HOW SHOULD WE MEASURE SLACKNESS IN THE LABOR MARKET?*

by

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I. Introduction

The unemployment rate is popularly used as a measure of economic well-being and within the professional literature it is taken to be a rough measure of the wasted resources in the labor market. As the macroeconomic theory of labor market interactions has grown, the measures used to gauge "slackness" in the labor market have changed. Nevertheless, the official unemployment rate is still frequently used in empirical work as a measure of excess capacity in the labor market (e.g., Sims (1980), Ashenfelter and Card (1982)). The purpose of this paper is to develop several competing measures of non-equilibrium unemployment, and to consider the performance of these measures in a simple macroeconomic model of the labor market that describes the relationship between the rate of change of wages and slackness in the labor market to see what effect the method of measuring slackness has. While estimating such wage equations is not the only means of testing our alternative measures of slackness in the labor market, they provide a simple and convenient vehicle for doing so.

It is now well known that the economy could never be completely without unemployment. In a large dynamic market system, unemployment will always exist at least in its frictional form because there will always be job search. This search behavior does not signal a lack of adjustment in the labor market, but is instead an inevitable result of adjustment. Thus search unemployment must be netted out of any measure designed to measure slackness. Recently economists have recognized that the rate of natural unemployment varies over time. In particular as the composition of the labor force changes, as the composition of the job pool changes and as the institutions of the labor market change the amount of frictional unemployment will change. An important question for economists concerned with macroeconomic dynamics is what part of the pool of unemployed workers is frictionally unemployed.

Natural unemployment rates were once calculated as simple time series or time trended averages of actual unemployment rates. Such measures are really without economic content. The implicit model is that on average the total labor market is in equilibrium. Such a model is simplistic at best. Labor is not a homogeneous good, and to measure equilibrium levels of unemployment one first has to recognize that "the labor market" is in fact comprised of many smaller markets which can, in theory, function independently. If the importance or size of these smaller markets varies over time, and if we compute a natural rate of unemployment in each smaller market, then we can construct a time varying natural rate for the aggregate market. In this paper we view these smaller markets as being characterized by the demographic (age and sex) characteristics of the workers, but these smaller markets could be industrial or occupational.[1] The extent of segmentation, and the modelling of the natural rate of unemployment within the segmented markets is severely limited by the availability of data. Our results show, however, ignoring the heterogeneous nature of the labor market can have serious consequences for the estimation of macroeconomic models.

The final notion that we wish to put forward in this paper is that the residual of the actual from some constructed natural rate of unemployment may include among the unemployed, workers who are not unemployed in the traditional sense, but instead laid-off and awaiting recall. Viewed from the perspective of implicit contract theory (e.g., Azariadis (1975) and Burdett and Mortensen (1980)) such temporarily laid off workers do not represent

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[1]See Lilien (1982) for a similar approach using industrial and occupational characteristics.

"disequilibrium" in the labor market. That is, contract theory suggests that even if all workers are not employed the labor market may be in equilibrium at a particular moment in time if all workers consider themselves to be attached to a firm. Observed temporary layoff unemployment may be an accepted part of the implicit contractual relationships that develop between workers and firms. Accordingly, the search behavior of those on temporary layoff may be substantially different than the search behavior of those who have no job attachment. These arguments suggest that an increase in unemployment attributable to temporary layoffs is likely to exert much less downward pressure on the price of labor than an equivalent increase in unemployment attributable to permanent job loss. This is an important testable implication of the contract theoretic view of equilibrium that has not previously been examined. We take this contract point of view into account in constructing our measures of slackness and our empirical analysis provides simple, albeit crude, tests of this hypothesis.

II. Calculation of the Natural Rate of Unemployment

The unemployment rate is defined by the Bureau of Labor Statistics (BLS) to be the percentage of workers in the labor force who are without work and who are either actively searching for work or expecting a recall from layoff. Economists interpret the unemployment rate within a theoretical framework which states that waste is inefficient and markets, when allowed to function without impediments to adjustment, will allocate resources so they are not wasted. The simplest economic interpretation of the unemployment rate is that it indicates the extent to which labor resources are being wasted, or alternatively the extent to which there is a surplus of labor resources. Economists have long since dispensed with this simplest view, recognizing that in a dynamic economy in which the allocation of labor resources is continually adjusting to market conditions, there will be some level of equilibrium or "natural" unemployment, and unemployment in excess of this natural level indicates slackness in the labor market.

The level of natural unemployment in the economy depends on how quickly the labor market can adjust. This adjustment process requires displaced workers finding new jobs. If long search times are required, the level of natural unemployment will be high. The more mobile the worker, both geographically and professionally, the easier it will be for the worker to find a job. To the extent that workers vary in their ability to find jobs and in the permanence of their attachment to jobs, the natural rate among groups of workers will vary. For example, one might expect that teenagers with little training or women entering the labor market after having begun families might experience high levels of "search unemployment." To the extent that the composition of the labor force changes over time then the natural rate of unemployment will change. If demographic characteristics can be used to identify relatively homogeneous groups of workers, then we can trace the changing natural rate of unemployment using the demographic composition of the labor force.[2]

Suppose there are N different groups in the labor force indexed by $i = 1,\ldots,N$ and observations are made in T periods, $t = 1,\ldots,T$. Let $U(i,t)$ be the unemployment rate in sector i in period t and suppose that it is composed of two parts: the natural rate of unemployment, $U^N(i,t)$, and the disequilibrium rate of unemployment, $U^D(i,t)$. Thus:

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[2]The procedure for measuring the natural rate in this section is similar to that of Wachter (1976).

(2.1) $$U(i,t) = U^N(i,t) + U^D(i,t)$$

Let $h(i,t)$ be the fraction of the labor force in sector i during period t. The aggregate unemployment rate, $U(t)$ is:

(2.2a) $$U(t) = \sum_i h(i,t)U(i,t)$$

(2.2b) $$= \sum_i h(i,t)U^N(i,t) + \sum_i h(i,t)U^D(i,t)$$

(2.2c) $$= U^N(t) + U^D(t).$$

Our object is to estimate the decomposition represented in equation (2.2c), however we can only observe labor force shares and the actual rates of unemployment in each sector. Suppose that the natural rate of unemployment in sector i is a function of the labor force shares:

(2.3) $$U^N(i,t) = g_i(h(1,t), h(2,t),\ldots,h(N,t))$$

and there is one sector, say $i = 1$, for which the natural rate is constant over time. In a demographic analysis this would typically be prime age males — a group whose unemployment rate shows little fluctuation about a constant. Thus

(2.4) $$U^N(1,t) = U^N(1).$$

Furthermore suppose disequilibrium unemployment can be characterized by:

(2.5) $$U^D(i,t) = r(i)e(t)$$

and choose the arbitrary normalization that $r(1) = 1$. Thus combining equations we get:

(2.6) $$U(1,t) = U^N(1) + e(t)$$

(2.7) $$U(i,t) = g_i(h(1,t), \ldots h(N,t)) + r(i)e(t) \text{ for } i = 2,\ldots,N$$

Therefore:

$$U(i,t) = g_i(h(1,t),\ldots,h(N,t)) + r(i)(U(1,t) - U^N(1)) \tag{2.8}$$

The assumption that the natural rate of unemployment in sector one is constant allows us to observe the time varying component of the disequilibrium level of unemployment. Sectors will be differentially sensitive to this component. Econometrically, we can assume g_i is a linear function of the labor force shares and thus we can estimate:

$$U(i,t) = a_i + \sum_j b_{ij}\, h(j,t) + c_i\, U(1,t) + v(i,t). \tag{2.9}$$

Using any econometric technique that would yield consistent estimates of the parameters of equation (2.9) will permit us to form a consistent estimate of $U^N(i,t)$. We do this by calculating the predicted value of the unemployment rate given this estimated relationship (2.9) at $U(1,t) = U^N(1)$. Thus:

$$\hat{U}^N(i,t) = \hat{a}_i + \sum_j \hat{b}_{ij}\, h(j,t) + \hat{c}_i\, U^N(1). \tag{2.10}$$

In Appendix A we show that (2.10) provides a consistent estimate of $U^N(i,t)$. We then aggregate the sectoral natural rates to estimate the economy-wide natural rate:

$$\hat{U}^N(t) = \sum_i h(i,t)\, \hat{U}^N(i,t) \tag{2.11}$$

and the disequilibrium measure is simply:

$$U^D(t) = U(t) - \hat{U}^N(t). \tag{2.12}$$

To recap the procedure, within each sector of the labor force we regress the sectoral unemployment rate on the prime-age male unemployment rate and on an array of variables that characterize the composition of the labor force across sectors. With this estimated relationship in hand, we calculate the predicted unemployment rate for each sector in each period if the prime age male unemployment rate were equal to the natural unemployment rate for prime age males.

We then calculate the aggregate natural rate from the sectoral natural rates.

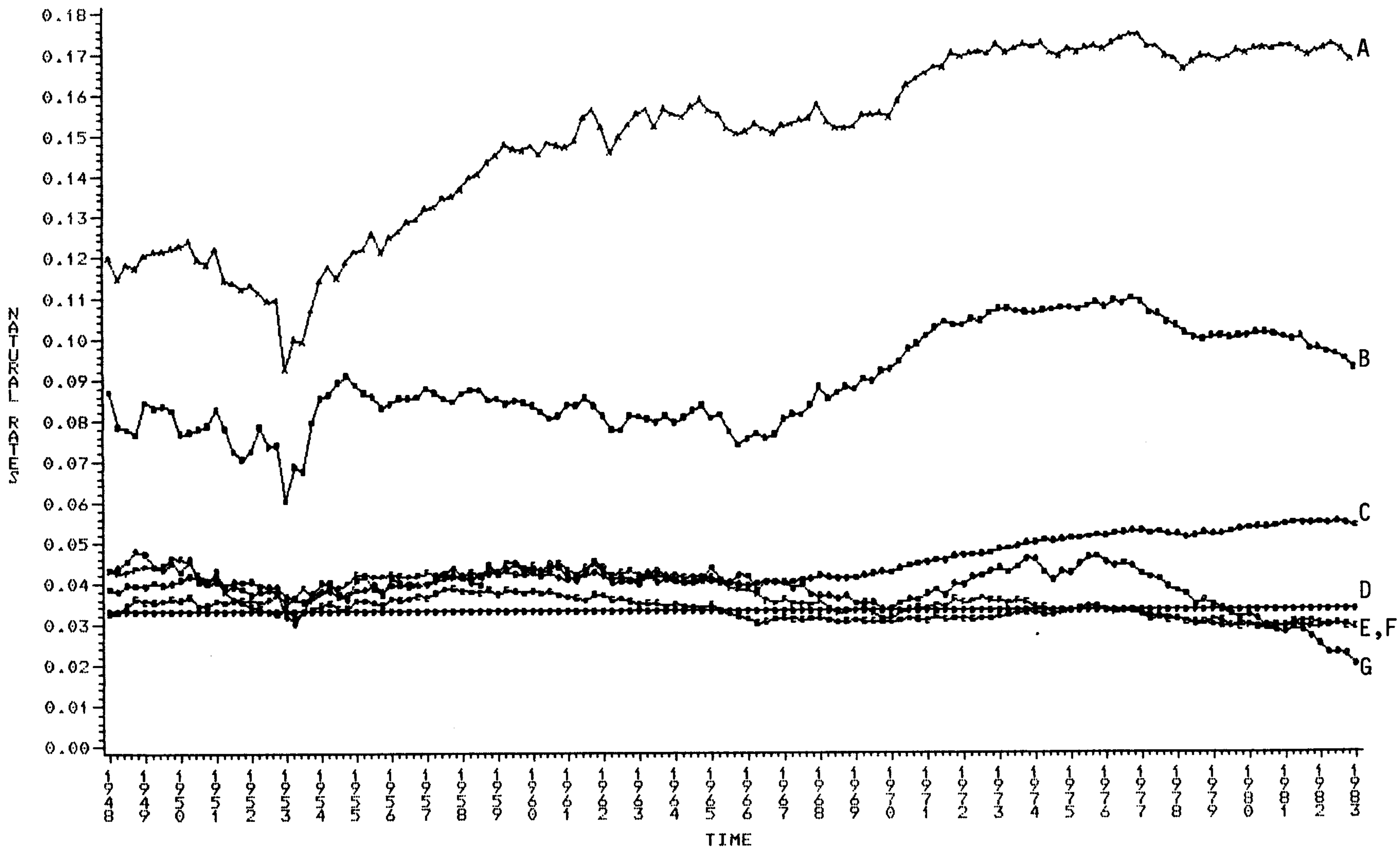
The natural rate we construct is based on the standard BLS demographic decomposition. The workforce is broken down into fourteen groups: workers age 16-69, 20-24, 25-34, 35-44, 45-54, 55-65 and over 65 for both males and females. This classification is as detailed as published BLS data allow. We assume that there is no variation in the natural rate of unemployment at a given point in time within any of these fourteen groups. Males aged 35-44 were chosen as the group with no variation in the natural rate over time. The regression results of estimating equation (2.9) are given in Appendix B. The calculated natural rates for the seven male subsamples are graphed in Figure 1. The estimated natural unemployment rate (NUR) for teenagers and for 20-24 year old males vary considerably over the 1948-83 period, peaking in the mid-1970s and decreasing in the early 1980s. This change is probably an artifact of the baby boom, with numbers of young workers decreasing during the 1980s. Note also the steady rise in the NUR for 25-34 year old males as the baby boom enters the prime age workforce. The NUR for 35-44 year old males is constant by assumption. The decrease in the NUR for elderly males during the late 1970s is again probably due to the baby boom, since elderly workers and teenage workers are often thought to be good substitutes (see Murphy, Plant and Welch, 1984).

The analysis of the natural rate of unemployment for females parallels that for males. In Figure 2 we see that overall, female NUR are higher than males' and have a higher variance as well. This demonstrates even more sensitivity of females' NUR to demographic fluctuations.

The aggregate natural rate of unemployment is computed as a weighted average of the sectoral natural rates, the weights being the labor force shares. Thus, there are two sources of variation in the estimated natural

Figure 1

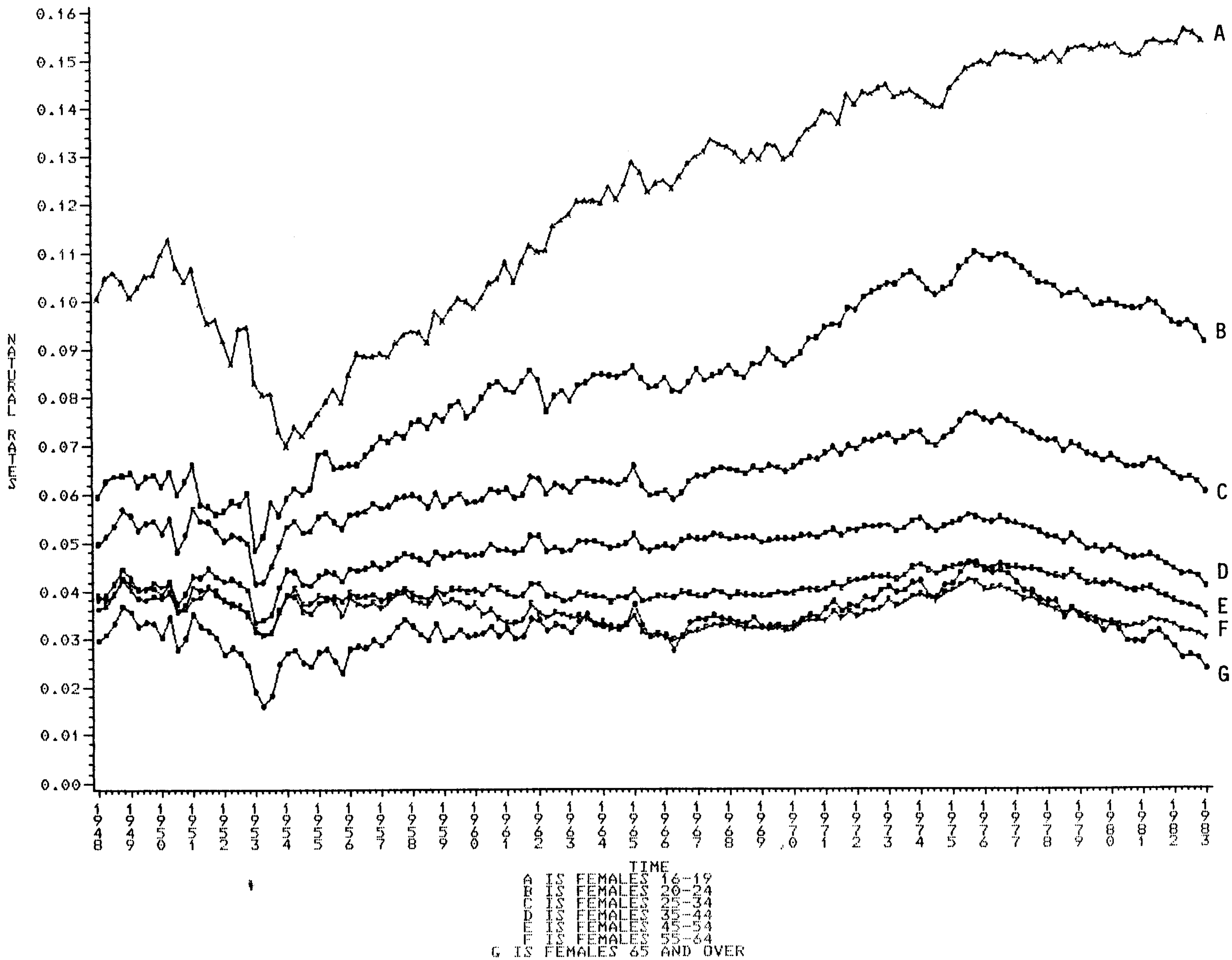
NATURAL RATES FOR MALES



A IS MALES 16-19
B IS MALES 20-24
C IS MALES 25-34
D IS MALES 35-44
E IS MALES 45-54
F IS MALES 55-64
G IS MALES 65 AND OVER

Figure 2

NATURAL RATES FOR FEMALES



rate, the sectoral natural rates and the demographic composition of the labor force. In Figure 3 we plot the actual and natural rates of unemployment from 1948 to 1983. The natural rate rose steadily through the 1960s and early 1970s, peaking around 1977. This rise reflects the emergence of the baby boom babies as young members of the labor force. The startling finding shown in Figure 3 is that the natural rate has fallen steadily since the late 1970s. Again this reflects the demographic changes in the labor force, but runs contrary to popular opinion which posits that early 1980s unemployment rates were less severe than they seemed since the natural rate of unemployment had actually increased during that period. Our results show the opposite. This notion that the measure of "true" unemployment is the difference between the natural and actual rates is discussed in the next section.

III. Measures of Slackness in the Labor Market

Professional interest in the unemployment rate has been rooted in its use as a measure of slackness in the labor market. Search theory has suggested that only unemployment in excess of the natural rate of unemployment represents excess supply in the labor market, and contract theory has suggested that workers on temporary layoff, expecting recall, should not be included when calculating measures of slackness. In this section we discuss the measures of slackness we construct from available statistics.

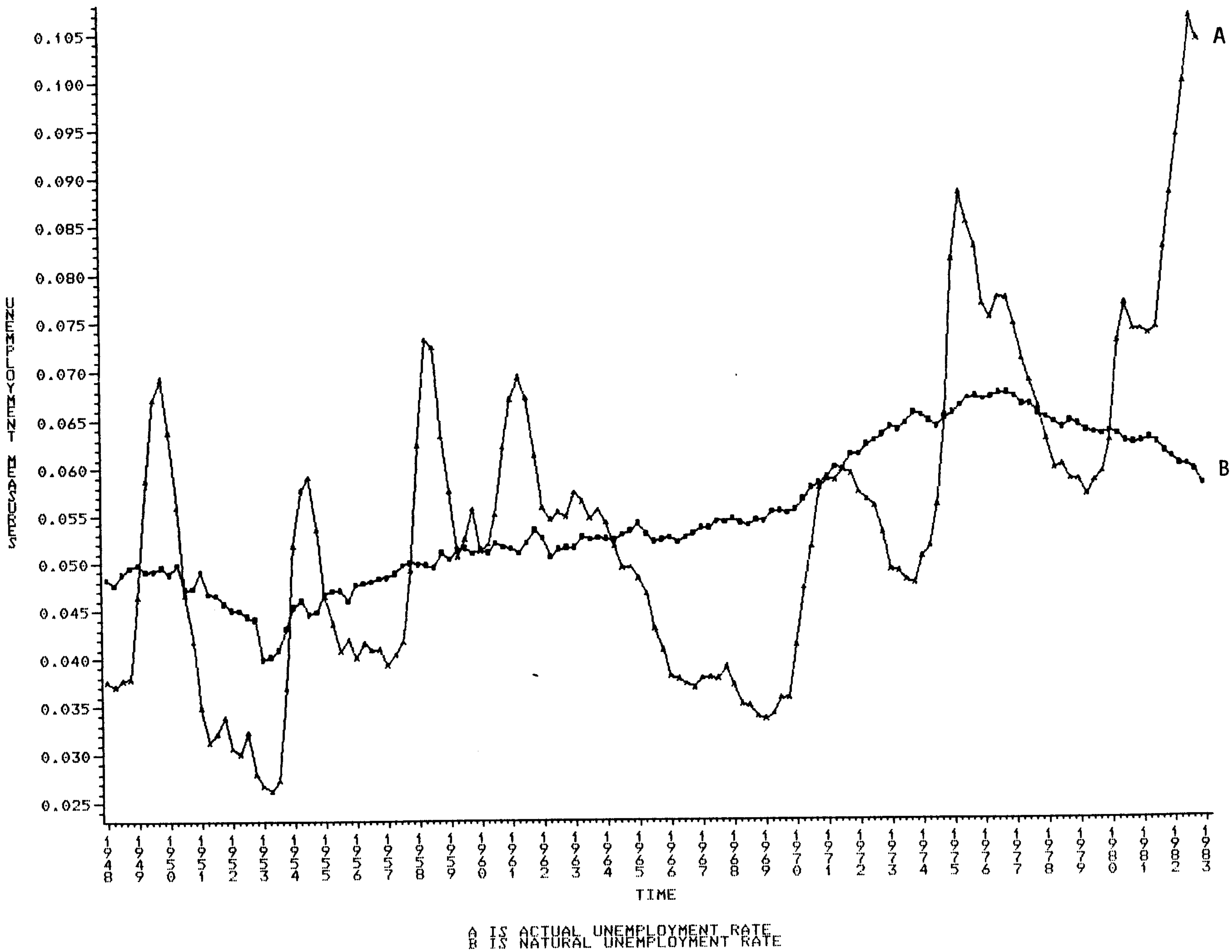
The simplest measure of slackness (D_1) is simply the unemployment rate. Using the demographic-based natural rate we presented in Section II we can compute a second measure of slackness as the difference between the actual unemployment rate and the natural unemployment rate:

$$D_2(t) = U(t) - U^N(t) \tag{3.1}$$

Both these measures can be constructed for the period 1948 to 1983. The third

Figure 3

ACTUAL AND NATURAL UNEMPLOYMENT RATES



measure of slackness we propose nets out those workers on temporary layoff. Unfortunately, the statistics gathered on this group of workers are not complete. No detailed statistics by demographic group are available. There are two series of economy-wide statistics. From 1948 to the present the number of workers who are on layoff and expecting recall within a specified period of time is available. From 1967 to the present a second series which counts the number of workers on layoff expecting recall at some indefinite time in the future is also available. These two pools of unemployed workers constitute what we call workers on temporary layoff. Thus complete data is only available since 1967. Our third measure of slackness is:

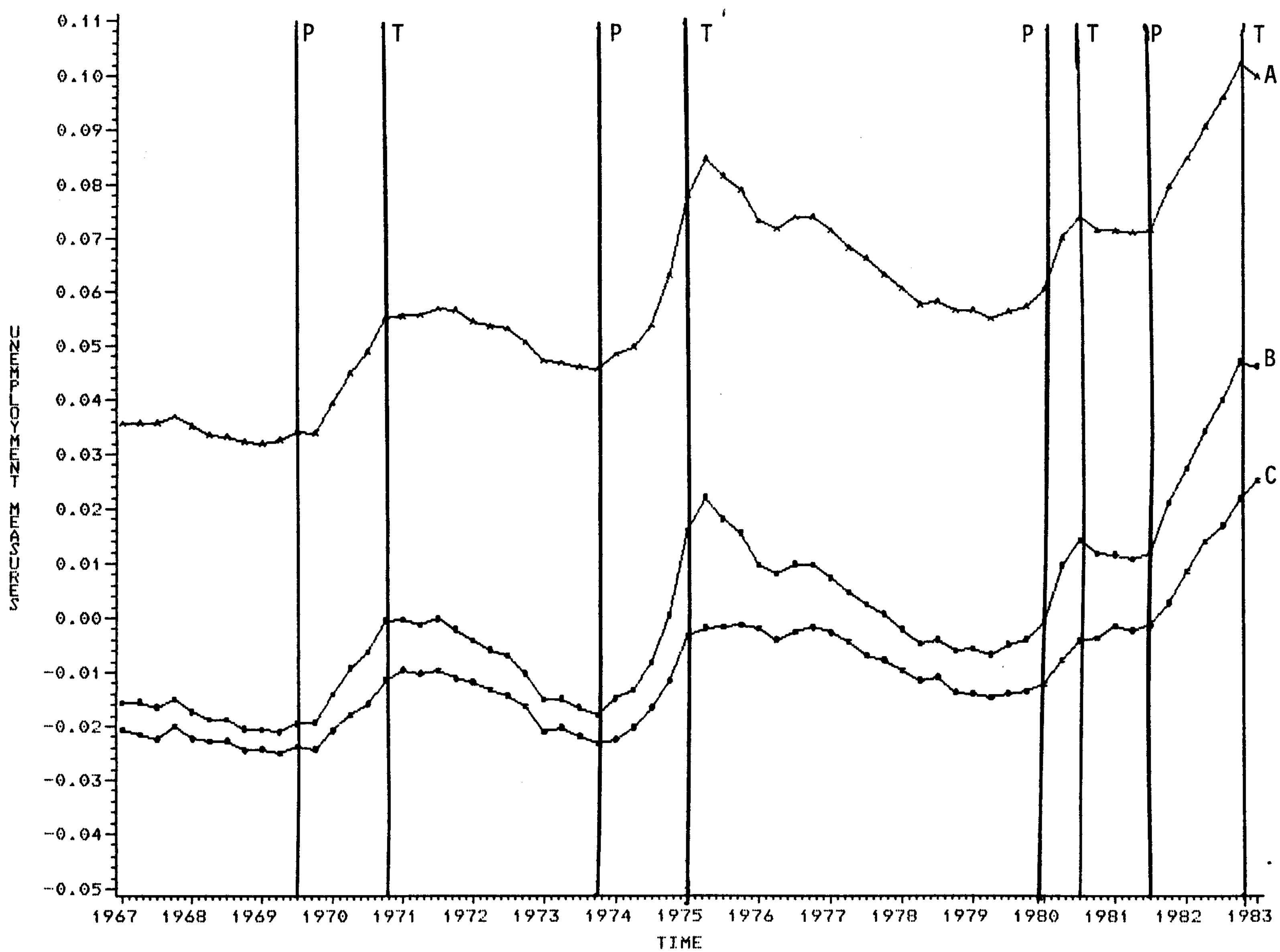
$$D_3(t) = U(t) - U^N(t) - U^L(t) \tag{3.2}$$

where U^L is the temporary layoff rate. In Figure 4 we plot these three measures of slackness from 1967 to the present. We have included vertical lines noting the peaks (P) and troughs (T) of the NBER reference business cycle. Note that all three measures follow the business cycle closely, but the third measure is less volatile. In particular, the large increase in unemployment in 1975 was due in large part to an increase in temporary layoffs, so netting those out flattens the cycle considerably. Also note that the 1982 recession was by far the most severe using any measure of slackness. The actual quarterly numbers used to generate Figure 4 are given in Appendix B.

These measures of slackness in the labor market are more than useful descriptive guides to the economic progress of the last twenty years. In aggregate macroeconomic modelling, some measure of potential downward pressure on wages has been used by all economists to characterize the economy, no matter what the economists' ideological stripe. Our basic point here is that theoretical developments in understanding the unemployment statistics have not

Figure 4

MEASURES OF LABOR MARKET SLACKNESS



A IS NATURAL UNEMPLOYMENT RATE

B IS ACTUAL-NATURAL RATE

C IS ACTUAL-NATURAL-LAYOFF RATE

been followed by empirical implementation of those ideas. In the next section we choose one particular macroeconomic characterization of the labor market to illustrate the differences generated by using various measures of labor market slackness.

IV. The Relationship Between The Rate of Change of Wages and Slackness in the Labor Market

The relationship between the rate of change of wages and some appropriate measure of slackness in the labor market has been of considerable concern to both economists and policymakers for some time. It is this relationship which is used in many of the large macroeconomic models (e.g., DRI, Wharton, Chase) of the economy to indicate how quickly the labor market adjusts to changes in the economic environment. Since Phillips' (1958) pioneering work, considerable attention has been devoted to examining this relationship empirically. However, during the intervening years, economists have become increasingly pessimistic about finding a stable relationship between the rate of change of wages and slackness in the labor market. Since Friedman's (1968) and Phelp's (1968) characterization of the natural rate hypothesis, it has generally become accepted that a long run tradeoff between unemployment and the rate of wage or price inflation is inconsistent with optimizing behavior of economic agents. Attention then focused on the short run tradeoff and the length of the short run. The Lucas (1972) critique and the advent of rational expectations models suggested that any observed short run tradeoff is only consistent with unanticipated changes in the economic environment, thereby casting doubt on the manner in which expectations were often accounted for in empirical investigations of the short-run tradeoff. Furthermore contract theory suggests that the relevant price of labor is not the current wage rate but an unobservable that represents the current value of a long-term contract.[3] To make matters worse, the empirical estimates of the short run tradeoff over the 1970s often yielded a positive relationship rather than the hypothesized negative relationship between the unemployment rate and the rate of wage inflation. These developments led many to suggest that the underlying theory was seriously flawed and the econometric estimation and testing of this relationship severely biased. Nevertheless such wage relationships are frequently used and theoretical matters aside, correct measurement of the variables used in estimation is essential.

In the present analysis we argue that the difficulties encountered in empirical analyses of the relationship between the rate of change of wages and slackness in the labor market may be partially attributable to the use of poor measures of slackness in the labor market. In what follows, we estimate a typical wage equation using the alternative measures calculated in Section III. It should be noted that apart from improving the measure of slackness in the labor market our estimating equations do not account for other theoretical and empirical criticisms of estimating wage equations.

The results of the empirical analysis are reported in Table 1. The dependent variable for all equations is the rate of change of average hourly earnings.[4] Equation 1 is a typical wage equation with the actual rate of unemployment, the percentage change in the federally mandated minimum wage, and a polynomial distributed lag on the one period lagged rate of price

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[3]That is, viewed from the contract theoretic perspective the current wage represents an "installment payment" on a long term commitment and thus may not play much of a current allocative role.

[4]This series is from the Bureau of Labor Statistics Establishment Survey. Our source for this data as well as for most of the other series used in this analysis is Citibase.

TABLE 1

The Relationship Between The Rate Of Wage Inflation And Alternative Measures of Slackness In The Labor Market[1]

Variable	Eqn.: 1	2	3
Constant	0.0189 (0.0018)	0.0059 (0.0020)	0.0028 (0.0028)
D_1	-0.2269 (0.0596)		
D_2		-0.2568 (0.0493)	
D_3			-0.3613 (0.0794)
$\dot{p}^e$ [2]	0.7352 (0.1667)	0.7081 (0.1256)	0.6891 (0.1359)
%ΔMINW	0.0032 (0.0093)	0.0028 (0.0086)	0.0042 (0.0090)
$\bar{R}^2$	0.267	0.372	0.323
D.W.	1.67	1.93	1.88
S.E.E.	0.0037	0.0035	0.0036

[1] Standard errors in parentheses. Period of estimation is 1967:1 through 1983:4.

[2] This coefficient represents the sum of lag coefficients for a 24 quarter, 3rd order polynomial Distributed lag on the one period lagged rate of price inflation.

inflation (to capture the expected rate of inflation) as explanatory variables. The distributed lag on the one period lagged rate of price inflation is a 3rd order polynomial with 24 lags and the coefficient on the 24th lag constrained to zero. The measure of price inflation is the rate of change of the consumer price index. The period of estimation is 1967:1Q to 1983:4. The 1967:1Q starting point is chosen because, as mentioned in Section III, temporary layoff data is only available since 1967.

The estimated coefficient on the actual rate of unemployment in equation 1 is both negative and significant. This is consistent with the hypothesized negative short run tradeoff between wage inflation and unemployment. Note also that the coefficient on the measure of price expectations is positive and significant. While this latter coefficient is less than one, it is not significantly different from one. The coefficient on the minimum wage variable is positive as expected but not significant.

Equation 2 estimates the same wage equation with the variable $D_2 = U - U^N$ substituted for $D_1 = U$. The coefficients on the price expectations variable and the minimum wage variable are similar to those from equation 1. This estimation also yields a negative and significant coefficient on D_2 and that this coefficient is marginally greater in absolute value than the coefficient on D_1 in equation 1. An interpretation of this is that an increase in unemployment that is not associated with a change in the natural rate of unemployment exerts greater downward pressure on wage inflation than does a general increase in unemployment.

Equation 3 estimates the wage equation with D_3 as the measure of slcakness in the labor market. Of particular interest is the negative, significant and relatively large coefficient on D_3. The coefficient on D_3 is more than forty percent larger in magnitude than the analogous coefficients on D_2 and D_1 from equations 2 and 1 respectively. This finding supports the hypothesis from contract theory that the rate of wage inflation is much more likely to be reduced in response to an increase in the pool of unattached, unemployed workers than in response to an equivalent increase in temporary layoffs. Or in other words, these findings suggest that a modified short run Phillips curve that takes into account developments from both search theory and contract theory is significantly steeper than is the simpler more traditional short run Phillips curve relating wage inflation to the unemployment rate.

V. Conclusion

In this paper we have described a method to obtain a more meaningful measure of excess supply in the labor market. Recognizing the theoretical advances in search theory, any time invariant measure of the natural rate of unemployment seems implausible. As the composition of the labor market changes, the natural rate will change and thus any measure of excess supply must account for a time varying natural rate. Contract theory has demonstrated that those workers on temporary layoff may not represent excess supply in the labor market because they may still be attached to the firms from which they are temporarily separated. Thus including them in measures of slackness in the labor market will result in an error of measurement. In this paper we constructed two alternative measures of slackness to the simple unemployment rate. The natural rate we constructed depended on the labor force shares of age-sex groups, and allowed for a time-varying natural rate both within these groups and over the entire labor force. Subtracting this natural rate from the actual unemployment rate gave us our first alternative measure. We calculated our other measure by subtracting out the temporary layoff unemployment rate. We tested these measures by using them in wage regressions, similar to the classic Phillips curves run in the past. Although we recognize the theoretical limitations of such regressions, we found that more refined measures of disequilibrium showed a considerably more pronounced effect than did past measures.

There is substantial room for future work. First the measures of the natural rate could be refined by using other groups than age-sex. Refinement is limited by the available data but further investigation is certainly warranted. Secondly the performance of these alternative measures of slackness should be tested in other macrodynamic settings.

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Appendix A

The Consistent Estimation Of The Natural Rate Of Unemployment

We wish to show that equation (2.10) provides a consistent estimate of the natural rate of unemployment. Recall (2.10) is:

$$\text{(A.1)} \qquad \hat{U}^N(i,t) = \hat{a}_i + \sum_j \hat{b}_{ij}\, h(j,t) + \hat{c}_i\, U^N(1)$$

Note that c_i is a consistent estimate of $r(i)$ and that a_i is a consistent estimate of the constant in the linear form of $g(\ )$ minus the terms $r(i)\,(U^N(1))$. The b_{ij} are consistent estimates of the linear coefficients in $g(\ )$. Thus:

$$\text{(A.2)} \qquad \text{plim}\ \hat{U}^N(i,t) = b_{i0} - r(i)\,(U^N(1)) + \sum_j b_{ij}\, h(j,t) + r(i)U^N(1)$$

$$= b_{i0} + \sum_j b_{ij}\, h(j,t)$$

$$= g_i\,(h(1,t),\ \ldots,\ h(i,T))$$

$$= U^N(i,t)$$

Appendix B

Data Appendix

In Tables B.1 and B.2 we report the regressions of sectoral unemployment rates on labor force shares and the unemployment rate of males age 35-44. At the head of each column we identify the group whose unemployment rate is the dependent variable in the regression, and the rows are the coefficients of the labor force shares and unemployment rate. Standard errors are in parentheses. The regressions were run with monthly observations over the period 1948 through 1983.

In Table B.3 we report the quarterly figures for the three measures of disequilibrium depicted in Figure 4. These are quarterly averages of monthly figures which were calculated using monthly unemployment rates, monthly natural rates calculated as described in the text and monthly temporary layoff rates.

TABLE B1

Regressions Of Male Unemployment Rates On Labor Force Shares

(1948-1983, monthly; number of observations - 432)

		Unemployment Rate Age Group					
		16-19	20-24	25-34	45-54	55-64	65+
Constant		-1.7041 (1.1455)	0.0656 (0.9251)	-0.8055 (0.4130)	-0.5273 (0.3305)	0.4900 (0.4216)	0.0672 (0.7003)
Labor Force Shares:							
Males	16-19	-0.4772 (1.2831)	-3.3556 (1.0363)	0.6813 (0.4627)	-0.4861 (0.3702)	-1.0872 (0.4722)	-0.4532 (0.7844)
	20-24	3.0047 (1.1692)	0.6145 (0.9443)	1.0200 (0.4216)	0.2986 (0.3373)	-0.0730 (0.4303)	0.4319 (0.7148)
	25-34	2.3338 (1.2680)	1.1086 (1.0242)	1.0268 (0.4573)	-0.0744 (0.3658)	-0.2292 (0.4667)	-0.3507 (0.7753)
	35-44	1.8935 (1.3079)	-1.5062 (1.0563)	0.6315 (0.4716)	0.0029 (0.3773)	0.0199 (0.4813)	-0.2310 (0.7996)
	45-54	0.8703 (1.2031)	-0.0445 (0.9721)	0.7667 (0.4338)	0.7362 (0.3471)	-0.7172 (0.4428)	1.3051 (0.7355)
	55-64	2.5111 (1.2037)	1.3249 (0.9721)	0.6826 (0.4340)	-0.6204 (0.3473)	-0.8904 (0.4430)	-0.3749 (0.7358)
Females	16-19	3.1990 (1.2295)	2.3011 (0.9930)	0.7793 (0.4434)	0.2153 (0.3547)	-0.1848 (0.4525)	0.4138 (0.7517)
	20-24	1.1251 (1.2225)	-0.0719 (0.9813)	0.4562 (0.4408)	-0.2493 (0.3527)	-0.8207 (0.4499)	-1.3367 (0.7474)
	25-34	1.4267 (1.0963)	-1.0482 (0.8854)	0.8530 (0.3953)	0.4259 (0.3163)	-0.6541 (0.4035)	0.9593 (0.6703)
	35-44	1.1373 (1.2767)	0.6613 (1.0311)	0.7959 (0.4603)	-0.2519 (0.3683)	-1.2532 (0.4699)	-1.1793 (0.7805)
	45-54	2.7504 (1.2939)	-0.1897 (1.0449)	1.1116 (0.4666)	0.2138 (0.3733)	-0.4538 (0.4762)	-0.7585 (0.7910)
	55-64	3.2589 (1.6347)	-0.4615 (1.3202)	1.0264 (0.5895)	-0.0899 (0.4716)	0.2547 (0.6017)	0.6523 (0.9994)
	65 +	0.0920 (1.3859)	-1.0533 (1.1193)	0.6682 (0.4997)	0.4425 (0.3998)	-0.0667 (0.5101)	-0.3609 (0.8473)

Table B1 (cont.)

	16-19	20-24	25-34	45-54	55-64	65+
Unemployment Rate Males Age 35-44	1.8690 (0.0693)	-1.0533 (0.0560)	1.2036 (0.0249)	0.8059 (0.0200)	0.7555 (0.0255)	0.5669 (0.0423)
D.W.	1.2794	0.9251	1.3451	1.2077	1.0436	0.809
$\bar{R}^2$	0.9225	0.9256	0.9628	0.9317	0.8872	0.5803

TABLE B2

Regressions Of Female Unemployment Rate On Labor Force Shares

(1948-1983, monthly; number of observations = 432)

	Unemployment Rate Age Group						
	16-19	20-24	25-34	35-44	45-54	55-64	65+
Constant	-0.0546 (1.0523)	2.7099 (0.7895)	0.6003 (0.5384)	-0.2250 (0.4720)	-0.5238 (0.4755)	-1.5522 (0.5825)	0.1153 (0.8559)
Labor Force Shares:							
Males							
16-19	0.7712 (1.1787)	-3.9124 (0.8844)	-2.1388 (0.6031)	-0.5250 (0.5287)	0.2008 (0.5326)	0.4408 (0.6524)	-1.4222 (0.9548)
20-24	1.1131 (1.0741)	-2.1078 (0.8059)	-0.1137 (0.5496)	0.4834 (0.4818)	0.8215 (0.4854)	1.8826 (0.5946)	0.5276 (0.8736)
25-34	-0.5832 (1.1649)	-2.7433 (0.8740)	-1.1336 (0.5961)	-0.2579 (0.5225)	0.2876 (0.5264)	1.4067 (0.6448)	-0.8465 (0.9475)
35-44	0.0184 (1.2015)	-2.9000 (0.9015)	-0.9414 (0.6147)	-0.0376 (0.5389)	0.5621 (0.5429)	1.5810 (0.6651)	-0.8594 (0.9772)
45-54	0.5259 (1.1052)	-1.7862 (0.8292)	0.5650 (0.5655)	0.8849 (0.4957)	0.8250 (0.4994)	2.5120 (0.6118)	1.9530 (0.8989)
55-64	0.4425 (1.1057)	-2.6301 (0.8296)	-0.3354 (0.5678)	0.7847 (0.4960)	0.7276 (0.4997)	0.8525 (0.6121)	-0.1939 (0.8994)
Females							
16-19	-1.4027 (1.1295)	-1.9989 (0.8474)	0.2284 (0.5779)	0.8083 (0.5066)	1.0102 (0.5101)	2.1171 (0.6252)	0.4613 (0.9187)
20-24	-0.2443 (1.1230)	-3.3275 (0.8426)	-1.0588 (0.5746)	-0.4015 (0.5037)	-0.0108 (0.5075)	1.3100 (0.6217)	-0.9194 (0.9134)
25-34	1.0439 (1.0071)	-1.8360 (.7557)	0.5979 (0.5153)	1.2019 (0.4518)	1.3373 (0.4551)	2.2116 (0.5575)	1.3013 (0.8192)
35-44	-0.4552 (1.1728)	-3.9280 (0.8799)	-1.6001 (0.6001)	-0.5035 (0.5261)	-0.2509 (0.5300)	0.6418 (0.6492)	-0.7599 (0.9539)
45-54	-0.9303 (1.1886)	-2.7719 (0.8918)	-0.9515 (0.6082)	0.1906 (0.5332)	0.7652 (0.5371)	1.3948 (0.6579)	-0.9330 (0.9668)
55-64	2.9199 (1.5012)	-2.2789 (1.1267)	-0.1777 (0.7684)	0.4131 (0.6736)	0.8351 (0.6786)	2.1259 (0.8313)	0.0305 (1.2215)

Table B2 (cont.)

	16-19	20-24	25-34	35-44	45-54	55-64	65+
65+	-0.6889 (1.2732)	-4.3382 (0.9553)	-0.5629 (0.6515)	0.2907 (0.5712)	1.0722 (0.5753)	2.0633 (0.7048)	0.1025 (1.0356)
Unemp. Rate Males Age 35-44	1.1065 (0.0637)	1.0199 (0.0478)	0.8642 (0.0326)	0.7614 (0.0285)	0.6538 (0.0288)	0.5195 (0.0352)	0.3618 (0.0518)
D.W.	1.3802	1.1466	1.0782	1.0429	1.0421	1.0780	1.3587
$\bar{R}^2$	0.9098	0.9052	0.8883	0.8579	0.8065	0.6701	0.4052

TABLE B3

Measures of Disequilibrium

D_1 = Unemployment Rate (U)

$D_2 = U - U^N$

$D_3 = U - U^N$ - Temporary Layoffs

Year		D1	D2	D3
1967	1	.356 E-01	-.157 E-01	-.207 E-01
	2	.357 E-01	-.155 E-01	-.215 E-01
	3	.356 E-01	-.164 E-01	-.224 E-01
	4	.368 E-01	-.150 E-01	-.200 E-01
1968	1	.351 E-01	-.173 E-01	-.223 E-01
	2	.335 E-01	-.188 E-01	-.228 E-01
	3	.332 E-01	-.188 E-01	-.228 E-01
	4	.321 E-01	-.205 E-01	-.245 E-01
1969	1	.320 E-01	-.206 E-01	-.243 E-01
	2	.326 E-01	-.210 E-01	-.250 E-01
	3	.340 E-01	-.195 E-01	-.238 E-01
	4	.339 E-01	-.192 E-01	-.242 E-01
1970	1	.392 E-01	-.140 E-01	-.207 E-01
	2	.448 E-01	-.925 E-02	-.179 E-01
	3	.488 E-01	-.626 E-02	-.159 E-01
	4	.549 E-01	-.472 E-03	-.114 E-01
1971	1	.554 E-01	-.337 E-03	-.967 E-02
	2	.556 E-01	-.129 E-02	-.102 E-01
	3	.568 E-01	-.135 E-03	-.980 E-02
	4	.566 E-01	-.208 E-02	-.110 E-01
1972	1	.544 E-01	-.408 E-02	-.117 E-01
	2	.536 E-01	-.584 E-02	-.131 E-01
	3	.531 E-01	-.689 E-02	-.142 E-01
	4	.506 E-01	-.103 E-01	-.163 E-01
1973	1	.471 E-01	-.150 E-01	-.210 E-01
	2	.468 E-01	-.149 E-01	-.202 E-01
	3	.459 E-01	-.165 E-01	-.218 E-01
	4	.456 E-01	-.178 E-01	-.232 E-01
1974	1	.484 E-01	-.148 E-01	-.224 E-01
	2	.496 E-01	-.131 E-01	-.201 E-01
	3	.537 E-01	-.821 E-02	-.165 E-01
	4	.631 E-01	.470 E-03	-.115 E-01
1975	1	.780 E-01	.158 E-01	-.319 E-02
	2	.847 E-01	.219 E-01	-.172 E-02
	3	.816 E-01	.179 E-01	-.167 E-02
	4	.791 E-01	.153 E-01	-.130 E-02
1976	1	.733 E-01	.968 E-02	-.198 E-02
	2	.718 E-01	.807 E-02	-.392 E-02
	3	.740 E-01	.979 E-02	-.253 E-02
	4	.741 E-01	.963 E-02	-.169 E-02

Table B3 (continued)

Year		D1	D2	D3
1977	1	.715 E-01	.734 E-02	-.265 E-02
	2	.683 E-01	.457 E-02	-.442 E-02
	3	.663 E-01	.240 E-02	-.692 E-02
	4	.632 E-01	.641 E-03	-.769 E-02
1978	1	.605 E-01	-.211 E-02	-.978 E-02
	2	.576 E-01	-.474 E-02	-.114 E-01
	3	.581 E-01	-.391 E-02	-.109 E-01
	4	.565 E-01	-.605 E-02	-.137 E-01
1979	1	.565 E-01	-.567 E-02	-.140 E-01
	2	.549 E-01	-.671 E-02	-.147 E-01
	3	.562 E-01	-.499 E-02	-.139 E-01
	4	.573 E-01	-.391 E-02	-.135 E-01
1980	1	.604 E-01	-.898 E-03	-.122 E-01
	2	.701 E-01	.943 E-02	-.789 E-02
	3	.739 E-01	.140 E-01	-.428 E-02
	4	.714 E-01	.115 E-01	-.382 E-02
1981	1	.714 E-01	.113 E-01	-.163 E-02
	2	.710 E-01	.105 E-01	-.244 E-02
	3	.714 E-01	.116 E-01	-.138 E-02
	4	.795 E-01	.209 E-01	.258 E-02
1982	1	.846 E-01	.270 E-01	.843 E-02
	2	.903 E-01	.340 E-01	.136 E-01
	3	.958 E-01	.396 E-01	.166 E-01
	4	.102	.470 E-01	.216 E-01
1983	1	.997 E-01	.459 E-01	.249 E-01
	2	.966 E-01	.426 E-01	.232 E-01
	3	.901 E-01	.364 E-01	.204 E-01
	4	.813 E-01	.287 E-01	.157 E-01

Note: E-01 means x 10^{-1}.