The Impact of Monetary Policy on the Distribution and Type of Unemployment

William M. Rodgers III[1]

July 2004

[1]Rodgers: Rutgers, The State University of New Jersey, John J. Heldrich Center for Workforce Development and National Poverty Center. Keith Phillips and Maya Rockeymore gave useful comments and suggestions. I also thank Gregory Licausi for outstanding research assistance. Results from this paper were presented at the 68th Annual Research Conference of the Western Economic Association International in Denver. CO, July 2003 and the 24th Annual Research Conference of the Association for Public Policy Analysis and Management in Dallas, TX, November 9, 2002.

Abstract

This paper employs two widely used approaches to estimate the effects of monetary policy on seven measures of unemployment. Evidence from recursive vector autoregressions and autoregressive distributed lag models that use information on the Federal Reserve's contractionary initiatives indicate that the weeks of unemployment distribution (e.g., less than five weeks) is significantly altered. The number of unemployed increases at all segments of the distribution. However, as a share of total unemployment, the increase is greatest among those with 15 weeks of unemployment or more. The number of job losers on both temporary and permanent layoff rise, with over two-thirds of the increase among permanent job losers. The number of reentrants into the labor force, new entrants and part-time workers that become unemployed also rises. The share of the unemployed that are job losers rises, while the shares of reentrant, new entrant and part-time workers that become unemployed falls.

Key Words:

Monetary Policy
Federal Funds Rate
Unemployment
Distribution of Unemployment
Weeks of Unemployment
Long-Term Unemployment
Job Losers
Reentrants
Job Quitters
New Entrants

JEL Classifications:

E5, E6, and J64

I. Introduction

This paper examines the impact that contractionary monetary policy as measured by an increase in the federal funds rate has on a variety of measures of unemployment. To my knowledge, this study is the first to estimate using recursive vector autoregressions and autoregressive distributed lag models the relationship between contractionary monetary policy's impact on the duration of unemployment, and how the composition of the unemployed changes. However, the paper does add to a literature that identifies monetary policy's differential impacts on labor market outcomes such as the employment-population ratios, unemployment rates, and labor force participation rates of minorities, less-educated and less-skilled individuals.[1] The analysis also adds to the large and well-developed literature that identifies different relationships between aggregate demand, macroeconomic policies and the economic outcomes (e.g., poverty) of various socio-economic groups.[2,3]

Monetary policy's impact on socioeconomic outcomes is not a recent focus of researchers. For example, Romer and Romer (1998) find that expansionary monetary policy tends to lessen poverty. In the long run, low inflation and steady growth in aggregate demand is associated with lower poverty. Romer and Romer conclude that since the effects of monetary policy are "inherently temporary," a strategy with the goals of low inflation and stable aggregate demand has the greatest chance to permanently lower poverty.

Most recently, building on Thorbecke (2001), Carpenter and Rodgers (Forthcoming, 2004) find that evidence from recursive vector autoregressions and autoregressive distributed lag models that use information on the Federal Reserve's

contractionary initiatives indicate that the employment-population ratio of minorities is more sensitive to contractionary monetary policy than that of whites: the ratio falls primarily because of an increase in unemployment and not because of a decline in labor force participation. Monetary policy appears to have a disproportionate effect on the unemployment rate of teenagers, particularly African American teenagers. Their employment-population ratios fall because of increased difficulty in obtaining employment.

Why might contractionary monetary policy affect the duration of unemployment and the composition of the unemployed? The basic job search model developed in Mortensen (1970) can be used to answer this question. An increase in the federal funds rates creates excess labor supply. As a result, firms may decrease the size of their workforces by raising their skill requirements and by not raising their relative wage offers. Raising the skill requirements lessens the proportion of jobs open to every unemployed person. Keeping wages constant reduces the number of wage offers that exceed the reservation wages of the unemployed.

As a result, the contractionary policy has a ripple effect throughout the weeks of unemployment distribution. The least skilled workers become short-term unemployed. The likelihood of exiting unemployment for short-term unemployed falls because their labor market prospects worsen. These individuals become medium-term unemployed. The employment prospects of medium-term unemployed also deteriorate. They become long-term unemployed. The long-term unemployed remain out of work because their prospects deteriorate. The contractionary policy also impacts the reasons individuals cite for being unemployed. The absolute and relative (compared to job quitters) number of job

losers increases. New entrants and reentrants to the labor force have a more difficult time securing employment. As firms make their workforces smaller, part-time workers will lose their jobs.

This paper uses VARs and Romer and Romer (1989, 1994a, the so-called "Romer dates") and data from March 1973 to September 2002 to describe how contractionary monetary policy changes the nature of unemployment. I focus on unemployment because previous work finds that monetary policy acts to make it more difficult to find employment, but not enough such that individuals leave the labor force in large numbers (Carpenter and Rodgers, Forthcoming, 2004; Thorbecke, 2001).

The results show that contractionary monetary policy raises the number of unemployed at all segments of the distribution. However, as a share of the total number of unemployed individuals, the increase is greatest among those that have been unemployed 15 weeks or more.

The number of job losers on both temporary and permanent layoff rise, with over two-thirds of the increase among permanent job losers. The number of reentrants and new entrants into the labor force and part-time workers that become unemployed also rises. The share of the unemployed that are job losers rises, while the shares of reentrant, new entrant and part-time workers that become unemployed falls.

Methods

Estimation[4]

VARs are a convenient and popular econometric modeling technique used in analyzing macroeconomics and the impact of monetary policy in particular. Consider a general linear model of the economy:

$$Y_t = \sum_{i=0}^{p} A_i Y_{t-i} + \varepsilon_t$$

where Y_t is a vector of variables summarizing the state of the economy. Re-arranging the equation in reduced form yields only lagged values on the right hand side:

$$Y_t = \sum_{i=1}^{p} B_i Y_{t-i} + \nu_t .$$

The system is estimated with OLS equation by equation. The federal funds rate is the measure of monetary policy, following Bernanke and Blinder (1992). While this measure is open to debate, I choose it because the federal funds rate is fairly standard and parsimonious relative to a more elaborate measure (see for instance Bernanke and Mihov, 1998). Although the federal funds rate was not the principal instrument of the Fed from 1979 to 1982 when reserves were targeted, it was the main instrument in the rest of the sample. Even when reserves were targeted, the funds rate was never ignored. While some studies have tried to isolate the best measure of monetary policy, for the current study, this more simple measure suffices.

In a VAR, it is presumed that all variables are endogenous. The OLS residuals represent unforecastable innovations to each of the variables in the system. Identification of exogenous shocks, such as a policy change I seek to examine here, typically comes from contemporaneous restrictions imposed on the system. Here, I impose a simple recursive structure on the system. The impulse response functions result from a Cholesky decomposition with the funds rate ordered last. This implies that actions by the Fed are informed by developments in the economy, but policy is only effective with a lag. Re-ordering the variables to place the federal funds rate first does not change any of the qualitative results. Moreover, we are only interested in identifying the effects of monetary policy on the rest of the economy so I omit a structural identification strategy.

The variables in the VAR are ordered as follows: industrial production growth, the percent change in the Consumer Price Index for Urban Consumers, the Commodity Research Board spot price index, a measure of unemployment (e.g. weeks of unemployment), the federal funds rate, nonborrowed reserves, and total reserves. Industrial production growth, the percent change in the Consumer Price Index, the spot price index, and the labor market outcome describe the goods markets. The federal funds rate, nonborrowed reserves, and total reserves capture the Federal Reserve's policy instruments.[5]

To identify the response of unemployment to an increase in the federal funds rate, we estimate a VAR and impulse response functions for each measure of unemployment (for example, weeks of unemployment distribution). For example, the impulse response functions simulate the effect of an increase in the federal funds rate on the four segments of the weeks of unemployment distribution for which the Bureau of Labor Statistics publishes data: less than 5 weeks, 5 to 14 weeks, 15 or more weeks, and 27 or more weeks of unemployment. Because of these relations, I will be able to show the ripple effects that contractionary monetary policy has throughout the weeks of unemployment distribution.

The Impact of Contractionary Episodes on Labor Market Outcomes

Another approach to identifying the impact of monetary policy on labor markets is to examine episodes in which there was a distinct change in policy by the Federal Reserve. Romer and Romer (1989, 1994b) examine records of the Federal Open Market Committee (FOMC) policy deliberations through 1988 and identify times when "the Federal Reserve attempted to exert a contractionary influence on the economy in order to

reduce inflation." This definition includes only those times when the FOMC could be construed to have intentionally changed policy to exert restraint on the economy in order to reduce current or expected inflation. Romer and Romer (1989, 1994b) identified 1947:10, 1955:09, 1968:12, 1974:04, 1978:08, 1979:10, and 1988:12 as meeting their criteria for a contractionary episode.

The minutes from FOMC meetings in February 1994 and June 1999 suggest that these two episodes also fit the criteria used by the Romers in their papers. From reading the minutes, it seems clear that the FOMC intentionally changed the stance of monetary policy towards a much less accommodative position in order to slow the economy and ward off inflation.

To identify the effect that these contractionary episodes have on a particular demographic group, I estimate:

4) $$y_t = A(L)y_{t-1} + B(L)\pi_{t-1} + C(L)D_{t-1},$$

where y_t denotes a type of unemployment, A(L) and B(L) are unrestricted polynomials in the lag operator L, π_t denotes the percent change in the consumer price index for urban consumers, C(L) is estimated as a fourth-order polynomial distributed lag, and D_t represents dummy variables for the Romer dates plus the two that we identified. The A(L) and B(L) polynomials contain seven lags. The impact of the Romer and Romer dates on y_t are robust to changes in the order of A(L) and B(L). To maintain consistency with the VARs, C(L) has 48 lags.

III. Data

The measures of unemployment that I analyze are weeks of unemployment, the number of the unemployed that are job losers, reentrants into the labor force, job quitters,

new entrants and were working part-time prior to becoming unemployed. The series come from the U.S. Bureau of Labor Statistics (BLS). Monthly data for all individuals 16 years of age and over is available from January 1959 to September 2002. However, to maintain comparability with Carpenter and Rodgers (Forthcoming, 2004) and Thorbecke (2001), I focus on the period since March 1973. The unemployment series are available for the total number of people unemployed, the number unemployed for less than 5 weeks, the number unemployed 5 to 14 weeks, the number unemployed 15 weeks or more, and the number unemployed 27 weeks or more. From these series, I create the share of unemployment at each segment of the distribution.

The BLS sorts unemployed individuals into several categories of unemployment. I focus on six of the major categories. Job losers are unemployed persons who lost their last job or who had completed a temporary job. This includes persons on temporary layoff and persons not on temporary layoff. Among those not on temporary layoff are permanent job losers and those whose temporary jobs had ended. New entrants are unemployed persons who have never worked before and are entering the labor force for the first time. Reentrants are unemployed persons who have previously worked but were out of the labor force prior to beginning their job search. Job leavers or quitters are unemployed individuals that have initiated the departure from their establishment. A resignation from a job is placed in this category. The BLS also identifies unemployed individuals who previously held part-time employment, where part-time employment is defined as usually working between 1 and 34 hours per week (at all jobs within an establishment) regardless of the number of hours worked in the reference week.

A potential drawback to the unemployment data is the common censoring problem that duration data possesses. A portion of the spells of unemployment will end during the following month, while another portion will continue into the future. If monetary policy's impacts on the probability of a spell ending are uniform across the four categories of length and types of unemployment, then our estimates will remain unbiased, but, if monetary policy affects the censoring differently, then the estimates from the VAR and PDL models will be biased. A priori, I have no reason to believe that an increase in the federal funds rate would have differential impacts on the censoring of the spells across the distribution or type of unemployment.

Monthly time-series data for the federal funds rate, industrial production, total reserves, and nonborrowed reserves come from the Federal Reserve Board of Governors (Federal Reserve, 2004). Monthly values for the CPI-U come from the Bureau of Labor Statistics and the monthly spot price index comes from the Commodity Research Board. I used industrial production instead of the GDP and the CPI-U instead of the GDP deflator. Industrial production and the CPI-U are available monthly while GDP and the GDP deflator are only available quarterly.

In general, residuals from each equation of the VARs are relatively stable over this period, typically remaining within two-standard deviations. The only series that are less stable are nonborrowed and total reserve series. The residuals two months after September 11, 2001, are quite large, but quickly return to lying within 2 standard deviations. The response of the Federal Reserve to the extraordinary events of September 11, 2001, explain their size, as the Fed injected extremely large amounts of reserves into the federal funds market to maintain market liquidity.[6, 7, 8]

IV. Results

The impulse response functions shown in Figure 1 indicate that a one-standard-deviation innovation to the federal funds rate (123 to 125 basis points) leads to a growth in the number of unemployed at all segments of the weeks of unemployment distribution.[9] More specifically, at 5 weeks of unemployment or less, the growth in the number of unemployed peaks at just above 17,000 in months 14 to 19. At 5 to 14 weeks of unemployment, the growth in unemployment reaches a maximum of 28,000 people. At 15 or more and 27 weeks or more (what labor economist consider to be long-term unemployment), growth in unemployment peaks at 65,000 and 46,000 people.[10]

Figure 2 shows in percentage terms, how the shape of the unemployment distribution changes. Although the number of unemployed for less than 5 weeks increases, as a share of total unemployment it falls, reaching a maximum of 0.23 percentage points in the 24th month. For 5 to 14 weeks of unemployment, the same increase in the federal funds rate increases the share by only 0.10 percentage points. For 15 and 27 or more weeks of unemployment, a one-standard deviation innovation in the federal funds rate increases the shares of unemployment at these segments by 0.29 and 0.26 percentage points, with the peaks both reached during the 24th and 25th months.

To illustrate the impacts of contractionary monetary policy on the types of unemployment, Figure 3 plots the impact a one-standard-deviation increase in the federal funds rate has on all job losers and job losers on temporary layoff. Permanent job losers comprise the difference between these two groups. The figure indicates that contractionary monetary policy leads to an increase in both the total number and share (as percent of all unemployed) of job losers. The increase peaks at 104,000 in the 13th month,

with lower and upper bounds of 47,000 and 167,000. Among job loses on temporary layoff, a peak of 36,000 occurs in the 13th month. The bounds are 18,000 and 54,000 individuals. These estimates suggest that the maximum increase is comprised of 68,000 permanently unemployed individuals. All eventually find employment; however, two-thirds of the new job losers will probably not return to their previous employer.

It is worthy to note that job losers' share of all unemployed individuals rises as a result of contractionary policy, peaking at 0.43 percent in the 12th month. The share of job losers on temporary layoff increases, but the increase is only around one-half of the increase for all job losers.

Figure 4 reports the impact of contractionary monetary policy on individuals who were employed in part-time jobs prior to the policy innovation. Although the percent of all unemployed shrinks, the absolute number increases and peaks at 61,000 in the 19th month, with lower and upper bounds of 22,000 and 101,000. The pool of labor force new entrants that cannot find a job and become unemployed also increases in absolute terms, but falls as a share of all unemployed individuals. The increase is approximately 5,500. The lower bound suggests that no increase has a likely change of occurring. Figure 5 shows that reentrants to the labor force have greater difficulty finding a job. Their unemployment rises and peaks at just over 10,000, with a lower bound indicating that no increase could occur.

Finally, as a check for model consistency, I constructed the impulse response function for job quitters. Since individuals are the catalysts for this type of separation, I expect that there should be little if any relationship between contractionary monetary policy and the decisions of job quitters to separate from their establishment.[11] The

estimates in Figure 5 support this hypothesis. There is no discernable relationship that is statistically significant.

Isolating Contractionary Episodes

Table 1 presents the ADL results from specifications that use the updated "Romer and Romer dates". Similar to the VAR results, the number of unemployed increases at all segments of the distribution, with the largest increases occurring at the 5 to 14 and 15 or more segments. A contractionary episode leads to a peak increase of 26,046 people with less than 5 weeks of unemployment, 53,290 between 5 to14 weeks, 42,555 with 15 or more weeks, and 29,760 with 27 or more weeks of unemployment. All of the estimates are significant at the 95 percent level, except for the estimate at less than 5 weeks of unemployment. The estimates from the ADL exceed those from the VARs because the federal funds rate's variation during disinflationary episodes is larger than the variation of the federal funds rate in the time series of the VARs.

The specifications using the share of the unemployed as the labor market outcome are also similar in nature to the VARs. The share of unemployment that is less than five weeks reaches its maximum decrease of 0.92 percentage points in the 29th and 30th months. The share of unemployment between 5 to 14 weeks increases, hitting a maximum of 0.41 percentage points in the 22nd month. The shares of unemployment that are 15 or more weeks and 27 or more weeks peak at 0.53 and 0.39 percentage points. All of the estimates except at 5 to 14 weeks are statistically significant at the 95 percent level. The estimate at the 5 to 14 weeks segment just fails the 95 percent test of significance.

The estimates from the VAR and ADL models show that in a "macroeconomics sense", monetary policy's impacts are short nature. The number of unemployed grows,

but returns to its pre-innovation value by the end of the forecast period. Yet, from the standpoint of a labor economist, the economic impacts are long-term, especially for the long-term unemployed (more than 27 weeks). Spells of unemployment weaken employment stability, particularly for those with the least skills, such as youth and less-educated individuals. It is well documented that a lack of employment stability, which leads to breaks in job tenure and experience has adverse impacts on wage growth.

The ADLs for the different types of unemployment are consistent with the previous findings. Table 2 reports the changes in the number and share of job losers, job losers on layoff, reentrants into the labor force, job quitters, and new entrants and individuals that were working part-time prior to losing their job. The estimates are largest for job losers, followed by job losers on layoff. Again, the difference between these measures of unemployment measures permanent job losers. Because of that, the estimates in Table 2 indicate that permanent job losers comprise the biggest expansion in the number of unemployed. The estimates have a high degree of precision. Reentrants into the labor force, new entrants, and part-time workers all see their numbers rise as a result of a contractionary episode. Their shares of all unemployed individuals fall. The results for job quitters are similar to the results from the VAR. They are not related to contractionary monetary policy.

V. Summary

This paper estimates the extent to which contractionary monetary policy alters the weeks of unemployment distribution and six types of unemployment. Using recursive VARs, I find that a one-standard-deviation increase in the federal funds rate raises the number of unemployed at all segments of the distribution, with the largest effects in

percentage terms occurring at the less than 5 weeks segment. I then show the effects on the weeks of unemployment distribution associated with a contractionary episode. They too, reveal that the number of unemployed increases at all segments of the distribution.

I also show that the number of job losers, both temporary and permanent rise, with the largest increase occurring among permanent job losers. The number of reentrants into the labor force, new entrants and part-time workers that become unemployed also rises. The share of the unemployed that are job losers also rises, but as a share of the unemployed they fall. Estimates from ADL models yield similar findings.

Even though in a "macroeconomic sense", disinflationary monetary policy's effects are short-term in nature, the evidence in this paper demonstrates that they have real and lasting effects on employment stability. These effects are felt throughout the distribution, generating new spells and extending spells of both short and long-term unemployment. Potentially, most problematic is that two-thirds of job losers will not return to their previous employer.

REFERENCES

Badgett, M.V. (1994). "Rising Black Unemployment: Changes in Job Stability or in Employability?" *Review of Black Political Economy*, *22*(3), 55-75.

Bagliano, F. & Favaro, C. (1998). "Measuring Monetary Policy with VAR Models: an Evaluation," *European Economic Review*, 42(6), 1069-1112.

Bernanke, B. & Blinder. A. (1992). "The Federal Funds Rate and the Channels of Monetary Transmission." *American Economic Review, 82(4), 901-921.*

Bernanke, B. & Mihov, I. (1998). "Measuring Monetary Policy," *Quarterly Journal of Economics*, 113(3), 869-902.

Blank, R. & Blinder, A. (1986). "Macroeconomics, Income Distribution, and Poverty," in S. Danziger and D. Weinberg (eds.) *Fighting Poverty: What Works and What Doesn't* (pp.108-208). Cambridge, MA: Harvard University Press.

Blinder, A. S. & Yellen, J. L. (2001). "The Fabulous Decade: Mecroeconomic Lessons from the 1990s," in A. Krueger and R. Solow (eds.) *The Roaring Nineties: Can Full Employment be Sustained?* (New York: Russell Sage Foundation).

Carpenter, S. & Rodgers III, W. M. (Forthcoming, 2004). " Labor Market Impacts of Monetary Policy," *Journal of Policy Analysis and Management*.

Clark, K. & Summers, L. (1981). "Demographic Differences in Cyclical Employment Variation," *Journal of Human Resources*,16(1) (Winter), 61-79.

Clark, K & Summers, L. (1990). "Demographic Differences in Cyclical Employment Variation." in Lawrence Summers (ed) *Understanding Unemployment*. (pp. 111-129) Cambridge, MA: The MIT Press.

Federal Reserve (2004)."Increases in the Federal Funds Rates," U.S. Federal Reserve Board of Governors, http://www.federalreserve.gov/fomc/fundsrate.htm; accessed June 4, 2004.

Freeman, R. (2001). "A Rising Tide Lifts…," Working Paper #8155, Cambridge, MA: National Bureau of Economic Research.

Freeman, R. & Rodgers III, W.M. (2000). "Area Economic Conditions and the Labor Market Outcomes of Young Men in the 1990s Expansion." In R. Cherry and W. M. Rodgers III (eds). *Prosperity for All: The Economic Boom and African Americans*. New York: Russell Sage Foundation.

Holzer, H. & Offner, P. (2001). "Trends in Employment Outcomes of Young Black Men," Unpublished Manuscript. Georgetown University Public Policy Institute,

Washington, DC.

Hoynes, H. (2000). "The Employment and Earnings of Less Skilled Workers Over the Business Cycle," In R. Blank and D. Card (eds.), *Finding Jobs: Work and Welfare Reform* (pp. 23-71), New York: Russell Sage Foundation.

Hoynes, H., Hines, J. Jr., & Krueger. A. (2001)."Another Look at Whether a Rising Tide Lifts All Boats," in A. Krueger and R. Solow (eds.), *The Roaring Nineties: Can Full Employment be Sustained?* (pp. 493-537), New York: Russell Sage Foundation.

Korenman, S. & Okun, B. (1991). "Gender Differences in Cyclical Unemployment," In *Structural Changes in U.S. Labor Markets: Causes and Consequences*. R. Eberts, E. Groshen, (eds.) Armonk and London: Sharpe. pp. 177-95.

Milanovich, M. (2002). "How Great was the 1990s Boom," Unpublished Manuscript. Center for the Study of Equality, College of William and Mary, Williamsburg, Va.

Mortensen, D. T. (1970). "Job Search, the Duration of Unemployment, and the Phillips Curve," *The American Economic Review*, 60(5), pp. 847-862.

Moorthy, V. (1988). "On Demographic Adjustments to Estimates of the Natural Rate of Unemployment: a note," Working Papers in Applied Economic Theory, 88-01. Federal Reserve Bank of San Francisco.

Reimers, C. (2000). "The Effect of Tight Labor Markets on Unemployment of Hispanics and African Americans: The 1990s Experience," in R. Cherry & W. M. Rodgers III (eds). *Prosperity for All: The Economic Boom and African Americans*. New York: Russell Sage Foundation.

Romer, C. & Romer, D. (1989). "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," *Macroeconomic Annual,* (vol. 4, pp. 121-170). Cambridge, MA: National Bureau of Economics Research.

Romer, C. & Romer, D. (1998). "Monetary Policy and the Well-Being of the Poor." *Working Paper #6793*. Cambridge, MA: National Bureau of Economics Research.

Romer, C. & Romer. D. (1994b). "What ends recessions?" In *Macroeconomic* Annual, (vol. 9, pp. 13-57). Cambridge, MA: National Bureau of Economics Research.

Romer, C. & Romer. D. (1994a). "Monetary Policy Matters." *Journal of Monetary Economics,* 34(1), pp. 75-88.

Shulman, S. (1991). "Why is the Black Unemployment Rate Always Twice as High as

the White Unemployment Rate," In R. Cornwall and P. Wunnava (eds.), *New Approaches to Economics and Social Analyses of Discrimination* (pp. 5-31). New York: Praeger.

Spriggs, W. & Williams, R. (2000). "What Do We Need to Explain About African American Unemployment?" in R. Cherry and W. M. Rodgers, III (eds) *Prosperity for All? The Economic Boom and African Americans* (pp. 188-207) New York: Russell Sage Foundation.

Thorbecke, W. (2001). "Estimating the Effects of Disinflationary Monetary Policy on Minorities," *Journal of Policy Modeling*, 23(1), pp. 51-66.

Wilson, F., Tienda, M. and Wu, L. (1991). "Racial Equality in the Labor Market: Still an Elusive Goal." Paper presented to the American Sociological Association, annual meeting, Cincinnati, August 23, 1991.

Table 1: Changes in Weeks of Unemployment in Response to Contractionary Episodes
(t-statistics in parentheses)

	Less than 5 weeks		5 to 14 weeks		15 or more weeks		27 or more weeks	
Response of:	**Max Effect**	**Month**	**Max Effect**	**Month**	**Max Effect**	**Month**	**Max Effect**	**Month**
Number of Weeks (in thousands)	26.046	24	53.290	28	42.555	31	29.760	33
	(1.247)		(3.116)		(2.580)		(2.757)	
Percent Distribution of Weeks	-0.924	29-30	0.406	22	0.532	31	0.331	33
	(-4.278)		(2.105)		(3.213)		(2.875)	

Notes: The table shows the results from the weeks of unemployment distribution on seven own lags, seven lags for the percent change in the CPI-U, and 48 lags on the beginning of disinflationary episodes. Each are fourth order polynomials. The detailed results are available from the author upon request.

Table 2: Changes in Unemployment in Response to Contractionary Episodes (t-statistics in parentheses)

	Number (in thousands)		Percentage Points	
Response of:	**Max Effect**	**Month**	**Max Effect**	**Month**
Job Losers	63.49	32	0.551	30
	(2.80)		(2.715)	
Job Losers on Layoff	29.20	32	0.357	14
	(2.40)		(2.214)	
Reentrants into Labor Force	45.73	29	-0.277	20
	(3.00)		(1.448)	
Quit Job	-9.08	40	-0.444	30
	(1.10)		(4.236)	
New Entrants	33.29	32	0.000	0
	(4.09)		0.000	
Worked Part-Time	69.49	29	-0.971	32
	(2.48)		(2.478)	

Notes: The table shows the results for types of unemployment on seven own lags, seven lags for the percent change in the CPI-U, and 48 lags on the beginning of disinflationary episodes. Each are fourth order polynomials. The detailed results are available from the author upon request.

APPENDIX
FEDERAL OPEN MARKET COMMITTEE EXCERPTS

The following are selected quotes from the February 3-4, 1994 and June 29-30, 1999 Federal Open Market Committee (FOMC) meetings. Prior to 1998, the FOMC Secretariat produced a transcript that contains member's names. The detailed transcripts are available at www.federalreserve.gov/fomc/transcripts.

February 3-4, 1994:

Mr. Forrestal: On the price side, for the first time in a long time our directors have talked a little about seeing some price increases.

Mr. Melzer: We project that the CPI will move up sharply in 1994 and will be even high in 1995. Indeed, there may be some early warning signs that the economy's disinflationary course has already come to an end.

Ms. Phillips: I think that we're now seeing some major risks on the inflation front

Vice Chairman Mcdonough: With the unemployment rate coming down to what we think is a reasonable estimate of the NAIRU—in the low 6 percent area—we do have to be considerably concerned about inflation.

Chairman Greenspan: While we may not find it in the broader price indexes, there was at least an inkling that the presumption that inflationary indicators are all quiescent is, as I said, sort of fraying at the seems… The presumption that inflation is staying down is very hard to maintain.

Vice Chairman Mcdonough: …Send the right signal in the sense that the federal reserve, the central bank, is being watchful, as it should be. And we would be moving earlier in the economic cycle than the fed has done historically…

Mr. Jordan: …That 25 basis point move would be viewed clearly as the first of a series of moves.

Mr. Boehne: This is as good as it gets in terms of convincing evidence to move.

Mr. Forrestal: We certainly have a demand surge in the fourth quarter and it would appear that that is going to continue to some extent.

Mr. Syron: What we all want to do very clearly is to maximize long-term growth in the economy, controlling real growth. As Larry Lindsey said, controlling prices is a mechanism for doing that.

Chairman Greenspan: (reading the statement he plans to release) …The decision was taken to move toward a less accommodative stance in monetary policy in order to sustain

and enhance the economic expansion… this is the first firming of reserve market conditions by the Committee since early 1989.

June 29-30, 1999:

"The members' concerns about inflation had increases appreciably since the meeting in late March."

"Indeed, in the absence of some policy firming most of the members saw tightening labor markets and an updrift in measured inflation as a significant risk."

"It remained unclear how long faster gains in productivity could continue be offset increases in labor costs and avert an intensification of price inflation"

"Most members had become increasingly worried about the risks of an overheating economy and rising inflation over time."

"The concerns about the outlook for inflation tended to focus on the risk that, in the absence of an appreciable moderation in overall demands, very tight labor markets would at some point foster significantly faster increases in labor compensation that could no longer be offset by stronger productivity growth…. The higher labor cost increases would in turn generate more rapid price inflation."

"The declines in commodity and other import prices that had helped to suppress inflation and inflation expectations over the last two years were not likely to be repeated."

"…An increase of ¼ percentage point in the federal funds rate to an average of around 5 percent. In the view of most members, such a policy move represented a desirable and cautious preemptive step in the direction of reducing what they saw as a significant risk of rising inflation."

"The persisting strength of domestic demand augmented by increasing demand from abroad would show through at some point to even tighter labor markets and higher inflation… In these circumstances a small preemptive move at this time would provide a degree of insurance against worsening inflation later."

ENDNOTES

[1] See, for example, Carpenter and Rodgers (Forthcoming, 2004) and Thorbecke (2001).

[2] For general studies, see, for example, Badgett (1994), Blank and Blinder (1996), Clark and Summers (1981, 1990), Hoynes (2000), Korenman and Okun (1991), Moorthy (1988), Romer and Romer (1998), Spriggs and Williams (2000) Shulman (1991), and Wilson, Tienda and Wu (1991).

[3]For studies on race and ethnicity, see, for example, Freeman (2001), Freeman and Rodgers (2000), Hoynes, Hines and Krueger (2001) and Reimers (2000). A second round of studies continues to find gains, but they have not made up the lost ground that occurred from the 1970s to 1980s (Holzer and Offner, 2001; and Milanovich, 2002).

[4] The specifications draw heavily from Carpenter and Rodgers (2004).

[5] The importance of industrial production and the CPI-U is well known. It may not be well known that the Commodity Research Board spot price is a component of the Bureau of Economic Analysis' index of leading indicators. Our main reason for including total reserves and nonborrowed reserves is to allow direct comparability to Thorbecke's estimates. Christiano et al. show that these two variables have different responses to an increase in the Federal Funds Rate. Nonborrowed reserves experience a persistent drop, consistent with the existence of a liquidity effect. The drop in total reserves is initially quite small. However, over the simulated time horizon of the impulse response function, total reserves fall. The Federal Reserve protects short-run reserves by increasing borrowed reserves. As a check for robustness, we estimate the VAR with only industrial production, the Consumer Price Index, the labor market outcome and the federal funds rate. We obtain qualitatively similar results to the estimates presented in this paper. The detailed estimates are available up request.

[6] Although not on the scale of September 11th, Bagliano and Favero (1998) find evidence of large residuals in 1984 when sudden borrowing increased by Continental Illinois.

[7] Immediately after September 11th, the Federal Reserve Board to a variety of actions that led to unexplainable (large residuals) movements in reserves. Following the terrorist attacks on September 11, 2001, the Committee established or enlarged reciprocal currency (swap) arrangements with the European Central Bank, the Bank of Canada, and the Bank of England. The purpose of these arrangements was to facilitate the functioning of U.S. financial markets by providing as necessary through the foreign central banks the liquidity in dollars needed by European, Canadian, and British banks whose U.S. operations had been disrupted by the disturbances in the United States. On September 17, 2001, the Committee members voted unanimously to ease reserve conditions appreciably further, consistent with a reduction in the federal funds rate of 50 basis points to a level of 3 percent. In conjunction with these policy moves, the Federal Reserve would continue to supply, as needed, an atypically large volume of liquidity to the financial system. As a consequence, the Committee recognized that the federal funds rate might fall below its target on occasion until more normal conditions were restored in the functioning of the financial system (FOMC Transcripts for September 17th, 2001).

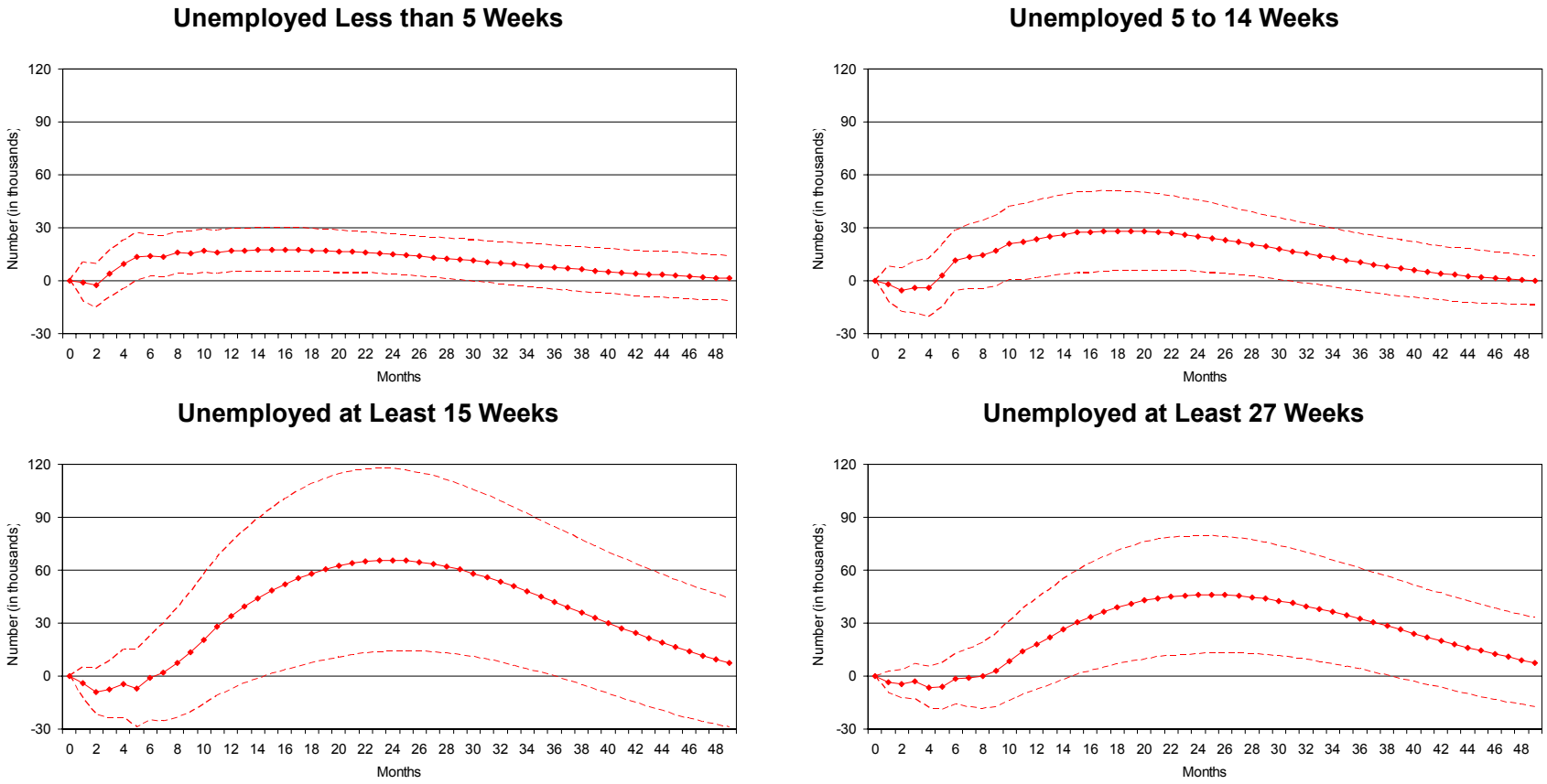
[8] Excluding the post September 11, 2001 segment of the time series has no impact on the standard deviations. They range from 1.23 to 1.26.

[9] The VARs and impulse response functions are estimated using STATA Version 8.0.

[10] The impulse response functions for the 1959:7 to 2002:9 series are similar. At less than 5 weeks of unemployment, the number of unemployed reaches its maximum of 22,900 in the 24th month. At 5 to 14 weeks, the maximum increase of 23,300 is reached in month 26. At 15 or more weeks, the number reaches its maximum of 42,980 by the 32nd month and 24,500 by the 35th month in the 27 weeks or more category.

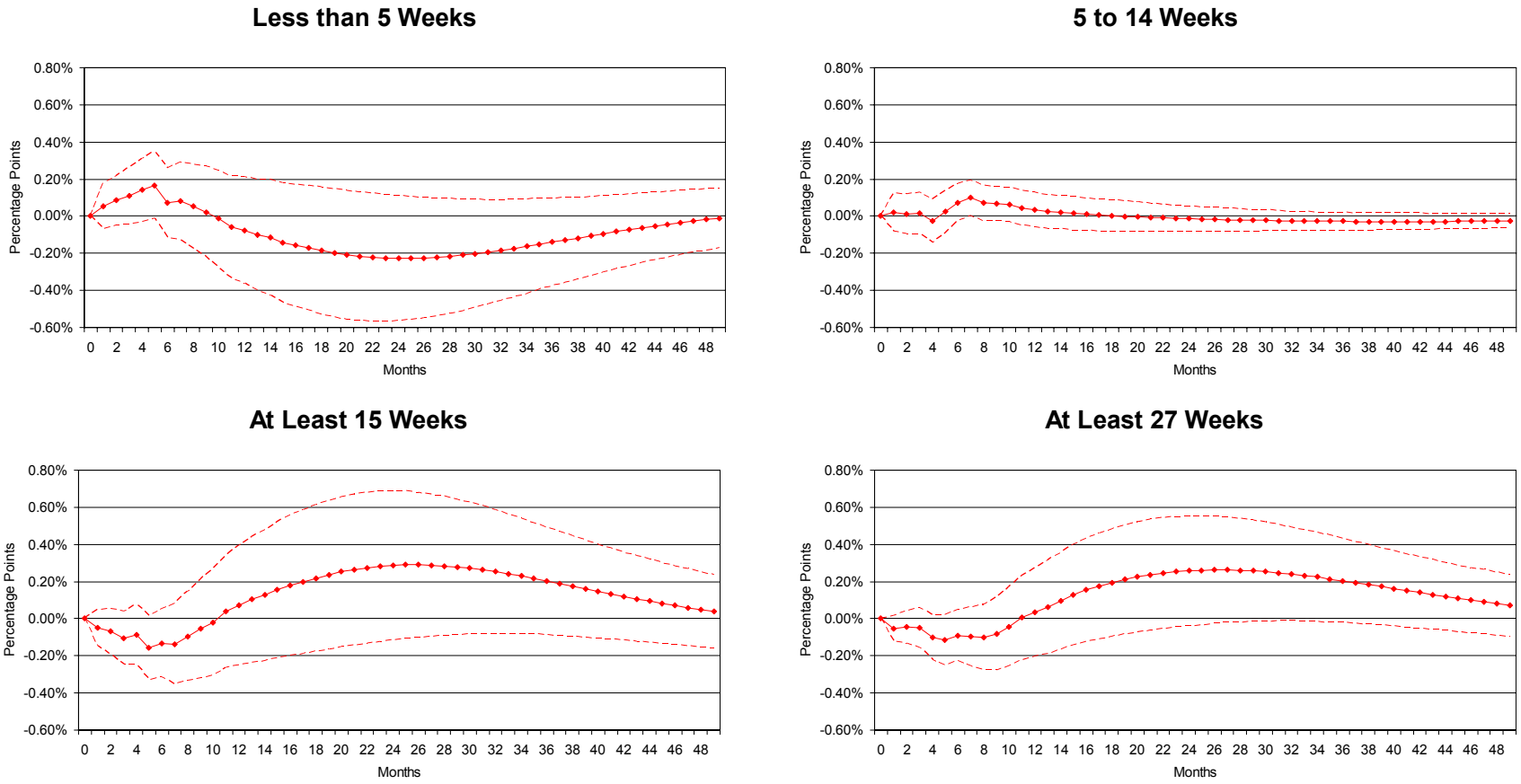
[11] I suppose that if workers are close watchers of the Federal Reserve, the number might fall. People realize that the labor market will become slacker, creating fewer opportunities.

Figure 1: The Effect of Positive Innovations in the Federal Funds Rate on the Number of Unemployed (in Thousands)



Notes: The figures plot the impulse response functions of the impact of a one-standard-deviation increase in the federal funds rate has on a particular segment of the weeks Of unemployment distribution. The ordering is a follows: industrial production growth, the percent change in the Consumer Price Index for Urban Consumers, the log of the Commodity Research Board spot price index, weeks of unemployment, the federal funds rate, nonborrowed reserves, and total reserves. They are entered in the model in the order as they are listed. The system uses 6 lags and estimation starts in September 1973 with the sample extending to September 2002. The dashed lines are lower and upper bounds of 95% Confidence Intervals that come from bootstrapped samples of 500 replications.

Figure 2: The Effect of Positive Innovations in the Federal Funds Rate on the Percent Unemployed by Length of Unemployment

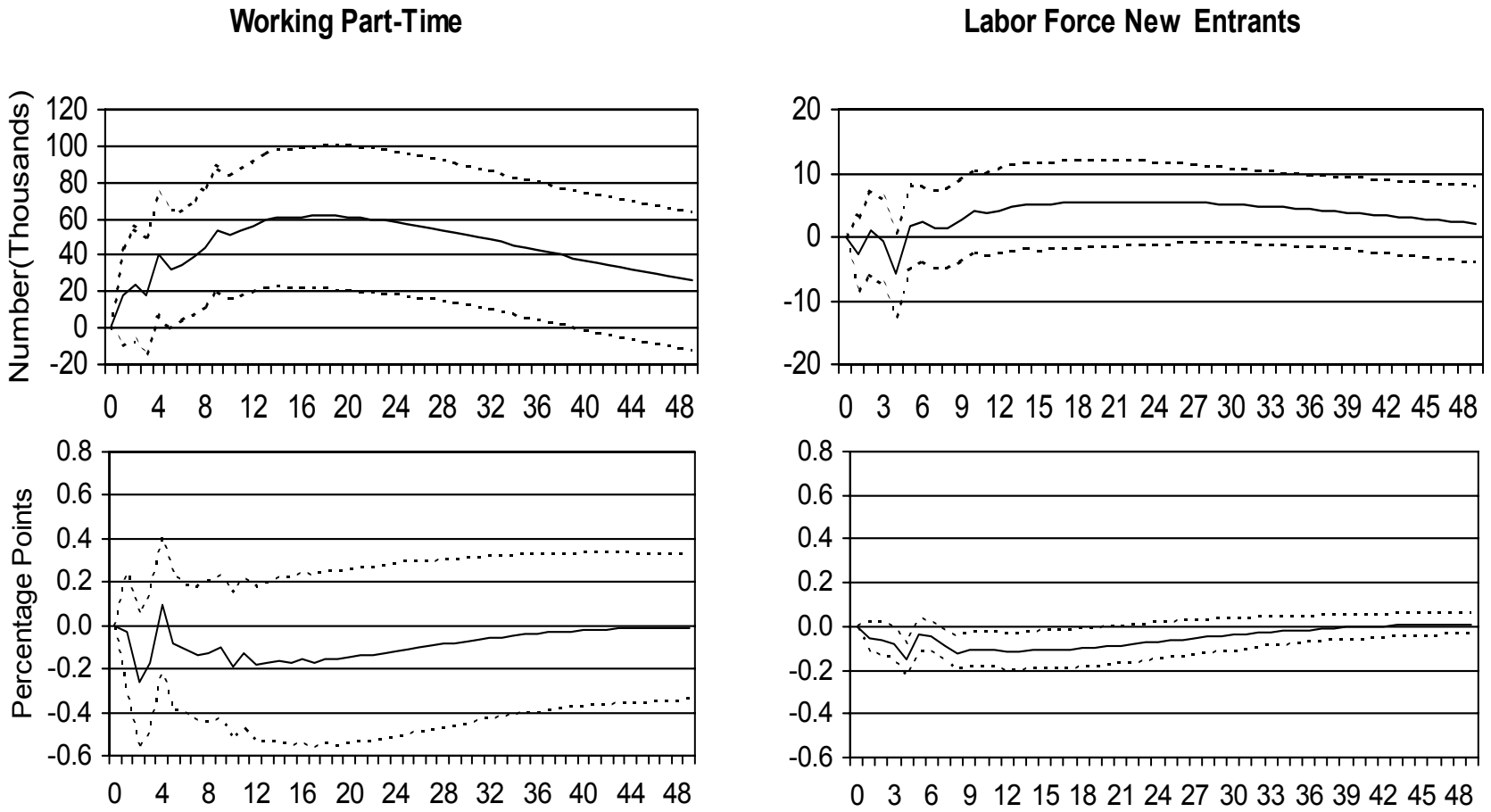


Notes: The figures plot the impulse response functions of the impact of a one-standard-deviation increase in the federal funds rate has on a particular segment of the weeks Of unemployment distribution. The ordering is a follows: industrial production growth, the percent change in the Consumer Price Index for Urban Consumers, the log of the Commodity Research Board spot price index, weeks of unemployment in percent, the federal funds rate, nonborrowed reserves, and total reserves. They are entered in the model in the order as they are listed. The system uses 6 lags and estimation starts in September 1973 with the sample extending to September 2002. The dashed lines are lower and upper bounds of 95% Confidence Intervals that come from bootstrapped samples of 500 replications.

Figure 3: The Effect of Positive Innovations in the Federal Funds Rate on the Types of Unemployed

Notes: The figures plot the impulse response functions of the impact of a one-standard-deviation increase in the federal funds rate has on a particular segment of the weeks Of unemployment distribution. The ordering is a follows: industrial production growth, the percent change in the Consumer Price Index for Urban Consumers, the log of the Commodity Research Board spot price index, job losers, the federal funds rate, nonborrowed reserves, and total reserves.
They are entered in the model in the order as they are listed. The system uses 6 lags and estimation starts in September 1973 with the sample extending to September 2002. The dashed lines are lower and upper bounds of 95% Confidence Intervals that come from bootstrapped samples of 500 replications.

Figure 4: The Effect of Positive Innovations in the Federal Funds Rate on the Types of Unemployed



Notes: The figures plot the impulse response functions of the impact of a one-standard-deviation increase in the federal funds rate has on a particular segment of the weeks Of unemployment distribution. The ordering is a follows: industrial production growth, the percent change in the Consumer Price Index for Urban Consumers, the log of the Commodity Research Board spot price index, type of unemployment, the federal funds rate, nonborrowed reserves, and total reserves.
They are entered in the model in the order as they are listed. The system uses 6 lags and estimation starts in September 1973 with the sample extending to September 2002. The dashed lines are lower and upper bounds of 95% Confidence Intervals that come from bootstrapped samples of 500 replications.

Figure 5: The Effect of Positive Innovations in the Federal Funds Rate on the Types of Unemployed

Notes: The figures plot the impulse response functions of the impact of a one-standard-deviation increase in the federal funds rate has on a particular segment of the weeks Of unemployment distribution. The ordering is a follows: industrial production growth, the percent change in the Consumer Price Index for Urban Consumers, the log of the Commodity Research Board spot price index, type of unemployment, the federal funds rate, nonborrowed reserves, and total reserves.
They are entered in the model in the order as they are listed. The system uses 6 lags and estimation starts in September 1973 with the sample extending to September 2002. The dashed lines are lower and upper bounds of 95% Confidence Intervals that come from bootstrapped samples of 500 replications.