Eastern Economic Journal, Volume XV, No. 4, October–December 1989

Persistence Effects in Labor Force Participation

Robert S. Gay and William L. Wascher*

INTRODUCTION

Much of the recent research on aggregate labor supply functions has sought to explain cyclical fluctuations in employment and unemployment by focusing on the dynamic aspects of the participation decision. The purpose of this paper is to distinguish empirically two facets of participation dynamics that are of particular interest because they imply quite different interpretations of labor market fluctuations. The first is the notion that workers time their participation to coincide with periods of high real wages. In this view of labor supply, which underlies equilibrium business cycle models, cyclical fluctuations in employment and unemployment are primarily voluntary responses of workers to transitory movements in real wages. A second facet of participation dynamics turns on the notion that workers' current labor force status is heavily influenced by their work experience in the recent past. In this view, short-run increases in employment lead to longer-term increases in participation as workers remain in the labor force because they become committed to consumption standards and their associated contractual costs, accumulate human capital and form attachments to careers, and face adjustment costs associated with leaving and reentering the labor force. These persistence effects in contrast with the timing hypothesis, would lead to a secular increase in labor supply and involuntary unemployment during cyclical downturns.

The timing hypothesis rests on the presumed importance of intertemporal substitution among labor supply decisions over the life cycle.[1] That is, consumption of leisure in the current period is presumed to be highly substitutable with leisure (and goods) in other periods. Thus, movements in the current real wage relative to expected future real wage rates would generate large short-run responses in labor supply. Supporting empirical evidence on short-run elasticities, however, has been inconclusive. In one seminal study, Lucas and Rapping (1969) did find a fairly high elasticity of labor supply with respect to temporary wage changes for the period 1930–65. Their empirical work was based on the assumption that expectations about future wages and prices, which play a key role in the model, are formed adaptively and thus are not directly observed. Their estimates for elasticities with respect to permanent wage changes was also consistent with a vertical long-run supply curve. However, another study by Altonji (1982) reestimated the Lucas and Rapping model for the period 1930–76 using wage and price expectations generated from explicit forecasts for a system of equations implied by a rational expectations solution to the labor market model and the results generally do not support the intertemporal substitution hypothesis.[2] From this evidence and other studies using panel data on individuals' labor supply decisions, he concludes that the temporary wage elasticity probably is weakly positive, although he allows that a large elasticity for married women cannot be ruled out.[3]

There are, however, several reasons to believe that longer term perspectives play a major role in labor supply decisions. First, high transactions costs incurred by the jobseeker in finding a job and by the employer in training new workers may impede intermittent participation. Second, employed workers tend to accumulate human capital or valuable work habits, thereby increasing the probability of keeping their current jobs or of finding another one and raising the return to work relative to leisure.[4] Third, certain incentives that spur greater participation among young persons (such as cohort effects) may carry over

*Senior Economist, Morgan Stanley & Co. and Senior Economist, Board of Governors of the Federal Reserve System respectively. We have benefitted from the comments and suggestions of Steven Braun, Lisa Ehrlich, Michael Keeley, Kathryn Shaw, and Lawrence Slifman. We are also grateful to Maura Shaughnessy for excellent research assistance. The views expressed here are the authors and do not necessarily represent those of the Board of Governors or staff of the Federal Reserve System.

throughout the life cycle as workers develop attachment to careers. To the extent that labor supply decisions are conditioned by these longer term considerations, they should not be strongly responsive to transitory developments.

Much of the evidence on persistence comes from microdata studies of employment patterns based on panel data. Heckman and Willis (1977), for example, found that, for married women, the probability of current participation was strongly affected by past work experience. They attributed part of that persistence to heterogeneity in the sense that some persons inherently have higher probabilities of attachment to the labor force than others due to individual differences in tastes and preferences. After adjusting for this heterogeneity, they still found evidence of substantial persistence or "state dependence." Chamberlain (1978) also estimated that prior work experience raises the probability of participation after controlling for individual differences. Moreover, other evidence suggests that persons with work experience have better chances of finding a new job when unemployed than do new entrants.

Persistence effects in aggregate time series data have been examined by Clark and Summers (1982). Their approach was to introduce a measure of the "stock" of past employment into the intertemporal substitution framework. They found some support for the importance of persistence in explaining fluctuations in labor supply, while transitory variations in the perceived real wage had little effect on labor force participation.

In the present paper, which also uses the intertemporal substitution framework in a time-series model of labor force participation, persistence is characterized as emanating from macroeconomic conditions (as in Clark and Summers) as well as cohort-specific influences on labor supply. Rather than using aggregate data, however, in which timing and persistence effects may be obscured by divergent behavorial patterns among worker groups, separate labor force participation equations are estimated for 14 age-sex groups. Indeed, the use of aggregate data by Clark and Summers may account for their finding only weak support for the persistence hypothesis which, in truth, may have significant bearing on the labor force behavior of some groups but not others.[5] Given the disaggregated analysis, it is necessary to control for other group-specific factors affecting participation, such as demographic composition, which generates intermediate-run swings in participation particularly for younger workers and women (Wachter, 1977), and disability income, which plays a key role in participation among older men (Parsons, 1980). Through these models, we hope to identify more clearly for which workers persistence effects are most relevant and to suggest time-series specifications that can be used in more detailed models of aggregate labor force behavior.

MODEL SPECIFICATION

Labor force participation rates for each demographic group i are specified as a function of both timing effects and persistence effects:

$$(1) \qquad L_{it}^{s} = f\left(Z_t, w_t, \frac{w_t^e}{1 + r_t}, \frac{P_t^e}{P_t(1 + r_t)}, Y_t/P_t, X_{it}\right).$$

In equation (1), w_t and w_t^e are current and future expected real wage rates, r_t is the nominal interest rate, P_t and P_t^e are current and future expected prices, and A_t/P_t is real non-wage income. In addition, we have included Z_t to represent persistence effects and X_{it} for variables of particular importance in labor supply decisions for certain demographic groups.

Life cycle models generally assume that leisure is easily substitutable over time, implying that workers will time their entries into and exits out of the labor force to obtain the maximum benefits. That is, workers enter the labor market when the current market wage is high relative to future expectations and exit when the current market wage is relatively depressed. Since w^e and p^e are unobserved at time t, a mechanism must be specified for the formation of expectations of wages and prices. To generate these expectations, a system of vector autoregressions was estimated from quarterly data for real wages, prices, and real output (Q_t) along with univariate autoregressions for the money supply (M_t) and interest rates (r_t). Using the parameter values estimated over the entire sample period, the system of equations was

simulated beginning in each quarter t over the next 20 quarters to form forecasts ($w_{t+1}, \ldots, w_{t+20}$) and ($p_{t+1}, \ldots, p_{t+20}$). The forecast values were then discounted back to period t and averaged to form estimates for w_t^{e*} and P_t^{e*} for each period in the sample.[6]

In addition to timing considerations, the micro literature suggests that past work experience is important to current labor supply decisions. In particular, the presence of high transactions costs, human capital accumulation, and habit formation can effectively lower the reservation wage relative to the market wage.[7] For the latter two sources to be of any consequence, an individual must first accumulate work experience. In the context of aggregate time-series data, this observation suggests that persistence in labor supply is likely to be observed in the wake of developments that augment total employment. That is, rising aggregate demand spawns relatively favorable labor market conditions, and draws individuals into the labor market who would be reluctant to participate under less attractive conditions. Up to this point, the story is akin to the timing hypothesis embodied in intertemporal substitution models. However, in contrast with the timing hypothesis, a portion of these new entrants or reentrants may not withdraw from the labor force when labor market conditions deteriorate because temporary concerns about the prospective wage in the immediate future are outweighed by the fact that recent work experience has already raised their market wage relative to the reservation wage. The result would be an upward ratchet in the participation rates for groups whose labor supply decisions are most likely to be affected by strong aggregate demand.

To capture persistence associated with recent strength in aggregate demand, a so-called ratchet variable, $(E_t/N_t)^*$, is included in the model, defined as the highest ratio of civilian employment to the working-age population observed over the previous five years.[8] Although this variable cannot distinguish among the various rationales for persistence, increasing job opportunities in the aggregate presumably entail these microeconomic effects. The goal is not to identify the specific source of persistence, but to link the "macro" aggregate demand concepts with "micro" ideas underlying persistence and to compare the role of that link with discouraged worker effects for various demographic groups.[9]

The discouraged worker effect is measured using the gap between the employment-to-population ratio and its recent cyclical peak (as defined by the ratchet variable). This form for the slack variable (denoted by $[E_t/N_t - (E_t/N_t)^*]$) was chosen in lieu of the usual unemployment rate for several reasons. First, the employment gap variable is purely cyclical in nature; it exhibits no secular trend as does the overall unemployment rate. Second, an employment rate may be a better measure of actual labor market conditions because it is not influenced by labor force entry into and exit from unemployment, as is the unemployment rate.[10] Third, discouragement is circumscribed to occur during periods of slack demand (relative to past peaks in E_t/N_t); that definition represents the converse of our interpretation of the ratchet variable—a sustained expansion in job opportunities augments labor supply, and slack in the labor market discourages participation. As a result, by construction the employment gap variable permits consistent comparisons between the degree of discouragement during recessions and the offsetting extent of persistence elicited during the previous expansion.

Other developments that may influence labor supply decisions for certain demographic groups also may lead to longer-term persistence. For example, studies have identified cohort size as an important factor leading to the secular rise in participation among young women.[11] Once workers are induced to enter the labor force as added workers during their youth, they may develop an affinity for market activity and so have a higher probability of remaining in the labor force. We refer to this type of persistence as the "lagged added worker" effect and have included a variable, RP_{t-k}, to measure this effect. This variable is measured as the size of the population age 16–34 relative to the total working-age population, lagged back to when the members of each specific cohort were on average 25 years of age—the midpoint of the cohort size variable.

Finally, a lagged dependent variable is included in each equation and may pick up some aspects of persistence that are not explicitly captured by the other measures. In general, using aggregate participation rates, it is difficult to disentangle parameter estimates for the "past employment" effect (as measured here by the ratchet variable) from those for the lagged dependent variable. But in a disaggregated analysis, the lagged dependent variable is specific to a demographic group, whereas the

ratchet effect reflects a generalized increase in demand. Given the widely divergent trends in participation across demographic groups, it seems less likely that lagged group-specific participation rates and the aggregate employment-to-population ratio are highly collinear.

Rewriting equation (1) in terms of the hypothesized determinants of persistence (embodied in Z_t) gives the participation function for demographic group i:

$$\ln L_{it}^s = \beta_{0i} + \beta_{1i}\left(\frac{E_t}{N_t}\right)^* + \beta_{2i}\left[\left(\frac{E_t}{N_t}\right) - \left(\frac{E_t}{N_t}\right)^*\right] + \beta_{3i}RP_{i,t-k} + \beta_{4i}\ln L_{i,t-1}^s + \beta_{5i}\ln w_t + \beta_{6i}\ln w_t^{e*} + \beta_{7i}\ln\left(\frac{P_t^{e*}}{P_t}\right) + \beta_{8i}\frac{A_t}{P_t} + \beta_{9i}X_{it}. \tag{2}$$

where L_{it}^s is the fraction of the civilian population in the labor force for group i, $(E_t/N_t)^*$ denotes the ratchet variable, $[(E_t/N_t) - (E_t/N_t)^*]$ is the discouraged worker effect, and $RP_{i,t-k}$ represents the lagged effect of demographic composition on a cohort's participation rate. For convenience, we assume a logarithmic relationship between participation, wages, and prices; a log-linear relationship is assumed between labor supply and the various persistence measures.[12]

Substantial persistence implies $\beta_1 > 0$ so that increases in past employment experience raise subsequent participation rates. In contrast, $\beta_1 < 0$ might be viewed as consistent with the timing hypothesis; that is, past employment experience reduces subsequent participation given current and expected wages and prices. The same line of reasoning applies to the expected signs for β_{3i} and β_{4i}. If large cohorts depress their own relative earnings and augment their labor supply in order to maintain living standards during the formative years of work experience, then $\beta_{3i} > 0$ implies persistence in labor supply later in life; a positive impact of past labor supply ($\beta_{4i} > 0$) carries a similar interpretation. On the other hand, a strong form of the timing hypothesis would predict that persons who were added workers early in life would select themselves out of the labor force later ($\beta_{3i} < 0$) and would predict a negative impact of lagged labor supply ($\beta_{4i} < 0$) apart from its role as a distributed lag generator.

On the other hand, if the results are to provide persuasive evidence of intertemporal substitution, the elasticity of labor supply with respect to movements in the contemporaneous real wage, β_{5i}, is expected to be positive and sizable, while the sign of the coefficient of w_t^{e*}, β_{6i} should be negative. In addition, one would expect the long-run elasticity of labor supply with respect to the real wage, $\beta_{5i} + \beta_{6i}$, to be close to zero.[13] The prediction of the intertemporal substitution theory about the sign of β_{7i} is ambiguous while income effects captured by β_{8i} should be negative.[14]

The remaining variables in the models, which are denoted by X_{it}, are meant to capture influences on labor supply that were found to be of importance in earlier disaggregated time-series studies of participation. Cohort size relative to total population is included in the relevant female equations to measure relative income effects that were estimated by Easterlin (1968) and Wachter (1972, 1977). Measures of non-wage income in the form of social security and disability payments were included in the equations for older workers; disincentives to participation associated with transfer payments were found by Parsons (1980) and Leonard (1979). Other control variables are school enrollment rates in the equations for young persons and the proportion of the population serving in the armed forces in the equations for young males.[15]

EMPIRICAL RESULTS

The data used to estimate equation (2) are quarterly time-series data for the U.S. over the period 1952 to 1986. Labor force participation rates are disaggregated into 14 separate age-sex groups in order to identify particular portions of the population for whom either timing or persistence effects are particularly important. The estimated coefficients from equation (2) are presented in table 1.[16]

In general, the results support the importance of persistence in mitigating the procyclical forces influencing labor force participation for many demographic groups. In particular, the ratchet variable

TABLE 1
Labor Force Participation Equations With Persistence

	Females						
	16–19	20–24	25–34	35–44	45–54	55–64	65+
Log w	.200	.184	.066	.035	.115	−.104	.001
	(1.18)	(1.33)	(.66)	(.36)	(.98)	(−1.07)	(.02)
Log w^e	−.141	−.465	−.381	−1.23	−.153	.646	.101
	(−.71)	(−2.97)	(−2.44)	(−4.71)	(−1.08)	(4.32)	(1.88)
Log P^e/P	−.0004	−.0005	.001	−.002	−.001	.0002	−.0002
	(−.95)	(−1.64)	(−3.30)	(−5.50)	(−1.57)	(.72)	(−1.38)
$(E/N)^*$	1.16	.267	.241	.686	.802	.491	.130
	(2.92)	(.88)	(1.10)	(3.29)	(3.07)	(2.41)	(1.10)
$(E/N) - (E/N)^*$	1.03	.542	.402	.582	.259	.180	.117
	(4.91)	(3.29)	(3.29)	(5.72)	(2.09)	(1.84)	(2.39)
RP	.821	.941	.022	−.022	−.815	−.923	−.267
	(4.68)	(4.45)	(.08)	(−.21)	(−4.84)	(−6.13)	(−4.69)
RP_{t-k}			.728	−.809	.219	−.418	.361
			(2.19)	(−2.48)	(.67)	(−1.21)	(2.24)
Lagged dependent variable	.522	.621	.672	.507	.641	.509	.441
	(7.54)	(9.25)	(9.71)	(7.49)	(9.75)	(6.74)	(5.73)
Time	.002	.011	.014	.035	.008	.008	−.002
	(1.69)	(4.69)	(3.72)	(6.33)	(3.04)	(4.32)	(−2.26)
School enrollment	−.379	.233					
	(−2.87)	(1.51)					
Social Security Benefits						−.005	.007
						(−2.28)	(2.02)
Constant	−.805	.888	1.01	5.32	.059	−1.90	−.553
	(−1.85)	(2.50)	(1.56)	(4.86)	(.23)	(−4.92)	(−3.86)
$\bar{R}^2$	.979	.997	.999	.999	.995	.985	.909
Durbin H	.89	.12	−.05	−.64	.02	1.32	.17
ρ	—	—	—	—	—	—	—

Sample period is from 1952-Q1 to 1986-Q4.
T-statistics are in parentheses.

$(E_t/N_t)^*$ is positive in all of the female equations and is statistically significant in four of the seven. For males, $(E_t/N_t)^*$ appears with a significant, positive coefficient both for teenagers and older persons. Perhaps not surprisingly, the strongest short-term persistence influences associated with a generalized improvement in job opportunities appear for those groups often thought to have the weakest attachment to the labor market—teenagers, adult women, and older men. Although these groups also exhibit the largest and most significant discouraged worker effects, as measured by the coefficients in $(E_t/N_t) - (E_t/N_t)^*$, much of that influence is offset by the persistence associated with the previous economic expansion. As shown in table 2, this persistence reduces the procyclical pattern of labor force participation associated with the discouraged worker effect by between 10 and 70 percent for the female groups and for teenage and older men, but by very little for prime-age male groups.

In contrast, only limited support is found for a significant intertemporal substitution influence on labor force participation associated with cyclical fluctuations in wages and prices. In the male equations, none of the models has a positive and significant elasticity of labor supply with respect to w_t, a negative and significant elasticity with respect to w_t^e, or a significant coefficient of any consequence on the expected inflation variable. Only the female equations offer some weak evidence for intertemporal substitution effects, primarily for young adult women. In particular, although the coefficient of log w_t is never

TABLE 1 (continued)
Labor Force Participation Equations

	Males						
	16–19*	20–24*	25–34*	35–44	45–54	55–64*	65+
Log w	−.109	−.180	−.012	−.007	−.008	.0003	.188
	(−.46)	(−1.49)	(−.46)	(−.25)	(−.22)	(.00)	(.97)
Log w^e	.331	.186	.009	.010	−.039	.072	.045
	(1.23)	(1.54)	(.32)	(.31)	(−.87)	(.87)	(.21)
Log P^e/P	.009	.0002	.00007	.00004	−.00003	.0003	.007
	(1.21)	(.74)	(.70)	(.55)	(−.25)	(1.41)	(1.43)
$(E/N)^*$	2.93	.367	−.059	−.015	.001	.275	2.20
	(4.75)	(1.73)	(−1.49)	(−.30)	(.02)	(2.37)	(4.00)
$(E/N) - (E/N)^*$	2.19	.458	.041	.033	−.021	−.077	.426
	(7.46)	(4.07)	(1.70)	(1.08)	(−.49)	(−1.22)	(2.10)
RP	1.79	−.173					
	(4.92)	(−2.01)					
Lagged dependent variable	.041	.121	.792	.466	.564	.769	.624
	(.52)	(1.47)	(14.43)	(6.18)	(7.86)	(16.18)	(9.01)
Time	−.013	−.002	−.0001	−.0006	.0007	−.002	−.017
	(−4.73)	(−1.72)	(−.61)	(−2.69)	(1.68)	(−2.60)	(−4.38)
School enrollment	−.312	−.273					
	(−2.10)	(−3.50)					
Armed Forces	−3.71	−2.43					
	(−3.44)	(−4.74)					
Social Security Benefits						−.0005	−.012
						(−.33)	(−1.07)
Disability Benefits (DB)					.001	−.001	
					(.60)	(−.46)	
Dummy (=1 after 1965)					.016	.021	
					(3.97)	(3.58)	
DB × Dummy					−.013	−.026	
					(−4.32)	(−4.70)	
Constant	1.00	3.89	1.00	2.45	2.20	.571	−.773
	(1.35)	(8.50)	(3.98)	(7.02)	(6.04)	(3.26)	(−1.81)
$\bar{R}^2$	.918	.821	.957	.947	.979	.997	.997
Durbin H	1.38	1.44	−.36	−.68	−1.22	−.14	.65
ρ	.49	.12	−.25	—	—	−.17	—

*Corrected for serial correlation using an iterative Cochrane-Orcutt procedure.

statistically significant, the elasticity of labor supply with respect to w_t^e is negative and significant for women aged 20–24, 25–34, and 35–44 while the coefficient on log (p_t^e/p_t) is negative and significant for women aged 25–34 and 35–44. Nonetheless, even for these groups, the long-run elasticity of labor supply with respect to the real wage is substantially different from zero.[17]

The longer term persistence variable, represented by lagged values for the size of the youth cohort (denoted as RP_{t-k}), enters into the equations for women aged 25 and over. Only two groups—females 25 to 34 and those age 65 and over—show significant coefficients for this variable. These results cast some doubt on whether the size of one's own cohort alters labor force behavior over that generation's entire worklife. A large cohort may instead depress wages and elicit additional participation from secondary wage earners during peak years of consumption.

The other cohort-specific measure with potential implications for persistence, the lagged dependent

TABLE 2
Comparison of Short-Term Persistence and Discouraged Worker Effects for Post-WW II Business Cycles

Age-sex group	(1) $\frac{\partial \log PR_i}{\partial \left(\frac{E_t}{N_t}\right)^*} \cdot \Delta\left(\frac{E_t}{N_t}\right)^*$ (ratchet variable)[1]	(2) $\frac{\partial \log PR_i}{\partial\left[\frac{E_t}{N_t} - \left(\frac{E_t}{N_t}\right)^*\right]} \cdot \Delta\left[\frac{E_t}{N^t} - \left(\frac{E_t}{N_t}\right)^*\right]$ (discouraged worker effect)[2]	(3) (1) ÷ |(2)|
	— — — — — percentage points — — — — —		
Females:			
16–19	.54	−2.20	.25
20–24	.13	−1.16	.11
25–34	.11	−.86	.13
35–44	.32	−1.25	.26
45–54	.38	−.55	.69
55–64	.23	−.39	.59
65+	.06	−.25	.24
Males:			
16–19	1.38	−4.68	.29
20–24	.17	−.98	.18
25–34	.0	−.09	.0
35–44	.0	−.02	.0
45–54	.0	.04	*
55–64	.13	.16	*
65+	1.03	−.91	1.13

[1]Column 1 is computed using the mean increase per cycle in the ratchet variable over seven postwar business cycles excluding the brief 1980–81 cycle. From 1948-Q1 to 1986-Q4, the ratchet variable increased 3.31 percentage points, or an average .47 percentage points per cycle.

[2]Column 2 is computed using the mean maximum value of the labor market slack variable at seven cyclical troughs excluding the one in 1980. The value was −2.14 percentage points.

*Ratchet variable and discouraged worker effects are in the same direction.

variable, generally had a coefficient between one-third and two-thirds and usually was highly significant. In addition, three interesting patterns emerged across age and sex groups. First, the coefficients on the lagged dependent variables tended to be lower for males than females in the young and middle age groups; the reverse was true for older age groups. Second, the coefficients were higher for young and middle-aged females than for older females while the reverse pattern appeared in the male equations. To the extent that the lagged dependent variable is capturing persistence effects not associated with strength in aggregate demand or cohort size, women and older males are the groups most likely to exhibit such "unmeasured" persistence.

Third, a good case can be made that lagged dependent variables included in previous studies of labor force participation actually were picking up persistence emanating from high levels of employment during cyclical expansions. When $(E_t/N_t)^*$ and RP_{t-k} were omitted from the models, the coefficients on the lagged dependent variables increased in 13 out of the 14 equations. The increase was fairly large for those groups in which $(E_t/N_t)^*$ was important, but quite small among prime-age males, for whom persistence was not a key feature of labor force behavior.

Among the remaining variables, the results generally were consistent with those of earlier studies. First, the labor force participation of younger persons, both male and female, is positively affected by their own cohort's size (shown by the coefficient on RP_t) as is predicted by the relative income hypothesis. In

contrast, the coefficients on RP_t are negative for older women, implying that they are substitutes for youth in the labor market, while participation among middle-aged women largely is unaffected by the size of the current cohort of younger persons. All of these patterns parallel those found by Wachter (1977) and provide a plausible explanation for the relatively high participation among the baby-boom generation.[18] Second, the time trend appears with a positive sign in most of the female equations with the trend rate of growth highest among middle-aged women and lowest for older women. The trend is negative in most of the male equations, although it appears with a very small coefficient. Thus, one cannot rule out sociological explanations of labor force trends, such as changing preferences for market work.

Finally, higher disability benefit levels have a negative influence on the labor supply of older men, at least after eligibility requirements were eased in 1965.[19] The coefficients imply elasticities ranging from about $-.01$ for males 45–54 to about $-.025$ for males 55–64. The estimate for males 45–54 is lower than those found by Parsons (1980) and in the range of those found by Haveman and Wolfe (1984). Similarly, social security benefits appeared with the expected negative sign in three of the four equations in which they were included, but were only statistically significant for females 55–64.

CONCLUSION

The evidence presented here indicates that persistence effects are a key feature in labor force dynamics. Once lured into the labor market, a sizable portion of newly added workers elect to maintain their attachments to the labor force even after job prospects deteriorate. Apparently, for many new entrants, decisions to participate are viewed as long-term commitments that are not readily reversed when market conditions are no longer as favorable as first anticipated. One rationale for such long-term perspectives rests on the potential importance of entry costs and of human capital accumulation associated with work experience. Both entry costs and human capital accumulation in effect raise the market wage relative to the reservation wage, thereby muting any potential response of labor supply to transitory fluctuations in labor demand. Indeed, once persistence variables are incorporated into a life-cycle model, very little evidence could be found to support the notion that workers time their participation to coincide with periods of high real wages.

Somewhat ironically, persistence effects were strongest among those demographic groups that are often characterized as having relatively weak attachments to the labor force, namely middle-aged women, and older men. Although these groups show strong tendencies to withdraw from the labor force when job opportunities contract during recessions, the finding of substantial persistence in labor supply in the wake of the preceding employment expansion substantially diminishes estimates of net discouragement during recessions. Among groups for which such short-term persistence is important, the persistence effect is typically between 10 and 70 percent as large as the discouraged worker effect.

The dominance of persistence and the absence of intertemporal substitution clearly favor a disequilibrium interpretation of cyclical fluctuations in unemployment rather than the view that unemployment is primarily a voluntary response to changes in current and expected real wages. That is, high unemployment rates during recessions are indicative of involuntary unemployment associated with inadequate job opportunities rather than voluntary unemployment reflecting depressed real wages. In addition, the demographic composition of persistence contradicts the old view of women as secondary workers with little attachment to jobs. The results presented here suggest that many women become attached to careers during periods of expanding employment and subsequently are hesitant to exit the labor market during periods of economic contraction. Indeed, an upward ratcheting of women's participation over time is an implication of the participation dynamics depicted by the persistence model and offers a potential explanation for the upward secular trends in participation for females over the past four decades.

FOOTNOTES

1. Perhaps the best presentation of the timing argument can be found in Ghez and Becker (1975). Barro (1978) has developed a more complete model of intertemporal substitution in general equilibrium.

2. It should be noted that both Lucas-Rapping and Altonji employ labor supply functions in terms of total hours worked, whereas Clark and Summers (1982) and this paper examine labor force participation rates.
3. Hall (1980) briefly summarizes the evidence on intertemporal labor supply from U.S. negative income tax experiments, which suggest a temporary wage elasticity of 0.26 for men, 0.66 for women, and 0.40 for all workers.
4. Conversely, when out of the labor force, an individual's stock of human capital may depreciate, thereby impeding future employability. See, for example, Mincer and Polachek (1974).
5. Clark and Summers do offer some evidence on persistence effects for groups of workers using cross-section data by state.
6. The weights chosen to discount the forecast values of wages and prices are normalized to one and use an annual decay parameter of 0.95. While it would be ideal to discount future values using an interest rate, Altonji (1982) found that changing the weights made little difference. The choice of a 5-year forecast horizon is arbitrary, although it does correspond with the average duration of postwar business cycles. Clark and Summers (1982) used a similar procedure.
7. Attachment to a career may directly lower the reservation wage, whereas the acquisition of skills raises the market wage without a predictable effect on the reservation wage. The role of transactions costs in generating an asymmetrical pattern to intertemporal substitution is more ambiguous because such costs will discourage some individuals from ever entering the labor market as well as encouraging those who find jobs to remain employed. For encumbent workers, a fairly convincing case can be made that high transactions costs reinforce other sources of persistence. Once a job is taken, transactions costs are sunk, and a person might be reluctant to quit his job in response to a temporary decline in the market wage because leaving would mean that he would have to again incur fixed costs in order to find a new job. Indeed, in this case the market wage need not necessarily exceed even the shadow price of time for a worker to remain on the job.
8. During each successive postwar business cycle with the exceptions of the two cycles in the 1953–60 period, rising aggregate demand ratcheted the employment-population ratio to ever higher levels. The choice of a five year horizon merely allows the ratchet variable to step down (in 1958) from the unusually high level reached during the Korean War. Other than that single discontinuity, the ratchet variable is constant at its previous peak level during recessions and the initial stage of recoveries and then rises during expansions.
9. Given this objective, a cohort-specific "ratchet" variable, in conjunction with a cohort-specific measure of labor market tightness, would add little to the analysis. The parameter estimates on the aggregate variable should speak for themselves.
10. See, for example, Keeley (1984).
11. As the baby boom generation reached working age during the 1960s and early 1970s, their increased numbers augmented labor supply and depressed relative earnings for young workers. That adversity spurred increased participation, especially among married women, in an effort to maintain desired standards of living. See, for example, Wachter (1977).
12. In addition, each equation contains a time trend to control for exogenous sociological effects. If the coefficient on the trend is positive, as is likely to be the case for most female groups, then entering a trend variable in a linear fashion eventually would lead to a predicted participation rate above unity. To adjust for this problem, the dependent variable in each female equation is transformed to $-\log(1 - (L_{it}^s))$. The result is a functional form for the dependent variable that approaches unity asymptotically. See Wachter (1972).
13. Although the timing hypothesis usually is framed in terms of current and expected real wage rates, fluctuations in labor supply associated with changes in other measures of labor demand (such as the employment rate) also may be appropriate if it is believed that workers are timing their participation based on their perception of job opportunities rather than the real wage.
14. Given the expected real wage, higher expected inflation stimulates greater current consumption of goods by fostering a buy-in-advance psychology. Higher current consumption must be financed through borrowing, working more, or saving less. Consumers' choices among these options are conditioned by the real interest rate and credit availability. Because nominal interest rates probably reflect price expectations with some delay, expectations of higher inflation mean that consumers perceive the current interest rate to be temporarily favorable for borrowing more, saving less, and perhaps working less ($\beta_{7i} < 0$). This result seems most plausible for persons with stable incomes and job prospects (prime-age workers). On the other hand, persons with low or less stable incomes (youth and the elderly), who have a limited capability to borrow against future earnings and little savings, must finance higher current consumption by working more ($\beta_{7i} > 0$).
15. Although data on assets are not available by demographic group, we did include a measure of financial net worth for the household sector of the economy. This variable generally performed quite poorly due to a high correlation with movements in the real wage and so was dropped from the analysis.
16. Because of possible simultaneity between current labor supply and the contemporaneous real wage, an instrumental variables approach was used for w_t. The instrument list included lagged values of the real wage, productivity, real GNP, and the inflation rate as measured by the fixed weight price index for personal consumption expenditures.
17. We also estimated a pure timing model, which excludes the ratchet and lagged added workers variables. These

models implicitly assume that the market clears at the prevailing wage, so the measure of labor market slack was dropped as well. The lagged dependent variables were left in this specification on the judgment that their role in picking up unmeasured influences on participation outweigh their role as a measure of persistence. These results also provided little support for the intertemporal substitution model. Estimates for the pure timing model are available from the authors.

18. Age-specific fertility rates also were tried in the appropriate female equations and generally showed a strong inverse relationship with participation. However, when both fertility rates and the cohort size variable were included, the coefficients on fertility rates were rendered insignificant due to collinearity with cohort size. Indeed, a graph of the cohort size variable is a mirror image of a graph of the fertility rate. This evidence suggests that women make decisions concerning childbearing in conjunction with decisions about their careers and that both decisions are conditioned by influences emanating from the changing age structure of the population.
19. Both social security and disability benefits are average annual benefits deflated by the fixed-weighted personal consumption deflator. In addition, a dummy variable set equal to one after 1965 is interacted with the disability variable to capture the easing of eligibility requirements that took place in that year.

REFERENCES

Altonji, Joseph G. "The Intertemporal Substitution Model of Labour Market Fluctuations: An Empirical Analysis." *Review of Economic Studies* 49(1982): 783–824.

Barro, Robert, J. "Unanticipated Money, Output, and the Price Level in the United States." *Journal of Political Economy* 86(August 1978): 549–580.

Chamberlain, Gary. "The Use of Panel Data in Econometrics." unpublished 1978.

Clark, Kim B. and Lawrence H. Summers. "Labour Force Participation: Timing and Persistence." *Review of Economic Studies* 49(1982): 825–844.

Easterlin, Richard A. *Population, Labor Force, and Long Swings in Economic Growth.* New York: Columbia University Press, 1968.

Ghez, Gilbert and Gary Becker. *The Allocation of Time and Goods Over the Life Cycle.* New York: Columbia University Press for the National Bureau of Economic Research, 1975.

Hall, Robert E. "Labor Supply and Aggregate Fluctuations." *Carnegie-Rochester Conference Series on Public Policy* 12(1980): 7–33.

Haveman, Robert H. and Barbara L. Wolfe. "The Decline in Male Labor Force Participation: Comment." *Journal of Political Economy* 92(June 1984): 532–541.

Heckman, James J. and Robert J. Willis. "A Beta-logistic Model for the Analysis of Sequential Labor Force Participation by Married Women." *Journal of Political Economy* 85(Feb. 1977): 27–58.

_____. "Cyclical Unemployment and Employment: Implications From a Dynamic Model of the Labor Market." Working paper no. 84-01: Federal Reserve Bank of San Francisco, April 1984.

Leonard, Jonathan S. "The Social Security Disability Program and Labor Force Participation." Working paper no. 392: National Bureau of Economic Research, August 1979.

Lucas, Robert E. and Leonard A. Rapping. "Real Wages, Employment, and Inflation." *Journal of Political Economy* 77(September/October 1969): 721–754.

Mincer, Jacob and Solomon Polachek. "Family Investments in Human Capital: Earnings of Women." *Journal of Political Economy* 82(March/April 1974): S76–S108.

Parsons, Donald O. "The Decline in Male Labor Force Participation." *Journal of Political Economy* 88(February 1980): 117–134.

_____. "Disability Insurance and Male Labor Force Participation: A Response to Haveman and Wolfe." *Journal of Political Economy* 92(June 1984):542–549.

Wachter, Michael L. "A Labor Supply Model for Secondary Workers." *Review of Economics and Statistics* 54(May 1972): 141–151.

_____. "Intermediate Swings in Labor Force Participation." *Brookings Papers an Economic Activity* (1:1977): 545–576.

DATA APPENDIX

L_i^j: Civilian labor force participation rate for demographic group i. Source: U.S. Bureau of Labor Statistics.
E/N: Civilian employment to population ratio ages 16+. Source: U.S. Bureau of Labor Statistics.
RP: Total noninstitutional population age 16–34 relative to total population age 16+. Source: U.S. Bureau of the Census, *Current Population Reports,* series P-20.
w: Real wage, measured as nominal hourly compensation deflated by the fixed-weighted price index for personal consumption expenditures. Source: U.S. Bureau of Labor Statistics.
P: Fixed-weighted price index for personal consumption expenditures. Source: U.S. Bureau of Labor Statistics.
Q: GNP in 1982 dollars. Source: Bureau of Economic Analysis, Department of Commerce.

M: Money supply (M1) in 1982 dollars. Source: *Federal Reserve Bulletin.*
r: Monthly average interest rate for long term (>10 years) U.S. government bonds. Source: *Federal Reserve Bulletin.*
School enrollment rate. Source: U.S. Bureau of Labor Statistics.
Armed forces: Ratio of armed forces to total population 16 and over. Source: U.S. Bureau of Labor Statistics.
Social Security Benefits: Average monthly benefit in 1982 dollars. Source: *Social Security Bulletin.*
Disability benefits: Average monthly benefit in 1982 dollars. Source: *Social Security Bulletin.*