INFLATION, UNEMPLOYMENT, AND DURATION

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Inflation, Unemployment, and Duration*

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Abstract

In the early 1990s, core CPI inflation and employment cost inflation have been overpredicted by Phillips curve models, while the duration of unemployment has been unusually high. Duration adds significant information about core inflation in the post-Volcker disinflation period.

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Shifts in economic behavior have made it difficult to closely predict inflation in the 1990s. For example, the P-star model of Hallman, Porter, and Small (1990), which uses M2, has grossly overpredicted inflation in the 1990s because households shifted away from M2 toward stock and bond mutual fund assets [see Becsi and Duca (1994) and Duca (1994)]. While money demand shifts have complicated monetarist models, Phillips curve models have also tended to overpredict inflation (Figure 1), but to a much smaller extent, leading some to speculate that the "natural rate" of unemployment has fallen.

This study provides evidence that the recent pattern of Phillips curve overpredictions is explained by the unusually high level of the duration of unemployment. If this high duration reflects an upward shift in the expected period of unemployment, then, consistent with search theories of unemployment, it could lower reservation wages and thereby reduce inflationary pressures.[1,2] Indeed, up until the early 1990s, the average duration of unemployment tended to slightly lag unemployment and a simple model using 4 lags of unemployment tracks duration very closely. However, as shown by the line labeled "normal duration" in Figure 2, ex post forecasts of duration based on 4 lags of

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[1]For example, a lower probability of finding a new job or of being recalled to a prior job will lower reservation wages in Katz's (1986) model. Alternatively, if duration mainly reflected structural unemployment, it would positively affect inflation and a modified model would overestimate inflation by even more than standard models. In fact, duration has a negative effect.

[2]The high duration of the 1990s cannot be simply explained by the new emergency unemployment insurance benefits program because duration jumped to a high level in early 1991 before the program began (April 1992), the number of new claims under this program was trivial after October 1993, and duration has remained high after the program was shut to new claimants in April 1994.

Figure 1
Core Inflation Estimates
(4 quarter moving averages)

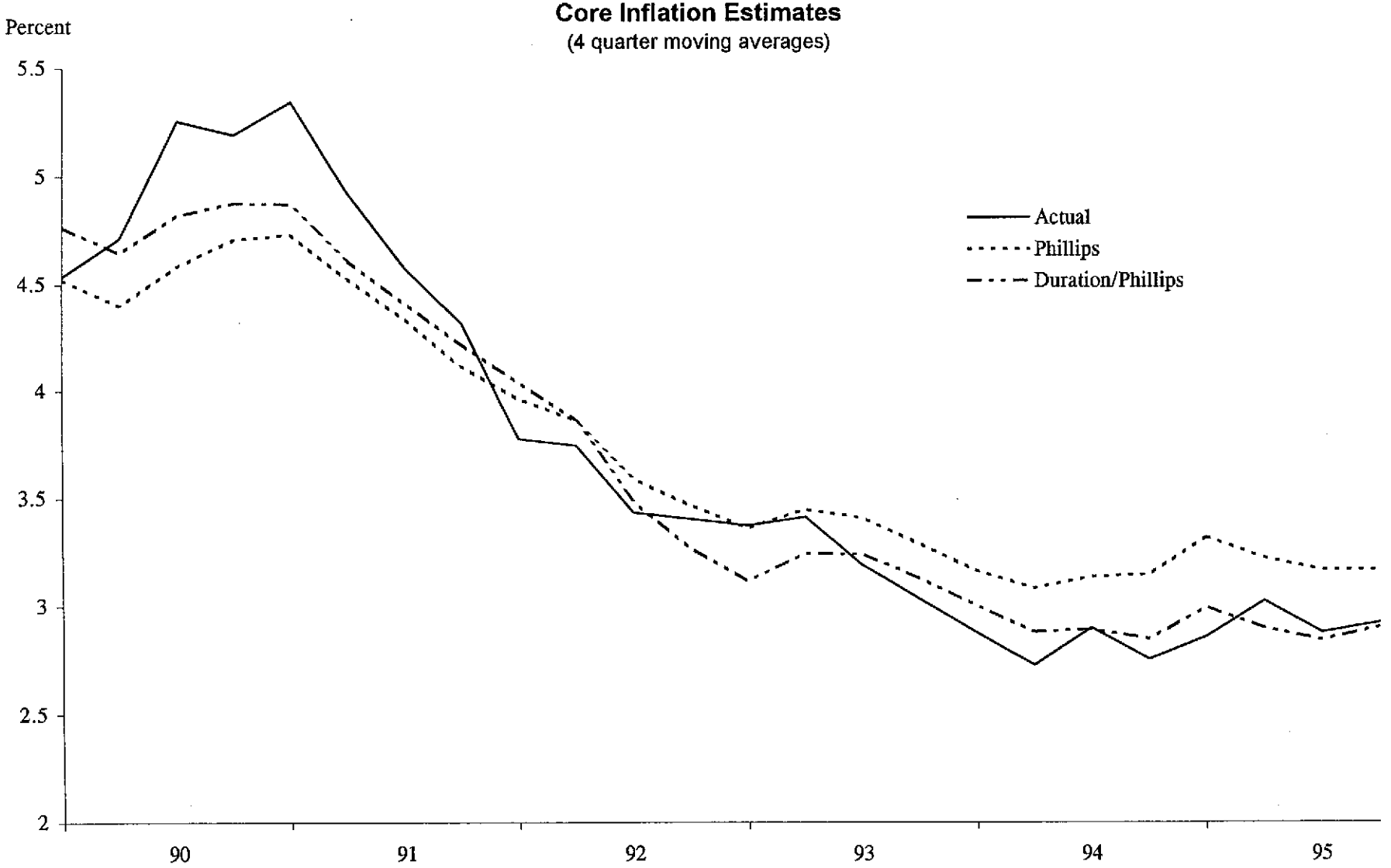
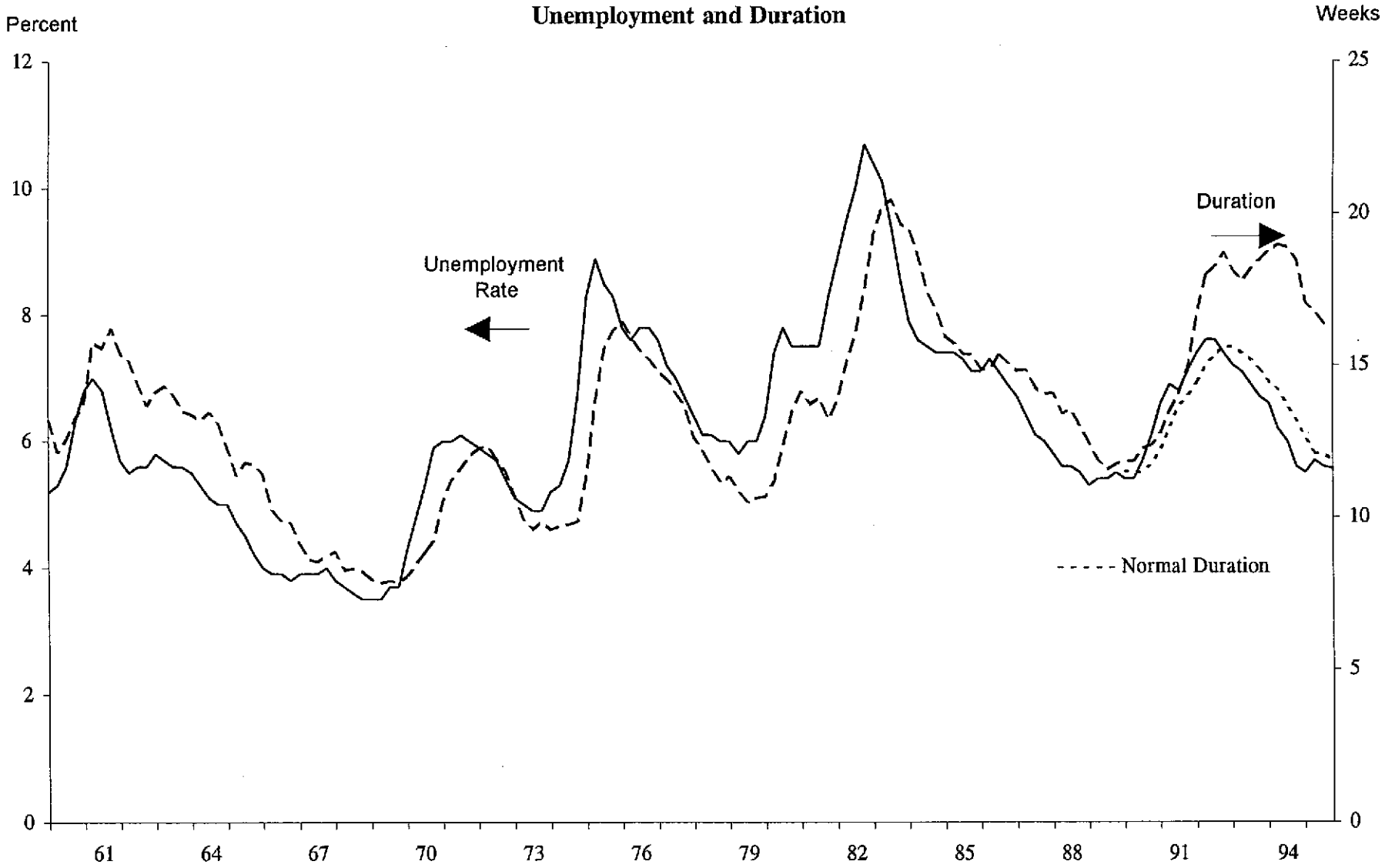


Figure 2
Unemployment and Duration



unemployment are far below actual observations in the 1990s. Not surprisingly, because average duration adds no information beyond that already contained in the unemployment rate before the 1990s, duration is statistically insignificant in standard Phillips Curve models using samples that either exclude the 1990s or are dominated by a long pre-1990 period.

1. Benchmark Empirical Model

This study uses Fuhrer's (1995) model as a benchmark, both because of its relative stability over time and because of its relative parsimony:

$$\pi_t = \Sigma_{i=1}^{12} \alpha_i \pi_{t-i} + \beta_1 U_{t-1} + \beta_2 U_{t-2} + \gamma_1 ENERGY_t \qquad (1)$$

where π_t ≡ quarterly core inflation (CPI excluding food and energy), $\Sigma_{i=1}^{12} \alpha_i$ is constrained to equal 1, U ≡ the unemployment rate, and ENERGY ≡ real energy price inflation (PPI energy prices deflated by the PPI).[3] To minimize the potential role of demographic shifts, the civilian unemployment rate [used by Fuhrer (1995)] is replaced by a weighted average of the unemployment rates for men and women who are at least 20 years old.[4] To minimize the potential role

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[3]To control for the 1994 time series break in the household survey of employment, .2 percentage points is added to U before 1994. Compared to Fuhrer (1995), ENERGY replaces real oil prices to account for broader energy prices, but this difference did not qualitatively affect the results.

[4]Weights are based on the labor force for each gender. This rate outperforms the overall and 25+ year-old unemployment rates. Using duration as a separate variable outperforms replacing the 20+ unemployment rate with the long-term unemployment rate (unemployed for 15+ weeks) in two ways. First, using duration as a separate variable with the 20+ unemployment rate yields a better fit than replacing both with the long-term unemployment rate over 1983-

of Fed policy shifts in explaining inflation [see Emery (1994)], the sample is 1983-95. This sample is also not dominated by the era when duration simply moved with unemployment, and allows the dependent variable to be replaced with employment cost inflation, a series which begins in 1982:Q2.

In addition to equation (1), three other models are run that include a job growth dispersion variable DISP (model 2), duration--DUR (model 3), and job growth dispersion and duration (model 4).[5] If the marginal information in duration proxies for variation in structural unemployment, then including a job growth dispersion index will largely control for such spurious correlation. DISP measures the seasonally adjusted, weighted average standard deviation of year-over-year job growth across 2 digit SIC code industries.

2. Empirical Findings

Duration has a significant negative effect on core CPI inflation, and its presence boosts the significance of the unemployment rate lags whether or not a job growth dispersion variable is present (Table 1). The coefficient on DUR indicates that each week of duration cuts annual core inflation by .1 percentage points and that if duration fell to what its pre-1990 behavior implies, annual core inflation would be about .4 percentage points higher. This is shown by Figure 1 which plots in-sample estimates from models 1 and 3 using 4 quarter moving averages to smooth out short-term noise. Compared to

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95. Second, the 20+ unemployment rate yields a better fit than the long-term unemployment rate when the 1960s are included, with or without duration.

[5]In models 3 and 4, the constant reflects information on the underlying "natural rates" of unemployment and duration. For this reason, a simple natural rate of unemployment (equal to minus the constant divided by the sum of coefficients on both lags of U) could not be computed from models 3 and 4.

the benchmark model ("Phillips"), the duration model ("Duration/Phillips") does not tend to overpredict core inflation in 1994 and 1995, and underpredicts core inflation less in 1990.

If duration has a negative effect on core inflation through depressing reservation wages, then it should also negatively affect employment cost index (ECI) inflation. To test this, regressions of ECI inflation are run that correspond to the core CPI models except that lags of core CPI inflation are replaced with lags of overall CPI inflation to better reflect the impact of overall living costs on compensation--this avoids correlation in residuals that arose when lags of core CPI inflation were tried. The ECI results (models 5-8) are generally consistent with the core CPI findings (models 1-4), with the estimated coefficients on duration being similar, but with duration being significant at the 7% level. This slight difference may reflect the difficulty of modeling ECI inflation arising from the sharp slowing of benefits inflation relative to wage inflation in the 1990s. This sudden deceleration of benefit costs may have stemmed from regime shifts such as the restructuring of health benefits and legal reforms of workmans compensation.

3. Conclusion

Consistent with basic search theory, the unusually long duration of the early-1990s appears to be holding down core CPI and employment cost inflation. It is unclear whether duration has permanently risen and whether the "natural rate" of unemployment has fallen. Nevertheless, duration has been providing significant information about inflation in the 1990s and for this reason, warrants being monitored and further assessed as an information variable. However, because of short-sample problems and because we do not know why duration has shifted, the recent relationship between inflation, unemployment, and duration should be cautiously viewed as a "working hypothesis" for now.

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Table 1: Core CPI and ECI Inflation Results
(Sample: 1983:Q1-1995:Q4)[1]

	Core CPI Inflation Models (1)-(4)				ECI Inflation Models (5)-(8)			
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
constant	0.0033 (1.42)	0.0033 (1.16)	0.0064* (2.45)	0.0066* (2.12)	-0.00003 (-0.01)	0.0016 (0.16)	0.0031 (1.01)	0.0046 (1.39)
$ENERGY_t$	0.0020 (1.36)	0.0020 (1.33)	0.0020 (1.39)	0.0020 (1.37)	0.0005 (0.31)	0.0008 (0.47)	0.0004 (0.24)	0.0007 (0.40)
U_{t-1}	-0.0038** (-3.40)	-0.0038** (-3.28)	-0.0047** (-4.12)	-0.0047** (-4.00)	-0.0038** (-3.23)	-0.0041** (-3.46)	-0.0046** (-3.82)	-0.0050* (-4.02)
U_{t-2}	0.0032** (2.72)	0.0032* (2.57)	0.0042** (3.51)	0.0043** (3.34)	0.0038** (3.46)	0.0044** (3.69)	0.0049** (4.04)	0.0054** (4.24)
DUR_{t-1}			-0.0003* (-2.25)	-0.0003* (-2.22)			-0.0003+ (-1.90)	-0.0003+ (-1.86)
$DISP_{t-1}$		-0.0006 (-0.01)		-0.0045 (-0.10)		-0.0586 (-1.24)		-0.0553 (-1.21)
q(12)	10.55	10.51	14.52	14.29	14.00	18.14+	9.15	7.92
R.M.S.E.	.00151	.00153	.00143	.00145	.00162	.00161	.00157	.00156
R^2	.5745	.5623	.6165	.6054	.5628	.5691	.5914	.5967

1. Sums of coefficients for π are not reported since the sum is constrained to equal 1.

*(**,+) denotes significant at the 5% (1%, 10%) level.

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