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Further Evidence on the Distributional Effects of Disinflationary Monetary Policy

by
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The performance of the U.S. economy between 1994 and 1998 has been superb. Real GDP growth has averaged over 3 percent per year. Unemployment has fallen from 6.6 percent in January 1994 to 4.5 percent in June 1998. The change in the consumer price index for urban consumers has averaged below 3 percent per year. These solid economic fundamentals have been accompanied by booming asset prices. Between January 1994 and June 1998 the Standard & Poors' 500 Index has appreciated almost 150 percent. Since March 1997 bond prices have been steadily increasing (and yields decreasing), producing the lowest yields ever in July 1998 on 30-year Treasury securities.

The Economist magazine argues that the Federal Reserve should depress economic activity and lower asset prices. Stock prices have grown too much, it claims, along with the prices of real estate and works of art. In addition, *The Economist* contends that the M3 money supply has grown too fast this year. It is concerned either that stock prices will fall quickly, destroying wealth, or that capital gains will increase spending and lead "inevitably" to inflation. *The Economist* (16 May 1998, p. 83) suggests that "it would take a substantial rise in rates-which of course would result in a sharply slowed economy-to change investors expectations" and thus lower stock prices.

While sharp drops in stock prices can hurt the economy, there are several problems with these arguments. First, the Fed is legally mandated to consider employment, prices, and interest rates. All of these variables are performing well. The Fed should not "sharply" slow the economy to stabilize the prices of stocks and works of art unless Congress extends the Fed's mandate to include these variables. Second, unstable velocity in recent years has caused most economists to downplay the importance of money supply changes. Third, few causal links in economics are "inevitable." While higher stock prices may lead to more spending, it is not clear how large this effect is. While more spending may in turn lead to higher inflation, it is not clear this must happen. A recent series of papers published in the Winter 1997 *Journal of Economic Perspectives* presents evidence that an increase in spending may sometimes but certainly not inevitably lead to higher inflation. Fourth, a substantial rise in rates would have adverse distributional effects, harming those most who have profited the least from the stock market's recent rise. It is this fourth issue that this paper focuses on.

In an earlier paper Thorbecke (1997) considered the distributional effects of disinflationary monetary policy. He argued that in theory monetary policy should have its largest effect on interest-sensitive industries such as construction and durable goods. He discussed how these effects can be amplified if monetary policy affects firms' access to credit. He also presented theoretical reasons why the burden of monetary policy should fall on low-income individuals and minorities. Finally he reported evidence indicating that the brunt of monetary policy falls on low- income, urban workers.

This paper presents further evidence on the distributional effects of monetary policy. As discussed below, evidence that monetary policy matters comes from the identified vector autoregression methodology of Bernanke and Blinder (1992) and Christiano, Eichenbaum and Evans (1996), the narrative approach of Friedman and Schwartz (1963), and the investigation of disinflationary periods by Romer and Romer (1989). This paper identifies monetary policy shocks using all three approaches. The effect of disinflationary policy measured in these three ways on economic variables is then examined. A Social Accounting Matrix is also employed to investigate the distributional effects of monetary policy. The results indicate that monetary policy disproportionately burdens interest-sensitive industries, blue-collar workers, urban employees, and minorities.

The next section discusses the methodology used in this paper. This is followed by evidence of the effects of contractionary monetary policy on industries, factors of production, and households. The last section concludes.

Methodology

Identifying Monetary Policy Shocks

Most economists agree that in the short run monetary policy can be an important source of economic fluctuations.[1] As Bernanke and Gertler (1995) discuss, this belief is supported by the vector autoregression evidence of Bernanke and Blinder (1992) and Christiano, Eichenbaum, and Evans (1996), the narrative study of Friedman and Schwartz (1963), and the evidence from disinflationary periods presented in Romer and Romer (1989). Monetary policy shocks are identified in this paper using all three approaches.

Vector Autoregression Evidence

Vector autoregressions (VARs) are discussed in Thorbecke (1997). There he uses impulse-response functions from a VAR to measure the effects of monetary policy. The impulse-response approach involves calculating unexpected changes in monetary policy in month t and noting the predicted effects on employment and other variables in months t, t+1, t+2, etc. To measure unexpected changes in monetary policy a method similar to that employed by Bernanke and Blinder (1992) and Christiano, Eichenbaum, and Evans (1996) can be used. They measure monetary policy by unexpected changes in the federal funds rate. The funds rate, the rate on one-day interbank loans, has often been used as the Fed's instrument in implementing monetary policy. Christiano *et al.* note that including an index of sensitive commodity prices along with variables such as GDP and the GDP deflator in a prediction equation for the funds rate produces a credible measure of monetary policy in that it is correlated in the expected way with variables such as bank reserves, real GDP, employment, and prices. Following their approach unexpected changes in the federal funds rate are calculated by regressing the funds rate on a constant, six lags of itself, and six lags of aggregate industrial production growth, the inflation rate, the log of a commodity price index, the log of nonborrowed reserves, the log of total reserves, and the log of employment. The portion of the funds rate that can not be predicted using these variables (the residual) is treated as the unexpected change in the funds rate. The predicted responses of employment and other variables to these funds rate shocks are noted. More information on the procedure, including data sources, is presented in the Thorbecke (1997).

Narrative Evidence

Friedman and Schwartz (1963) wrote a classic work employing the narrative approach to examining the effects of monetary policy. Their strategy involves "examining a wide range of qualitative evidence" to "discern the antecedent circumstances whence arose the particular movements that become so anonymous when we feed the statistics into the computer."[2] They thus identify exogenous changes in monetary policy using historical analysis and note whether real variables are affected. This paper attempts to follow Friedman and Schwartz (1963) by constructing a narrative history of recent disinflationary periods. As Ball (1994) discusses, there are two recent episodes during which the Fed tightened monetary policy in order to substantially lower trend inflation. These periods began in 1974 and 1979. In both cases the policy shifts were followed by severe recessions. These episodes are discussed below.

Disinflationary Monetary Policy in 1974-75

Monetary policy in 1974 was influenced by the oil embargo that lasted from October 1973 to March 1974 and by inflationary pressures. As the *Economic Report of the President* (1975) discusses, monetary policy eased over this period to offset the uncertainties arising from the embargo. With the end of the embargo in March 1974 and the lifting of wage and price controls in April the Fed shifted its emphasis to fighting inflation. Over the second and third quarters of 1974 it focused on slowing the growth rate of the money supply. Modigliani and Papademos (1975) discuss how this strategy led to excessively contractionary policy because the preliminary estimates the Fed was responding to overstated money growth by 2.1 percentage points. For the year 1974 M1 grew by only 4.6 percent, far below the target of 6 percent that the Fed had set at the beginning

of the year (see the *Economic Report of the President* , 1974). By reducing money supply growth so much the Fed caused the funds rate to rise by more than 450 basis points between March and July. Bernanke, Gertler, and Watson (1997), using impulse-response techniques from a vector autoregression, find that this funds rate increase is explained mainly by inflationary concerns (as measured by an increase in commodity prices).

Other interest rates rose along with the funds rate, contributing to a slowdown in interest- sensitive sectors and to a recession. The prime rate rose almost 400 basis points between March and July and commercial paper rates rose almost 350 basis points. Mortgage rates between March and the end of the year rose by almost 100 basis points. These higher interest rates decimated the housing industry. The *Economic Report of the President* (1975) describes how housing activity appeared to rebound in the Spring of 1974. The historically high interest rates in July, though, aborted this recovery. The high interest rates prompted funds to flow out of accounts at thrift institutions and into higher yielding assets. This process of disintermediation restricted new mortgage commitments, causing housing starts to tumble. According to Modigliani and Papademos (1975) one half of the decline in GNP during the recessionary year of 1974 can be explained by declines in housing investment. The other sector experiencing a major decline was durable goods. Real output in this sector declined 9 percent in 1974, with most of the decline coming in the fourth quarter.

The Fed did succeed at bringing inflation down. As Ball (1994) discusses, between 1974 and 1976 trend inflation (measured by the change in the consumer price index) declined 4 percentage points. Below the responses of employment and unemployment over this period are examined.

The Volcker Disinflation

The period from 1979 to 1982 that economists call the "Volcker disinflation" is the clearest recent example of a disinflation in the U.S. In October 1979, with inflation exceeding 10% and the unemployment rate at 6%, Fed Chairman Paul Volcker declared his commitment to reducing money supply growth in order to fight inflation. Although M1 had grown at an annual rate of 9% in the first three quarters of 1979, the policy reversal beginning in the fourth quarter reduced the overall growth rate in 1979 to 7.9%. M1 then grew 7.3% in 1980 and 5.1% in 1981. In 1982, it grew at a 4.6% annual rate for the first two quarters before the Fed abandoned M1 growth targets in the second half of the year.[3] This monetary contraction was associated with an increase of 800 basis points in the federal funds rate and of about 500 basis points in long-term Treasury and corporate bond yields.

Many economists believe that the slower money supply growth rates and higher interest rates helped spark the two recessions that occurred between 1979 and 1982. As the *Economic Report of the President* (1982) discusses, two interest-sensitive sectors, residential investment and consumer durables, showed the largest declines in 1980 and 1981. The *Economic Report* attributes these declines to the high interest rates and resulting high cost of credit during these years.As economic activity slowed, inflation did decline. Ball (1994) discusses how trend inflation in the U.S. (measured by the change in the consumer price index) declined 8 percentage points between 1979 and 1982. Below the responses of employment and unemployment over this period are examined.

Evidence from the Romer and Romer Approach

Romer and Romer (1989), in an influential study, isolate disinflationary episodes after World War II. They treat the disinflations as exogenous events and note the responses of unemployment and industrial production. To identify episodes when the Fed switched to disinflationary policy, they examine the minutes of the Federal Open Market Committee meetings. They choose dates when the Fed attempted to create a recession to reduce inflation. In the original paper they note six dates. In a later paper (Romer and Romer, 1994) they add one more recent date.[4] In their econometric work they represent these dates using dummy variables. They include the dummy variables in univariate autoregressions of unemployment and industrial production. They find that unemployment is higher than forecasted and unemployment lower than forecasted following disinflationary episodes.

Their approach can be used to investigate the effect of monetary policy on economic variables. In doing this the model estimated in this paper has the form:

$$u_t = A(L)u_{t-1} + B(L)\pi_{t-1} + C(L)D_{t-1}$$

where u_t represents the variable (e.g., unemployment) under consideration, A(L) and B(L) are unrestricted polynomials in the lag operator L, π_t is the 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 and $_t$ is a mean-zero error term. Following Shapiro (1994), inflation is included as an explanatory variable and the A(L) and B(L) polynomials contain 7 lags. To be consistent with the vector autoregression work, C(L) includes 48 lags.

An effort is made to correct for trends. Employment for almost all industries examined has a clear upward trend. The log of employment is thus regressed on a constant and a linear time trend. The residual from this regression is then used as the variable under consideration in equation (1). Unemployment rates do not exhibit clear trends over the sample period. Thus unemployment rates are estimated in levels, but to check for robustness the equations are re-estimated with unemployment rates that are alternatively detrended and first-differenced.

A General Equilibrium Approach to Analyze Distributional Issues

Thorbecke (1992) has argued that it is desirable to take account of general equilibrium interactions when considering distributional effects. For instance, if contractionary monetary policy causes a slowdown in construction, spending on intermediate inputs such as wood products will decline, decreasing the incomes of factors involved in the wood industry. These decreases in the incomes of factors employed in producing wood will decrease the incomes of socioeconomic groups such as the rural workers. As the incomes of groups such as these decline, spending on commodities such as pickup trucks will decline, depressing output in the automotive sector. This decline in output will decrease the incomes of factors such as production workers, thus reducing the incomes of socioeconomic groups such as urban workers. This in turn will depress their expenditures on commodities such as consumer durables. The cycle continues as the output of durable goods and the incomes of factors producing durables decline.

To capture these interdependencies and to measure the total effect of an exogenous decline in sectoral output on the incomes of factors and socioeconomic groups a Social Accounting Matrix (SAM) is useful. A SAM is a disaggregated general equilibrium accounting framework that seeks to model the interdependencies characterizing an economy at a given time. This paper employs the SAM of Roland-Holst and Sancho (1992) to examine the effect of declines in sectoral output due to contractionary monetary policy on factorial and household income distribution. Their SAM has 56 categories, including 10 production sectors, 6 occupational groups, and 4 household types.

Consistent with a general equilibrium perspective, this paper considers first the effects of disinflationary policy on industries, then on factors, and finally on households. Evidence from VARs, disinflationary periods, the Romer and Romer approach, and SAMs are combined to try to shed light on the distributional effects of disinflationary policy.

Evidence on the Effects of Disinflationary Monetary Policy

The Effects on Industries

Table 1 reproduces evidence from impulse-response functions presented in Thorbecke (1997).[5] It presents the responses of employment after 18 months by industry to an unexpected increase in the funds rate. For all the industries examined the response peaked after about 18 months. The two sectors that are most harmed are construction and durable goods. As discussed above, these are sectors that one would expect to be affected by monetary policy because they are interest-sensitive. For construction, an unexpected increase in the federal funds rate of one-standard-deviation (equal to 0.55 percentage points) decreases employment after 18 months by an average of 0.7 percent. For durable manufacturing, an unexpected funds rate increase of 0.55 percentage points decrease employment after 18 months on average by 0.5 percent. Table 2 will provide some perspective

on these numbers by noting how much employment in these industries fell during the 1974-5 and 1979-1982 disinflations. Table 1 further indicates that employment in sectors such as nondurable goods, government, transportation, and mining are barely affected. The results thus indicate that contractionary monetary policy disproportionately affects employment in sectors such as construction and durable goods.

Table 2 shows the decline in sectoral employment during the two recent disinflations. The results show that the only sectors experiencing double-digit declines in employment were the construction and durable goods industries. Employment in construction fell 17.1 percent during the 1974-5 recession and 14.6 percent during the 1979-82 recessions. Employment in durable manufacturing fell 12.9 percent during the 1974-5 recession and 18.3 percent during the 1979-82 recessions. The only other sectors whose employment fell close to this amount were nondurable goods and transportation. Employment in nondurable manufacturing employment fell 7.9 percent during the 1974-5 recession and increased 4.2 percent during the 1979-82 recessions. Employment in the transportation sector fell 4.4 percent during the 1974-5 recession and 3.1 percent during the 1979-82 recessions. Thus this evidence indicates that the brunt of these disinflations fell on workers in durable manufacturing and construction.

Table 3 reports evidence from estimating equation (1). It presents the maximal responses of employment to contractionary policy as measured by the Romer and Romer (1994) dates. All the responses are negative, indicating that contractionary monetary policy depresses employment. The most affected sectors are durable manufacturing, with a value of -0.0022, construction, with a value of -0.0027, and mining, with a value of -0.00393.

The evidence for construction and durable goods is consistent with the results reported in Tables 1 and 2, although the results for mining are not. Tables 1 and 2 indicate that the construction and durable goods sectors are disproportionately burdened by disinflations. However, those Tables contain no evidence that mining is affected. It is possible that the positive results for mining in Table 3 are due to sampling error. Alternatively the results could be due to the fact that mining is affected by monetary policy. In any case, employment in the mining sector is an order of magnitude smaller than employment in construction or durable manufacturing.[6] Thus in the Social Accounting Matrix analysis below it will be assumed that construction and durable manufacturing are the key sectors harmed by contractionary policy. Since mining is a small sector ignoring it should not alter the results much.

The Effects on Factors

The SAM framework makes it possible to map changes in sectoral output onto changes in factorial income. The focus in this paper is on labor. Labor is disaggregated according to the Bureau of Labor Statistics occupational categories.

Table 4 reports the effect of a 10 percent decline in output in construction and durable goods on the incomes of different occupations. For both industries, blue-collar workers are hit the hardest. In durable goods, lower-skilled blue-collar workers employed as "laborers" are harmed the most, suffering a 7 percent decline in income. In construction, more skilled blue-collar workers employed in "crafts" are hurt more, suffering a 1.3 percent decline in income. Thus, if disinflationary monetary policy causes a slowdown in construction and durable goods, blue-collar workers will be disproportionately burdened.

The Effects on Households

It is also important to consider the effect of monetary policy on households (socioeconomic groups). The Social Accounting Matrix of Sanchez and Roland-Holst (1992) disaggregates households into white rural, white urban, nonwhite rural, and nonwhite urban. The SAM framework can be used to map changes in sectoral output onto changes in household income.

Table 5 reports the effect of a 10 percent decline in output in construction and durable goods on household incomes. For both industries, urban households are hurt much more than rural households. The effects on whites and nonwhites appear similar.

One drawback with the SAM approach is that it can only capture the effects of a downturn in one sector at a time. If it were used to measure simultaneous downturns in several sectors, it would double-count the interactions. The VAR, narrative, and Romer and Romer approaches, on the other hand, can be used to measure the aggregate effects of a disinflation on households. Evidence from these three techniques on the effects of monetary policy on households is presented below.

The effect on households can be measured by the unemployment rate. Monthly data on unemployment for white, black, and Hispanic households are available from the Bureau of Labor Statistics (BLS) beginning in 1973. Data on unemployment for white and nonwhite households are available from BLS beginning in 1954. Data on household unemployment rates are thus readily available. Unemployment rates by race are closely correlated with income levels and other measures of welfare. Thus changes in unemployment can be used to infer how much a given household group is suffering from disinflationary policy.

Figure 1 presents the results from an impulse-response function. It shows the effect of a one-standard deviation unexpected increase in the funds rate on unemployment by race. A one-standard deviation shock in this case equals about 55 basis points. For all three races unemployment increases following the contractionary shock. Although standard error bands are not included, all three responses are statistically significant at the 5 percent level.[7] The maximal effect on unemployment occurs one to two years after the tightening. The results indicate that a 55 basis point unexpected increase in the funds rate raises white unemployment by 0.09 percentage points, Hispanic unemployment by 0.17 percentage points, and black unemployment by 0.14 percentage points.[8] The evidence in Figure 1 indicates that minorities are harmed more than whites by contractionary monetary policy. Some perspective will be provided on the magnitude of these numbers below when discussing how much unemployment rates increased during recent disinflations.

One way to formally test for differential effects of monetary policy is to include the differences in unemployment rates between races rather than the level of the unemployment rate by race in the VAR. Figures 2 and 3 present the results from doing this. Figure 2 plots the response of the difference between the Hispanic and white unemployment rates to a one-standard deviation funds rate shock. One-standard error bands are also included. The Figure indicates that point estimates of the differential response become one-standard error greater than zero after 7 months. The response peaks after 14 months at 0.06, indicating that a 55 basis point increase in the funds rate raises the difference between the Hispanic and white unemployment rates by 0.06 percentage points. The p-value (two-tailed test) associated with this coefficient is 0.01. Figure 3 plots the response of the difference between the black and white unemployment rates to a one-standard deviation funds rate shock. The Figure indicates that point estimates of the differential response become one-standard error greater than zero after 9 months. The response peaks after 20 months at 0.05, indicating that a 55 basis point increase in the funds rate raises the difference between the black and white unemployment rates by 0.05 percentage points. The p-value (two-tailed test) associated with this coefficient is 0.085. Thus these results indicate that minorities are harmed more than whites by disinflationary policy.

The same results are obtained when examining the change in unemployment by race during recent disinflations. Figure 4 plots unemployment by race during the 1974-5 disinflation. For all three races unemployment began increasing in the summer of 1974 and peaked in the first half of 1975. The white unemployment rate increased 3.4 percentage points over this period, the Hispanic rate 6.2 percentage points, and the black rate 5.4 percentage points. At their peaks white unemployment reached 8.4 percent, Hispanic unemployment reached 14.3 percent, and black unemployment reached 15.3 percent. Figure 5 plots unemployment by race during the 1979-82 disinflation. For all three races unemployment began increasing near the end of 1979 and peaked at the end of 1982. The white unemployment rate increased 4.5 percentage points over this period, the Hispanic rate 8.1 percentage points, and the black rate 9.5 percentage points. At their peaks white unemployment reached 9.7 percent, Hispanic unemployment reached 15.7 percent, and black unemployment reached 21.2 percent. Thus black unemployment increased more than twice as much as white unemployment over this period and peaked at levels greater than twice as high. Minorities clearly paid a greater cost than whites for the disinflation.

The Romer and Romer approach also yields similar results. In order to use as many of the Romer dates as possible, unemployment data disaggregated into white and nonwhite categories rather than into white, black, and Hispanic categories are employed. As discussed above the former data are available beginning in January

1954 and the latter beginning in March 1973.

Table 6 presents the results from estimating Equation (1). For nonwhites the responses of unemployment to a disinflationary episode peaks at 0.199 while for whites it peaks at 0.046. This implies that a contractionary monetary shock raises the nonwhite unemployment rate on average by 0.199 percentage points and the white unemployment rate by 0.046 percentage points. The results are similar when the levels of the unemployment rates are replaced in the regressions by rates that are detrended or first-differenced.

Table 6 also presents the results from including the differences in unemployment rates between races rather than the level of the unemployment rate by race in equation (4). This difference peaks at 0.266, implying that a disinflationary episode raises the difference between the nonwhite and white unemployment rates by 0.266 percentage points. The p-value (two-tailed test) associated with this coefficient is less than 0.0001. This evidence indicates that minorities are harmed more than whites by disinflationary policy.

Conclusion

The United States economy has performed exceptionally well over the last 5 years. Stock and bond prices have also increased steadily. *The Economist* argues that the Federal Reserve must push stock prices down and slow the U.S. economy, perhaps "sharply." One factor that the magazine does not discuss is the distributional effects of such a policy. Who would pay the costs for depressing asset prices? Evidence in this paper indicates that the construction and durable goods industries, blue-collar workers, urban employees, and minorities would be disproportionately burdened by contractionary monetary policy.

In the case of minorities, the differential effects are particularly striking. Impulse-response functions from a vector autoregression indicate that positive innovations in the federal funds rate increase unemployment among blacks and Hispanics by 50-90 percent more than among whites. Examination of historical episodes of disinflationary policy shows that unemployment among minorities increases almost twice as much as among whites. Estimation using the Romer dates

reveals that anti-inflationary policy shocks increase unemployment among nonwhites more than twice as much as it does among whites. Thus the brunt of disinflationary policy falls on minorities.

On the other hand, minority households would not share proportionately in the benefit of keeping the stock market stable. The *Economic Report of the President* (1998) reports that only 5 percent of black families possess stocks, mutual funds, or pension funds. For white families, more than 25 percent possess these assets. Thus stable stock prices, while desirable, would in the first instance benefit whites much more than minorities.

Before the Fed accepts the advice of *The Economist* and slows the economy down in order to lower the prices of stocks, real estate, and works of art, there should be open debate in Congress that these variables are important goals of monetary policy. Currently the Fed is mandated to seek maximum employment, commodity price stability, and moderate long-term interest rates. It is meeting these goals exceptionally well. While it is always possible that higher stock prices can lead to inflation or lower stock prices to recession, these links are tenuous and uncertain. The Fed should not "sharply" slow the economy to stabilize asset prices unless Congress extends the Fed's mandate to include these variables. If Congress does debate this issue, it should take into account that the individuals most likely to be hurt by deflating asset prices are the ones least likely to benefit when the prices of stocks and works of art stabilize.

Table 1: Impulse Response of Sectoral Employment after 18 Months to One-Standard Deviation Shock to the Federal Funds Rate

Sector	Response to One-Standard Deviation Shock to FF	(Std. Error)
Construction	-0.00693*	(0.00235)
Durable Goods	-0.00491**	(0.00169)
Finance, Insurance, Real Estate	-0.00182**	(0.00070)
Government	-0.00090*	(0.00054)
Mining	0.000701	(0.00307)
Nondurable Goods	-0.00110*	(0.00072)
Retail Trade	-0.00261**	(0.00076)
Services	-0.00151**	(0.00057)
Transportation	-0.00086	(0.00085)
Wholesale Trade	-0.00241**	(0.00080)

*Significant at the 10% level.
**Significant at the 5% level.

Table 2: Percentage Change in Employment by Industry During Recent Disinflations.

Sector	1974-5 Disinflation	1979-82 Disinflation
Construction	-17.1	-14.6
Durable Goods	-12.9	-18.3
Finance, Insurance, Real Estate	0.5	6.9
Government	4.4	-1.3
Mining	8.8	4.5
Nondurable Goods	-7.9	4.2
Retail Trade	1.3	1.8
Services	4.8	11.0
Transportation	-4.4	-3.1
Wholesale Trade	-0.3	-0.5

Source: Bureau of Labor Statistics
Note: For the 1974-5 disinflation, the change is calculated from April 1974 to July 1975. For the 1979-82 disinflation, the change is calculated from September 1979 to December 1982.

Table 3: Maximal Response of Sectoral Employment to Romer and Romer Episode

Sector	Response to Disinflationary Episode	(Std. Error)	Lag at Maximal Response
Construction	-0.00273	(0.00182)	24
Durable Goods	-0.00220*	(0.00115)	15
Finance, Insurance, Real Estate	-0.00024	(0.00020)	24
Government	-0.00105**	(0.0004)	26
Mining	-0.00393	(0.00415)	48
Nondurable Goods	-0.00015	(0.00037)	36
Retail Trade	-0.00081*	(0.00055)	14
Services	-0.00082**	(0.00032)	24
Transportation	-0.00145*	(0.0078)	27
Wholesale Trade	-0.00039	(0.00036)	18

*Significant at the 10% level.
**Significant at the 5% level.

Table 4: The Effect of a Ten Percent Decline in Sectoral Output on Occupational Incomes

Occupation	Sector	
	Durables	Construction
	(Percent Decline in Income)	
Executive, Administrative, and Managerial	3.8	0.6
Technical, Sales, and Administrative Support	3.9	0.6
Service	2.5	0.4
Farming, Forestry, and Fishing	2.5	0.6
Precision Production, Craft, and Repair	4.6	1.3
Operators, Fabricators, and Laborers	7.0	0.9

Source: Social Accounting Matrix presented in Roland-Holst and Sancho (1992)

Table 5: The Effect of a Ten Percent Decline in Sectoral Output on Household Incomes

Household	Sector	
	Durables	Construction
	(Percent Decline in Income)	
White Rural	1.0	0.2
White Urban	3.1	0.5
Nonwhite Rural	1.3	0.2
Nonwhite Urban	3.0	0.5

Source: Social Accounting Matrix presented in Roland-Holst and Sancho (1992)

Table 6: Response of Unemployment by Race Following Romer Episodes

Independent	**Nonwhite**	**White**	**Difference between Nonwhite and White**

Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
$Romer_{0}$	-0.058	-0.39	-0.034	-0.60	-0.036	-0.26
$Romer_{-1}$	-0.034	-0.28	-0.027	-0.57	-0.009	-0.08
$Romer_{-2}$	-0.014	-0.13	-0.019	-0.48	0.012	0.13
$Romer_{-3}$	0.004	0.04	-0.013	-0.34	0.028	0.32
$Romer_{-4}$	0.019	0.20	-0.006	-0.18	0.040	0.48
$Romer_{-5}$	0.031	0.34	-0.001	-0.02	0.049	0.59
$Romer_{-6}$	0.042	0.45	0.005	0.13	0.054	0.65
$Romer_{-7}$	0.051	0.54	0.009	0.26	0.057	0.68
$Romer_{-8}$	0.059	0.62	0.014	0.38	0.059	0.69
$Romer_{-9}$	0.065	0.69	0.018	0.49	0.059	0.70
$Romer_{-10}$	0.070	0.76	0.021	0.60	0.058	0.69
$Romer_{-11}$	0.075	0.83	0.025	0.71	0.056	0.69
$Romer_{-12}$	0.080	0.91	0.028	0.82	0.054	0.69
$Romer_{-13}$	0.084	0.98	0.030	0.93	0.053	0.69
$Romer_{-14}$	0.088	1.07	0.033	1.03	0.052	0.70
$Romer_{-15}$	0.092	1.15	0.035	1.13	0.051	0.72
$Romer_{-16}$	0.096	1.23	0.037	1.22	0.052	0.75
$Romer_{-17}$	0.100	1.31	0.038	1.30	0.053	0.79
$Romer_{-18}$	0.105	1.39	0.040	1.37	0.056	0.84
$Romer_{-19}$	0.110	1.48	0.041	1.42	0.061	0.92
$Romer_{-20}$	0.115	1.56	0.042	1.47	0.066	1.01
$Romer_{-21}$	0.121	1.65	0.043	1.51	0.073	1.12
$Romer_{-22}$	0.127	1.74	0.044	1.55	0.082	1.26
$Romer_{-23}$	0.133	1.84	0.045	1.58	0.092	1.43
$Romer_{-24}$	0.140	1.96	0.045	1.62	0.103	1.63
$Romer_{-25}$	0.147	2.09	0.045	1.65	0.116	1.86
$Romer_{-26}$	0.154	2.23	0.046	1.69	0.129	2.12
$Romer_{-27}$	0.161	2.38	0.046	1.73	0.144	2.41
$Romer_{-28}$	0.169	2.55	0.046	1.77	0.159	2.73
$Romer_{-29}$	0.175	2.71	0.045	1.81	0.174	3.08
$Romer_{-30}$	0.182	2.86	0.045	1.84	0.189	3.42
$Romer_{-31}$	0.187	2.99	0.045	1.84	0.205	3.74
$Romer_{-32}$	0.192	3.07	0.044	1.83	0.219	4.02
$Romer_{-33}$	0.196	3.10	0.043	1.79	0.232	4.22
$Romer_{-34}$	0.198	3.08	0.042	1.73	0.244	4.33

$Romer_{-35}$	0.199	3.01	0.041	1.65	0.254	4.37
$Romer_{-37}$	0.194	2.76	0.039	1.46	0.266	4.25
$Romer_{-38}$	0.188	2.60	0.037	1.36	0.266	4.13
$Romer_{-39}$	0.179	2.43	0.035	1.28	0.262	3.98
$Romer_{-40}$	0.166	2.24	0.033	1.20	0.253	3.81
$Romer_{-41}$	0.150	2.02	0.031	1.12	0.238	3.59
$Romer_{-42}$	0.129	1.78	0.029	1.05	0.217	3.31
$Romer_{-43}$	0.104	1.45	0.026	0.96	0.189	2.91
$Romer_{-44}$	0.074	1.02	0.023	0.84	0.152	2.33
$Romer_{-45}$	0.038	0.50	0.020	0.68	0.106	1.54
$Romer_{-46}$	-0.004	-0.04	0.016	0.48	0.051	0.65
$Romer_{-47}$	-0.052	-0.50	0.012	0.30	-0.015	-0.16
$Romer_{-48}$	-0.108	-0.82	0.007	0.15	-0.094	-0.78
$Unemployment_{-1}$	0.728	15.43	0.933	19.80	0.521	11.09
$Unemployment_{-2}$	0.315	5.44	0.265	4.11	0.276	5.21
$Unemployment_{-3}$	-0.023	-0.39	-0.079	-1.22	0.004	11.1
$Unemployment_{-4}$	-0.037	-0.62	-0.004	-0.06	-0.015	-0.28
$Unemployment_{-5}$	0.094	1.58	-0.125	-1.92	0.118	2.18
$Unemployment_{-6}$	-0.143	-2.49	0.012	0.20	-0.042	-0.80
$Unemployment_{-7}$	0.036	0.77	-0.030	-0.66	0.094	2.02
$Inflation_{-1}$	5.363	0.53	5.703	1.46	3.398	0.37
$Inflation_{-2}$	-0.338	-0.03	1.608	0.40	-0.245	-0.03
$Inflation_{-3}$	12.13	1.13	2.525	0.62	11.717	1.20
$Inflation_{-4}$	-13.56	-1.26	4.855	1.19	-16.588	-1.70
$Inflation_{-5}$	12.33	1.15	6.945	1.70	1.922	0.20
$Inflation_{-6}$	-0.35	-0.03	-5.980	-1.47	1.430	0.15
$Inflation_{-7}$	3.98	0.38	-7.018	-1.76	9.109	0.97
Constant	0.21	1.98	0.106	2.60	0.144	1.63
Adjusted R^2	0.97		0.98		0.92	
S.E. of Regression	0.46		0.18		0.42	

Note: The Table presents the results from regressing unemployment disaggregated by race on 7 own lags, 7 lags of the inflation rate, and 48 lags of the Romer dates. The sample period is 1954:1 to 1996:12.

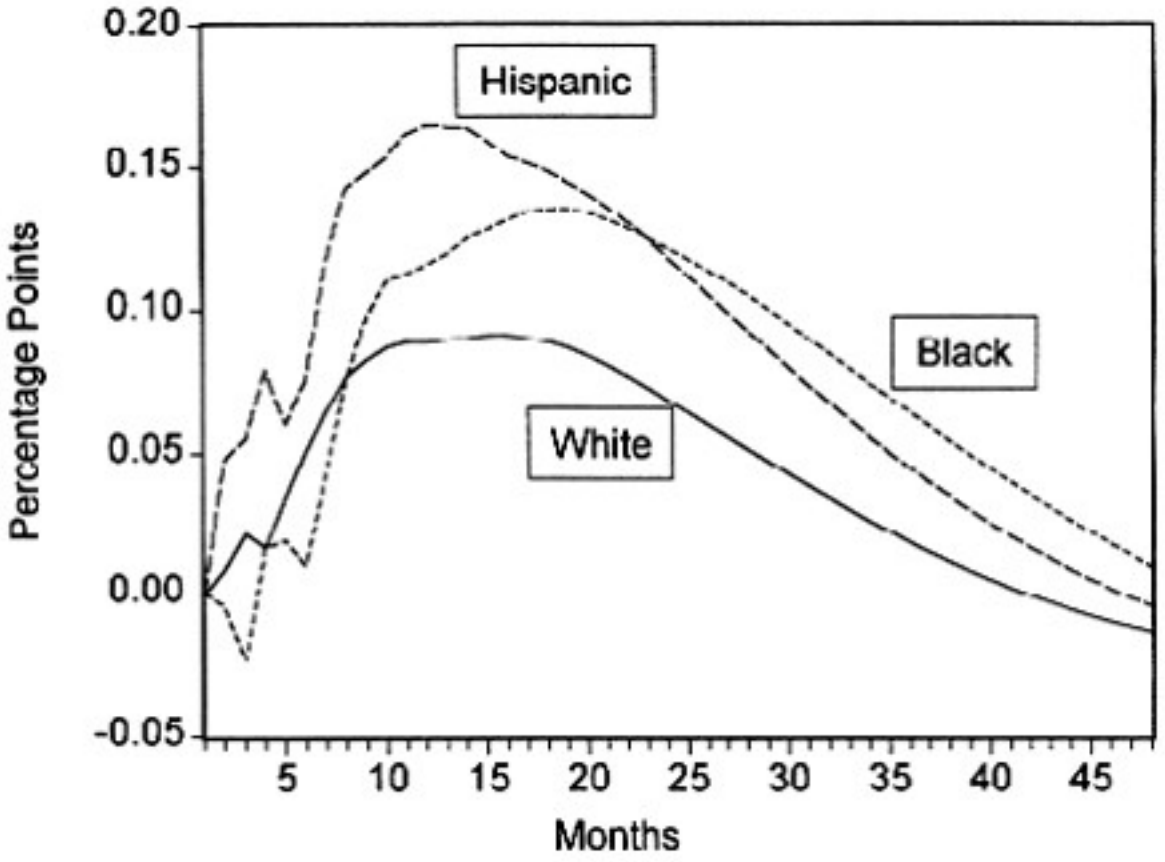

Figure 1. The Effect of Positive Orthogonalized Innovations in the Federal Funds Rate on Unemployment by Race

Note: The estimated impulse-response functions are calculated from VARs that include industrial production growth, inflation, an index of sensitive commodity prices, unemployment disaggregated by race (either white, black, or Hispanic), the federal funds rate, nonborrowed reserves, and total reserves. The sample period is from September 1973 to December 1996.

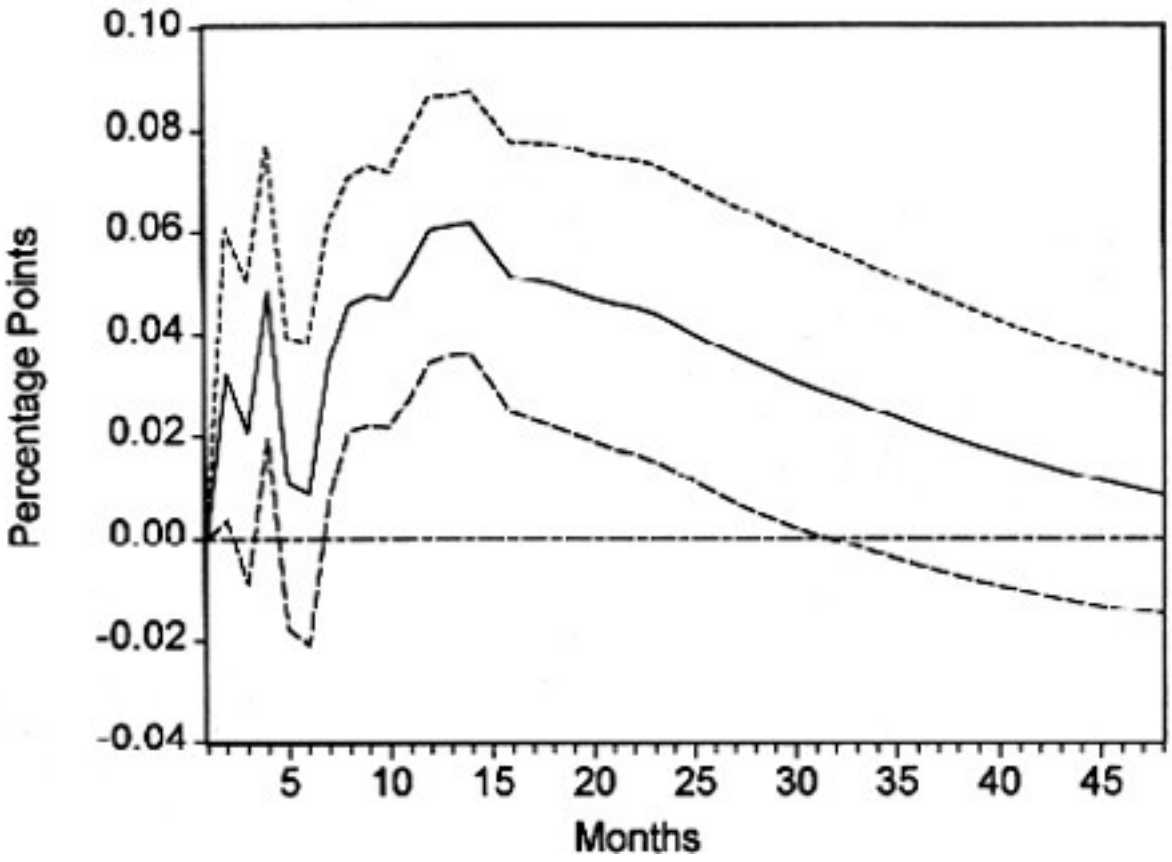

Figure 2. The Effect of Positive Orthogonalized Innovations in the Federal Funds Rate on the Difference Between the Hispanic and White Unemployment Rates

Note: The estimated impulse-response functions are calculated from VARs that include industrial production growth, inflation, an index of sensitive commodity prices, the difference between the Hispanic and white unemployment rates, the federal funds rate, nonborrowed reserves, and total reserves. Dashed lines represent one-standard error bands. The sample period is from September 1973 to December 1996.

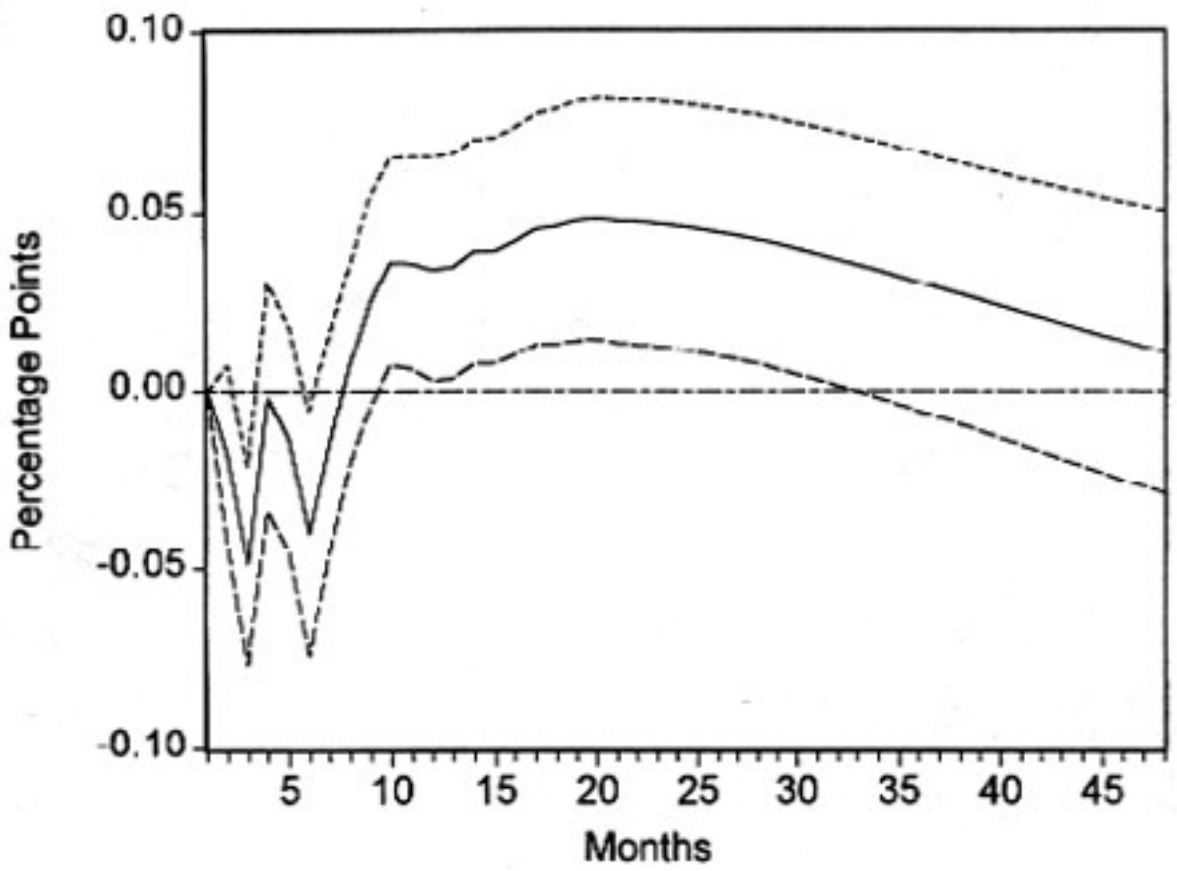

Figure 3. The Effect of Positive Orthogonalized Innovations in the Federal Fund Rate on the Difference Between the Black and White Unemployment Rates

Note: The estimated impulse-response functions are calculated from VARs that include industrial production growth, inflation, an index fo sensitive commodity prices, the difference between black and white unemployment rates, the federal funds rate, nonborrowed reserves, and total reserves. Dashed lines represent one-standard error bands. The sample period is from September 1973 to December 1996.

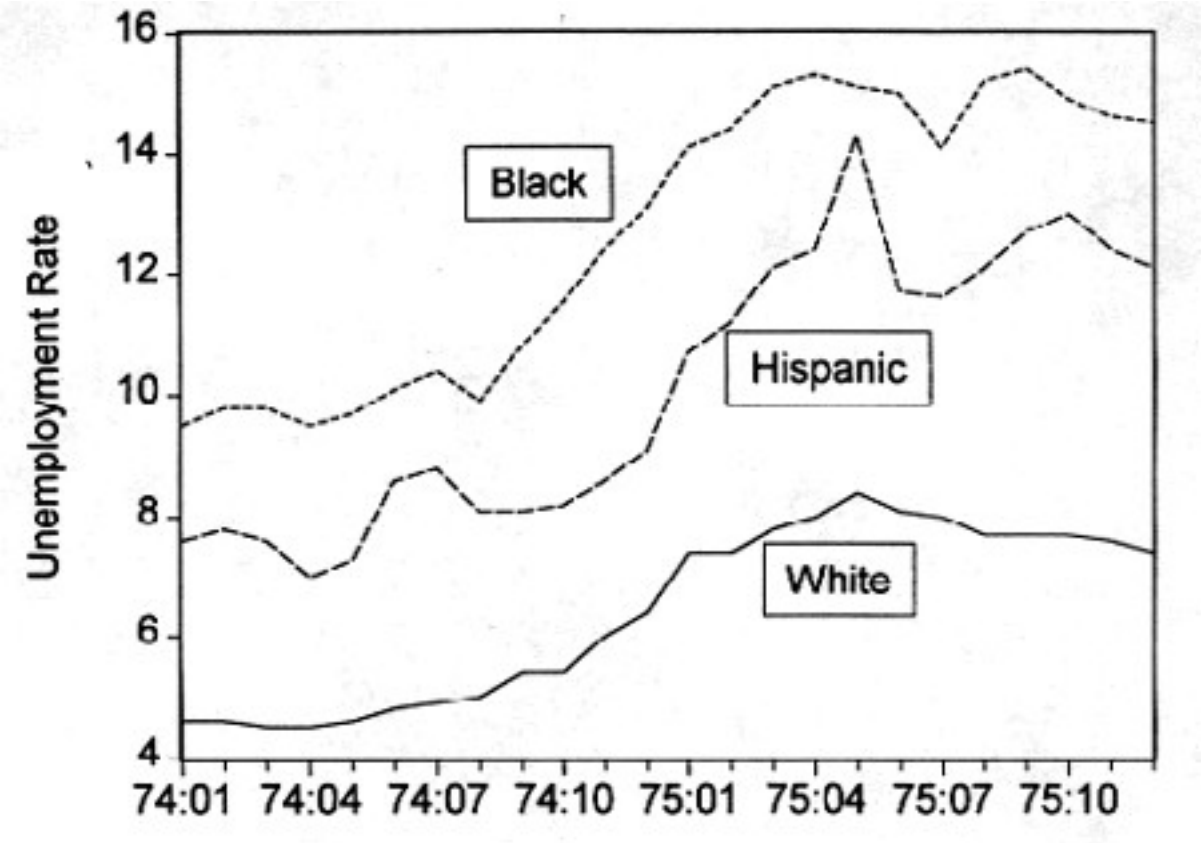

Figure 4. Unemployment by race During the 1974 Disinflation

Source: Haver Analytics database

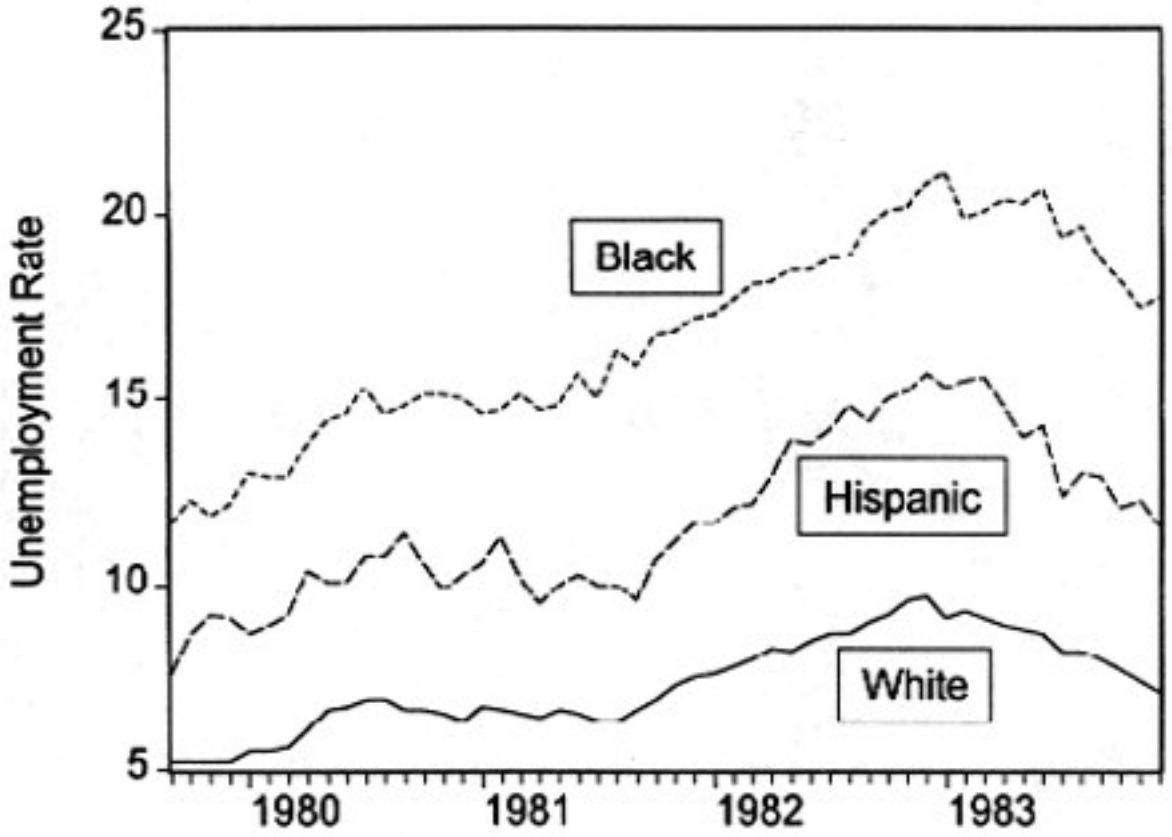

Figure 5. Unemployment by Race During the 1979-1982 Disinflation

Source: Haver Analytics database

References

Ball, L. (1994) What Determines the Sacrifice Ratio? In *Monetary Policy*. (N. G. Mankiw, Ed.). Chicago: University of Chicago Press.

Bernanke, B. and Gertler, M. (1995) Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives* 9: 27-48.

Bernanke, B., Gertler, M., and Watson, M. (1997) Systematic Monetary Policy and the Effects Of Oil Price Shocks. *Brookings Papers on Economic Activity* 91-158.

Bernanke, B. and Blinder, A. (1992) The Federal Funds Rate and the Channels of Monetary Transmission. *American Economic Review* 82: 901-21.

Christiano, L., Eichenbaum, M. and Evans, C.. The Effects of Monetary Policy Shocks: Some Evidence from the Flow of Funds. *Review of Economics and Statistics* 78: 16-34.

Executive Office of the President, Council of Economic Advisors. *Economic Report* of *the President* . Washington D.C.: United States Government Printing Office, various issues.

Friedman, B.. (1988) Lessons on Monetary Policy from the 1980s. *Journal of Economic Perspectives* 2: 51-72.

Friedman, B. and Kuttner, K. (1996) A Price Target for U.S. Monetary Policy? Lessons from the Experience with Money Growth Targets. *Brookings Papers on Economic Activity* 77-146.

Friedman, M. and Schwartz, A. (1963) *A Monetary History of the United States 1867-1960* . Princeton: Princeton University Press.

Leeper, Eric, Sims, C. and Zha, Tao (1996) What Does Monetary Policy Do? *Brookings Papers on Economic Activity* 1-63.

Modigliani, F. and Papademos, Lucas. (1975) Targets for Monetary Policy in the Coming Year. *Brookings Papers on Economic Activity* 141-165.

Roland-Holst, D. and Sanchez, F. (1992) Relative Income Determination in the United States, A Social Accounting Perspective. *Review of Income and Wealth* 38.

Romer, C. and Romer, D. (1994) Monetary Policy Matters. *Journal of Monetary Economic* 34: 75-88.

Romer, C. and Romer, D. (1989) Does Monetary Policy Matters? A New Test in the Spirit of Friedman and Schwartz. *NBER Macroeconomic Annual* 4:121-70.

Thorbecke, E. (1992) *Adjustment and Equity in Indonesia* , Paris: Organization for Economic Cooperation and Development.

Thorbecke, W. (1997) "Disinflationary Monetary Policy and the Distribution of Income," Levy Institute Working Paper No. 165.

Notes

1. An additional reason why minorities may be harmed more during disinflationary periods is the fact that they are often the last to be hired and the first to be fired.
2. The May 1997 American Economic Review (pp. 230-246) contains articles by a panel of distinguished macro economists addressing the question of whether there is a practical core of macroeconomics that we should all believe. All the panel members agreed that one element of the core is the proposition that in the short run monetary policy can affect the real economy. The panel members were Olivier Blanchard, Alan Blinder, Martin Eichenbaum, Robert Solow, and John Taylor.
3. Friedman and Schwartz (1963, 686).
4. These data are taken from Friedman (1988).
5. The original dates are 1947:10, 1955:09, 1968:12, 1974:04, 1978:08, and 1979:10. The date that they added is 1988:12.
6. The sample period used by Thorbecke (1997) extended from January 1967 to December 1995.
7. In 1998 there were 11 million people employed in the durable goods sector, 6 million in construction, and less than 600,000 in mining.
8. The R-squared statistics for the white, black, and Hispanic unemployment equations are, respectively, 0.98, 0.97, and 0.92. The standard errors of the equations are, respectively, 0.17, 0.48, and 0.56.
9. The results are similar when the levels of the unemployment rates are replaced in the VARs by rates that are detrended or first- differenced.
