Technical Note

A new leading index of employment and unemployment

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One of the composite leading economic indicators published by the Commerce Department is the "marginal employment adjustments" index. Its title derives from the fact that its components reflect employment adjustments typically made by employers and employees during the early stage of the business cycle. Three of the four components pertain to manufacturing: the average workweek, the accession rate, and the layoff rate. The fourth, initial claims for unemployment insurance, is broader in scope. The workweek reflects changes in the amount of overtime or in the number of workers employed part time; such adjustments can usually be made more promptly, and are easier to reverse when necessary, than decisions to hire and fire. The accession rate includes persons newly hired as well as those rehired after layoff, and the layoff rate includes both temporary and permanent layoffs. Initial claims represent the number of persons currently applying for unemployment compensation, rather than those who are already receiving it.

Each of the four series typically leads at business cycle peaks and leads or is roughly coincident at troughs. Thus, the composite of the four series has led at every one of the seven business cycle peaks and six troughs between 1948 and 1980. The leads at troughs, however, have been short; for 4 of the 6 troughs, the lead was only 1 month. At peaks, the leads averaged 12 months, and none was shorter than 8 months.

One reason the leads are long at peaks and short at troughs is that the index, as well as each of its components, displays virtually no long-term growth. At its earliest peak, in January 1948, the index was 102.5 (1967 = 100). At its latest peak, in December 1978, the index stood at 99.1. Because the marginal employment adjustments index does not reflect the substantial

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growth of the economy during the intervening 30 years, its flat trend tends to produce early peaks and late troughs when compared with aggregate economic activity. This characteristic is a disadvantage for some purposes and an advantage for others. Warnings of a recession a year or more ahead are apt to be discounted, in view of the inevitable uncertainties, while signs of recovery a month ahead of the event are of limited value. On the other hand, the marginal employment adjustments index can be expected to be symmetrical in its behavior with respect to the peaks and troughs of some important economic indicators, such as the unemployment rate, the employment ratio, or the capacity utilization rate, which are also largely trendless.

There is a need, therefore, for a leading index in two forms, one with a trend corresponding to the growth in the economy, the other without. The trend requirement can be met by the same procedure used in the Commerce Department's comprehensive leading index, namely, reverse trend adjustment. Here the long-term trend in the index is set equal to a "target trend" observed over a certain period, and the current figures are adjusted by the same monthly increment required to achieve the target trend in the given period. In addition, it would be desirable to take advantage of component series that are available promptly, and at the same time reduce the considerable weight given to manufacturing in the existing index (3 out of 4 series). Less emphasis on a single sector may reduce the size of subsequent revisions of the index and smooth out erratic fluctuations, especially if the expanded sector coverage is provided by series from different sources.

With these objectives in mind, the Rutgers Center for International Business Cycle Research has constructed a new index based upon four components. Two are included in the existing index: average workweek and initial claims. The third series is average weekly overtime hours in manufacturing. This is a component of the average workweek, but is included as well because it is smoother and less frequently affected by holidays. The fourth series is the ratio of voluntary to involuntary part-time employment. The cyclical movements in this ratio are attributable primarily to the denominator, which reflects employers' decisions to shorten work hours in response to current or anticipated adverse business conditions. It behaves as a leading indicator at

Chart 1. Relation of new leading index of employment to the unemployment rate, 1972-80

Index (1967=100)   Unemployment rate (in percent)
110
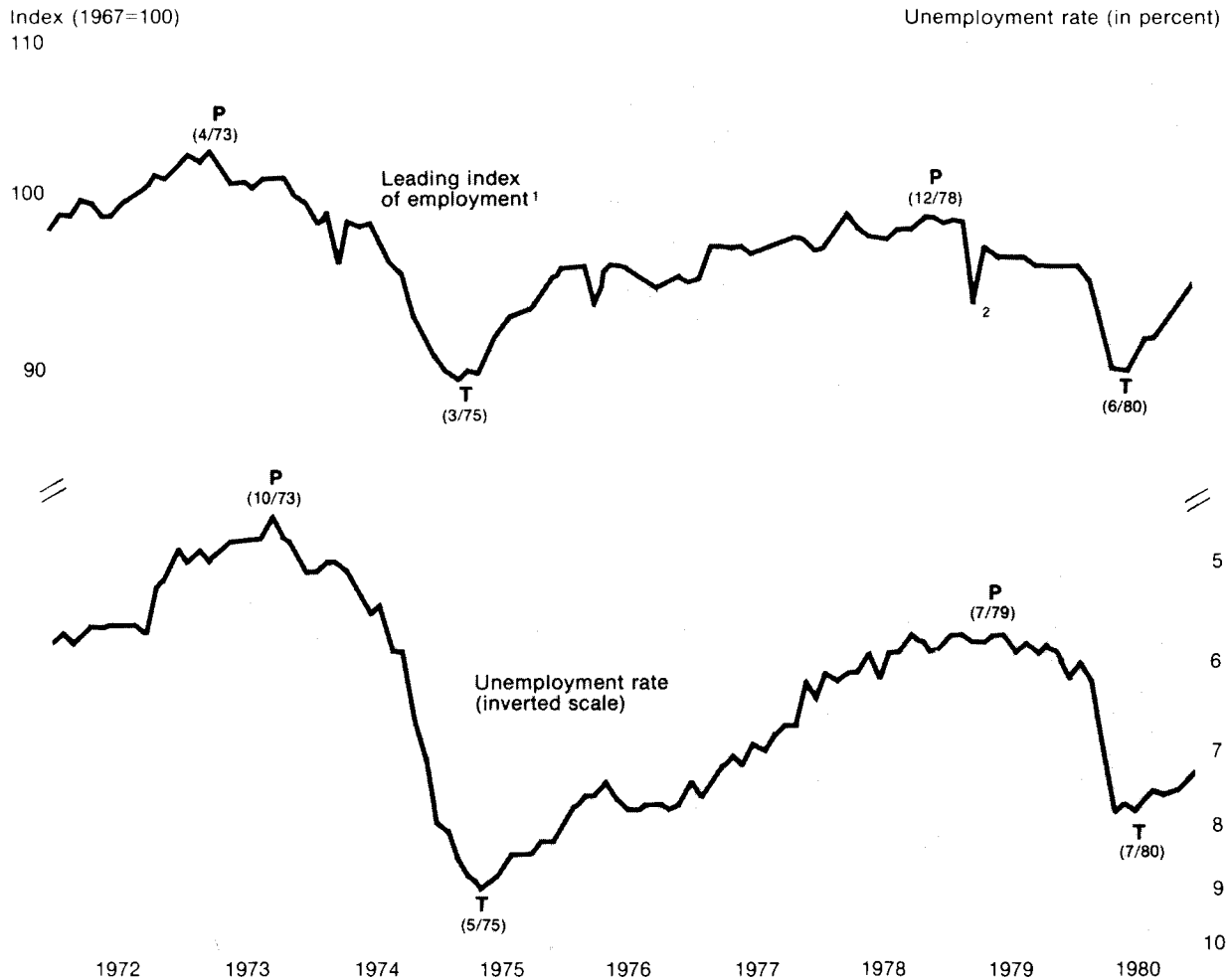
' Excludes target trend.
² April 1979 data affected by trucking strike and holidays.

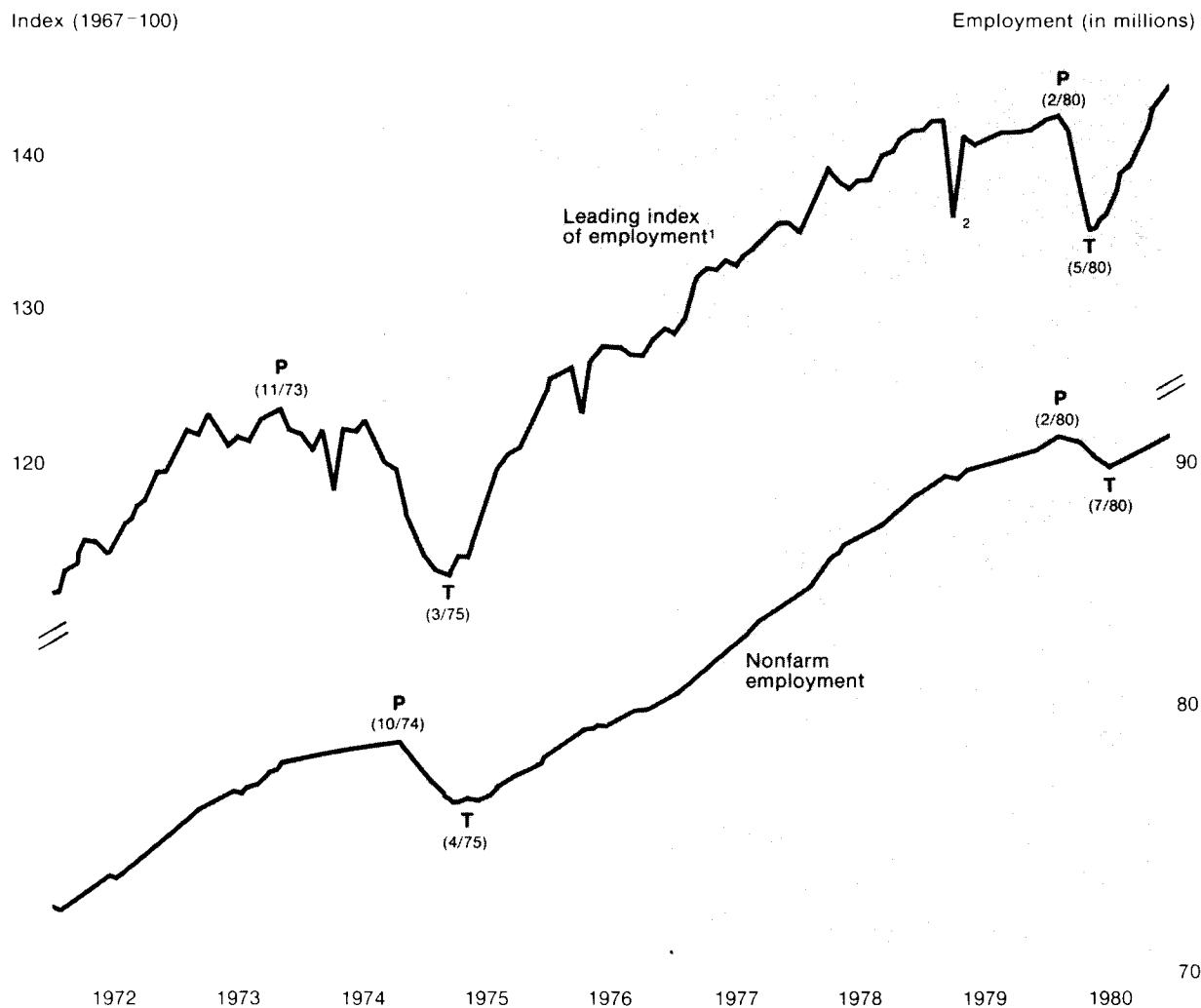NOTE: P indicates series peaks; T indicates troughs.

peaks and is roughly coincident at troughs.[1] It is based on data from the Current Population Survey of households and hence is statistically independent of the other series in the index, which are based on the Bureau of Labor Statistics establishment survey (average workweek and overtime hours) or unemployment insurance records (initial claims). Also, it covers all sectors of the economy, not just manufacturing.

Hence the new index includes two series that are restricted to manufacturing (average workweek and overtime hours) and two that are broader in scope (initial claims and part-time employment ratio). Only two of the series are from the same data source. Moreover, all

the components are usually available by the end of the first or second week of the month following the month to which they refer. As a result, the new leading index is compiled by the Rutgers Center concurrently with other employment data, and about 3 weeks earlier than the existing index. In its original form the index has virtually no long-run trend, but it is also compiled with a growth trend equal to that used in the Commerce Department's leading, coincident, and lagging indexes, namely 3.3 percent annually, or 0.272 percent per month.[2]

The new index without the target trend factor yields results very similar to those from the present index.

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Chart 2. Relation of new leading index of employment to nonfarm employment, 1972-80

Index (1967─100)   Employment (in millions)

P
(2/80)

140

Leading index
of employment¹

T
(5/80)

130

P
(11/73)

P
(2/80)

120   90

T
(7/80)

T
(3/75)

Nonfarm
employment

P
(10/74)

80

T
(4/75)

70

1972   1973   1974   1975   1976   1977   1978   1979   1980

¹ Includes target trend factor of 3.3 percent per year.
² April 1979 data affected by trucking strike and holidays.

NOTE: P indicates series peaks; T indicates troughs.

Five of the turning points are in the same month in both indexes, one is 6 months earlier in the new index, six are a month later, and one is 2 months later. Thus, the new index is often not quite as prompt as the existing one in reaching its high and lows. However, the new index is somewhat smoother. Its relation to the unemployment rate is shown in table 1. It reaches its highs and lows prior to the corresponding turns in unemployment in every instance except the January 1948 peak, and the average lead is about 6 months. Hence the new index should prove to be a useful leading indicator of unemployment, especially if, as we expect, it is less subject to revision than the present index.

Not only does the new index lead, but the magnitude of its changes are rather closely correlated with subsequent changes in the unemployment rate. (See chart 1.) For example, a regression of the year-to-year change in unemployment on the change in the new index during the last 6 months of the preceding year yields a correlation coefficient of $-.90$ during the period 1949–80 (31 observations). Thus, by this simple method, the unemployment rate was forecast for the year ahead with an average error of about half a percentage point.

The new index with the target trend bears a fairly close relationship to nonfarm employment. (See chart 2.) However, the trend is steeper because the trend rate

of growth in nonfarm employment is 2.2 percent annually, compared with the 3.3-percent target trend in the new index; the latter figure was selected to permit comparison with series other than nonfarm employment. The new index leads employment at 12 of the 13 peaks and troughs between 1948 and 1980, and is coincident once. The average lead is 3 months and the leads are about as long at troughs as at peaks (table 2).

COMPARED WITH THE existing index of this type, the new leading index of employment and unemployment has a broader economic coverage and is available more promptly. In its trendless form the new index is comparable with other series that are essentially trendless, such as the unemployment rate, employment ratio, or capacity utilization rate. It consistently leads the unemployment rate at both peaks and troughs by about 6 months on average. The index is also constructed with a trend, in which form it is comparable with series that grow with the economy, such as the employment level,

which it leads by 2 or 3 months at both peaks and troughs. The new index, therefore, offers an early warning of cyclical shifts in employment and unemployment. □

Table 1. Relationship of the unemployment rate and the new leading index of employment (without target trend) to the business cycle, 1948–80

[In months]

Business cycle	Lead (-) or lag (+) at business cycle turns		Lead (-) or lag (+) of new index at turns in unemployment rate
	Inverted unemployment rate	New leading index of employment without target trend	
Peak: November 1948	[1]-10	[1]-10	[1]0
Trough: October 1949	0	-5	-5
Peak: July 1953	-1	-8	-7
Trough: May 1954	+4	-1	-5
Peak: August 1957	-4	-21	-17
Trough: April 1958	+3	0	-3
Peak: April 1960	-2	-11	-9
Trough: February 1961	+3	-2	-5
Peak: December 1969	-7	-14	-7
Trough: November 1970	+9	0	-9
Peak: November 1973	-1	-7	-6
Trough: March 1975	+2	0	-2
Peak: January 1980	-6	-13	-7
Mean lead or lag:			
At peaks	-4	-12	-8
At troughs	+4	-1	-5
At both turns	-1	-7	-6

[1] Initial month of series. Hence, peak might have been earlier and index might have led the unemployment rate.

Table 2. Relationship of nonfarm employment and the new leading index of employment (with target trend) to the business cycle, 1948–80

[In months]

Business cycle	Lead (-) or lag (+) at business cycle turns		Lead (-) or lag (+) of new index at turns in employment rate
	Nonfarm employment	New leading index of employment, with target trend [1]	
Peak: November 1948	-2	-4	-2
Trough: October 1949	0	-6	-6
Peak: July 1953	-1	-3	-2
Trough: May 1954	+3	-2	-5
Peak: August 1957	-5	-8	-3
Trough: April 1958	+1	0	-1
Peak: April 1960	0	-3	-3
Trough: February 1961	0	-2	-2
Peak: December 1969	+3	0	-3
Trough: November 1970	0	0	0
Peak: November 1973	+11	0	-11
Trough: March 1975	+2	0	-1
Peak: January 1980	+1	0	-1
Mean lead or lag:			
At peaks	+1	-2	-4
At troughs	+1	-2	-2
At both turns	+1	-2	-3

[1] Target trend is that used in *Business Conditions Digest* composite indexes, 0.272 percent per month.

————FOOTNOTES————

[1] See Geoffrey H. Moore, *Business Cycles, Inflation and Forecasting* (Cambridge, Mass., Ballinger Publishing Company, 1980), Ch. 18.

[2] The trend rates are compound monthly rates between average levels during the peak-to-peak specific cycles 1948–53 and 1974–79. The target trend is the average for the four components of the coincident index: nonfarm employment, real personal income less transfer payments, industrial production, and real manufacturing and trade sales. It is almost the same as the rate for real gross national product. See *Business Conditions Digest*, March 1979, p. 107, for more details.