



BOARD OF GOVERNORS  
OF THE  
FEDERAL RESERVE SYSTEM  
WASHINGTON, D. C. 20551

October 7, 1977

TO: Federal Open Market Committee      SUBJECT: Analyses of Seasonal  
FROM: Arthur L. Broida *ALB*      Adjustments of Unemployment Series

At the September 20 FOMC meeting Chairman Burns referred to certain recent staff analyses of seasonal adjustment problems in the unemployment series and indicated that the staff memoranda in question would be distributed to the Committee.

Note that in the tests relating to unemployment insurance claims (reported in the memorandum dated September 16), the standard X-11 seasonal adjustment procedure is applied to average monthly data, whereas in the series actually published by the B.L.S., the X-11 procedure is applied to weekly data, which are then averaged to arrive at monthly data.

Attachments

BOARD OF GOVERNORS  
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# Office Correspondence

Date SEPTEMBER 20, 1977

To CHAIRMAN BURNS

Subject: SEASONAL ADJUSTMENT OF UNEM-

From ROBERT GAY *Robert Gay*

PLOYMENT RATE AND NUMBER OF UNEMPLOYED

## RECENT EXPERIENCE:

IN AUGUST THE NUMBER OF UNEMPLOYED PERSONS ROSE BY 180,000 TO 6.9 MILLION, SEASONALLY ADJUSTED. THE OVERALL UNEMPLOYMENT RATE WAS 7.1 PER CENT, UP FROM 6.9 PER CENT IN JULY. OF CONCERN IS WHETHER PROBLEMS IN THE SEASONAL ADJUSTMENT OF THESE DATA MAY BE OVERSTATING THE RISE IN UNEMPLOYMENT.

## ANALYSIS

TO TEST FOR POTENTIAL BIAS IN THE SEASONAL ADJUSTMENT PROCEDURE, AN ALTERNATIVE SERIES WAS CONSTRUCTED FOR BOTH SERIES BY ADJUSTING EACH WITH PRE-RECESSION (1973) SEASONAL FACTORS USED BY THE B.L.S. TABLES 1 AND 2 PRESENT THE OFFICIAL B.L.S. SERIES AND THE ALTERNATIVE SERIES FOR THE NUMBER OF UNEMPLOYED AND THE UNEMPLOYMENT RATE, RESPECTIVELY. A GRAPHICAL COMPARISON OF THE TWO SERIES ALSO IS INCLUDED.

## RESULTS

IF IT CAN BE ASSUMED THAT SEASONAL PATTERNS HAVE NOT CHANGED FROM THOSE OF 1973, THE LEVEL OF THE NUMBER OF UNEMPLOYED AND THE LEVEL OF THE UNEMPLOYMENT RATE WOULD HAVE BEEN LOWER IN AUGUST--6.7 MILLION AND 6.9 PER CENT, RESPECTIVELY-- THAN THE OFFICIAL SERIES. HOWEVER, THE RATES OF INCREASE

IN AUGUST FOR THE ALTERNATIVE SERIES ARE ROUGHLY COMPARABLE TO THE OFFICIAL INCREASES--110,000 MILLION INCREASE IN UNEMPLOYED PERSONS AND .1 PERCENTAGE POINT INCREASE IN THE UNEMPLOYMENT RATE.

THE PATTERN OF POTENTIAL BIAS DUE TO PROBLEMS WITH SEASONAL ADJUSTMENT PROCEDURES IS SEEN IN GRAPHS 1 AND 2. COMPARED TO THE SERIES ADJUSTED BY PRE-RECESSION FACTORS, THE OFFICIAL SERIES ON THE NUMBER OF UNEMPLOYED PERSONS AND THE UNEMPLOYMENT RATE TENDS TO UNDERSTATE UNEMPLOYMENT FROM JANUARY TO JUNE EACH YEAR AND OVERSTATE UNEMPLOYMENT DURING THE JULY TO DECEMBER PERIOD.

TABLE 1: TOTAL NUMBER OF UNEMPLOYED PERSONS  
SEASONALLY ADJUSTED BY ALTERNATIVE METHODS

	Number of Unemployed Seasonally Adjusted <u>1/</u> (Official BLS figures; in thousands)	Number of Unemployed Seasonally Adjusted by 1973 Factors <u>2/</u> (in thousands)
1975 - January	7280	7527
February	7362	7530
March	7777	7974
April	7964	8114
March	8314	8389
June	8099	8095
July	8061	7942
August	7921	7723
September	8011	7758
October	8048	7908
November	7813	7634
December	7705	7623
1976 - January	7247	7529
February	7126	7300
March	7017	7209
April	7047	7174
May	6911	6971
June	7171	7164
July	7406	7287
August	7517	7318
September	7448	7191
October	7564	7429
November	7651	7475
December	7519	7449
1977 - January	6958	7232
February	7183	7361
March	7064	7253
April	6737	6855
May	6750	6808
June	6962	6948
July	6744	6635
August	6926	6743

1/ Official BLS figures use 1976 seasonal factors to adjust 1977 data. The component series for adults are adjusted by multiplicative factors; the unemployment level for teenagers is adjusted by an additive factor.

2/ Official (multiplicative) BLS factors based on data from 1967 through 1973, were used for the adult series; the unemployment series for teenagers was adjusted by additive factors computed for the same period by standard X-11 procedures.

TABLE 2: UNEMPLOYMENT RATE SEASONALLY ADJUSTED BY  
ALTERNATIVE METHODS

	Unemployment Rate, Seasonally Adjusted <u>1/</u> (Official BLS Series)	Unemployment Rate, Seasonally Adjusted by 1973 Factors <u>2/</u>
1975 - January	7.9	8.2
February	8.0	8.2
March	8.5	8.7
April	8.6	8.8
May	9.0	9.0
June	8.7	8.7
July	8.7	8.5
August	8.5	8.3
September	8.6	8.3
October	8.6	8.5
November	8.4	8.2
December	8.3	8.2
1976 - January	7.8	8.0
February	7.6	7.8
March	7.5	7.7
April	7.5	7.6
May	7.3	7.4
June	7.6	7.6
July	7.8	7.7
August	7.9	7.7
September	7.8	7.5
October	7.9	7.8
November	8.0	7.8
December	7.8	7.8
1977 - January	7.3	7.6
February	7.5	7.7
March	7.3	7.5
April	7.0	7.1
May	6.9	7.0
June	7.1	7.1
July	6.9	6.8
August	7.1	6.9

1/ Official BLS figures use 1976 seasonal factors to adjust 1977 data. All component series are adjusted by multiplicative factors except the unemployment series for teenagers which are additively adjusted.

2/ All component series except the teenage unemployment series were adjusted by official (multiplicative) BLS factors based on data from 1967 through 1973. The teenage unemployment series were additively adjusted based on data from 1967 through 1973.

CHART 1: COMPARISON OF NUMBER OF UNEMPLOYED PERSONS SEASONALLY ADJUSTED BY ALTERNATIVE METHODS

(BASED ON HOUSEHOLD SURVEY; IN THOUSANDS)

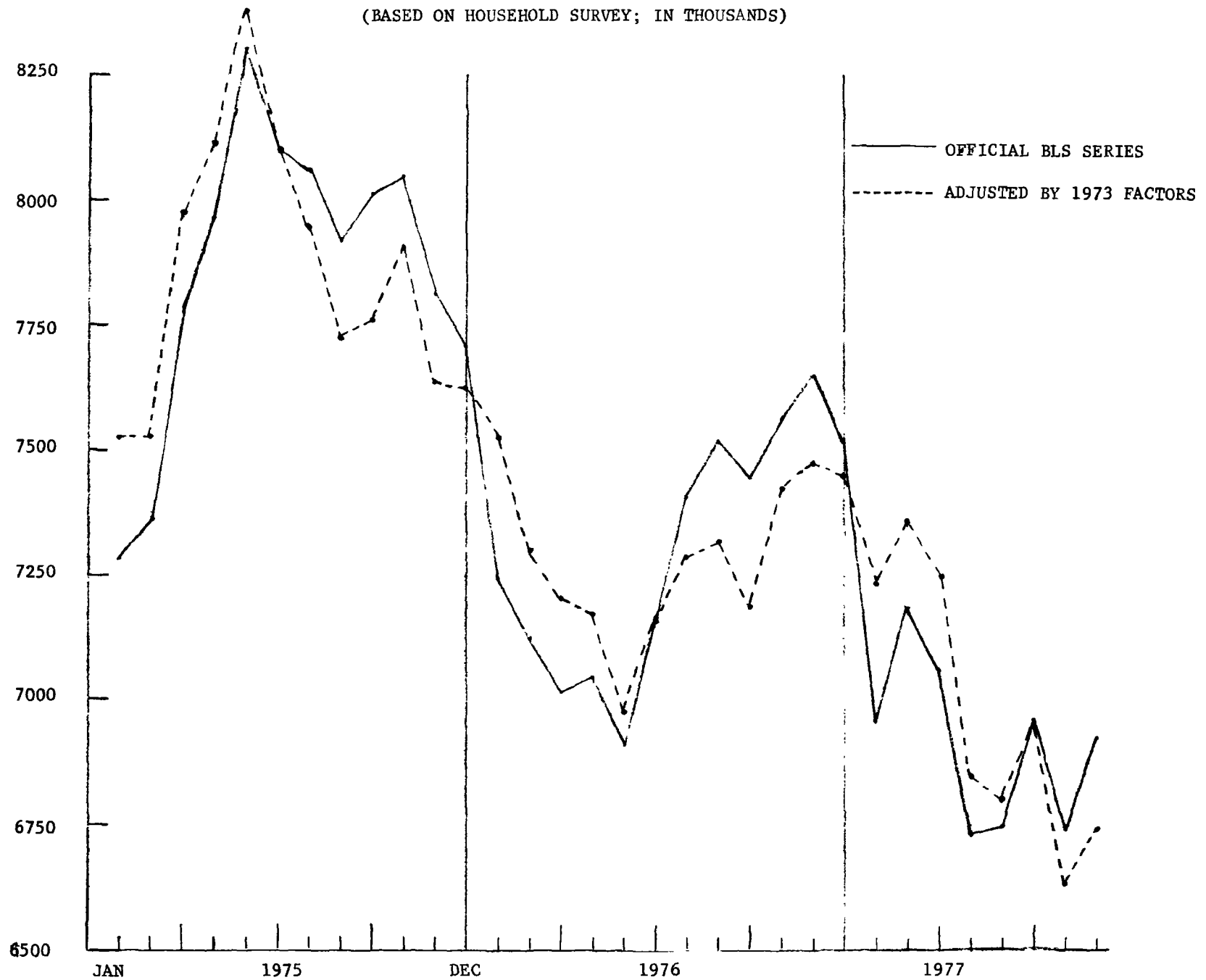
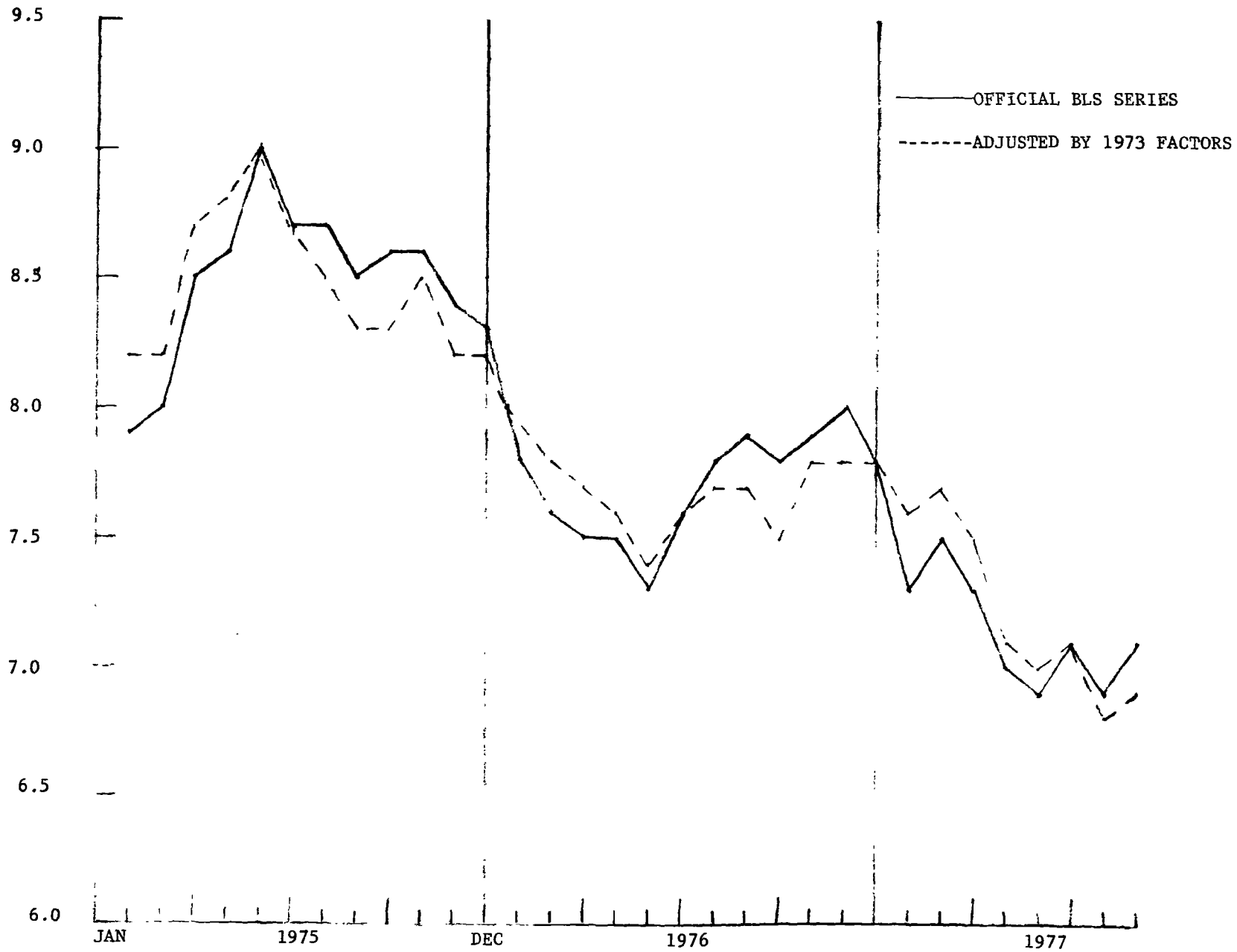


CHART 2: COMPARISON OF UNEMPLOYMENT RATES SEASONALLY ADJUSTED BY ALTERNATE METHODS

(BASED ON HOUSEHOLD SURVEY)



BOARD OF GOVERNORS  
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# Office Correspondence

Date September 16, 1977

To Mr. James Annable

Subject: Seasonal Adjustment of Unem-

From Robert Gay

ployment Insurance Data

## Recent U.I. Data

In recent months, the seasonally adjusted series on the average weekly volume of initial claims and continuing claims for unemployment insurance under regular State programs have been increasing. Average weekly volume of initial claims for the month of August was 6.7 per cent above the June level; continuing claims rose 10.7 per cent over the same period. At issue is whether the increase for the summer months is due to a combination of the following problems:

- a) distortion of seasonal adjustment factors by the sharp cyclical movements of 1974 and 1975; and
- b) the use of multiplicative seasonal factors which may over-adjust these series when they lie outside their normal range.

Taken together, these seasonal adjustment problems may have distorted the two U.I. claims series.

## Analysis

To test for potential bias in the seasonal adjustment procedure, two alternative series were constructed. Both monthly claims series were adjusted by:

1. pre-recession (1973) seasonal factors; and
2. factors which assume a stable seasonal pattern over the 1967-1976 period, thus reducing the importance of the recession years in their construction.



Tables 1 and 2 present the various series for initial and continuing claims, respectively, adjusted on a monthly basis using standard 1976 factors (column 1), 1973 factors (column 2) and stable seasonal factors (column 3). A graphical comparison of each standard series with the alternative series using 1973 factors also is included.

### Results

If it can be assumed that seasonal patterns have not changed from those of 1973, the initial claims series actually would have declined by 1.6 per cent between June and August of this year; continuing claims would have risen by only 1 per cent. Under the assumption of a stable seasonal pattern for the entire 1967-1976 period, adjusted initial claims would have remained unchanged between June and August; adjusted continuing claims would have risen by 3.6 per cent.

The pattern of potential bias due to problems with seasonal adjustment procedures is most clearly seen in the graphs. The initial claims series adjusted by standard 1976 factors is consistently lower than the one adjusted by pre-recession factors from December through March each year; the standard series is higher for the July through November months. The pattern of potential bias is quite similar for the continuing claims series, the standard series being lower in the first half of the year (February through June) and higher in the latter half (August through December). When the series adjusted by stable seasonal factors is used as a basis of comparison, an identical pattern of potential bias is found although the magnitude of the bias appears smaller.

TABLE 1: AVERAGE WEEKLY INITIAL UNEMPLOYMENT INSURANCE  
CLAIMS: SEASONAL ADJUSTMENT BY ALTERNATIVE METHODS

	Adjusted By <sub>1</sub> / 1976 Factors <sub>1</sub> / (in thousands)	Adjusted By <sub>2</sub> / 1973 Factors <sub>2</sub> / (in thousands)	Adjusted By Constant Seasonal (1976) Factors <sub>3</sub> / (in thousands)
1973 - January	224	237	225
February	223	233	222
March	226	236	227
April	240	243	241
May	239	237	240
June	242	241	244
July	248	231	244
August	261	244	250
September	251	238	248
October	251	242	250
November	260	253	263
December	288	301	295
1974 - January	298	319	303
February	320	336	321
March	308	325	313
April	293	296	293
May	294	290	295
June	304	303	306
July	313	285	301
August	351	326	333
September	371	351	365
October	416	400	414
November	474	456	474
December	508	535	525
1975 - January	524	569	540
February	541	570	544
March	533	565	545
April	517	520	516
May	499	491	498
June	502	499	505
July	450	403	425
August	470	432	441
September	462	435	453
October	438	422	436
November	399	382	397
December	360	382	374

TABLE 1 (continued)

	Adjusted By <sup>1/</sup> 1976 Factors (in thousands)	Adjusted By <sup>2/</sup> 1973 Factors (in thousands)	Adjusted By Constant Seasonal (1976) Factors <sup>3/</sup> (in thousands)
1976 - January	360	394	374
February	346	366	349
March	351	375	361
April	367	369	365
May	397	391	396
June	406	404	408
July	404	358	378
August	415	380	388
September	429	405	421
October	429	414	428
November	395	378	393
December	352	373	366
1977 - January	394	432	409
February	427	452	432
March	336	358	345
April	362	364	361
May	382	376	381
June	372	370	374
July	384	341	360
August	397	364	372

- <sup>1/</sup> Monthly seasonal adjustment factors (multiplicative) for 1976 were derived from the standard X-11 procedure and applied to the average monthly data. Factors for 1976 were used for 1977. The data in this column correspond, but are not identical, to the official BLS monthly series which is seasonally adjusted weekly and then averaged to arrive at the monthly figure.
- <sup>2/</sup> Monthly seasonal factors (multiplicative) were computed by the standard X-11 procedure from data for 1967 through 1973 and were applied to average monthly data. These factors are independent of the 1974 and 1975 experience.
- <sup>3/</sup> Monthly seasonal factors (multiplicative) were derived by weighting data for each of the last ten years (1967-1976) equally in the X-11 procedure. These factors suppress the heavy weight which the standard X-11 procedure assigns to data for the most recent years.

**TABLE 2: INSURED UNEMPLOYMENT UNDER STATE PROGRAMS (AVERAGE WEEKLY VOLUME):**

**SEASONAL ADJUSTMENT BY ALTERNATIVE METHODS**

	Adjusted By 1976 Factors <sup>1/</sup> (in thousands)	Adjusted By 1973 Factors <sup>2/</sup> (in thousands)	Adjusted By Constant Seasonal (1976) Factors <sup>3/</sup> (in thousands)
1973 - January	1602	1586	1595
February	1588	1625	1572
March	1560	1614	1554
April	1543	1599	1556
May	1551	1609	1575
June	1569	1599	1592
July	1624	1624	1610
August	1687	1630	1664
September	1688	1623	1695
October	1692	1623	1697
November	1748	1675	1741
December	1813	1758	1794
1974 - January	1945	1913	1923
February	2015	2072	2006
March	2040	2128	2049
April	2029	2124	2068
May	2027	2123	2079
June	2064	2120	2110
July	2148	2146	2128
August	2222	2127	2172
September	2332	2229	2327
October	2553	2434	2544
November	2928	2786	2895
December	3370	3248	3314
1975 - January	3626	3549	3567
February	3899	4027	3897
March	4125	4329	4169
April	4338	4574	4453
May	4451	4699	4602
June	4343	4483	4461
July	4183	4176	4142
August	4111	3900	3982
September	4027	3826	3995
October	3845	3649	3814
November	3594	3396	3529
December	3250	3120	3184

TABLE 2 (continued)

	Adjusted By 1976 Factors <u>1/</u> (in thousands)	Adjusted By <u>2/</u> 1973 Factors <u>2/</u> (in thousands)	Adjusted By Constant Seasonal (1976) Factors <u>3/</u> (in thousands)
1976 - January	2976	2911	2926
February	2831	2933	2838
March	2750	2898	2791
April	2734	2896	2819
May	2820	2990	2928
June	2952	3054	3039
July	3064	3054	3029
August	3182	3003	3067
September	3239	3069	3204
October	3254	3083	3222
November	3189	3003	3121
December	2964	2839	2897
1977 - January	2777	2717	2731
February	2773	2874	2782
March	2561	2698	2599
April	2488	2636	2567
May	2499	2650	2596
June	2560	2649	2636
July	2668	2659	2636
August	2835	2674	2730

1/ Monthly seasonal adjustment factors (multiplicative) for 1976 were derived from the standard X-11 procedure and applied to the average monthly data. Factors for 1976 were used for 1977. The data in this column correspond, but are not identical, to the official BLS monthly series which is seasonally adjusted weekly and then averaged to arrive at the monthly figure.

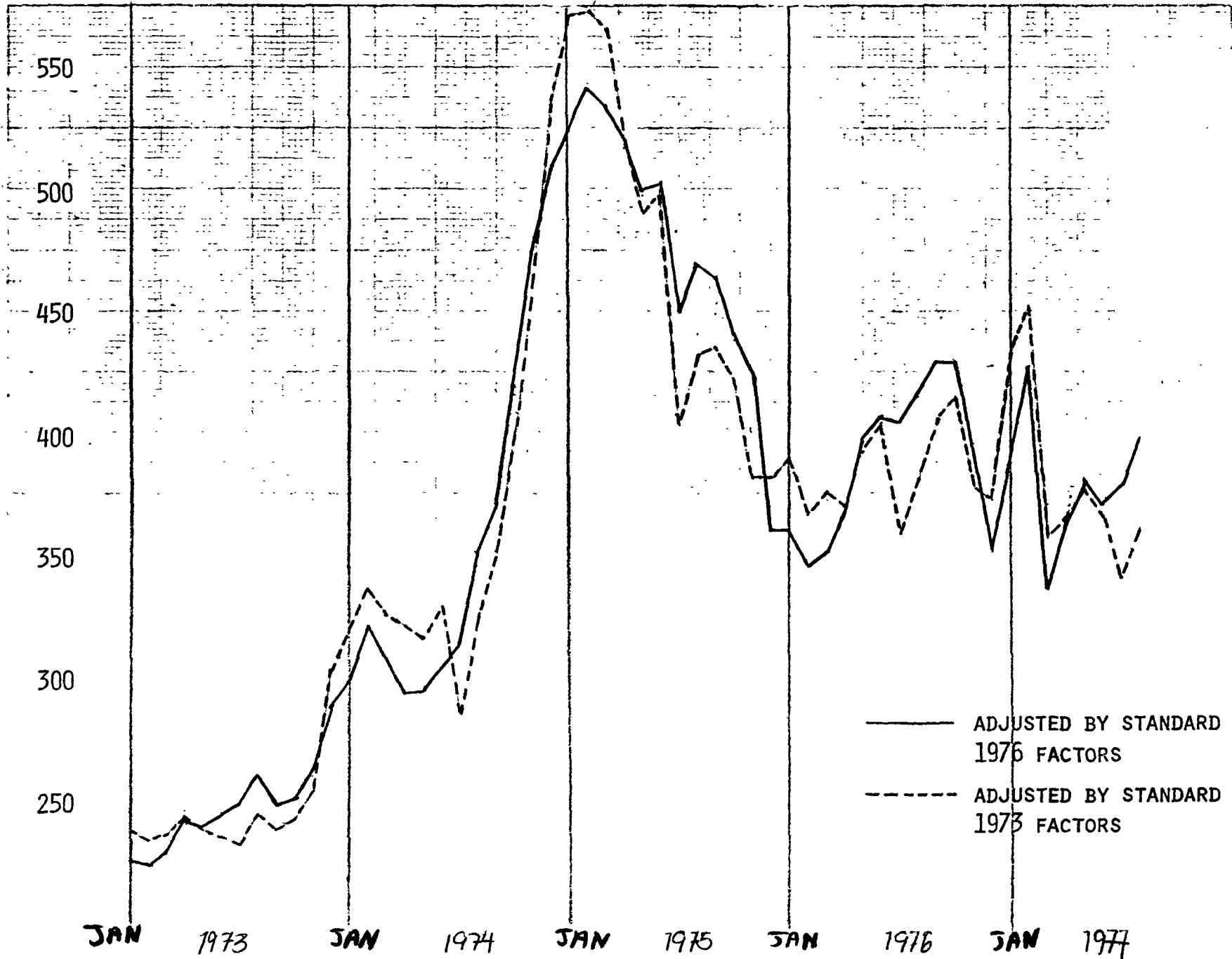
2/ Monthly seasonal factors (multiplicative) were computed by the standard X-11 procedure from data for 1967 through 1978 and were applied to average monthly data. These factors are independent of the 1974 and 1975 experience.

3/ Monthly seasonal factors (multiplicative) were derived by weighting data for each of the last ten years (1967-1976) equally in the X-11 procedure. These factors suppress the heavy weight which the standard X-11 procedure assigns to data for the most recent years.

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CHART 1: COMPARISON OF ALTERNATIVE SEASONAL ADJUSTMENT OF INITIAL CLAIMS  
(AVERAGE WEEKLY VOLUME IN REGULAR STATE PROGRAMS, IN THOUSANDS)

9/16/77



FR 731

CHART 2: COMPARISON OF ALTERNATIVE SEASONAL ADJUSTMENT OF CONTINUING CLAIMS  
(AVERAGE WEEKLY VOLUME IN REGULAR STATE PROGRAMS, IN THOUSANDS)

9/16/77

