

Industry diffusion indexes for average weekly hours

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The Bureau of Labor Statistics has developed diffusion indexes of average weekly hours of production workers on private nonagricultural payrolls. The indexes cover both nonmanufacturing and manufacturing industries at more detailed industry levels than the 20-industry indexes produced currently by the Department of Commerce.

The new indexes measure the dispersion of increase in hours. The Average Weekly Hours Diffusion Index indicates the percentage of industries which had gains in their monthly average weekly hours series. For example, a diffusion index of 25.0 means that 25 percent of the industries covered by the index had increased average weekly hours for the month.

The indexes were computed for time spans of 1, 3, 6, 9, and 12 months. Each is centered on the midpoint of the span, or as close to it as possible. Thus, a 3-month diffusion index measures the percentage of industries with hours rising based on the middle month. A 6-month index is centered on the third month. One-month indexes measure the gain in hours from the previous to the current month. (See table 1, pp. 34-35.) Data for average weekly hours are based on the week including the 12th day of the month. Each index was computed using the following algorithm:

$$\frac{A + B/2}{A + B + C} * 100,$$

where:

A = The number of industries which have an increase in their average weekly hours for the specified period;

B = The number of industries which have no changes in their average weekly hours for the specified period; and

C = The number of industries which have declining average weekly hours for the specified period.

For the 1-, 3-, 6-, and 9-month span indexes, the average weekly hours data have been seasonally adjusted before computation of the index. Average weekly hours

are calculated to tenths of an hour; thus, a change from 40.0 to 40.1 hours is an increase. Of the industries with no change in their average weekly hours, half are considered to have risen and half to have fallen. The 12-month span index uses unadjusted data.

The Bureau has expanded the number of industries covered by the current diffusion index, so as to include nonmanufacturing industries, as well as changing to a more detailed unit within manufacturing. The current index produced by the Commerce Department has 2-digit Standard Industrial Classification (SIC) industries in manufacturing only. The new detail includes all 3-digit SIC categories in the manufacturing sector and 2-digit SIC categories in the nonmanufacturing sector.

The result of the expansion is the use of 186 industries to compute the indexes. Forty-nine of these industries are in the nonmanufacturing sector and the remaining 137 industries are in the manufacturing sector. The diffusion indexes, which contain both manufacturing and nonmanufacturing, are still heavily weighted toward the former.

Historical diffusion indexes, particularly those prior to 1972, reflect the industry detail available, and therefore cover fewer industries, as shown in the following tabulation:

Period	Industries	
	Manufacturing	Nonmanufacturing
Feb. 1958 to Dec. 1963	90	14
Jan. 1964 to Dec. 1971	91	17
Jan. 1972 to present	137	49

There is some overlap for the different indexes, due to the time lag necessary to produce an index. No attempt was made to produce an index prior to 1958 because of the lack of data.

Clear cyclical patterns can be discerned for the 3-, 6-, 9-, and 12-month indexes. Turning points in the diffusion indexes were tentatively determined using methods developed by Bry and Boschan¹. Table 2 on page 36 compares these turning points with peaks and troughs designated by the National Bureau of Economic Research (NBER).

The data in table 2 suggest that the Average Weekly Hours Diffusion Index is an indicator which precedes, or leads, the NBER reference dates. However, in the period since 1958, many additional peaks and troughs were also identified. These extra cycles make analysis of the Average Weekly Hours Diffusion Index somewhat ambiguous. We suggest that several other economic phenomena be observed in conjunction with the index's cyclical movements when predicting economic movement.

To determine industry bias, diffusion indexes were

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Table 1. Diffusion indexes of average weekly hours in manufacturing and nonmanufacturing sectors by month, year, and span

Year	1-month span											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1958	—	37.5	48.6	26.9	48.1	69.2	64.4	75.5	83.7	45.2	72.6	62.5
1959	60.6	66.3	56.7	71.6	45.2	46.6	38.9	51.4	48.1	45.7	38.9	72.6
1960	43.3	24.5	48.1	36.5	70.2	27.4	51.4	42.8	23.1	61.1	26.0	11.5
1961	88.5	66.3	40.9	67.8	47.6	74.5	66.8	61.5	50.5	73.6	68.3	41.3
1962	25.5	61.1	70.7	70.7	32.7	44.2	45.2	46.2	71.2	14.4	54.8	43.3
1963	66.8	42.3	54.8	34.6	77.9	58.7	45.7	50.0	64.9	51.0	31.7	63.0
1964	21.2	81.0	38.0	72.7	37.0	56.9	63.9	53.7	28.2	68.1	60.6	65.7
1965	64.8	52.8	64.8	22.7	76.9	41.2	51.4	58.8	47.2	69.4	60.6	64.8
1966	51.4	75.5	33.3	48.1	46.8	39.4	33.3	59.7	42.1	48.6	33.3	30.1
1967	67.6	13.4	50.9	63.9	30.6	50.5	66.7	50.9	56.0	41.2	69.9	33.8
1968	22.7	80.1	26.4	17.6	83.8	56.5	38.9	51.9	69.4	40.3	36.1	39.8
1969	58.3	30.6	77.3	49.1	44.0	41.7	39.8	50.0	61.6	30.1	41.7	60.2
1970	36.6	32.9	39.4	30.1	32.9	48.1	63.0	32.9	21.3	70.4	51.9	55.6
1971	62.5	40.7	62.0	45.8	69.4	52.3	62.0	41.2	37.0	65.3	70.4	62.0
1972	56.0	51.3	53.0	63.7	24.7	55.9	46.5	53.0	46.5	60.5	54.0	36.3
1973	44.9	71.2	58.1	50.0	31.7	40.6	56.7	35.2	63.2	36.8	66.7	40.9
1974	51.9	37.6	47.3	19.9	80.4	41.7	38.4	45.7	29.3	34.7	27.7	40.3
1975	55.4	22.8	43.5	68.8	45.4	61.3	57.0	75.0	62.9	56.5	56.2	72.8
1976	72.8	31.5	34.7	34.7	72.8	28.0	58.6	32.0	36.3	59.4	52.2	57.0
1977	27.7	81.7	34.7	63.2	45.2	58.9	36.3	47.3	49.5	61.3	40.6	41.9
1978	21.8	58.1	83.1	71.8	19.9	60.5	51.1	39.8	50.5	43.0	52.7	43.8
1979	58.9	34.1	62.4	17.7	75.8	54.6	50.8	45.7	56.7	37.9	57.0	48.4
1980	60.8	29.6	26.9	50.3	29.3	40.1	42.2	67.7	65.1	54.3	58.1	57.5
1981	69.9	18.3	55.1	63.2	66.4	33.1	50.5	42.7	23.4	59.9	34.4	36.3
1982	12.4	87.9	28.5	51.6	56.7	49.7	50.3	41.1	36.8	47.0	49.2	55.4
1983	74.5	^p 18.3	^p 75.0	—	—	—	—	—	—	—	—	—
3-month span												
1958	—	—	28.4	36.5	57.2	74.0	83.2	84.6	78.4	86.5	72.1	78.8
1959	84.1	68.3	72.1	62.0	59.6	38.5	39.9	31.7	42.3	34.1	57.2	57.7
1960	37.5	24.0	25.5	51.4	38.0	52.9	35.1	28.8	31.3	19.7	9.6	29.8
1961	59.1	87.0	65.9	46.2	78.4	75.5	80.8	60.1	77.4	81.3	74.5	43.3
1962	30.8	54.3	83.7	72.1	50.5	29.3	38.5	49.0	24.5	37.0	24.0	63.0
1963	55.3	62.0	35.1	61.1	70.2	74.5	50.0	62.0	66.8	47.6	48.6	25.5
1964	63.0	45.7	82.9	48.1	62.0	47.2	63.0	38.0	51.4	57.4	75.9	72.2
1965	69.0	73.1	33.8	55.6	32.9	67.1	40.3	47.7	65.3	65.7	75.0	63.9
1966	82.9	64.4	59.7	34.7	36.1	32.9	37.5	38.0	45.4	31.9	26.4	32.4
1967	14.8	20.8	17.1	42.1	46.8	46.3	65.3	66.7	46.8	56.0	41.2	30.6
1968	52.8	49.1	35.2	37.5	63.9	76.9	48.1	60.2	63.4	47.2	26.9	41.2
1969	32.4	63.0	51.4	70.8	38.4	32.4	32.9	47.2	40.3	37.5	36.6	42.6
1970	32.9	22.7	21.3	19.9	22.2	42.1	41.7	24.5	21.8	38.4	60.6	63.4
1971	48.1	57.4	50.9	73.1	66.2	72.7	56.0	44.9	50.9	67.1	75.9	76.4
1972	73.6	65.3	60.5	50.5	50.5	36.0	52.7	50.5	56.5	53.2	46.0	39.2
1973	54.3	67.7	69.9	43.3	31.7	40.9	40.1	57.0	34.9	62.9	44.4	53.8
1974	33.3	34.7	19.9	43.3	39.2	69.9	33.1	25.5	27.4	18.5	21.8	31.2
1975	22.8	28.8	39.5	57.0	66.4	55.6	75.8	80.1	76.1	61.8	73.1	80.9
1976	72.8	41.9	23.1	48.9	48.4	68.0	29.0	31.7	31.7	49.2	64.0	34.4
1977	69.1	61.8	81.7	46.2	62.6	40.6	42.7	35.8	56.2	51.6	45.7	16.9
1978	28.0	63.2	86.3	73.1	50.5	38.7	49.5	47.8	40.9	44.4	41.1	51.9
1979	41.1	56.7	22.0	41.1	34.4	75.8	50.5	48.4	40.3	49.7	49.5	64.8
1980	41.1	25.8	26.1	24.2	28.0	28.8	47.8	66.1	79.3	69.9	67.2	79.6
1981	47.0	42.7	34.4	72.0	60.2	49.7	33.6	22.8	25.5	22.0	42.7	12.4
1982	54.6	43.5	78.5	42.5	57.5	56.5	45.4	34.1	33.3	41.4	54.6	76.9
1983	^p 49.2	^p 64.8	—	—	—	—	—	—	—	—	—	—
6-month span												
1958	—	—	—	46.6	72.1	81.3	78.8	91.3	89.4	93.3	93.3	81.7
1959	91.3	77.4	68.8	59.1	51.0	44.2	32.7	29.3	51.0	47.6	26.4	30.3
1960	35.6	38.5	19.2	26.9	38.9	26.4	48.1	11.5	7.7	28.8	37.5	51.0
1961	48.1	64.4	91.8	76.0	70.2	74.0	84.1	88.5	76.4	59.6	62.5	75.5
1962	67.8	51.0	56.7	67.8	57.2	58.7	24.0	30.3	31.3	40.9	40.9	35.1
1963	47.1	61.5	74.0	63.0	63.9	71.2	80.3	51.4	53.8	31.3	63.5	41.3
1964	52.4	60.1	51.9	82.4	62.5	45.4	47.7	64.8	77.3	71.8	72.7	84.7
1965	53.7	70.4	53.2	48.1	49.5	36.1	75.0	61.1	69.9	74.5	85.2	79.6
1966	71.3	63.9	49.5	35.6	26.9	28.7	35.2	29.2	22.7	39.8	13.0	16.2
1967	15.7	13.4	18.1	21.8	54.6	56.9	39.8	65.7	56.5	31.5	62.5	41.2
1968	25.5	41.2	63.0	72.7	39.4	70.8	80.6	42.6	35.6	44.9	32.9	39.4
1969	42.1	52.8	53.7	36.1	63.0	37.5	25.5	29.6	37.5	35.2	30.6	22.7
1970	26.4	19.4	14.8	23.1	21.3	18.5	25.5	35.6	38.9	34.3	38.4	66.7

See note at end of table.

Table 1. Continued—Diffusion indexes of average weekly hours in manufacturing and nonmanufacturing sectors by month, year, and span

Year	6-month span											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	60.2	64.4	68.5	64.4	68.5	53.2	66.2	66.2	69.0	67.6	75.5	81.5
1972	84.3	69.4	64.8	50.5	50.0	48.1	42.2	57.0	45.4	42.5	57.8	60.5
1973	56.5	49.7	52.4	62.9	35.8	39.2	31.7	52.7	49.5	44.9	49.5	34.1
1974	22.3	31.2	35.5	30.6	31.7	27.7	54.8	14.8	20.4	23.4	12.1	13.4
1975	31.5	37.4	48.4	43.3	67.7	73.1	67.7	75.8	82.8	87.9	76.6	63.7
1976	48.9	66.7	41.9	34.7	36.8	34.9	58.6	33.1	47.8	23.9	66.1	69.4
1977	65.9	66.7	65.6	77.7	43.3	52.7	51.9	48.9	37.1	19.1	26.3	57.0
1978	64.2	50.3	60.5	78.2	71.2	45.7	28.5	50.3	41.4	45.2	38.4	51.1
1979	19.6	33.9	42.2	36.6	45.7	39.0	70.4	51.3	46.0	52.4	41.4	30.6
1980	37.1	19.4	16.4	18.8	24.7	44.1	49.7	59.9	75.3	83.9	64.0	62.6
1981	67.2	69.4	49.7	34.7	53.5	29.3	28.2	20.7	25.8	12.4	31.5	41.7
1982	37.1	44.9	50.3	79.6	36.3	46.5	38.2	31.5	37.4	58.1	^p 35.2	^p 63.7
Year	9-month span											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1958	—	—	—	—	—	72.6	84.6	88.0	91.3	93.3	94.2	93.8
1959	92.3	79.8	76.9	70.2	55.8	50.5	37.0	56.3	38.5	25.5	26.9	30.8
1960	30.3	23.6	33.7	33.7	14.4	23.6	28.8	12.0	35.6	27.4	29.8	40.9
1961	37.5	71.6	64.9	76.4	87.5	82.2	81.7	83.2	66.8	82.2	81.3	77.9
1962	76.4	70.7	58.7	34.1	56.3	53.8	50.0	29.8	27.9	32.2	37.5	31.3
1963	50.5	49.5	73.6	65.4	73.6	70.7	60.1	65.4	47.1	62.5	49.5	69.7
1964	59.1	51.4	56.3	74.5	39.4	78.7	65.7	79.6	69.9	78.7	81.0	49.5
1965	73.1	75.0	70.4	62.5	53.2	56.5	59.3	63.0	79.6	80.1	79.2	76.9
1966	73.1	67.6	48.6	54.2	42.1	39.4	22.2	14.8	30.6	11.1	11.1	13.0
1967	9.3	17.6	15.7	24.5	33.3	24.5	54.2	49.5	32.9	67.1	56.9	25.5
1968	55.1	59.3	59.3	45.4	67.1	76.4	40.7	48.1	79.6	34.7	46.3	55.1
1969	53.7	37.5	32.9	42.1	52.3	32.9	56.5	30.6	24.5	18.1	22.7	27.8
1970	18.5	13.4	25.9	19.0	14.4	13.9	23.1	25.9	36.6	38.0	50.9	34.3
1971	56.0	70.4	70.4	64.4	60.6	65.7	74.5	73.6	79.2	76.4	79.2	81.0
1972	71.8	75.5	73.6	69.9	61.1	54.8	54.8	47.8	34.4	61.3	58.6	59.4
1973	50.8	44.4	50.8	37.4	54.0	51.1	48.4	34.7	38.4	37.6	40.9	20.2
1974	40.1	30.1	31.2	24.2	22.6	20.7	16.7	19.9	43.0	9.4	10.8	18.8
1975	18.0	25.5	33.6	52.4	56.3	59.1	69.9	79.0	80.6	83.3	78.2	62.4
1976	71.0	59.7	64.5	53.5	33.6	25.8	33.9	47.0	45.2	51.3	51.9	51.1
1977	64.8	72.6	63.4	64.0	57.5	77.4	46.2	50.5	21.2	25.5	49.7	68.5
1978	53.2	57.5	52.2	53.5	55.4	76.1	68.0	42.7	36.3	42.7	49.5	19.9
1979	32.8	37.9	40.9	38.4	47.6	34.4	48.1	42.7	71.2	43.3	33.3	37.4
1980	26.6	20.2	23.9	25.0	26.3	28.0	38.2	57.3	66.1	57.5	72.6	77.2
1981	77.2	65.1	60.5	55.4	25.8	17.5	33.6	23.4	9.1	27.2	25.3	25.0
1982	27.2	46.8	40.3	40.1	41.9	69.9	30.4	43.3	64.5	^p 35.5	^p 54.8	—
Year	12-month span											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1958	—	—	—	—	—	—	83.7	90.4	91.8	91.8	93.3	88.5
1959	88.9	89.9	71.6	69.2	55.8	67.3	56.7	32.2	30.3	29.3	31.3	24.0
1960	29.8	26.9	18.8	30.3	20.2	8.2	18.8	32.7	31.3	45.7	28.8	55.3
1961	63.9	61.1	72.6	74.0	88.5	91.8	67.3	72.6	88.9	85.1	89.4	78.4
1962	71.6	66.8	74.0	44.2	33.2	35.6	63.5	49.0	42.3	24.5	44.7	46.2
1963	49.0	49.5	56.7	76.4	63.5	69.7	34.6	67.3	58.7	79.3	56.7	58.7
1964	63.5	68.8	39.9	51.0	72.6	78.8	83.8	71.8	80.6	44.9	78.7	71.3
1965	62.5	64.8	74.5	72.7	75.9	71.8	69.4	78.2	71.3	80.6	67.6	72.2
1966	60.6	60.6	62.0	53.7	49.1	29.2	36.6	8.3	11.1	15.7	7.9	11.6
1967	19.9	16.2	23.6	16.7	31.0	31.9	15.7	58.3	50.9	29.2	63.9	71.3
1968	56.5	50.5	59.7	65.7	42.1	52.3	70.8	31.9	63.0	78.2	46.8	45.4
1969	37.5	39.8	32.9	29.2	39.4	42.6	29.2	41.7	20.8	19.4	11.1	14.8
1970	26.4	14.4	12.0	15.3	18.1	15.3	27.3	23.1	32.9	36.6	57.4	53.7
1971	51.4	56.0	66.7	66.2	68.5	73.6	71.3	78.2	73.6	86.1	72.7	74.5
1972	67.1	79.6	81.0	75.0	69.4	62.0	47.3	55.6	61.6	53.8	57.3	46.8
1973	54.0	40.3	49.2	41.1	48.4	54.3	59.1	39.0	29.3	24.5	35.5	34.7
1974	27.4	33.1	22.8	23.1	14.5	20.7	21.5	12.9	13.2	35.5	15.3	17.7
1975	20.7	31.5	43.0	42.7	59.4	65.1	75.8	80.4	79.6	64.5	78.0	73.9
1976	71.2	57.8	44.6	54.0	56.5	43.5	21.0	50.0	54.0	62.5	48.7	63.2
1977	44.4	59.1	66.4	64.5	62.4	55.6	48.9	29.0	60.8	66.7	50.8	46.5
1978	54.6	50.0	49.7	39.2	53.8	53.8	76.9	61.6	49.7	18.3	37.4	30.9
1979	30.1	34.9	35.5	40.3	45.4	45.7	48.1	43.8	27.4	61.8	30.9	23.4
1980	23.7	26.9	25.8	37.4	37.9	42.7	50.5	38.4	51.1	53.8	70.7	69.4
1981	70.7	69.4	39.2	43.5	33.3	24.5	5.6	40.9	25.0	21.2	21.0	25.0
1982	28.5	23.1	33.9	23.4	32.5	43.0	80.9	^p 30.4	^p 60.5	—	—	—

NOTE: Indexes are computed using seasonally adjusted data, except for the 12-month index. Three-digit SIC categories are included in the manufacturing sector, and 2-digit ones in nonmanufacturing. ^p=preliminary.

Table 2. Diffusion index peaks and troughs and those of the business cycle¹

Diffusion index peaks					NBER ¹ reference peaks
1 month	3 months	6 months	9 months	12 months	
—	—	—	—	—	Aug. 1957
Sept. 1958	Oct. 1958	Nov. 1958	—	—	Apr. 1960
June 1961	Oct. 1961	Aug. 1961	May 1961	Nov. 1961	—
May 1965	Jan. 1966	Nov. 1965	Oct. 1965	Oct. 1965	—
Feb. 1968	June 1968	July 1968	Sept. 1968	Dec. 1967	Dec. 1969
Nov. 1971	Dec. 1971	Jan. 1972	Dec. 1971	Oct. 1971	Nov. 1973
Aug. 1975	Dec. 1975	Oct. 1975	Oct. 1975	Aug. 1975	—
Mar. 1978	Mar. 1977	Apr. 1977	June 1977	Mar. 1977	Jan. 1980
—	Dec. 1980	Oct. 1980	Jan. 1981	Jan. 1981	July 1981
—	—	Apr. 1982	—	—	—
Diffusion index troughs					NBER ¹ reference troughs
1 month	3 months	6 months	9 months	12 months	
—	—	—	—	—	Apr. 1958
Dec. 1960	Nov. 1960	Sept. 1960	Aug. 1960	June 1960	Feb. 1961
Oct. 1962	Nov. 1962	July 1962	Sept. 1962	Oct. 1962	—
Feb. 1967	Jan. 1967	Nov. 1966	Jan. 1967	Nov. 1966	—
Sept. 1970	Apr. 1970	Mar. 1970	Feb. 1970	Mar. 1970	Nov. 1970
Feb. 1975	Oct. 1974	Nov. 1974	Oct. 1974	Aug. 1974	Mar. 1975
June 1976	July 1976	Aug. 1976	June 1976	July 1976	—
—	Apr. 1980	Mar. 1980	Feb. 1980	Dec. 1979	July 1980
Jan. 1982	Dec. 1981	Oct. 1981	Sept. 1981	July 1981	—

¹ Designated by the National Bureau of Economic Research.

computed, as a test, for both manufacturing and nonmanufacturing sectors using the same procedures described earlier. The nonmanufacturing index indicates less volatile changes than that of manufacturing. This is particularly true in the 9- and 12-month spans where trend curves and cyclical movement are more easily identified. Although we did not pursue this further, the new indexes will be somewhat affected by the subdued behavior of the nonmanufacturing industries.

We hope that these indexes will be useful to the economist who attempts to forecast future economic activity. Perhaps they will provide a stronger analytical framework for developing business, labor, and government policies. □

— FOOTNOTE —

¹ Gerhard Bry and Charlotte Boschan, *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs*, National Bureau of Economic Research, 1971, Columbia University Press, New York and London.