Labor market dynamics and trends in male and female unemployment

"Gross flow" data from the Current Population Survey help to identify the labor market movements that underlie changes in the monthly rates of male and female unemployment over the past two decades

Wayne J. Howe

In the late 1960's and throughout the 1970's, unemployment rates for adult women were much higher than those for adult men. During the 1980's, a decade of generally higher jobless rates, the female-male unemployment rate gap essentially disappeared. (See chart 1.) What were the labor market dynamics that caused this development?

Obviously, changes in a group's jobless rate often would reflect a change in the frequency of job loss. But jobless rates can change without this happening at all. For example, a rise might occur because the unemployed face increased difficulties in finding jobs—and thus remain unemployed longer—or because persons move into and out of the labor force more frequently. Of course, while some forces are at work to raise a group's unemployment rate, others may tend to offset these effects. And the dynamics of these forces may change considerably over time.

The patterns of movements into and out of employment, unemployment, and the labor force have changed substantially over the last two decades. This article looks separately at the trends in these patterns for adult men and women (20 years and over), and the effect that they had on the changes in the rates of male and female unemployment over the 1968–88 period. (See table 1.)

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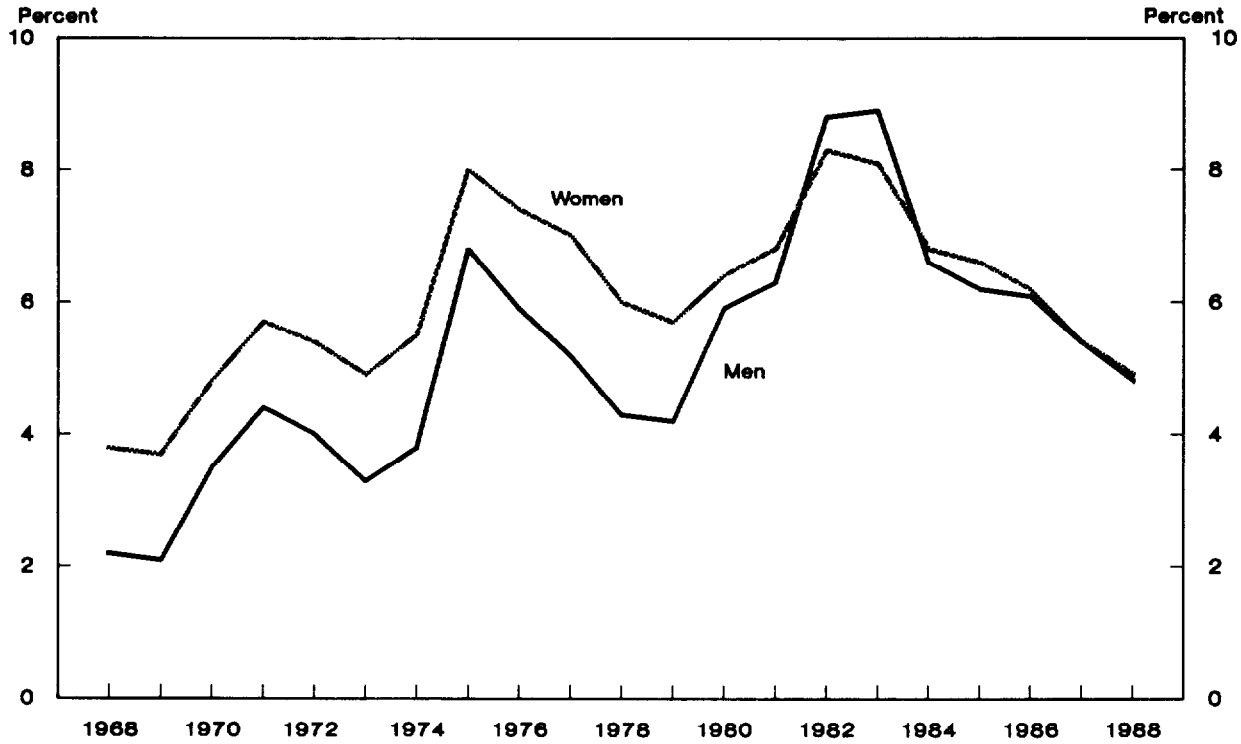
Labor market transitions

Data on the changing labor market status of the population are collected monthly through the Current Population Survey (CPS). Interviews are conducted in approximately 60,000 households to determine the labor market status of all household members 16 years of age and over. However, the published data based on the survey are monthly levels from which can be derived only the *net changes*, from one month to the next, in the numbers of persons employed, unemployed, or not in the labor force. They do not quantify the much larger *gross movements* among these three labor market states.

For example, the monthly data do not show that roughly half of all persons reported as unemployed in any given month become employed or leave the labor force by the following month, being replaced by other unemployed persons who had jobs or were not in the labor force during the previous month. In fact, the total unemployment count could rise (fall) because more (fewer) people become unemployed, or because fewer (more) leave unemployment, or both. By the same token, periods of stability in the jobless rate may be the result of large but offsetting movements between one labor market state and another.

Gross flow data. The size of, and changes in, these labor market transitions can be determined from the "gross flow data" that are generated as part of the CPS. A household selected for the CPS sample is interviewed for 4 consecutive months, leaves the sample for the next 8 months, and

Chart 1. **Seasonally adjusted unemployment rates for men and women age 20 and over, 1968–88**



then reenters for a final 4 months. Thus, in any particular month, the CPS sample consists of eight "rotation groups," each of which has been in the survey for between 1 and 8 months.

Given that framework, the households in six of the eight rotation groups (all except those in their first and fifth months of survey participation) have also been interviewed in the prior month, a fact that permits tracking of the labor market behavior of individual household members for at least 2 consecutive months. For these households, it is possible to generate "gross change" or "gross flow" data on the labor market dynamics underlying changes in the numbers of persons employed, unemployed, or out of the labor force. There are small but systematic differences between the labor force behavior reported by persons covered by the gross flow data and that reported by the entire CPS sample. Therefore, there are also some systematic differences between the net changes implicit in the gross flow data and those derived from the published stock data.[1] However, the gross flow estimates are more suitable for this analysis than those based on published data because the latter show only the changes between beginning and ending "stocks" of persons in the various labor market categories, and not the movements of individuals that resulted in those changes.

For any 2 consecutive months, the labor market experience of an individual, as derived from the gross flow data, falls into one of nine combinations represented in the following matrix, where: E = employed, U = unemployed, N = not in the labor force, ($_t$) represents the current month, and ($_{t-1}$) represents the previous month. Various combinations in the matrix, therefore, denote the transitions from one specific labor market state to another or the continuation in a given state from one month to the next.

	Labor force status in current month		
	Employed	*Unemployed*	*Not in labor force*
Labor force status in previous month:			
Employed	$E_{t-1}E_t$	$E_{t-1}U_t$	$E_{t-1}N_t$
Unemployed ..	$U_{t-1}E_t$	$U_{t-1}U_t$	$U_{t-1}N_t$
Not in labor force	$N_{t-1}E_t$	$N_{t-1}U_t$	$N_{t-1}N_t$

For example, $U_{t-1}N_t$ represents the movement of persons from unemployed status in the previ-

Table 1. **Civilian unemployment rates and percentage-point changes by sex and detailed age groups, selected periods, 1968–88**

Sex and age	Unemployment rate (annual average)			Percentage-point change		
	1968	1979	1988	1968–79	1979–88	1968–88
Men						
20 years and over	2.2	4.2	4.8	2.0	0.6	2.6
20 to 24 years	5.1	8.7	8.9	3.6	.2	3.8
25 to 34 years	1.9	4.3	5.3	2.4	1.0	3.4
35 to 44 years	1.6	2.9	3.8	1.3	.9	2.2
45 to 54 years	1.6	2.7	3.5	1.1	.8	1.9
55 to 64 years	1.9	2.7	3.5	.8	.8	1.6
65 years and over	2.8	3.4	2.5	.6	–.9	–.3
Women						
20 years and over	3.8	5.7	4.9	1.9	–.8	1.1
20 to 24 years	6.7	9.6	8.5	2.9	–1.1	1.8
25 to 34 years	4.7	6.5	5.6	1.8	–.9	.9
35 to 44 years	3.4	4.6	4.1	1.2	–.5	.7
45 to 54 years	2.4	3.9	3.4	1.5	–.5	1.0
55 to 64 years	2.2	3.2	2.7	1.0	–.5	.5
65 years and over	2.7	3.3	2.9	.6	–.4	.2

NOTE: These are the officially published unemployment rates and may differ slightly from those derived from the gross flow data.

ous month to out of the labor force in the current month. Similarly, $E_{t-1}U_t$ represents the transition of employed persons to unemployment.

The probability of making such transitions in successive months is calculated by dividing the number of persons making a particular labor market transition from one month to the next by the number of persons in the initial month. Each resulting labor market transition probability (P) will be designated by subscript letters throughout this article. For example, the likelihood that an employed worker will become unemployed from one month to the next is written as P_{eu}.

Modeling transition probabilities

This analysis focuses on the relationship between movements in unemployment rates and changes in the flows of men and women into and out of employment, unemployment, and the labor force. The first step involves the computation of the labor market transition probabilities for adult men in 1968, 1979, and 1988, along with a further breakdown of the same data into 10-year age groupings.[2] Those data are presented in table 2. Similar data for adult women are shown in table 3. The probabilities of remaining in one of the three labor market states from one month to the next (P_{ee}, P_{uu}, and P_{nn}) are not used in the analysis, because the emphasis is on the dynamic nature of the labor market. In any case, the fraction of people remaining in any one state between observations is equal to 1 minus the fraction who leave to enter the two other states.

The second step in the analysis requires the calculation of the male and female unemployment rates in 1968, 1979, and 1988 using the six dynamic labor market transition flow probabilities (P_{eu}, P_{en}, P_{ue}, P_{un}, P_{ne}, and P_{nu}).[3] The general form of the unemployment rate derived from those transition probabilities is defined as $Urate = U/(U+E)$, where the numerator (U) is the sum of the total probabilities of the transition flows into unemployment. It therefore represents the likelihood of employed persons as well as of those not in the labor force becoming unemployed. The denominator in the above equation represents the total flows into unemployment (U), found in the numerator, in addition to the sum of the total flow rates from unemployment and from outside the labor force into employment (E), which is likewise composed of direct and indirect transitions. In other words:

$$Urate = \frac{P_{eu} + P_{en}\left(1-(P_{ne} / P_{ne} + P_{nu})\right)}{P_{eu}+P_{en}\left(1-(P_{ne} / P_{ne}+P_{nu})\right)+P_{ue}+P_{un}(P_{ne}/P_{ne}+P_{nu})}$$

The third analytical step is the calculation, for both men and women, of the changes in the six dynamic flow rates and the rates of unemployment between 1968 and 1979 and between 1979 and 1988. In addition, the partial derivatives of the group unemployment rates with respect to the specific labor market transition probabilities between 1968 and 1988 are computed and presented in tables 2 and 3.[4] These show how sensitive a group's jobless rate was to changes in a particular labor market flow. As presented in

the tables, they represent the overall estimate of the percentage-point change in each group's rate of unemployment, given a 1-percentage-point increase in each transition probability.

Next, simulated changes in the rates of male and female unemployment are computed. Each of those simulated changes corresponds to a particular transition flow rate, representing the amount by which the male and female unemployment rates would have shifted if only that specific transition flow rate had varied while the others remained constant. The results of this step are used to determine the proportion of the change in a group's unemployment rate attributable to a change in a specific labor market transition flow.

The final step in the analysis can be illustrated by looking at table 4: The change in the adult male unemployment rate between 1968 and 1979 was 2.0746 percentage points. (Obviously, the unemployment data are not accurate to four decimal places, but this presentation provides a more precise picture of the relationship between the actual and simulated rates of unemployment.) If the probability of unemployed men finding a job (P_{ue}) had held constant during the 1968–79 period, the resulting rise in the male rate of unemployment would have been 1.3084 rather than 2.0746 percentage points. The simulated change in the rate was 0.7662 percentage point lower than the actual change, and represents 37 percent

Table 2. **Average monthly labor market transition probabilities and their relationship to the unemployment rates of adult men by detailed age groups, 1968, 1979, and 1988**

Type of transition and year	Transition probability						
	Total, men age 20 and over (in percent)	Men age—					
		20 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 and over
Employment to unemployment (P_{eu}):							
1968	0.0081	0.0194	0.0084	0.0063	0.0061	0.0065	0.0063
1979	.0123	.0287	.0133	.0094	.0078	.0064	.0061
1988	.0140	.0299	.0162	.0117	.0096	.0086	.0045
Derivative[1]	2.01	1.67	2.00	2.17	2.31	2.30	1.70
Employment to not in the labor force (P_{en}):							
1968	.0152	.0392	.0053	.0043	.0067	.0161	.1012
1979	.0156	.0301	.0081	.0059	.0071	.0194	.1045
1988	.0159	.0315	.0096	.0062	.0085	.0241	.1076
Derivative	.54	.47	.72	.80	.71	.58	.18
Unemployment to employment (P_{ue}):							
1968	.4386	.4901	.5077	.4717	.4059	.3521	.2273
1979	.3195	.3526	.3312	.3365	.2895	.2378	.1690
1988	.3117	.3534	.3279	.3140	.2761	.2017	.2093
Derivative	–.07	–.11	–.08	–.06	–.06	–.08	–.05
Unemployment to not in the labor force (P_{un}):							
1968	.1460	.1621	.0974	.0818	.1294	.1690	.3788
1979	.1304	.1373	.1066	.0897	.1278	.1784	.3380
1988	.1270	.1553	.1028	.0973	.1070	.2059	.3721
Derivative	–.05	–.08	–.05	–.04	–.04	–.06	–.05
Not in the labor force to employment (P_{ne}):							
1968	.0587	.1635	.1644	.1298	.1025	.0620	.0270
1979	.0487	.1600	.1515	.1192	.0640	.0386	.0200
1988	.0445	.1611	.1317	.0917	.0778	.0338	.0167
Derivative	–.16	–.09	–.04	–.04	–.06	–.31	–.90
Not in the labor force to unemployment (P_{nu}):							
1968	.0157	.0491	.0570	.0561	.0387	.0165	.0036
1979	.0213	.0878	.0926	.0628	.0384	.0142	.0027
1988	.0206	.0771	.0988	.0668	.0384	.0132	.0018
Derivative	.43	.28	.06	.06	.06	.86	7.75

[1] Partial derivative of the group unemployment rate with respect to the specific labor market transition probability, 1968–88. These statistics represent the over-the-period estimates of the percentage-point change in each group's rate of unemployment, given a 1-percentage-point increase in each labor market transition probability.

of the total over-the-period rise in the male rate. In other words, the drop in the probability of transition from unemployment to employment among adult men was responsible for more than a third of the 2.0746-percentage-point upswing in their unemployment rate between 1968 and 1979.

A detailed review of the relationship between changes in each of the six independent labor market transition flows and the changes in the male and female rates of unemployment between 1968 and 1979 and from 1979 to 1988 follows. Examination of the year-by-year transition probabilities for men and women indicates that the results of the analysis would have been fairly insensitive to the selection of years studied.[5]

Unemployment rates for men

The increase in the probability that employed workers would experience a spell of unemployment (P_{eu}) was responsible for 41 percent of the rise in joblessness among adult men between 1968 and 1979. (See table 4.) Increases in this labor market transition probability are highly and positively associated with a rise in the male rate of unemployment. As shown in table 2, a 1.00-percentage-point rise in the employment-to-unemployment transition probability corresponded, on average, to a 2.01-percentage-point increase in the unemployment rate for men over the two decades under study.

The propensity for employed men to lose or leave their jobs (most often, lose)[6] continued to rise over the 1979–88 period. In part, this was due to the fact that a high proportion of men were employed in industries—particularly within manufacturing—in which payrolls were being reduced as part of the restructuring made necessary by declining demand and foreign competition. As shown in table 4, the rise in the probability of employed men experiencing a spell of unemployment was responsible for almost 70 percent of the increase in the male rate of unemployment between 1979 and 1988.

As expected, an increase in the likelihood of successful job search (P_{ue}) corresponds to a lower jobless rate. A sizable decline in the propensity for men to go from unemployment to employment accounted for more than a third of the rise in their unemployment rate from 1968 to 1979. The probability that jobless men would find a job continued to decline between 1979 and 1988, but more slowly, accounting for only 13 percent of the rise in the male unemployment rate over that period.

Returning to the period 1968–79, we see that the increase in the probability of moving from out of the labor force into unemployment (P_{nu}) accounted for 11 percent of the rise in the male rate of unemployment. It should be noted, however, that the over-the-period effect of the probability of entering the labor force into joblessness on the male unemployment rate may be somewhat overstated because of distortions in the young adult male labor market in 1968. The Vietnam conflict simultaneously boosted demand for labor and drew down the pool of young men (ages 20 to 34) available for civilian work, with the result that the probability of entering the labor force directly into unemployment was particularly low among these young men in 1968. In addition, even though the magnitude of the rise in that transition probability was similar among men and women, the effect that it had on the male rates of unemployment was much smaller than its influence on female unemployment between 1968 and 1979. In large part, this was because male rates are much less sensitive than female rates to changes in the probability of making the not in the labor force-to-unemployment transition.

The likelihood of an employed woman becoming unemployed declined over the 1968–88 period.

Table 2 shows that, overall, the probability of entry into unemployment from "not in labor force" status edged down among men between 1979 and 1988, with declines in this probability among men in the youngest and oldest age groupings more than offsetting increases among workers in the middle age ranges. The slip in that labor market transition probability between 1979 and 1988 meant that the male unemployment rate would have been 6 percent higher had the transition probability remained unchanged during that period. (See table 4.)

Table 2 also shows that, in the aggregate, employed men were only slightly more likely to drop out of the labor force (P_{en}) in 1988 than they were in 1968. The large increase in the same likelihood among men 55 to 64 years of age over the past two decades, however, represents the more frequent use of early retirement options, including special incentives offered by employers to reduce staff. Men between 20 and 24 years of age were the only males with a lower propensity for leaving employment by withdrawing from the labor force in 1988 than 1968. The overall decline in this propensity for 20- to 24-year-old men occurred, in large part, because of a slide in the proportion of those workers who exited the labor force to attend school—from 68 to 60 percent between 1968 and 1988. At first glance, this would seem inconsistent with school enrollment data, which show that full-time college enrollment among 16- to 24-year-old men was fairly stable between 1970 and 1988, while the number enrolled on a part-time basis rose substantially. During that same period, however, the employment-population ratio for 16- to 24-year-old men enrolled in college on a full-time basis rose from

34 to 44 percent. It would appear, therefore, that increasing numbers of young men have worked their way through college over the past two decades, perhaps because of the tremendous rise in the cost of a college education during that period.

Unemployment among women

The increase in the probability of moving from outside the labor force into unemployment (P_{nu}) accounted for more than three-fourths of the total rise in the rate of adult female unemployment between 1968 and 1979. (See table 4.) The strong correlation between this probability for women and their rate of unemployment is illustrated by the fact that, over the two decades, a 1.00-percentage-point rise in the transition probability corresponded to a 1.70-percentage-point increase in their jobless rate. (See table 3.) Between 1979 and 1988, however, the probability that women would make the transition from out of the labor force into unemployment was little changed, and that transition probability had very little influence on the change in women's unemployment rates.

Rising educational attainment and the higher wages associated with educational gains helped to increase the female labor force participation rate over the period studied. The expansion in labor force participation also increased the likeli-

Table 3. **Average monthly labor market transition probabilities and their relationship to the unemployment rates of adult women by detailed age groups, 1968, 1979, and 1988**

Type of transition and year	Transition probability						
	Total, women age 20 and over (in percent)	Women age—					
		20 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 and over
Employment to unemployment (P_{eu}):							
1968	0.0086	0.0149	0.0092	0.0085	0.0069	0.0031	0.0059
1979	.0121	.0221	.0132	.0109	.0081	.0046	.0069
1988	.0104	.0200	.0112	.0090	.0081	.0039	.0060
Derivative[1]	1.84	1.73	1.90	1.87	1.81	1.88	1.67
Employment to not in the labor force (P_{en}):							
1968	.0642	.0702	.0739	.0591	.0501	.0311	.1419
1979	.0446	.0536	.0420	.0405	.0349	.0275	.1067
1988	.0341	.0456	.0305	.0259	.0270	.0317	.1114
Derivative	.48	.61	.60	.48	.38	.32	.16
Unemployment to employment (P_{ue}):							
1968	.3130	.3512	.2888	.3125	.3195	.1831	.2333
1979	.2616	.2882	.2607	.2637	.2406	.1568	.1316
1988	.2542	.2814	.2412	.2523	.2630	.1429	.1143
Derivative	–.08	–.13	–.10	–.07	–.05	–.04	–.05
Unemployment to not in the labor force (P_{un}):							
1968	.3426	.3077	.3755	.3333	.3550	.2113	.4412
1979	.2727	.2551	.2764	.2794	.2669	.2054	.4474
1988	.2630	.2720	.2600	.2560	.2457	.1513	.4286
Derivative	–.06	–.08	–.07	–.05	–.04	–.03	–.02
Not in the labor force to employment (P_{ne}):							
1968	.0348	.0629	.0405	.0449	.0439	.1358	.0108
1979	.0378	.0892	.0595	.0641	.0467	.0649	.0081
1988	.0387	.1020	.0691	.0749	.0663	.0550	.0080
Derivative	–.56	–.40	–.51	–.31	–.27	–.32	-2.15
Not in the labor force to unemployment (P_{nu}):							
1968	.0096	.0293	.0138	.0114	.0092	.0228	.0011
1979	.0166	.0620	.0324	.0248	.0154	.0154	.0012
1988	.0164	.0634	.0389	.0308	.0177	.0132	.0008
Derivative	1.70	.77	1.30	1.07	1.08	1.38	20.72

[1] Partial derivative of the group unemployment rate with respect to the specific labor market transition probability, 1968-88. These statistics represent the over-the-period estimates of the percentage-point change in each group's rate of unemployment, given a 1-percentage-point increase in each labor market transition probability.

hood that women (particularly new entrants or reentrants to the labor force) would experience a spell of unemployment. However, it should be noted that, as was the case in 1968, men who were out of the labor force were still more likely than women to enter or reenter the labor force (into unemployment or employment) in 1988. (See tables 2 and 3.)

As shown in table 3, the probability of making a transition from employment to unemployment (P_{eu}) was highly correlated with joblessness among women between 1968 and 1988. The rise in the probability of moving from employment to unemployment was responsible for 37 percent of the rise in women's rate of unemployment between 1968 and 1979. (See table 4.)

In contrast to the situation for employed men, the likelihood of an employed woman becoming unemployed declined over the 1979–88 period. The experience of women between 20 and 44 years of age was largely responsible for the over-the-period improvement in this transition probability. As seen in table 4, the decline in the likelihood that an employed woman would become unemployed caused the overall female jobless rate to fall by 37 percent more than it would have had that transition probability been unchanged between 1979 and 1988.

The past two decades witnessed substantial growth in women's attachment to year-round, full-time jobs. This was reflected in a sizable drop (from 6.4 to 3.4 percent) in the rate at which employed women left the labor force (P_{en}) between 1968 and 1988. As shown in table 4, the increase in the female rate of unemployment would have been 55 percent higher had the probability of women exiting the labor force from employment not declined between 1968 and 1979. In addition, the drop in this transition probability among women accounted for 70 percent of the decrease in the female jobless rate over the 1979–88 period.

The strong relationship between the unemployment rate and this flow out of employment may not be easy to discern, because unemployment is not directly involved. The relationship between the decrease in P_{en} and the decline in the rate of unemployment is indirect, reflecting a reduction in labor market friction (movements into and out of the labor force), traditionally a major component of unemployment among women.

The drop in the probability of employed women exiting the labor force is probably a reflection of both the postponement of marriage and a sizable reduction in the number of women leaving the labor force due to child-rearing or homemaking responsibilities. In 1968, for example, only one-fourth of all 25- to 44-year-old mothers whose youngest child was under age 3 were in the labor force. By 1988, more than half of similarly aged mothers with toddlers were labor market participants. Also over these two decades, a gradually increasing proportion of women chose not to have children (or to postpone having them). In spite of these trends, however, employed women were still far more likely than their male counterparts to drop out of the labor force as of 1988 (3.4 percent for women versus 1.6 percent for men). (See tables 2 and 3.)

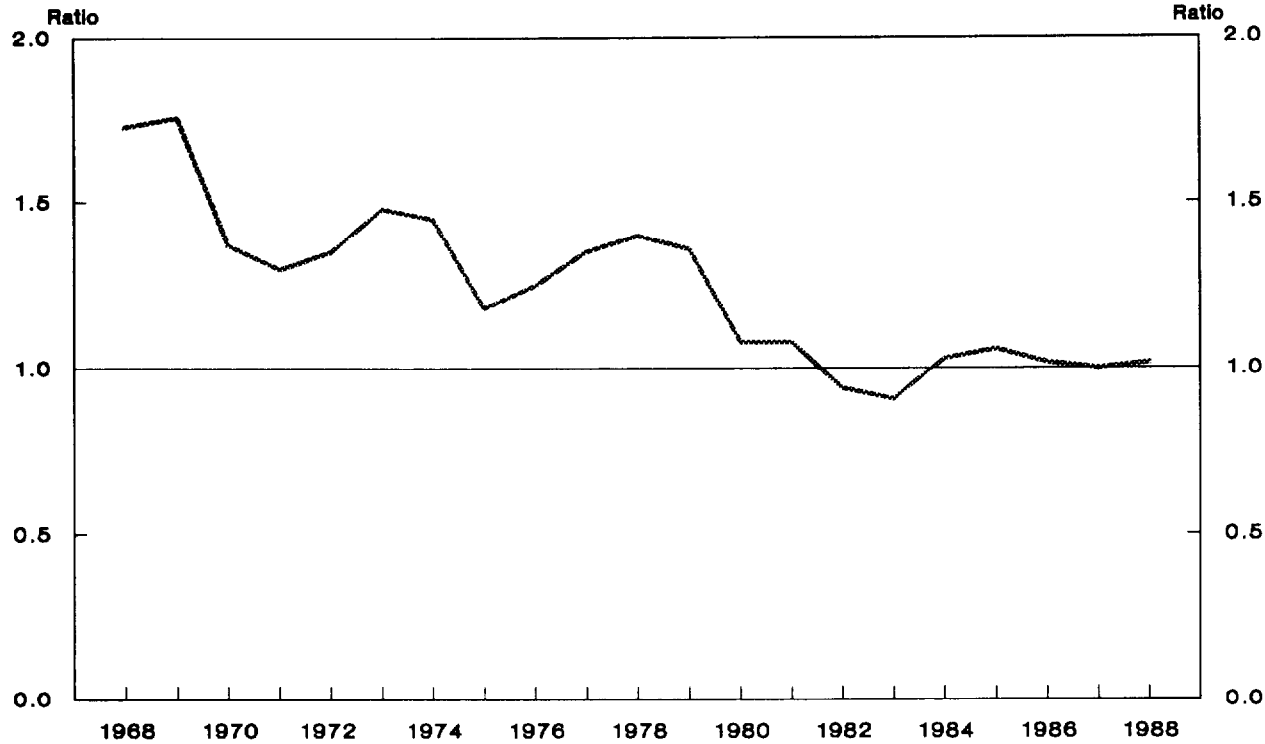
The rising difficulties that unemployed

Table 4. **Average monthly transition probabilities and their relationship to the changes in the adult unemployment rate, by sex, 1968-79 and 1979-88**

Period and transition probability held constant	Actual percentage-point change in rate of unemployment[1]	Simulated change in rate	Actual minus simulated change in rate	Percent of change in rate due to holding transition probability constant
Men				
1968–79				
P_{eu}	2.0746	1.2319	0.8426	40.6
P_{en}	2.0746	2.0528	.0218	1.1
P_{ue}	2.0746	1.3084	.7662	36.9
P_{un}	2.0746	2.0013	.0732	3.5
P_{ne}	2.0746	1.9271	.1474	7.1
P_{nu}	2.0746	1.8514	.2231	10.8
Total	—	—	2.0746	100.0
1979–88				
P_{eu}	.5849	.1806	.4043	69.1
P_{en}	.5849	.5662	.0188	3.2
P_{ue}	.5849	.5063	.7866	13.4
P_{un}	.5849	.5589	.0260	4.4
P_{ne}	.5849	.4917	.0932	15.9
P_{nu}	.5849	.6210	–.0360	–6.2
Total	—	—	.5849	100.0
Women				
1968–79				
P_{eu}	1.6978	1.0692	.6286	37.0
P_{en}	1.6978	2.6232	–.9254	–54.5
P_{ue}	1.6978	1.2516	.4462	26.3
P_{un}	1.6978	1.2557	.4420	26.0
P_{ne}	1.6978	1.8852	–.1870	–11.0
P_{nu}	1.6978	.4041	1.2936	76.2
Total	—	—	1.6978	100.0
1979–88				
P_{eu}	–.9170	–.5742	–.3428	37.4
P_{en}	–.9170	–.2750	–.6420	70.0
P_{ue}	–.9170	–.9927	.0758	–8.3
P_{un}	–.9170	–.9868	.0697	–7.6
P_{ne}	–.9170	–.8616	–.0550	6.0
P_{nu}	–.9170	–.8949	–.0220	2.4
Total	—	—	–.9170	100.0

[1] The rates of unemployment derived from the transition flow probabilities do not precisely match those reported in the monthly CPS. However, the over-the-period changes resulting from the two methods of calculating the rates are similar.

Chart 2. **Ratio of female-to-male unemployment rates for persons age 20 and over, annual averages, 1968-88**



women faced in finding a job between 1968 and 1979, a deterioration shown by the fall in P_{ue}, was responsible for more than one-fourth of the increase in the female unemployment rate over the period. A further decline in the propensity to find a job between 1979 and 1988 put upward pressure on women's jobless rate. That is, the rate of female unemployment would have fallen slightly more than it did had the probability of a jobless woman finding a job remained unchanged.

In general, an unemployed woman is less likely to find a job as of the next month than is a man. On average, roughly 25 percent of the women and 31 percent of the men who were unemployed in any given month during 1988 were likely to be employed in the following month. In 1968, these probabilities had been 31 and 44 percent, respectively. (See tables 2 and 3.) Overall, the sizable decline in both male and female probabilities of moving from unemployment to employment between 1968 and 1988 indicates that, once they experienced a spell of unemployment, both women and men had a much more difficult time finding a job in 1988 than they did in 1968.

Women have become increasingly more likely to go directly from being out of the labor force into employment over the past 20 years. That development placed downward pressure on female joblessness during that period. The over-the-period increase in the likelihood of entering the labor force directly into employment was partly spurred by the substantial employment gains in the service-producing sector of the economy, where a large share of women are employed.

Finally, as was the case among men, there was also a small negative association between the probability of women ending a spell of unemployment by exiting the labor force (P_{un}) and the female jobless rate over the past 20 years. The sizable drop in this transition probability among women between 1968 and 1979 (from 34.3 to 26.3 percent) accounted for more than one-fourth of the increase in the female rate of unemployment. During the 1979–88 period, the decline in women's joblessness would have been 8 percent greater had that labor market transition probability not continued to decline. (See table 4.)

Gender differences in joblessness

The increased probability of job loss played a prominent role in the rise in the adult male unemployment rate during the past 20 years.

Also, once unemployed, men have faced increasing difficulties in finding a job, and this has further contributed to the rise in their unemployment rate and to the narrowing of the female-male unemployment rate gap. (See chart 2.)

For women, the rise in the rate of unemployment between 1968 and 1979 was caused by increases in the probabilities of entering unemployment from outside the labor force and of employed women becoming unemployed. Those changes tended to increase the female-male unemployment rate differential during that period, while a drop in the proportion of employed women leaving the labor force helped to hold down their joblessness and shrink the unemployment rate gap. The fall in the female unemployment rate between 1979 and 1988 was mostly due to the continued decline in the flow of employed women out of the labor force. Over the 1979–88 period, a decrease in the likelihood of employed women becoming unemployed also contributed to the decline in the female rate of unemployment and the narrowing of the female-male unemployment rate differential.

IN A BROADER CONTEXT, the use of data on labor market transitions in this analysis highlights the variety of pressures that effect change in a demographic group's jobless rate, as well as the unemployment rate differential between groups. As the results of this analysis suggest, strong offsetting factors can be at work at the same time. For example, increased job market stability (less movement into and out of the labor force) can serve to lower unemployment rates at the same time that a rise in the incidence of job loss is tending to force them upward. Policies for dealing with structural changes in unemployment should necessarily be different depending on the cause of those changes. The gross flow data, rarely used in the analysis of labor market trends, provide some interesting and useful insights into those complex forces that contribute to changing rates of unemployment. □

Footnotes

[1] It should be noted that gross flow statistics generated from the monthly CPS generally show movements into and out of the various labor force categories which do not yield the same net changes as are shown by the published data. Three major factors have been identified as possible reasons for this inconsistency and are reviewed briefly below:

Rotation group bias. For reasons not completely understood, the responses of persons interviewed in the first and fifth months in which the sample is taken tend to show higher levels of unemployment, compared with subsequent months. This leads to an overestimation of the outflows from unemployment after the first and fifth months. Therefore, the movements reflected in gross flow data are rotation-group biased to some degree.

Exclusion of noninterviews and movers. The basis for selection of the CPS sample is household units rather than individuals; therefore, common rotation groups reflect identical households but not necessarily identical persons. The exclusion of nonidentical persons in the gross flows from month to month further limits the size of the sample available for gross flow analysis. In addition, nonidenticals were found to have employment-population ratios considerably higher than those for the total CPS sample and out of labor force ratios that are considerably lower than the published ones. The exclusion of nonidenticals from the gross flow calculations is thus a contributing cause for the discrepancies with the changes in the published labor force totals.

Problems in matching data. In a survey as large as the CPS, coding errors can never be eliminated entirely. It is thus inevitable that some records will fail to match the month-to-month flow estimates, even when the labor force status is correctly recorded. There are also errors arising from incorrect interpretation of the questions by respondents or interviewers, the miscoding of answers, the conditioning of respondents to answer in certain ways, and so forth. While such errors tend to offset each other in the monthly stock measurement, their effect is cumulative in the gross change data and, on average, results in an overestimate of the monthly flows.

For a more complete discussion of these problems and other issues related to gross flow data, see Paul O. Flaim and Carma R. Hogue, "Measuring labor force flows: a conference examines the problems," *Monthly Labor Review*, July 1985, pp. 7–17.

[2] Because the analysis is conducted over a discrete period, the choice of the starting and ending years may bias the results. The years 1968, 1979, and 1988 are roughly similar reference points because they all occur well into the expansionary phases of business cycles. Nevertheless, the Vietnam conflict was at its maximum level of intensity in 1968, and this contributed to a very tight demand for labor, particularly for men. As a result, the female-male unemployment rate differential may be somewhat inflated in that year. Historical data show, however, that the gap still would have been large at a business cycle peak, even in the absence of the (perhaps) distorting affects of the Vietnam conflict on the civilian job market. Data from 1989 are not used in the analysis because the 1989 annual average monthly gross flow data used to derive the labor market transition probabilities were not yet available at the time of publication.

[3] See Stephen T. Marston, "Employment Instability and High Unemployment Rates," *Brookings Papers on Economic Activity*, No. 1, 1976, pp. 171–73.

[4] Marston, "Employment Instability," pp. 202–03. As shown by Marston, and outlined in the text, the calculated unemployment rate is $Urate = U/(U+E)$, where: U is equal to the sum of the total probabilities of the flow into unemployment—$U = P_{eu} + P_{en}(1-(P_{ne}/P_{ne}+P_{nu}))$, where the first term on the right-hand side of the equation is the probability that workers will take the direct route into unemployment, and the second term is the sum of the probabilities that persons will become unemployed after first dropping out of the labor force and then reentering unsuccessfully. E is equal to the sum of the transition probabilities from unemployment to employment—$E = P_{ue} + (P_{ne}/P_{ne}+P_{nu})P_{un}$—where the first term is the probability of direct transition from unemployment to employ-

ment, and the second term is the probability of indirect transitions. In other words:

$$Urate = \frac{P_{eu} + P_{en}\left(1-(P_{ne} / P_{ne} + P_{nu})\right)}{P_{eu}+P_{en}\left(1-(P_{ne} / P_{ne}+P_{nu})\right)+P_{ue}+P_{un}(P_{ne} / P_{ne}+P_{nu})}$$

The detailed calculations of the partial derivatives of the unemployment rate presented in tables 2 and 3 are available from the author. Those partial derivatives relate to each specific transition flow probability and correspond to the over-the-period percentage-point change in the rate of unemployment resulting from holding all the other transition flow probabilities constant.

As explained by Marston, the calculated rates of unemployment are accurate, given the "steady state" assumption, wherein the flows into employment and unemployment just compensate for the flows out of those states. While the rates of unemployment derived from the transition flow probabilities do not precisely match those reported in the monthly CPS (the author tried various adjustments to the gross flow data which made no qualitative difference to the results), mostly because of the rotation bias problem discussed in footnote 2, the over-the-period changes produced by the two methods of calculating the rates are similar.

[5] A tabular presentation of the year-to-year changes in the six independent labor market transition probabilities for adult men and women is available from the author.

[6] Technically, people showing up as $E_{t-1}U_t$ could have left their jobs voluntarily. Aggregate CPS data on reasons for unemployment suggest, however, that increases in P_{eu} for men over this period did not stem from job leaving.

'Old-old population' growing fast

Over the past 40 years, the number of older people in the population has grown steadily. In 1950, only 12 million Americans were age 65 or older; today, the number is close to 30 million—roughly 12 percent of the population. Demographic projections show that the size of the older population will increase slowly for the next 20 years, only to rise dramatically after 2010 as the large baby boom generation (born between 1946 and 1964) begins to reach age 65. About 65 million people (or 20 percent of the population) are expected to be age 65 or older by 2030.

The fastest-growing segment of this population group is among the old-old, those age 85 and older. Their numbers are expected to triple by 2030, accounting for more than 8.6 million people. Because the need for supportive services increases dramatically with age, the growing number of elderly who are over the age of 85 is likely to place a significant claim on public sector resources. California, Florida, New York, Texas, and Pennsylvania are expected to have the largest number of people age 85 and older by the year 2010.

—William P. O'Hare and Carol J. De Vita

America in the 21st Century: Governance and Politics
(Washington, Population Reference Bureau, Inc., 1990), p. 3.