Job Search Behavior and the Duration of Unemployment

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Abstract

The duration of unemployment measures the length of time during which an unemployed worker has been looking for a job. Search activity may lead workers to find employment, higher wages, or improved job-skill matching upon reemployment. Not all the unemployed leave unemployment for gainful employment; some retire and others withdraw from the labor force for various reasons. A certain period of unemployment, as well as positive unfilled vacancies, are inevitable in the operation of the labor market because adjustment in the supply of and demand for labor does not tade place instantaneously. Firms need time to find qualified workers, and workers need time to find acceptable wages and to adjust required skills.

This paper analyzes the causes of the cyclical fluctuations of unemployment duration in the context of the job search behavior of unemployed workers. The analysis focuses on the relative importance of the two major explanations for aggregate activety in the labor market. One explanation emphasizes the influence of aggregate demand on employment and unemployment via the relaxation of job-rationing constraints. The other explanation stresses the employment-acceptance responses of suppliers of labor to misperceptions of equilibrium wages. In the aggregate these two explanations can be represented by the job availability and wage misperception effects. This study examines the empirical importance of these two effects for the average duration of unemployment. The empirical results using two different sets of data regarding the time period and the choice of key variables indicate that unemployment duration is affected by both variations in the availability of job vacancies and variations in the wage aspirations of

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workers.

Section Ⅰ introduces the standard search theory of short-run unemployment fluctuations focused on the behavior of an individual worker. Section Ⅱ aggregates individual begavior through an employment-acceptance function. An empirical analysis is presented in section Ⅲ, which describes data, reports empirical findings, and discusses their implications. Section Ⅳ contains a summary and concluding remarks.

Ⅰ. Job Search Theory of Cyclical Unemployment

The job search model of short-run unemployment fluctuation described below was advanced by Mortensen (1970a, 1970b) and Barron (1975b) and has been subject to empirical estimation in Axelsson and Lofgren (1977) and Bjorklund and Holmlund (1981). The theory assumes that each worker has a reservation wage. If the worker is offered a job at a wage equal to, or in excess of, his reservation wage, he accepts the job offer.[1] In any period of unemployment he part to seek work.

Consider the behavior of an unemployed worker who is actively seeking employment. His first tast is to locate a vacancy. He then must decide whether to accept the job offer or to continue the search until a better wage offer is found. He will leave unemployment when he finds an acceptable wage offer. The probability of leaving unemployment in period t(PLU_t)is given by:

$$PLU_t=g_tp_t, \tag{1}$$

where g_t is the probability of locating a vacancy in period t, and P_t is the probability that the searcher accepts a job which he has found.[2] g_tp_t amounts to the probability of locating an acceptable job affer in period t. If PLU is constant and independent of the length of the unemployment spell[3], the expected duration of unemployment (D) can be written as:

$$D=PLU+2PLU(1-PLU)+3PLU(1-PLU)^2+\cdots$$
$$D=PLU[1+2(1-PLU+3(1-PUL)^2+\cdots]$$
$$(1-PUL)D=PLU[(1-PLU)+2(1-PLU)^2+\cdots]$$

$$D=1+(1-PLU)+(1-PLU)^2+\cdots$$

$$D=\frac{1}{1-(1-PLU)}=\frac{1}{PLU} \tag{2}$$

If v_t is the number of vacancies in period t, k is the number of firms which the job searcher expects to contact, n_t is the total number of firms, and h is the number of occupations (or types of labor)in the economy, then g_t is given by:

$$g_t=\frac{v_t k}{n_t h} \tag{3}$$

g may thus be give by:

$$g=g(v), \tag{4}$$

where v is the vacancy rate, and is defined to be the ratio of the number of vacancies to the number of employers and vacancies.

p_t is given by:

$$P_t=1-F(a_t)=1-\int_0^{a_t} o(a_t)da_t$$
$$=\int_{a^t}^{\infty} f(w_t)dw_t, \tag{5}$$

where a_t is acceptance (or reservation) wage, w_t is the wage offered, and f(.) and F(.) are the density function and the cumulative distribution function of (.). In (5) P_t is determined by the optimum stopping rule that the searcher accepts the wage offer w_t if w_t is at least as large as the acceptance wage a_t. a_t is chosen to equate the marginal cost of searching for one more period C with the expected marginal return from searching for more period R_t:

$$C=R_t. \tag{6}$$

R_t will be equal to the product of the probability of finding an acceptable wage (PLU_t) and the expected wage offer above the acceptance wage, or:

$$R_t=g_t p_t[E(w_t \mid w_t>a_t)-a_t]$$
$$=g_t\int_{a^t}^{\infty}(w_t-a_t)f^e(w_t)dw_t. \tag{7}$$

where $f^e(w_t)$ is the perceived density function of wage offer.

In a simple case of an infinite time horizon and a positive time discount rate r, equation (6) becomes:

$$C+a_t=\frac{g_t}{r}\int_{at}^{\infty}(w_t-a_t)f^e(w_t)dw_t. \quad (8)$$

The left side of equation (8) is the cost of searching for one more period which includes foregone income, The right side of (8) is the discounted expected return from continued search. The acceptance wage will be chosen to satisfy equation (8). A decrease in r will increase the acceptance wage a_t by increasing the expected return from search. A decrease in C will increase a_t by decreasing the cost of continued search.. Unemployment compensation benefits will reduce the cost of continued search and thus increase a_t. A rightward shift of $f^e(w_t)$ along w_t-axis will also increase a_t.[4]

II. Employment-Acceptance Function

To be able to test the search theory of unemployment outlined above at an aggregate level, the two probabilities g and P must be defined in aggregate terms. Previous empirical studies baseid on the job search theory associated g and P with the job availability effect and expectations effect [Axelsson and Lofgren (1977) and Bjorklund and Holmlund (1981)]. These effects are defined as follows:

The Job Availability Effect

An increase in the number of vacancies affects the average job seeker in the following two ways: First, an increasing number of vacancies, at a given reservation wage, will increase the probability of finding a job offer, thereby reducing the average duration of unemployment (the pure availability effect). Second, an increase in the number of vacancies will increase the returns from search. At a given wage distribution, this will increase the worker's reservation wage and will decrease the probability of accepting a wage offer, thereby lengthening the average duration of unemployment (the supply effect). The net effect of a rising number of vacancies on the average duration of unemployment is ambiguous.

The Expectation Effect

An increase in the actual wage inflation relative to the expected wage

inflation will increase the probability of accepting a wage offer because the average wage offer appears to be higher than the expected market average. This will reduce the duration of unemployment.

In this study the job availability effect is represented by equation (4), and the expectation effect will be formulated through an aggregate employment-acceptance function. An aggregate employment-acceptance function is represented by the two properties of the employment-acceptance decision emphasized in micro-economic explanations for employment and inflation theory. They are explained below in a model formulated by Grossman (1973).[5]

First rationalization for the employment-acceptance behavior emphasizes the fact that workers have incomplete information regarding the relevant alternatives they face. The parameters of the alternative wage distribution are not known with certainty. Workers formulate subjective estimates of the distribution of money wage rate offers over either space or time. Given this subjective estimate of the distribution of money wage offers, workers' decision to accept the wage offer is highly sensitive to the actual wage offer they receive. Workers will accept an actual wage offer thay is high relative to its subjective estimate of the mean wage offer. However, workers will reject an actual wage offer that is low relative to its subjective estimate of the mean.

Second aspect for this employment-acceptance decision is the intertemporal substitutability of work and leisure. An expected change in the future real wage rate will prompt workers to alter their current allocation of time between labor and leisure. Workers will increase working hours and reduce consumption of leisure when they perceive a rise in the real wage rate.

Let W represent the mean of the temporal distribution of actual money wage rate being offered, and W^e represent the mean of workers' subjectively estimated distribution of money wages. w^e is the mean of workers' subjectively estimated distribution of the real wage rate. An aggregate employment-acceptance function may be specified as:

$$L=L(W-W^e,\ w^e). \tag{9}$$

In (9) the employment accepted in the short run, L, depends on the subjectively estimated real wage w^e, reflecting the long-run planning of households to supply labor, and on the short-run speculative behavior of workers, i.e., their decision to accept an actual wage offer that is high relative to W^e and to reject an offer that is low relative to W^e.

In the case of fluctuations in aggregate transition probability, the aggregate employment-acceptance function (9) will replace the individual employment-acceptance probability (P) in equation (1). From (1), (4) and (9),

$$PLU_t=g_t(v_t)P(W_t-W_t^e,\ w_t^e). \tag{10}$$

From (2) and (10),

$$D_t=\frac{1}{PLU_t}=f(v_t,\ W_t-W_t^e,\ w_t^e). \tag{11}$$

In equation (11) the average duration of unemployment depends on the vacancy rate, unexpected money wages and expected real wages.

III. Empirical Analysis

The basic regression equation to represent the relation described in equation (11) is specified as:

$$\log D_t=b_0+b_1\log v_t+b_2\log (W_t/W_t^e)+b_3\log w_t^e \tag{12}$$

The estimate of b_1 reflects effects of job availability on the job offer probability (g). An increase in job availability reduces the expected length of search time to find a job offer. An increase on the vacancy rate can alter the distribution of the worker's reservation wage and the firm's offer wage. Such an increase will raise both the reservation and offer wages. An increacse in the level of the vacancy rate may have proportionate effects on the reservation and offer wages, leaving the length of search time unaltered. If is assumed that the probability of finding a wage offer which is as good as the searcher's reservation wage increases as the vacancy rate rises, the increase in the vacancy rate reduces the average duration of unemployment. The net effect of a rising vacancy rate on the duration of search is an empirical question.

The estimate of b_2 reflects the wage misperceptions effect. A surprise rise in money wage offer will boost the short-run speculative behavior of labor suppliers, thereby raising the acceptance probability (P) and reducing the duration of unemployment. On the other hand, workers will believe the unexpected rise in current money wage as a permanent increase in money wage rate offers over time. Workers expect increased returns from search and therefore raise their reservation wage. This negative effect on the acceptance probability will increase the duration of unemployment. The net wage misperceptions effect is also an empirical matter.

The b_3 estimate reflects the effect of intertemporal substitutability of work and leisure. An expected increase in real wage($_{t-1}w_t^e$)will increase the workers' current supply of labor, thereby reducing the duration of unemployment. The negative (positive) sign of b_3 assumes the dominance of substitution (income) over income (substitution) effects.

The Data

A. Manufacturing Vacancy Data

The job vacancy rates in manufacturing industries during the period April 1969-December 1973 are the only direct data about vacancy rates in the U.S. Consequently, estimation is limited for this period. Since the index of help-wanted advertising in newspapers has been frequently used as a proxy for economy-wide job vacancies, this data were also tried.[6] A proxy for the vacancy rate was obtained through dividing the help-wanted index by the number of employees on nonagricultural payrolls from the establishment survey.[7] This adjustment was made because the help-wanted index would be expected to rise with the number of jobs and with the number of establishments advertising.[8] The "average duration of unemployment" statistic (D) published by the Bureau of Labor Statistics measures the average time currently unemployed individuals have been searching for employment.[9]

The money wage variable (W) used was average hourly earnings of production workers in manufacturing excluding overtime payment. It is assumed here that W is a proxy for the mean of the distribution of actual

money wage offers and that expectations about W is a proxy for the mean of the distribution of the subjectively estimated money wage offers. Expectations about money wages anr generated from the optimal autoregressive moving-average (ARMA) forecasting procedure of Box and Jenkins.[10] It is assumed that the forecasts made at any time are to be based only on the information available at that time. This requires reestimating a separate Box-Jenkins equation for each month based on the observations available as of that month. An ARMA (1,1) model with a seasonal MA (1) term applied to the seasonal first differences of the wage variable was identified and estimated initially for the period of January 1960-March 1969 using monthly data. This estimated model was used to generate the forecast of the wage for April 1969. The forecast was updated at monthly intervals through December 1973. For example, the forecast for December 1973 was generated from the seasonal ARMA model estimated with data over the period January 1960-November 1973.

The real wage variable (w) used was the money wage divided by the Consumer Price Index. Expected real wages were calculated using the optimal ARMA forecasting procedure of Box-Jenkins described above. Specifically, an ARMA (1,1) model with a seasonal MA (1) applied to the seasonal first differences of the real wage variable was identified and estimated. The calculation assumes that forecasts made at each month are based only on the information available at that time and that the ARMA process estimated at each month is based on observations from January 1960 onwards.

B. Wage Expectations from the Livingston Survey

Since direct survey data about expected wages are available from the Livingston survey, this measure of expected wages are also utilized. The actual as well as expected wages are for average weekly earnings are taken from the six months forecast of the weekly earnings from the Livingston's June and December surveys. Following Wachtel (1977), it is assumed that participants in the survey forecast six-months ahead wage from survey dates based on the April and October figures in the June and December surveys, respectively. Notice that this assumption regarding the forecasting

horizon in the Livingston survey is different from the often-cited Carlson's (1977) assumption that participants in the survey forecast eight-months ahead wage from survey dates given the April and October figures in the June and December surveys, respectively.[11] To correspond the time interval with the expectations variables, all other variables in the regression are the monthly averages of May-October (for June survey) and November-April (for December survey).

Expected real wage was obtained through dividing the expected money wage by the CPI forecast from the Livingston survey.[12] The vacancy rate is proxied by the normalized help-wanted index described above. Equations using the Livingston wages data are estimated for the period from May-October 1949(June 1949 survey) to May-October 1980 (June 1980 survey).

Empirical Results

The results of estimating equation (12) for the period April 1969-December 1973 using the manufacturing industry data are presented in Table 1. Equation (12) is also estimated allowing a lagged term of the each independent variable. The lagged variables are allowed because it takes workers a period of time to search firms for vacancies as well as to search vacancies for acceptable wages. All of the regressions are corrected for the first-order autocorrelation of the error term. The first degree autocorrelation coefficients ($\hat{\rho}$) are reported in the last row of Table 1. The vacancy rate is represented by the manufacturing vacancy rate (v) in equations 1-4 of Table 1 and by the normalized help-wanted index (H) in equations 5-8 of Table 1.

In equations 1 and 5 of Table 1 where only contemporaneous vacancy rate and unexpected money wage are entered, neither of these variables is statistically significant. When a lagged term of each of these variables is added in the regressor, equations 2 and 4 of Table 1, the coefficients on the lagged vacancy variable are statistically significant whereas neither current nor lagged unexpected money wages is significant.

In equations 3 and 7 of Table 1, the duration equation is represented by the contemporaneous vacancy measures, unexpected money wages and ex-

Table 1. Regression Estimates of Duration of Unemployment
Monthly Data 1969 : 4 - 12

	1	2	3	4	5	6	7	8
Constant	2.2404	2.2173	−.5241	−1.5329	1.7934	.2276	−4.9872	−7.8187
	(33.72)	(82.30)	(.67)	(2.19)	(2.06)	(.28)	(4.06)	(7.29)
Log v_t	.0509	−.0778	−.1760	−.0956				
	(.89)	(1.08)	(3.47)	(1.51)				
Log v_{t-1}		−.1984		−.1886				
		(2.79)		(3.09)				
Log H_t					−.0855	.3123	−.5613	−.1263
					(.51)	(1.05)	(4.21)	(.63)
Log H_{t-1}						−.7075		−.6770
						(2.40)		(3.50)
Log $(W/W^e)_t$	.9947	1.5843	1.9100	2.3354	.9503	1.3173	2.2398	2.6202
	(1.18)	(1.18)	(1.75)	(2.01)	(1.15)	(.76)	(2.01)	(2.27)
Log $(W/W^e)_{t-1}$		1.0290		.4044		1.2359		.4706
		(.76)		(.30)		(.71)		(.34)
Log w^e_t			2.6345	2.3051			4.1364	3.0317
			(3.53)	(2.11)			(5.48)	(2.85)
				1.2688				2.6025
Leg w^e_{t-1}				(1.14)				(2.42)
R^2	.037	.335	.343	.595	.028	.176	.414	.675
ρ	.943	.708	.773	.687	.960	.648	.744	.643

Notes : Dependent variable is the log of the duration of unemployment.
Numbers in parentheses are absolute values of t-statistics.

pected real wages,. Coefficients on the vacancy variables have negative signs and are highly significant. Estimated coefficients on unexpected money wages have positive signs and are significant at the 10 percent level (equation 3) and at the 5 percent level (equation 7). Coefficient on expected real wage has a positive sign and is highly significant.

Equations 4 and 8 of Table 1 contain the current as well as preceding month's vacancy measures, unexpected money wages and expected real wages variables in regressor. For vacancy rate variables, only the lagged

one is significant in both equations. For unexpected money wages, only the current variable is significant in both equations. Both the current and lagged expected real wages are significant in equation 8 of Table 1.

Regression estimates of equation (12) for the period May-October 1949 to May-October 1980 using the Livingston survey data for expected wages are presented in Table 2. These equations are adjusted for the first-order serial correlation of the error terms. Only contemporaneous variables are entered in equations 1 and 3 of Table 2. In these equations, the coefficient of the normalized help-wanted index (H) has a negative sign, the coefficients of the wage variables have positive signs, and they are statistically significant. In equations 2 and 4 of Table 2 where a lagged term of each independent variable is added to equations 1 and 3 respectively, only a monthly-lagged H is highly significant with the expected sign, while other explanatory variables become insignificant.

Equation 1 in Table 2 is qualitatively different from the comparable equations in Table 1 (equations 1 and 5). Coefficients on both the vacancy and wage variables are significant in equation 1 of Table 2, while they are insingnificant in equations 1 and 5 of Table 1. Equation 2 in Table 2 is qualitatively somewhat similar to the comparable equations in Table 1 (equations 2 and 6). Equation 3 in Table 2 is qualitatively much similar to the comparable equations in Table 1 (equations 3 and 7). In these equations, all of three explanatory variables are significantly different from zero. These results may be interpreted as follows.

A rise in job availability, represented by either the manufacturing vacancy rate or the normalized help-wanted index, significantly increases the probability that a job searcher will find a job offer, thereby reducing the duration of unemployment. The job availability effect on unemployment duration does not take place instantaneously. It requires workers a period of time to complete job search and to match unemployment and unfilled vacancies either geographically or occupationally.

It has been suggested that wage misperceptions affect the duration of unemployment through the two mechanisms. First, unexpected higher wage offers will decrease the probability of accepting a wage offer by increasing the reservation wage and thus increase the length of job search. Second,

Table 2. Regression Estimates of The Duration of Unemployment, Biannual Data 1949-1980

	1	2	3	4
Constant	1.2207	−.8839	−1.2725	−6.2045
	(2.08)	(1.83)	(1.18)	(9.53)
Log H_t	−.2205	.1692	−.4090	.0879
	(2.08)	(1.92)	(3.37)	(.94)
Log H_{t-1}		−.7786		−1.1083
		(7.57)		(10.89)
Log(W/W^e)	.8187	.0121	.9336	−.4370
	(1.96)	(.03)	(2.01)	(1.10)
Log$(W/W^e)_{t-1}$		0633		−.1841
		(.17)		(.31)
Log w^e_t			.3102	.2392
			(2.84)	(.36)
Log w^e_{t-1}				.4097
				(.62)
R^2	.138	.630	.222	.815
$\hat{\rho}$	.858	.876	.683	.509

Note : Dependent variable is the log of th duration of unmploymnt.
Numbers in parenthses are absolut valus of t-statistics.

the wrong expectations will increase the probability of accepting a wage offer, because the job seeker is fooled to find the wage offers on the average to be better than expected, and this will reduce the length of search. The positive sign on the wage misperceptions variable suggests that the reservation wage effect dominate the wage aspiration effect. The estimate of coefficient on unexpected money wages is fairly sensitive with respect to the specifieation of the duration equation. The wage misperceptions variable is significant only when expected real wage is included as an explanatory variable in the duration equation. Only contemporaneous wage misperception affects the reservation wage mechanism for unemployment duration. In sum, these results support the hypothesis that the average

unemployed worker will continue to search for job if the wage offered fells under the acceptance level, Unemployment periods can be purchased owing to the fact that the worker's expectations about the distribution of wages are erroneous.

Expected real wages have a positive rather tnan negative effect on the duration of unemployment. A possible explanation for this outcome can be the dominance of income over substitution effect. This implies that workers increase their leisure in response to a rise in the expected real wage rate.

The high level of aggregation used in this study makes it difficult to extract implications with respet to the effects of the job offer probability and of the acceptance probability on the duration of unemployment.

IV. Summary and Conclusions

The new microeconomic foundations for employments and inflation theory as expounded in Phelps et. al. (1970), which can be grouped as the search theory of cyclical fluctuations in the labor market, have focused on the behavior of individual suppliers of labor, while the demend aspect has been generally considered as exogenous. An increase in aggregate demand will cause expectational errors about the actual distribution of money wage offers. Workers are fooled into accepting more employment through the employment-acceptance decision. Exogenous changes in aggregate demand generate a causal relationship between aggregate demand and employment through the relationship between search unemployment and market wages. An alternative view, which may be termed the Keynesian theory, emphasizes the importance of quantity rationing constraint of the labor market. In explaining cyclical fluctuations in unemployment, the Keynesian theory places considerable emphasis on changes in investment, aggregate demand, output, and the demand for labor.

This study attempted to quantify the effect on unemployment duration of reservation wage strategy and the availability of job vacancies. The regression results presented here indicate that the average duration of unemployment is inversely related to the vacancy rate but directly related to wage misperceptions. The vacancy rate has a strong impact on the duration of

unemployment, and wage misperceptions are somewhat less so. The findings provide support for both the Keynesian disequilibrim theory that emphasizes quantity constraints and job rationing and the new classlical theory that emphasizes individual optimizing behavior in response to random shocks. In this sense the existing theories are not mutually exclusive.

Several points make the findings subject to qualification. Only a few econometric problems can illustrate this : the treatment of the vacancy and wage variables and the difficulty of separating them from other trended variables ; the formation of expectations ; and the degree of aggregation on which estimation is performed. These problems suggest that the empirical results of this study and others might well be interpreted as tentative rather than conclusive. It would be also misleading to draw implications for the search behavior of an individual worker such as the reservation wage property from the results obtained using aggregate data. Extension of the analysis to the individual duration of unemployment is warranted

Footnotes

1) In this paper the terms "reservation wage", "acceptance wage" and "aspiration wage" are used synonomously.
2) In Mortensen (1970b) PLU is given by :
$PLU = Pr(a \leqq W \leqq W) = \int_m^w f(w)dw - \int_m^a f(w)dw = \int_a^w f(w)dw$
where w is wage offer, a is acceptance(or reservation)
wage, $\hat{w}$ is maximum attainable wage, and m is a positive minimum wage offered by an employer. Since $\int_m^w f(w)dw = \int_a^w f(w)dw + \int_m^a f(w)dw = K$,
PLU can be written as :
$PLU = k - \int_m^a f(w)dw$
where k is the proportion of jobs open to a searcher. Therefore, the duration of unemployment, 1/PLU, depends upon the proportion of jobs open to the searcher and the acceptance wage.
3) It has been pointed out that the probability of leaving unemployment may not be constant for any worken over the period of his unemployment. The probability of leaving unemployment may depend upon the previous location of the worker in the labor maket. That is, the longer a person is unemployed the less likely he is to leave unemployment for employment. This is because the longer a person is unemployed the more likely he is to become inactive. On the other hand, search theory contends that the longer a perosn is unemployed thd lower is his reservation wage, the less choosy he becomes and the more likely he is to find an acceptable wage offer. See Joll, McKenna, McNabb, and Shorey (1983, pp. 323-24).
4) While Mortensen (1970b) assumed that the reservation wage is constant over the duration of unemployment, McCall (1970) and Gronau (1971) suggested that the reservation wage decline over the duration of unemployment. McCall emphasized downwatrd flexibility in the reservation wage in response to revised wage expectations over the

duration of unemployment. Gronau argued that increased duration of unemployment reduces the expected future employment length. This reduced expected length of future employment increases downward flexibility in the reservation wage. Barnes (1975) presented some evidence supportive of McCall's explanation.

5) This method does not derive an aggregate job acceptance function from an individual acceptance function. An explicit aggregation procedure to refine the individual acceptance function is found in Parsons (1973).
6) For the method of constructing the index, see Preston (1977, pp. 3-8). The cyclical movements in the help-wanted index have closely responded to the business cycle. Preston, in a study covering 1951-75, found that the index has consistently led business- cycle peaks 6-7 months but are coincident at troughs over the postwar cycles.
7) The "deflator" for the help-wanted index is not self-evident. Cohen and Solow (1967) used the civilian labor force, and Medoff and Abraham (1982) used the number of employees on nonagricultural payrolls for the normalization factor.
8) Cohen and Solow (1967) illustrated further reasons why the help-wanted index may be a biased indicator of unfilled vacancies, They are : (i) No information about the number of jobs offered per advertisement. (ii) The possibility of multiple advertising. (iii) Other forms of advertising. (iv) Help-wanted advertising is more frequent in some occupations than in others. (v) Since the index is a total of all advertisements placed in certain newspapers (leading newspapers of large cities), it may overstate the actual number of vacancies that exist.
9) Data for the duration of unemployment relate to uncompleted spells of the unemployed rather than to completed spells.
10) Variants of the ARMA process were used to generate expected wages in Altonji and Ashenfelter (1980), Bjorklund and Holmlund (1981) and Warren (1983) to test the wage misperceptions hypothesis. Hence, properties of the wage expectations from the ARMA are familar, and the results obtained from using this variable may be compared with those of other studies.
11) There have been various assumptions regarding timing aspects of Livingston survey, that is, the is, the information available at the time of survey and the time horizon for which respondents were forecasting. Questionnaires are typically mailed in May and November and the results appear in late June and December. For example, prediction horizon of the June survey "six"-month forecast has been interpreted as six months from April (Wachtel, 1977), seven months from May (Jacobs and Jones, 1980), or eight months from April (Carlson, 1977). Though Carlson's version of the Livingston price index has been widely used, Carlson's series consistently underestimate expected inflation rates by assuming forecast horizons to be eight and fourteen months for six- and twelve-month forecasts.
12) The expected CPI was normalized through dividing it by the CPI at the time of survey. Thus, expected real wage (w^e) is given by : w^e=Forecast of the weekly earnings/ (Forecast of CPI/CPI at the time of survey).

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