

The Case of the Reluctant Recovery

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Two things are widely believed about [the recession that began in 1990]: first, that it is more severe than others, and second, that it has weighed especially heavily on the middle class. The first proposition is false; the second cannot be known now What stands out about the 1990 recession is that although by almost every objective measure it is rather mild, there is, according to many reports, unusual anxiety and fear about it.

—Herbert Stein (1992)

INTRODUCTION

Characteristics of recessions, and the recoveries that follow them, vary. The recession that began in 1990 was, as Herbert Stein (1992) observes, relatively mild. On the other hand, the recession's effects have been unusually persistent; the first year of recovery from the recession was unusually weak—some say nonexistent. The recession's breadth, also, was unusually large. Industries such as those within the so-called service-producing industry group that were largely unaffected by past recessions suffered in this recession along with the so-called cyclical industries like manufacturing and construction.

The broad scope of the 1990-91 recession and the economy's delayed recovery from it are at the heart of the "unusual fear and anxiety" noted by Stein. Some observers have called the 1990-91 recession a white-collar, or middle management, recession. Usually coupled with these observations is the quite pessimistic view that employment may not recover from the 1990 downturn for years, because the malaise stems from basic institutional changes in U.S. businesses. These organizational and managerial changes are designed to promote efficiency through restructuring and downsizing.

There is much anecdotal evidence that middle managers and skilled staff workers¹ were affected

¹ The distinction between white-collar and blue-collar workers, while convenient, is an anachronism in the U.S. economy of the 1990s. In the informal service-oriented economy of the 1990s, collar colors mean very little. Highly skilled computer software developers and other researchers are not noted for their conformity to dress code. Also, production workers in many of the services do wear white collars, but their skills and incomes are lower than those of many workers in many traditional blue-collar jobs. The U.S. Department of Labor recognizes these changes in the habits of the work force and has discontinued publishing employment data on white- and blue-collar workers. This paper will, therefore, distinguish between (1) supervisory and nonproduction workers and (2) nonsupervisory and production workers rather than between white- and blue-collar workers.

unusually severely by the 1990 downturn. Sylvia Noser, for example, quoted Charles Albrecht, Executive Vice President at Drake Beam Morin, the nation's largest outplacement firm, that "unlike the early 80's, we're seeing accountants, engineers, lawyers, financial types, people from all across the spectrum" (Noser, 1992, p. D4).

Upon examining the data it becomes clear that few groups have been immune from the effects of the 1990-91 economic downturn. However, layoffs of normally recession-proof professionals such as accountants, engineers, lawyers, financial types, and middle managers provide support for the hypothesis that firms have been making basic structural changes in the 1990-92 period.

Sylvia Noser (1992) also contends that the 1990-92 recession and recovery in the services industry was coincident with a basic restructuring of service-producing firms necessitated by overexpansion and runaway costs prevalent in the 1980s, installations of labor-saving technologies, and increases in competition. On the other hand, Stephen McNees (1992), in an article placing the 1990-91 recession in historical perspective, concludes that the 1990-91 recession was not particularly unusual. McNees observes that "the most unusual feature of the 1990-91 recession may well be that it was both preceded and followed by periods of sub-par growth, so that the 'growth recession' that began in 1989 has persisted for nearly three years" (p. 21).

If the current experience is a cyclical happening rather than an economy-wide change in business practices, the widespread belief that middle managers and highly skilled staff workers became superfluous in the late 1980s would be erroneous. After all, if firms needed the services of such workers before the downturn, they should need them equally as much when the economy recovers.

This paper first examines the empirical characteristics of the recovery in comparison to the past recessions using payroll employment (establishment) data. The study then examines the argument that the slowness of the current recovery stems from a change in the structure of the U.S. economy.

CHARACTERISTICS OF THIS AND PAST EMPLOYMENT CYCLES

A series of charts showing payroll employment² as a percentage of recession troughs is used to compare the decline and recovery of employment in the

² The payroll employment data are taken from the Department of Labor's establishment survey. These data are thought by many business economists to be more accurate than the employment data derived from the household survey. In addition, the use of the establishment data allows comparisons of the effects of the recessions on employment by industry.

current recession to declines and recoveries in the seven other postwar cycles. All of the charts begin by showing data 12 months prior to the trough and end with data 12 months after the trough. The trough of the 1990-92 recession is assumed to be April 1991.³

One chart depicts overall payroll employment. Another shows the employment of supervisory workers, and a third, that of production workers. Still others show employment by industry. Table 1 provides information on various components of employment 12 months before and 12 months after the April 1991 trough compared to an average of past cycles.

³ Dating the trough of the current recession in April 1991 was quite common throughout the second half of 1991, but the behavior of the economy since April 1991 has been such that some observers have been reevaluating their analyses. It still appears, however, that the employment decline leveled off in April 1991, so that month remains the most likely candidate.

Table 1

Industry	Cycle Trough	12 Months Before (percent of trough)	12 Months After (percent of trough)
All Industries	1991:4	101.7	100.2
	Average*	102.2	103.1
Private Supervisors	1991:4	100.7	99.0
	Average†	99.7	102.2
Private Production Workers	1991:4	102.4	100.3
	Average†	103.0	103.3
Construction	1991:4	111.0	97.9
	Average*	107.1	103.1
Manufacturing	1991:4	104.5	99.1
	Average*	109.0	103.6
Durables Manufacturing	1991:4	105.9	98.0
	Average*	112.1	104.7
Transportation & Public Utilities	1991:4	100.5	99.7
	Average*	103.4	100.2
Service-Producing	1991:4	100.5	100.6
	Average*	99.2	102.8
Finance, Insurance, & Real Estate	1991:4	100.6	99.9
	Average*	97.7	103.1
Retail Trade	1991:4	102.2	99.5
	Average*	100.4	103.3
Business & Health Services	1991:4	99.8	102.0
	Average*	97.6	104.2
Federal Government	1991:4	106.8	101.1
	Average*	100.6	100.5
State & Local Government	1991:4	98.8	101.0
	Average*	96.7	102.2

* The average used for comparison is the average of the seven post-1953 recessions.

† Average employment indexes in the four post-1969 recessions.

Total Payroll Employment

Chart 1 provides an overall view of the effects of recessions on employment. The chart shows, as McNees (1992) observes, that the downturn after the July 1990 peak was not unusual. It also shows, as Stein (1992) notes, that the contraction from July 1990 to April 1991 was relatively mild.

The chart also shows, however, that the 1990-91 employment recovery has been very different from past employment recoveries. In fact, payroll employment (at 100.2 percent of trough in April 1992) can hardly be said to have recovered at all. Employment recovered much more rapidly in the other postwar recessions, when, after 12 months, it ranged from a low of 102 percent of trough to a high of 104.7 percent. Employment after 12 months averaged 103.1 percent of trough for the other seven postwar cycles.

In percentages, the differences in the rates of recovery may seem relatively small. Translated into jobs, however, they are not small. For example, by

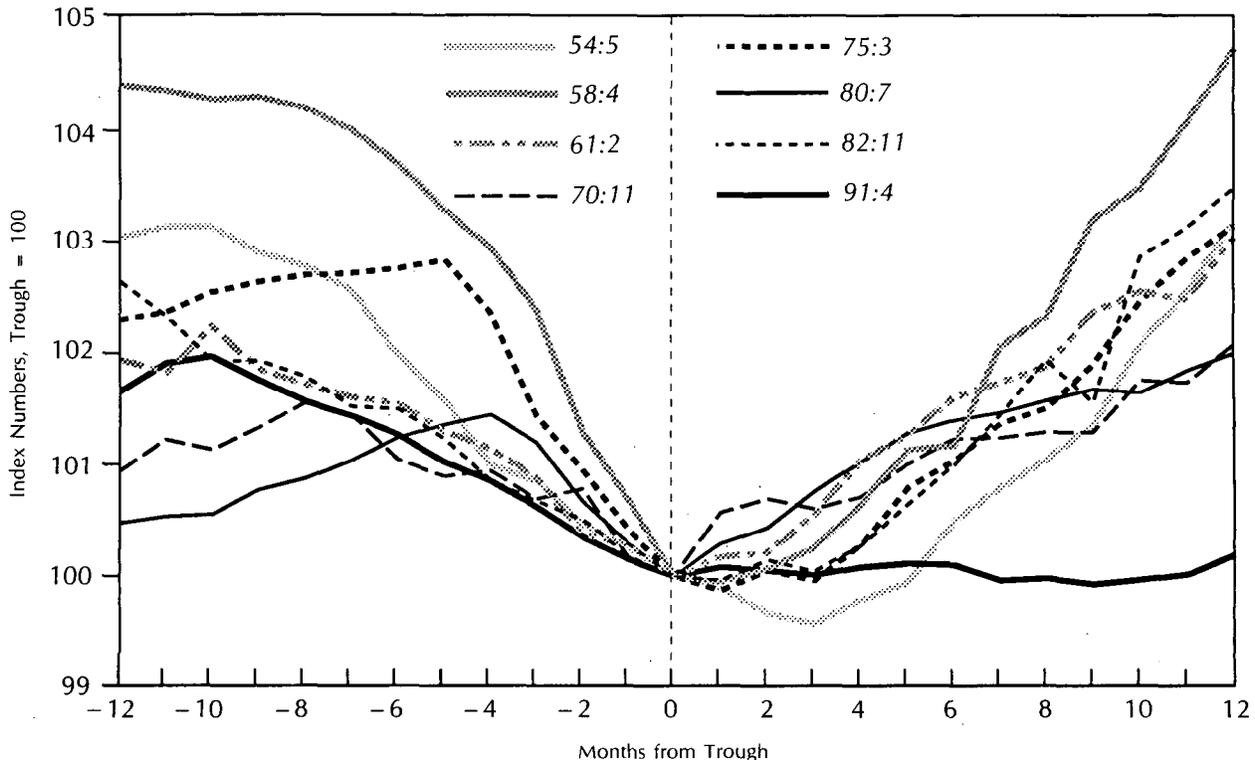
April 1992, there were only 295,000 more jobs than there were in April 1991. If the current recovery had been as strong as the weakest prior recovery (1970-71), however, employment would have increased by 1.9 million jobs since April 1991. Moreover, if the 1990-91 employment recovery had been as strong as the average of past cycles, there would have been 2.9 million more jobs by April 1992. Given these comparisons, it is little wonder that there has been widespread fear that the U.S. economy has lost its resilience.

On the other hand, as noted earlier, the employment contraction in this recession was relatively mild. As Chart 1 also shows, payroll employment fell by only about 1.5 percent to reach its April 1991 trough. This was about the same percentage decline as the declines registered in the relatively mild recessions of 1970 and 1980. Compare the 1.5 percent decline to the declines in the four more severe recessions: employment fell 4.4 percent in 1957-58, 3.1 percent in 1953-54, 2.8 percent in 1974-75, and 2.7 percent in 1981-82.

Chart 1

PAYROLL EMPLOYMENT

(1954, 1958, 1961, 1970, 1975, 1980, 1982, and 1991 Troughs)



Supervisory Workers and Production Workers

As noted at the outset, a number of observers have attributed the delayed recovery in the current recession to structural changes in the economy, namely, permanent cuts by firms in nonproduction and supervisory employees. Chart 2 shows that in the current recession, private supervisory/nonproduction employment fell slightly through most of the 24-month period, reaching 99 percent of trough by April 1992. On the other hand, nonproduction employment in the four post-1969 recessions, the period for which data are available, averaged about 99.7 percent twelve months prior to the trough and 102.2 percent twelve months after the trough. Thus, the recovery for nonproduction and supervisory workers has been weaker than usual.

Chart 3 shows employment of private production workers in post-1969 recessions. These workers apparently fared no better than supervisory workers in the current recovery. Jobs for production workers fell from 102.4 percent of trough in April 1990 to 100.3 percent of trough two years later, while production jobs in the other four post-1969 recessions averaged 103 percent twelve months before trough and 103.3 percent two years later.

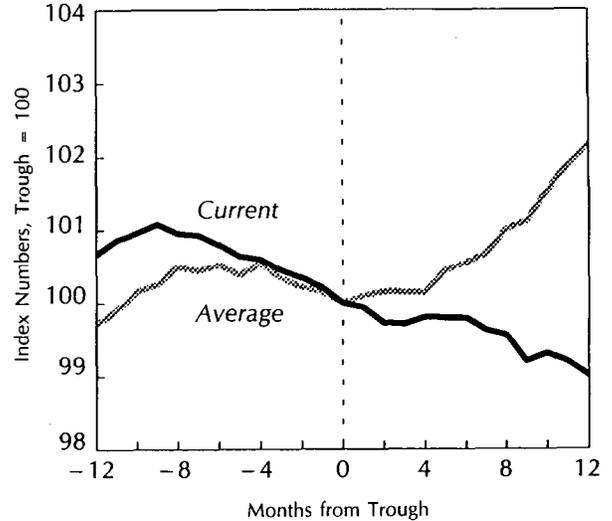
Employment by Industry

Chart 4 shows the plight of construction employment. The series in the current recession began about 111 percent of trough and ended about 97.9 percent of trough. In comparison, construction employment in the other post-1969 recessions averaged 107.1 percent of trough twelve months prior to the trough and 103.1 percent twelve months after.

Chart 5 shows that manufacturing employment has also not recovered well relative to past recessions. Twelve months before April 1991, manufacturing employment was 104.5 percent of trough. Twelve months after, it was still only 99.1 percent of trough. The average for the four post-1969 recessions was 109 percent of trough 12 months before and 103.6 percent of trough 12 months after. Employment in durable goods manufacturing, normally a cyclical industry, also has shown no recovery whatsoever, and in fact is continuing to decline.

Chart 6 shows that while the employment recovery in the transportation and public utilities industries has not been substantially different from past recoveries, the contractionary period prior to the trough was unusually mild. Employment in that period fell only

Chart 2
SUPERVISORY EMPLOYMENT
Average of Cycles
Around 1970, 1975, 1980, and 1982
Troughs versus Current Cycle



about 0.8 percent, whereas the average employment decline in the past recessions over the year before the trough was 3.6 percent.

Chart 7 shows that the recovery of employment in the service-producing industries was weaker than usual in the current recession. Service-producing employment was 100.6 percent of trough 12 months

Chart 3
NONSUPERVISORY EMPLOYMENT
Average of Cycles
Around 1970, 1975, 1980, and 1982
Troughs versus Current Cycle

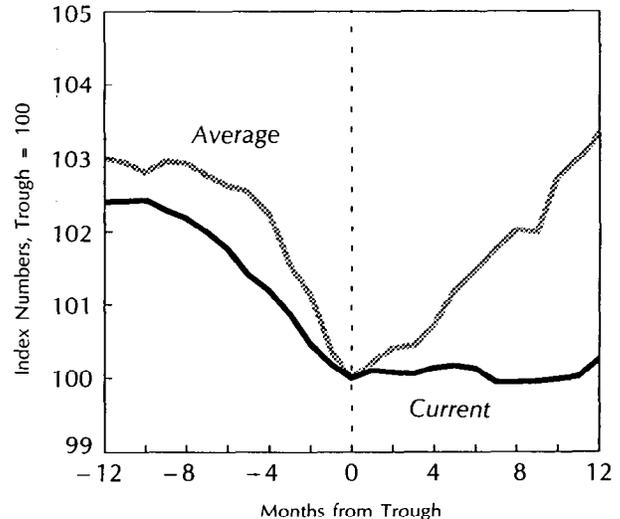
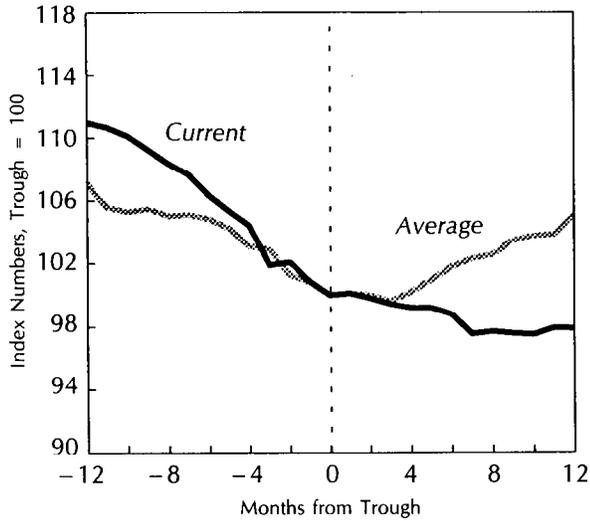


Chart 4

CONSTRUCTION EMPLOYMENT
Average of Seven (Pre-1990) Cycles
Around Troughs versus Current Cycle

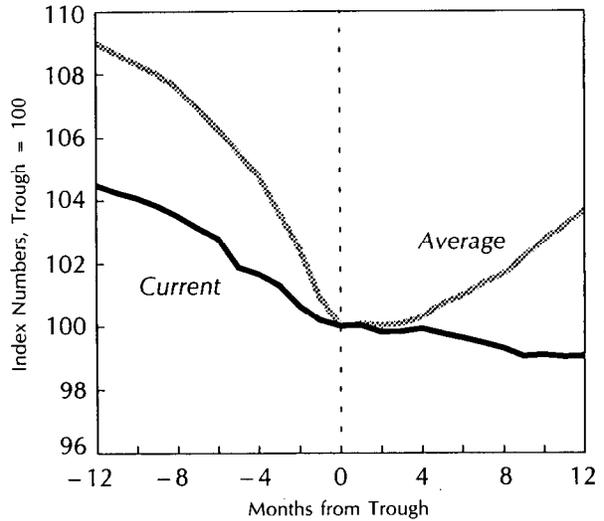


after the most recent trough. The average for the four post-1969 recoveries, however, was 102.8 percent of trough after 12 months.

Chart 8 depicts employment in the finance, insurance, and real estate industries. Twelve months after the trough of the current recession, employment remained at 99.9 percent of trough. In the other

Chart 5

MANUFACTURING EMPLOYMENT
Average of Seven (Pre-1990) Cycles
Around Troughs versus Current Cycle



post-1969 recessions finance, insurance, and real estate employment averaged 3.1 percent above trough after 12 months.

As in finance, insurance, and real estate, employment in retail trade remained slightly (0.5 percent) below trough after 12 months. By contrast, retail employment after 12 months averaged 103.3

Chart 6

TRANSPORTATION AND UTILITIES EMPLOYMENT
Average of Seven (Pre-1990) Cycles
Around Troughs versus Current Cycle

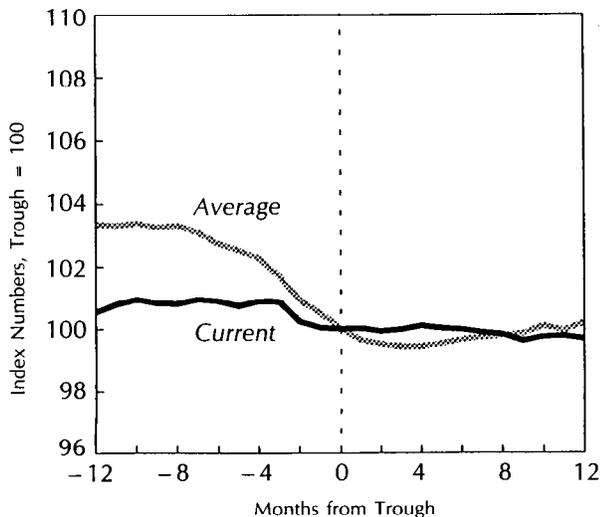


Chart 7

SERVICE-PRODUCING EMPLOYMENT
Average of Seven (Pre-1990) Cycles
Around Troughs versus Current Cycle

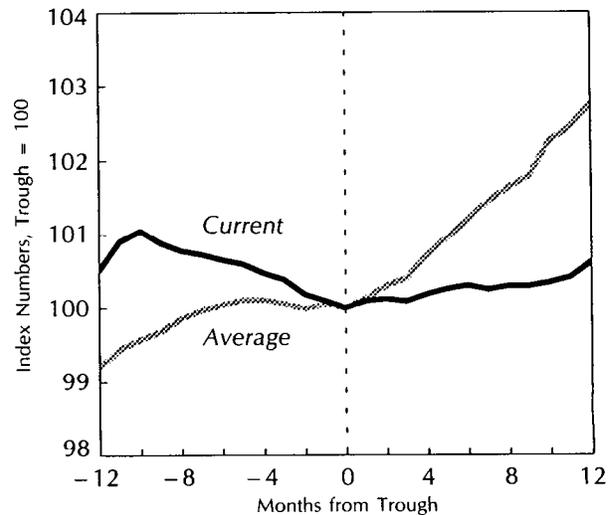
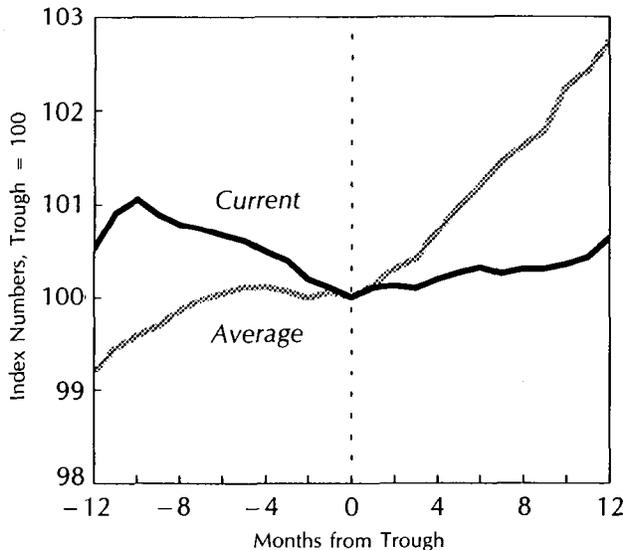


Chart 8

F.I.R.E. EMPLOYMENT

Average of Seven (Pre-1990) Cycles
Around Troughs versus Current Cycle



percent of trough in the other post-1969 recessions. The employment recovery in the business and health services industry and in government, however, seemed to be little different from employment in past recoveries.

Summary of Cyclical Comparisons

The charts show that, except in the construction industry, the employment contraction that began in 1990 was mild relative to contractions in past recessions. In addition, the charts show no evidence that the recent recession hit supervisory workers any harder than it hit production workers. Service workers were hard hit, but so were workers in the construction and manufacturing sectors.

Two features of the recent recession seem to stand out. First, virtually all industries were affected, even industries that had been thought to be immune to recession. The finance, insurance and real estate sector in particular, which was not affected by past recessions, was hit hard in the 1990-92 recession. Only the business and health services sector seemed to retain immunity to the effects of recession.

Second, there has been an absence of a recovery in employment. Although most observers still place the trough of the recession in April 1991, there has been virtually no increase in employment since that time. The failure of the employment to rebound as it did from other recessions is indeed puzzling. More

than any other factor, this sluggishness indicates that something unusual, perhaps something noncyclical such as a restructuring of the various industries (as Sylvia Noser suspects), is delaying the recovery from what would otherwise be a rather mild recession. But whatever is preventing the rebound, it is playing few favorites, for it seems to be affecting almost all industries and classes of workers.

EVIDENCE THAT THE SLOW RECOVERY STEMS FROM STRUCTURAL CHANGE

Trends in Aggregate Employment over Past Three- and Four-Year Periods

As McNees (1992) noted, the U.S. economy has experienced slow economic growth since 1989. Payroll employment increased at an annualized average monthly rate of only 0.15 percent during the three-year period from April 1989 to April 1992. This rate of growth, while slow, is not unique to the 1989-92 time period. Between 1950 and 1992 there were 16 (occasionally overlapping) 36-month periods with slower average growth rates.

Using overall employment data to evaluate longer-term employment trends, however, fails to take into account demographic changes in the U.S. labor force. Therefore, three- and four-year growth rates of the ratio of payroll employment to the 16-64 year-old population were examined. The calculated employment/population ratio averaged an annualized percentage increase of 0.1 percent per month in the four-year period ending in April 1992 and -0.5 percent per month in the three-year period ending in the same month. There were 157 (often overlapping) four-year periods and 85 (often overlapping) three-year periods between 1952 and 1991 that had slower average growth than the current ones. The conclusion of this last finding, contrary to that of McNees (1992), is that the slow growth characteristic of current aggregate employment has not been especially unusual relative to past three- and four-year periods.

There remains, however, the argument that the trend toward downsizing and restructuring of the U.S. economy has resulted in a number of jobs being permanently discontinued. This argument implies that even if the aggregate employment situation recovers, there will have been a substitution of low-paying unskilled or semi-skilled service jobs for more desirable and higher-paying middle-management and skilled staff positions.

Evidence of Downsizing and Restructuring

Dan Lacy, who edits the newsletter *Workplace Trends*, has recorded corporate staff cuts since 1988. He calculates that corporations cut 111,000 permanent staff positions in 1989, 316,000 in 1990, and 556,000 in 1991. He also estimates that since the start of 1989, 155,000 positions have been eliminated in the computer industry, 131,000 in autos and related industries, and 121,000 in defense/aerospace. In 1991, the auto industry was the leading downsizer, removing 88,600 positions, followed by computers (85,700), financial services (64,200), defense/aerospace (63,600), and retailing (53,200).

The almost one million permanent staff cuts counted since 1988, of course, do not necessarily mean that there are a million fewer permanent positions than there were in 1988. In a dynamic economy, some industries and firms reduce staff while others expand, and Lacy's numbers calculate only the positions lost. There is, however, other evidence that permanent jobs are, on net, being eliminated.

The Bureau of Labor Statistics (BLS) provides a breakdown of unemployment in the economy by those who lost their jobs temporarily (on layoff) or permanently (other job losers). Studies by both (1) David Altig and Michael Bryan (1992) and (2) James Medoff (1992) examine these categories in explaining unemployment in the current recession. Altig and Bryan conclude that:

Increases in permanent separations have occurred in roughly the same magnitude in every recession of the past 25 years, suggesting that structural change has been an important element of each of the past five downturns. Rather, it is the absence of a rise in cyclical layoffs during the latest recession that is unusual from a historical perspective. That is, our current economic landscape is almost entirely the product of permanent, structural change. (p. 3)

Charts 9 and 10 illustrate the differences between layoffs and permanent job losses in this and past recessions that were observed by Altig and Bryan (1992).⁴ Chart 9 shows layoffs as a percent of age 16-64 population for the five post-1964 recession/recovery periods. As the chart shows, there were quite definite cyclical peaks for layoffs in the 1974-76, 1979-81, and 1980-83 periods, but no distinct

⁴ The data on job losers are not available before 1967, a factor which precludes any comparison with the 1957-59 or 1960-61 periods. For these charts, the data are shown as percentages of the total working-age population.

cyclical peak in 1990-92. Chart 10 shows permanent job losses (in BLS terminology, other job losses) as percentages of the 16-64 population. It illustrates quite well Altig and Bryan's point that permanent job losses tend to rise in recession/recovery periods. It also shows that by April 1992, twelve months after the April 1991 trough, permanent job losses were relatively large compared to the losses registered in November 1971, March 1976, and July 1981, but lower than the job losses as of November 1983.

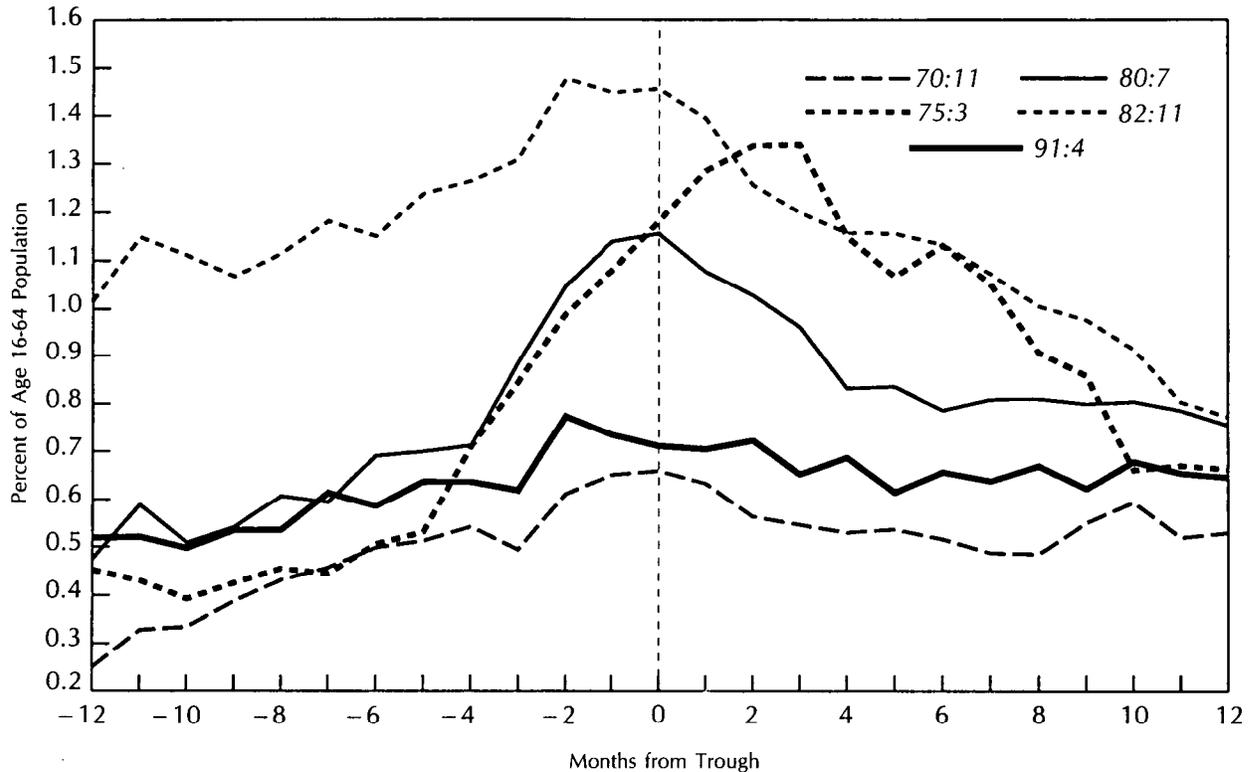
Medoff (1992) uses the Conference Board's Index of Help Wanted Advertising in Newspapers as a measure of the availability of jobs for unemployed workers. He compares the levels of the help wanted index to the level of the unemployment rate in this and past recessions. He concludes that jobs have been less readily available in the current recovery than they were in past periods when the unemployment rate was about the same as it has been recently.

One final bit of information relates to the average duration of unemployment, shown in Chart 11. If the recent sluggishness in the economy is mainly a structural phenomenon, the average duration of unemployment 12 months after the trough would be expected to be greater than it was in past, more cyclical, recessions. The data show the average duration 12 months after trough to have been 12 weeks (1970 trough), 16.5 weeks (1975 trough), 13.8 weeks (1980 trough), 19.7 weeks (1982 trough), and 17 weeks (1991 trough). This information indicates that the structural component of the current recession and recovery may be relatively weaker than in the 1981-83 period, but stronger than in the other three past recessions.⁵

What can be gleaned from these data? First, as Altig and Bryan (1992) observe, structural (permanent) job losses are characteristic of other recessions as well, and the structural component of the current recession is high but not unique. On the other hand, the present recession has shown a much less than normal cyclical rise in the layoff rate. Altig and Bryan conclude about the current recession/recovery that "what distinguishes the current economy is the lack of a typically 'cyclical' element" (p. 1). Their conclusion is based, however, solely on the unusual behavior of the layoff data in the current recession. Before accepting their conclusion, one should determine whether there are other explanations for the unusual behavior of the layoff rate.

⁵ Data on the average duration of unemployment is not available before 1964, so comparisons with the other postwar recessions cannot be made.

Chart 9
LAYOFFS IN PAST CYCLES



It is possible that something in the economic environment has changed since the last recession and recovery period (1981-83) that would induce firms to *terminate* rather than *furlough* workers even if the firms are likely to need such workers in the future. One possibility relates to health care benefits, the costs of which have risen sharply since the early 1980s.

A Speculation: Health Insurance Coverage of Laid-Off and Terminated Workers

The Bureau of Labor Statistics' Office of Compensation and Working Conditions in 1986 conducted a survey of medium and large firms that provide health care benefits to full-time employees on layoff. The survey found that 52 percent of the firms continued health benefits coverage during layoff, 22 percent did not continue coverage, and 25 percent had no policy established (usually because layoffs were unusual). Of those who had policies and who continued coverage for laid-off employees, slightly over half paid all of the cost of continuing the coverage, slightly over one-fourth required the

employee to pay all of the cost, and slightly over one-tenth split the cost between employer and employee. The duration of the coverage varied considerably, but it was generally six months or less.

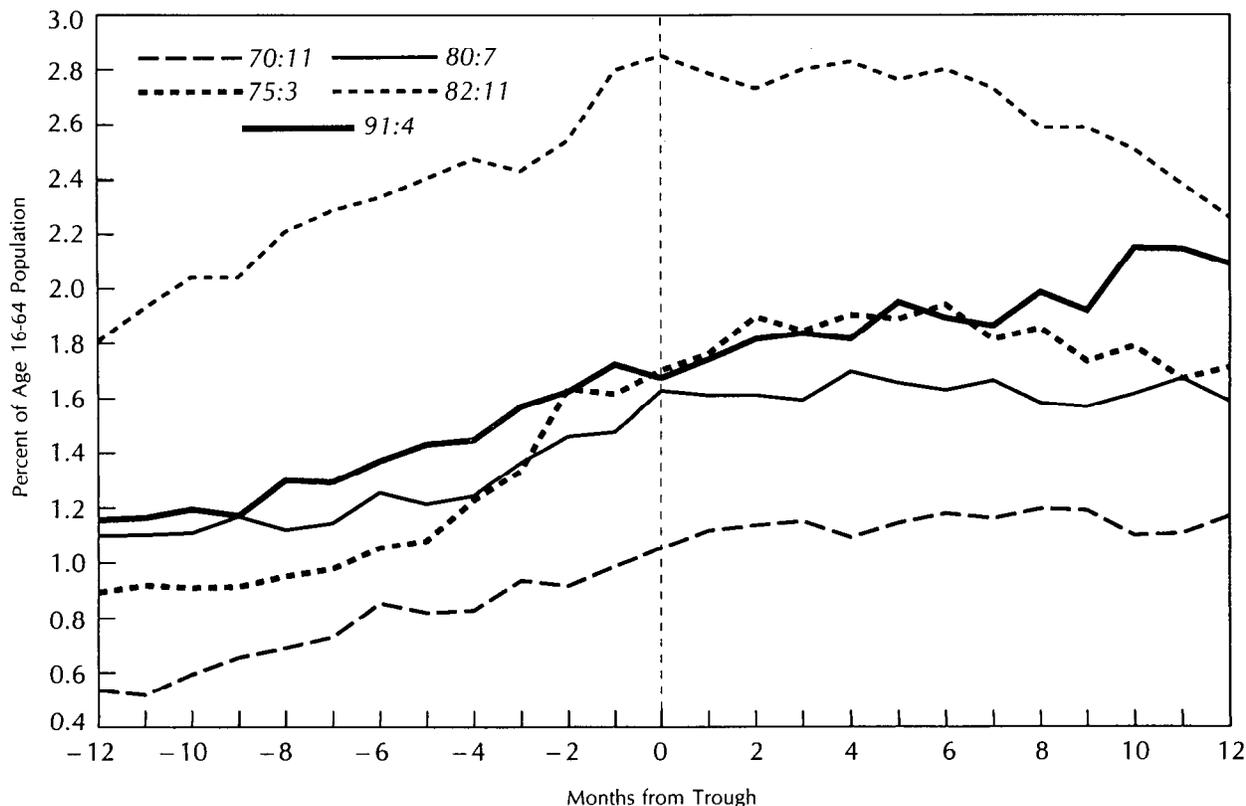
The Consolidated Omnibus Budget Reconciliation Act, known as COBRA, was signed into law on April 7, 1986. This law provides for health care continuation, and may affect the incentives for firms to lay off workers. COBRA requires employers (of over 20 persons) that sponsor group health care plans to offer qualified beneficiaries the right to elect to continue their health care coverage if they are terminated (for reasons other than gross misconduct) or if they lose coverage because their work hours were reduced.⁶ Coverage in the case of termination is for a period of 18 months. The law allows the firm to require the beneficiary to pay up to 102 percent of the insurance premium (employee and

⁶ And for other reasons as well. These reasons include death of covered employee, covered employee's divorce or legal separation, covered employee's entitlement to Medicare, and bankruptcy of a retired covered employee's employer.

Chart 10

PERMANENT JOB LOSSES IN PAST CYCLES

12 Months Before and After Trough



employer share) required for regular non-terminated employees.⁷

COBRA does not distinguish between layoffs and permanent terminations, but it does extend the period of coverage for all covered employees beyond the usual duration found by the 1986 BLS survey. COBRA, therefore, could influence firms' decisions on layoffs versus terminations. Even if a firm paid an employee's total health insurance costs for 6 months, it would still be required under COBRA to offer the employee coverage for the remaining 12 months of the 18-month period following layoff. Thus, given the extraordinarily high current costs of health care, firms with policies to pay for laid-off employees' health care might now find those policies to be too expensive. As a result, firms would have

⁷ The 102 percent, according to some employers, does not cover the entire cost of the continuation of coverage. In one BLS survey of 103 employers and administrators, 45 of which provided adequate information for cost comparisons, continuation-of-coverage costs were 157 percent of active employee costs.

incentives to terminate employees who formerly might have been put on temporary layoff.

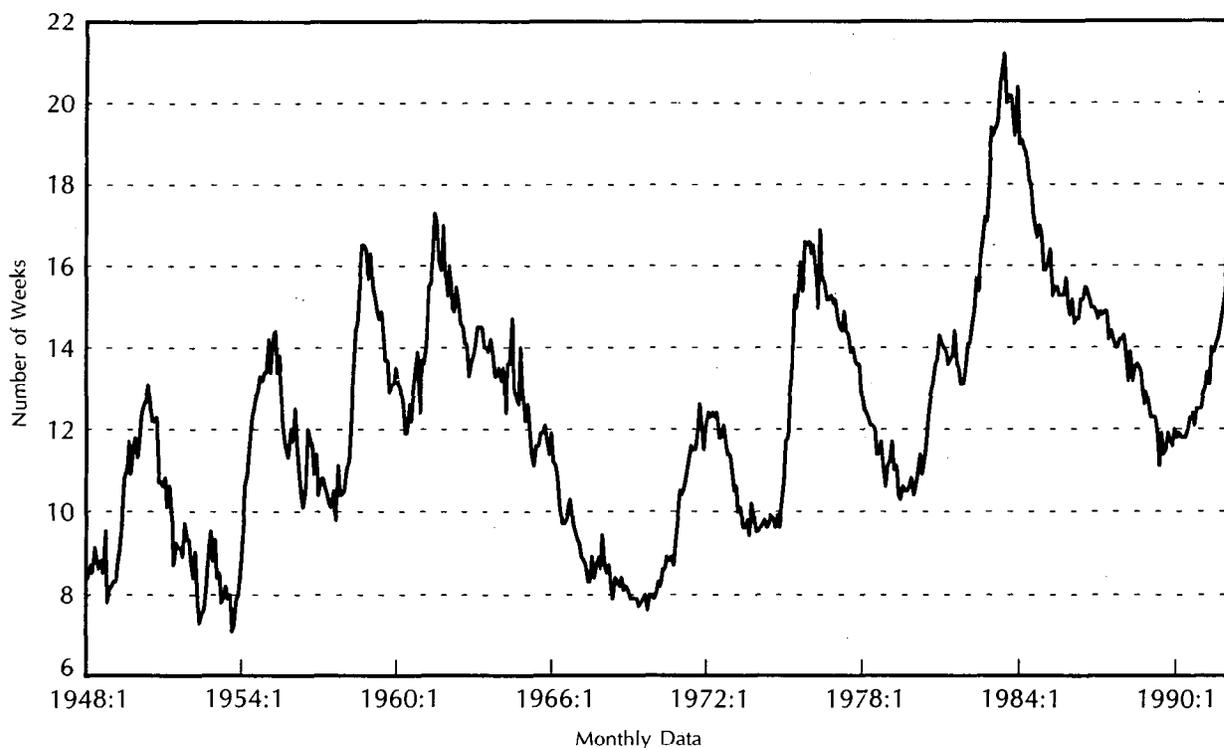
Admittedly, the full effects of COBRA and rising health insurance costs on the layoff data are not known. An examination of the effects would seem to be a fertile area for future research.

SUMMARY AND CONCLUSIONS

The 1990-91 recession was relatively mild by standards of past recessions, but the recovery from the recession has been unusually weak. The economy has also had relatively slow trend employment growth since April 1989, but there have been a number of three-year periods in which employment growth has been slower. The recession also seems to have had an impact on an unusually large number of industries, including industries that formerly were considered to be "recession-proof." The recovery has been weak for supervisory and nonproduction employment, but it has been equally weak for production workers. Finally, highly skilled professional staff members

Chart 11

AVERAGE DURATION OF UNEMPLOYMENT



have been affected to a greater degree than in past recessions, according to anecdotal information. Thus, there is substantial evidence that the economy has been undergoing structural changes.

Cyclical series like total payroll, construction, and manufacturing employment and retail trade have had little or no recovery from their trough values. In fact, employment in the normally cyclical durable goods manufacturing has been declining since April 1990. Employment in normally noncyclical series has also behaved differently in the current recession and recovery period. Employment in the service-producing sector (especially the finance, insurance, and real estate portion) has been unusually weak since April 1990.

Additionally, according to Don Lacy (1992), corporations have made almost one million permanent staff cuts since 1988. BLS data on job losers show that permanent job losses 12 months after the April 1991 trough were relatively larger than they were 12 months after the 1971, 1976, and 1981 troughs, but *smaller* than they were after the 1983 trough. The

same relative pattern was true of average duration of employment 12 months after a trough.

The layoff pattern has also been quite different in the current recession/recovery period. Altig and Bryan (1992) note the absence of a cyclical movement in layoffs that has been characteristic of past recessions. On the other hand, it may be that the unusual behavior of layoffs is attributable to firms trying to economize on health care costs. It seems likely, however, that Altig and Bryan are generally correct in noting that there has been less cyclical movement in the current recession.

Everyone knows, moreover, that there has been a movement toward structural change in U.S. industry since the mid-1980s. There have been revolutionary changes in the financial industry and substantial changes in the automobile, computer, and retail trade industries. These changes do not necessarily mean that positions have been permanently lost for managers and highly skilled staff employees, but since the more highly skilled positions often require a longer job search, the

structural changes may explain the relative slowness of the employment recovery to date.

On the other hand, if the 1990-91 recession is examined by itself, cyclical changes seem normal. Thus, since the relevance of the layoff data can be discounted somewhat because of firms' incentives to

economize on health care costs, it seems risky to conclude that there was no cyclical component to the recent recession. The best conclusion seems to be that the economy's behavior in the current recession/recovery period results from a blend of cyclical and structural factors, with the structural factors delaying the economy's recovery.

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Oil Shocks, Monetary Policy, and Economic Activity

*Michael Dotsey and Max Reid**

I. INTRODUCTION

The U.S. economy has experienced nine recessions over the post-World War II period. Whether the causes of these recessions are primarily real or monetary has been widely debated. In this paper we examine two seemingly conflicting results regarding the primary causes of contractions in U.S. economic activity since the end of World War II. One set of results obtained by Hamilton (1983) shows that major downturns in U.S. economic activity are associated with prior exogenous increases in oil prices, while another set of results established by Romer and Romer (1989) indicate that exogenous tightening in monetary policy is the major cause of declines in industrial production and increases in unemployment.

We note that while Hamilton is careful not to rule out the role policy may play in determining economic activity, he does place heavy emphasis on the effects of oil prices. Romer and Romer are more emphatic in their belief that they have uncovered exogenous monetary policy and that this policy is solely responsible for the events they study. We wish to examine their contention by testing whether real disturbances could simultaneously be influencing Federal Reserve policy and downturns in economic activity. Given Hamilton's work and the fact that four of the six episodes that the Romers associate with exogenous monetary policy are very close to oil price shocks, we check to see if these shocks are responsible for their results. We find that including oil prices in their analysis makes monetary policy as specified by the Romers insignificant.

Negating the results of Romer and Romer does not imply that monetary policy plays no role in determining economic activity. Following McCallum's (1983) suggestion, which is also implemented by Sims (1991), we use interest rates as a proxy for

monetary policy in Hamilton's model. Specifically, we use the federal funds rate and the spread between the ten-year Treasury bill rate and the funds rate as depicting the relative tightness of monetary policy. In this setting we find that both oil price increases and movements in interest rates are significant in our statistical analysis of real GNP and employment. Further, an analysis of impulse response functions and variance decompositions indicates that innovations in both oil price increases and interest rates are associated with subsequent movements in real economic activity.

II. LITERATURE REVIEW

Here we review the analysis presented in the papers of Romer and Romer (1989) and Hamilton (1983) that are of primary interest to the subject of this paper. More broadly, these two papers represent contributions to the ongoing debate in macroeconomics concerning the primary source of economic fluctuations. Are these sources primarily real or monetary?

Romer and Romer (1989) adopt the perspective of the seminal work of Friedman and Schwartz (1963) that monetary policy explains much of the variation in economic activity. In performing their investigation of the relationship between monetary policy and movements in U.S. economic activity over the post-World War II period, they use Friedman and Schwartz's methodology, which they term the "narrative approach." This approach attempts to isolate historically exogenous monetary policy and then analyze the effects of such policy on economic activity. Whether or not they have accurately identified exogenous monetary shocks is the basis of our critical evaluation of their work.

The Romers' (1989) conclusion is that six of the eight postwar recessions in their data set were caused by contractionary monetary shocks. The identification of these monetary shocks is based on examinations of the "Record of Policy Actions" of the Board of Governors and the Federal Open Market

* We have benefited from the comments of James Hamilton, Thomas Humphrey, Peter Ireland, Jeffrey Lacker, and Bennett McCallum. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Committee (FOMC), as well as the minutes of the FOMC prior to their discontinuance in 1976. The Romers identify as shocks, "only episodes in which the Federal Reserve attempted to exert a contractionary influence on the economy in order to reduce inflation" (p. 134). Consequently, the Romers never investigate whether expansionary policy also has real effects. The Romers argue that the Fed only engages in expansionary policy to alleviate an economic downturn once it has already begun. Thus, it would be difficult to isolate the effect of monetary policy from any "natural recovery mechanism" inherent in the economy. After their examination of the historical record, the Romers identify six times during the postwar period that the Fed caused monetary shocks. The dates of these episodes are given in Table 1.

To investigate whether these monetary shocks do have real effects, the Romers (1989) conduct several experiments. Using monthly data on industrial production and the civilian unemployment rate from January 1948 to December 1987, the Romers estimate a univariate forecast for 36 months following each of the monetary shocks. If the actual values for the industrial production series were lower than the forecasted values based on previous values of each series, this would indicate that monetary policy does have real effects. (The opposite is true for the unemployment rate, since higher rates of unemployment are associated with economic downturns.) For industrial production,

Table 1

Dates of Monetary and Oil Price Shocks

<u>Money</u>	<u>Oil Prices</u>
October 1947	December 1947
	June 1953
September 1955	
	February 1957
December 1968	March 1969
	December 1970
April 1974	January 1974
	July 1974
August 1978	
October 1979	June 1979
	January 1981
	August 1990

they find the average maximum deviation of the actual value from the forecasted value at a three-year horizon was -14 percent, with a range of -8 percent to -21 percent. With the exception of the December 1968 episode, the actual unemployment rate was typically 1.5 to 2.5 percentage points higher than its forecasted value two years after a monetary shock.

As a second experiment, the Romers regress both series described above on 24 own lags and 36 lags of a dummy variable that assumes a value of one for the six monetary shocks and zero otherwise. From this regression an impulse response function is calculated to examine the effect of a unit shock to the dummy variable. For industrial production, the impact of the monetary shock peaks after 33 months, at which time industrial production is 12 percent lower than it would have been without a monetary shock. Similarly, the civilian unemployment rate peaks after 34 months and is 2.1 percent higher than it would have been otherwise.

Finally, the Romers check to see if other factors could be responsible for their results. They do this in two ways. First, they check whether supply shocks affect their results by excluding the two monetary shocks that could be associated with oil price increases (April 1974 and October 1979) and recalculating the impulse response functions. They find, however, that the new impulse response functions are essentially unchanged.

As a further test, the Romers include a supply shock measure, namely, the relative price of crude petroleum, in their regressions. Again, their results are essentially unchanged.

It is unclear, however, on what basis they reach their conclusion that supply shocks have little impact on the effect of their monetary shock variable. It appears to us that their claim is based solely on the shape and magnitude of the impulse response functions. If so, their conclusion is of limited interest. For instance, in the presence of other explanatory variables, the same impulse response function would be obtained if the estimated coefficients for the money dummy variable remained the same but the standard error of the coefficient increased. Such a situation would imply a less statistically significant effect of the monetary shock. For this reason, we feel that testing the sum of coefficients in a regression would provide a better estimate of the significance of both monetary and supply (i.e., oil) shocks. We perform this test in the next section.

Some of our skepticism concerning the Romer and Romer claim that supply shocks—in particular oil price shocks—are unimportant in influencing postwar U.S. economic activity is based on the influential empirical work of Hamilton (1983, 1985) and the theoretical work of Finn (1991). Hamilton's empirical work provides the basis for our investigation in Section IV and will be discussed in detail. Finn's work is also relevant since it provides an interesting model in which oil price shocks act as impulses in a real business cycle model. Her work argues that a significant portion of economic variability attributed to technological innovations is actually accounted for by oil price shocks.

From an empirical perspective, Hamilton (1983) notes that seven of the eight post-World War II recessions in his sample have been preceded by "dramatic" increases in the price of crude oil. He then hypothesizes three different explanations for this observation. First, the correlation between oil price increases and recessions is simply coincidence. Second, there is some other variable or set of variables that not only cause the oil price increases, but also cause the recessions. Finally, the oil price increases are at least partly responsible for the recessions. Although Hamilton does not explicitly refute the first hypothesis in his (1983) paper, in a later paper (1985) he rejects this hypothesis at the 0.0335 significance level.

Hamilton (1983) provides a detailed analysis of the second hypothesis. As a starting point, he considers the impact of oil prices in Sims's (1980) six-variable VAR model of the economy. This model includes real GNP, unemployment, U.S. prices, wages, money (M1), and import prices. Collectively, these variables do not Granger-cause oil prices. Using bivariate Granger-causality tests, Hamilton also finds that individually none of the six variables in Sims's model Granger-cause oil prices when four lags are used. However, oil prices do Granger-cause real GNP. Oil prices also Granger-cause unemployment. The only variable in Sims's system which does Granger-cause oil prices is the change in import prices when eight lags are included. Hamilton concludes, however, that import prices do not explain fluctuations in economic activity sufficiently to merit consideration as a variable that is jointly causing oil prices and economic fluctuations.

To further insure that no other third explanatory variable is responsible for both the increases in oil prices and the declines in real GNP, Hamilton (1983) tests several other series to see if they Granger-cause

oil prices. Various output measures, including nominal GNP, the ratio of inventories to sales, the index of leading economic indicators, the index of industrial production, and the ratio of man-days idle due to strikes to total employment are used. Of these various measures, only the ratio of man-days idle due to strikes to total employment Granger-causes oil prices. As with import prices, variations in this series still do not account for the cyclical variation of output. Several different price series are also checked. Only one of the seven price series considered, the price of coal, Granger-causes oil prices when both four and eight lags are included. Again, however, this series cannot explain future output. Finally, two financial variables are considered—the yields on BAA bonds and the Dow-Jones Industrial Average. Neither of these variables are found to Granger-cause oil prices. Thus, Hamilton concludes there is little evidence that some third variable explains both the increases in oil prices and the recession that normally follows. Since both the first and second hypotheses have been rejected, his finding bolsters the argument for the last alternative. Specifically, "the timing, magnitude, and/or duration of at least some of the recessions prior to 1973 would have been different had the oil price increase or attendant energy shortages not occurred" (1983, p. 247).

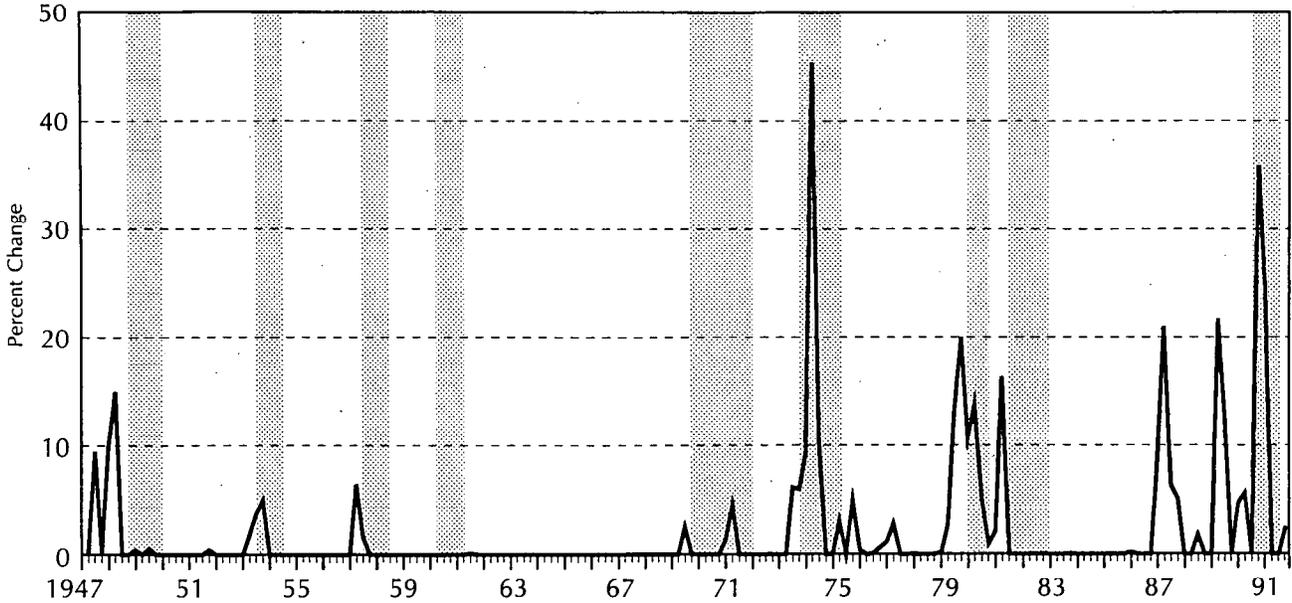
III. A REEXAMINATION OF THE ROMER AND ROMER HYPOTHESIS

Romer and Romer (1989) attempt to uncover the effects of monetary policy by examining the response of the economy to unexpected exogenous tightening in policy. By focusing on monetary tightness in response to excessive inflation, they claim an ability to isolate shocks that are purely monetary in nature. For this procedure to capture solely monetary events it is important that the inflationary pressures that the Fed is reacting to are not caused by real disturbances. As one can see from Table 1 and Chart 1, four of their dates are very near positive shocks to oil prices (POIL). Indeed, in both the 1974 and 1979 episodes the effects of oil price increases on inflation were discussed at FOMC meetings.

In order to sort out the effects of oil prices and the six contractionary episodes selected by Romer and Romer, we include the percent change in oil prices (OIL) in a reexamination of their statistical results. We first replicate their results in Table 2, and then check them for sensitivity to slight changes in lag structure and the sample period. We perform this check because our oil price data does not

Chart 1

POSITIVE OIL PRICE SHOCKS



Note: Shading denotes recessions.

Table 2

The Romer and Romer Results*

$$IP_t = \alpha_0 + \sum_{i=1}^{11} B_{1i}M_{it} + \sum_{j=1}^{24} B_{2j}IP_{t-j} + \sum_{k=0}^n B_{3k}MD_{t-k},$$

where IP = the log change of industrial production,
 M = a set of monthly seasonal dummy variables,
 and MD = the Romers' dummy variable for contractionary monetary shocks.

Sample Period	1948:2- 1987:12	1948:2- 1987:12	1950:1- 1990:12	1950:1- 1990:12
IP	-.219(.327)	-.134(.506)	-.162(.460)	-.059(.77)
MD (n=36)	-.100(.0167)		-.089(.028)	
MD (n=24)		-.085(.0066)		-.071(.023)
R ²	.790	.788	.796	.794
S.E.E.	.0132	.0132	.0127	.0128

$$U = \alpha_0 + \alpha_1TREND + \sum_{i=1}^{11} B_{1i}M_{it} = \sum_{j=1}^{24} B_{2j}U_{t-j} + \sum_{k=0}^n B_{3k}MD_{t-k},$$

where U = the civilian unemployment rate, and the remaining variables are as described above.

Sample Period	1948:1- 1987:12	1948:1- 1987:12	1950:1- 1990:12	1950:1- 1990:12
U	.972(.000)	.971(.000)	.973(.000)	.973(.000)
MD (n=36)	2.106(.016)		2.06 (.014)	
MD (n=24)		1.25 (.054)		1.06 (.097)
R ²	.977	.977	.977	.977
S.E.E.	.267	.268	.259	.261

* The reported results are the estimated sum of coefficients for each variable, with the p-value for the t-test testing the null hypothesis that this sum equals zero included in parenthesis. The estimates for the constant and monthly dummies, as well as the trend term in the employment regression, are not reported.

exactly overlap with their sample period and we want to make sure that we do not confuse oil price effects with a slight change of specification. As one can see from the results in the table, the sum of coefficients on the money dummy is significant at the 10 percent level in all regressions and at the 5 percent level in most regressions. Therefore, our results concerning the addition of oil prices reflect the effect of oil prices. (See Tables 3a and 3b.)

The real price of oil series is derived using Mork's (1989) procedure that corrects for the effect of price controls in the early 1970s. As mentioned, the regressions are run on monthly data over a slightly different sample period than the one used by Romer and Romer (1989). We analyze the period 1950:1-1990:12. As in their analysis, we include seasonal dummies and a trend in the regressions for unemployment. Our specification includes only 24 lags of the dependent variable rather than the 36 lags employed in their study.¹ The dependent variables examined are the percent change in industrial production (IP) and the unemployment rate (U). The independent variables are the Romer and Romer money dummy (MD) and oil (OIL). We also examine regressions in which we separate the effects of positive oil price shocks (POIL) from negative oil price shocks (NOIL).

Tables 3a and 3b present results that are consistent with the methodology of Romer and Romer. Implicit in this specification is the assumption that the money dummy and oil prices are exogenous. We also ran regressions omitting contemporaneous values of oil prices and the money dummy with little change in results.

In the regressions on industrial production, changes in oil prices have asymmetric effects. This finding is consistent with the result of Mork (1989) and the discussion in Shapiro and Watson (1988). There are numerous reasons why the effect of oil prices on economic activity may be asymmetric. One model that formally treats this asymmetry is Hamilton (1988), which relies on specialized labor inputs and on movements of labor across sectors.

In Hamilton's (1988) model any exogenous change in the supply of oil and hence its price can induce unemployment. Individuals choose to relocate from an industry that is adversely affected by oil price

¹ Using 36 lags did not appreciably alter our results and the slight change in sample period needed to accommodate our oil price data is innocuous.

shocks if the effect of the shock is prolonged enough to warrant the costs associated with relocation. Since there exist some industries that can suffer when oil prices rise as well as industries that suffer when prices fall, any change in oil prices can potentially induce declines in output and employment. For example, a fall in the price of oil could cause a contraction in the oil industry. Analogously, a rise in the price could cause unemployment and a decline in output in industries that use oil as an input or that produce goods such as automobiles that rely on the use of oil. Depending on the relative strength of income and substitution effects and the relative importance of various sectors in the economy, the effects of oil price changes could be either symmetric or asymmetric. It is also possible that a rise in the price of oil could lead to a decline in economic activity while a fall in the price of oil could have little or no effect.

Another class of models that can produce asymmetric results are models that involve differential financing costs when firms finance their activities using either retained earnings or external finance [see Gertler (1988), Fazzari, Hubbard and Peterson (1988), and Gilchrist (1989)]. In the absence of complete hedging arrangements, firms relying on oil as an essential input are more likely to bump up against a financing constraint when oil prices rise and thus could face an increase in their effective cost of capital. The rise in the effective cost of capital would lower investment and output.

The regression results in Tables 3a and 3b indicate that positive changes in oil prices are associated with declines in industrial production while monetary policy is insignificant, where significance is measured using *t*-statistics for the sum of the coefficients. The significance levels are depicted inside the parentheses next to the sums of coefficients. With regard to unemployment, changes in oil prices have a significant positive effect while monetary policy is again insignificant. Also, if we use only money dummies for the two periods—September 1955 and August 1978—that are not contaminated by large oil price movements, the sum of the coefficients on the dummy variable is insignificant.

We conclude from this exercise that monetary policy as isolated by Romer and Romer is not statistically associated with subsequent real economic activity. Rather it is the presence of oil price shocks that occurred at nearly the same time as their contractionary monetary episodes that is responsible for their results.

Table 3a

Monthly Regression Results*

$$IP_t = \alpha_1 + \sum_{i=1}^{11} B_{1i}M_{it} + \sum_{j=1}^{24} B_{2j}IP_{t-j} + \sum_{k=0}^{24} B_{3k}MD_{t-k} + \sum_{l=0}^{24} B_{4l}POIL_{t-l} + \sum_{m=0}^{24} B_{5m}NOIL_{t-m},$$

where IP = log change of industrial production

M = a set of monthly seasonal dummy variables

MD = the Romers' dummy variable for contractionary monetary policy

POIL = positive log changes of the price of oil constructed according to Mork's (1989) methodology

NOIL = negative log changes of the price of oil constructed according to Mork's (1989) methodology.

<u>Sample Period</u>	<u>1950:1- 1990:12</u>	<u>1950:1- 1990:12</u>
IP	-.234(.300)	-.206(.351)
POIL	-.149(.089)	-.144(.047) ¹
NOIL	-.009(.923)	
MD	-.044(.232)	-.048(.147)
\bar{R}^2	.792	.796
S.E.E.	.0128	.0127

* The reported results are the estimated sum of coefficients for each variable, with the p-value for the t-test testing the null hypothesis that this sum equals zero included in parentheses. The estimates for the constant and monthly dummies are not reported.

¹ The F-test testing the null hypothesis that the sum of coefficients for POIL equals the sum of coefficients for NOIL was $F(1,381) = 2.723$ with a p-value of .100.

Table 3b

Monthly Regression Results*

$$U_t = \alpha_0 + \alpha_1 TREND + \sum_{i=1}^{11} B_{1i}M_{it} + \sum_{j=1}^{24} B_{2j}U_{t-j} + \sum_{k=0}^{24} B_{3k}MD_{t-k} + \sum_{l=0}^{24} B_{4l}OIL_{t-l},$$

where U = the civilian unemployment rate

M = a set of monthly seasonal dummies

MD = the Romers' dummy variable for contractionary monetary shocks

and OIL = log changes in the price of oil constructed according to Mork's (1989) methodology.

<u>Sample Period</u>	<u>1950:1- 1990:12</u>
U	.974(.000)
OIL	3.65 (.0248) ¹
MD	.225(.760)
\bar{R}^2	.977
S.E.E.	.261

* The reported results are the estimated sum of coefficients for each variable, with the p-value for the t-test testing the null hypothesis that this sum equals zero included in parentheses. The estimates for the constant and monthly dummies are not reported.

¹ The F-test testing the null hypothesis that the sum of coefficients for POIL equals the sum of coefficients for NOIL was $F(1,380) = .0169$ with a p-value of .897.

IV. MONETARY POLICY RECONSIDERED

In this section we reinvestigate the potential effects of monetary policy in the statistical model used by Hamilton (1983). In his study monetary policy is represented by M1. McCallum (1983) makes the forceful argument that policy is better represented by short-term interest rates since over most of the postwar period the operating instrument of the Federal Reserve has been the federal funds rate. Sims (1991) also supports this viewpoint. We use two different interest rate measures to represent monetary policy. They are the average federal funds rate and the spread between the ten-year Treasury bill rate and the funds rate. These series are displayed in Chart 2 and Chart 3. One can see most recessions are preceded by a run-up in the funds rate or a flattening or inversion of the yield curve.

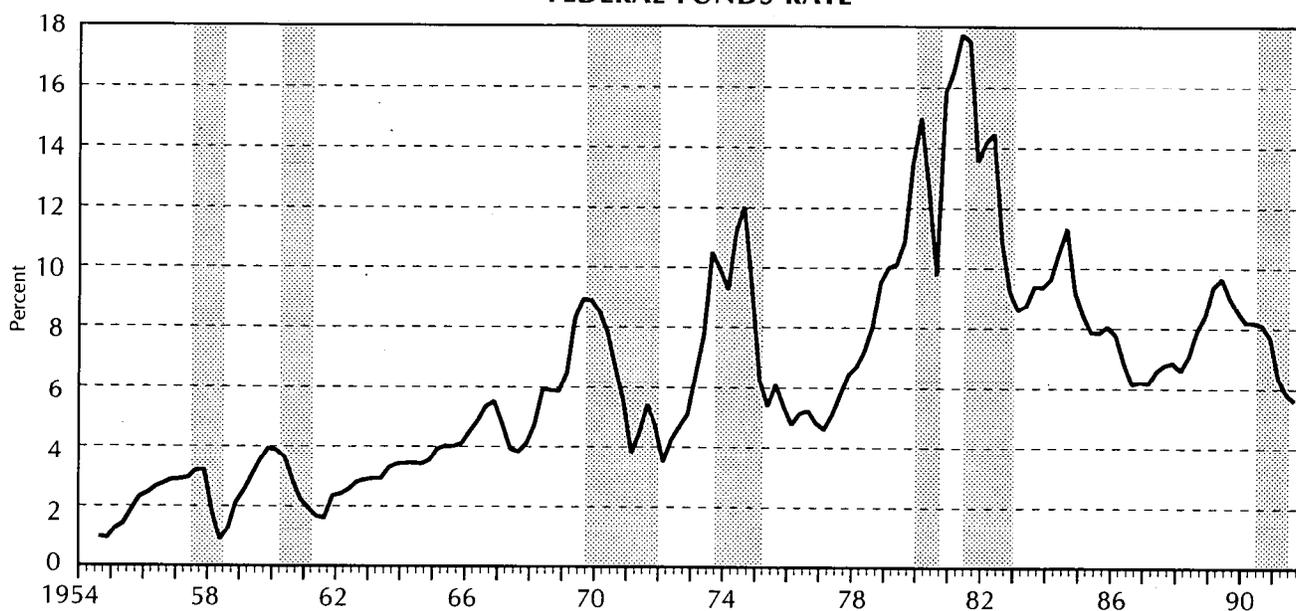
The empirical results are displayed in Table 4 for the sample period 1955:3-1991:3, where we include four lags of each variable. Again we test for an asymmetric effect of oil prices on output, which is measured by real GNP. The other variables in the regression are the funds rate (RFF), the spread (RS), the unemployment rate (U), import prices (IM), the wage rate (W), and the inflation rate (π) as measured by the GNP deflator. Following Hamilton we use first differences of the logs of GNP, import prices, the wage rate, inflation, and oil prices.

The results indicate that both positive percent changes in oil prices and our interest rate measures have significant explanatory power in explaining percentage changes in GNP. The signs on the coefficients for both our interest rate measures are consistent with a monetary policy interpretation. A rise in the funds rate or a rise in the funds rate relative to long-term interest rates (a fall in the spread) is associated with restrictive monetary policy and, hence, with declines in output.

To further examine our results we look at variance decompositions and impulse response functions. Our preferred specification is to order positive changes in oil prices first and our interest rate measures last. We prefer this because (1) oil price rises appear to be exogenous events [see Hamilton (1983, 1985)] and (2) putting interest rates last in the orthogonalization implies that the effects of interest rates are due to innovations that are orthogonal to other variables in the system. Thus the interest rate innovation is orthogonal to any taste or technology shocks that affect economic activity or inflation. These effects may reasonably be thought of as policy. McCallum (1983) shows that when the monetary authority uses an interest rate instrument, innovations in monetary policy are best captured by innovations in the nominal interest rate. By ordering interest rates last in our orthogonalization, we hope to exclude the effects of other endogenous variables

Chart 2

FEDERAL FUNDS RATE



Note: Shading denotes recessions.

Table 4

Quarterly Regression Results for the Log Change of Real GNP*

$$GNP_t = \alpha_0 + \sum_{i=1}^4 \alpha_i X_{t-i},$$

where X is a vector of explanatory variables.

(Note: Each column below corresponds to a distinct X-vector.)

	(1)	(2)	(3)	(4)
GNP	.0841(.784)	.045 (.88)	-.067 (.833)	-.068 (.83)
POIL	-.0723(.0136) ¹	-.077 (.0068)	-.079 (.007) ²	-.083 (.0041)
NOIL	.0213(.398)		.029 (.255)	
RFF	-.001 (.007)	-.0012(.0019)		
RS			.003 (.004)	.0026(.005)
U	.002 (.001)	.0021(.0015)	.0005(.457)	.0003(.66)
IM	.096 (.197)	.11 (.14)	.173 (.026)	.188 (.013)
W	-.718 (.077)	-.69 (.078)	-.528 (.175)	-.40 (.28)
π	.523 (.271)	.56 (.23)	.176 (.682)	-.088 (.83)
\bar{R}^2	.32	.31	.31	.30
S.E.E.	.0082	.0082	.0082	.0083

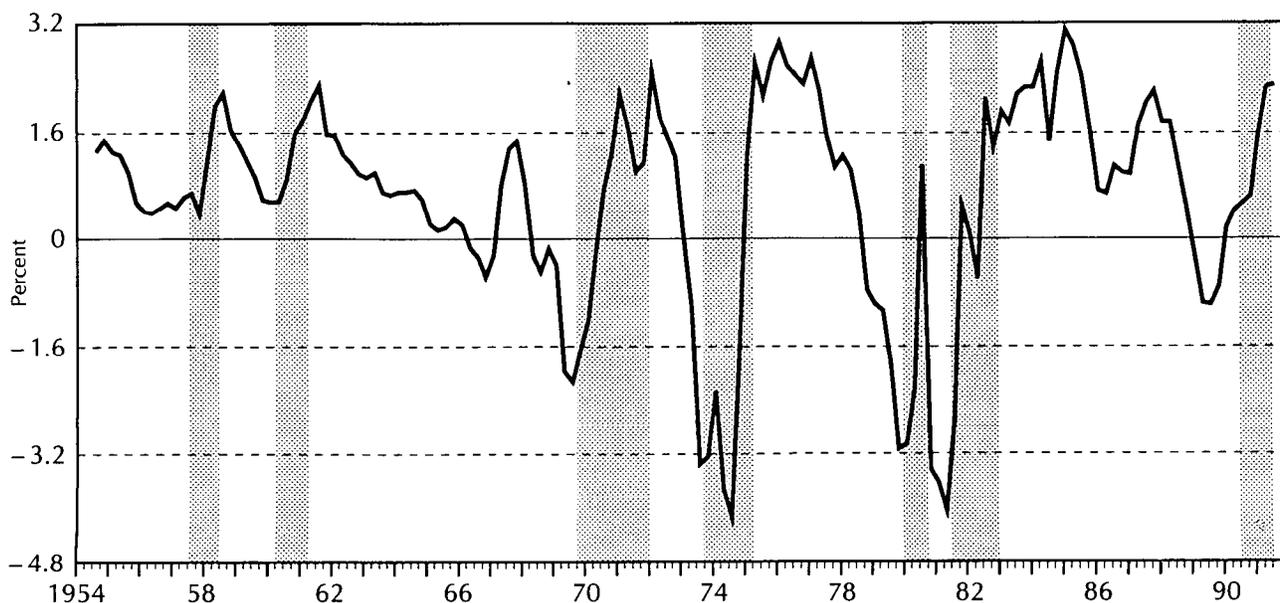
* The reported results are the estimated sum of coefficients for each variable in the X-vector, with the p-value for the t-test testing the null hypothesis that this sum equals zero included in parentheses. Estimates for the constant term are not reported. The sample period is 1955:3-1991:3.

¹ The F-test testing the null hypothesis that the sum of coefficients for POIL equals the sum of coefficients for NOIL was $F(1,112) = 6.866$ with a p-value of .01.

² The F-test testing the null hypothesis that the sum of coefficients for POIL equals the sum of coefficients for NOIL was $F(1,112) = 8.97$ with a p-value of .003.

Chart 3

INTEREST RATE SPREAD



Note: Shading denotes recessions.

that may influence Fed behavior. As a specification check we include results from an alternative ordering in which interest rates are ordered first and positive oil price changes are ordered last.

The variance decomposition results are given in Table 5. In our preferred specification oil prices explain between roughly 5 and 6 percent of the variation in GNP. These results are not very sensitive to the ordering of the variables, nor do they seem to vary with respect to the interest rate measure. This evidence is consistent with the hypothesis that oil

prices are exogenous. The federal funds rate explains about 5 percent of the variation in output in our preferred specification, while the spread explains roughly 8 percent of the variation in GNP. Not surprisingly, the contribution of these two variables for changes in GNP is influenced by their ordering in the orthogonalization.

Charts 4a and 4b depict the summed impulse response functions for our preferred specification. The cumulative response of GNP to a 1 percent increase in oil prices peaks in seven quarters at a value

Table 5

Variance Decompositions for Percent Change in GNP

(POIL first, RFF last)

Step	(POIL)		(RFF)	
	Percent of Variance Explained	95% Confidence Interval	Percent of Variance Explained	95% Confidence Interval
1	.01	(.00, 2.29)	.00	(.00, .00)
4	2.03	(.00, 8.53)	5.29	(.13, 11.49)
8	5.09	(.61, 13.50)	5.15	(1.36, 10.51)
12	5.71	(.71, 14.62)	5.00	(1.46, 10.36)
16	5.83	(.61, 15.21)	4.94	(1.46, 10.36)

(POIL last, RFF first)

Step	(POIL)		(RFF)	
	Percent of Variance Explained	95% Confidence Interval	Percent of Variance Explained	95% Confidence Interval
1	.00	(.00, .00)	3.58	(.00, 10.36)
4	1.51	(.00, 6.94)	11.84	(3.79, 21.18)
8	4.92	(.52, 12.69)	14.17	(5.97, 22.58)
12	5.77	(.69, 14.12)	13.79	(5.88, 22.21)
16	6.35	(.55, 15.36)	13.65	(5.84, 22.09)

(POIL first, RS last)

Step	(POIL)		(RS)	
	Percent of Variance Explained	95% Confidence Interval	Percent of Variance Explained	95% Confidence Interval
1	.01	(.00, 2.51)	.00	(.00, .00)
4	1.88	(.00, 8.79)	7.43	(.69, 15.15)
8	5.29	(.26, 14.87)	7.93	(1.80, 15.59)
12	5.65	(.50, 15.44)	7.95	(2.00, 15.99)
16	5.58	(.49, 15.48)	8.38	(1.83, 17.07)

(POIL last, RS first)

Step	(POIL)		(RS)	
	Percent of Variance Explained	95% Confidence Interval	Percent of Variance Explained	95% Confidence Interval
1	.00	(.00, .00)	.01	(.00, 2.80)
4	1.98	(.00, 7.50)	8.71	(1.09, 18.61)
8	5.89	(.78, 13.29)	10.94	(3.16, 21.24)
12	6.85	(1.25, 14.58)	10.85	(3.27, 21.52)
16	7.18	(1.20, 15.28)	11.25	(3.22, 22.50)

Chart 4a

**CUMULATIVE RESPONSE OF DLN(GNP)
TO A 1 PERCENT SHOCK IN SERIES POIL**

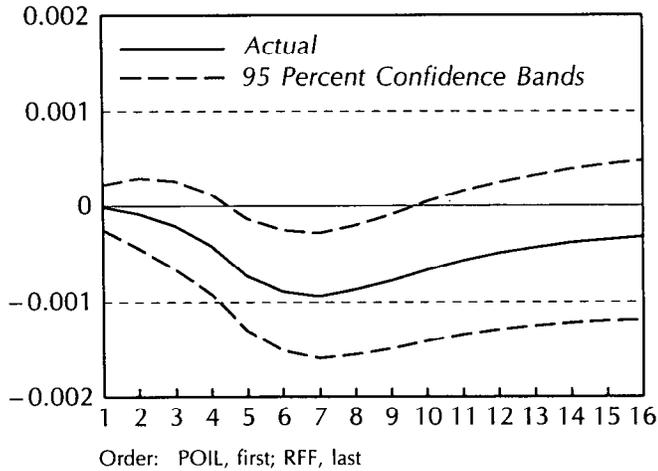
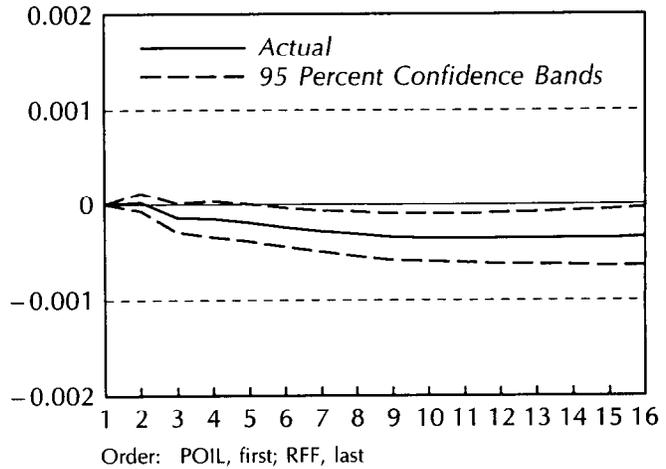


Chart 4b

**CUMULATIVE RESPONSE OF DLN(GNP)
TO A 1 PERCENT SHOCK IN SERIES RFF**



of $-.094$ percent. This result is very close to the one reported in Shapiro and Watson (1988) in a somewhat different empirical setting. Our result corresponds to a 4.23 percent loss in output due to a 45 percent increase in oil prices attributable to the 1973 oil embargo. The response of GNP to a 1 percent increase in the average funds rate for the period, which equals an increase of 6.39 basis points, peaks at 13 quarters with a decline in GNP of $-.036$ percent. This change would correspond to a loss in output of 3.39 percent in response to a funds rate increase from 9.83 to 15.85. These last numbers depict the run-up in interest rates during the autumn of 1980 resulting from the restrictive monetary policy conducted by the Fed. The alternative ordering of

the variables results in similar impulse response functions for a positive oil price shock, while the effect of the funds is increased by about 50 percent.

The results using the spread are depicted in Charts 5a and 5b. In our preferred specification, the response of GNP to a 1 percent increase in oil prices again peaks in the seventh quarter at a value of $-.091$ percent while GNP's response to the spread peaks in quarter nine at a value of $-.0057$ percent. This result implies a 4.1 percent loss in output due to the 1973 oil embargo and a 4.25 percent loss in output due to the 1980 tightening in monetary policy. Changing the ordering of the variables increases the effects of both variables by about 20 percent.

Chart 5a

**CUMULATIVE RESPONSE OF DLN(GNP)
TO A 1 PERCENT SHOCK IN SERIES POIL**

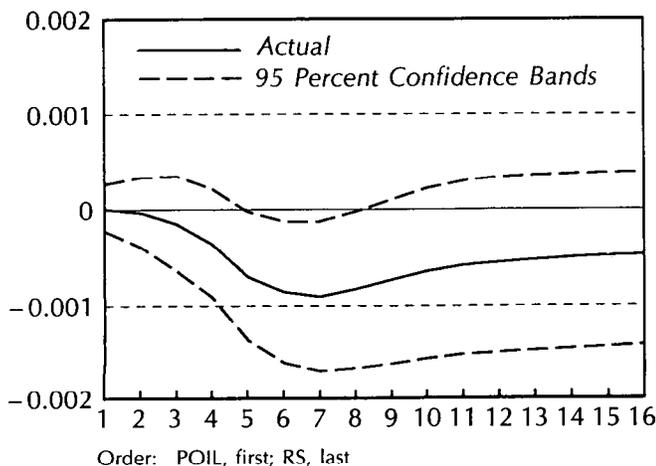
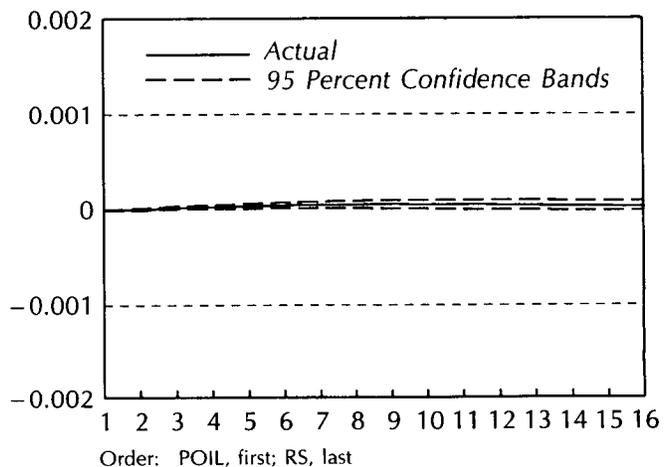


Chart 5b

**CUMULATIVE RESPONSE OF DLN(GNP)
TO A 1 PERCENT SHOCK IN SERIES RS**



To further examine the effects of oil prices and monetary policy on real economic activity, we also look at the response of the percentage change of employment in nonfarm and nongovernment activities to changes in oil prices and interest rates. These regressions are given in Table 6 and are identical to those reported in Table 4, with employment replacing GNP. The results using the spread as a measure of monetary policy are consistent with our results for GNP, but the funds rate does not appear to affect employment significantly. Increases in oil prices reduce employment and enter asymmetrically in the empirical specification that uses the spread, a result consistent with Mork's (1989) conclusions. By contrast, we reject an asymmetric effect in regressions with the funds rate. Taking the results on GNP and employment together, our results are broadly consistent with Mork's (1989) finding of asymmetry.

Regarding variance decompositions (Table 7), positive oil price shocks account for roughly 8-10 percent of the variation in employment when oil prices enter first in the orthogonalization. Their contribution is reduced to about 6 percent when oil enters last. The contribution of the monetary policy variables is greatly enhanced when they are the first element in the orthogonalization. This result indicates that disturbances other than those depicting policy are included in the interest rate innovations. In our preferred specification the funds rate contributes roughly 6 percent to the variation in employment while the spread contributes about 15 percent.

The impulse response functions also look very similar to those depicted for GNP. These are displayed in Charts 6a, 6b, 7a, and 7b. In our preferred specification, the effect of a 1 percent positive

Table 6

Quarterly Regression Results for the Log Change of Employment*

$$E_t = \alpha_0 + \sum_{i=1}^4 \alpha_{1i} X_{t-i},$$

where X is a vector of explanatory variables.

(Note: Each column below corresponds to a distinct X-vector.)

	(1)	(2)	(3)	(4)
E	.31 (.115)	.34 (.070)	.30 (.122)	.31 (.093)
POIL	-.031 (.084) ¹	-.028 (.108)	-.039 (.030) ²	-.036 (.036)
NOIL	-.010 (.52)		-.0038(.81)	
RFF	-.0003(.19)	-.0003(.15)		
RS			.0013(.011)	.0013(.0062)
GNP	.50 (.015)	.47 (.017)	.35 (.096)	.34 (.097)
IM	.014 (.78)	.0016(.97)	.059 (.23)	.051 (.27)
W	-.41 (.106)	-.47 (.052)	-.40 (.095)	-.43 (.052)
π	.63 (.039)	.68 (.020)	.53 (.044)	.56 (.024)
\bar{R}^2	.54	.56	.55	.56
S.E.E.	.0051	.0051	.0051	.0050

* The reported results are the estimated sum of coefficients for each variable in the X-vector, with the p-value for the t-test testing the null hypothesis that this sum equals zero included in parentheses. Estimates for the constant term are not reported. The sample period is 1955:3-1991:3.

¹ The F-test testing the null hypothesis that the sum of coefficients for POIL equals the sum of coefficients for NOIL was $F(1,112) = .95$ with a p-value of .332.

² The F-test testing the null hypothesis that the sum of coefficients for POIL equals the sum of coefficients for NOIL was $F(1,112) = 2.56$ with a p-value of .113.

Table 7

Variance Decompositions for Employment

(POIL first, RFF last)				
	(POIL)		(RFF)	
Step	Percent of Variance Explained	95% Confidence Interval	Percent of Variance Explained	95% Confidence Interval
1	.03	(.00, 2.66)	.00	(.00, .00)
4	1.61	(.00, 8.89)	4.86	(1.80, 12.75)
8	10.25	(.26, 22.16)	5.94	(.00, 14.67)
12	10.27	(.50, 22.19)	5.80	(.00, 14.51)
16	10.35	(.55, 22.28)	5.80	(.00, 14.56)
(POIL last, RFF first)				
	(POIL)		(RFF)	
1	.00	(.00, .00)	9.45	(1.20, 19.48)
4	1.17	(.00, 6.76)	8.89	(2.34, 17.89)
8	5.84	(.00, 16.96)	11.44	(2.95, 21.83)
12	5.86	(.00, 17.43)	11.29	(3.11, 21.63)
16	6.06	(.00, 17.96)	11.27	(3.29, 22.64)
(POIL first, RS last)				
	(POIL)		(RS)	
1	.02	(.00, 2.67)	.00	(.00, .00)
4	1.14	(.00, 8.18)	6.84	(.00, 15.50)
8	7.26	(.00, 18.45)	15.67	(3.25, 26.55)
12	8.14	(.00, 19.53)	15.74	(3.49, 26.53)
16	8.42	(.02, 20.06)	15.58	(3.63, 26.15)
(POIL last, RS first)				
	(POIL)		(RS)	
1	.00	(.00, .00)	3.22	(.00, 9.48)
4	2.00	(.00, 8.93)	8.16	(.45, 17.58)
8	5.96	(.00, 15.85)	21.55	(6.20, 35.57)
12	6.86	(.00, 17.05)	21.75	(6.55, 35.67)
16	7.40	(.00, 18.13)	21.59	(6.62, 35.22)

oil price shock peaks in quarter nine and causes employment to fall by .11 percent, while a 1 percent increase in the funds rate causes employment to fall by roughly .036 percent. These impulse responses correspond to a 5 percent fall in employment due to the 1973 oil embargo and a 3.4 percent fall in employment resulting from the 1980 monetary policy pursued by the Fed. When the spread is used to depict monetary policy, the effects

of an oil price increase peak in the eighth quarter at -.085 percent and the effects of the spread peak in quarter eleven at .0077 percent (Charts 7a and 7b). Again these results correspond to a decline in employment of 3.8 percent and 5.7 percent over the 1973 and 1980 episodes, respectively. Thus both monetary policy and oil price disturbances appear to significantly associate with subsequent movements in employment.

Chart 6a

CUMULATIVE RESPONSE OF DLN(EMP) TO A 1 PERCENT SHOCK IN SERIES POIL

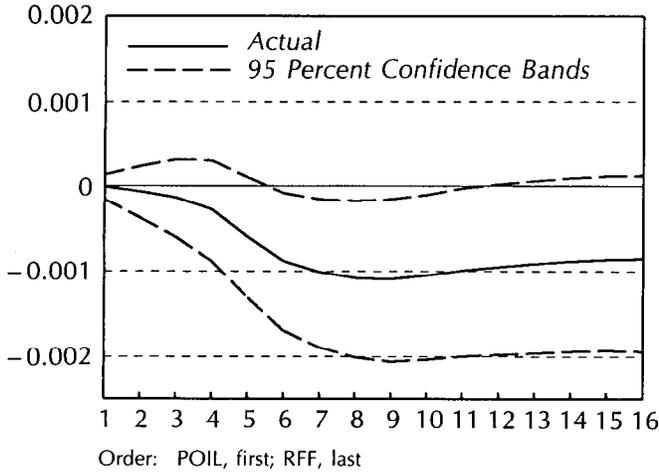


Chart 6b

CUMULATIVE RESPONSE OF DLN(EMP) TO A 1 PERCENT SHOCK IN SERIES RFF

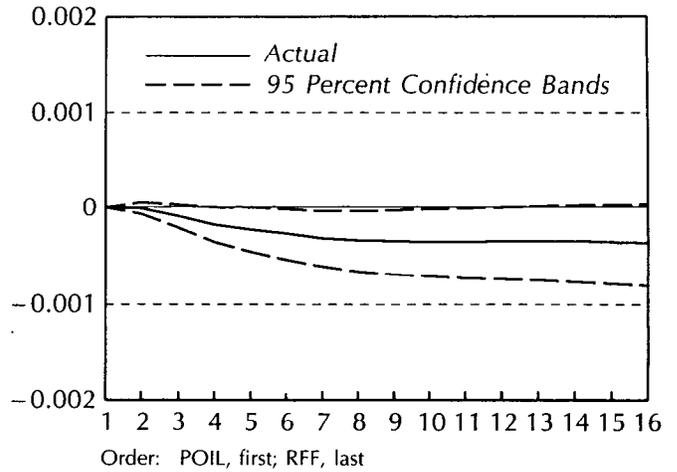


Chart 7a

CUMULATIVE RESPONSE OF DLN(EMP) TO A 1 PERCENT SHOCK IN SERIES POIL

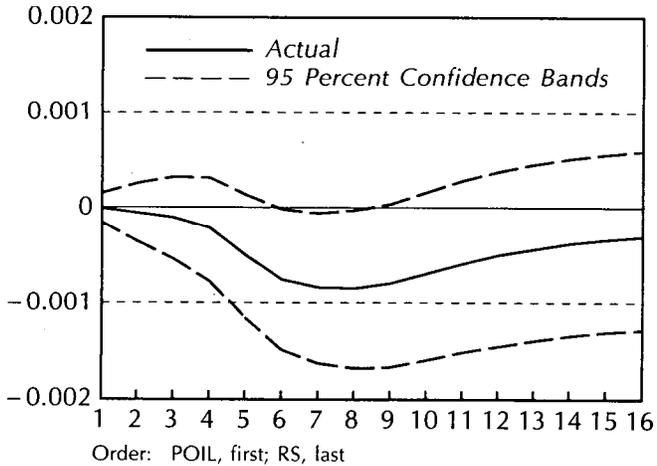
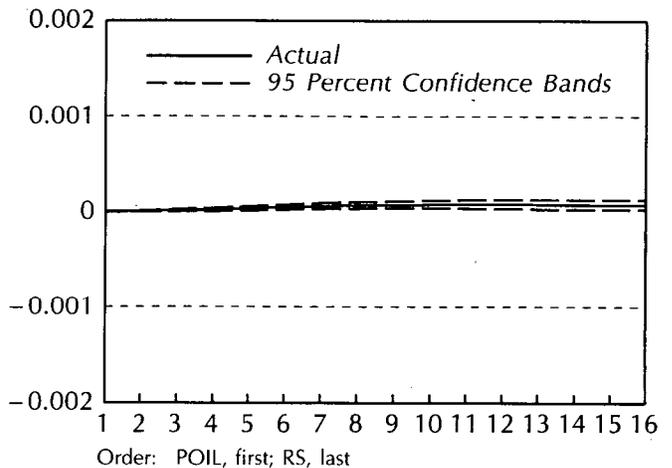


Chart 7b

CUMULATIVE RESPONSE OF DLN(EMP) TO A 1 PERCENT SHOCK IN SERIES RS



V. CONCLUSION

In this paper we take a somewhat more inclusive look than that taken by the Romers at the causes for economic downturns in the post-World War II U.S. economy. We find that their identification of monetary policy does not produce any convincing results. Nevertheless we do find that both tight monetary policy and oil price increases are statistically associated with declines in economic activity.

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