-.1	1.9	4.7	4.0	6.0
Computer and office	29.5	44.7	41.9	43.7	58.1	-.3	1.7	4.5	9.2	10.5
Industrial	10.0	8.5	1.2	5.2	3.3	.1	.8	1.2	-.5	.3
Transit	1.5	-9.4	14.3	22.8	9.9	4.1	3.3	-4.9	5.2	7.5
Autos and trucks	8.4	-6.0	-3.0	12.3	-9.8	5.7	1.6	-2.9	3.8	-1.4
Other	5.9	1.9	5.5	10.4	1.0	-.2	.1	.7	.9	3.3
Defense and space equipment	-6.7	-7.2	-1.0	-3.9	.6	.9	1.5	.5	-1.3	-.2
Oil and gas well drilling	-6.7	2.4	7.6	9.4	-19.8	.3	.4	.6	.2	-2.0
Manufactured homes	8.6	8.7	-.7	-.7	6.7	1.0	2.0	.2	.5	-5.0
Intermediate products	4.3	.5	3.8	3.2	2.8	-.1	.0	.0	-.4	.6
Construction supplies	7.2	-.3	5.9	2.4	5.2	.0	.2	.1	.2	-.9
Business supplies	2.5	1.1	2.4	3.8	1.3	-.2	-.2	.0	-.8	1.4
Materials	9.3	5.7	6.9	9.0	1.0	-.3	.3	2.2	1.7	.2
Durable	13.5	11.0	10.2	13.3	1.8	-.4	.6	3.5	2.1	.6
Consumer parts	10.3	3.6	1.2	7.3	-4.8	.2	1.3	1.1	.4	.0
Equipment parts	21.4	26.3	22.7	26.4	9.3	-1.3	.5	7.8	4.8	1.0
Semiconductors, printed circuit boards, and oth. elec. comps.	53.2	65.4	49.4	53.3	18.3	n.a.	n.a.	n.a.	n.a.	n.a.
Other	8.9	2.3	3.9	5.0	-1.8	-.1	.2	.8	.4	.3
Basic metals	6.9	1.6	3.9	4.3	-4.4	-.2	.2	1.3	-.4	-.4
Nondurable	5.9	-2.5	3.6	4.5	-2.0	-.2	-.1	-.1	1.0	.2
Textile	8.9	-7.2	2.7	3.2	-3.8	-.2	.1	1.8	-.7	1.9
Paper	5.1	-2.8	4.3	4.7	-1.5	-.1	1.1	1.4	1.5	-.4
Chemical	5.7	-.8	5.1	5.0	-3.1	-.4	-.6	-1.0	1.7	-.5
Other	5.6	-3.0	.5	3.8	.5	-.2	-.2	-.1	.0	1.2
Energy	2.0	.6	.8	.3	2.1	-.1	-.2	.3	-.8	-.7
Primary	3.3	.3	-.7	.2	1.9	.0	-.2	.3	-.2	-1.4
Converted fuel	-.3	1.1	3.6	.5	2.5	-.1	-.1	.6	-1.8	.7
SPECIAL AGGREGATES										
Total excluding:										
Computers	6.1	2.9	4.6	5.9	.8	.0	.2	.9	.6	.6
Business equipment excluding:										
Computer and office equipment	7.7	3.8	6.8	10.5	4.7	.8	1.5	1.1	1.5	3.1

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading. For 1998, the growth rates are calculated from the fourth quarter of 1997 to the third quarter of 1998 and annualized.

Table 4
RATES OF GROWTH IN INDUSTRIAL PRODUCTION, BY INDUSTRY GROUPS, 1994–1998¹

Item	SIC	Revised growth rate (percent)					Difference between revised and earlier growth rates (percentage points)				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Total index		6.5	3.5	5.3	6.6	1.9	.0	.2	1.1	.8	.9
Manufacturing		7.5	3.6	5.9	7.3	1.9	-.1	.3	1.2	1.0	1.1
Primary processing		6.5	-.3	4.1	3.9	-.6	-.1	.1	.6	.4	-.1
Advanced processing		8.0	5.5	6.7	8.8	3.0	.0	.4	1.5	1.2	1.7
Durable		9.9	6.9	8.6	11.1	4.2	.0	.7	2.1	1.6	1.8
Lumber and products	24	5.3	.8	1.8	3.1	4.0	.3	-.4	-1.0	1.0	-.7
Furniture and fixtures	25	5.6	-.8	4.7	3.3	1.3	.3	-1.2	-2.6	-.3	3.6
Stone, clay, and glass products	32	5.2	2.7	6.3	2.6	2.6	-.4	1.2	2.5	-2.0	2.5
Primary metals	33	8.7	-.2	4.6	4.9	-6.2	-.2	.2	1.1	-.7	-.8
Iron and steel	331,2	7.7	-.3	3.6	5.0	-9.2	-.1	.6	1.4	-.7	-.8
Raw steel		6.2	.7	-1.7	7.3	-2.6	.0	.0	.0	.0	.0
Nonferrous	333-6,9	10.1	-.1	5.9	4.9	-2.5	-.3	-.3	1.0	-.6	-.8
Fabricated metal products	34	8.9	1.2	4.1	4.5	-.2	-.1	.0	.9	.8	.9
Industrial machinery and equipment	35	15.3	14.1	9.8	13.4	15.0	.0	1.7	2.2	2.1	4.2
Computer and office equip.	357	30.8	41.6	42.9	43.6	56.0	.3	3.8	6.4	7.3	5.7
Electrical machinery	36	25.4	25.9	22.2	24.2	8.3	-1.8	.2	9.6	5.7	.7
Semiconductors and related electronic components	3672-9	48.8	58.0	44.6	48.6	16.0	-6.2	-1.3	19.1	8.8	-1.4
Transportation equipment	37	2.1	-4.2	4.9	13.1	-1.2	.8	1.1	-.6	.9	2.2
Motor vehicles and parts	371	8.9	-.6	-1.4	12.8	-9.6	1.1	1.0	.0	.9	-.4
Autos and light trucks		4.2	-5.1	1.9	10.9	-12.9	-.9	-.6	.9	1.3	-1.2
Aerospace and misc.	372-6,9	-6.7	-9.7	15.3	13.4	10.6	.4	1.1	-1.7	.7	5.8
Instruments	38	1.9	4.2	3.0	3.6	1.4	1.2	2.3	-1.2	.4	.8
Miscellaneous	39	3.8	2.5	2.7	1.4	-1.4	-.1	-.8	-2.5	-3.4	-.5
Nondurable		4.8	-.3	2.6	2.6	-1.0	-.1	-.2	.1	.0	.2
Foods	20	2.3	.5	1.1	1.9	-.2	-.1	-1.1	-.6	.1	.4
Tobacco products	21	43.6	-4.4	-.1	-.8	-5.3	.1	.8	-2.5	-2.7	-3.8
Textile mill products	22	5.9	-4.6	1.9	3.5	-.8	-.1	.5	1.8	-.6	1.6
Apparel products	23	6.4	-3.6	-.9	-2.0	-4.4	-.2	.9	2.5	-.1	-.4
Paper and products	26	4.5	-2.5	3.0	4.2	-.9	-.1	.3	.7	1.1	-.7
Printing and publishing	27	1.1	-.2	1.9	3.6	-1.9	-.1	-.2	.3	-.4	3.1
Chemicals and products	28	4.6	1.6	4.9	3.1	-1.8	-.1	-.5	-.5	.2	-.5
Petroleum products	29	-.8	.7	3.7	2.0	3.3	.2	.2	.4	-.2	-2.6
Rubber and plastics products	30	9.6	.2	4.0	4.3	2.3	.0	.2	.6	.5	.0
Leather and products	31	-8.4	-5.6	1.3	-8.7	-7.6	.5	5.4	5.3	-1.4	2.7
Mining		.8	-.9	2.0	2.1	-2.3	-.1	-.1	.3	.0	-2.1
Metal mining	10	-3.2	4.6	4.6	4.4	-5.4	-.1	.1	1.3	1.7	.6
Coal mining	12	8.9	-1.4	4.3	2.2	5.9	-.3	-1.3	1.8	-2.5	3.2
Oil and gas extraction	13	-1.2	-1.4	1.0	1.8	-4.8	.0	.1	.1	-.1	-3.3
Stone and earth minerals	14	6.7	-1.1	4.8	3.4	4.5	-.2	.1	-.6	2.8	-5.5
Utilities		-.4	6.3	1.1	1.9	6.2	-.1	-.1	-.4	-.5	1.7
Electric	491,3pt	1.7	5.2	1.0	2.6	7.6	.0	-.1	.0	-.2	1.4
Gas	492,3pt	-8.0	10.8	1.8	-1.3	-.3	-.3	.0	-1.3	-2.1	1.7
SPECIAL AGGREGATES											
Computers, communications eq., and semiconductors		36.6	42.0	36.7	38.5	24.0	-2.6	1.4	13.9	7.9	3.7
Manufacturing ex. computers, communications eq., and semiconductors		5.4	.5	3.0	4.3	-.3	.1	.2	.0	.1	.7
Manufacturing excluding motor vehicles and parts		7.4	3.9	6.4	6.9	2.6	-.1	.3	1.3	.9	1.2

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading. For 1998, the growth rates are calculated from the fourth quarter of 1997 to the third quarter of 1998 and annualized.

Note—Primary processing manufacturing includes textile mill products, paper and products, industrial chemicals, synthetic materials, and fertilizers, petroleum products, rubber and plastics products, lumber and products, primary metals, fabricated metals, and stone, clay, and glass products. Advanced processing manufacturing includes foods, tobacco products, apparel products, printing and publishing, chemical products and other agricultural chemicals, leather and products, furniture and fixtures, industrial and commercial machinery and computer equipment, electrical machinery, transportation equipment, instruments, and miscellaneous manufactures.

Table 5
RATES OF GROWTH IN CAPACITY, BY INDUSTRY GROUPS, 1994–1998¹

Item	SIC	Revised growth rate (percent)					Difference between revised and earlier growth rates (percentage points)				
		1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Total index		3.6	5.4	5.7	5.1	5.0	-.1	.5	1.2	.4	.6
Manufacturing		4.0	6.0	6.4	5.8	5.6	-.1	.5	1.2	.5	.7
Primary processing		2.4	3.3	3.8	3.9	3.0	.1	.4	.5	.6	-.1
Advanced processing		4.8	7.4	7.4	6.4	6.6	-.2	.6	1.5	.2	.9
Durable		5.8	9.5	9.7	8.6	7.9	-.1	1.1	2.2	.6	.3
Lumber and products	24	3.1	3.0	3.9	4.2	2.9	.2	-.8	-.5	.2	1.4
Furniture and fixtures	25	2.0	2.5	5.9	5.1	1.9	-.5	-1.4	.1	.2	-.6
Stone, clay, and glass products	32	-.1	5.7	4.9	2.9	.6	-.9	3.4	1.6	-.8	-2.7
Primary metals	33	3.0	2.7	3.6	3.4	3.4	.6	.2	.0	-.4	-1.5
Iron and steel	331,2	2.8	1.9	5.0	3.9	5.1	.0	.3	.7	.1	-.1
Raw steel		.9	3.1	2.8	5.8	6.8	.0	.0	.0	.0	1.2
Nonferrous	333-6,9	3.2	3.5	2.0	2.8	1.4	1.3	.0	-.8	-.8	-3.1
Fabricated metal products	34	3.0	5.2	5.5	6.5	4.3	.4	1.3	.8	1.5	-.3
Industrial machinery and equipment	35	9.2	11.5	13.0	12.1	14.6	.9	.7	1.7	.4	4.1
Computer and office equip.	357	21.7	34.7	46.1	43.2	59.4	-.2	3.5	6.2	2.2	17.8
Electrical machinery	36	16.3	28.8	30.3	23.6	18.4	-2.0	2.9	11.0	4.4	.6
Semiconductors and related electronic components	3672-9	31.6	58.7	56.6	46.7	33.4	-9.6	2.7	24.8	9.9	-1.7
Transportation equipment	37	2.7	4.3	2.5	2.0	2.1	-.5	.5	.1	-1.4	-1.6
Motor vehicles and parts	371	5.5	8.4	3.9	3.2	2.5	-1.5	.3	-.8	-1.4	-1.8
Autos and light trucks		3.7	4.5	-.5	.8	2.7	-1.5	-1.4	-1.7	-1.5	.2
Aerospace and misc.	372-6,9	-.6	-.4	.5	.2	1.4	.5	.9	1.3	-1.6	-1.3
Instruments	38	1.6	2.6	.1	1.3	2.4	1.5	2.2	-.6	-.5	-.9
Miscellaneous	39	1.5	1.7	1.9	1.9	1.9	-.4	-1.1	-1.3	-1.4	-1.6
Nondurable		1.9	2.1	2.3	2.0	2.6	-.1	-.2	-.1	-.2	.8
Foods	20	1.7	2.2	2.0	1.2	2.8	-.5	-.7	-.5	-1.2	.9
Textile mill products	22	3.4	2.0	2.2	4.6	.9	-.3	-1.2	.1	2.7	-.1
Apparel products	23	1.3	2.3	.7	1.8	-.7	-.1	.1	.4	1.8	.0
Paper and products	26	1.7	2.4	2.9	2.4	3.0	.3	.1	.5	.6	.9
Printing and publishing	27	.6	.7	.3	.1	3.1	-.1	.0	-.6	-.7	2.2
Chemicals and products	28	2.5	2.8	3.5	2.7	2.5	-.2	.0	-.1	-.6	.2
Petroleum products	29	1.9	-.2	.8	1.3	1.1	.0	.0	.5	-.4	-1.9
Rubber and plastics products	30	4.7	4.4	4.9	5.1	4.8	.3	-.6	.5	.9	1.5
Leather and products	31	-.5	3.4	3.5	-.3	-.4	.7	5.9	5.9	-.6	4.5
Mining		.9	-.4	.4	1.5	.9	-.1	.1	.2	.8	-.1
Metal mining	10	-.5	.7	1.6	2.9	.8	.0	-.2	.9	2.2	-.7
Coal mining	12	3.3	.6	1.7	1.7	1.7	-.8	.9	.7	.0	.0
Oil and gas extraction	13	.3	-1.0	-.2	1.0	.4	.0	.0	.1	.8	-.1
Stone and earth minerals	14	2.4	2.4	3.5	4.4	4.0	.0	-.1	.2	.4	.5
Utilities		1.2	1.7	1.9	.3	.7	-.1	-.3	.4	-.1	-.2
Electric	491,3pt	1.0	2.2	1.9	-.1	.6	.0	-.4	.3	-1.5	-.4
Gas	492,3pt	.4	.5	2.1	1.9	1.5	.0	.0	.0	.0	-.1
SPECIAL AGGREGATES											
Computers, communications eq., and semiconductors		23.2	41.0	46.3	37.4	34.8	-4.2	3.2	16.2	7.0	5.2
Manufacturing ex. computers, communications eq., and semiconductors		2.5	3.2	2.9	2.7	2.6	.2	.3	.0	-.4	-.1

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading.

Note—Primary processing manufacturing includes textile mill products, paper and products, industrial chemicals, synthetic materials, and fertilizers, petroleum products, rubber and plastics products, lumber and products, primary metals, fabricated metals, and stone, clay, and glass products. Advanced processing manufacturing includes foods, tobacco products, apparel products, printing and publishing, chemical products and other agricultural chemicals, leather and products, furniture and fixtures, industrial and commercial machinery and computer equipment, electrical machinery, transportation equipment, instruments, and miscellaneous manufactures.

Table 6
REVISED AND EARLIER CAPACITY UTILIZATION RATES, BY INDUSTRY GROUPS

Percent of capacity, seasonally adjusted

Item	SIC	Revised rate						Difference between revised and earlier rates (percentage points)		
		1967-1997 Ave.	1988-1989 High	1990-1991 Low	1996 Q4	1997 Q4	1998 Q3	1996 Q4	1997 Q4	1998 Q3
Total index		82.1	85.4	78.1	82.2	83.4	81.5	-.1	.2	.4
Manufacturing		81.1	85.7	76.6	81.3	82.5	80.3	-.1	.3	.6
Primary processing		82.3	88.9	77.7	85.4	85.3	83.0	-.5	-.7	-.7
Advanced processing		80.5	84.2	76.1	79.6	81.4	79.3	.2	1.0	1.5
Durable		79.4	84.6	73.1	80.2	82.1	79.9	-.2	.5	1.4
Lumber and products	24	82.5	93.6	75.5	82.1	81.3	81.9	-.6	.1	-1.2
Furniture and fixtures	25	81.4	86.6	72.5	79.2	77.9	77.5	-1.8	-2.1	.4
Stone, clay, and glass products	32	78.2	83.5	69.7	80.9	80.7	81.8	-.5	-1.4	1.7
Primary metals	33	81.1	92.7	73.7	90.7	92.0	85.5	-.1	-.3	.0
Iron and steel	331,2	81.1	95.2	71.8	90.9	91.8	82.3	.7	.0	-.5
Raw steel		80.9	92.7	71.5	88.8	90.0	84.0	.1	.1	-.6
Nonferrous	333-6,9	81.3	89.3	74.2	90.5	92.3	89.7	-1.0	-.9	.7
Fabricated metal products	34	78.0	82.0	71.9	80.3	78.8	76.2	-.3	-.8	-.1
Industrial machinery and equipment	35	81.3	85.4	72.3	84.4	85.4	85.7	-.4	.9	1.1
Computer and office equip.	357	81.2	86.9	66.9	83.3	83.5	82.5	.8	3.7	-.9
Electrical machinery	36	81.1	84.0	75.0	81.3	81.7	76.2	-.7	.2	.1
Semiconductors and related electronic components	3672-9	80.0	81.1	75.6	82.7	83.8	75.0	-.6	-1.3	-1.4
Transportation equipment	37	75.9	85.8	68.5	72.2	80.0	78.1	.3	2.0	4.1
Motor vehicles and parts	371	76.8	89.1	55.9	74.4	81.3	74.0	2.3	4.2	4.5
Autos and light trucks ¹			92.3	53.3	79.6	87.6	77.3	3.0	5.5	4.1
Aerospace and misc.	372-6,9	75.0	87.3	79.2	69.3	78.4	83.7	-2.2	-.7	3.4
Instruments	38	81.7	81.4	77.2	79.1	80.8	80.3	-.4	.3	1.2
Miscellaneous	39	75.6	79.0	71.7	80.1	79.7	77.7	.9	-.7	.0
Nondurable		83.4	87.3	80.7	82.8	83.3	81.1	.2	.4	.1
Foods	20	83.0	85.4	82.7	81.6	82.1	80.3	.7	1.6	1.4
Textile mill products	22	85.7	90.4	77.7	85.5	84.7	83.5	3.0	.4	1.4
Apparel products	23	81.1	85.1	75.5	79.1	76.2	73.9	2.2	.8	.5
Paper and products	26	89.2	93.5	85.0	87.8	89.3	86.8	-.7	-.3	-1.3
Printing and publishing	27	85.8	91.7	79.6	82.1	85.1	82.1	.7	1.0	1.7
Chemicals and products	28	79.5	86.2	79.3	79.5	79.8	77.2	-.2	.4	.0
Petroleum products	29	86.6	88.5	85.1	94.5	95.2	96.8	.1	.3	-.3
Rubber and plastics products	30	84.5	89.6	77.4	86.2	85.5	84.0	-1.7	-2.1	-3.0
Leather and products	31	80.8	83.3	76.1	70.9	66.9	63.4	-.4	-1.0	-1.5
Mining		87.5	88.0	87.0	88.1	88.6	86.6	-.2	-.9	-2.2
Metal mining	10	79.1	89.4	79.9	90.8	92.2	87.8	.4	-.1	.7
Coal mining	12	86.6	91.5	83.4	84.2	84.5	87.1	-2.0	-4.2	-2.3
Oil and gas extraction	13	88.6	88.2	88.7	88.9	89.6	86.1	.2	-.6	-2.8
Stone and earth minerals	14	84.8	89.0	79.4	86.3	85.5	85.8	-.5	1.5	-2.1
Utilities		87.3	92.6	83.4	89.4	90.8	94.5	-.6	-.1	1.3
Electric	491,3pt	89.2	95.0	87.1	90.8	93.2	98.0	-.1	1.0	2.3
Gas	492,3pt	82.4	85.0	67.1	83.7	81.1	80.0	-1.6	-3.3	-2.1
SPECIAL AGGREGATES										
Computers, communications eq., and semiconductors		80.3	81.9	72.4	81.4	82.0	76.9	.2	.7	.2
Manufacturing ex. computers, communications eq., and semiconductors		81.2	86.1	76.8	81.3	82.6	80.8	-.1	.3	.8

1. Series begins in 1977.

Note—The "high" column refers to periods in which utilization generally peaked; the "low" column refers to recession years in which utilization generally bottomed out. The monthly highs and lows are specific to each series, and all did not occur in the same month.

Table 7
ANNUAL PROPORTIONS IN INDUSTRIAL PRODUCTION, BY INDUSTRY GROUPS

Item	SIC	1990	1991	1992	1993	1994	1995	1996	1997
Total index		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing		84.4	84.5	85.4	85.9	86.7	86.8	86.8	87.8
Primary processing		26.8	26.1	26.6	27.0	28.2	28.0	27.6	27.8
Advanced processing		57.6	58.4	58.9	58.9	58.5	58.8	59.2	60.0
Durable		44.8	44.2	44.9	45.6	46.3	46.8	47.6	48.5
Lumber and products	24	1.8	1.8	2.1	2.2	2.2	2.1	2.1	2.1
Furniture and fixtures	25	1.4	1.3	1.4	1.4	1.4	1.4	1.4	1.4
Stone, clay, and glass products	32	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.4
Primary metals	33	3.3	3.1	3.1	3.3	3.5	3.5	3.5	3.6
Iron and steel	331,2	1.9	1.7	1.8	1.9	2.0	1.9	1.9	2.0
Raw steel		.1	.1	.1	.1	.1	.1	.1	.1
Nonferrous	333-6,9	1.4	1.4	1.4	1.4	1.6	1.6	1.6	1.6
Fabricated metal products	34	5.1	4.9	5.0	5.1	5.2	5.3	5.4	5.5
Industrial machinery and equipment	35	8.3	7.9	7.8	8.1	8.4	8.9	9.2	9.4
Computer and office equip.	357	1.8	1.6	1.6	1.6	1.6	1.7	1.8	1.9
Electrical machinery	36	6.7	6.8	7.1	7.4	7.8	8.3	8.6	8.8
Semiconductors and related electronic components	3672-9	2.2	2.3	2.5	2.6	2.9	3.4	3.6	3.7
Transportation equipment	37	9.7	9.6	9.4	9.5	9.3	8.9	8.8	9.2
Motor vehicles and parts	371	4.7	4.6	4.7	5.1	5.5	5.4	5.2	5.3
Autos and light trucks		2.7	2.6	2.5	2.6	2.8	2.7	2.7	2.6
Aerospace and misc.	372-6,9	5.0	5.0	4.7	4.4	3.8	3.5	3.6	3.9
Instruments	38	5.1	5.4	5.4	5.3	4.9	4.8	4.9	4.8
Miscellaneous	39	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4
Nondurable		39.6	40.3	40.6	40.3	40.4	40.1	39.3	39.3
Foods	20	9.0	9.4	9.6	9.6	9.3	9.2	9.0	8.9
Tobacco products	21	1.5	1.6	1.6	1.1	1.2	1.3	1.3	1.3
Textile mill products	22	1.7	1.7	1.8	1.8	1.8	1.7	1.6	1.6
Apparel products	23	2.1	2.2	2.2	2.1	2.1	2.0	1.9	1.8
Paper and products	26	3.7	3.7	3.5	3.4	3.8	3.9	3.5	3.5
Printing and publishing	27	6.7	6.8	6.8	6.8	6.6	6.6	6.6	6.7
Chemicals and products	28	9.8	9.9	10.0	9.9	10.0	9.9	9.7	9.8
Petroleum products	29	1.6	1.5	1.4	1.5	1.6	1.5	1.6	1.6
Rubber and plastics products	30	3.2	3.3	3.5	3.6	3.8	3.7	3.7	3.8
Leather and products	31	.3	.3	.3	.3	.2	.2	.2	.2
Mining		7.9	7.5	6.8	6.4	6.0	6.1	6.5	5.9
Metal mining	10	.5	.5	.5	.4	.5	.5	.4	.4
Coal mining	12	1.2	1.1	1.0	.9	.9	.9	.9	.9
Oil and gas extraction	13	5.6	5.3	4.7	4.4	4.0	4.1	4.6	4.1
Stone and earth minerals	14	.6	.6	.6	.6	.6	.6	.6	.6
Utilities		7.7	8.0	7.8	7.7	7.4	7.1	6.7	6.3
Electric	491,3pt	6.3	6.5	6.2	6.1	5.8	5.6	5.4	5.2
Gas	492,3pt	1.5	1.5	1.6	1.6	1.5	1.5	1.3	1.1
SPECIAL AGGREGATES									
Computers, communications eq., and semiconductors		5.4	5.3	5.7	5.8	6.2	6.9	7.3	7.6
Manufacturing ex. computers, communications eq., and semiconductors		79.0	79.2	79.8	80.1	80.4	80.0	79.5	80.1

Note— The IP proportion data are estimates of the industries' relative contributions to overall IP growth in the following year. For example, a 1 percent increase in durable goods manufacturing in 1998 would account for a 0.485 percent increase in total IP.

Table 8
RATES OF GROWTH IN ELECTRIC POWER USE, 1994–1998¹

Item	Revised growth rate (percent)					Difference between revised and earlier growth rates (percentage points)				
	1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Total	4.9	-.8	1.5	1.0	-2.6	.2	.3	.5	-.1	.0
Manufacturing	5.1	-.9	1.4	1.1	-2.9	.2	.3	.5	.0	.0
Durable	3.4	.5	-.2	3.1	-1.0	.1	.4	.7	-.5	1.0
Lumber and products 24	2.9	1.5	4.3	-.1	6.6	.0	-.6	-.8	-1.4	-.8
Furniture and fixtures 25	7.6	-3.6	4.2	1.4	-1.6	.4	-.3	-.1	-.2	.6
Stone, clay, & glass products 32	2.1	.2	3.4	.8	.9	.6	.4	.4	-.2	1.3
Primary metals 33	3.0	1.5	-3.8	4.0	-.3	.0	1.4	2.3	-.7	1.5
Fabricated metal products 34	5.5	.1	3.7	3.1	-1.7	.3	.4	.2	-.2	.7
Industrial machinery and equipment 35	4.0	.4	1.4	3.0	2.6	.5	.5	-.2	-.1	1.1
Electrical machinery 36	2.4	1.5	2.5	2.3	-3.2	.2	-1.0	-1.1	-.8	-.1
Transportation equipment 37	4.1	-2.0	-.3	5.2	-7.2	-.5	-.8	-.7	-.4	1.4
Instruments 38	1.7	.4	-2.8	.6	2.6	.8	.9	.6	-.3	.7
Miscellaneous manufactures 39	11.1	-4.7	6.9	.3	-4.8	-.2	-1.1	-1.4	-.7	-.2
Nondurable	6.5	-2.0	2.6	-.5	-4.3	.3	.2	.3	.3	-.8
Foods 20	4.5	2.5	1.7	2.2	.5	1.0	.9	.7	.5	.0
Tobacco products 21	-5.5	6.4	-.3	.6	-5.0	-.3	-1.1	-2.3	-2.3	3.2
Textile mill products 22	6.0	-3.4	2.9	2.1	3.0	.6	-.2	.3	-1.0	-.5
Apparel products 23	6.8	-6.4	-1.8	-2.0	-9.1	.5	.4	.8	.5	-.3
Paper and products 26	2.7	-.6	.4	2.2	-4.1	-.1	-.1	.0	1.3	-.1
Printing and publishing 27	4.2	.7	.8	3.0	-2.0	.5	.0	.3	-.4	1.1
Chemicals and products 28	9.7	-6.5	5.7	-4.2	-9.5	.3	.2	.1	-.1	-2.0
Petroleum products 29	2.7	7.3	-3.3	2.5	-2.7	.0	1.1	1.2	2.0	.5
Rubber and plastics products 30	9.0	-.5	3.4	.6	3.5	.3	-.3	-.2	-.4	-.3
Leather and products 31	-3.5	-9.2	-1.4	-1.7	-7.3	-.6	.8	-4.5	-.6	2.1
Mining	2.2	1.0	2.8	-.4	1.7	.0	.0	.5	-1.2	.5
Metal mining 10	5.6	8.5	2.5	.4	-.1	-.2	-.2	-.1	-.1	-1.6
Coal mining 12	7.4	-1.3	.0	-.6	8.1	-.1	.0	.0	.3	1.0
Oil and gas extraction 13	-4.8	-4.9	4.4	1.0	-4.4	.0	.0	1.4	-.8	-.9
Stone and earth minerals 14	7.5	5.7	3.7	-4.2	10.1	.2	.5	.2	-5.8	6.9
SUPPLEMENTARY GROUPS										
Total, excluding nuclear nondefense	3.7	.6	.9	2.2	-1.5	.2	.3	.4	-.1	.2
Utility sales to industry	5.3	-1.2	1.9	1.0	-2.6	.3	.4	.3	.1	.3
Industrial generation	1.3	4.8	-5.7	.8	3.4	-.3	-.1	-.1	.4	1.4

1. Growth rates are calculated as the percent change in the seasonally adjusted index from the fourth quarter of the previous year to the fourth quarter of the year specified in the column heading. For 1998, the growth rates are calculated from the fourth quarter of 1997 to the third quarter of 1998 and annualized.

Explanatory Note

The statistical release of **Industrial Production and Capacity Utilization** reports measures of output, capacity, and capacity utilization in manufacturing, mining, and the electric and gas utilities industries. The release also includes monthly indexes on the use of electric power in manufacturing and mining. Files containing data in the release and historical data are available under statistical releases at <http://www.federalreserve.gov>, the Board's World Wide Web site. These data are also available on line on the day of issue through the Economic Bulletin Board of the Department of Commerce. For information, call (202) 482-1986. Diskettes containing historical data and the data published in this release are available from the Board of Governors of the Federal Reserve System, Publications Services, (202) 452-3245.

Industrial Production

Coverage. The industrial production (IP) index measures output in the manufacturing, mining, and electric and gas utilities industries; the reference period for the index is 1992. For the period since 1992, the total IP index has been constructed from 264 individual series based on the 1987 Standard Industrial Classification (SIC). These individual series are classified in two ways: (1) market groups (shown in table 1), such as consumer goods, equipment, intermediate products, and materials; and (2) industry groups (shown in tables 2 and 6), such as two-digit SIC industries and major aggregates of these industries—for example, durable and nondurable manufacturing, mining, and utilities.

Market groups. For purposes of analysis, the individual IP series are grouped into final products, intermediate products, and materials. Final products are assumed to be purchased by consumers, businesses, or government for final use. Intermediate products are expected to become inputs in nonindustrial sectors, such as construction, agriculture, and services. Materials are industrial output requiring further processing within the industrial sector. Total products comprise final and intermediate products, and final products are divided into consumer goods and equipment.

Timing. The first estimate of output for a month is published around the 15th of the following month. The estimate is preliminary (denoted by the superscript "p" in tables) and subject to revision in each of the subsequent three months as new source data become available. (Revised estimates are denoted by the superscript "r" in tables.) After the fourth month, indexes are not revised further until the time of an annual revision or a benchmark revision. The last three benchmark revisions were published in 1990, 1985, and 1976.

Source data. In annual or benchmark revisions, the individual IP indexes are constructed from a variety of source data, such as the quinquennial *Censuses of Manufactures and Mineral Industries* and the *Annual Survey of Manufactures*, prepared by the Bureau of the Census; the *Minerals Yearbook*, prepared by the Department of the Interior; and publications of the Department of Energy. On a monthly basis, the individual indexes of industrial production are constructed from two main types of source data: (1) output measured in physical units and (2) data on inputs to the production process, from which output is inferred. Data on physical products, such as tons of steel or barrels of oil, are obtained from private trade associations as well as from government agencies including those listed above; data of this type are used to estimate monthly IP where possible and appropriate. When suitable data on physical product are unavailable, estimates of output are based on either production-worker hours or electric power use by industry. Data on hours worked by production workers are collected in the monthly establishment survey conducted by the Bureau of Labor Statistics. The data on electric power use are described below. The factors used to convert inputs into estimates of production are based on historical relationships between the inputs and the comprehensive data used to benchmark the IP indexes; these factors also may be influenced by technological or cyclical developments. Especially for the first and second estimates for a given month, the available source data are limited and subject to revision.

Weights. In the index, series that measure the output of an individual industry are weighted according to their proportion in the total value-added output of all industries. The industrial production index, which extends back to 1919, is built as an annually weighted chain-type index since 1977. The components of IP are combined using estimates of value added per unit of output. For months from January to June, the weights are drawn from the year containing the month being estimated and the preceding year; for months from July to December, the weights are drawn from the current and following year. The IP proportions shown in column 1 of tables 1A, 2A, and 6 are estimates of the industries' relative contributions to overall growth in the following year. For example, a 1 percent increase in durable goods manufacturing in 1997 would account for an increase in total IP of nearly 1/2 percent.

Seasonal adjustment. Individual series are seasonally adjusted by the X-11 ARIMA method, developed at Statistics Canada. For series based on production-worker hours, the current seasonal factors were estimated with data through October 1998; for other series, the factors were estimated with data through at least June 1998. In some cases, series were preadjusted for the effects of holidays or the business cycle before using X-11 ARIMA. For the data since 1977, all seasonally adjusted aggregate indexes are calculated by aggregating the seasonally adjusted indexes of the individual series.

Reliability. The average revision to the *level* of the total IP index, without regard to sign, between the first and the fourth estimates was 0.28 percent during the 1987-97

period. The average revision to the *percent change* in total IP, without regard to sign, from the first to the fourth estimates was 0.21 percentage point during the 1987-97 period. In most cases (about 83 percent), the direction of change in output indicated by the first estimate for a given month is the same as that shown by the fourth estimate.

Rounding. The published percent changes are calculated from unrounded indexes, and may not be the same as percent changes calculated from the rounded indexes shown in the release.

Capacity Utilization

Definition. Capacity utilization is calculated for the manufacturing, mining, and electric and gas utilities industries. For a given industry, the utilization rate is equal to an output index divided by a capacity index. Output is measured by seasonally adjusted indexes of industrial production. The capacity indexes attempt to capture the concept of sustainable practical capacity, which is defined as the greatest level of output that a plant can maintain within the framework of a realistic work schedule, taking account of normal downtime, and assuming sufficient availability of inputs to operate the machinery and equipment in place. The 76 individual capacity indexes are based on a variety of data, including capacity data measured in physical units compiled by trade associations, surveys of utilization rates and investment, and estimates of growth of the capital input.

Groups. Estimates of capacity and utilization are available for a variety of groups, including primary and advanced processing industries within manufacturing, durable and nondurable manufacturing, total manufacturing, mining, utilities, and total industry. Component industries of the primary and advanced processing groups within manufacturing are listed in the note on tables 2 and 3 of the release.

Weights. Although each utilization rate is the result of dividing an IP series by a corresponding capacity index, aggregate utilization rates are equivalent to combinations of individual utilization rates aggregated with proportions that reflect current capacity levels of output valued in current-period value added per unit of actual output. The implied proportions of individual industry operating rates in the rate for total industry for the most recent year are shown in the first column of table 3.

Perspective. The historical highs and lows in capacity utilization shown in the tables above are specific to each series and did not all occur in the same month. Industrial plants usually operate at capacity utilization rates that are well below 100 percent: none of the broad aggregates has ever reached 100 percent. For total industry and total manufacturing, utilization rates have exceeded 90 percent only in wartime.

Electric Power

Data on electric power (expressed in kilowatt hours) are collected by the Federal Reserve District Banks from electric utilities and also from manufacturing and mining establishments that generate electric power for their own use (cogenerators). The indexes of power use shown in table 9 are sums of kilowatt hours used by an industry or industry group expressed as a percentage of that industry's or group's usage in 1992. The first column of the table shows, for reference, electric power use in billions of kilowatt hours as reported by manufacturing and mining industries in the 1992 censuses of those industries. The supplementary group, "Total, less nuclear nondefense," is shown separately because the value-added proportion for the nondefense nuclear material series (part of SIC 2819) in total IP is considerably smaller than its share of total electric power use. Excluding this component from total power use facilitates comparisons with total IP.

References

This annual revision will be described more completely in the February 1999 *Federal Reserve Bulletin*.

A description of the aggregation methods for industrial production and capacity utilization is included in an article in the *Federal Reserve Bulletin*, vol. 83 (February 1997), pp. 67-92. *Industrial Production—1986 Edition* contains a more detailed description of the other methods used to compile the industrial production index, plus a history of its development, a glossary of terms, and a bibliography. To obtain *Industrial Production—1986 Edition* (\$9.00 per copy), write to Board of Governors of the Federal Reserve System, Publications Services, Washington, DC 20551. The major revisions to the IP indexes and capacity utilization since 1990 have been described in the *Federal Reserve Bulletin* (April 1990, June 1990, June 1993, March 1994, January 1995, January 1996, February 1997, and February 1998). The basic methodology used to estimate capacity and utilization is discussed in the June 1990 *Federal Reserve Bulletin*.

Release Schedule for 1999

At 9:15 a.m. on January 15, February 17, March 16, April 16, May 14, June 16, July 16, August 17, September 16, October 15, November 16, and December 15.