

Thorbecke, Willem

Working Paper

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Working Paper, No. 185

Provided in Cooperation with:

Levy Economics Institute of Bard College

Suggested Citation: Thorbecke, Willem (1997) : Disinflationary Monetary Policy and the Distribution of Income, Working Paper, No. 185, Levy Economics Institute of Bard College, Annandale-on-Hudson, NY

This Version is available at:

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Disinflationary Monetary Policy
and the Distribution of Income

by

Willem Thorbecke*

Working Paper No. 185

March 1997

*The Jerome Levy Economics Institute of Bard College and Economics Department, George Mason University,
4400 University Drive, Fairfax, Virginia 22030-4444.

There is no need to reduce inflation further because those Americans who would benefit--the bond holders--wouldn't be the same ones who bore the costs of the reduction--those who would lose their jobs in the process.

- Joseph Stiglitz
Quoted in Berry (1996)

Inflation over the last 5 years has remained below 3 percent. Many economic observers applaud these results, arguing that inflation has ceased to matter much in the decisions of consumers and businesses. Others such as Martin Feldstein (1996), Lee Hoskins (1991), and Jerry Jordan (1993) advocate further gains on the inflationary front. Feldstein, for instance, argues that reducing the inflation rate to zero would ameliorate the tax distortions caused by inflation, producing substantial gains to the economy. He estimates that to achieve price stability the Federal Reserve would have to engineer a recession that reduces real gross domestic product by 5 percent. Feldstein holds that these costs are far outweighed by the benefits that would occur from reducing the misallocation of resources (in jargon, the deadweight losses) due to inflation. What he overlooks in his analysis is how the costs and benefits of such a policy would be shared. Who would bear the burdens from disinflationary monetary policy? Who would reap the benefits? Would such distributional consequences be desirable in the present economic environment?

This *Brief* attempts to answer these questions first by considering based on economic principles how different sectors would be affected by disinflationary policy. The traditional "money" channel of monetary policy implies that employment in

interest-sensitive industries should fall the most. The "credit" channel implies that small, financially-constrained firms should be hurt more than large, financially-stable firms. A slowdown in aggregate activity working through either channel would burden low-income workers more than high-income workers. Since minorities tend to have lower wages than whites, disinflationary policy should disproportionately affect them. Lenders such as bond holders would gain by an unanticipated decrease in inflation.

This *Brief* next examines evidence concerning the distributional effects of contractionary policy. Evidence from impulse-response functions indicates that interest-sensitive industries such as construction and durable goods and small firms are harmed disproportionately by contractionary monetary policy. Examination of a social accounting matrix reveals that a slowdown in construction and durable goods will affect especially low-income urban workers. Econometric evidence shows that unemployment among blacks and hispanics increases approximately twice as much as unemployment among whites following contractionary policy. Evidence also indicates that Treasury bond prices are driven primarily by news of inflation, and will appreciate as inflation declines.

Corroborating evidence concerning these effects is obtained by examining the period from 1979-82 when the Fed raised interest rates and contracted economic activity while reducing inflation. Employment in durable manufacturing fell 18 percent over this period and employment in construction dropped 15 percent. Profits

of small firms declined much more than profits of large firms. Unemployment among blacks rose 9.5 percentage points to reach 21.2 percent while unemployment among whites increased less than half as much and never exceeded 10 percent. Long-term Treasury bonds in 1982, the first year that inflation dropped appreciably, yielded their best performance ever with total returns exceeding 40 percent. At this time the wealthiest 10 percent of households held almost 95 percent of all bonds and trusts.¹ Thus examining the disinflationary period from 1979-1982 confirms the econometric findings that contractionary policy harms low-income families and benefits bond holders, who predominantly belong to high-income families.

This *Brief* finally considers whether a further redistribution from poorer individuals to wealthier individuals would be desirable at present. Over the past 20 years incomes of those on the upper tail of the income distribution have increased steadily while incomes of the poorest decile have decreased almost 30 percent and of the second poorest decile almost 20 percent.² Commenting on this trend, Federal Reserve Chairman Alan Greenspan stated that it could be a major threat to our society and Federal Reserve Bank of New York President William McDonough warned that it could endanger our ability to go forward together as a unified society.³ Faced with these distributional problems, now would be a particularly bad time to engineer a monetary disinflation. Rather, the fact that inflation has remained quiescent despite the fact that unemployment has stayed below 6 percent since September 1994 suggests that now

would be a good time for the Fed to "test the waters" by continuing to let unemployment fall. Even if the monetary authorities did not stimulate the economy, abstaining from tightening following positive employment news would be helpful. Allowing the jobless rate to fall in this way would especially benefit those most at risk in our society--poorer families, minorities, inner city workers, and people on welfare.

Economic Theory and the Distributional Effects of Monetary Policy

Monetary Policy, Interest-Sensitive Industries, and Small Firms

In traditional macroeconomic models disinflationary monetary policy slows the economy by raising interest rates. The Fed directly controls the federal funds interest rate, the rate on one-day loans between banks. By increasing current and expected future values of the funds rate, the Fed can raise longer-term interest rates and reduce stock prices. These changes increase the interest cost of using capital. As the cost of capital rises, spending on capital goods, houses, and durables should decrease. The reduction in spending then causes output in these sectors to fall. As output and thus the incomes of those working in these industries decline, other sectors of the economy will be harmed. The largest burden, though, should be borne by interest-sensitive industries such as construction and durable goods.

This direct effect of contractionary monetary policy on

interest-sensitive industries can be amplified by its effect on firms' access to credit. As Bernanke (1993) and Gertler and Gilchrist (1994) have discussed, firms with better balance sheet positions are more able to finance their activities either directly using their own funds or indirectly using their net worth as collateral to obtain credit. Firms that have weak balance sheet positions or that are otherwise constrained in their access to capital markets are more dependent on banks to finance inventory investment and capital formation. For these credit-constrained firms, a monetary contraction can severely curtail their ability to operate. As Gertler and Gilchrist (1994) have discussed, a monetary tightening, by increasing interest rates, can worsen cash flow net of interest and thus firms' balance sheet positions. As Bernanke and Blinder (1988) have shown, a monetary contraction engineered through an open market sale by the Federal Reserve can decrease bank loans (assuming that bonds and bank loans are imperfect substitutes). The reduction in collateralizable net worth and in bank loans caused by a monetary contraction restricts working capital and thus economic activity among firms with limited access to capital markets.

Gertler and Gilchrist have argued that smaller firms are more likely to be constrained in their access to credit. They are more likely to obtain funds from banks than from equity, bonds, or commercial paper. They are less likely to be well-collateralized. Further, Gertler and Gilchrist argued that, because credit constraints bind a larger number of small firms in a downturn,

changes in monetary policy should have a larger effect on small firms in bad times than in good times. A monetary contraction when the economy is in a recession can have a much more serious effect on small firms than a monetary expansion would when the economy is growing. Thus, if credit constraints help propagate monetary policy, small firms should be disproportionately burdened by disinflationary monetary policy, especially during recessions.

Contractionary Policy, Low-Income Individuals, Minorities, and Wall Street

There are many reasons why contractionary policy should hurt low-income individuals more than high-income individuals. Blanchard (1995) argued that a negative macroeconomic shock such as a tightening of monetary policy will harm those on lower rungs of the occupational ladder much more than those on higher rungs. He further argued that unskilled workers have much larger labor supply elasticities than skilled workers. Decreases in wages of skilled workers will not decrease their labor supply much, while decreases in wages of unskilled workers will sharply decrease theirs. Thus a business cycle downturn that reduces wages will lower employment much more for unskilled workers than for skilled ones. Fischer, Dornbusch, and Schmalensee (1988) argue that blue-collar jobs tend to be affected much more than white collar jobs by negative aggregate disturbance. Blinder and Esaki (1978) found that negative macroeconomic shocks that increase the unemployment rate

by one percentage point take about 0.28% of national income away from the lowest 40% of the income distribution and give it to the richest 20%. Thus low-income, low-skilled individuals should suffer more from a monetary contraction.

It is well known that African-Americans tend to have lower incomes than whites (see, for example, Bound and Freeman, 1992). The reasons for this wage gap are less clear. As Card and Lemieux (1994) discuss, it could reflect factors such as discrimination, productivity differences, or differential access to job information. The implication of the wage gap for monetary policy, however, is clear. The brunt of contractionary monetary policy should fall on blacks and other minorities earning lower wages rather than on whites.

Another way to shed light on the distributional effects of disinflationary monetary policy is to examine the types of workers in the industries most affected. As discussed above, contractionary monetary policy should burden primarily interest-sensitive sectors such as construction and durable goods. Evidence presented below indicates that this is the case. It is then possible to use a Social Accounting Matrix (SAM) for the United States to trace through the effects of a decline in output in these industries on the distribution of income by socio-economic group. These groups could be disaggregated by location (rural versus urban), union membership, and other characteristics.

While disinflationary monetary policy should harm low-income individuals, it should benefit bond market investors and other

creditors. In order to hold a bond, lenders require not only an expected real return but also compensation for expected inflation. Assume, for instance, that to hold a given bond wealth-holders required a 2% expected real return and a 3% inflation premium. The anticipated nominal return on the bond would thus be 5%. If inflation declined unexpectedly to 1% and the nominal return remained at 5%, then the real return on the bond would actually be 4%. Thus lenders would receive a 2% higher real return than they required, provided involuntarily by borrowers. Since Feldstein's (1996) proposal is not currently expected to be implemented, it is not reflected in forecasts of inflation. If it were implemented, it would bring about an unanticipated decline in inflation. Such a decline would produce a redistribution to creditors from debtors. In practice wealthier households are creditors while businesses, the government, and poorer households are debtors. Thus one would expect an unanticipated disinflation to help wealthier households at the expense of other sectors.

Evidence on the Distributional Effects of Monetary Policy

Evidence from Econometrics and Social Accounting Matrices

The discussion above indicates that disinflationary monetary policy should have differential effects across the economy. It should disproportionately harm interest-sensitive industries, small firms, low-income individuals, and minorities. It should benefit

bond holders. This section summarizes a variety of evidence on these distributional effects of monetary policy.

To calculate the effect of monetary policy on employment disaggregated by industry and race and on small firms the impulse-response methodology of Sims (1980) is useful. This approach involves calculating unexpected changes in monetary policy (the impulse) in month t and noting the predicted effect on employment and other variables in months t , $t+1$, $t+2$, etc. (the responses). To measure unexpected changes in monetary policy a method similar to that employed by Bernanke and Blinder (1992) and Christiano, Eichenbaum, and Evans (1996) was used. They measured monetary policy by unexpected changes in the federal funds rate. The funds rate has often been used as the Fed's instrument in implementing monetary policy. Christiano *et al.* noted 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 produced a credible measure of monetary policy in that it was 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 were 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 could not be predicted using these variables (the residual) was treated as the

unexpected change in the funds rate. The predicted responses of employment and other variables to these funds rate shocks were noted. Although standard errors are not always presented, the effects reported are statistically significant. More information on the data sources and the sample periods are presented in the Appendix.

Table 1 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. The following section will help put these magnitudes in perspective by examining the changes in employment in these industries during the period of monetary contraction from 1979-1982. 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.

To shed further light on the types of workers affected by declines in these industries a social accounting matrix (SAM) is useful. This *Brief* uses the SAM constructed by Roland-Holst and Sancho (1992). Table 2 presents evidence concerning how a \$1 decline in output in the construction and durable goods sectors will affect the income of different socioeconomic groups.⁴ The Table indicates that non-union workers who are not covered by union contracts are harmed much more than union workers or other covered workers. These in non-covered jobs are much more likely to be in low-income jobs. Thus these results indicate that monetary policy is disproportionately harming those on the lower tail of the income distribution. The Table also indicates that urban workers are harmed much more than rural workers. It thus appears that contractionary monetary policy can worsen the urban blight afflicting so many cities at present.

Gertler and Gilchrist (1994) used the impulse-response technique to investigate the differential affect of monetary policy on small and large firms. They examined several episodes when the Fed tightened monetary policy and noted how manufacturing firms were affected. They classified these firms as small if their total sales were below the 30th percentile for manufacturing firms. They found that contractionary monetary policy reduces sales of small firms much more than sales of large firms. They also found that small firms exhibit an asymmetric response to monetary policy (but large firms do not). Small firms are harmed much more by contractionary monetary policy during recessions than they are

helped by expansionary monetary policy during expansions. Thus Gertler and Gilchrist's evidence indicates that small firms bear a greater burden than large firms from contractionary monetary policy.

The impulse-response methodology can be used to investigate the effects of monetary policy on unemployment disaggregated by race. The results are presented in Figure 1. To understand the graph, note that it shows the effect over time of an increase in the federal funds rate of one-standard-deviation (equal to 0.55 percentage points) on unemployment disaggregated by race. The evidence indicates that contractionary monetary policy increases unemployment among all races, with the maximal effect occurring between one and two years. The unemployment rate among whites following a 55 basis point increase in the funds rate increases on average by about 0.075 percentage points and the unemployment rate among hispanics and blacks by about twice as much. The following section will help put these magnitudes in perspective by examining the changes in unemployment by race during the period of monetary contraction from 1979-1982. The evidence presented in the Figure indicates that minorities, who tend to be concentrated in lower-income jobs, suffer more than whites from contractionary monetary policy.

The evidence above indicates that contractionary monetary policy reduces employment, with the burden falling disproportionately on minorities, low-income individuals, and those working for interest-sensitive industries and small firms. How

does such a decrease in employment affect the bond market? To investigate this Coppock and Thorbecke (1997) examined how unexpected changes in employment affected Treasury bond returns. They found that news of higher employment depressed bond returns. To determine why they examined what other assets were harmed by news of strong employment. They found a strong and statistically significant relationship between an asset's exposure to inflation and monetary policy and the amount the asset's return fell following news of strong employment. So strong employment hurts stocks and bonds because it can cause inflation and because it can cause the Fed to tighten. For Treasury bonds Coppock and Thorbecke found that fear of inflation explains more of the fall in returns than concern about tighter monetary policy. Thus bond market participants would prefer that employment not be too high to prevent the risk of an overheating economy and inflation.

Further evidence that bonds would benefit from reducing inflation comes from several studies. Mishkin (1990) and Campbell and Amner (1993) show that long-term bond prices respond primarily to news about future inflation. Their evidence also indicates that news of higher inflation pushes bond returns down. Thus contractionary policy that reduces inflation should produce large capital gains to bond-holders over time.⁵

The Example of the Volcker Deflation

These distributional effects of contractionary monetary policy can be seen by studying the clearest recent example of a disinflation, the period from 1979-1982 that economists call the "Volcker deflation." In October 1979, with inflation exceeding 10%, Fed Chairman Paul Volcker declared his commitment to fight inflation. He allowed the federal funds rate to increase 800 basis points. Long-term Treasury and corporate bonds both increased by about 500 basis points. These higher interest rates slowed the economy and contributed to two recessions, one in 1980 and one in 1981-82. Finally, in late 1982, with unemployment at a post-war high of over 10 percent and inflation below 4 percent, the Federal Reserve eased on monetary policy. How was the burden of this disinflation shared across the economy?

Table 3 shows the percentage change in employment by industry from September 1979 to the end of 1982. Other things equal employment should increase over this period because the population increases and the size of the economy grows. The results show that employment in durable manufacturing was down 18 percent and employment in construction was down 15 percent. The only other sector whose employment fell close to this amount was transportation, where employment fell 3 percent. Thus the brunt of the disinflation fell on workers in durable manufacturing and construction.

Figure 2 shows earnings of small and large firms. Following Fama and French (1995) firms are classified as small if the market capitalization of their stocks is below the median value for the

New York Stock Exchange.⁶ Earnings of small and large firms are divided by the book values of the firms to make the two series comparable. As Fama and French discuss, until 1981 profitability showed little relationship to firm size. However, during the 1981-82 recession the profits of small firms declined much more than the profits of large firms. Finally, after the recession, the earnings of large firms quickly recovered while the earnings of small firms never really did. Rather, earnings of small firms have remained at historically low levels. Thus small firms were harmed much more by the Volcker deflation than large firms

Figure 3 shows unemployment by race over the period. At their highest points, African-American unemployment reached 21.2 percent, hispanic unemployment hit 15.7 percent, and white unemployment remained below 10 percent. From October 1979 until unemployment peaked at the end of 1982 African-American unemployment increased 9.5 percent, hispanic unemployment increased 7.1 percent, and white unemployment increased 4.5 percent. Minorities clearly paid a much higher price than whites for the reduction in inflation that occurred.

Bonds, on the other hand, soared as inflation went down. Inflation in 1981 was high, just short of 9 percent. In 1982, on the other hand, inflation fell below 4 percent. Long-term Treasury securities provided a total return in 1982 exceeding 40 percent. This annual return on Treasury securities was easily the highest return ever.

This evidence indicates that during the Volcker deflation

employment in durables and construction and among minorities plunged while bond prices soared. The discussion above implies that lower-income individuals will suffer disproportionately from the decrease in employment in durable goods and construction. Which households will gain from the increase in bonds? As Moore (1989) and Niggle (1989) discuss, the wealthiest 10 percent of households held almost 95 percent of all bonds and trusts in 1982. Thus the 40 percent return on bonds in 1982 yielded a huge windfall to the wealthy.

Policy Implications

Both the econometric results and the evidence from the Volcker deflation present a consistent picture of how the burdens of disinflationary policy are distributed. Employment in construction and durables decreases disproportionately. Within these sectors income falls most for uncovered workers, who belong to the secondary labor market. Minority unemployment increases twice as much as white unemployment. Small firms' profits decline more than large firms' profits. Bond market investors gain. Disinflationary policy thus redistributes wealth from low-income families to high-income families. Would a further transfer in this direction, produced through contractionary policy, be desirable?

To answer this question it is useful to look at how income is distributed presently in the U.S. Katherine Bradbury (1996) of the Federal Reserve Bank of Boston has shown that for the poorest 10

percent of families, real income declined almost 30 percent between 1973 and 1994, for the second poorest decile real income fell almost 20 percent over this period, and it was not until the median decile that incomes increased at all over the 21-year period. The top four deciles, on the other hand, showed steady increases, with the largest increase (over 20 percent) going to the top decile. These results contrast with the period between 1947 and 1973, when all ten deciles experienced steady increases in wages of about the same size. Commenting on this recent trend towards increasing inequality Fed Chairman Alan Greenspan stated that it could be a major threat to our society.⁷ Federal Reserve Bank of New York President William McDonough similarly argued that growing differences in income between high- and low-skilled workers are endangering our ability to "go forward together as a unified society."⁸

Given the economic difficulties facing lower-income families and the consequent threats to our society, engineering a disinflationary recession now would be inappropriate. Such a slowdown would burden low-income families, minorities, and interest-sensitive industries while providing a bonanza to fixed-income investors. Bonds are held primarily by wealthy households, and a further redistribution to these investors from poor families could risk tearing the fabric of our society.

While disinflationary monetary policy would be deleterious at present, the risks of more expansionary monetary policy seem smaller. As Alan Greenspan (1997) testified, although unemployment

has fallen to about 5.25 percent, inflation remains quiescent. Greenspan attributes the failure of unit labor costs and thus prices to increase as the economy expands to heightened job insecurity. Workers are willing to accept lower wage increases in return for greater job security. He suggests that their willingness to forgo demands for wage increases could be due to fears of job skill obsolescence. He cites other factors such as international competition, the decline of unions, the deceleration of health care costs, and deregulation as also moderating pressures for wage and price increases. Thus the danger that expansionary monetary policy will trigger inflation seems less now than in the past.

This being so, now seems like an appropriate time to let employment grow rather than limiting job expansion. In the past the Fed sometimes applied the monetary brakes when employment grew more than expected. As discussed above, Coppock and Thorbecke (1997) found that prices of assets harmed by contractionary monetary policy fell after news of strong employment growth. This indicates that Wall Street expected the Fed to tighten when employment expanded quickly. Prominent Fed watcher David Jones (1994) said that employment was Greenspan's favorite series to watch, and he was more inclined to tighten monetary policy when it grew quickly. The problem with restricting employment to fight inflation is that it forces low-income workers and minorities to pay the lion's share of the costs of controlling inflation. With these groups suffering and inflation risks low, now is an

appropriate time to let the economy grow rather than limiting the amount employment can increase and unemployment can fall. As Council of Economic Advisors Chair Joseph Stiglitz stated, allowing the jobless rate to remain low will particularly help workers such as inner-city blacks and people on welfare who have difficulty finding jobs.⁹

Some people might object that if the Fed was perceived as being less willing to tighten when employment increased bond market participants would demand a larger inflation risk premium and push up long-term rates. While this might be true there are several reasons why this argument is not compelling. First, by not raising short-term interest rates when there are signs of economic strength, the Fed could prevent a lot of the increases in longer-term rates that have occurred recently (see Thorbecke, 1996 and Coppock and Thorbecke, 1997). Second, the U.S. Treasury has recently issued inflation-indexed bonds, giving those concerned about inflation an instrument free of inflation risk. Third, if inflation did not materialize, investors would bid interest rates back down. Fourth, as Blinder (1996) discusses, the Fed should not focus narrowly on the interests of the bond market but broadly on the interests of the country. If it was determined that allowing unemployment to fall was a sensible policy, the Fed should follow it even if the policy displeased bond investors who would prefer zero inflation risk.

Conclusion

Inflation over the last 5 years has remained below 3 percent. While many applaud these outcomes, economists such as Feldstein (1996) advocate a monetary policy-induced recession to lower inflation further. In principle the burden of a monetary contraction should fall disproportionately on interest-sensitive sectors, small firms, low-income workers, and minorities. The benefits of a disinflation should accrue primarily to creditors such as bond market investors. Evidence from impulse-response functions, a social accounting matrix, and the 1979-82 disinflation all indicate that this is so. Employment in industries such as construction and durable goods falls much more than employment in other sectors. Those who lose their jobs in these sectors tend to be those in the secondary labor market. Unemployment among minorities increases by twice as much as unemployment among whites. Bond prices, on the other hand, soar as inflation declines. A monetary contraction would thus redistribute income from poorer families to wealthier ones.

The fact that lower-income families are suffering in today's global economy combined with the evidence discussed by Greenspan that inflation risks are low indicates that rather than contracting the economy, the Fed should let it expand. Allowing employment to grow would disproportionately benefit low-income families, inner-city blacks, and those on welfare. Fine-tuning the economy by preventing unemployment from falling, on the other hand, would hurt

these individuals who are most at risk. Given that conservative central bankers such as Federal Reserve Bank of New York President McDonough are warning that growing income disparities are endangering our ability to go forward together as a unified society, implementing policies to benefit low-skilled workers is of particular moment. "Testing the waters" by letting unemployment fall would benefit these workers, promoting both distributive justice and social cohesion. While this strategy would involve some risk of price increases, the Fed would have ample time to contain any incipient inflation before it became embedded in wages and prices.

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)
Retail Trade	-0.00261**	(0.00076)
Wholesale Trade	-0.00241**	(0.00080)
Finance, Insurance, Real Estate	-0.00182**	(0.00070)
Services	-0.00151**	(0.00057)
Nondurable Goods	-0.00110*	(0.00072)
Government	-0.00090*	(0.00054)
Transportation	-0.00086	(0.00085)
Mining	0.000701	(0.00307)

*Significant at the 10% level.

**Significant at the 5% level.

Table 2: The Effect of a One Dollar Decline in Sectoral Output on the Income of Various Socioeconomic Groups.

Socioeconomic Group	Sector	
	Construction	Durables
Union	-0.164	-0.130
Non-union Covered	-0.017	-0.015
Non-union non-covered	-0.612	-0.539
Rural	-0.030	-0.025
Urban	-0.807	-0.692

Source: Roland-Holst and Sancho (1992).

Table 3: Percentage Change in Employment by Industry from September 1979 to the end of 1982.

Sector	Percentage Change in Employment
Durable Goods	-18.3
Construction	-14.6
Transportation	-3.1
Government	-1.3
Wholesale Trade	-0.5
Retail Trade	1.8
Nondurable Goods	4.2
Mining	4.5
Finance, Insurance, Real Estate	6.9
Services	11.0

Source: Haver Analytics Data Tape

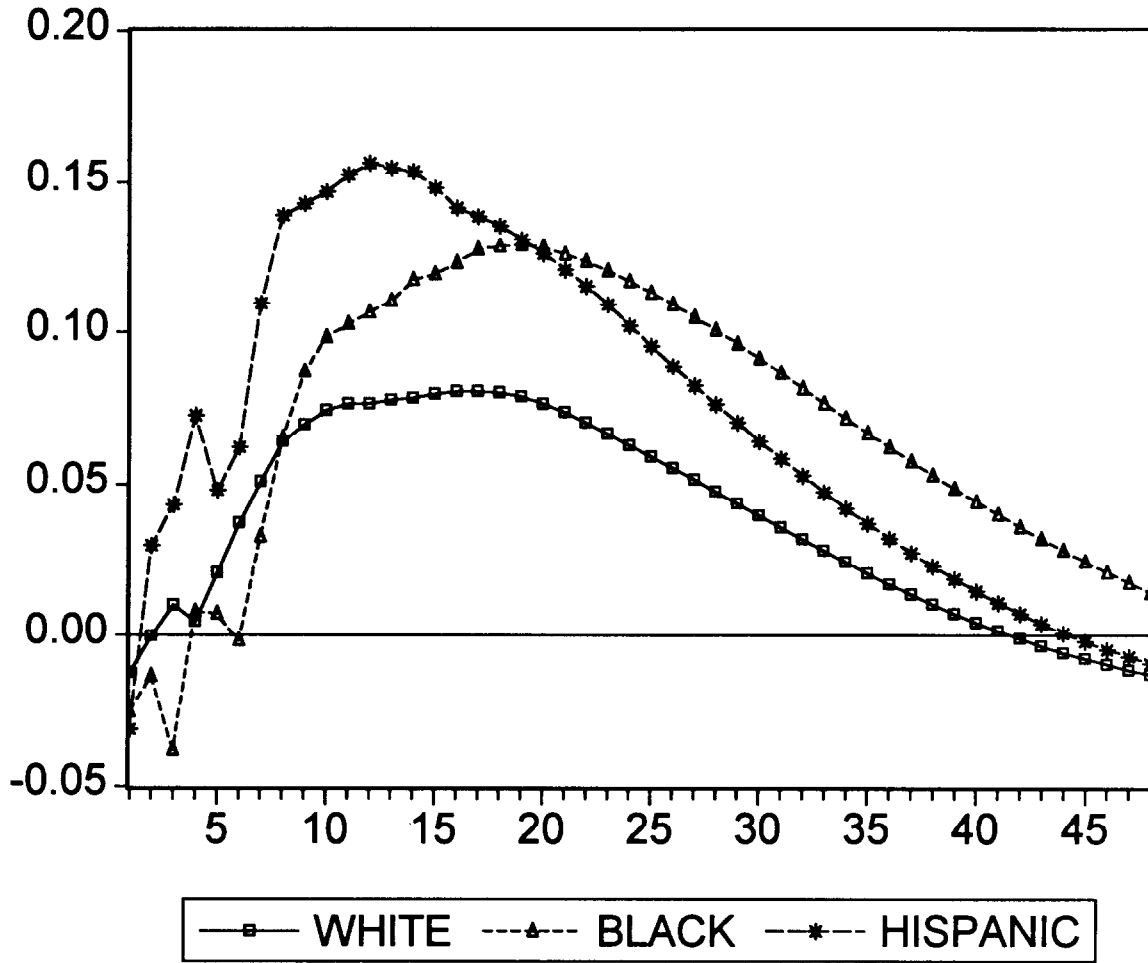


Figure 1. Change in the Unemployment Rate by Race Over the 48 Months Following a Monetary Contraction

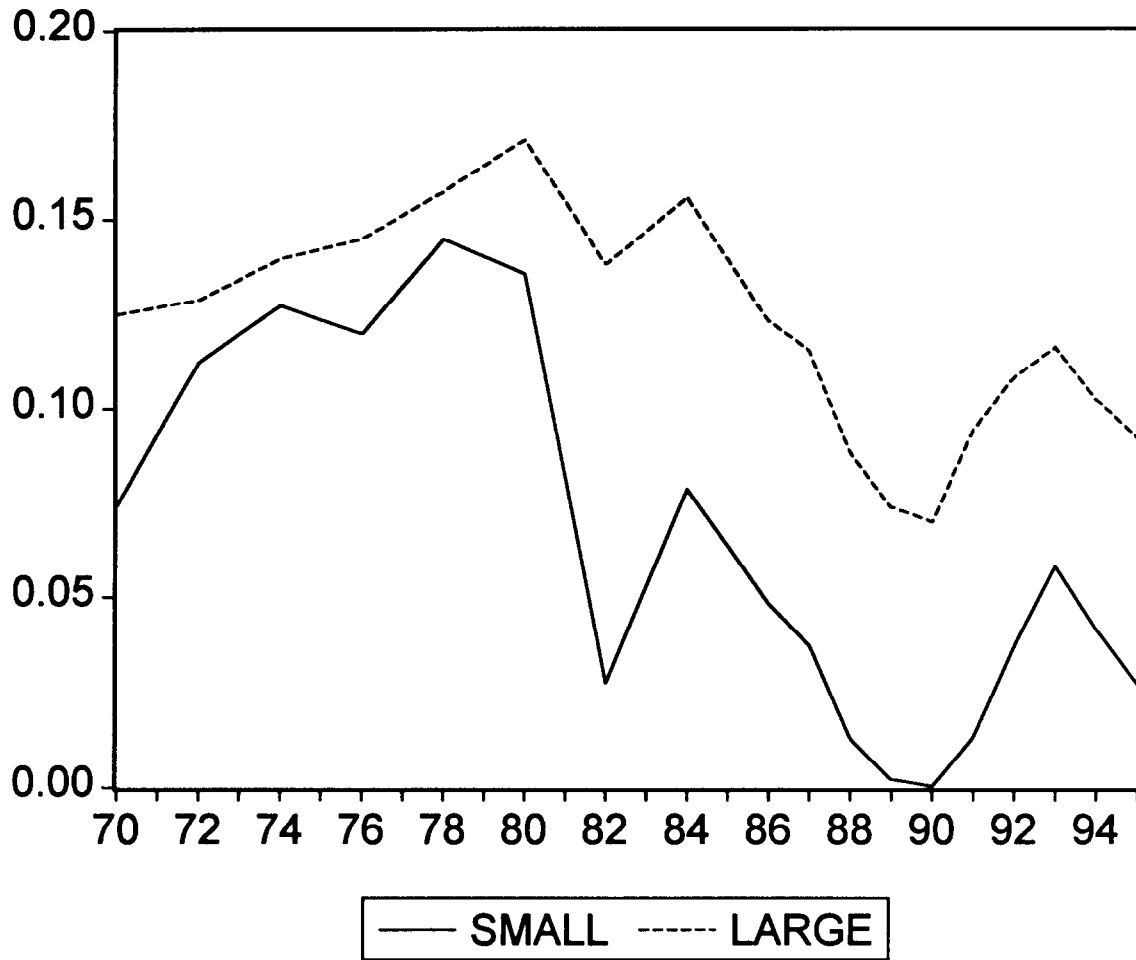


Figure 2. Earnings of Small and Large Firms Divided by Book Common Equity

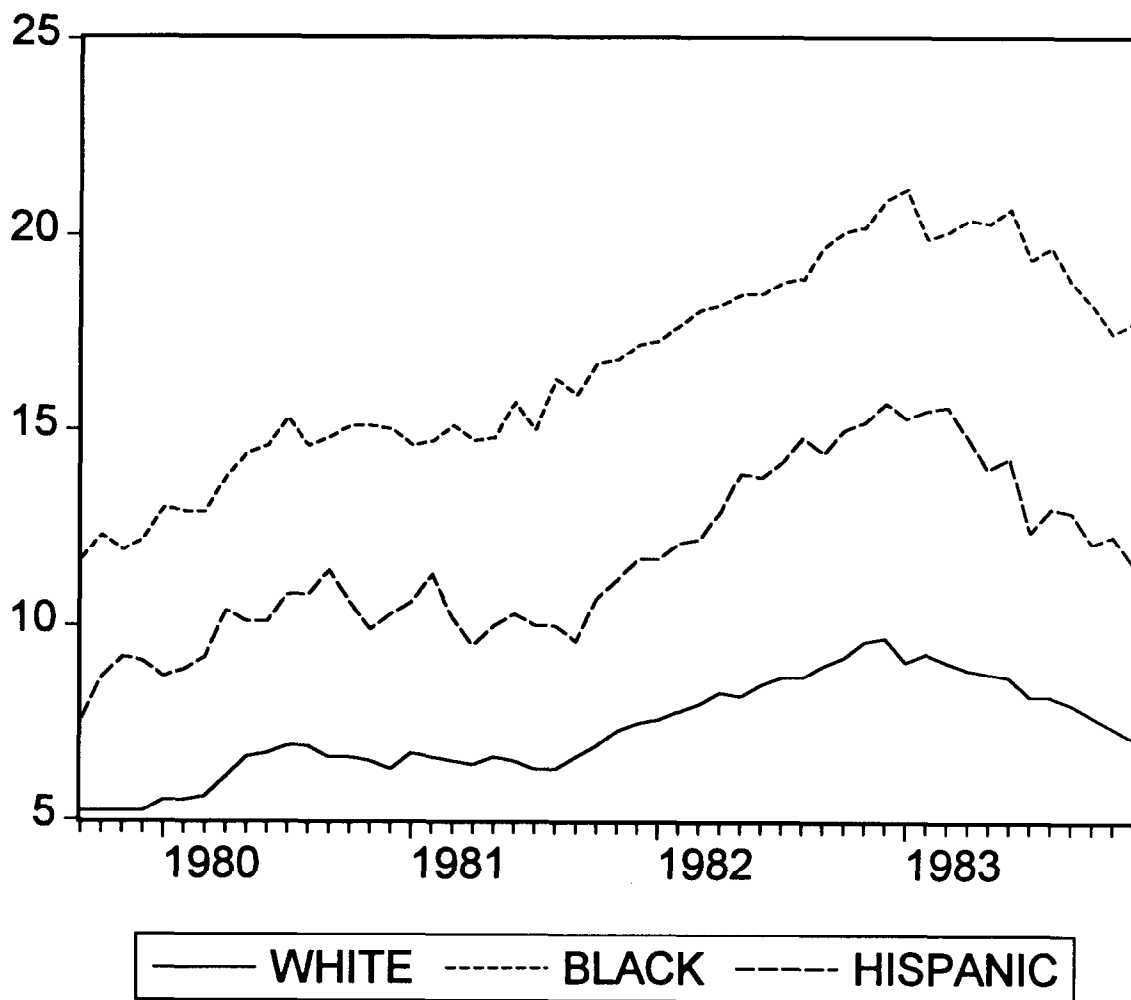


Figure 3. Unemployment by Race During the Volcker Deflation

Appendix. Data Sources and Sample Periods

Data on industrial production, the inflation rate, commodity prices, the federal funds rate, total reserves, nonborrowed reserves, employment by industry, and unemployment by race were obtained from the Haver Analytics data tape. Since data on commodity prices were available from Haver beginning in January 1967, the sample period used to obtain the estimates in Table 1 was January 1967 - December 1995. Since data on unemployment disaggregated into white, black, and hispanic categories were available from Haver beginning in March 1973, the sample period used to obtain the estimates in Figure 1 was March 1973 - December 1995.

Acknowledgments

I would like to thank Walter Cadette, Wynne Godley, George McCarthy, Jay Levy, Dimitri Papadimitriou and Frances Spring for helpful comments.

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Notes

1. See Moore (1989) and Niggle (1989).
2. See Bradbury (1996).
3. Greenspan's statement was made in his Humphrey-Hawkins testimony before Congress in July 1995. McDonough's statement was quoted in The New Yorker, 16 October 1995, p. 113.
4. The results are presented for white workers, but the same pattern holds for non-white workers.
5. It is true that disinflationary monetary policy that raises current and expected short-term interest rates can depress bond returns. However, Thorbecke (1996) found that bond prices also decline if bond market investors perceive that the Fed is too timid about raising interest rates to fight inflation. Further, the evidence of Campbell and Amner (1993) and Mishkin (1990) that bond prices are primarily driven by news of inflation implies that the benefit to bond market participants of disinflationary monetary policy over time outweighs the short run costs of higher interest rates.
6. The data up to 1986 are taken from Fama and French (1995) and after that from the Compustat data tape. To facilitate interpretation the data for small firms up to 1986 are the average of the two small firm series that Fama and French used and similarly the data for large firms are the average of the two large firm series they employed. Since earnings of small firm in both series fell precipitously in 1981-82 and earnings of large firms in both series did not taking averages in this manner should present an accurate picture of what happened to earnings during the Volcker deflation.
7. Testimony before Congress, July 1995
8. Quoted in The New Yorker, 16 October 1995, p. 113.
9. *Washington Post*, 11 January 1997, p. D2.

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