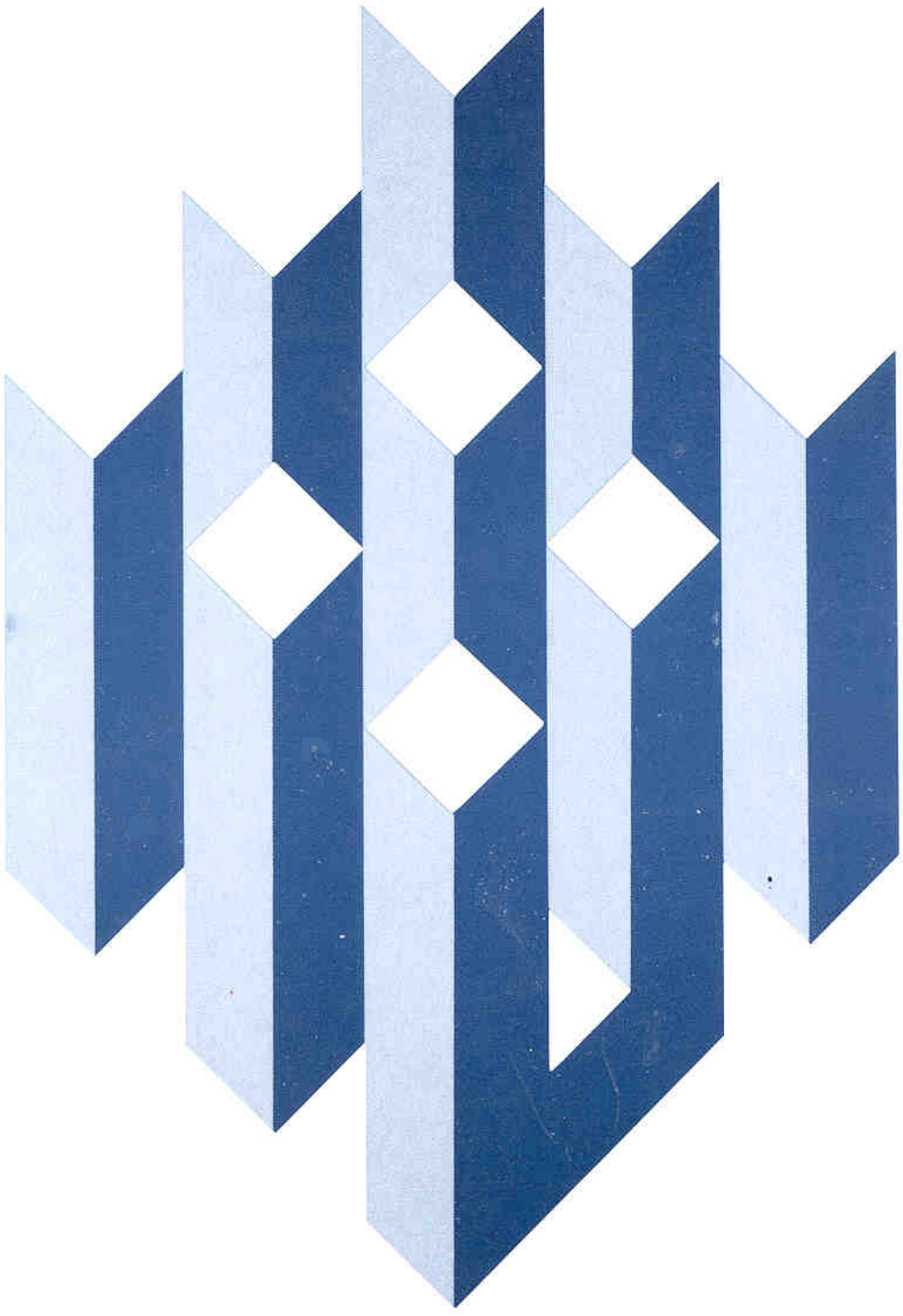
The Cyclical Effects of the Unemployment Insurance (UI) Program: Final Report

Unemployment Insurance
Occasional Paper 91-3

U.S. Department of Labor
Employment and Training Administration



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U.S. Department of Labor
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1991

This report was prepared for the Unemployment Insurance Service, U.S. Department of Labor under Contract Number 99-9-4818-98-037-01 with Metrica, Inc. The authors of this report are Bruce H. Dunson, S. Charles Maurice, and Gerald P. Dwyer, Jr. Since contractors conducting research and evaluation projects under government sponsorship are encouraged to express their own judgment freely, this report does not necessarily represent the official opinion or policy of the U.S. Department of Labor.

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THE CYCLICAL EFFECTS OF THE UNEMPLOYMENT INSURANCE (UI) PROGRAM

FINAL REPORT

December 31, 1990

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ACKNOWLEDGEMENTS

This project benefitted from the assistance of numerous individuals. At the U.S. Department of Labor, our project officer, John Robinson, provided guidance and helpful comments throughout the project. His insight on many occasions proved to be crucial to the success of this project. A special thanks for the technical assistance of Robert Pavosevich, Daniel Ryan and Joseph Hight of the U.S. Department of Labor. A number of other staff members at the U.S. Department of Labor provided data and extremely useful comments throughout the project. These included Stephen Wandner, Ray Uhalde, James Manning and Michael Miller.

We also want to thank Professor Ronald Oaxaca at the University of Arizona and Professor Carol Taylor West at the University of Florida for their suggestions, comments, and criticisms in early stages of the project. Their assistance is gratefully appreciated.

The excellent work of Sara Johnson at Data Resource Inc. (DRI) was critical to the success of this project.

A number of individuals at Metrica, Inc. also contributed to the report. Carlton Hubbard provided research assistance throughout the project, and Joan Lovan and Ronda Daniel oversaw the production of the Final Report.

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Summary of the Report

SUMMARY OF THE REPORT

This report presents an analysis of the effect of the unemployment insurance program as an automatic stabilizer and of recent changes in that effect. The report discusses the theoretical reasons that would enable the UI program to stabilize, to some extent, the business cycle; then presents some previous empirical evidence of this effect. It reviews the empirical literature concerning the ability of UI to act as a stabilizer. The report describes the methodology that is used to estimate the effect of UI and discusses the results of the estimation.

1. A possible benefit of the unemployment insurance program is its role as an automatic stabilizer. In recessions, the payments of benefits and reduction in taxes would increase expenditure above what it otherwise would be and consequently smooth out the recession. In an expansion, the increase in taxes and reduction in benefits would reduce expenditure, thereby dampening the expansion and reducing the rate of inflation.
2. The magnitude of the stabilizing effect is an empirical question. Thus far, the empirical evidence has been mixed.
   a. The UI surpluses and deficits have moved in the right direction for an automatic stabilizer. Surpluses have generally come in expansions and deficits in recessions.
   b. The business cycle has changed, becoming generally smoother. The effect of this change on the ability of UI to act as a stabilizer, however, is unclear. One possible effect may be the decline in the number of unemployed who receive UI benefits, which would reduce the stabilizing effect. On the other hand, the smoothing of the business cycle may reduce the need for automatic stabilizers.
   c. A review of relevant literature reveals that empirical evidence concerning the ability of the UI program to act as a stabilizer is mixed. Evidence concerning income and

expenditure probably points to a decline in the effect. Evidence of a decline from labor force data is stronger, but not totally convincing. Labor force data indicate a decrease in the ratio of insured unemployed to total unemployed, a decline in the ratio of recipients to jobs covered, and a decline in workers covered and those receiving benefits. These decreases may be due to the changing nature of the work force, migratory patterns, and the changing business cycle. All the declines would reduce the ability of UI to act as a stabilizer. Nonetheless, it should be emphasized that the previous evidence is not overwhelming.

3. The conclusions that can be drawn from preliminary descriptive statistics are somewhat mixed. Some of the statistics indicate a recent decrease in the ability of UI to act as an economic stabilizer, particularly during a recession. Examples are the decline in the insured unemployment rate relative to the total unemployment rate and the decrease in benefits paid relative to total wages from the 1970s to the 1980s, and the decrease in correlations of UI benefits, taxes and deficits with economic activity. A small amount of preliminary evidence points to little or no change. Thus the available evidence seems to be rather heavily weighted toward a recent decrease in effectiveness.
4. A vector autoregressive (VAR) model was used to determine if there are any changes in the effects of the UI system on the economy. The evidence indicates that a marked change in the effects of the system occurred between the 1970s and 1980s.
5. Finally, and most importantly, a DRI econometric model of the economy was used to examine any changes in the effectiveness of UI as a stabilizer, and determine the magnitude of the change. Evidence from simulations of the DRI model after an imposed monetary shock on the economy was much more conclusive than the preliminary statistics. This evidence indicates that the UI program in the 1980s was about two-thirds as effective

as a stabilizer as it was in the 1970s. In the 1970s the UI system could offset 5.4 percent of the maximum loss in real GNP or 4.9 percent of employment losses from a recession caused by a monetary shock, whereas currently it could only offset 3.7 percent of this loss in GNP or 3.5 percent of the employment loss caused by a recession from a similar monetary shock. This decrease in the percentage of job losses prevented during the peak of a recession translated to a saving of 42,000 jobs in the 1970s and to a saving of 31,000 jobs in the 1980s. If the performance of UI in the 1990s is reflected by its performance in the 1980s, UI payments would only offset 2.9 percent of the loss in GNP during the peak loss of a recession caused by a monetary shock.

A simulation of the current recession indicates that the UI system could offset 4.2 percent of the maximum loss in GNP if the recession is severe and 2.3 percent of the loss in employment during the quarter of maximum GNP loss under that scenario. This reduction translates into a 115,000 reduction in the number of jobs lost.

6. The evidence from this report, taken as a whole, indicates that the UI system does act as an economic stabilizer although to a relatively minor extent. The evidence is quite strong that a diminution in the ability of UI to act as a stabilizer, in the sense of reducing the decrease in GNP and the number of jobs lost during the peak of a recession, took place during the 1980s.

Chapter 1
Introduction

CHAPTER 1
INTRODUCTION

The unemployment insurance (UI) program was established under federal and state law in 1935 to provide individuals with temporary income maintenance during periods of involuntary unemployment while they are searching for alternative employment. These payments are financed primarily through taxes on employers. Presently, about 97% of all wage and salary workers are covered.

Another aspect of the UI program that has gained prominence is its effect as an automatic stabilizer. Many economists and public officials believe that unemployment compensation payments can mitigate recessions by sustaining consumption, and therefore spending, when unemployment is relatively high. Because total spending during periods of high unemployment does not fall as much as would otherwise be the case, the recession is cushioned. During an expansion, when unemployment is reduced, UI payments decline. Some have also suggested that the UI program stabilizes employment because taxes on employers are countercyclical. An increase in employers' taxes during an expansion, when employment is relatively high, can slow down the expansion, thereby limiting some of the inflationary effects. Alternatively, the lower taxes paid by employers during a recession, when unemployment is relatively high, should have the opposite effect. Business spending would be stimulated by the lower taxes, thereby mitigating the recession somewhat. The effects of the payments to the unemployed during recessions and the varying taxes paid by employers should, theoretically, smooth out the business cycle.

The purpose of this study is to analyze the effectiveness of UI as an economic stabilizer in today's economy and determine whether there has been any change in the effectiveness in recent years. To accomplish this objective, we will estimate the dynamic impact of UI on key macroeconomic variables for the period from 1970 to 1989 and also provide a forecast for the period 1991 to 2001. In addition to measuring the countercyclical effects of the UI program at the national level, estimates of the countercyclical effectiveness of the UI program for selected states are computed.

The actual effect of the UI program as an automatic stabilizer is a complex topic. Both the program itself and the types of participants in the program have changed over time. The impact of such changes must be considered in order to fully evaluate the stabilizing effect of UI. The nature of the business cycle has changed as well, which should certainly be considered when analyzing the effect of UI on the economy. Because changes in the business cycle are so important, this study begins with an analysis of the U.S. business cycle. Chapter Two presents a survey of selected research examining changes in the business cycle, focusing to some extent upon the way such changes could affect the impact of UI on the economy.

In Chapter Three, we will briefly discuss the theoretical relationship between UI and the business cycle in order to describe the conditions under which the program would act as an automatic stabilizer. Chapter Three also presents some empirical information that characterizes trends in the UI program. Chapter Four presents a review of the major theoretical and empirical literature relating to the effectiveness of the unemployment insurance program as an economic stabilizer. The survey itself is divided into two sections: (1) The Effect of UI: Aggregate Income and Expenditure; and (2) The Effect of UI: Labor Force Behavior. Particular attention is paid to recent changes in the effects of UI, due to changes in the program, changes in the participants, and changes in the business cycle. As will be apparent, the evidence from the literature is not clear cut.

Chapter 5 begins the empirical analysis of the effect of UI on the business cycle by presenting some descriptive statistics. It first discusses changes in the relation of the insured unemployment to the total unemployment rate and presents some analysis of these changes. It then shows how UI benefits, taxes, and deficits are related and discusses the correlation of these variables with cyclical movements in the economy.

Chapter 6 sets forth a vector autoregression model of the economy and selected states. This model is used to test whether any changes have occurred in the UI system that would affect its ability to stabilize the economy.

A simulation analysis of the effectiveness of UI as a stabilizer and any change in the effectiveness is presented in Chapter 7. This analysis uses the DRI

econometric model of the economy to compare the effect of an exogenously imposed monetary shock on the economy with and without the UI system. It also uses this forward-looking model to simulate the effect of UI as a stabilizer in the 1990s and in the current (I/1991) recession. A principal purpose of the analysis is to determine whether or not there have been recent changes in the effectiveness of the UI system. The conclusions of the report are presented in Chapter 8.

Chapter 2
The U.S. Business Cycle

CHAPTER 2
THE U.S. BUSINESS CYCLE

Because this report is concerned with the effect of UI on the business cycle and with any recent changes in that effect, we begin with a discussion of the nature of U.S. business cycles and some recent changes in the cycles. Certain of these changes appear to have reduced the ability of UI to act as an automatic stabilizer. On the other hand, changes in the cycle may have reduced the need for automatic stabilizers. This chapter summarizes some important recent literature on the subject.

Over the past half century the study of business cycles has gained in technical complexity and sophistication. Zarnowitz, in a series of review articles (1985, 1989), summarizes some of the pertinent facts that characterize these movements in the economy. Although the fluctuations vary greatly in amplitude and scope, as well as duration, he observes that they also have much in common. Business cycles are national, often international, in scope. Business cycles show up simultaneously in many different processes, not just in total output, employment and unemployment. They are persistent -- lasting, as a rule, several years, i.e., long enough to permit the development of cumulative movements in the downward as well as upward direction. Moreover, for all their differences, Zarnowitz states that business expansions and contractions consist of patterns of recurrent, serially correlated, and cross-correlated movements in many economic activities. They dominate changes in the economy over spans of several years, in contrast to the seasonal and other variations which generally last a year or less.

Zarnowitz presents evidence illustrating the changes that have taken place over the past 100 years. He observes that peacetime expansions in the United States averaged about three years in the last half-century, but only two years in earlier periods. Moreover, each of the wartime expansions was much longer. Contractions, he notes, have lasted about one year since 1933 and about twice as long in earlier periods. The conclusion from this analysis was that there has been a shift toward longer and more variable expansions and shorter and more uniform contractions.

Furthermore, the amplitudes of cyclical expansions vary as much as their durations. On the whole, the conclusion is that recessions are now not only shorter, but also shallower and less diffused (Zarnowitz 1985).

In a more recent study, Zarnowitz (1989) suggests a number of reasons for these changes. First, U.S. output and employment have been shifting from goods to services. In 1969, employment in trade, finance, insurance, and other service industries that are generally "noncyclical" was 19 percent of total U. S. employment; in 1979-81, the comparable figure was 45 percent. The reason services are relatively noncyclical is that the demand for services, which cannot be stored, is much less sensitive to changes in income than the demand for manufactured goods, which can be stored. Purchases of durable goods can be postponed. Moreover, spending on services never fell between 1948 and 1982. Thus, the shift to services has made GNP and employment less volatile.

Zarnowitz also observes that wages and prices have become less flexible downward in the last 50 years. One reason given is long term contracts. In general, the flexibility of relative prices and wages tends to moderate business cycles. Before World War II, wages would fall during recessions, thus aggravating slumps in demand. Since then, because wages are less flexible, workers' spending power is not reduced as much, and, consequently, the reduction in demand is not as severe. Moreover, prior to World War II, the severe downturns were, in general, made worse by financial crashes. Now bank deposit insurance and central bank cooperation help to divert such financial panics.

Zarnowitz also suggests that the expectations of consumers and businessmen affect the cycle. Recessions became mild and short, he observes, in part because consumers and businessmen expect them to be so, which reduces their need to cut back their spending when times take a turn for the worse. This observation is of course qualified by the recognition that not all recent developments built confidence and promoted growth in this way: the rise of inflation in the 1970s and the subsequent disinflation in the early 1980s, he notes, worked in the opposite direction for a while.

The final factor Zarnowitz mentions that has aided in changing the character of the business cycle is the government. Government, and hence government employment, which does not shrink in recessions, has grown much larger and more important to the economy over the century. Government employment was 4 percent of total U.S. employment 100 years ago and is approximately 19 percent today. Thus a sector that is not susceptible to the business cycle has become much more important, causing a larger segment of the economy to become "cycle proof". As we will discuss in Chapter 4, these moderations in the business cycle may have important implications for recent changes in the proportion of the unemployed receiving UI benefits and therefore for changes in the effect of UI as a stabilizer.

This survey now turns to research that sheds information on the nature of those forces that affect the economic cycles of expansion and recession. Lilien (1982) argues that, unlike the natural rate of unemployment hypothesis in which cyclical unemployment is viewed as a deviation from some relatively stable natural rate, as much as one-half of the variance of unemployment over the postwar period can be attributed to fluctuations of the natural rate itself. Lilien also suggests that sectoral shifts in demand have more recently played a role in inducing a general economic downturn and general increase in the rate of unemployment. These shifts in demand took the form of a shift from durable manufacturing to retail sales and services. He observes that, rather than occurring smoothly, three distinct shocks characterized the change: durable manufacturing's share of total employment, he observes, fell by 12.6 percent in 1970-71, by 9.1 percent in 1975, and by 5.3 percent in 1980. These three periods of falling employment in durable manufacturing coincided with the three cyclical increases in unemployment over the decade: The annual unemployment rate increased 2.4 percentage points in 1970-71, 2.9 percentage points in 1975, and 1.3 points in 1980. In all three downturns, employment actually rose in retail trade and service industries.

Lilien's explanation for the general increase in unemployment caused by these shocks is that such a major, sectoral shift in demand caused more workers to remain unemployed than would have been the case had the demand shift been between firms in similar industries or between similar types of industries. He notes, "If workers

have strong firm or industry attachments, due in part to firm- and industry-specific skills and to wage premiums associated with seniority, they are reluctant to seek employment in other sectors of the economy. Thus the process of adjustment to sectoral shifts tends to be slow and typically involves significant unemployment before labor adjusts fully to new patterns of employment demand." The conclusion is that the increase in the unemployment rate was not due to a lack of aggregate demand but to a shift in demand between different sectors of the economy.

The policy implications of Lilien's work are of particular interest. His findings suggest that much of the unemployment of the seventies could not have been avoided through aggregate monetary and fiscal policies. Such policies may have been successful in delaying or smoothing the change in the pattern of unemployment, but, because inadequate demand was not the source of unemployment, aggregate demand policies were not a cure. If this is the case, and Lilien presents evidence that it is, unemployment insurance would also have had little effect as an economic stabilizer during this period. Certainly, UI eased the transition of workers from declining to growing sectors of the economy. However, since lack of aggregate demand was not the problem, any impact of UI on aggregate demand would not have lessened the unemployment problem to any great extent, if in fact Lilien's thesis is correct.

Other noncyclical factors probably increased the unemployment rate recently. For example, the composition of the labor force shifted toward greater participation by women and teenagers, groups with relatively high rates of labor market turnover.

Finally, when discussing trends in severity of recessions, Zarnowitz and Moore (1986) observe that, although the recession of 1981-82 had the highest rate of unemployment (10.8%) since the great depression, the increase in the unemployment rate in 1981-82 from the previous year was not particularly large, and by this measure the 1974-75 recession was more severe than the 1981-82 recession. They argue that the change in, rather than the level of, unemployment is the critical indicator of relative cyclical performance. The level attained during a recession is influenced in part by the level reached during the preceding expansion. This indication of a possible smoothing of the business cycle or lessening of the effect of recessions will be useful later in explaining changes in the take up rate of UI and consequently possible changes in its effect as a stabilizer.

Delong and Summers (1986) put forth some interesting ideas explaining the noted differences in characteristics of business cycles in the pre- and post- World War II periods. They observe that it is frequently suggested that automatic stabilization in the form of a progressive tax system and countercyclical expenditure measures, such as unemployment insurance, have enhanced economic stability by reducing the multiplier. However, they note that recent evidence suggests that this explanation may be less than satisfactory. Ignoring the effects of tax rates on people's behavior, Delong and Summers suggest that automatic stabilization policies will have important real effects only if a sizable fraction of consumption represents purchases by consumers who, in the absence of the stabilizers, would be constrained by their available liquidity and be forced to reduce their consumption significantly. Thus, according to the authors, establishing the existence of liquidity-constrained consumers during a recession is necessary to demonstrate the efficacy of automatic stabilization policy. They go a step further and suggest that perhaps the multiplier has changed over time because the fraction of liquidity-constrained consumers has declined due to the growth in the availability of consumer credit. Concerning the first point, they conclude that it is difficult to gauge the postwar extent of liquidity constraints. Their results suggest that some, but not all, consumers were liquidity constrained. However, they also note that progress in financial intermediation may have contributed to stability by enhancing the consumer's ability to smooth fluctuations in income by borrowing.

To summarize, it appears that the business cycle has become somewhat smoother. Some of the change is probably due to the changed composition of the labor force: relatively more employment in services and relatively less in manufacturing; more women and teenagers in the work force; and fewer liquidity constrained consumers during a downturn. In the next chapter, we will discuss how these recent changes may have affected the ability of unemployment insurance to act as an automatic stabilizer.

Chapter 3
The UI Program as an Automatic Stabilizer

CHAPTER 3
THE UI PROGRAM AS AN AUTOMATIC STABILIZER

As noted in the introduction to this study, unemployment insurance would act as an automatic stabilizer because of two effects: the effect upon the consumption of those who receive UI benefits and the effect upon the taxes of employers who pay UI taxes. These effects would tend to reduce the severity of recessions, thereby reducing unemployment; and dampen the strength of expansions, thereby reducing the rate of inflation. These effects would be automatic, because no legislative intervention is necessary. We now will discuss these effects in somewhat more detail.

Turning first to the consumption effect, when workers become unemployed, obviously their income is reduced. The automatic payment of unemployment insurance restores part of that lost income, at least for a while. Therefore, worker income is higher than it would be in a recession without UI benefits. To the extent that the higher income from the benefits is used to make up the otherwise reduced consumption spending, total spending in the economy is higher with UI than without it. This increase in spending can reduce the severity of a recession, when many workers are unemployed.

For the UI benefits to be stabilizing, the payments would have to be translated into increased spending. Some might argue that life-cycle and permanent-income theories of consumption predict that these payments would not have much effect on consumption spending (Ando and Modigliani 1953; Friedman 1957; Hall 1978). According to these theories, consumption depends not upon temporary income but on lifetime wealth or income. This hypothesis would suggest that a temporary loss of income from being unemployed, or any UI benefits received, would have little effect on the total wealth of households, and if this is the case, UI would not have much impact on consumption or the economy's fluctuations.

There is, however, a problem with this line of reasoning: these theories relate consumption, not consumption spending, to lifetime wealth. Current consumption includes the services provided by durable goods, such as automobiles or appliances,

that were previously purchased. Current consumption expenditure is made up of the current purchases of all goods, both durable and non-durable. Consumption expenditure may very well depend much more on current income than does consumption.

Another assumption made in modern theories of consumption is that a household's consumption is not constrained by its current income. The reason given for the absence of a constraint is that households may borrow or draw upon liquid assets when income is low and repay the loan or reaccumulate liquidity when income is high. This may be accurate for some people, but it hardly seems to apply to most unemployed, especially during long periods of unemployment. Unemployed workers are unlikely to be able to borrow much, and certainly not at the same interest rate as would be the case if they were employed. Many unemployed will have few liquid assets.

There is some evidence that unemployed workers are constrained by a reduction in income. Hall and Mishkin (1982) found that food purchases of a large number of households in their data set were reduced by unemployment. They found that the consumption of many households was constrained by their income. A survey by Hubbard and Judd (1986) turned up similar evidence.

It would appear then that modern consumption theories, such as the permanent income hypotheses, do not imply that UI benefits have a zero effect upon the consumption spending of unemployed workers. What these theories do imply is that the effect on spending may be dampened somewhat, to the extent that the benefits are used as a substitute for other sources of funds for spending. Any dampening of the effect of UI on consumer spending reduces its effectiveness as an automatic stabilizer.

Just like the income tax, the UI tax can be an automatic stabilizer in an expansion. Total UI tax revenue depends on the employment and tax rate. These tax revenues decrease when fewer workers are employed during a recession and increase as workers are hired during an expansion. This increases the spending of business firms above what it otherwise would have been in a recession. The increase in taxes paid during an expansion reduces firms' expenditure above what it otherwise

would have been. If firms spend more on, say, investment in a recession, total income increases, and therefore unemployment decreases. If firms spend less in an expansion, inflation is reduced.

Furthermore, due to the methods of funding that most states use for UI, tax rates are likely to be relatively low during the early stages of a recession when the state's trust fund is large, because relatively fewer benefits were paid during the preceding expansion when unemployment was low. Alternatively, these trust funds are drawn down by more unemployment benefits during the recession. The increase in tax rates to replenish the fund can come after the recession is largely over or even during the following expansion. To the extent that UI tax rates are lower in a recession and higher in an expansion, the spending of firms is increased in a recession and decreased in an expansion. The difference in tax rates could have an additional effect. A firm's marginal cost of employing workers (the wage plus the unemployment tax) falls during a recession and rises in an expansion. This effect would tend to increase employment during recessions and decrease employment during expansion.

It is rather clear that it is theoretically possible, even highly probable, that the UI program acts as an automatic stabilizer. The magnitude of the stabilizing effect is an empirical question. An interesting piece of information is the timing of the benefits and taxes. To be effective, benefits should rise and tax receipts fall during a recession, while receipts rise and benefits fall during an expansion. Table 1 gives some evidence to this effect.

The table shows unemployment insurance taxes collected, benefits paid, and the corresponding surplus or deficit from 1950 through 1987, in nominal and real dollars. As can be seen in the table, excluding the peak years of 1960 and 1981, the deficit moves countercyclically, being relatively high in the various recessions during this period, while turning to a surplus during periods of low unemployment. Moreover, even for the two peak years that showed a deficit, the deficits are smaller than in the previous year. At least the difference was moving in the right direction. The difference between benefits paid and taxes collected ran a deficit during each of the eight postwar recessions. For each recession, the annual program deficit was greatest

TABLE 1

Unemployment Taxes and Benefits

Year	Taxes Collected (nominal in billions)	Benefits Paid (nominal in billions)	Deficit or Surplus (nominal in billions)	Taxes Collected (1967 $ in billions)	Benefits Paid (1967 $ in billions)	Deficit or Surplus (1967 $ in billions)
1950 T[1]	1.094	1.862	(0.768)	1.518	2.583	(1.065)
1951	1.365	0.873	0.492	1.754	1.122	0.632
1952	1.432	0.991	0.441	1.800	1.245	0.555
1953 P	1.368	0.913	0.455	1.706	1.139	0.567
1954 T	1.246	1.589	(0.343)	1.548	1.975	(0.427)
1955	1.142	1.760	(0.618)	1.423	2.193	(0.770)
1956	1.329	1.282	0.047	1.632	1.574	0.058
1957 P	1.537	1.504	0.033	1.825	1.786	0.039
1958 T	1.500	2.875	(1.375)	1.734	3.323	(1.589)
1959	1.675	2.790	(1.115)	1.918	3.195	(1.277)
1960 P	2.165	2.356	(0.191)	2.443	2.658	(0.215)
1961 T	2.361	3.509	(1.148)	2.636	3.917	(1.281)
1962	2.709	2.778	(0.069)	2.989	3.065	(0.076)
1963	3.005	2.789	0.216	3.275	3.039	0.236
1964	3.043	2.642	0.401	3.273	2.842	0.431
1965	3.046	2.303	0.743	3.225	2.438	0.787
1966	3.062	1.901	1.161	3.148	1.954	1.194
1967	2.911	1.963	0.948	2.912	1.963	0.949
1968	2.598	2.055	0.543	2.494	1.972	0.522
1969 P	2.556	2.021	0.535	2.327	1.840	0.487
1970 T	2.558	2.783	(0.225)	2.199	2.393	(0.194)
1971	2.573	4.800	(2.227)	2.122	3.958	(1.836)
1972	3.210	4.804	(1.594)	2.563	3.835	(1.272)
1973 P	4.996	4.006	0.990	3.755	3.011	0.744
1974	5.220	5.978	(0.758)	3.533	4.046	(0.513)
1975 T	5.211	11.754	(6.543)	3.232	7.290	(4.058)
1976	7.532	8.973	(1.441)	4.418	5.263	(0.845)
1977	9.171	8.345	0.826	5.052	4.597	0.455
1978	11.212	7.710	3.502	5.737	3.945	1.792
1979	12.089	8.865	3.224	5.560	4.077	1.483
1980 P-T[2]	11.415	13.768	(2.353)	4.625	5.578	(0.953)
1981 P	11.625	13.256	(1.631)	4.268	4.867	(0.599)
1982 T	12.112	20.358	(8.246)	4.189	7.041	(2.852)
1983	14.489	17.720	(3.231)	4.855	5.938	(1.083)
1984	18.750	12.593	6.157	6.026	4.047	1.979
1985	19.258	14.101	5.157	5.977	4.377	1.600
1986	18.111	15.403	2.708	5.515	4.691	0.824
1987	17.568	13.603	3.965	5.188	4.017	1.171

Source: Unpublished Unemployment Insurance Data; and the National Bureau of Economic Research.

(1) The "T" indicates the Trough of a Business Cycle, and the "P" references the Peak of a Business Cycle.
(2) In 1980, the previous expansion peaked in January of that year and a new recession immediately followed with a trough in July 1980. Hence the notation P-T indicates a peak and trough in the same year.

in the fiscal year in which the business cycle reached a trough, or in the following year. Thus, based upon the timing of the deficits and surpluses, UI, in general, is countercyclical.

Alternatively, Edgell and Wandner (1974) suggest that the countercyclical effect is not simply the presence of a deficit or surplus but the change in the deficit or surplus from one period to another. This change could be a better measure of UI's stabilizing effect than the deficit or surplus itself. For example, consider those years in which a recession occurred during the period shown in the table. In 1970, the program went from a $535 million surplus to a $225 million deficit, for a net stimulus of $760 million (nominal dollars). In fiscal 1975, the deficit increased from $758 million to $6,543 million, for a net stimulus of $5,785 million. In 1982, during the last recession, the deficit in the program increased from $1,631 million to $8,246 million, for a net stimulus of $6,615 million. By these measures, the net stimulus in a recession can be more or less than just the deficit itself, depending on the state of the program during the preceding year.

An alternative statistic for examining the countercyclical effects of UI is benefits paid, as a percent of total wages in covered employment, shown in Table 2. As can be seen in the table, this statistic moves countercyclically. As expected, it is, in most instances, higher in recession years and lower during years of low unemployment. This statistic was greater than 2 percent in only two of the post World War II recessions, 1958 and 1975. As shown in the table, the other recession years when this percentage was greater than 1.5 were 1961 (1.72%), and 1982 (1.72%).

The UI program has changed somewhat during the past 30 years. The coverage of the program has increased, while the insured unemployment rate has decreased relative to the total unemployment rate. Nonetheless, the program deficit and surplus and the change in the deficit and surplus continue to perform as expected. Moreover, the ratio of benefits paid, as a percent of total wages in covered employment, exhibits a countercyclical pattern and shows no clear pattern of increase or decrease over time. With this bit of evidence in mind, we now will examine some more specific empirical evidence of the countercyclical effect of UI insurance in the next chapter.

TABLE 2

Unemployment Insurance Benefits Paid As a Percent of Total Wages In Covered Employment

Year	Percent of Benefits Paid To Total Covered Wages	Year	Percent of Benefits Paid To Total Covered Wages
1950 T[1]	1.330	1969 P	0.580
1951	0.710	1970 T	1.010
1952	0.780	1971	1.230
1953 P	0.690	1972	0.980
1954 T	1.480	1973 P	0.790
1955	0.910	1974	1.070
1956	0.840	1975 T	2.030
1957 P	1.000	1976	1.390
1958 T	2.050	1977	1.160
1959	1.220	1978	0.930
1960 P	1.400	1979	0.940
1961 T	1.720	1980 P-T[2]	1.340
1962	1.260	1981 P	1.170
1963	1.240	1982 T	1.720
1964	1.050	1983	1.430
1965	0.840	1984	0.920
1966	0.620	1985	0.950
1967	0.690	1986	0.980
1968	0.610	1987	0.800

Source: U.S. Department of Labor Handbook of Unemployment Insurance Financial Data.

(1) The "T" indicates the Trough of a Business Cycle, and the "P" references the Peak of a Business Cycle.

(2) In 1980, the previous expansion peaked in January of that year and a new recession immediately followed with a trough in July, 1980. Hence, the notation P-T indicates a peak and trough in the same year.

Chapter 4
The Countercyclical Effects of UI: A Review of the Literature

CHAPTER 4
THE COUNTERCYCLICAL EFFECTS OF UI: A REVIEW OF THE LITERATURE

The literature dealing with the countercyclical effect of the UI program falls into two categories: papers concerned with the effect of UI on aggregate income or expenditure and papers concerned with the effect on labor force behavior. We will examine in turn the important papers in each category. Then we will discuss some papers that examine the way changes in the business cycle may have also affected labor force behavior and the effect of unemployment insurance.

Countercyclical Effects of UI: Aggregate Income or Expenditure

Several papers have attempted to measure the countercyclical effect of the UI program on aggregate income and expenditure. In one of the earliest of these papers, Lester (1960) attempts to measure the earnings loss from unemployment and to estimate the extent to which that loss was compensated by unemployment insurance from 1948 through 1959. Of particular interest here is the part of the paper that deals with compensation for recession induced wage loss for workers in the sector covered by unemployment insurance. Specifically, he examines the question of how much earnings loss caused by the recession was met by the additional benefit payments from recession unemployment. Although the quality of later analyses of this same question is more sophisticated, Lester's findings are instructive and many remain valid today. For example, investigating the cyclical variation in the compensation rate, he concludes that the unemployment compensation reaches its maximum effectiveness during the first half year after the recession commences. This finding remains consistent with that of later researchers who observe that benefit payments are highest in the trough of the recession. For our purposes, his main finding of interest was that the benefits for the unemployed, under the regular state and railroad unemployment compensation programs, at most, offset no more than 20 percent of the wage loss from total unemployment. Moreover, if those who suffer from partial unemployment are included, the percentage drops to about 15 percent.

Clement (1960) finds that automatic stabilizers, in general, can prevent up to 50% of the downswing in national income during a recessionary phase and up to 30% of the upswing in national income during an expansionary phase. Although this is quite an impressive finding, the study looks at automatic stabilizers as a whole, not just the unemployment compensation program. The time period covered is from 1948, quarter I, through 1957, quarter II. The effects were estimated as the change in national income divided by the change in transfer payments.

Eilbott (1966) also studies the effectiveness of automatic stabilizers in general on dampening income changes. He determines the percentage of potential income changes prevented by the presence of automatic stabilizers during both recessionary and expansionary phases of the economy using data from 1948 through 1960, a period which includes three expansions and three recessions. He basically calculates the percent change in national income (over time), going from no stabilizers to the presence of stabilizers, thus yielding a measure of potential change in income prevented by the presence of automatic stabilizers. His results indicate that stabilizers are extremely effective. During recessions, the potential percent change in national income prevented ranged from 27% to 56%, while during expansions the potential percent change in national income prevented ranged from 22% to 45%. The calculations of these results are based upon an assumption that the levels of government spending on goods and services do not change, which may not be very realistic, but was necessary in order to do the study. He notes this in his conclusion and says that, during expansions, the countercyclical effects are offset by increased government spending. Eilbott also finds that if the unemployment compensation system were strengthened, the effectiveness of unemployment compensation as an automatic stabilizer could be increased.

Rejda (1966) examines unemployment insurance alone as an automatic stabilizer. He finds that unemployment compensation offsets between 8% and 28% of the decline in national income during a recessionary phase and up to 3% of the increase in national income during an expansionary phase. Thus the effect during an expansion is not nearly as large. The time period considered is from October 1945 to March 1964. He breaks this time period up into recessionary and expansionary phases and calculates his results in much the same way as Clement.

Rejda also looks at the stabilizing effect of the unemployment tax on employers. He finds that sometimes, although not always, employer contributions to the unemployment system decrease with respect to total wages paid during recessionary phases, and that sometimes taxes increase during expansionary phases. Since he found this to occur only "sometimes", the reliability of his finding that the employer tax acts as an automatic stabilizer is questionable. Therefore, he performs a correlation study and finds evidence consistent with such an effect. He concludes by saying, "The empirical evidence suggests that unemployment taxes, even if they should move in the proper contra-cyclical direction, are not significantly important as an automatic stabilizer. However, the data also suggest that they are not automatic destabilizers,...".

Smyth (1966) also analyzes the countercyclical effect of taxes during the post war period to 1966. He calculates a measure of the stabilizing effectiveness of built-in flexibility that specifically takes account of the dynamic structure of the economy. The measure he suggests is the extent to which the standard deviation of income is reduced by the built-in flexibility of taxation. A "flexible" tax is one that increases as income increases and decreases as income decreases. Such a tax works in much the same way as the employer contribution to the unemployment fund -- the more employees, the higher the tax. If SD(y) equals the standard deviation of income without the built-in flexibility of taxation, and $SD(y^1)$ that of income with built-in flexibility, then his measure is represented as

$$M = \frac{SD(y) - SD(y^1)}{SD(y)}$$

Smyth estimated values of M=.22 for Australia and .33 for the United States. This means that having tax rates that are flexible reduces the standard deviation of income fluctuations in the United States by 33% and in Australia by 22%.

Thirlwell (1969) applies a method similar to Smyth's to unemployment compensation to examine its effectiveness as an automatic stabilizer. Thirlwell looks at the sensitivity of unemployment compensation in relation to gross domestic product (GDP) and personal disposable income (PDY) in the U.K. over the time

period 1955 to 1966 using quarterly data. The estimates are given in the following table:

BUILT-IN FLEXIBILITY DURING RECESSION AND RECOVERY PERIODS

	Recessions		Recoveries	
	1957-II to 1959-I	1961-IV to 1963-I	1959-I to 1961-IV	1963-I to 1965-IV
Sensitivity (w.r.t. GNP)	-0.0153	-0.0331	-0.397	-0.0447
Sensitivity (w.r.t. PDY)	-0.0208	-0.046	-0.0621	-0.0479

The results indicate that unemployment compensation is "not a powerful countercyclical device" and that taxes are a more powerful automatic stabilizer. For example, in the recession 1957-II to 1959-I the sensitivity of unemployment compensation with respect to gross domestic product is approximately .015, indicating that the effect of unemployment compensation on GDP was only about 1.5% during this period. As the table shows, unemployment compensation is marginally more sensitive to changes in personal disposable income than it is to changes in gross domestic product. Furthermore, the effect of unemployment compensation on national income swings was marginally larger during recoveries than during recession.

Thirlwell noted that previous, similar calculations by others for America give the impression that automatic variations in unemployment compensation have had a greater impact on stability in the United States than in the United Kingdom, at least in recessions. Thirlwell noted two possible reasons for the varying results between the two countries are: (1) U.S. unemployment compensation was a larger percentage of U.S. gross domestic product than was U.K. unemployment compensation to the U.K. gross domestic product, and (2) the U.S. had a higher unemployment rate than the U.K. during the period. Thirlwell concludes that decreases in personal disposable

income are not due to losses of employment, but due to lost overtime, failure to register as unemployed, and ineligibility for unemployment benefits.

The main difference, however, in the papers by Smyth and others and Thirlwell is that Thirlwell computes what can be referred to as benchmarks. These benchmarks provide an indication of what certain variables would have been had there not been a recession or recovery. The purpose of these benchmarks is to enable a distinction to be made between trends and cyclical effects on the variables being studied. Cyclical data were differenced in relation to these benchmarks rather than with the opposite end of a business cycle. This important departure from previous analyses is most likely the cause of the major discrepancy between this and other studies.

Palomba (1968) uses a measure suggested by Friedman (1955) to examine whether the UI program is stabilizing. This method defines Z_t as the Gross National Product (GNP) in any quarter t, in the presence of the unemployment compensation program, X_t = GNP in any quarter t, in the absence of the unemployment compensation program, and Y_t = the net deficit or surplus from the UI program. That is, Y_t is equal to unemployment benefits multiplied by a transfer payment multiplier minus unemployment collections multiplied by a tax multiplier. By definition then,

$$Z_t = X_t + Y_t,$$

where

$$Y_t = M_\Theta B_t - M_t T_t,$$

M_Θ and M_t are, respectively, the transfer payment and the tax multiplier, and B_t and T_t are, respectively, the benefits and taxes in period t.

According to Palomba, in order to have a stabilizing effect on GNP, the unemployment compensation program must withdraw income from the economy in an upswing and pump income into the economy during a downswing. In terms of the above equation, the variance of $Z(\sigma_z)$ must be less than the variance of $X(\sigma_x)$, if the UI program is to be stabilizing. Using data from the period 1948-I to 1964-IV,

Palomba concludes that unemployment benefits have operated and will continue to operate in a stabilizing manner during business cycles of the type such as 1948-IV to 1953-II when unemployment was low. However, during cycles in which the unemployment level is high throughout the cycle (such as 1953-II through 1957-III), we can expect unemployment benefits to remain high over the entire cycle and the stabilizing effect of UI to be less important.

Von Furstenberg (1976) examines the cyclical variation of UI benefits and their relationship to fluctuations in the economy. He divides average weekly benefits, covered employment, and the insured unemployment rate by total benefits paid. He then estimates regressions for each of these variables for 1955 to 1974. Besides variables to reflect changes in the programs, the major variables were the current and the prior year's unemployment rate and a time trend. Not surprisingly, the results indicate that the insured unemployment rate is procyclical and covered unemployment is countercyclical. In addition, he finds that average weekly benefits increase when unemployment is high and decrease when unemployment is low. This indicates that unemployment is concentrated among people with lower earnings, for example, younger or less skilled workers, when the unemployment rate is low and that people with relatively higher wages and therefore higher benefits, for example, more skilled workers, are unemployed when the unemployment rate is high. Holding constant the unemployment rate in the economy, he finds a negative trend in the insured unemployment rate and positive trends in covered employment and average weekly benefits. This suggests that a decrease in the insured unemployment rate was evident in the data almost a decade before the 1980s. Von Furstenberg also notes that, compared to cyclically sensitive taxes received by the federal government, the importance of UI benefits was not decreasing over time. He finds that unemployment insurance benefits were about 15 to 20 percent of the magnitude of the corresponding automatic changes in federal government tax revenue. It is interesting to note that von Furstenberg indicates that "it is disappointing that the elasticity of unemployment insurance benefits with respect to variations in the economy has not increased systematically over the last twenty years." (von Furstenberg 1976, p. 376).

In the process of estimating the government high-employment budget, the Bureau of Economic Analysis examines the cyclical sensitivity of UI benefits and taxes (de Leeuw et al. 1980; Holloway 1982; and de Leeuw and Holloway 1983). Later work has not altered the general picture drawn by de Leeuw et al. Just as von Furstenberg discovered, de Leeuw et al. find that average weekly benefits increase when unemployment is relatively high. They conclude this based on a regression of total regular benefits relative to annualized average weekly benefits per recipient on high-employment unemployment and the ratio of actual unemployment to high-employment unemployment. de Leeuw et al. (p. 23, p. 30) indicate that unemployment insurance benefits accounted for no more than about 10 percent of the automatic response of the budget to business fluctuations in 1979. de Leeuw et al. (1980, pp. 41-42) also conclude that the cyclical sensitivity of total benefits has increased because of increases in coverage, increases in benefits per recipient, and increases in the duration of benefits.

The cyclical sensitivity of UI taxes is based on the sensitivity of wages and salaries to deviations of the economy from high employment and on the elasticity of taxes with respect to employment and wages and salaries (de Leeuw et al. 1980). There is clear evidence of such sensitivity in the estimates, but unfortunately, they do not provide direct estimates of the importance of these taxes.

The most recent works that examine the countercyclical effects of the UI program are by Oaxaca and Taylor (1986) and McGibany (1983). Oaxaca and Taylor, using the DRI model of the national economy, estimate the effect of UI benefits as the difference between indicators of the strength of the national economy with and without UI. Specifically, they estimate GNP with unemployment benefits set equal to their historical levels. One minus the ratio of estimated national income without unemployment benefits to national income with unemployment benefits is the measure of effectiveness. The time period of these simulations is 1975 to 1976. They find that because UI spending is a minor source of total spending in the economy, its effects are quite small.

McGibany takes a different approach. His empirical work is based on the estimation of a small but completely specified model. From this model, impact

elasticities are estimated, and then used to calculate a measure of effectiveness. His models also incorporate a monetary sector and a government budget condition that provide avenues through which monetary reactions to disturbances in the goods sector and deficit financing can affect the measured effectiveness of UI. These factors, he notes, were completely ignored in all earlier studies that attempted to measure the effectiveness of the UI program as an automatic stabilizer. First, monetary reactions to fiscal policy, through interest rate changes, reduce the measured effectiveness of the UI program below that of aggregate demand models that incorporate only a goods sector. This results from the fact that the inclusion of a money sector allows interest rate movements, which affect investment and consumption and thus income. Second, subjecting aggregate demand models to a deficit financing condition marginally increases the measured effectiveness of the UI program by reducing interest rate changes in the models and increasing income through a wealth effect. In summary, according to McGibany, by not taking these factors into account, all earlier studies that attempted to measure the effectiveness of the UI program overestimated the program's effectiveness in recessions and underestimated its effectiveness in recoveries.

McGibany, in the tradition of Musgrave and Miller (1948), computes impact elasticities using a calculation similar to that of Eilbott. Moreover, McGibany calculates the elasticities using deviation from trends instead of measuring the stabilization effectiveness of the program as the percent of a potential change in the level of income. McGibany's measured effectiveness of the UI program in five post-war recessions is presented in Table 3. He finds the average potential change in income prevented by the UI program from 1955-1980 to be 14.21 percent, which is approximately the mean of the other studies. For specific recessions and recoveries, the measure varies from a maximum of 26.05 percent during the 1960 recession, to a minimum of 3.2 percent during the 1980 recession.

Countercyclical Effects of UI: Labor Force Behavior

Rather than using income as the basis for measuring UI's countercyclical effectiveness, some recent work has relied upon labor force data. For example,

TABLE 3

McGibany's Measured Effectiveness

Time Period	Overall Program	UI Benefits	UI Taxes
1955 - 1980	14.21%	12.51%	2.21%
1957:III - 1958:II	11.45%	11.27%	.23%
1960:II - 1961:I	26.00%	25.60%	.99%
1969:IV - 1970:IV	15.80%	14.66%	1.80%
1973:IV - 1975:I	15.30%	13.80%	1.98%
1980:I - 1980:III	3.20%	-5.44%	7.70%

Source: McGibany, James M., *An Econometric Analysis of the Stabilization Effectiveness of the Unemployment Insurance Program*, University Microfilms International, 300 N. Zeeb Road, Ann Arbor, MI 48106 (1983), pp. 40-72.

papers by Burtless (1983), Burtless and Saks (1984), and Burtless and Vroman (1985) are concerned with why the insured unemployment rate was so low during the 1981 recession relative to previous periods of high unemployment. The insured unemployment rate is defined as the ratio of (continued) claimants for regular unemployment insurance to the average number of persons in covered employment in four preceding quarters. The report by Burtless and Saks contains the major points made in the other papers. They find that since 1981, there has been a decline in the number of claimants of regular unemployment insurance payments relative to the number of unemployed job losers. They find that this decline is on the order of 25% compared to the 1968-1979 period. The number of recipients of regular UI benefits divided by the number of jobs covered by the UI system (hereafter referred to as IUR) has fallen relative to the traditional total unemployment rate (hereafter referred to as TUR). This decline has an additional effect because implementation of extended benefits is dependent upon the level of IUR, so not only are fewer people covered by UI, even fewer people are receiving extended benefits. This particular effect is compounded by another decrease in benefits: The federal supplemental compensation program, enacted in 1982, replaced a more generous program, and this program was phased out by 1985 legislation. The impact of all of these reductions in benefits is that the amount of income protection to individuals has been reduced. The authors then conclude that, as a result, the levels of countercyclical stimuli have fallen.

Burtless and Saks present further evidence illustrating this trend. For example, in fiscal year 1976, when only 7.6 million workers were unemployed, the U.S. spent approximately $31 billion (1982 dollars) on all UI programs. In fiscal 1982, when the number of unemployed averaged 10 million workers, less than $24 billion was spent on these programs. Furthermore, they note that the portion of the covered unemployed receiving benefits has declined substantially. In recent years these findings have raised questions about whether the state-federal system of unemployment insurance is continuing to provide the protection for unemployed workers that it did in earlier decades. For example, a number of individuals and organizations have suggested that these trends indicate the need for remedial policy

actions (see, for example, the testimony presented to the Government Operations Committee in 1986 -- U.S. Congress 1986).

Burtless and Saks suggest several reasons for these changes. Looking first at the period 1959-1979, IUR fell relative to TUR. This decline has been attributed to an extension of coverage in 1970 for a group who traditionally experience low unemployment rates. Additionally, there has been a compositional change in the work force since 1960. Many new entrants into the work force were teens, young people, and women. These groups have lower eligibility due to shorter terms of past employment. Finally, during this period, manufacturing became a much smaller part of the total employment level in the U.S. and the service sector became larger. More workers in manufacturing are eligible to receive UI than is the case in the service sector.

In the post 1979 period, IUR dropped much more rapidly than TUR. One reason put forth by Burtless and Saks is that there was a decline in the number of initial applicants for UI relative to the number of new job losers. Ruled out as contributing factors to this decline are that (1) new applicants are only eligible for a shorter duration of benefits, (2) states have shortened the duration of benefits, (3) new applicants are different from past applicants, (4) the composition of the unemployed as far as sex, age, industry, and work experience, has changed and (5) regional distribution of the unemployed has changed. Burtless and Saks say that a contributing reason for the decline is that an increasing portion of claimants for UI had recently experienced unemployment, so the benefits available to them were smaller or for a shorter duration. According to these authors, however, the ultimate factor behind this decline is the legal and administrative changes that have been instituted in the UI program. These changes are: (1) more vigorous enforcement of work search tests; (2) required visits to UI offices; (3) denial of benefits due to employee misconduct; (4) stiffer disqualification provisions; (5) limitation of UI benefits for social security retirement recipients; (6) limitation of UI benefits for pension recipients; (7) taxation of UI benefits; (8) one week eligibility wait; and (9) the decrease in potential duration of benefits due to decline in extended benefits. In summary, it became more difficult to obtain UI benefits.

Corson and Nicholson (1988) also analyze the decline in UI claims during the 1980s. The authors find that UI claims as a fraction of total unemployment fell approximately 15% from the 1970s to the 1980s. Across states, this decline varies widely with the largest declines coming in Illinois and Michigan. Two analyses were done, one national and one by state. The national data cover the period 1948 through 1986 while the state data are from 1971 through 1986. The results are similar to those of Burtless and Saks. First, Corson and Nicholson found a 15 percent decline in the UI claims ratio between the 1970s and 1980s. They apportioned this decline among several potential causes in three categories -- economic effects, the effects of changes in Federal UI policy, and the effects of changes in state UI policy. These effects are estimated using data from 1971-I to 1986-IV. The results are summarized in the following table, showing a high and a low estimate for the percentage of the decline in the UI claims ratio attributable to each effect:

Percent of Total Change In
UI Claims Ratio Attributable to Effect

	High	Low
ECONOMIC EFFECTS		
Increase in TUR	(6.0)	0.0
Decline in Unemployment for manufacturing	-17.5	-3.1
Shift in Geographic Distribution of Unemployment	-16.1	-16.1
CHANGES IN FEDERAL UI POLICY		
Partial Taxation of Benefits	-16.5	-11.3
Less Generous Extended Benefits Program	-6.8	0.0
CHANGES IN STATE UI POLICY		
Increase in Qualifying Wages	-10.5	- 3.4
Change in Gross Wage Replacement	- 1.9	- 3.9
Reductions in Maximum Durations	- 4.9	- 4.9
Reductions in Voluntary Separation Denial Rates	-13.1	- 0.0
Increase in Disqualification Income Rates	-10.8	- 8.6
Reduction in Worktest Denial Rates	(12.6)	(0.8)
Increase in Misconduct Denial Rates	-10.8	- 2.4

Furthermore, more accurate measurement of unemployment in the 1980s contributed from 1.5 percent to 12.3 percent of the change in the UI claims ratio. The high-range estimates account for virtually all of the decline in UI claims, whereas the low-range estimates account for about 55 percent.

Blank and Card (1989) also examine the trends in insured and uninsured unemployment. Similar to Burtless and Saks, they find that although over 90 percent of employed workers hold jobs that are covered by the unemployment insurance system, less than 30 percent of unemployed workers currently receive unemployment insurance benefits. This fraction, they observe, has fallen about 13 percentage points from 1977 to 1987. The puzzle, however, is that the decline in the past decade has occurred at the same time that the fraction of women in the labor force has stabilized and the baby boom has matured, which should have reduced the decline.

Blank and Card present new evidence on the reasons for the recent decline in the fraction of unemployed workers who receive unemployment insurance benefits. Moreover, they illustrate how the ratio of insured to total unemployed significantly overstates the fall in the fraction of unemployed workers who receive UI benefits. This second point is of considerable interest, since it suggests that recent work that only examines the trends in this ratio overstates the decline of the UI program, not only as an income support program, but possibly its stabilizing effectiveness.

Similar to Corson and Nicholson, Blank and Card observe that, during the past 35 years, the ratio of the insured unemployment rate to the total unemployment rate has fallen more rapidly than the ratio of UI recipients to total unemployed. This fall is largely attributable to the increase in the coverage rate of the UI system among employed workers, and the fact that the ratio of active UI claims to UI recipients has fallen while the unemployment rate has risen.

Using samples of unemployed workers from the March 1987 Current Population Survey, Blank and Card estimate the fraction of unemployed workers who are potentially eligible for benefits in each year and compare this to the fraction who actually receive unemployment compensation. First, they find no evidence that recent declines in the fraction of workers who receive regular UI benefits are due to changes in eligibility. In fact, according to their estimates, the same fraction of

unemployed workers was eligible for benefits in 1987 as was eligible in 1977. This finding lead to a focus on the determinants of take up rates for UI benefits among eligible workers. Takeup rates are defined as the ratio of the fraction of insured unemployment to the fraction of eligible unemployment. Their estimated takeup rates fell from an average of 75 percent in the 1977-80 period to an average of 67 percent after 1982.

According to Blank and Card, approximately one-half of the nationwide decline in average takeup rates for UI benefits appears to be due to a shift in unemployment from states with higher average takeup rates to states with lower takeup rates. States in the Northeast have significantly higher takeup rates for benefits than states in the South or West.

The authors explained the systematic differences in takeup rates across states by the differences in the characteristics of employed and unemployed workers in the states. For example, their results suggest that higher takeup rates are associated with higher unionization rates, higher benefit replacement rates, and higher coverage rates of the UI system.

In the most recent examination of the decline in unemployment insurance claims, Vroman (1991) presents a preliminary analysis based on responses to supplemental questions added to the monthly Current Population Survey (CPS) conducted by the Census Bureau for the Bureau of Labor Statistics. The supplemental questions, included in the May, August, and November, 1989, and February, 1990, surveys, were designed to acquire information on the reasons for the seemingly low UI application rate among the unemployed.[1] Because they are supplemental questions added only in one year, these data cannot provide direct evidence about the reasons for the apparent decrease in the UI takeup rate. In conjunction with data on the insured and total unemployment rates, though, they may provide evidence concerning factors that affect application rates that can be used to determine important determinants of changes in application rates over time.

According to Vroman's analysis of the responses to the supplemental questions, almost half of the unemployed in the sample did not apply for UI benefits because

[1]Vroman (1991) provides substantially more detail about the survey.

they believed that they were not eligible. More than half of those who believed that they were not eligible thought that they were not eligible because they did not earn or work enough to qualify. From geographical tabulations of the data, Vroman finds evidence suggesting that at least part of the regional discrepancies in insured unemployment rates relative to total unemployment rates is due to different recipiency rates among job losers in different regions of the nation.

Vroman also presents a preliminary analysis of the application and recipiency rates of the individuals in the sample. He finds that duration of unemployment beyond a week or two has an important effect on applications for and receipt of UI benefits. He also finds that the probability of application for UI benefits and receipt of benefits peaks at ages 35-44 and is higher for married males. Those losing employment in manufacturing or mining-construction are more likely to apply for benefits, as are union members. Vroman (1991, Appendix A) presents evidence consistent with a sharp break in the ratio of the insured unemployment rate to the total unemployment rate in 1981. Based on this conclusion, he does not find much evidence for important factors explaining the decrease in that ratio from estimated equations. Rather, he suggests that using these data with state program variables would be a fruitful extension. Our empirical analysis of the time-series behavior of the insured unemployment rate and the total unemployment rate will provide some indication of whether this focus on 1981 is warranted.

Countercyclical Effects: Changes in the Severity of Recessions

As discussed in Chapter 2, several studies (for example, Zarnowitz and Moore, 1986) have concluded that recent recessions have become more moderate. This change may have important implications for some of the recent movements in the fraction of the unemployed receiving unemployment insurance benefits. Search theory suggests that individuals will look for work until the expected marginal benefit from looking is equal to the expected marginal cost. The person will then accept the last job searched when this condition is binding. In a similar fashion, individuals applying for UI benefits do so with the expectation that they will receive a stream of benefits over time. The benefits they receive are income while searching and

ultimately their income from the new job. The costs on the other hand include the initial fixed start-up costs involved with applying for UI benefits and the out-of-pocket costs incurred while searching. Over time, with the decrease in the average duration of recessions, the unemployed might expect the stream of UI payments to be lower, while the initial fixed start-up costs associated with receiving UI benefits would remain the same, or, as some evidence indicates, even increase. Under these circumstances, it is possible that an individual would maximize expected net benefits by not applying for UI benefits but would either self-fund, or fund the search effort from alternative income sources. If this is the case, fewer of the unemployed would apply for UI benefits. This discussion highlights the possibility that the decrease in the fraction of unemployed receiving UI benefits may be the natural outcome of broader changes in the economy, such as the flattening out of the business cycle. Therefore, the decrease in the ratio of unemployed receiving benefits may represent a utility maximizing response on the part of individuals to those broad changes.

It seems probable, therefore, that the changing nature of the business cycle and the change in the composition of the labor force may have indirectly affected the effectiveness of UI as an automatic stabilizer. For reasons discussed above, the flattening out of the business cycle probably has reduced, to some extent, the proportion of those covered by UI who actually apply for benefits. Furthermore, changes such as the proportion of women and young people in the labor force, who are less eligible for benefits, along with the increased difficulty of obtaining benefits have also reduced the proportion who receive benefits. Increased coverage to jobs subject to low unemployment, for example, government, has increased the percentage of unemployed receiving benefits. The shift from manufacturing, in which a higher proportion of unemployed apply for benefits, to service jobs and a shift in unemployment from states with high takeup rates to states with low takeup rates have probably also contributed to the decline in the proportion of unemployed receiving benefits.

The resulting reduction in the ratio of UI recipients to total unemployed would reduce the stimulus of UI in a recession and, other things the same, reduce the stabilizing effect of UI in a recession. If, however, benefits had increased enough to

offset that reduction, the stimulus would remain the same. This offsetting effect does not appear to have occurred however. As noted above, the federal compensation program of 1982 replaced a more generous program. Furthermore, recall that Burtless and Saks pointed out that in fiscal year 1976, 7.6 million workers were unemployed and 31 billion (in 1982 dollars) was spent on all UI programs; in fiscal year 1982, unemployment averaged 10 million workers but less than 24 billion dollars was spent on UI programs. Thus it appears that not only has the percent of unemployed receiving benefits declined but the average benefits have declined also. Both effects would tend to diminish the effectiveness of UI as a stabilizer in a recession. The only other force that could offset these effects would be an increase in the benefits multiplier.

The above evidence does not indicate any significant change in the tax effect on UI as a stabilizer in a recession. If the proportion of covered unemployed to total unemployed has remained relatively constant, the reduction in UI taxes during a recession would not have changed much.

To the extent that these changes have reduced the effectiveness of UI as a stabilizer in a recession, they have also reduced its effect as a stabilizer in an expansion. The lower the proportion of unemployed receiving benefits in a recession and the lower the average benefit payments, the lower the total benefits paid for a given amount of unemployment. Consequently, the reduction in benefits paid is less as unemployment declined during the expansion.

Two possible offsetting factors may, however, be occurring. As the business cycle has become smoother, a smaller proportion of the work force is affected. Furthermore, a larger proportion is essentially unaffected by the cycle because of the nature of their occupations. If UI is in fact becoming less important as an automatic stabilizer, this may only indicate that business fluctuations are becoming smoother and automatic stabilizers in general are becoming less important.

Conclusions

This survey has examined two main strands of research that analyzed the effectiveness of unemployment insurance as a countercyclical device. The types of research were studies that looked at fluctuations in National Income and those that focused on unemployment rates. Moreover, particular attention was paid to those studies that addressed the question of whether the stabilizing effects have changed over time. The evidence is somewhat mixed but does indicate a possible decrease in the importance of UI as a stabilizer. The effects of changes in the nature of the business cycle and the composition of the labor force on the UI unemployment rate relative to total unemployment give some indication that the UI program has diminished in effectiveness as an economic stabilizer. The answer, however, is not totally clear.

It is important to re-examine empirically the effectiveness of the UI program for several reasons. Because the results from past studies have been somewhat inconsistent, a new in-depth empirical study provides a great deal of new information. Also, as emphasized above, the structure of the U.S. economy has undergone recent changes. The business cycle has changed considerably, as have the composition of the work force and characteristics of the jobs covered by UI. One can make many inferences about these changes, but a complete analysis requires a thorough empirical examination. The next three chapters will discuss the methodology used in that examination and present the results.

Chapter 5
A Descriptive Analysis of Unemployment Insurance as an Automatic Stabilizer

CHAPTER 5
A DESCRIPTIVE ANALYSIS OF UNEMPLOYMENT INSURANCE AS AN AUTOMATIC STABILIZER

Before discussing the econometric analyses of UI as an automatic stabilizer, a brief descriptive analysis of possible changes in this effect seems warranted. This chapter will discuss trends and recent changes in several of the variables related to unemployment insurance and the business cycle. Section II describes some recent changes in the relation between the unemployment rate and the insured unemployment rate. Section III presents data showing the relation between UI benefits and deficits and the business cycle. Finally Section IV discusses the correlation between UI benefits and deficits and variables reflecting cyclical changes in the economy.

The Unemployment Rate and The Insured Unemployment Rate

The insured unemployment rate relative to the civilian unemployment rate has decreased substantially over the past 35 years. This decrease is clearly illustrated in Figure 1, which shows both rates from January 1955 through December 1989. The gap between unemployment and insured unemployment has increased from the middle 1970s to the 1980s and has increased even more since the early 1970s.[2]

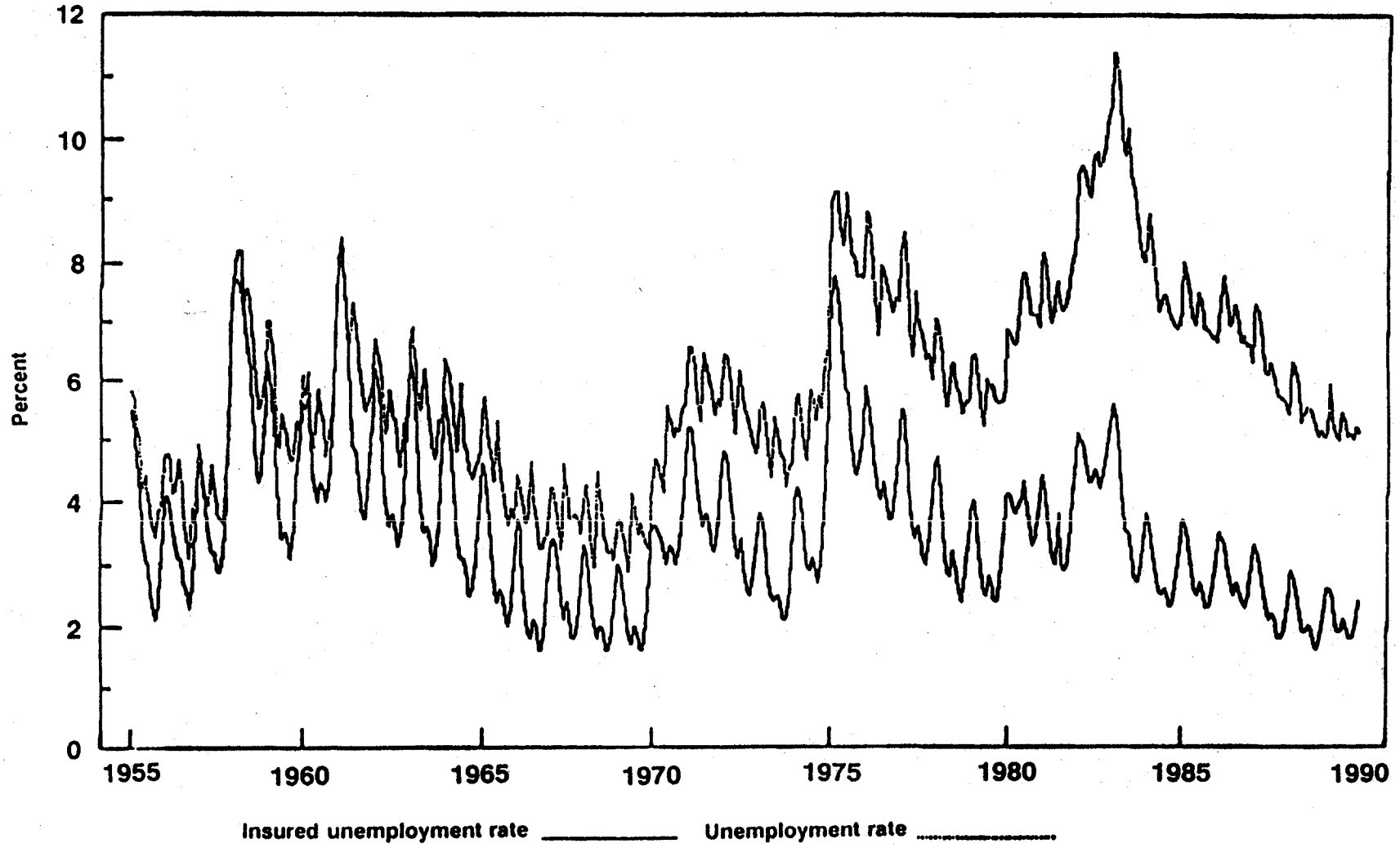
Despite the greater severity of the recessions in the 1980s compared to the 1970s, the insured unemployment rate was never as high in the 1980s as it was in the recession in the 1970s. As Figure 1 shows, the civilian unemployment rate was 9.1 percent at its peak in February and March 1975 and the insured unemployment rate was 7.8 and 7.7 percent respectively, in the same months. At its peak in January 1983, the civilian unemployment rate was 11.4 percent, more than two percentage points higher than the peak in 1975. In January 1983, the insured unemployment

[2]Changing the insured unemployment rate to more closely conform to the definition of the civilian unemployment rate has virtually no effect on this graph. The civilian unemployment rate includes the current number of people employed and unemployed in the denominator, while the insured unemployment rate includes the average number of covered workers employed over a recent twelve-month period in the denominator. Dividing the number of insured unemployed by the current number of employed workers covered plus the number of insured unemployed produces values of an "insured unemployment rate" that are little different from the values in the figure.

Figure 1

Unemployment Rate and Insured Unemployment Rate

1/1955 to 12/1989



rate was at its peak of 5.6 percentage points, almost two percentage points lower than the peak in 1975. Thus the general trend has been a marked decline in insured unemployment relative to total unemployment.

It should be noted that the relation between insured unemployment and total unemployment differs substantially among the different states and that these state relations differ from the relation for the country as a whole. Appendix A shows the relation between insured and total unemployment for four selected states over this time period.

The civilian unemployment rate is not the only evidence that the recession of the 1980s was more severe than that of the 1970s. An alternative measure of the severity of recessions is the GNP gap, measured by the deviation of DRI's estimated high-employment GNP from actual GNP relative to high employment GNP. The GNP gap from 1957 to 1990 is shown in Figure 2. Although there has been a great deal of cyclical fluctuation in the GNP gap, the overall trend has been relatively constant or possibly slightly increasing. The GNP gap also indicates that the recession in the 1980s was more severe than the recession in the 1970s. The GNP gap was 7 percent of high-employment GNP in 1975, compared to 9.6 percent in 1983. Thus neither the rate of civilian unemployment nor the GNP gap gives any evidence that the lower insured unemployment rate in the 1980s is merely a reflection of a less severe recession.

Paradoxically, the divergence between the insured and the civilian unemployment rate occurred while the proportion of the civilian labor force covered by unemployment insurance increased substantially. As shown in Figure 3, the proportion of the civilian labor force covered increased from 60 percent in 1950 to 90 percent at the end of 1989. In addition to the general upward trend in the percent of workers covered, two substantial jumps in the proportion of workers covered occurred in 1972 and 1978. The coverage ratio, measured here as covered workers relative to the civilian labor force, increased 4.9 percentage points in 1972 and 6.6 percentage points in 1978.[3] These two changes account for about one-third

[3]Effective January 1972, the Employment Security Amendments of 1970 required that state laws provide insurance to employees of smaller firms and to nonprofit organizations. Effective January 1978, the Unemployment Compensation amendments of 1976 extended coverage to state and local government employees and selected agricultural workers, household workers, and employees of nonprofit elementary and secondary schools.

Figure 2

GNP Gap

I/1957 to IV/1989

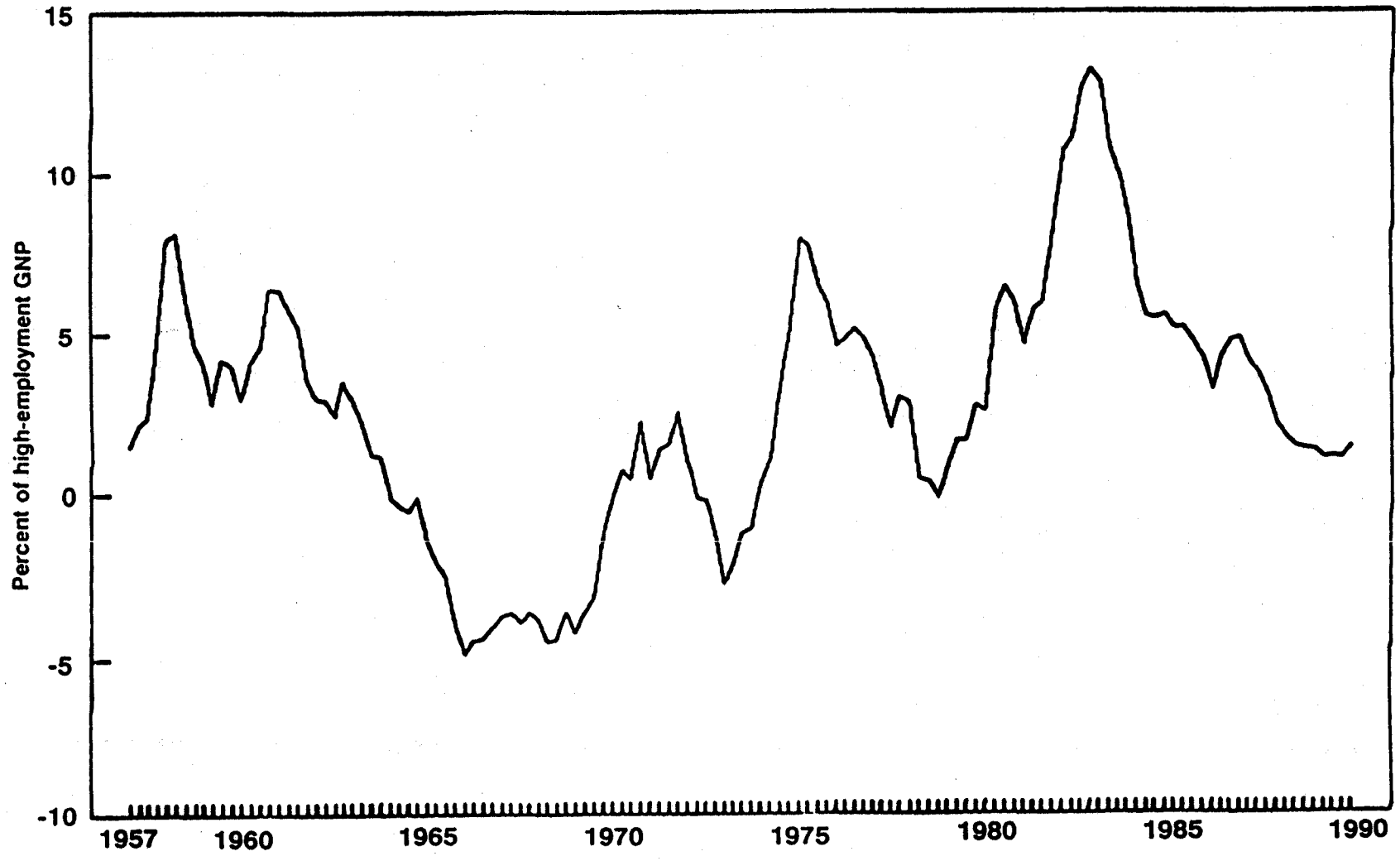
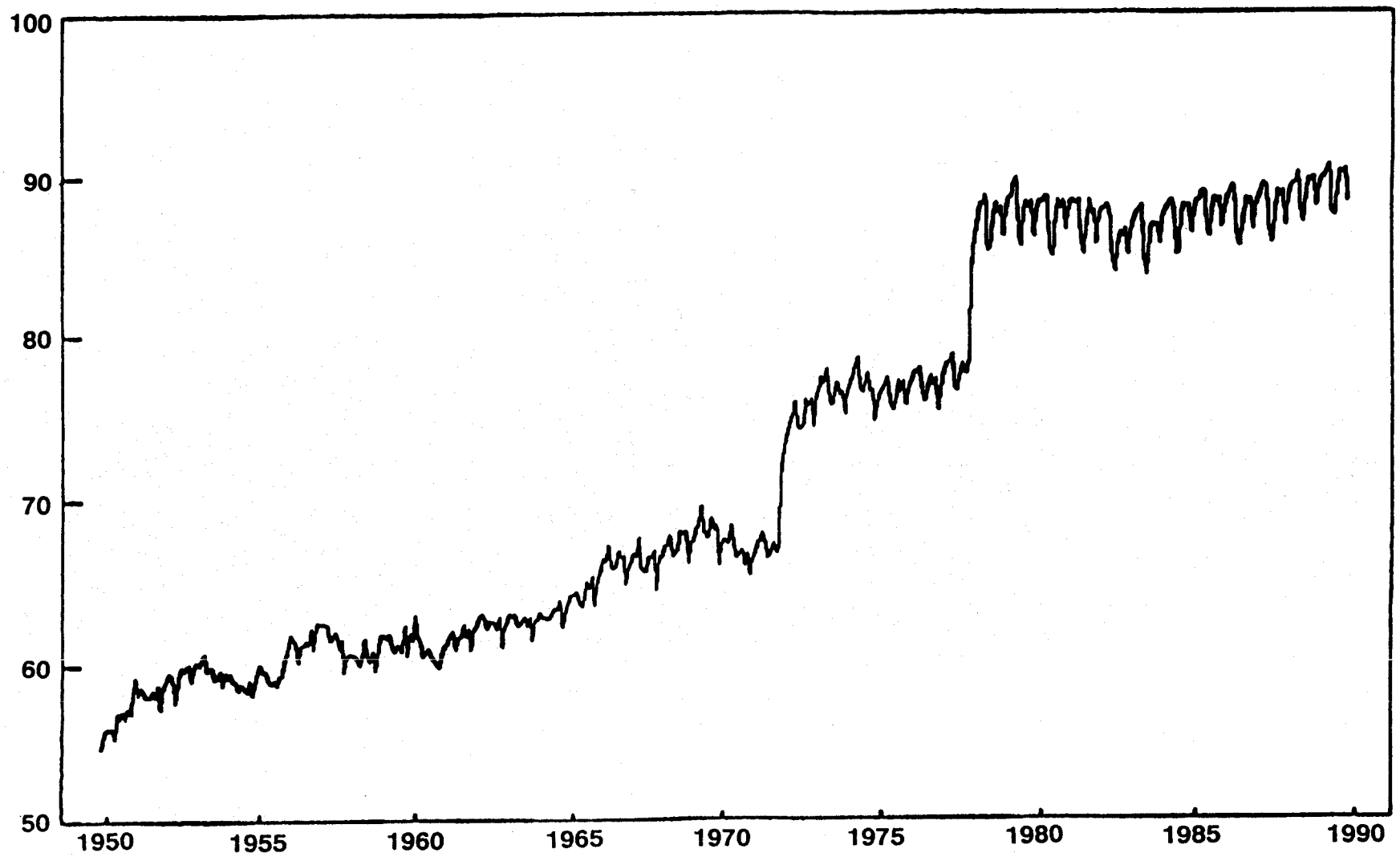


Figure 3

Covered Employment

As a Percentage of Civilian Employment

1/1950 to 12/1989



of the 30 percent increase in the coverage ratio from 1950 to 1989. The rest of the increase is due to smaller extensions of the coverage and possibly to shifts in the work force from uncovered to covered employment.

Occurring simultaneously with this increase in covered workers, was a gradual reduction in the proportion of total wages that are subject to the UI tax. Figure 4 shows the ratio of covered wages to total wages in taxed covered employment.[4] The proportion of covered wages in covered employment fell from 79 percent in 1950 to less than 40 percent in 1989, while the percent of the labor force covered by UI rose from 60 percent to 90 percent. During the gradual downward trend in the proportion of wages covered, three appreciable increases in this proportion occurred in 1972, 1978, and 1985.[5]

Some investigators have associated the decrease in the insured unemployment rate with this decrease in the percentage of total wages taxed and the resulting decrease in the amount of benefits paid relative to total wages. However, the increase in the percentage of the labor force covered would have worked in the opposite direction. Furthermore, the increase in the severity of recessions from the 1970s to the 1980s would, at first glance, seem to have increased the rate of insured unemployment. Notwithstanding the reason for the decline in the insured unemployment rate relative to total unemployment, this decline in and of itself would seem to imply that unemployment insurance may be becoming less effective as an automatic stabilizer, particularly during a recession. However, of more importance for this study of the stabilization effect of UI, is the behavior of UI benefits, taxes, and the UI deficit during recessions.

Unemployment Insurance Benefits, Taxes, and Deficits In Recessions

Unemployment insurance benefits and deficits increase in recessions and decrease in recoveries. Figure 5 shows quarterly UI benefits and taxes in terms of

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[4]Because state and local governments and nonprofit organizations can reimburse the UI system for benefits paid to their former employees rather than pay taxes, these wages cannot be included in the numerator and hence are not included in the denominator.

[5]In 1972 and 1978, coverage was extended to more workers and the covered wage base was increased. In 1985, several states increased covered wages and, following the provisions of the Deficit Reduction Act of 1984, twelve states included tip income in covered wages.

1982 dollars from 1950 to 1989. These benefits and taxes do not include extended benefits. The economy's peaks and troughs during this period, as defined by the National Bureau of Economic Research, are given in Table 4. Increases in benefits are clearly visible in each of the recessions.

In terms of its maximum contribution to the economy in recessions, unemployment insurance was less important in the 1980s than in the 1970s. As Figure 5 shows, benefits in 1982 dollars were barely higher during the recessions in the early 1980s than in the recession from 1973 to 1975. In the 1970s recession, real benefits peaked at $6.2 billion in the first quarter of 1975 (at the trough of the recession). In the 1980s, benefits peaked at $6.5 billion in the first quarter of 1983 (just after the trough of the recession in November 1982). Because the recession of the 1980s was probably more severe, it is likely that the benefits played less of a role in the recovery. (In Appendix A we show, for comparison, benefits and taxes for four selected states over the same period.)

Figure 6 shows the real UI deficit (in 1982 dollars) from 1950 through 1989. The figure indicates that the real deficit was virtually the same in the first quarter of 1983 as in the first quarter of 1975, again indicating a possibly smaller role in the recovery.

Because the economy had grown from the 1970s to the 1980s, unemployment insurance benefits as a percentage of GNP actually were greater in the recession in the 1970s than in the 1980s. Figure 7 shows benefits and taxes as a percent of GNP. As a percent of GNP, UI benefits were .94 percent of GNP in the first quarter of 1975 and .81 percent of GNP in the first quarter of 1982 again indicating a smaller role for UI.

Although the largest value of UI benefits and deficits in a quarter are an obvious measure of the program's importance, they are not the only such measure of the effectiveness of UI. At least one other measure paints a somewhat different picture. Consider UI benefits from the economy's peak to the trough. To be precise, this measure is total benefits from the first quarter after the peak quarter through the trough divided by total GNP over the same period. By this measure, UI benefits were .52 percent of GNP in the downturn from 1973 to 1975 and .64 percent of GNP

TABLE 4

Dates of Postwar Recessions
NBER Business Cycles Dates

Monthly		Quarterly	
Peak	Trough	Peak	Trough
7/53	5/54	2/53	2/54
8/57	4/58	3/57	2/58
4/60	2/61	2/60	1/61
12/69	11/70	4/69	4/70
11/73	3/75	4/73	1/75
1/80	7/80	1/80	3/80
7/81	11/82	3/81	4/82

Source: "The NBER's Business Cycle Chronologies," Geoffrey H. Moore and Victor Zarnowitz, p. 765, in The American Business Cycle.

Figure 6

Real Unemployment Insurance Deficit

1950 to 1989

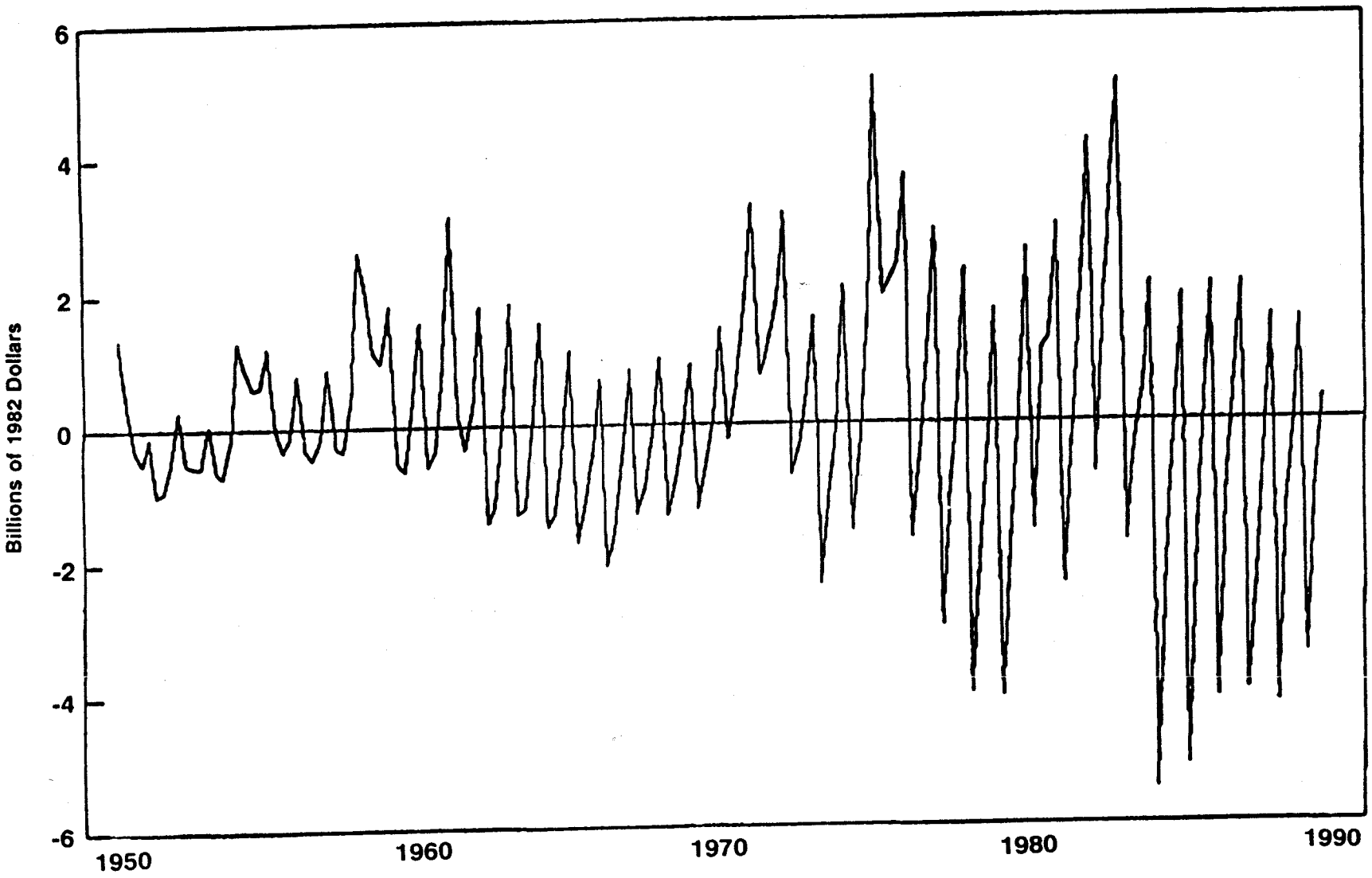
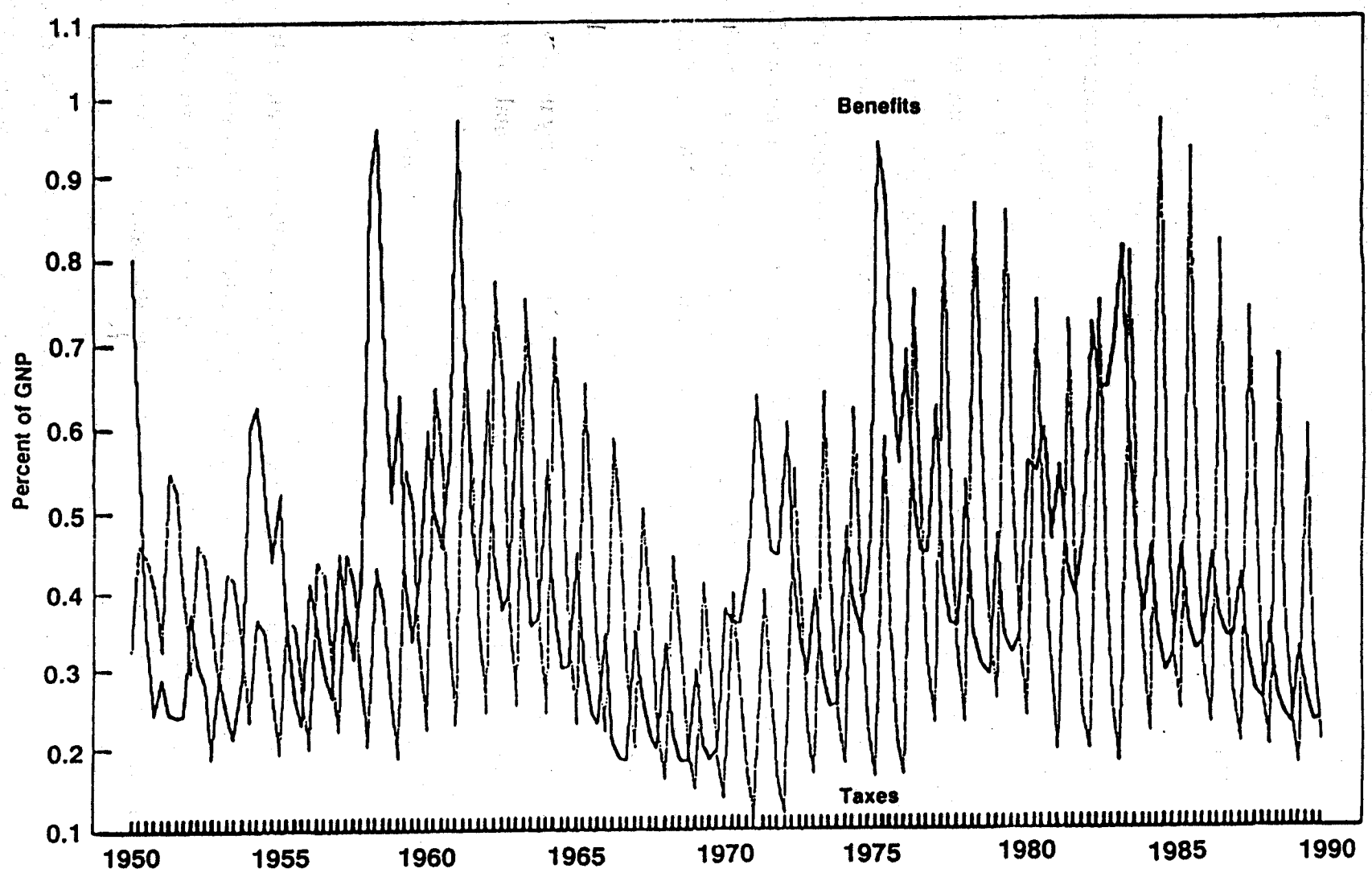


Figure 7

Unemployment Insurance Benefits and Taxes

Percent of GNP

I/1950 to IV/1989



in the downturn from 1981 to 1982. The UI deficits over the same periods were .20 and .26 percent of GNP, respectively. By this measure alone UI benefits and deficits were actually relatively larger in the 1980s, rather than smaller, and may have been a slightly more important stabilizer in the 1980s.

A somewhat stronger conclusion may be warranted, however. During the 1980s, the economy had a peak in January 1980 and a trough in July 1980, in addition to the peak in July 1981 and trough in November 1982. The civilian unemployment rate increased in 1980 and did not fall back to prior levels before the peak in 1981. This second recession in the 1980s, the one thus far used for calculating the program's contribution over the economy's decline, may have begun before the effects of the earlier recession on benefits had died out. Hence, the higher benefits in the recession beginning in 1981 may include the delayed effects of the immediately prior recession. These effects could tend to overstate the effect of the downturn on UI benefits during the second downturn in the 1980s. Delayed effects also could account for the larger apparent deficit in the 1980s. Nonetheless, benefits paid and the deficit were larger, not smaller, compared to GNP in the downturn from 1981 to 1982 than in the downturn from 1973 to 1975.

Hence, whether UI benefits and deficits had a larger or smaller stabilizing effect on the economy in the 1980s than in earlier periods is certainly not obvious from the evidence thus far. The next section presents some additional evidence. Simple correlations are used to examine whether there is any obvious decrease in the strength of the relation between UI insurance benefits, taxes, and deficits and cyclical changes in the economy.

Correlations of Benefits, Taxes, and Deficits with Cyclical Movements in the Economy

This section attempts to determine whether there has been a change in the relation between UI benefits, taxes, and deficits and cyclical variables such as the insured unemployment rate (IUR), the unemployment rate (UR), the GNP gap, and GNP. A significant change in these relations could indicate a change in the effect of UI as a stabilizer. Table 5 presents simple correlations of UI benefits, taxes, and deficits with these measures of cyclical movements in the economy (IUD, U, GNP

TABLE 5

Correlations of UI Benefits, Taxes, and the Deficit with Economic Activity

I/1960 through IV/1989

	benefits	taxes	deficit	iur	ur	gap	lngnp
benefits	1.000						
taxes	.102	1.000					
deficit	.812	-.498	1.000				
iur	.975	.170	.750	1.000			
ur	.902	.280	.622	.882	1.000		
gap	.768	.310	.488	.786	.839	1.000	
lngnp	-.686	-.368	-.382	-.684	-.742	-.793	1.000

I/1960 through IV/1975

	benefits	taxes	deficit	iur	ur	gap	lngnp
benefits	1.000						
taxes	.174	1.000					
deficit	.839	-.390	1.000				
iur	.992	.177	.830	1.000			
ur	.967	.241	.771	.976	1.000		
gap	.927	.258	.725	.939	.921	1.000	
lngnp	-.934	-.239	-.741	-.949	-.940	-.993	1.000

I/1976 through IV/1989

	benefits	taxes	deficit	iur	ur	gap	lngnp
benefits	1.000						
taxes	-.017	1.000					
deficit	.891	-.469	1.000				
iur	.834	-.306	.876	1.000			
ur	.760	-.035	.687	.883	1.000		
gap	.815	-.038	.738	.878	.969	1.000	
lngnp	-.763	.074	-.708	-.900	-.974	-.980	1.000

gap, GNP). As was the case with the above graphs, these correlations should be interpreted only as descriptive statistics.[6]

The top section of the table presents the correlations for the full period 1960 through 1989. This period is broken down into two parts: from the first quarter of 1960 through the end of 1975 (the downturn from 1973 to 1975 is included), shown in part two of the table; and from the first quarter of 1973 through the end of 1989 (including the recession of the 1980s), shown in part three.[7]

Table 5 gives some evidence of a decrease in the correlations of UI benefits with the cyclical variables. During the full period, the correlation of UI benefits is .77 with the GNP gap and -.69 with real GNP. The correlations of benefits with the unemployment rates are .90 with the civilian unemployment rate and .98 with the insured unemployment rate. In the first subperiod, these correlations are .93, -.93, .97, and .99 respectively. In the second subperiod, these correlations are .82, -.76, .76, and .83, respectively, indicating a decrease during the latter period.

Correlations between the UI deficit and cyclical activity show a somewhat different picture. There is little indication that the relation between the deficit and economic activity decreased in the second subperiod. During the full period, the correlations of the UI deficit with the GNP measures of cyclical variation are .49 with the GNP gap and -.38 with real GNP. The correlations of the UI deficit with the unemployment rates are .62 with the civilian unemployment rate and .75 with the insured unemployment rate. In the first subperiod, these correlations are uniformly higher: .73, -.74, .77, and .83, respectively. In the second subperiod, these correlations also are uniformly higher: .74, -.71, .69 and .88, respectively. The higher correlations for both of the subperiods compared to the whole period suggest that the relation in the two periods are different, possibly because of a change in the mean value of the deficit or in all of the variables. Nonetheless, there is no

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[6]Many of these variables have substantial trends and serial correlation. Hence, drawing statistical inferences from these correlations would not be warranted because the distributions of the correlations are far from the usual simple distribution around zero.

[7]Because economic variables such as GNP are subject to exponential growth, the logarithm of real GNP is detrended. All variables other than real GNP and the GNP gap are not seasonally adjusted. Other than the GNP variables, all variables in the correlations are deviations from quarterly means for the same periods as the correlations.

indication of a decrease or increase in the correlations between the deficit and the cyclical variables in the second period.

Conclusions

The conclusions from the descriptive statistics discussed in this chapter are somewhat mixed. Some of the statistics indicate a decrease in the importance of UI as a stabilizer, particularly during recessions, in the 1980s relative to earlier periods: correlation between benefits and cyclical variables, benefits relative to GNP, maximum contributions of benefits in recessions, the insured unemployment rate relative to the civilian unemployment rate, and the decrease in benefits paid relative to total wages. Other statistics point to little or no change in the role of UI: the correlation between UI deficits and cyclical variables, total benefits paid from peak to trough, and increased coverage of the labor force.

Despite the caveats about the descriptive nature of the statistics alone, one would infer that unemployment insurance has become somewhat less effective as a stabilizer, at least during recessions, in the 1980s relative to earlier periods. The only evidence that points one way or another indicates a decrease in the importance of UI in the 1980s. The other evidence indicates little change in the importance of UI. Thus the available evidence seems to be weighted toward a decrease.

Obviously, this evidence is tentative and should be interpreted as such. Furthermore, all of these tentative conclusions concern a possible change in the importance of UI, but not any assessment of the absolute or overall effectiveness of UI as a stabilizer. We turn to a more thorough analysis in the next chapter.

Chapter 6
Estimates of the Relations Between UI and the Economy

CHAPTER 6
ESTIMATES OF THE RELATIONS BETWEEN UI AND THE ECONOMY

We have emphasized that there has been a decrease in UI benefits relative to the unemployment rate. Furthermore, the analysis set forth in Chapter 5 suggests that the UI program may have become less effective as an economic stabilizer in the 1980s.

In this chapter we will examine the responsiveness of UI benefits and taxes to the state of the economy for further evidence of such changes. In this way we can determine what changes in unemployment insurance may account for any change in the effectiveness of UI. We use a vector autoregression (VAR) model to analyze the relation between unemployment insurance and the state of the economy and in particular, any change in this relation. Because some of the statistical techniques that are used are relatively new, we will describe the estimation techniques in some detail in this chapter, but a much more technical version of the estimation is set forth in Appendix B. Section I discusses the econometric model to be used. Section II develops the results of the model for the U.S. economy as a whole, and Section III discusses the results for four selected states: Colorado, Georgia, Massachusetts, and Texas. Section IV presents some conclusions.

The Econometric Model

In order to provide a solid basis for characterizing any change in the UI program, we estimate an econometric model of the UI program. On one level, these estimates are updates of the analyses of unemployment insurance by von Furstenberg (1976), de Leeuw et al. (1980), and de Leeuw and Holloway (1982). On another level, however, estimates of any changes in the cyclical responsiveness of the UI program provide evidence that may make it possible to characterize the change.

As noted above, we use a vector autoregression (VAR) to examine the relation between unemployment insurance and the economy. A VAR can be interpreted as

a set of reduced-form equations from a structural econometric model. Such a reduced-form representation can be written as

$$(1) \quad y_t = By_{t-1} + e_t,$$

where y is the vector of relevant variables, B is a matrix of estimated coefficients and e is a vector of error terms. This reduced form can be obtained from a structural econometric model by matrix manipulations. By a suitable transformation of variables, the number of lags represented by an equation can be any finite value. Hence, the number of lags of each variable is not limited to one.

We use a relatively small VAR for estimating the relation of UI with the economy and how this relation has changed over time, because such a model can be specified in such a way that the data largely determine the evolution of the estimated coefficients. This can be done using the relatively simple statistical procedure of testing for shifts in coefficients using dummy variables. Hence, the results are not specific to a particular economic model.

This econometric model of the UI program is estimated with quarterly data. While it seems desirable at first to use the underlying monthly data, there is an extremely large monthly variation in the UI trust funds' receipts due to quarterly payments. This variation is uninformative and potentially a severe complicating problem. There are two other pragmatic advantages of using quarterly data: 1. the quarterly estimates may reveal longer-run relations that are obscured by the short-term noise in the monthly data; and 2. the DRI model used in the simulations is a quarterly model.

The variables included in the analysis reflect the UI program and aggregate economic activity. The variables of direct interest are UI benefits and taxes. The proportion of employment covered by UI and the insured unemployment rate are related variables. The measure of aggregate economic activity is the civilian unemployment rate.[8] The logarithms of all of these variables are used in the

[8]Initial estimates for the United States included real GNP. The hypothesis that lagged values of real GNP had coefficients equal to zero in all equations other than the GNP equation could not be rejected with the civilian unemployment rate and all other variables included in each equation. Hence, we exclude this variable from the estimates presented below.

analysis to minimize heteroskedasticity and allow for exponential growth. In order to capture the seasonal variation in the variables, four lags of all variables and seasonal dummy variables are included.

In the analysis, all of the variables characterizing the UI system are potentially endogenous. This model provides direct estimates of the cyclical sensitivity of UI benefits and taxes and any possible changes in these sensitivities over time.

Estimates for the United States

A critical matter, which must be dealt with before estimation, is determining whether the estimates should be based on the levels of the variables or on changes in the variables. If regression relationships are properly specified in the levels, first-differencing the variables can throw away substantial variation in the series. On the other hand, if regression relationships are properly specified in the first differences, equations estimated in the levels can indicate nonexistent relationships with dramatically overstated levels of statistical significance. There are two issues involved here. The first is whether the time series we are examining has random walk components (or, more precisely, "unit roots"). The second is whether the levels of the variables are related, which can occur even if the variables are specified in terms of their first differences. The interpretation and implications of the results are discussed in the text. (Details on these issues and the results are provided in Appendix B.)

The test results shown in Appendix B indicate that all of the variables with the exception of the coverage ratio should be included in the VAR in terms of the first differences. That is, with the exception of the coverage ratio, all of the variables have random walk components or unit roots. Therefore, the level of the coverage ratio, rather than its first difference, is included in the estimated equations. Because the coverage ratio has a trend, a time trend is included in all equations.

The fact that all of the variables other than the coverage ratio have random walk components does not necessarily mean that the levels of the variables are unrelated. In general, the linear combination of two variables with random walk components also has a random walk component. On the other hand, the random

walks in the variables may be related (or more precisely, the variables may be "cointegrated"). If the random walks are related, this can be interpreted as a long-run relationship between the variables.

For example, the levels of UI benefits and taxes are, as might be expected, related. Figures 5, 6, and 7 in Chapter 5, showing UI benefits and taxes and the UI deficit, suggest that the UI benefits and taxes are related. They indicate that UI taxes rise after benefits rise in a recession and later fall, which may be consistent with eventual budget balance. It certainly is not obvious that the levels of UI benefits and taxes are unrelated. The test results in Appendix B are consistent with the hypothesis that UI benefits and taxes tend toward a constant ratio in the long run.[9]

This relation between UI benefits and taxes indicates that the UI deficit in the preceding quarter should be included in the VAR.[10] As the regressions in Appendix Table B-4 show, other things the same, a higher UI deficit is associated with an increase in UI taxes. There is no effect on benefits at usual statistical significance levels. Hence, changes in aggregate UI taxes respond to the level of the UI deficit in such a way that the benefits and taxes are equal in the long run.

In addition to the UI deficit, we examine whether there is a relation between the levels of the insured unemployment rate and the civilian unemployment rate. The negative answer to this question is fairly obvious for the United States because, as Figure 1 in Chapter 5 indicates, the insured unemployment rate decreases over time rather dramatically relative to the civilian unemployment rate. There appears to be no tendency for the two to return to a long-run relation that might, or might not, be consistent with the data for the 1960s and 1970s. Nonetheless, the answer to this question is of interest because a relation between the levels of the unemployment rates is less obviously false for the individual states and the contrast may be suggestive.

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[9]Because the individual variables are measured in terms of their logarithms, the logarithm of UI benefits and taxes are used in this analysis. Hence, only a tendency for UI benefits and taxes to return to a constant ratio can be tested.

[10]Lagged values of the deficit beyond the first are rendered superfluous by the linear combinations of the lagged values of first differences of the variables. The "deficit" is the difference between the logarithm of benefits and the logarithm of taxes, or equivalently, the logarithm of the ratio of benefits to taxes.

The major focus of our analysis is on whether the relation between UI benefits and taxes with the economy has changed over time. This hypothesis can be tested by a simple F-test for changes in all of the coefficients in the equations for UI benefits and taxes. The break in the equation is assumed to take place in the fourth quarter of 1979 (to be consistent with Chapter 5), although we do not assume that a change necessarily took place in that period. We pick this break to test the hypothesis because (1) it includes the 1974 and 1975 recession in the first subperiod and puts the recession in the 1980s in the second subperiod, and (2) it classifies the period with an apparent change in the relation between the unemployment rate and the insured unemployment rate as the second subperiod. The test statistic for testing the null hypothesis of no change in the UI benefits and taxes equations in the complete system of equations, presented in Table 6, has a marginal significance level of .001 percent. The hypothesis of no change in the estimated coefficients in the UI benefits and taxes equations is easily rejected.

By estimating the equations for UI benefits and taxes equations separately, we can focus on the change in the fit of these two equations, rather than the set of equations. When the UI benefits and taxes equations are estimated separately, the test statistic for testing the null hypothesis of no change in these two equations taken by themselves has a marginal significance level of .014 percent. Hence, the hypothesis of no change clearly is not consistent with the data.

Table B-4 in Appendix B presents the estimated equations for UI benefits and taxes for both subperiods. The rather substantial changes in the constant terms and dummy variables for benefits and taxes suggest the hypothesis that the major changes are in the constant terms. We test this hypothesis by testing the null hypothesis that all of the slope coefficients in the UI benefits and taxes equations are constant while allowing the constant terms (and the coefficients of the trend term) to change. The test statistic for testing this hypothesis in the full set of equations has a marginal significance level of .05 percent. The test statistic for testing this hypothesis with only the UI benefits and taxes equations has a marginal significance level of .16 percent. Hence, the null hypothesis of no change in the slope coefficients is not consistent with the data.

TABLE 6

Test for a Break in the Relationship
Between UI and the Economy
United States

Change in IV/1979

Complete System of Equations

	Change in All Coefficients	Changes in Slope Coefficients
F-Ratio	1.88	1.76
Degrees of Freedom	52,418	42,418
Marginal Significance Level	$.1 \times 10^{4}$	.0005

UI Benefits and Tax Equations

	Change in All Coefficients	Changes in Slope Coefficients
F-Ratio	2.21	1.99
Degrees of Freedom	52,418	42,418
Marginal Significance Level	.0001	.0016

These results indicate that the relation between UI benefits and taxes in the United States with the state of the economy has indeed changed in recent years.

Estimates for Selected States

A similar analysis was conducted for the four sample states: Colorado; Georgia; Massachusetts; and Texas. Because data at the state level are more limited, the analysis begins with I/1970 for Colorado and Georgia and I/1972 for Massachusetts and Texas. Also, because the data are more limited, the variables included in the analysis are limited to UI benefits, UI taxes, the insured unemployment rate, real personal income, and the unemployment rate. As before, logarithms of all variables are used and seasonal dummy variables are included. Overall, the test results detailed in the appendix indicate that all variables should be included in the regressions in terms of their first differences, not their levels. While there are some rejections of hypotheses that variables have random walk components, there is no pattern to these rejections and some rejections at the 5 percent marginal significance level are to be expected when many independent tests are conducted.

As is the case for the United States, the existence of random walk components in benefits and taxes does not imply that the two are unrelated or that the UI deficit has a random walk component. Instead, the random walk components of UI benefits and taxes may be related, so that the UI deficit for each state does not have a random walk component. In all of the states, the test results, detailed in Appendix B, indicate that the levels of benefits and taxes are related. Furthermore, the hypothesis that benefits and taxes tend to a constant ratio in the long run is consistent with the data for Colorado, Massachusetts, and Texas. Without a larger sample of states to make any other inference less tenuous, we conclude that the rejection of a constant ratio for Georgia is more likely to be a result of sample variation than an indication of a real difference between Georgia and the other states. Hence, the estimated equations for each of the states include a lagged value of the UI deficit.

We also examine the data for a long-run relation between the civilian unemployment rate and the insured unemployment rate. The data for each of these

states suggest less of a divergence between the civilian unemployment rate and the insured unemployment rate than do the similar data for the United States. Hence, it is not so obvious whether there is or is not a relation between the levels of these two unemployment rates in each of the states. Indeed, the test results discussed in Appendix B are mixed. The evidence generally is inconsistent with a long-run relation between the civilian unemployment rate and the insured unemployment rate, although a sample of four states is too small to warrant generalization. For the purposes of estimating the VARs for these selected states, we do not use any long-run relations between the unemployment rate and the insured unemployment rate in the estimated equations.

The major focus of the analysis is on the stability of the estimated coefficients over time. As we did for the United States, we pick the fourth quarter of 1979 as the breaking point. With four lags of all variables in each equation, this sample is too small to test for coefficient stability for Colorado and Georgia.[11] The evidence on the stability of the estimated coefficients is mixed for Massachusetts and Texas. The test-statistics, presented in Table 7, for testing this hypothesis have marginal significance levels of .03 percent for Massachusetts and 97 percent for Texas. These results are dramatically different: the data for Massachusetts are quite inconsistent with stability and the data for Texas are easily consistent with stability.

It is necessary to reduce the number of coefficients estimated for Colorado and Georgia in one fashion or another, or else forego the tests of stability. In the estimates for the United States, four lags of all variables are included, in part to allow for seasonal effects. Because the state data sets have fewer observations, it would be helpful if the order of the lag distribution could be reduced. The hypothesis that the fourth lag of all variables other than the dependent variable can be deleted is not consistent with the data. Overall, we conclude that fourth lags even of variables other than the dependent variable are important. Because the fourth lag is a seasonal lag, this does not necessarily imply that all other lags are important.

[11]The limit on the length of the data set backward is set by the unemployment rate. The unemployment rates are not available for Colorado and Georgia until the first quarter of 1972 and the rates are not available for Massachusetts and Texas until the first quarter of 1970.

TABLE 7

Test for a Break in the Relationship
Between UI and the Economy
Selected States

Change in IV/1979

Complete System of Equations
Four Lags of All Variables

	Colorado	Georgia	Massachusetts	Texas
F-Ratio	insufficient observations	insufficient observations	2.034	0.65
Degrees of Freedom			56,174	56,174
Marginal Significance Level			.0003	.97

UI Benefits and Tax Equations
Third Lag Deleted

	Colorado	Georgia	Massachusetts	Texas
F-Ratio	1.983	4.878	1.622	1.143
Degrees of Freedom	46,40	46,40	46,56	46,56
Marginal Significance Level	.0146	.0000	.0420	.3151

The evidence on deleting the third lag of variables other than the dependent variable is only slightly less unfavorable than the results for the fourth lag. Nonetheless, it is somewhat more consistent with the data and we delete these third lags in order to execute tests for Colorado and Georgia.

Table 7 presents test-statistics for testing the hypothesis that the coefficients in each of the states do not change in the fourth quarter of 1979. With the continued exception of Texas, the data are not consistent with the hypothesis of constant coefficients at the 5 percent marginal significance level. The conclusions for Massachusetts and Texas are the same as they were when four lags of all variables were included. The conclusions of coefficient instability for Colorado and Georgia, however, are conditional on the acceptability of deleting the third lag of variables, a hypothesis that received some, but not complete, support from the data. We conclude that there has been a change in the responsiveness of UI benefits and taxes to the economy in some states but, given the results for Texas, possibly not all states. In our sample, the results for Colorado, Georgia, and Massachusetts generally are consistent with the hypothesis that the responsiveness of UI benefits and taxes to the economy was different in the 1970s than in the 1980s.

Conclusions

All of the evidence in this chapter clearly is consistent with long-run equality of benefits and taxes for all of the UI programs examined. It is important to note that the estimates in this chapter reflect automatic and legislative changes in benefits and taxes.

There is no evidence to support a long-run relation between the civilian unemployment rate and the insured unemployment rate for the nation. We do find some such evidence for Georgia and Texas, but not for Colorado or Massachusetts. Whether this reflects real differences between the states or sample variation is not clear. A larger sample of the states would be necessary to draw firm conclusions. Combined with knowledge of changes in state laws, such information could be helpful in determining how much of the decline in the insured unemployment rate in the

United States is associated with geographic shifts in population and how much is due to changes in states' rules and qualification procedures.

In the United States, the responsiveness of UI benefits and taxes to the economy clearly was different in the 1980s than in the 1960s and 1970s. There was no evidence to the contrary.

The evidence for Colorado, Georgia, and Massachusetts generally is consistent with the hypothesis that the responsiveness of UI benefits and taxes to the economy was different in the 1970s than in the 1980s. There is no evidence of such a change in Texas. Our sample of states is too small to support a general conclusion about changes in the responsiveness for all states.

Chapter 7
The Countercyclical Effectiveness of Unemployment Insurance: A Simulation Analysis

CHAPTER 7
THE COUNTERCYCLICAL EFFECTIVENESS OF UNEMPLOYMENT INSURANCE: A SIMULATION ANALYSIS

This chapter examines the extent to which endogenous shifts in unemployment benefits and taxes dampen cyclical fluctuations, using the DRI Model of the U.S. Economy. This analysis looks at two distinct time periods, the late 1970s and the early 1990s, in order to assess whether the effectiveness of unemployment insurance (UI) as a cyclical stabilizer has changed during that time.

The analysis imposes a monetary shock to aggregate demand, first with the UI system in operation, then with UI taxes and benefits frozen at their baseline levels. A comparison of real GNP responses indicates the size of the counter-cyclical effect of UI. This procedure was carried out both for a historical model solution beginning in 1977 and for a forecast solution beginning in 1991, so that any change in this effect over time can be examined. The final section of the chapter simulates the effectiveness of UI as a stabilizer under the scenario that the current recession is long and severe.

The Model

We use the DRI model of the U.S. economy to analyze the extent to which the effectiveness of unemployment insurance as an automatic stabilizer has changed over time. Without any change in the parameters in any equation in the model, simulations for different time periods would yield different estimates of effectiveness due only to the combination of different levels of variables and nonlinearities in the model. With structural shifts in either of the equations for the UI program or in other equations, the simulations can yield substantially different multipliers for different time periods. There undoubtedly are many possible pertinent shifts in the economy, including for example, possible changes in the fraction of liquidity-constrained consumers. Besides shifts in the UI program, the DRI model itself includes changes in equations that will affect the simulations. For the purposes of

this research, we will focus our research on direct shifts in the UI program itself and its responsiveness to the changes in the economy.

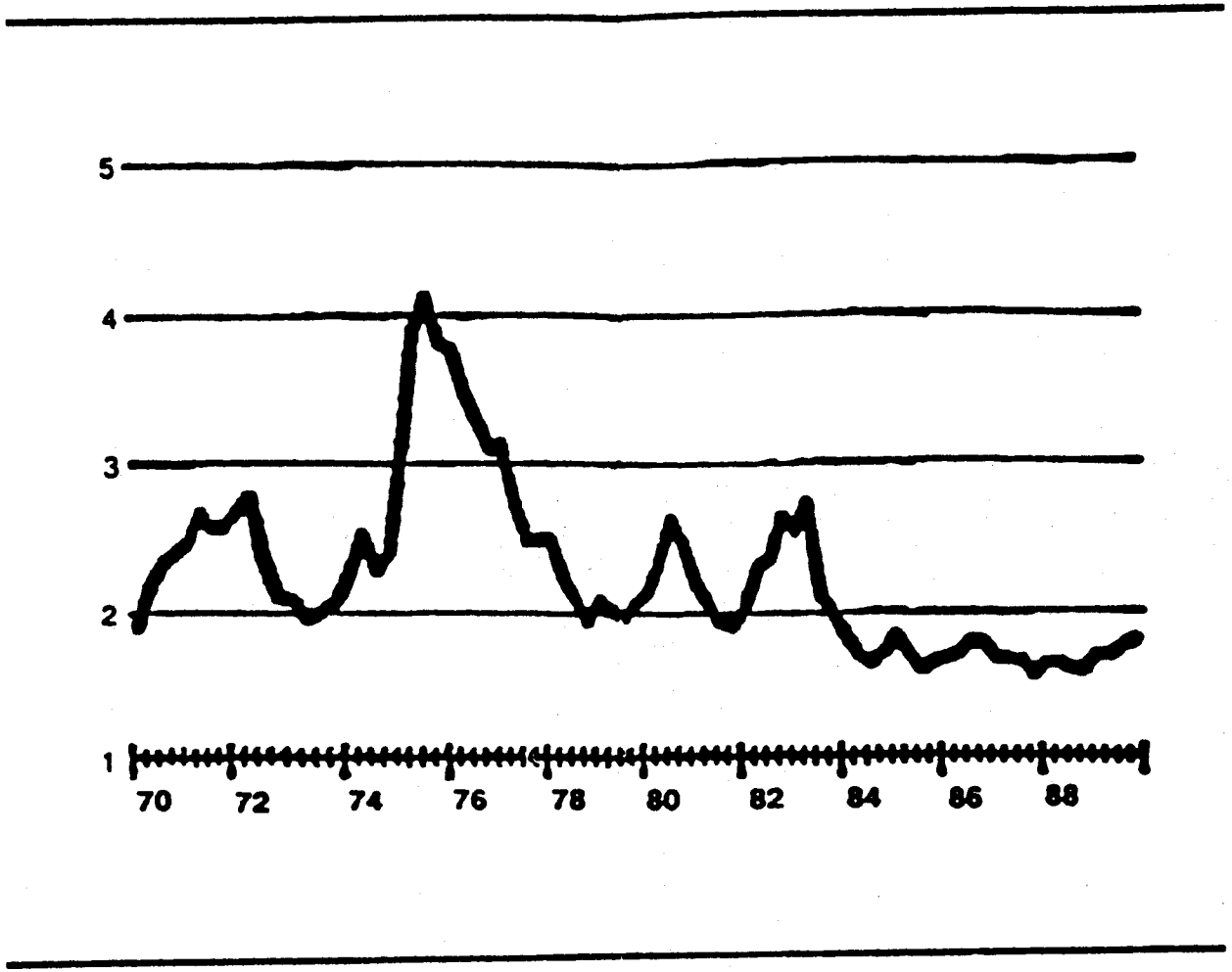
The current version of the DRI model includes a shift in its key equation for the UI program: an equation for UI benefits per unemployed person (not just insured unemployment). The DRI model indicates that UI benefits per unemployed person are lower in the late 1980s than in the 1970s (see Figure 8). In the DRI model, real benefits per unemployed person from 1960 to 1988 were modeled as a linear function of the following two variables:

1. The first variable is the difference between the actual unemployment rate and DRI's estimated full-employment unemployment rate (total rather than insured rates in both cases). This variable captures fluctuations in real UI benefits per unemployed person over the course of the business cycle. This variable has a positive coefficient, partly because the ratio of UI claimants to total unemployment tends to rise during a recession, as more job losers move onto the unemployment rolls and as the availability of benefits is extended during periods of high unemployment.
2. The second variable is a dummy variable, which captures the downward shift in real benefits per unemployed person over the period 1981 to 1985. The dummy is a time trend that begins in the first quarter of 1981 and ends in the first quarter of 1985. Its coefficient is negative, indicating a gradual decline in real benefits per person from the beginning of 1981 to the beginning of 1985. The cumulative decline in real benefits per unemployed person is on the order of 40 percent. Because there is no other time trend in the equation, the equation implies that trend real benefits per employed person have remained constant apart from the downward shift from 1980 to 1985.

Figure 8

Real Unemployment Benefits per Unemployed Person

(Thousands of 1982 dollars)



Benefits per person unemployed declined during the 1980s primarily because the proportion of unemployed persons claiming UI benefits dropped sharply (Figure 9). This ratio fell substantially in the first half of the decade and has rebounded only slightly since then, averaging 41% during the 1970s but only 34% in the 1980s. Real UI benefits per claimant, in contrast, fluctuate cyclically but show no dramatic shift in the 1980s (Figure 10).

Figure 11 shows that the ratio of UI claimants to total unemployment dropped because the previously close historical relationship between UI claimants and job losers -- the category of unemployed persons likely to be eligible for UI benefits -- became much more loose. During the 1970s, the number of UI claimants matched the number of job losers quite closely. In the 1980s, however, a large gap developed. The ratio of claimants to job losers dipped from 92% in the 1970s to just over 50% by 1983. Although the ratio has been moving up since then, it has only recently risen above 70% (Figure 12). During the 1980s as a whole, the ratio averaged 66%.

This ratio declined for several reasons, which, taken together, reflect a less generous UI system. As a result of a 1979 revision to the UI law, and other subsequent changes, the qualifying work period for benefit eligibility was raised slightly, the availability of extended benefits was reduced, and qualifying conditions were tightened. All of these factors acted to push down the number of UI claimants relative to the number of job losers.

The equation in the model does not attempt to explain the 1980s decline in real UI benefits per unemployed person, but it does take this decline into account via the dummy variable noted above. Without other changes in the economy, a downward shift in UI benefits per unemployed person indicates a decrease in the cyclical responsiveness of total UI benefits. Other things the same, the automatic increase of total UI benefits is less for the same increase in the total number of unemployed people and the automatic stabilization effect of unemployment insurance declines. One would therefore expect that the model simulations will show that the UI system will be a weaker counter-cyclical force in the 1990s, after this decline, than before.

Figure 13 shows how the model tracks overall UI benefits (given the number of unemployed people and the price level). Although it performs reasonably well, it

Figure 9

State Unemployment Insurance Claimants

(As a percent of total unemployed)

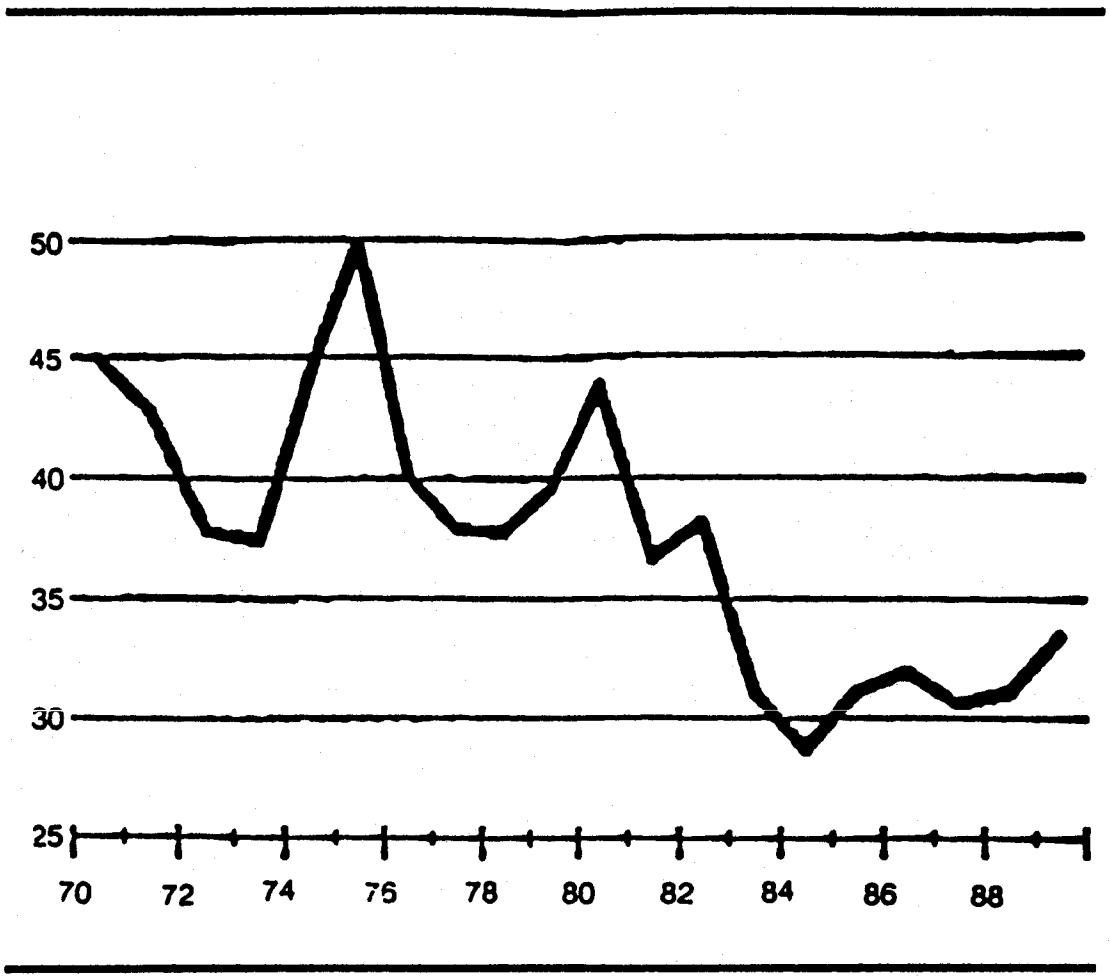


Figure 10

Total Real U.I. Benefits Divided by the Number of State U.I. Claimants

(Thousands of dollars)

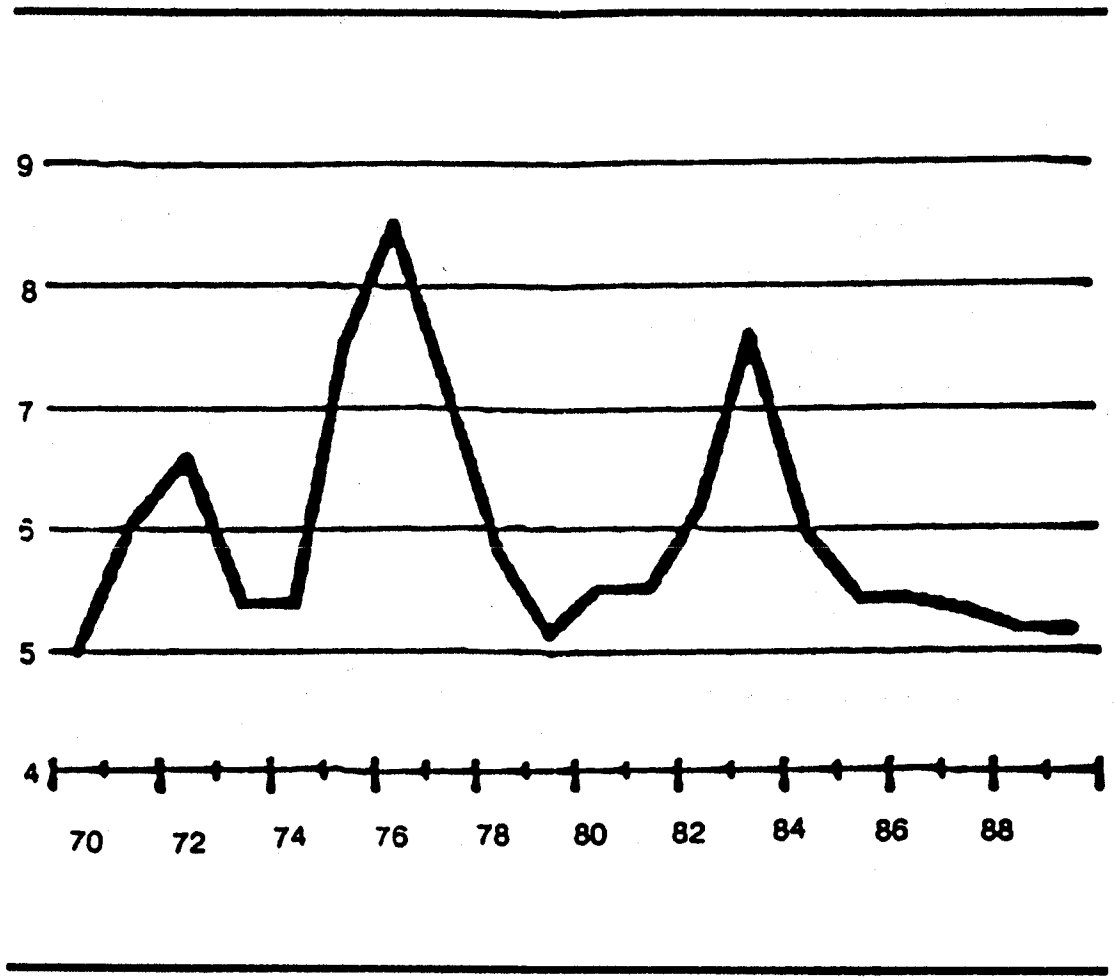


Figure 11

State Unemployment Insurance Claimants

and Job-Losers

(Millions)

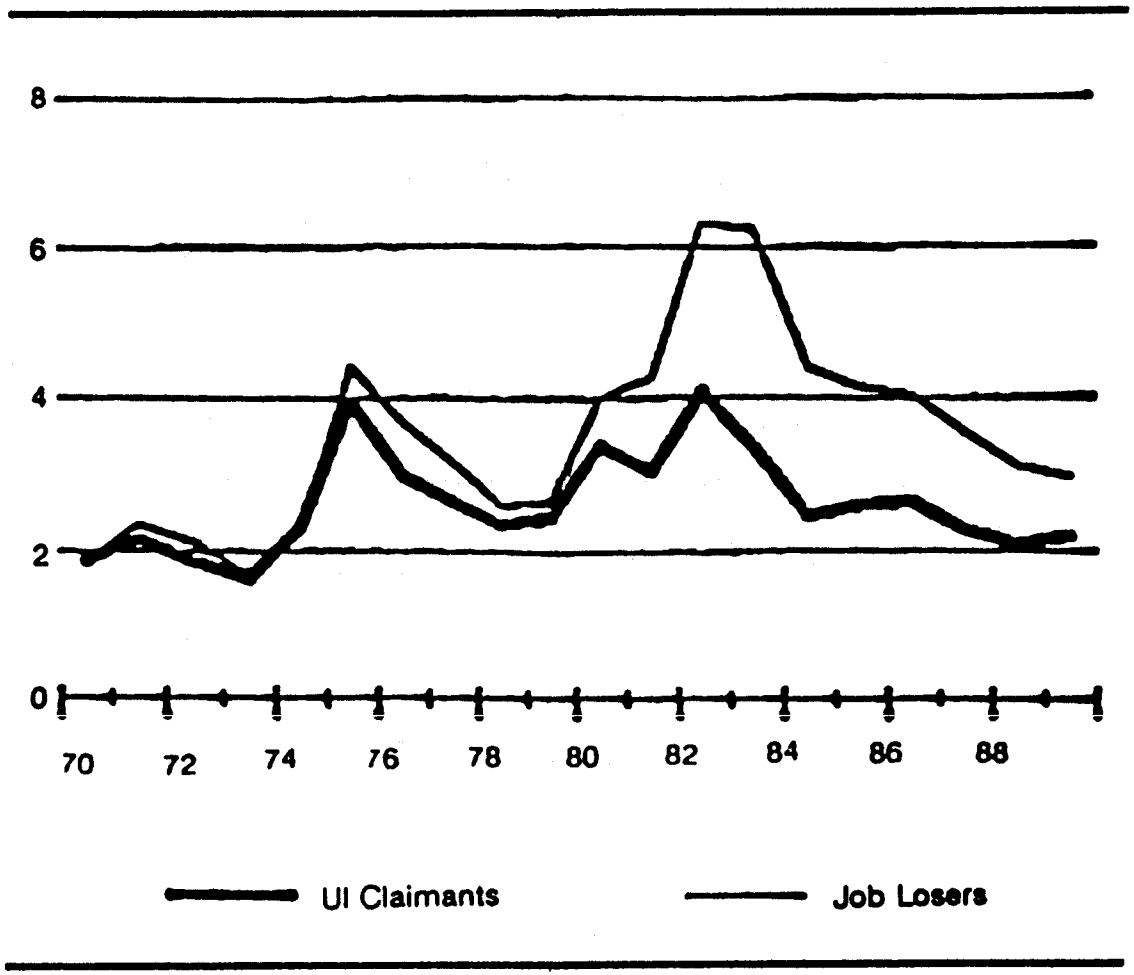


Figure 12

Unemployment Insurance Claimants

(As a percent of total job-losers)

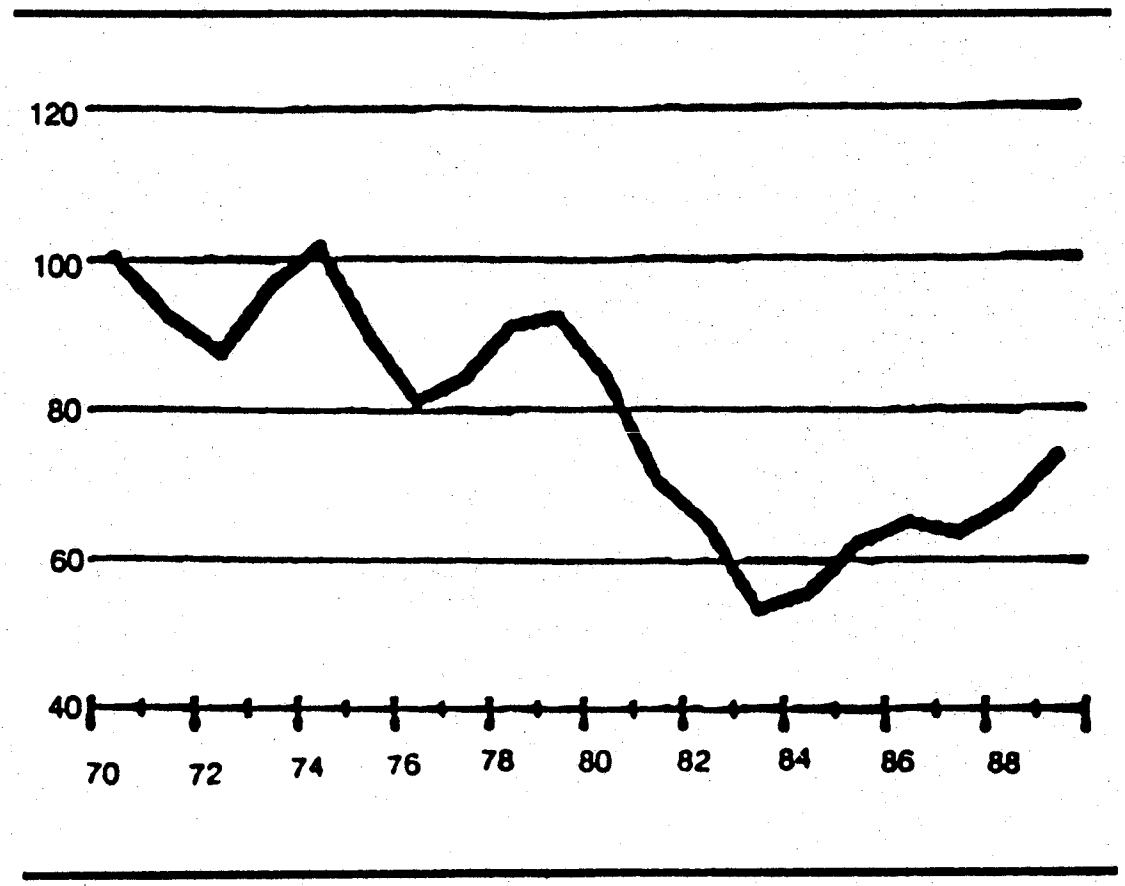
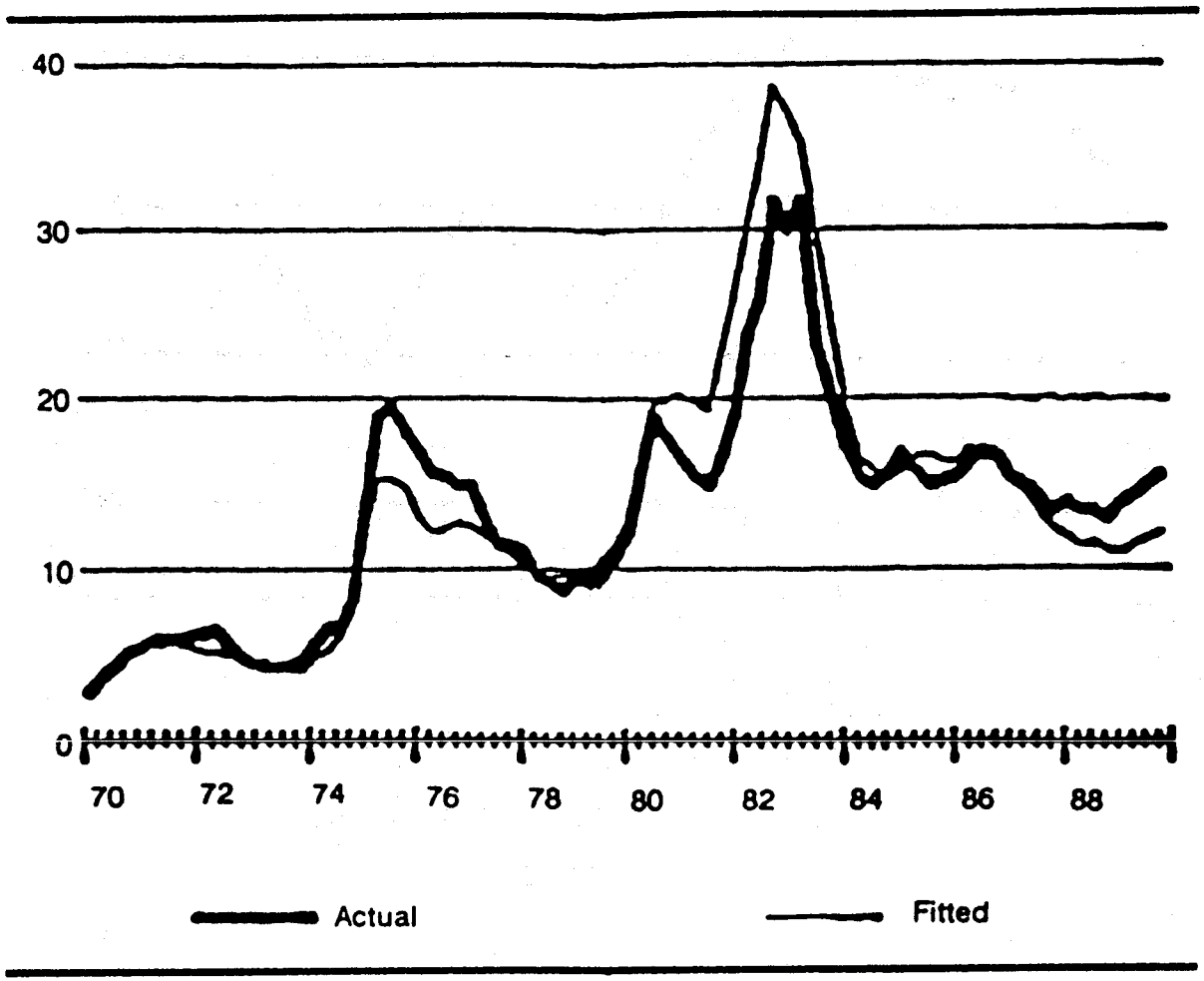


Figure 13

Unemployment Benefits

(Billions of dollars)



under-predicts benefits during the 1975 recession and overpredicts them during the 1982 recession. These deviations occur partly because supplemental benefits (enacted when both regular and extended benefits ran out for many of the unemployed during these recessions) were much more generous in 1975 than in 1982. The model's equation implicitly averages the two responses. If the response in future recessions is more like that in 1982 than in 1975, the future cyclical dampening effect of UI might be even weaker than the model suggests.

On the other hand, the model's equation does slightly underpredict benefits by 1989, in part because of data revisions since it was estimated. This effect works in the opposite direction, suggesting that the model may go too far in its trend reduction in benefits per unemployed person. We will examine these deviations in somewhat more detail after presenting the simulation results generated by the existing model.

The Model Simulations

The DRI econometric model is a standard econometric model of the economy with both demand and supply sides of the economy estimated for selected sectors. The fully integrated national and regional models provide detailed, consistent forecasts and impact analyses.

The starting point for the historical analysis was a baseline solution in which all exogenous variables were set equal to their actual values, while add-factors (constant adjustments) ensured that the endogenous variables matched their own actual values. The starting point for the forward-looking analysis was DRI's baseline forecast of August 1991.

Starting from each baseline, an exogenous shock was imposed on aggregate demand. This shock took the form of a permanent 2% reduction in nonborrowed reserves, the Federal Reserve's key instrument of monetary policy in the DRI Model. The reduction was phased in over four quarters for both the historical and forward-looking cases. These initial simulations represent the economy's response to a negative demand shock with the UI system in operation.

In the case of the historical solution, the shock was imposed beginning in the first quarter of 1977 and the model was then solved through the end of 1987. In the

forward-looking case, the shock was imposed beginning in the first quarter of 1991 and the model was solved through the end of 2001. In one latter case, a small upward adjustment to taxable income was necessary because the model treats UI benefits as untaxed, whereas in reality they have been fully taxed since 1987. The marginal tax rate on UI benefits was assumed to be 7.5% (halfway between zero and the lowest tax rate, 15%).

In the simulations with UI, as unemployment rises and employment declines in response to the negative demand shock, UI benefit payments increase and UI taxes decline. The next step was to construct simulations that eliminated these endogenous responses of the UI system but were otherwise the same as the simulations with UI.

In these simulations without UI, both benefits and taxes were pegged at their baseline levels in real terms (i.e. in nominal dollars they were allowed to deviate from baseline in the same proportion as the price level). This change required adjustments to federal transfer payments and to the social insurance tax rate. The model was re-solved, and the fluctuations in real GNP in the simulations without UI were compared to those in the simulations with UI. Because the required tax rate adjustments were trivial, virtually all of the difference between the simulations was attributable to the difference in UI benefits.

Figures 14 and 15 show, respectively, the deviations from the baseline for real GNP in the historical and forward-looking simulations. The decline in real GNP continues until, after roughly nine quarters in both cases, it begins to reverse. The gap between the two lines in each chart illustrates the extent to which unemployment insurance dampens the decline. The dampening is small in both cases, although slightly larger in the historical simulation than in the forward-looking one.

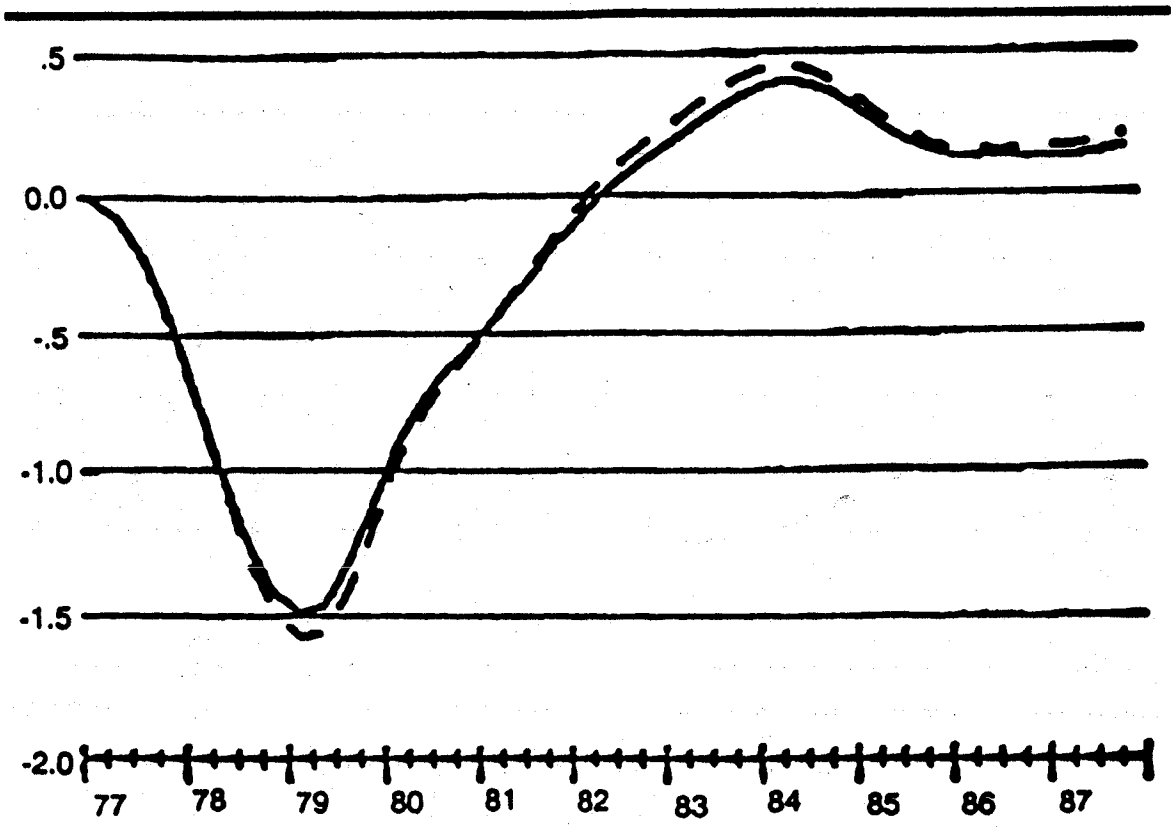
In order to quantify the extent of the dampening, we calculated the percentage of the GNP decline in the simulations without UI that is prevented in the simulations with UI. This figure measures, in proportional terms, the gaps between the two lines in Figures 14 and 15. The results are presented in Figure 16 for both the historical and the forward-looking simulations. Figure 16 covers only the initial period of the simulations because this measure is not meaningful once real GNP returns to its baseline level.

Figure 14

The Historical Response of Real GNP

to a Monetary Shock*

(Percent deviation from baseline)



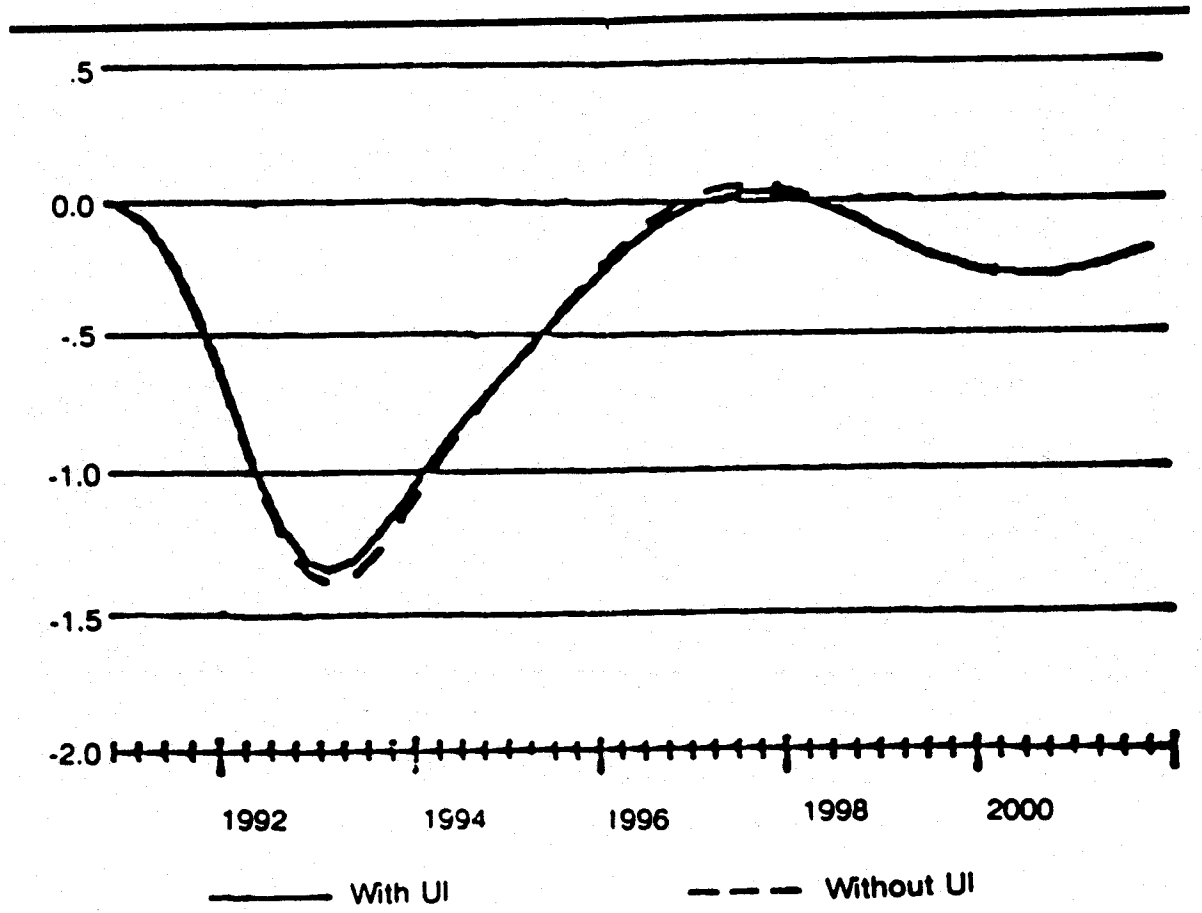
* Permanent 2% reduction in nonborrowed reserves.

Figure 15

The Future Response of Real GNP

to a Monetary Shock*

(Percent deviation from baseline)

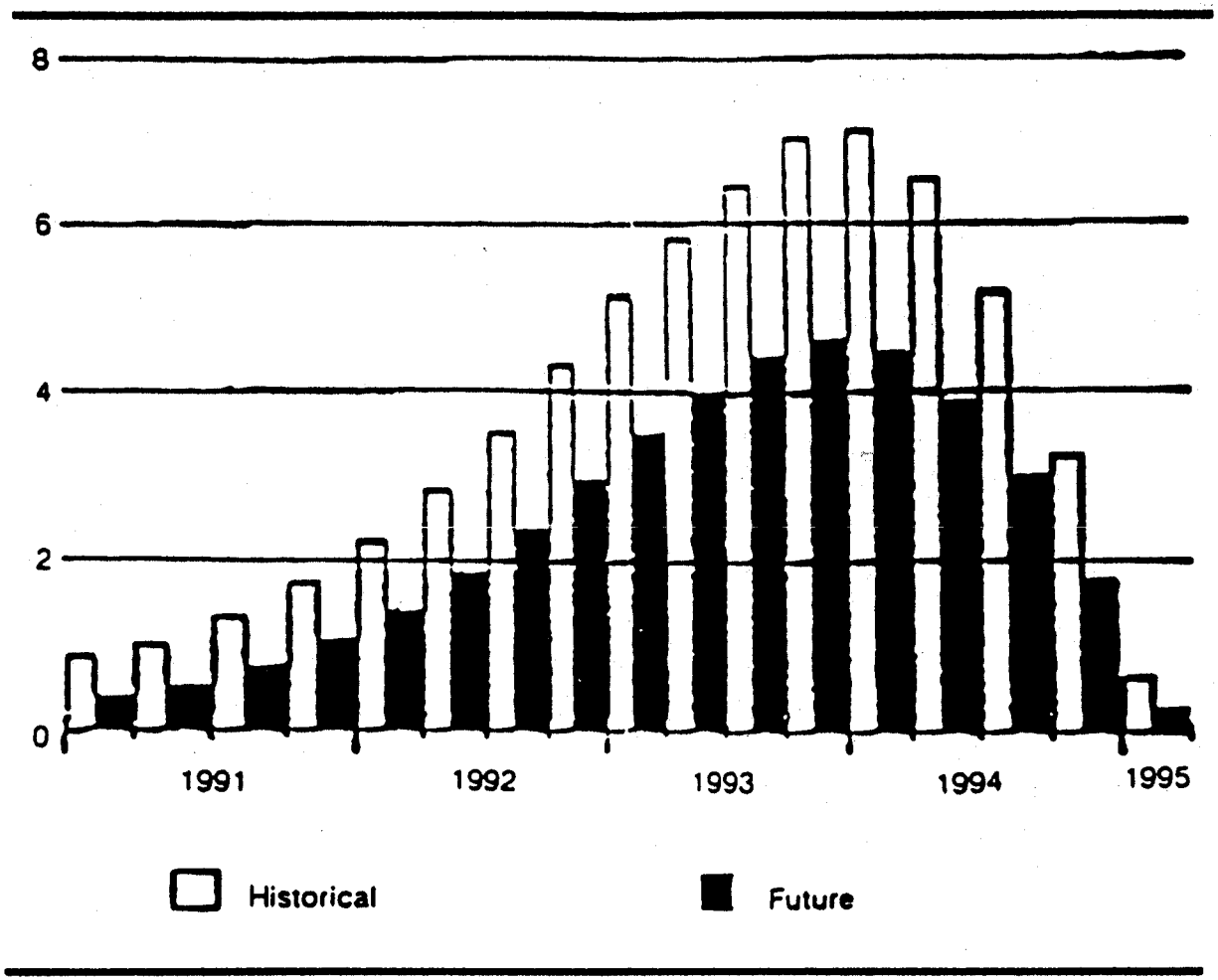


* Permanent 2% reduction in nonborrowed reserves.

Figure 16

Real GNP Deviation from Baseline Prevented by the UI System in a Monetary Contraction Scenario

(Percent of GNP deviation with UI operating)



As an alternative method of illustrating the results, Figure 17 presents the difference between real GNP in the simulations with and without UI, as a percent of baseline real GNP. This measure is meaningful over the entire period of the simulations.

The GNP dampening is clearly lower in the forward-looking simulation than in the historical one, as expected. The average measure, for the four quarters of highest decline in real GNP, indicates that in the 1970s simulation the UI system offset about 5.4 percent of the peak loss in real GNP, which translates into a 4.9 percent reduction of the employment loss resulting from the monetary shock. This figure represents a saving of approximately 42,000 jobs. By the early 1990s, however, the offset to the peak loss in real GNP had fallen to 3.7 percent. This offset implies only a 3.5 percent reduction in the employment loss caused by a similar monetary contraction, for a saving of 31,000 jobs.

Although the decline in the ratio of claimants to job-losers, which was discussed above, is by far the most important factor behind the decline in the counter-cyclical effectiveness of unemployment insurance, it is not the only one. A second factor is the flat trend in real UI benefits per claimant (see Figure 10 above), which implies a long-term decline relative to real compensation per worker. Furthermore, as noted above, UI benefits are now fully taxable; they were completely untaxed until 1979, then partially taxed until 1987. The marginal rate of taxation on UI benefits will depend on the precise timing of employment and unemployment periods relative to the calendar year, but this rate is clearly quite low (we assumed 7.5%). It therefore makes only a small contribution to the reduced effectiveness of UI.

What If The Future UI Response In A Recession Is Like 1982

We mentioned above that the model's equation for UI benefits implicitly averages the 1975 and 1982 recession responses in calculating the size of the temporary increase in real UI benefits per unemployed person that occurs when the unemployment rate rises. However, recall that the response was weaker in 1982 than in 1975. It is relevant to ask how much weaker the counter-cyclical effectiveness of UI would be in a future downturn if the response were as weak as in 1982.

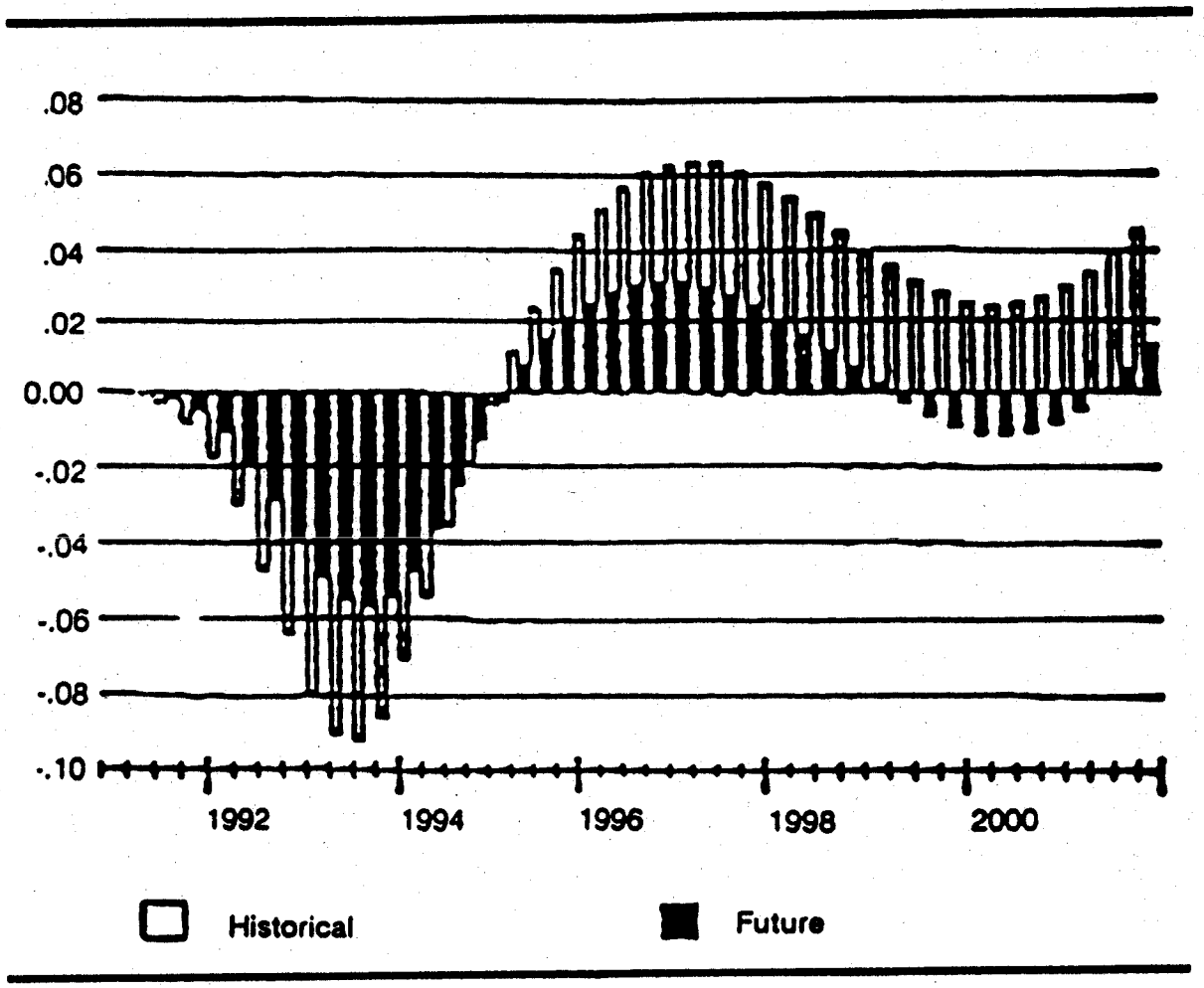
Figure 17

Extra Real GNP Deviation from Baseline

Without UI System Operating in a Monetary

Contraction Scenario

(Percent of baseline GNP)



To answer this question, a new equation for real UI benefits per unemployed person was estimated to allow the difference between the actual and full-employment unemployment rates to take different coefficients before and after 1979. The choice of 1979 is somewhat arbitrary, but that date falls roughly halfway between 1975 and 1982 and is consistent with Chapter 6. The equation yields a significantly lower response coefficient after 1979, about one-third of that before 1979. It also shows a smaller reduction in trend real benefits per unemployed person in the 1980s than the equation for the model. Intuitively, the new equation attributes more of the weakness in real UI benefits per person in the early 1980s to a reduction in the cyclical sensitivity of benefits per person and less to a permanent reduction in trend benefits per person.

Figure 18 shows how well the new equation tracks overall UI benefits. The equation, fitted over the period, clearly does better in capturing the recession peaks in benefit spending, and also, because of its smaller reduction in trend benefits, no longer underpredicts at the end of the period.

This new equation was used to examine its prediction of the response of UI benefits to the monetary contraction imposed on the full model described earlier. The new equation predicts a stronger response of benefits in the historical simulation than the other one does, about 12% stronger at the point of maximum GNP loss. This indicates that instead of offsetting 5.4% of the GNP loss from the monetary contraction, the UI system in the 1970s may actually have offset 6.1% of the loss.

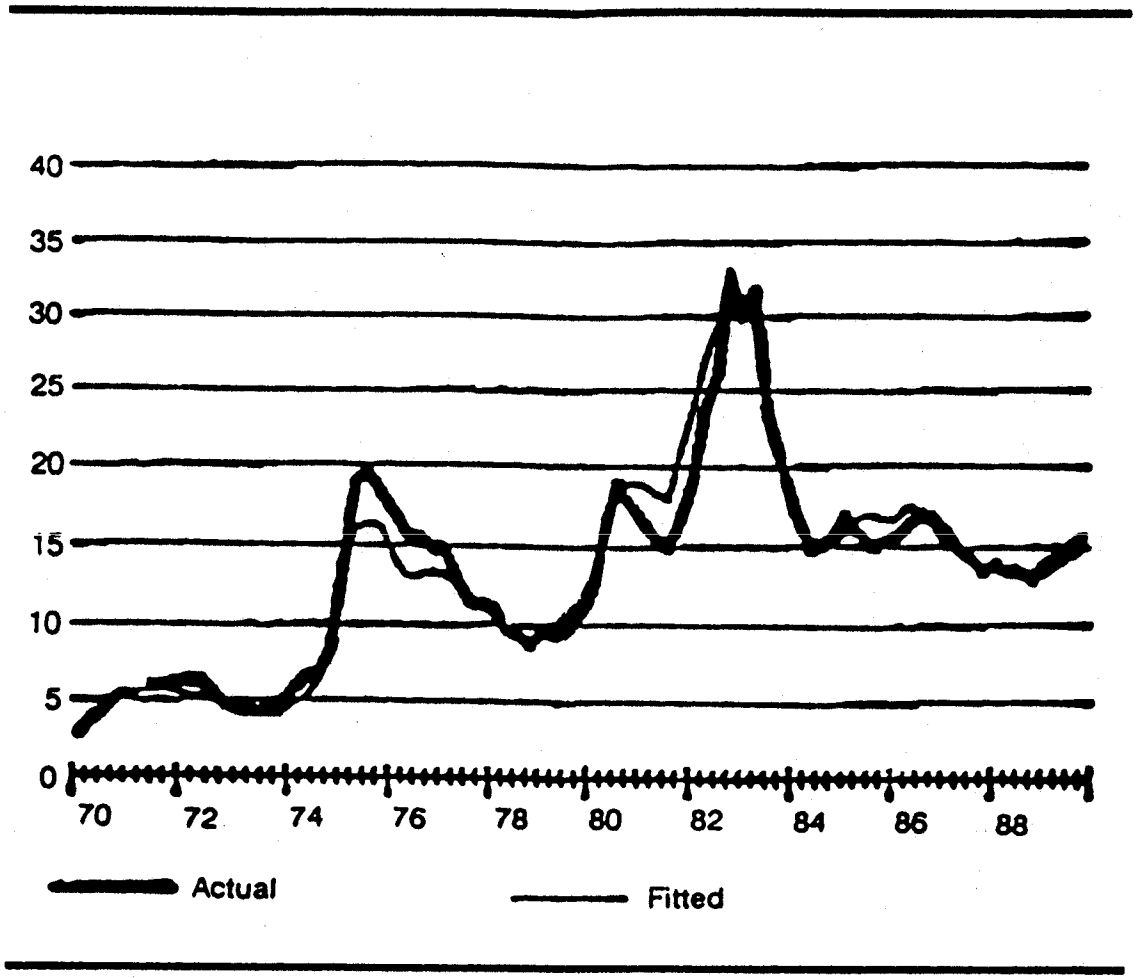
A more striking change, however, is the new equation's projection of the future response of UI benefits. It predicts a 22% smaller increase in benefits, at the point of maximum GNP loss, than the other model's equation. This result implies that instead of offsetting 3.7% of the GNP loss from a future monetary contraction, the UI system would offset only 2.9% of the loss. This would, of course, translate into fewer jobs saved.

Overall, the new equation indicates that if the future response of UI benefits in a recession is only as generous as in 1982, which in large part will be a political decision, the UI system will have only half the counter-cyclical effect that it did in the 1970s (2.9% versus 6.1%).

Figure 18

Unemployment Benefits: An Alternative Equation

(Billions of dollars)



The Counter-Cyclical Effects of UI in the Current Recession

The U. S. Economy is currently in a recession, which probably began in the latter part of 1990. Because of the uncertainty surrounding the possible duration of the war in the Persian Gulf and other resulting disturbances no one can accurately predict, at this stage of the recession, how long it will last and how severe it will be. Nonetheless, we will end the simulation analysis in this chapter with an analysis of the effect of unemployment insurance on the economy under the most pessimistic forecast -- the recession will be long and severe. In this way, we can forecast the effect of UI if, in fact, the pessimistic prediction is true, but we can also extrapolate the results if the recession turns out to be shorter and less severe.

We begin with the simulation of the model, using two alternative DRI forecasts of the U. S. economy, prepared in early January, 1991. We use as the baseline the most optimistic scenario. The economy begins to recover in the first quarter of 1991, and the recovery accelerates throughout the rest of the year. This forecast assumes a rapid resolution of the Persian Gulf war, with oil prices falling to below $20/barrel. Consumer and business confidence recover quickly, and the Federal Reserve eases monetary policy to ensure a solid recovery. Consumer spending on durables and housing lead the upturn. The unemployment rate peaks at 6.5 percent in Spring, 1991, then declines to an average of 5.5 percent in 1992 and 5.1 percent in 1993.

We contrast this optimistic baseline with DRI's deep recession scenario, with an extended war, soaring oil prices, and a credit squeeze in the private sector. In this worst-case alternative, the economy remains in the recession for a full year, with real GNP declining 3.6%. An eventual peace brings lower oil prices, falling interest rates, and renewed confidence by early 1992. After climbing to 8.5% in late 1991, the unemployment rate falls to an average of 7.4 percent in 1992 and 5.7 percent in 1993. This simulation of a deep recession includes an operating UI system.

Next we created a variation of the deep recession simulation in which the endogenous responses to the UI system are eliminated. In the simulation without UI, both benefits and taxes were held at the baseline levels in real dollars, although nominal values could vary with changes in the price level. This simulation required adjustments to federal transfer payments and to the social insurance tax rate. The

marginal personal tax rate on UI benefits was assumed to be 7.5%, which is consistent with the estimate discussed above. Since the maximum adjustment to UI taxes was $1.9 billion and the maximum adjustment to UI benefits was $18.3 billion, most of the differences between the "with UI" and "without UI" simulations are attributable to differences in benefit payments.

Figures 19 and 20 show the effects of the different assumptions on the simulations of real GNP and the unemployment rate. Figure 19 shows the path of real GNP from the present through 1993. As indicated, GNP under the most optimistic scenario is substantially above the deep recession scenario without UI. The deep recession path with UI is slightly above that without UI from mid-1991 through 1992. Comparing the deep recession case without UI to the baseline, the greatest deviation in real GNP is in the first quarter of 1992, when real GNP is 5.9 percent lower in the deep recession.

The unemployment rate under the three scenarios is shown in Figure 20. During the first quarter of 1991, when the GNP gap is largest, the unemployment rate with a deep recession in the absence of UI is 2.4 percentage points below the baseline. The unemployment rate without UI is slightly above the rate with UI in a deep recession from the first quarter of 1991 until mid-1993. The unemployment rates under the three scenarios converge by the end of 1993. However, a 2.9 percent gap in real GNP still remains when the unemployment rates converge, because the severe recession brings about a lower labor force participation.

Figure 21 shows the path of unemployment benefits paid under the two assumptions about the severity of the recession. The gap is largest from mid-1991 through mid-1992 and converges by the third quarter of 1993.

Next we consider more closely the response of the UI system under the severe recession scenario. One measure of the effectiveness of the unemployment insurance system is its dampening impact on the decline in real GNP. As noted above, the greatest deviation of real GNP in a severe recession from real GNP in the baseline case occurs in the first quarter of 1992. In that quarter, the UI system restores 4.1 percent of the loss, as shown in Table 8. The real GNP gain between the "with UI"

Figure 19

Real GNP in Alternative Scenarios

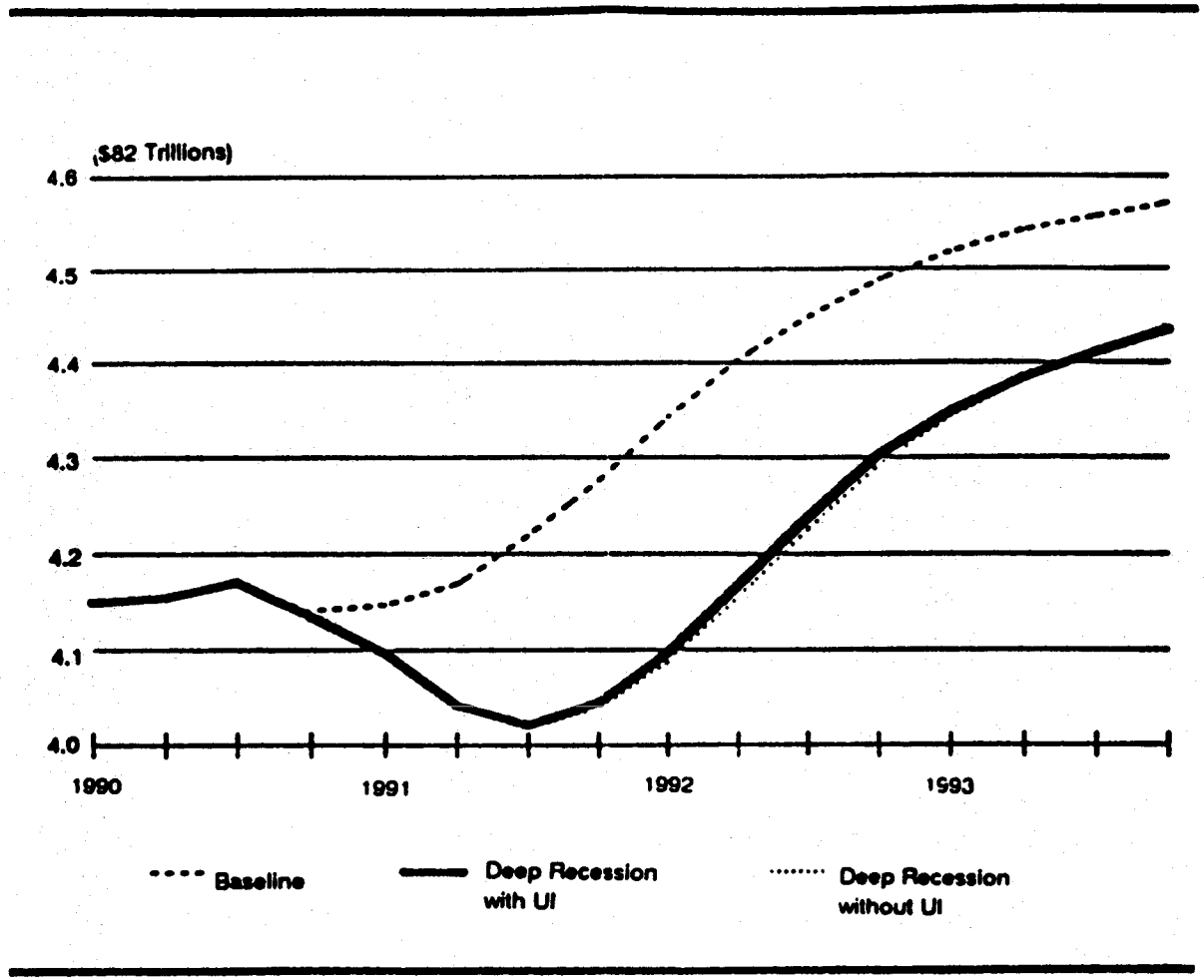


Figure 20
The Unemployment Rate in Alternative Scenarios

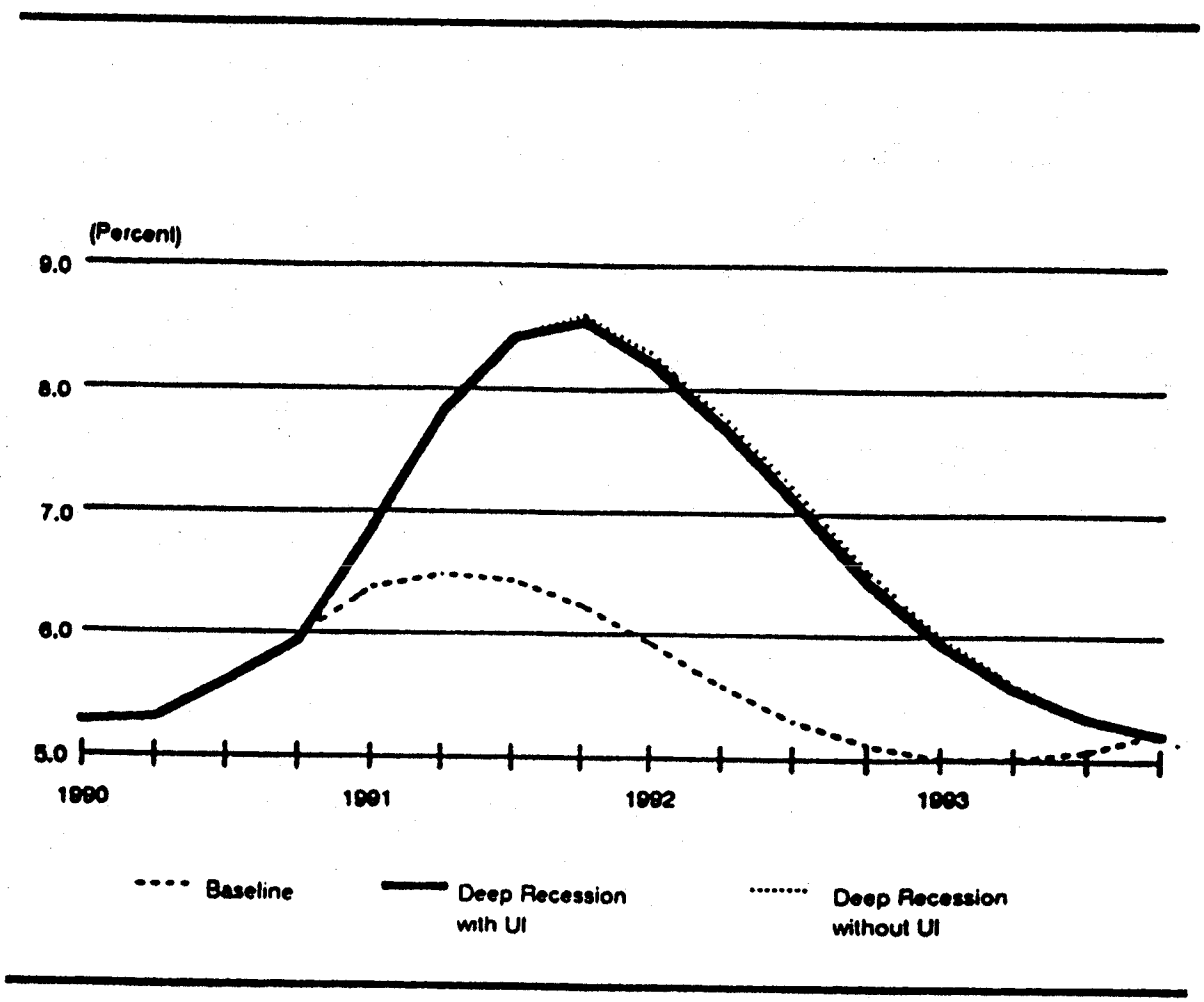
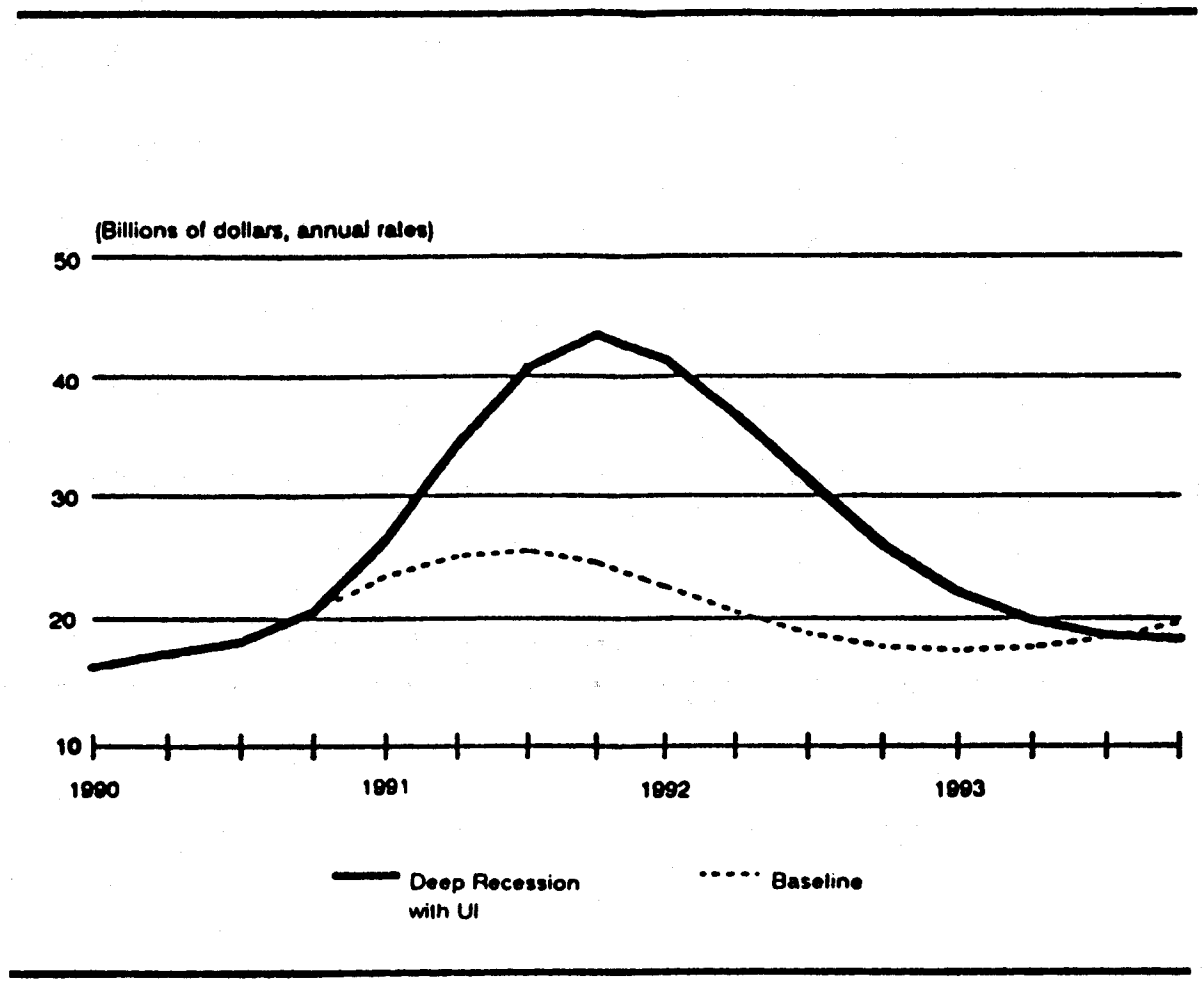


Figure 21

Unemployment Insurance Benefits in Alternative Scenarios



and "without UI" cases is $10.6 billion in 1982 dollars. The boost to real GNP reaches a maximum of $12.3 billion one period later.

Table 8 separates the gap in real GNP into its three components during the first quarter of 1992. The major part of the increase in real GNP attributable to the UI system, 87 percent, is a result of the additional consumer spending with UI. The loss in consumer spending in this quarter falls from $121.9 billion to $112.7 billion, or by $9.2 billion, because of the operation of the UI system. This represents a 7.5 percent decrease in the loss. The difference in the loss for the other two components of GNP in the table are relatively small: the difference in real capital spending between the "with UI" and "without UI" scenarios is $1.6 billion, while $0.9 billion in real residential investment is restored. As shown, the difference in real consumption resulting from UI benefit payments is only about half the gain in real personal income ($18.8 billion or 14.0 percent). We should note, however, that the additional domestic spending with the UI system results in an increase of $4.1 billion in real imports.

In the deep recession with UI, total employment is five million below what would be the case under the baseline in the first quarter of 1992. As shown in Table 8, the UI system restores 115,300 jobs in the deep recession during this quarter. This is a reduction of 2.3 percent in lost jobs. The maximum benefits in terms of job losses prevented came three quarters later, when the recovery is well under way. By the fourth quarter of 1992, the UI system has generated 170,100 jobs, offsetting 3.5 percent of the losses in that period. This suggests that the UI system not only dampens, to some extent, the economy's decline in a recession, but also accelerates its recovery.

Figures 22 through 24 summarize the deviation from the baseline prevented by the UI system for real GNP, real personal income, and total employment, respectively, in each quarter of the severe recession. As noted, the greatest deviation from the baseline of real GNP under a severe recession without UI occurs in the first quarter of 1992, when the UI system prevents 4.2 percent of this decline. Figure 22 shows that the deviation prevented is larger than 4.2 percent during the next three quarters, reaching a high of over 5 percent prevented in the third quarter of 1992, and is only slightly lower in the first quarter of 1993. This indicates that the UI

TABLE 8

Effectiveness of UI System in Cushioning a Deep Recession, 1992:1 (*)

	Losses Without UI Operating	Losses With UI Operating	Losses Prevented by UI System	Percent of Loss Prevented
Real GNP	254.7	244.1	10.6	4.1
Consumer Spending	121.9	112.7	9.2	7.5
Business Investment	81.5	79.9	1.6	1.9
Residential Investment	43.3	42.5	0.9	2.0
Real Personal Income ($82 Bil)	134.6	115.9	18.8	14.0
Employment (Thousands)	5,049.4	4,934.2	115.3	2.3

* Period of peak real GNP deviation from optimistic baseline scenario

Figure 22
Real GNP Deviation from Baseline Prevented by the UI System in a Deep Recession

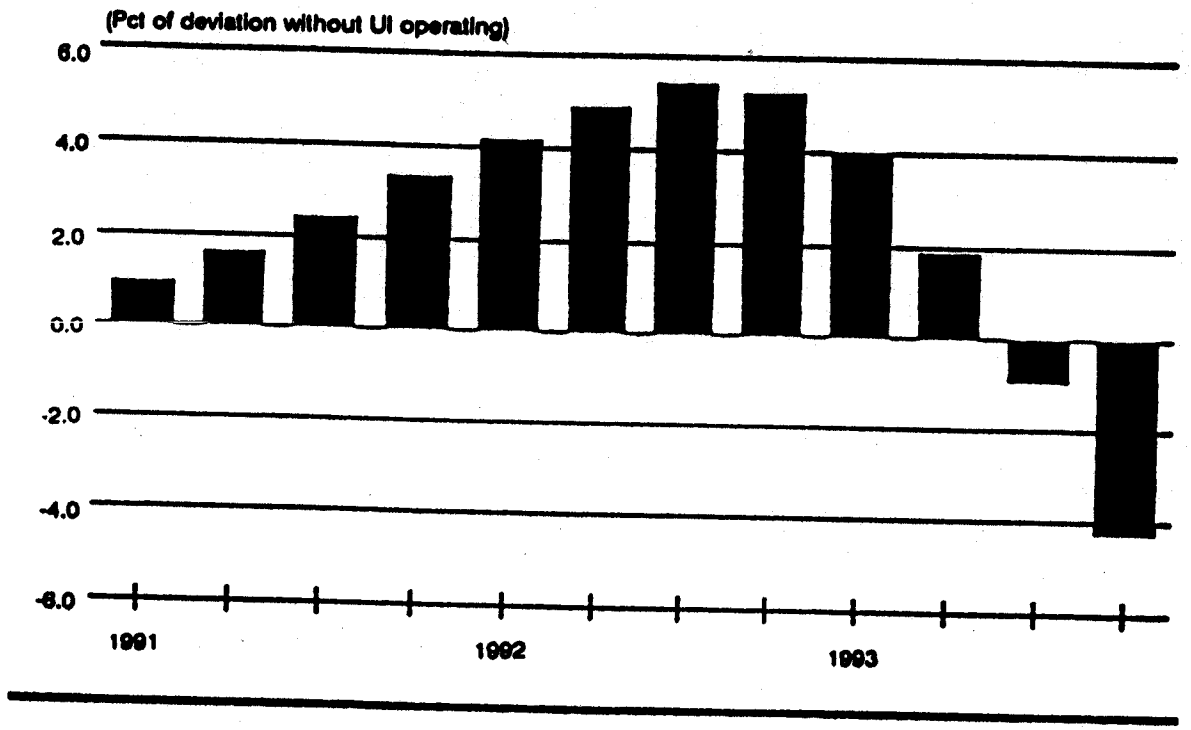


Figure 23

Real Personal Income Deviation from Baseline Prevented by the UI System in a Deep Recession

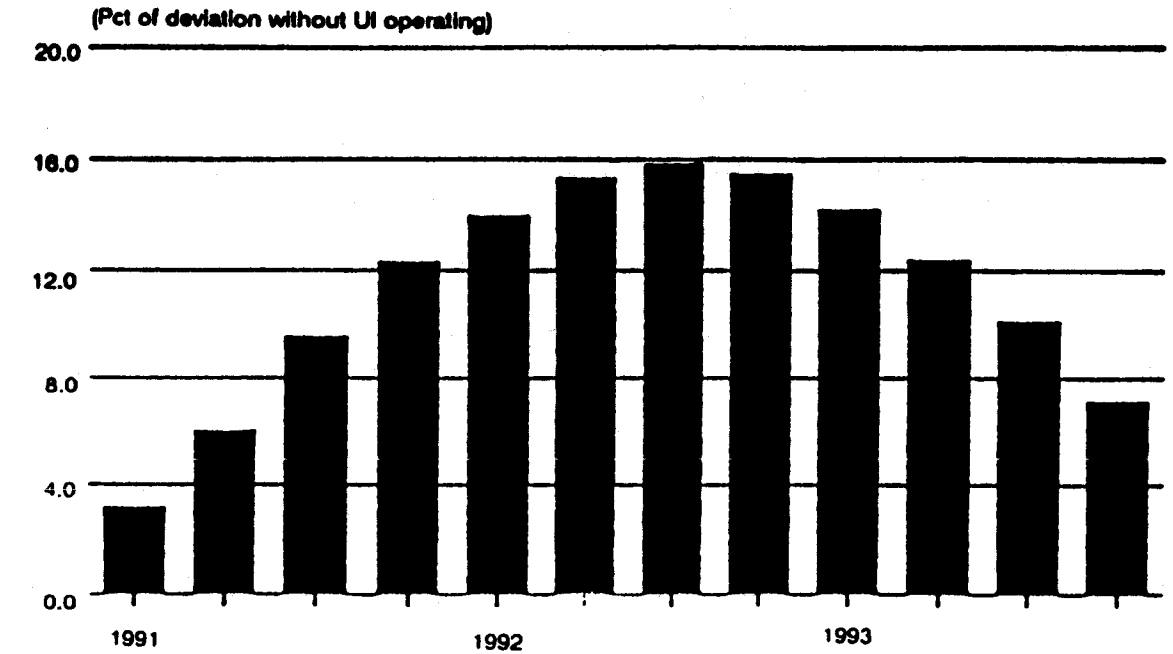
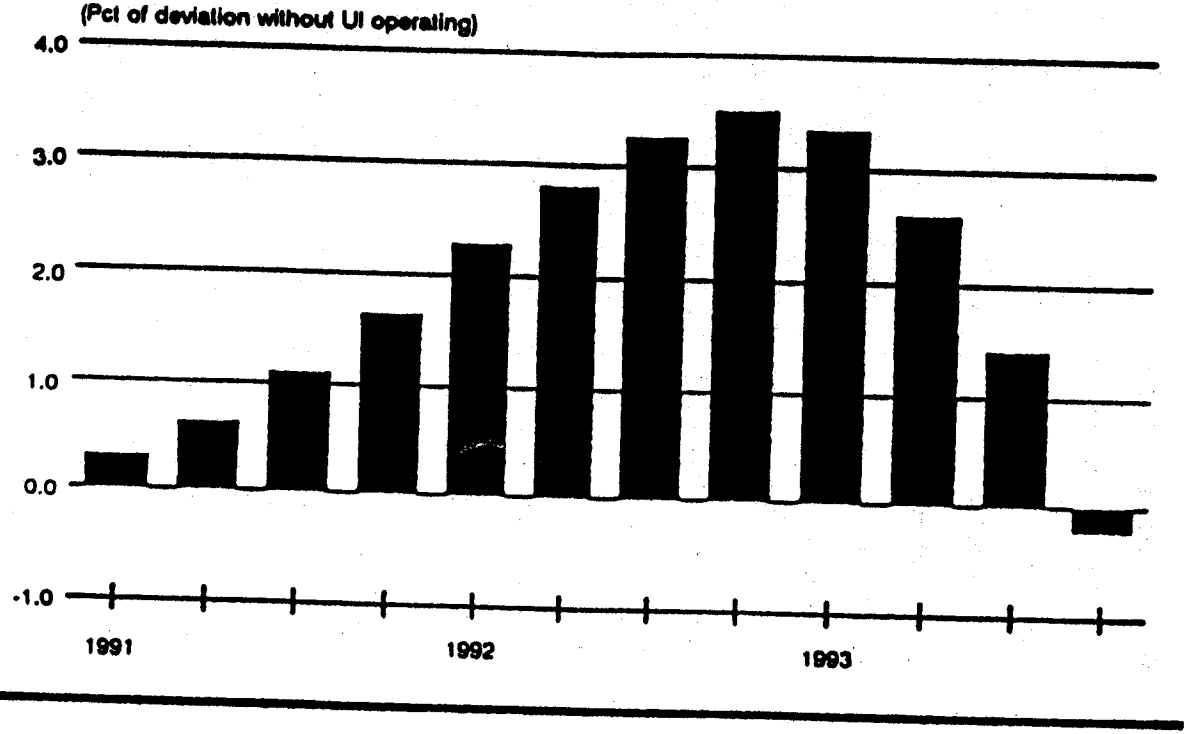


Figure 24
Employment Deviation from Baseline Prevented by the UI System in a Deep Recession



system becomes more effective as a stabilizer after the trough of the recession is reached.

A similar pattern is indicated for personal income, Figure 23, and total employment, Figure 24. Personal income deviation prevented by UI is higher than that in the first quarter of 1992 for the next four quarters, reaching a high of almost 16 percent in the third quarter. The percent of employment loss prevented is higher for the next five quarters.

To summarize, the unemployment insurance system should provide a mild cushion to the economy in 1991 through 1993 if the recession deepens, because of an extended war, escalating oil prices, and tightened credit conditions. The DRI model indicates that the UI system could offset 4.2 percent of the peak loss, in real GNP and 14 percent of the loss in personal income during that quarter of peak loss, after that the percentage offset increases.

As shown earlier, the DRI model indicates that the counter-cyclical effectiveness of the unemployment insurance system is now only about two-thirds as great as in the 1970s. However, the regional nature of the current downturn might help to augment its role in stabilizing income. Employment and income losses are heavily concentrated in Northeastern states, such as Massachusetts, where UI benefits are relatively generous.

Conclusions

The simulations of the DRI Model indicate that changes in the UI program during the early 1980s have reduced its effectiveness as a cyclical stabilizer to about two-thirds of what it was in the 1970s. The simulations indicate that in the 1970s the UI system could offset 5.4 percent of the maximum loss in real GNP caused by a monetary contraction. Now the simulations show that the UI system can offset only 3.7 percent of the maximum loss caused by a similar monetary contraction. This translates into a reduction in the percent of job losses prevented from 4.9 percent in the 1970s to 3.5 percent currently. In terms of job losses prevented this represents a decrease from 42,000 losses in the 1970s to 31,000 currently. However, simulation for the current recession indicates a slightly higher offset of 4.2 percent.

The DRI estimates are based upon benefit payments that are the average of payments in the 1970s and in the 1980s, which were less generous than those in the earlier decade. In the estimation that allowed for differences in benefits before and after 1979, it was estimated that the UI system may have offset 6.1 percent of the decline in GNP in the 1970s. If the performance of the UI system in the 1980s is indicative of its performance in a future recession, UI payments could perhaps offset only 2.9 percent of the loss in GNP.

The principal explanation for the decline in the effectiveness of UI as an automatic stabilizer in the 1980s is the reduction in the proportion of job losers who receive benefits. Other contributors to the decline are the absence of growth in real benefits per UI recipient and introduction of taxation of benefits.

The UI system as presently constituted could offset 4.2 percent of maximum GNP reduction and 2.3 percent of the employment loss during the quarter of maximum GNP reduction under the present UI system if the current recession turns out to follow the deepest and longest DRI scenario. This would imply a reduction in jobs lost of 115,000 jobs because of the UI system.

To summarize, all of the results of the DRI simulations indicate that a diminution in the ability of the UI system to ameliorate recessions and economic fluctuations in the economy took place between the 1970s and 1980s.

Chapter 8
Conclusions

CHAPTER 8
CONCLUSIONS

One objective of this study was to summarize much of the previous work on the effectiveness of UI as an economic stabilizer. It has therefore brought together several strands of seemingly different areas of research. However, each of these areas gives some insight into the effect of UI.

The first thing that is relatively clear is that the American business cycle has changed and become smoother. Evidence suggests that factors commonly thought to affect the course of the cycle of expansion and recession also have changed. Whether or not these changes have had an effect upon effectiveness of unemployment insurance as a stabilizer remains conjectural.

Some evidence from income and expenditures suggests a decrease in the stabilization effect of UI. Evidence from labor force data of a decline in the importance of UI is somewhat stronger, but not overwhelming.

The primary objective of this study was to examine empirically the effectiveness of the UI program as an automatic stabilizer and set forth the results of estimates. The controversy over the results of past attempts to measure its effectiveness is evidence that this is not a simple, straightforward problem. Many aspects of the program must be considered. Because of the problems involved, we followed three approaches: (1) Descriptive statistics were used to examine the relation of the UI program to the economy; (2) an especially designed vector autoregressive model was used to capture any changes in the effects of the UI program; and (3) a DRI econometric model of the economy, modified for the purposes of this study, estimated the magnitude of changes in the effect of UI on the economy, especially in a recession.

The majority of the empirical evidence points to a reduction in the effectiveness of the UI program as an automatic stabilizer during the 1980s. Certainly an important reason is the smaller proportion of the unemployed who receive UI benefits than was previously the case. Simulations using the DRI econometric model indicated that UI was only two-thirds as effective in mitigating the effects of a

recession in the 1980s compared to the 1970s. This model also predicted that UI will have even less of a stabilizing effect during a recession in the 1990s. The VAR results were consistent with those of the DRI model: a change in the UI system occurred between the 1970s and 1980s making it less effective as a stabilizer.

It is important not to confuse the stabilization aspect of UI with the income support function. Income support considerations were certainly the major force behind the establishment of the UI program, but they should be distinguished from the stabilization question. It is possible, though rather unlikely, that the income support role of UI and the countercyclical effect of the program may have moved in opposite directions. This would be the result if, because of demographic changes or changes in expectations, new recipients have distinctly different propensities to consume than was previously the case. Furthermore, since the expansion of the modern social welfare system, temporary income support is also provided through the programs of other agencies. Consequently, even though the proportion of eligible persons receiving UI benefits at a given time has decreased, the proportion of their income compared with their previous income while not working may be the same or even higher compared with the unemployed during earlier periods. If such is the case, UI alone may have diminished in importance as an economic stabilizer, but total transfer payments to the unemployed may act equally well, or perhaps even better. This would be an important topic for future research.

Appendix A
Relation of Insured Unemployment Rate and Total Unemployment and UI Benefits and Taxes for Colorado, Georgia, Massechusetts, and Texas

APPENDIX A

RELATION OF INSURED UNEMPLOYMENT RATE AND TOTAL UNEMPLOYMENT AND UI BENEFITS AND TAXES FOR COLORADO, GEORGIA, MASSACHUSETTS, AND TEXAS

In Chapter 5 we presented some statistics to show that the gap between insured unemployment and total unemployment had widened substantially from the 1970s to the 1980s for the United States as a whole. We also showed that the relation between UI benefits and taxes indicated that the role of UI as an automatic stabilizer may have diminished slightly for the economy as a whole from the 1970s to the 1980s. To show how these figures differ for different states, the eight graphs in this Appendix show the same statistics for four selected states over the same time period. These states are used for estimates in Chapter 6.

Figure A-1

Unemployment Rate Colorado

I/1970 to IV/1989

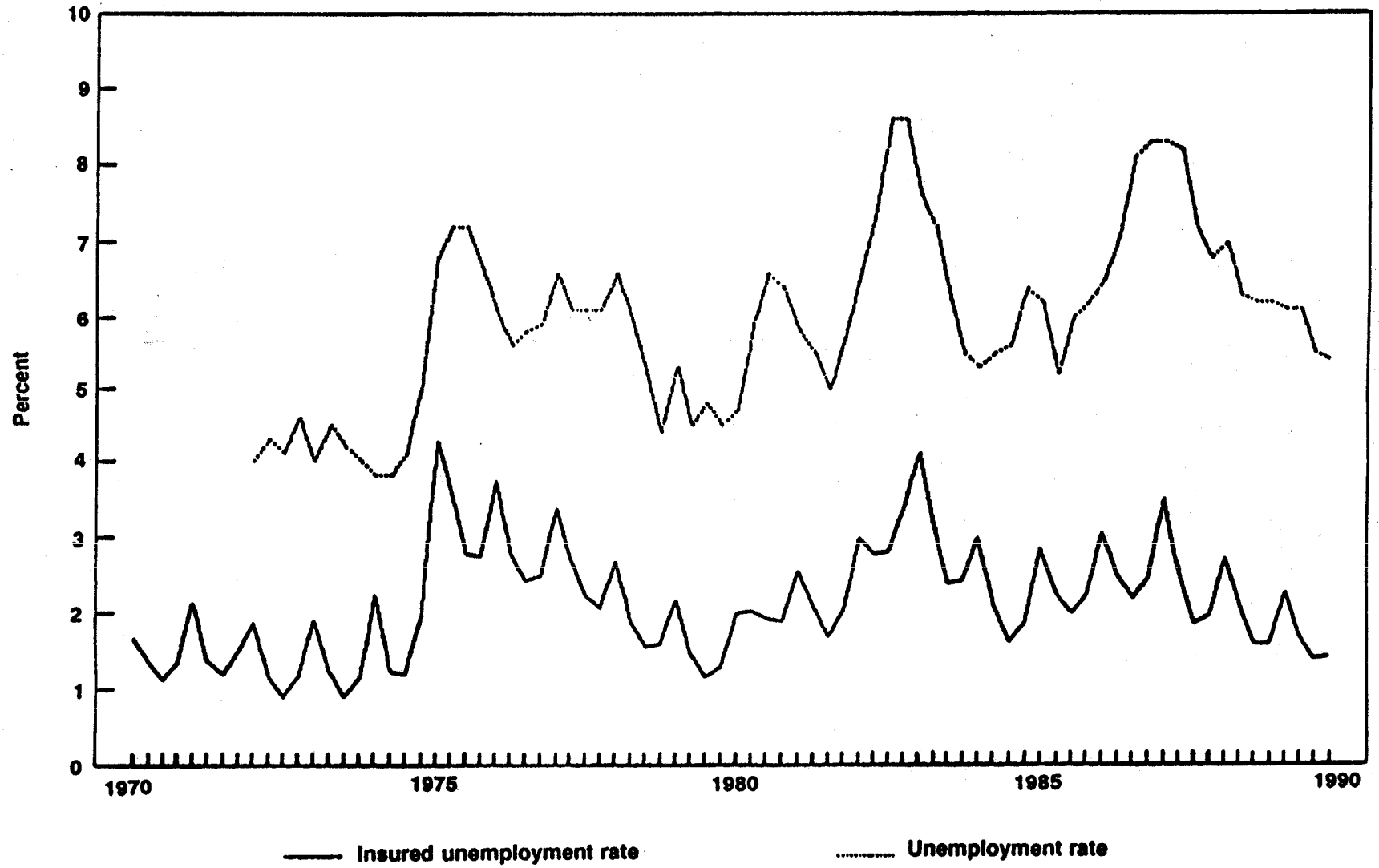


Figure A-2

Unemployment Rate Georgia

I/1970 to IV/1989

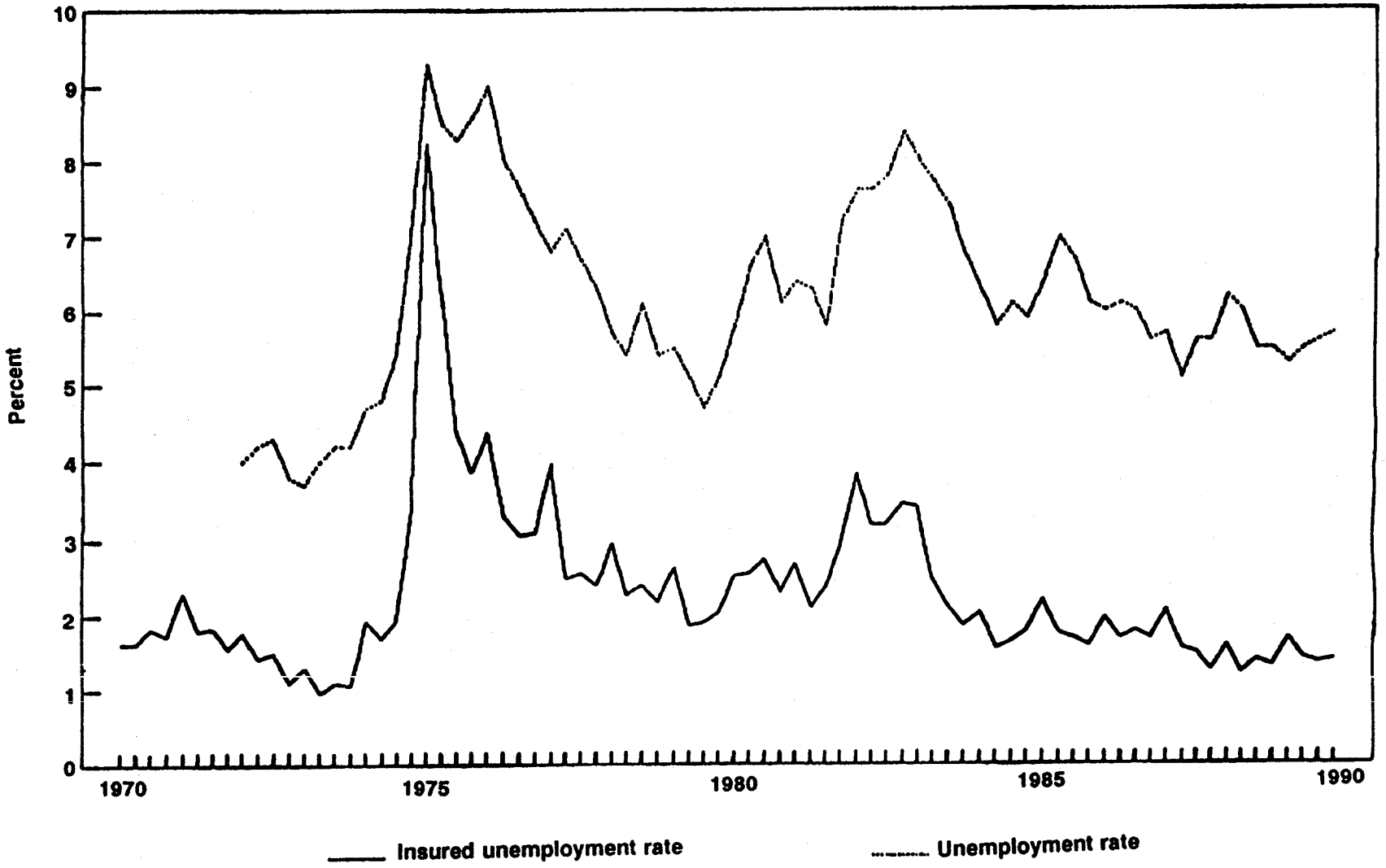


Figure A-3

Unemployment Rate Massachusetts

I/1970 to IV/1989

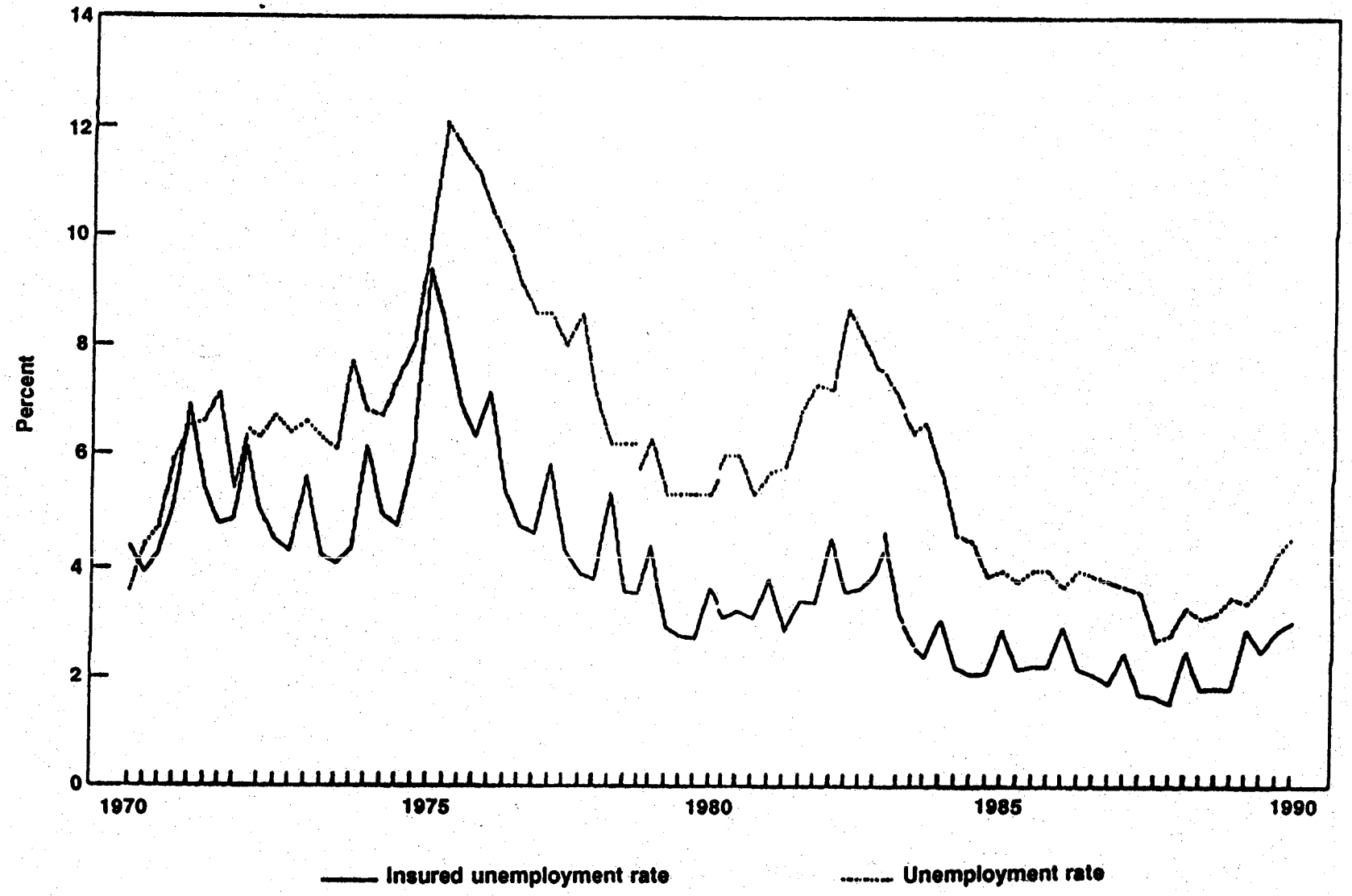


Figure A-4

Unemployment Rate Texas

I/1970 to IV/1989

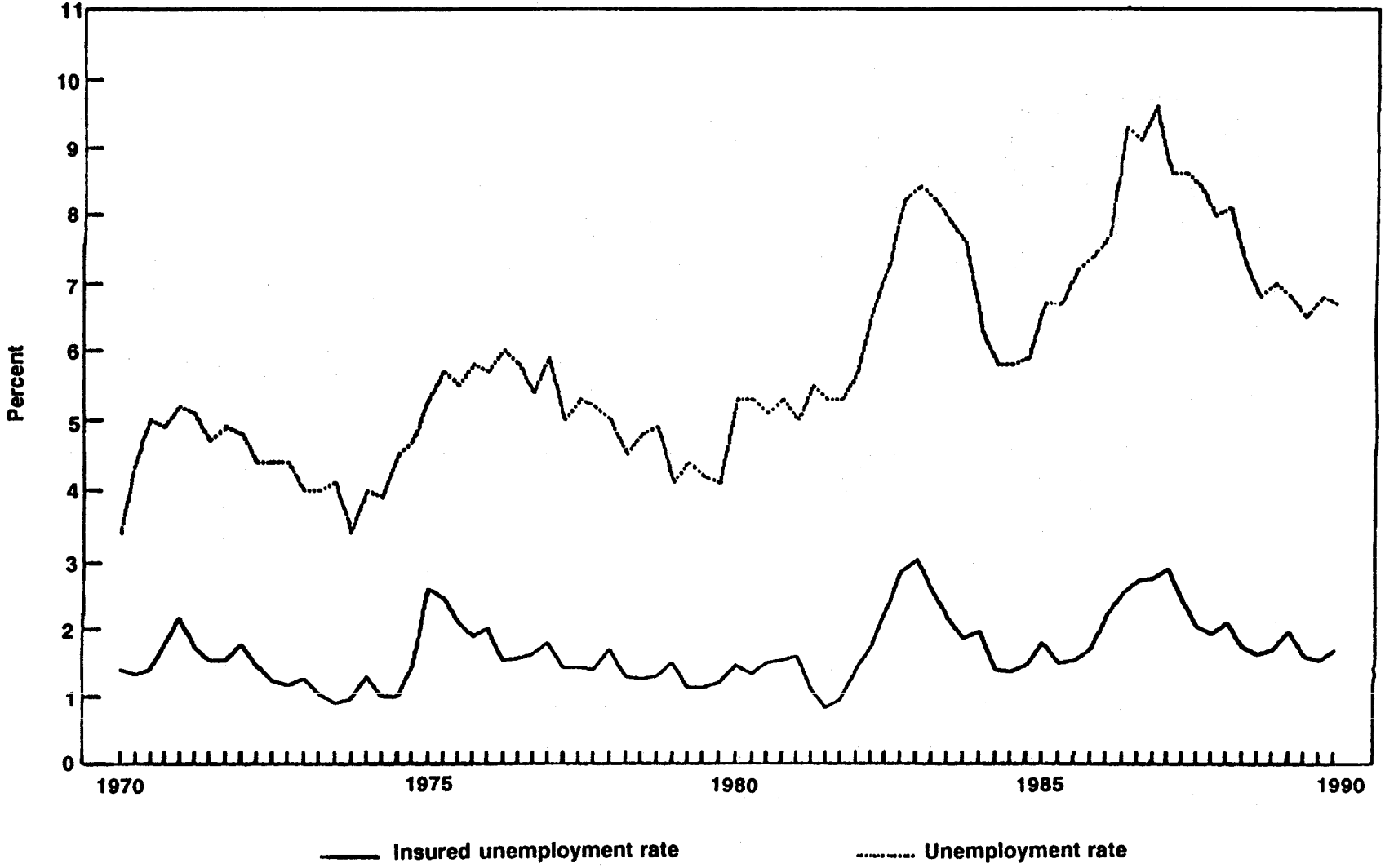


Figure A-5

Unemployment Insurance Benefits and Taxes Colorado

I/1962 to IV/1989

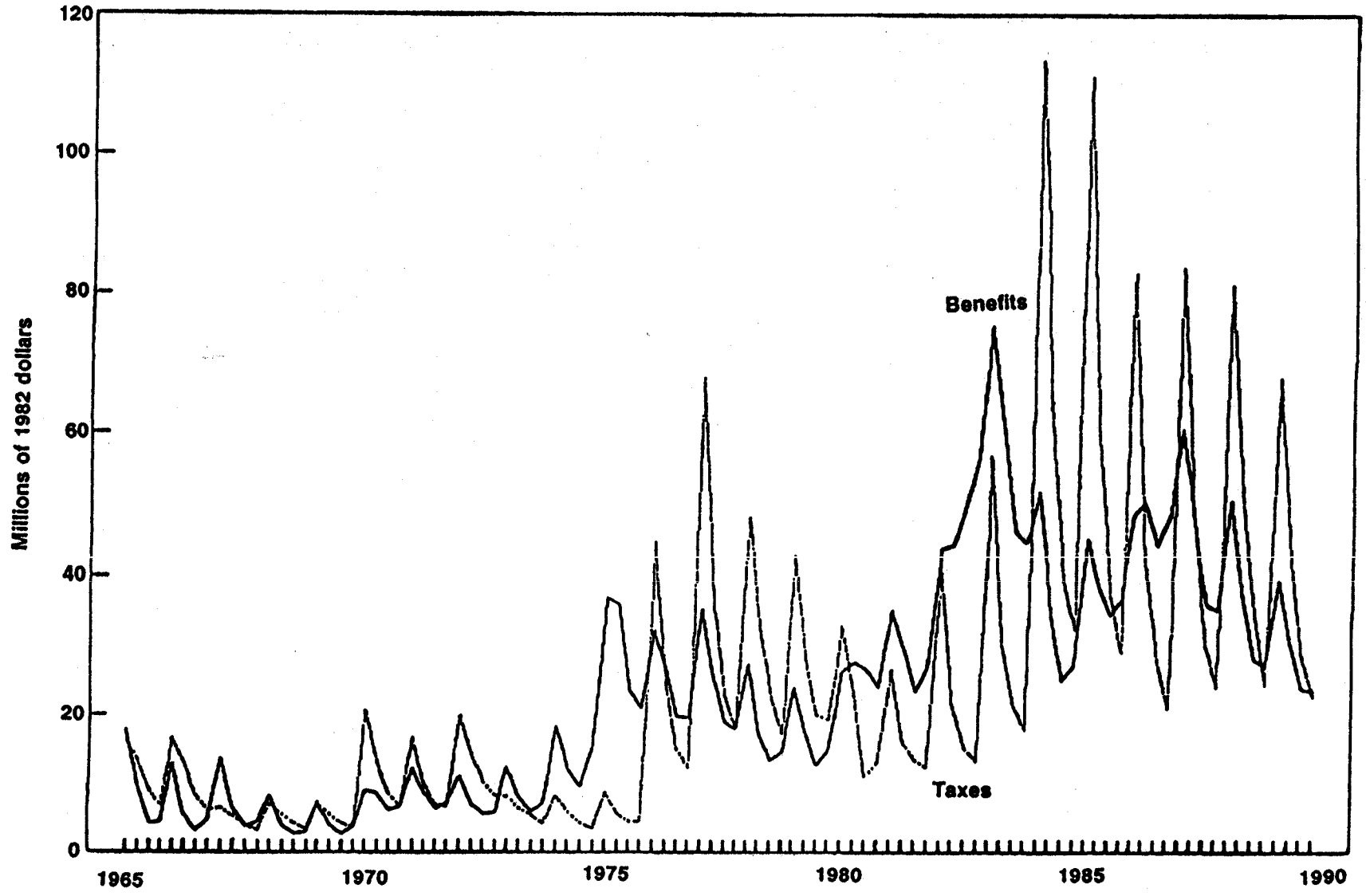


Figure A-6

Unemployment Insurance Benefits and Taxes Georgia

I/1962 to IV/1989

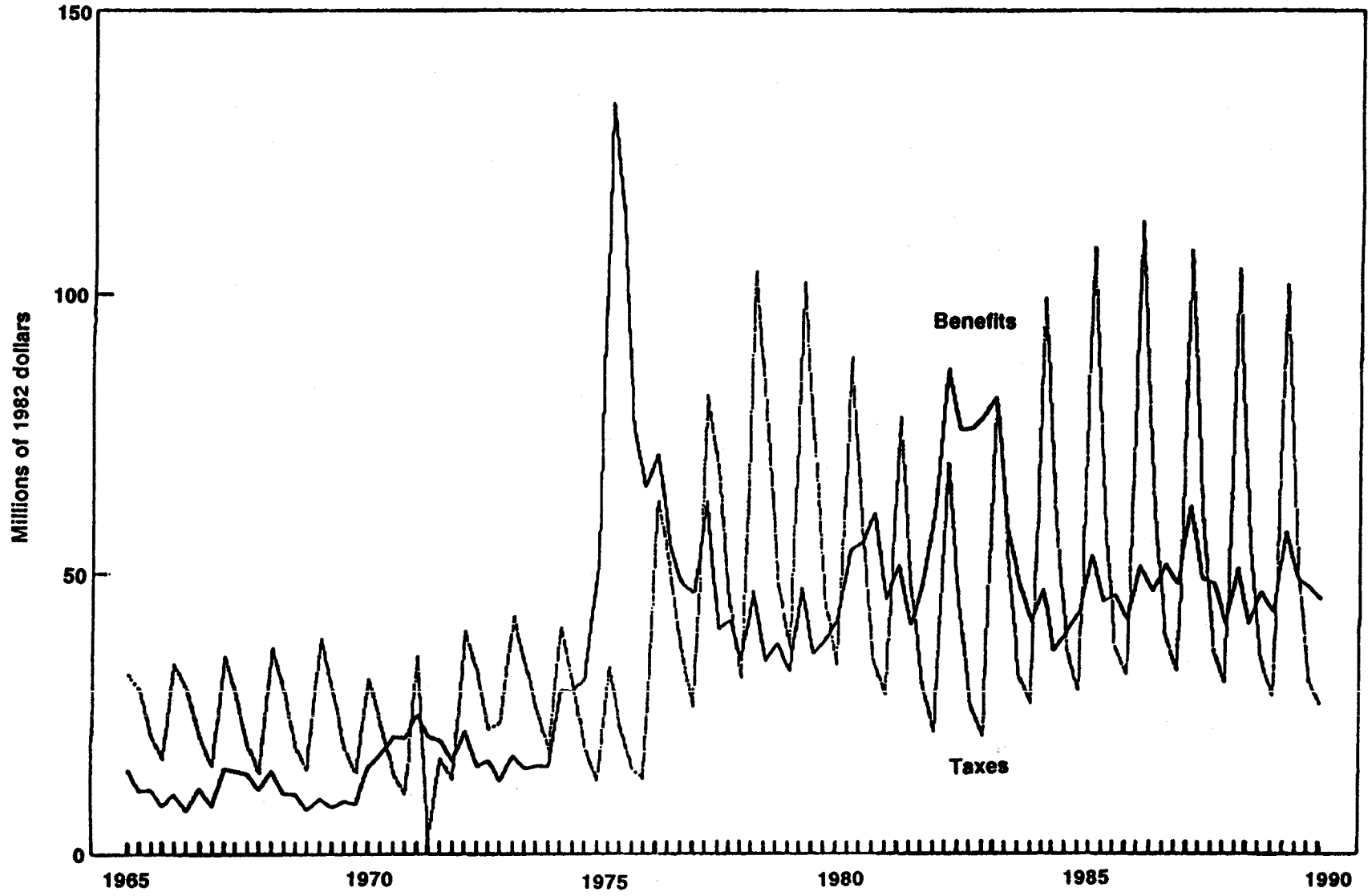


Figure A-7

Unemployment Insurance Benefits and Taxes Massachusetts

I/1962 to IV/1989

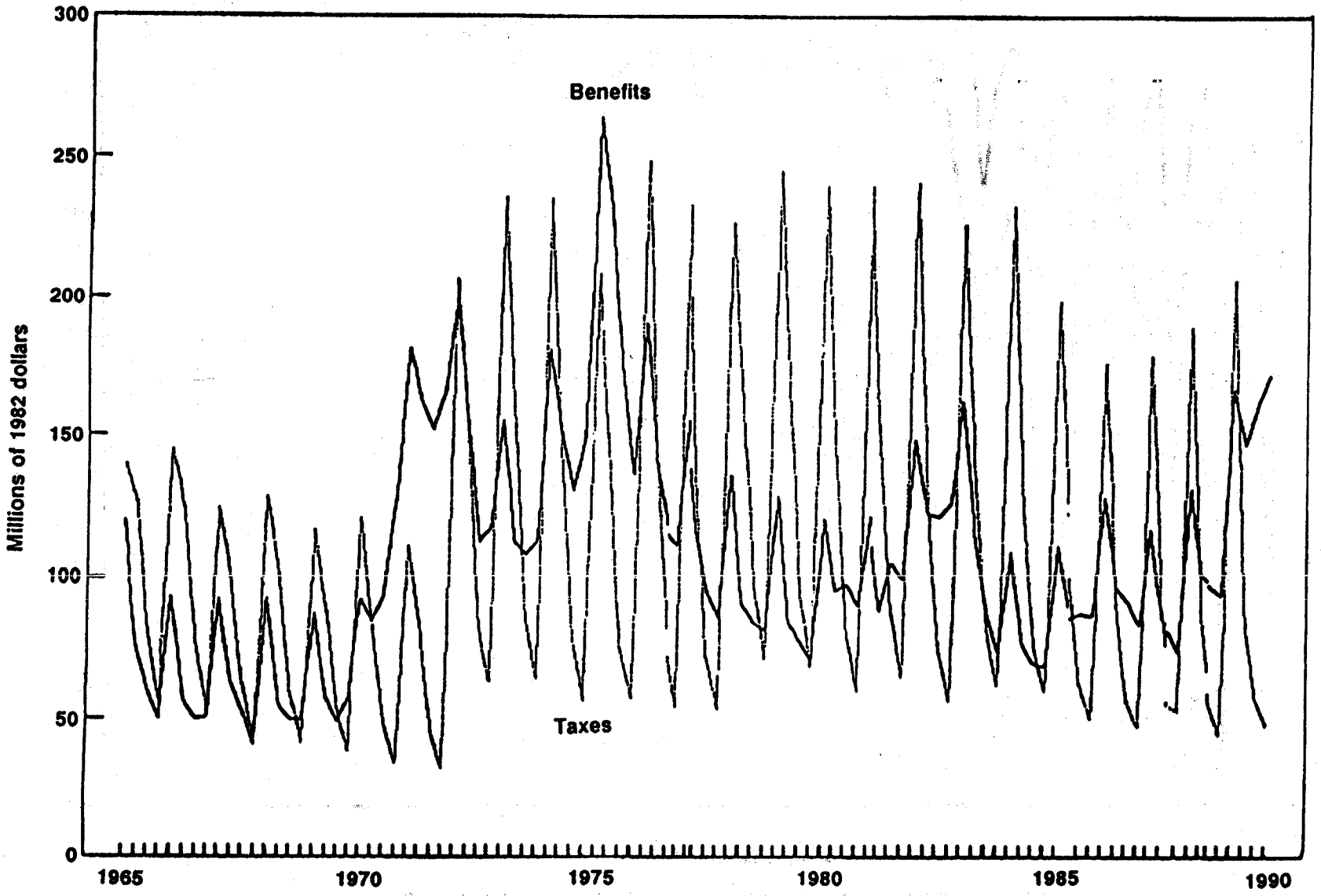
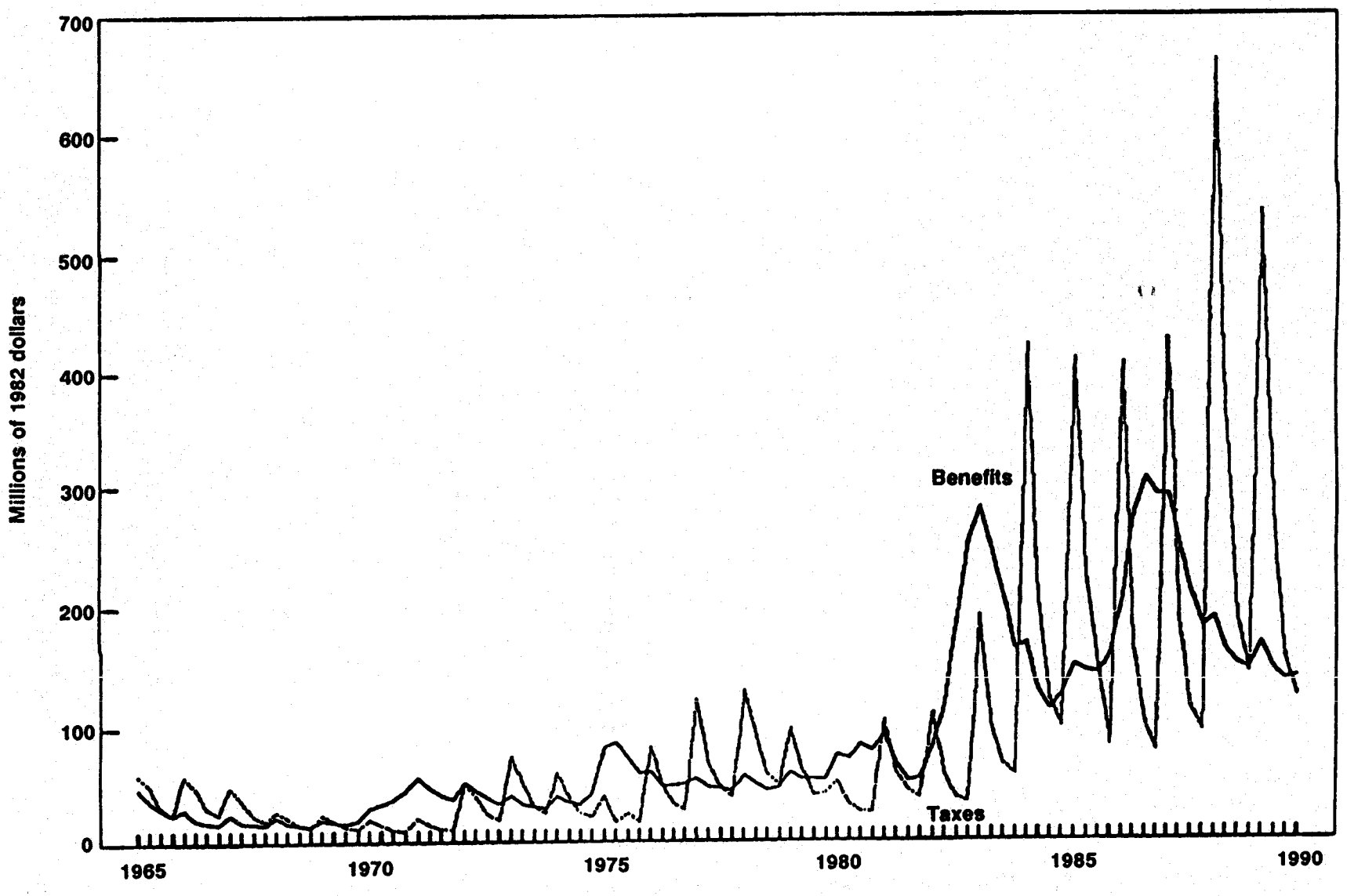


Figure A-8

Unemployment Insurance Benefits and Taxes Texas

I/1962 to IV/1989



Appendix B
Technical Discussion of Estimates of the Relations Between UI and the Economy

APPENDIX B

TECHNICAL DISCUSSION OF ESTIMATES OF THE RELATIONS BETWEEN UI AND THE ECONOMY

Chapter 6 described the results of the vector autoregression model (VAR), which indicated that a distinct break in the ability of the UI system to act as an automatic stabilizer occurred between the 1970s and 1980s. Chapter 6 also gave a brief overview of the econometric model that was used. This appendix sets forth the model in considerably more detail.

As noted above, we use a vector autoregression (VAR) to examine the relation between unemployment insurance and the economy. A VAR can be interpreted as a set of reduced-form equations from a structural econometric model. Such a reduced-form representation can be written as

$$(1) \qquad y_t = By_{t-1} + e_t,$$

where y is the vector of relevant variables, B is a matrix of estimated coefficients and e is a vector of error terms. Since the number of lags represented by an equation can be any finite value, the number of lags of each variable is not limited to one. For reasons discussed in Chapter 6, the econometric model of the UI program is estimated with quarterly data. The variables included in the analysis are UI benefits and taxes; the proportion of employment covered by UI and the insured unemployment rate are related variables. The measure of aggregate economic activity is the civilian unemployment rate.

Estimates for the United States

Next we determine whether the estimates should be based on the levels of the variables or on changes in them. There are two issues involved here. The first is whether the time series we are examining have unit roots. The second is whether the levels of the variables are related, which can occur even if the variables are specified in terms of their first differences. This second issue is discussed under the general topic of "cointegration" later in this appendix.

Tests for Unit Roots

Tests for whether the levels or first differences of variables should be included in the VAR are tests for unit roots. A first-order autoregression for the logarithm of a single variable, $\ln(X_t)$, with a time trend is

$$(2) \qquad x_t = \alpha + \beta x_{t-1} + \gamma t + \epsilon_t, \; t = 1,...,T$$

where x_t is $\ln(X_t)$ in period t, α is the constant term, β is the coefficient of the lagged value of the time series, γ is the exponential growth rate of X_t and ϵ_t is the error term. If β equals one then x_t is said to have a "unit root".[12] Tests for unit roots in a time series can be characterized as tests for a random walk component in the time series. This can be seen in the above example. If β equals one in equation (2), then x_t is a random walk and x_t has a random walk component in addition to the error term.[13]

We test for unit roots using the Dickey-Fuller test (Fuller 1976; Dickey and Fuller 1979; Said and Dickey 1984; Schwert 1989). There are two steps to this test: 1. determine the number of lagged values of x to include in an equation such as (2) by sequential t-tests on the lagged coefficients; and 2. compare a calculated "t-statistic" to values consistent with a unit root calculated by Dickey (published in Fuller 1976 and Harvey 1990). The "t-statistic" is based on the estimated value of d,

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[12]More generally, a unit root can be defined the following way. Assume that a series has a representation such as

$$[1-d(L)]x_t = e_t$$

where x is the time series and d(L) is a polynomial in the lag operator, and e_t is serially uncorrelated. This always can be rewritten as

$$(1-d_1L)[1-d^*(L)]x_t = e_t$$

where d_1 is a root of the polynomial in the lag operator. A test for a unit root is a test whether there is at least one root d_1 which equals unity.

[13]With a more general version of (2) with additional lags, x_t will not be a random walk, but it still has such a component.

the coefficient on the lagged level of the variable x_{t-1}, in

$$(3) \qquad \Delta x_t = a + dx_{t-1} + \sum_{j-1}^{k} \beta_j \Delta x_{t-j} + \gamma t + \epsilon_t$$

Table B-1 presents the estimated t-statistics on the lagged levels in the equations for all of the variables. All of the tests are conducted with the natural logarithms of the variables, which allows for exponential trends in the variables.[14] With 100 observations, a t-statistic of -3.45 or less is necessary to reject the null hypothesis of a unit root at the 5 percent marginal significance level. A t-statistic of -4.04 or less is necessary to reject the null hypothesis at the 1 percent significance level. With the exception of the coverage ratio, all of the estimated t-statistics are larger than the critical values for rejecting the null hypothesis. Hence, with the exception of the coverage ratio, these results are consistent with the hypothesis that the variables have unit roots. This implies that the first differences of all variables other than the coverage ratio should be included in the estimated VAR. The coverage ratio is more appropriately specified in the levels with a trend.

Cointegration

The above analysis indicates that all but the coverage ratio have unit roots. In general, this implies that linear combinations of the variables have unit roots as well. Such a result might be surprising though in the case of some of the variables above. For example, if all linear combinations of UI benefits and taxes have unit roots, then the UI deficit is a random walk: this implies that there is no tendency toward long-run balance between UI benefits and taxes. Such a result is not inevitable however. In fact, the value of a "t-statistic" for the UI deficit similar to those above is -3.37, close to the value of -3.45 necessary for rejecting the null hypothesis of a unit root at the 5 percent significance level.[15] This suggests that,

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[14]Because almost all of the time series are not seasonally adjusted, all estimated equations include quarterly seasonal dummy variables in addition to other variables.

[15]Because UI benefits and taxes are specified in terms of their logarithms, this test for a unit root is based on the difference between the logarithms of the variables (or equivalently the logarithm of the ratio between them.)

TABLE B-1

Test for Unit Roots
United States
I/1960 - II/1989

Variable	UI Benefits	UI Taxes	Insured Unemployment Rate	Real GNP	Unemp R
*Dickey-Fuller test statistic[a]	-2.516	-2.632	-2.549	-3.083	-2.204

[a]The critical values for rejecting a unit root are: -3.45 at the 5 percent significance level; and -4.04 at the 1 percent significance level.

even though benefits and taxes may have unit roots, the UI deficit may not behave as a random walk.

Examination of the UI benefits and taxes set forth in Chapter 5 suggests that the failure of the UI deficit to have a unit root is not necessarily surprising. The data in Chapter 5 suggest that UI taxes do rise after benefits rise in a recession, then taxes rise and later fall; this relation may be consistent with eventual budget balance. It certainly is not obvious that the difference between benefits and taxes has a random walk component.

If a linear combination of variables does not have a unit root, then the variables are said to be cointegrated (Engle and Granger 1987). This means that the random walks in the series are related in such a way that the series do tend to have a long-run relationship. In the case of the UI deficit, a more detailed examination of this issue is in order. To accomplish this, tests due to Johansen (1988; 1989) based on maximum-likelihood estimates of the relationship between the two series are calculated.[16] The estimated value of the test statistic for testing the null hypothesis that there is a single cointegrating relationship between benefits and taxes is 25.89.[17] This can be compared with the values for rejecting the null hypothesis that there is no such relation (14.60 at the 5 percent marginal significance level and 18.78 at the 1 percent marginal significance level). Hence, the hypothesis that there is no such relation is clearly rejected even at the 1 percent marginal significance level.

This long-run relation does not necessarily imply long-run UI budget equality. There may be a constant difference between benefits and taxes even in the long run. This issue essentially is a question of the steady-state mean value of the deficit, an issue that cannot be explored in depth without a substantially more detailed analysis. In addition, however, there may not be long-run budget equality because the cointegrating relationship does not necessarily have coefficients equal to one. For

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[16]We do not examine the possibility of a general linear combination of all of the variables. The distributions of the test statistics are not available for the relatively large number of variables that we have. In any case, the relationship between benefits and taxes (and below between the two unemployment rates) are a more interesting, if less general, focus of our study.

[17]The hypothesis that there are at most one or fewer cointegrating relationships, has a test statistic equal to 0.56, far less than the value necessary to reject this hypothesis relative to the alternative that there are two "cointegrating relationships." (Two cointegrating relationships would imply that the variables do not have unit roots.)

example, taxes could tend to be a constant fraction or multiple of benefits. Because the logarithms of benefits and taxes are included in the equations, cointegration of benefits and taxes with a coefficient equal to one implies that benefits and taxes tend to a constant ratio, a ratio not necessarily equal to zero. If the cointegrating coefficient is not equal to one, then benefits and taxes do not even tend to a constant ratio. In the context of this statistical analysis, the testable hypothesis that benefits and taxes tend to a constant ratio in the long run implies that the cointegrating coefficient equals one.

Nonetheless, at least up to a constant ratio, the evidence is consistent with UI benefits and taxes being equal in the long run. The estimated relationship indicates that benefits equal .987 times revenue. Given the closeness to one of the point estimate, it is not surprising that the restriction that the coefficient equals one has a Chi-square test statistic equal to .01 with 1 degree of freedom, a value that is far less than the value of this Chi-squared distributed test statistic at any usual significance level.

Cointegration of taxes and benefits implies that, in order to include the long-run equality of UI benefits and taxes, the estimated VAR should include the lagged value of the deficit in addition to changes in benefits and taxes. The deficit must be included because a deviation of the deficit from its mean results in a change in benefits, taxes, or both (and possibly other variables), so that the deficit returns to its mean in the long run.

In addition to benefits and taxes, we examine whether the insured unemployment rate is cointegrated with the civilian unemployment rate.[18] The value of the test statistic for testing the null hypothesis that the two series are not cointegrated is -3.29, far below the value necessary to reject the null hypothesis at any usual significance level.

[18]The answer to this question is fairly obvious for the United States because, as a figure in the last chapter indicated, the insured unemployment rate decreases over time rather dramatically relative to the civilian unemployment rate. There appears to be no tendency for the two to return to a long-run relationship that might, or might not, be consistent with the data for the 1960s and 1970s. Nonetheless, cointegration of the two unemployment rates is possible for the states and this statistical analysis is included here for completeness.

Estimated Set of Equations

The tests for unit roots and the examination of cointegration provide substantial information for estimating the equations. The tests for unit roots indicate that first differences of all variables except the coverage ratio should be used. The results for the coverage ratio are not consistent with a unit root and suggest that the level of the coverage ratio and a trend should be included for this variable. The tests for cointegration indicate that, in addition to lagged dependent variables, the estimated equations should include the UI deficit. While the deficit is likely to be most important for benefits and taxes, we include it in all equations initially. The definitions of the variables used in the estimations are in Table B-2.

Estimates of the equations for the entire period are presented in Table B-3. In order to capture the seasonal variation in the variables, four lags of all variables are included in addition to seasonal dummy variables and a time trend. Overall, the fit of the equations is quite good, as might be expected from an atheoretic time series model. As noted in Chapter 6, few individual coefficients are statistically significant, but this is not surprising because, once three other lags of a variable are included, an individual lag of a variable may well not be statistically significant. Because our analysis focuses on sets of coefficients and not point estimates of individual coefficients, the implied imprecision of the individual coefficients is not critical, especially since the alternative would be an involved set of tests of coefficients that would end up with a specification that would be highly likely to be an artifact of this particular sample.[19]

The hypothesis that the relation between UI benefits and taxes with the economy has changed over time can be tested by a simple F-test for changes in all of the coefficients in the equations for UI benefits and taxes. The break in the equation is assumed to take place in the fourth quarter of 1979 for reasons discussed in Chapter 6. The test statistic for testing the null hypothesis of no change in the UI benefits and taxes equations in the complete system of equations is 1.88 with 52 and

[19]As we find below for the states, where degrees of freedom are more critical, sets of coefficients of a lag commonly are statistically significant.

TABLE B-2

Variable Definitions for U.S.

Q2 - Quarterly Dummy - Second Quarter
Q3 - Quarterly Dummy - Third Quarter
Q4 - Quarterly Dummy - Fourth Quarter

Time - Time Trend

LRDEF1 - Log Real Benefits/Real Taxes Lagged One Quarter

LRBEN1 - Log Real Benefits Lagged One Quarter

DLRBEN1 - Difference In Log Real Benefits Lagged One Quarter
DLRBEN2 - Difference In Log Real Benefits Lagged Two Quarters
DLRBEN3 - Difference In Log Real Benefits Lagged Three Quarters
DLRBEN4 - Difference In Log Real Benefits Lagged Four Quarters

DLRTAX1 - Difference In Log Real Taxes Lagged One Quarter
DLRTAX2 - Difference In Log Real Taxes Lagged Two Quarters
DLRTAX3 - Difference In Log Real Taxes Lagged Three Quarters
DLRTAX4 - Difference In Log Real Taxes Lagged Four Quarters

DLIUR1 - Difference In Log Insured Unemployment Rate Lagged One Quarter
DLIUR2 - Difference In Log Insured Unemployment Rate Lagged Two Quarters
DLIUR3 - Difference In Log Insured Unemployment Rate Lagged Three Quarters
DLIUR4 - Difference In Log Insured Unemployment Rate Lagged Four Quarters

DLUR1 - Difference In Log Unemployment Rate Lagged One Quarter
DLUR2 - Difference In Log Unemployment Rate Lagged Two Quarters
DLUR3 - Difference In Log Unemployment Rate Lagged Three Quarters
DLUR4 - Difference In Log Unemployment Rate Lagged Four Quarters

DLRGNP1 - Difference In Log Of Real GNP Lagged One Quarter
DLRGNP2 - Difference In Log Of Real GNP Lagged Two Quarters
DLRGNP3 - Difference In Log Of Real GNP Lagged Three Quarters
DLRGNP4 - Difference In Log Of Real GNP Lagged Four Quarters

LCOV1 - Log Covered Employment - Log Civilian Labor Force Lagged One Quarter
LCOV2 - Log Covered Employment - Log Civilian Labor Force Lagged Two Quarters
LCOV3 - Log Covered Employment - Log Civilian Labor Force Lagged Three Quarters
LCOV4 - Log Covered Employment - Log Civilian Labor Force Lagged Four Quarters

TABLE B-3
ESTIMATES OF EQUATIONS
UNITED STATES
I/1960 - IV/1989

DEPENDENT VARIABLES

INDEPENDENT VARIABLE	ΔLog of Real Benefits		ΔLog of Real Taxes		ΔLog of Insured Unemployment Rate		ΔLog of Unemployment Rate		ΔLog of Real GNP		The Log of Covered Unemployment	
	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	Estimate Parameter=0
CONSTANT	0.65	2.5	-0.24	-1.3	0.51	2.1	0.50	3.4	-0.08	-3.1	-0.05	-1.2
Q2	-0.57	-2.5	0.55	3.3	-0.53	-2.5	-0.21	-1.6	0.02	0.7	-0.05	-1.4
Q3	-0.31	-1.3	0.26	1.4	-0.29	-1.3	-0.07	-0.5	-0.01	-0.2	-0.04	-1.0
Q4	-0.36	-1.5	0.17	1.0	-0.21	-1.0	-0.11	-0.8	-0.02	-0.8	0.00	0.1
TIME	0.00	-1.5	0.00	-0.1	0.00	-1.1	0.00	-3.2	0.00	4.1	0.00	2.0
LRDEF1	-0.09	-1.9	0.16	4.7	-0.07	-1.7	0.01	0.3	-0.01	-2.0	0.02	2.2
DLRBEN1	-0.83	-3.0	0.03	0.1	-0.56	-2.2	-0.49	-3.2	0.03	1.1	0.10	2.2
DLRBEN2	-0.16	-0.5	-0.50	-2.3	-0.11	-0.4	0.10	0.6	0.00	0.1	-0.02	-0.4
DLRBEN3	0.17	0.6	0.20	1.0	0.09	0.3	-0.04	-0.2	-0.01	-0.3	0.01	0.2
DLRBEN4	-0.03	-0.1	-0.17	-0.9	-0.05	-0.2	0.00	0.0	0.02	0.8	0.03	0.8
DLRTAX1	0.03	0.3	-0.32	-4.5	0.08	0.9	0.03	0.6	0.00	0.2	-0.03	-1.9
DLRTAX2	0.06	0.6	-0.28	-3.5	0.02	0.2	0.01	0.2	0.02	2.2	-0.02	-1.1
DLRTAX3	0.00	0.0	-0.26	-3.1	0.01	0.1	0.00	0.0	0.01	1.2	-0.03	-1.7
DLRTAX4	0.06	0.6	0.44	5.8	0.06	0.6	-0.02	-0.3	0.02	1.6	0.00	0.0
DLIUR1	1.13	3.3	-0.36	-1.4	0.66	2.1	0.89	4.7	-0.06	-1.7	-0.16	-2.9
DLIUR2	0.30	0.7	0.32	1.1	0.11	0.3	0.21	0.9	-0.01	-0.3	0.02	0.3
DLIUR3	-0.45	-1.2	-0.44	-1.6	-0.34	-1.0	0.13	0.6	0.01	0.3	0.01	0.2
DLIUR4	0.37	1.1	0.22	0.9	0.36	1.2	0.17	0.9	-0.04	-1.2	-0.10	-1.8
DLUR1	0.36	1.4	-0.16	-0.8	0.36	1.5	-0.21	-1.5	-0.01	-0.4	-0.09	-2.2
DLUR2	0.02	0.1	0.20	1.0	-0.05	-0.2	-0.45	-2.9	0.04	1.5	0.02	0.4
DLUR3	0.21	0.8	-0.17	-1.0	0.17	0.8	-0.24	-1.7	0.02	0.9	-0.03	-0.8
DLUR4	-0.19	-0.8	-0.23	-1.3	-0.23	-1.1	0.02	0.1	0.06	2.4	0.02	0.6
DLRGNP1	-3.28	-2.5	-0.70	-0.7	-3.64	-3.1	-1.41	-2.0	-0.09	-0.7	-0.28	-1.3
DLRGNP2	-0.71	-0.5	-0.27	-0.3	-1.81	-1.4	-1.02	-1.3	-0.10	-0.7	0.13	0.6
DLRGNP3	1.23	0.9	-0.61	-0.6	0.40	0.3	-0.39	-0.5	-0.15	-1.1	-0.03	-0.1
DLRGNP4	1.01	0.8	-0.24	-0.3	0.57	0.5	0.43	0.6	-0.02	-0.2	0.11	0.5
LCOV1	-0.12	-0.2	1.28	2.8	0.12	0.2	-0.02	0.0	0.12	1.9	0.90	8.6
LCOV2	0.45	0.5	-0.25	-0.4	0.56	0.7	0.46	0.9	-0.16	-1.9	0.17	1.2
LCOV3	-1.61	-1.9	-1.00	-1.6	-2.03	-2.6	-0.95	-2.0	0.12	1.4	0.10	0.7
LCOV4	1.69	2.4	-0.04	-0.1	1.62	2.5	1.01	2.6	-0.21	-3.0	-0.27	-2.3
R^2	.93		.99		.93		.89		.46		.99	
F-STATISTIC	44.4		563.2		40.4		24.7		2.66		365.8	
DF	90		90		90		90		90		90	

418 degrees of freedom and a marginal significance level of .001 percent. This hypothesis is easily rejected.

When the UI benefits and taxes equations are estimated separately, the test statistic for testing the null hypothesis of no change in these two equations taken by themselves is 2.21 with 52 and 136 degrees of freedom and a marginal significance level of .014 percent. Hence, the hypothesis of no change clearly is not consistent with the data.

Table B-4 presents the estimated equations for UI benefits and taxes for both subperiods. The rather substantial changes in the constants and dummy variables for benefits and taxes suggest the hypothesis that the major changes are in the constant terms. We test this hypothesis by testing the null hypothesis that all of the slope coefficients in the UI benefits and taxes equations are constant while allowing the constant terms (and the coefficient of the trend term) to change. The F-statistic for testing this hypothesis in the full set of equations is 1.76 with 42 and 418 degrees of freedom and a marginal significance level of .05 percent. The F-statistic for testing this hypothesis with only the UI benefits and taxes equations is 1.99 with 42 and 136 degrees of freedom and a marginal significance level of .16 percent. Hence, the null hypothesis of no change in the slope coefficients is not consistent with the data.

As discussed in Chapter 6, these results indicate that the relation between UI benefits and taxes in the United States with the state of the economy has indeed changed in recent years.

Estimated Equations for Selected States

A similar analysis was conducted for the four sample states: Colorado, Georgia, Massachusetts, and Texas. For reasons discussed in Chapter 6, the periods differ among states, and the variables included in the analysis are limited to: UI benefits, UI taxes, the insured unemployment rate, real personal income, and the unemployment rate.

Tests for Unit Roots

The test statistics for testing for unit roots are summarized in Table B-5. This table includes the statistics used for testing for unit roots in all of the included

TABLE B-4
ESTIMATES OF EQUATIONS
UNITED STATES

	DEPENDENT VARIABLES							
	PERIOD I/1970 - III/1979				PERIOD IV/1979 - IV/1982			
	DLRBEN		DLRTAX		DLRBEN		DLRTAX	
INDEPENDENT VARIABLES	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0
INTERCEP	0.85	2.2	0.07	0.3	0.93	1.5	-0.44	-0.9
Q2	-0.86	-3.2	0.37	2.2	-1.19	-1.9	1.08	2.1
Q3	-0.26	-0.8	0.25	1.2	-0.33	-0.7	0.07	0.2
Q4	0.08	0.3	0.22	1.2	-1.92	-2.9	-0.01	-0.2
TIME	0.00	-1.5	0.00	-1.5	0.00	-0.6	0.00	-0.3
LRDEF1	-0.03	-0.6	0.20	5.6	-0.37	-2.0	0.46	3.0
DLRBEN1	-0.49	-1.1	-0.20	-0.7	-0.21	-0.4	0.48	1.2
DLRBEN2	0.01	0.0	-0.68	-2.5	-0.11	-0.2	0.47	1.0
DLRBEN3	0.47	1.1	-0.15	-0.6	-0.78	-1.7	0.61	1.6
DLRBEN4	0.36	0.9	-0.22	-1.0	-0.10	-0.2	0.30	0.8
DLRTAX1	0.08	0.6	-0.32	-3.8	-0.48	-1.8	-0.44	-1.9
DLRTAX2	-0.15	-1.1	-0.36	-4.2	0.30	1.1	-0.34	-1.5
DLRTAX3	0.03	0.2	-0.32	-3.6	-0.18	-0.7	-0.46	-2.3
DLRTAX4	0.05	0.4	0.41	5.0	-0.11	-0.4	-0.20	-1.0
DLIUR1	0.87	1.9	-0.14	-0.5	0.46	0.9	-0.47	-1.1
DLIUR2	0.21	0.4	0.46	1.4	-0.57	-0.9	-0.45	-0.8
DLIUR3	-0.99	-1.9	-0.25	-0.8	0.34	0.5	-0.31	-0.5
DLIUR4	-0.17	-0.4	0.19	0.6	-0.42	-0.6	0.24	0.4
DLUR1	0.53	1.7	0.12	0.6	0.36	0.4	-0.73	-0.9
DLUR2	-0.30	-1.0	0.09	0.4	1.34	1.3	-0.08	-0.1
DLUR3	0.41	1.5	0.19	1.1	0.42	0.5	-1.11	-1.5
DLUR4	-0.35	-1.2	-0.18	-1.0	-0.03	0.0	-1.00	-1.6
LCOV1	0.23	0.3	1.65	4.0	-10.76	-2.0	4.42	1.0
LCOV2	-0.68	-0.7	-0.84	-1.5	9.84	1.7	4.38	0.9
LCOV3	-0.41	-0.4	-0.26	-0.5	-6.20	-1.1	-2.42	-0.5
LCOV4	1.68	2.2	-0.18	-0.4	6.44	1.3	-7.26	-1.8
R^2	.9559		.9966		.9650		.9981	
F-STATISTIC	45.912		618.197		16.53		312.091	
DF	53		53		15		15	

TABLE B-5

Tests for Unit Roots
Each State
I/1970 or I/1972 - IV/1989

Variable	UI Benefits	UI Taxes	Insured Unemployment Rate	Unemployment Rate	Personal Income
			COLORADO		
Dickey-Fuller test statistic	-1.946	-2.785	-2.128	-2.854	-1.40
			GEORGIA		
Dickey-Fuller test statistic	-2.675	-2.930	-2.582	-3.298	-1.84
			MASSACHUSETTS		
Dickey-Fuller test statistic	-2.626	-2.935	-2.705	-2.167	-1.20
			TEXAS		
Dickey-Fuller test statistic	-2.834	-3.386	-3.795	-3.527	-0.88

variables.[20] The values of the test statistics have been tabulated for 50 and 100 observations, which bracket the number of observations used in these tests. With 50 observations, the values of the test statistics inconsistent with the null hypothesis of a unit root are -3.50 and -4.15 at the 5 percent and 1 percent marginal significance levels respectively. With 100 observations, the values of the test statistics inconsistent with the null hypothesis of a unit root are -3.45 and -4.04 at the 5 percent and 1 percent marginal significance levels respectively. No test statistic is less than -3, for Colorado and Massachusetts. The only test statistic that is less than or equal to -3, for Georgia, is for the unemployment rate, which has a test statistic of -3.44. For Texas, the unemployment rate and the insured unemployment rate have test statistics that are statistically significant at the 5 percent significance level but not at the 1 percent significance level. In the context of this large a number of tests, some false rejections are to be expected. Overall, the results can be interpreted as consistent with the hypothesis that there are unit roots in all of the series.

Cointegration

The existence of unit roots in benefits and taxes does not imply that the UI deficit has a random-walk component. Instead, the random walk components of UI benefits and taxes may be related, so that the random walks cancel out in the deficit. That is, UI benefits and taxes may be cointegrated, so that the UI deficit does not have a unit root. The statistic used for testing the null hypothesis is that UI benefits and taxes are not cointegrated for each state is presented in Table B-6. The values for rejecting the null hypothesis that there is no cointegrating relationship are: 14.60 at the 5 percent marginal significance level; and 18.78 at the 1 percent marginal significance level. In all of the states, the null hypothesis is not consistent with the data. Hence, there does appear to be a cointegrating relationship between UI benefits and taxes in each of these states.

The test statistics for testing the hypothesis that the values of UI benefits and taxes tend to equality (up to a constant ratio) also are presented in Table B-6. With

[20]As for the United States, each of the equations estimated includes dummy variables for quarters and a time trend.

TABLE B-6

Tests for Cointegration of UI Benefits and Taxes Selected States I/1970 - IV/1989

	Colorado	Georgia	Massachusetts	Texas
	Test Statistic for No Cointegration			
Value of test statistic[a]	34.028	31.092	17.711	20.0
	Test Statistic for Cointegrating Coefficient Equal to One			
Value of test statistic	0.025	7.047	1.009	1.5
Degrees of freedom	1	1	1	1
Marginal significance level (percent)	87.44	0.79	31.51	20

[a]The critical values for rejecting the null hypothesis of no cointegration are 14.60 at the 5 percent significance level, 18.78 at the 1 percent significance level.

the exception of Georgia, all of the test statistics are consistent with long-run equality of UI benefits and taxes. In the absence of a larger sample of states, we conclude that the rejection of equality for Georgia is more likely to be a result of sample variation than an indication of a real difference between Georgia and the other states. Hence, we use a coefficient of unity in the estimates for all of the states.

The data for each of these states suggest less of a divergence between the civilian unemployment rate and the insured unemployment rate than do the similar data for the United States. Hence, it is not so obvious whether there is, or is not, a cointegrating relationship between the unemployment rates. The test results presented in Table B-7 are mixed. The hypothesis of no cointegrating relation between the unemployment rates cannot be rejected at the 5 percent marginal significance level for Colorado and Massachusetts. The hypothesis is inconsistent with the data for Georgia and Texas at the 5 percent but not the 1 percent level. Evidence of a cointegrating relationship can arise if one of the variables does not have a unit root, and the unemployment rate for Georgia for the sample period is marginally consistent with not having a unit root. A test of the hypothesis that the apparent cointegrating relationship for Georgia reflects that the unemployment rate does not have a unit root has a Chi-square test statistic of 0.210 with one degree of freedom and a marginal significance level of 0.65 percent. Hence, there is no evidence that the unemployment rate and the insured unemployment rate are cointegrated in Georgia. For Texas, both the unemployment rate and the insured unemployment rate were marginally inconsistent with unit roots.

In addition, the Chi-square test statistic for testing the hypothesis that the cointegrating relationship has a coefficient of unity in Texas, in which case the unemployment rates tend to equality (up to a constant ratio), is 6.557 with 1 degree of freedom and a marginal significance level of 1.0 percent. Hence, the hypothesis of equality is not consistent with the data for Texas at usual significance levels.[21] Given this generally negative evidence of a long-run relation between the

[21]The estimated equation is ur=1.5iur, where ur is the logarithm of the unemployment rate and iur is the logarithm of the insured unemployment rate. The hypothesis that the apparent cointegrating relation reflects an unemployment rate that does not have a unit root has a Chi-square test statistic of 13.659 with 1 degree of freedom and a marginal significance level of 0.02 percent.

TABLE B-7

Tests for Cointegration of Unemployment Rate and Insured Unemployment Rate Selected States I/1970 - IV/1989

	Colorado	Georgia	Massachusetts	Texas
	Test Statistic for no Cointegration			
Value of test statistic[a]	8.966	15.627	4.279	15.932
	Test Statistic for Cointegrating Coefficient Equal to One			
Value of test statistic	5.047	10.843	0.024	6.557
Degrees of freedom	1	1	1	1
Marginal significance level (percent)	2.47	0.01	87.69	1.04

[a]The critical values for rejecting the null hypothesis of no cointegration are: 14.60 at the 5 percent significance level; and 18.78 at the 1 percent significance level.

unemployment rate and the insured unemployment rate, we do not use any long-run relation between the unemployment rate and the insured unemployment rate in the estimated sets of equations below.

Estimated Sets of Equations

The tests for unit roots are consistent with including all variables in first differences, and the tests for cointegration are consistent with including a lagged value of the UI deficit in the equations. Definitions of the variables used for the estimation of the equations for each of the states are presented in Table B-8. The estimates for each state are set forth in Tables B-9 through B-12.

To test for stability of the estimated coefficients over time, we pick the fourth quarter of 1979 as the breaking point. With four lags of all variables in each equation, this sample is too small to test for coefficient stability for Colorado and Georgia.[22] The evidence on the stability of the estimated coefficients is mixed for Massachusetts and Texas. The F-statistics for testing this hypothesis are 2.034 with 56 and 174 degrees of freedom and a marginal significance level of 0.03 percent for Massachusetts and 0.654 with 56 and 174 degrees of freedom and a marginal significance level of 97 percent for Texas. These results indicate that the data for Massachusetts are quite inconsistent with stability and the data for Texas are easily consistent with stability.

It is necessary to reduce the number of coefficients estimated for Colorado and Georgia in one fashion or another, or else forego the tests of stability. The hypothesis that the fourth lag of all variables other than the dependent variable can be deleted have the F-statistics presented in the top part of Table B-13. Overall, we conclude that fourth lags even of variables other than the dependent variable are important. F-statistics for testing the hypothesis that third lags of variables other than the dependent variable also are important is presented in Table B-13. The evidence on this hypothesis is only slightly less unfavorable than the results for the

[22]The limit on the length of the data set backward is set by the unemployment rate. The unemployment rates are not available for Colorado and Georgia until the first quarter of 1972 and the unemployment rates are not available for Massachusetts and Texas until the first quarter of 1970.

TABLE B-8

Variable Definitions for States

DXL1 - Difference Log Benefits Lagged One Period
DXL2 - Difference Log Unemployment Rate Lagged One Period
DXL3 - Difference Log Insured Unemployment Rate Lagged One Period
DXL4 - Difference Log Personal Income Lagged One Period
DXL5 - Difference Log Revenue (Taxes) Lagged One Period
DXL6 - Difference Log Unemployment Rate (U.S.) Lagged One Period

DX2L1 - Difference Log Benefits Lagged Two Periods
DX2L2 - Difference Log Unemployment Rate Lagged Two Periods
DX2L3 - Difference Log Insured Unemployment Rate Lagged Two Periods
DX2L4 - Difference Log Personal Income Lagged Two Periods
DX2L5 - Difference Log Revenue (Taxes) Lagged Two Periods
DX2L6 - Difference Log Unemployment Rate (U.S.) Lagged Two Periods

DX4L1 - Difference Log Benefits Lagged Four Periods
DX4L2 - Difference Log Unemployment Rate Lagged Four Periods
DX4L3 - Difference Log Insured Unemployment Rate Lagged Four Periods
DX4L4 - Difference Log Personal Income Lagged Four Periods
DX4L5 - Difference Log Revenue (Taxes) Lagged Four Periods
DX4L6 - Difference Log Unemployment Rate (U.S.) Lagged Four Periods

D1 - Dummy Variable Representing One Quarter
D2 - Dummy Variable Representing Two Quarters
D3 - Dummy Variable Representing Three Quarters

TABLE B-9

COLORADO

	DEPENDENT VARIABLES									
	DX1		DX2		DX3		DX4		DX5	
INDEPENDENT VARIABLE	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0
INTERCEP	0.82	1.7	0.45	1.4	0.47	1.2	0.00	0.1	-3.03	-4.7
DXL1	-0.03	-0.1	0.09	0.5	0.27	1.0	-0.02	-1.2	-0.77	-1.9
DXL2	0.14	0.5	-0.08	-0.4	0.23	0.9	-0.01	-0.4	0.47	1.2
DXL3	-0.50	-1.5	0.04	0.2	-0.87	-3.0	0.04	1.7	-0.06	-0.1
DXL4	0.47	0.2	-0.69	-0.3	-2.50	-0.9	0.05	0.2	4.48	1.1
DXL5	0.09	1.0	0.07	1.1	0.13	1.6	0.00	-0.5	-0.08	-0.6
DXL6	1.50	2.9	0.48	1.4	0.96	2.1	-0.04	-1.1	-0.24	-0.3
DX2L1	-0.18	-0.6	0.04	0.2	-0.12	-0.4	0.00	0.0	-0.02	-0.1
DX2L2	0.15	0.6	0.00	0.0	0.31	1.4	0.02	1.0	-0.24	-0.7
DX2L3	-0.22	-0.6	0.17	0.7	-0.23	-0.7	0.00	-0.1	-0.87	-1.7
DX2L4	-0.63	-0.2	1.73	0.9	-1.50	-0.6	0.23	1.1	-2.56	-0.6
DX2L5	0.05	0.6	0.07	1.0	0.00	0.0	0.00	0.2	-0.12	-0.9
DX2L6	0.69	1.2	0.42	1.1	0.29	0.6	0.03	0.8	1.20	1.6
DX3L1	-0.38	-1.3	0.16	0.8	-0.13	-0.5	-0.01	-0.5	-0.47	-1.2
DX3L2	0.27	1.0	-0.18	-1.0	0.26	1.1	-0.02	-1.2	0.02	0.1
DX3L3	0.20	0.5	0.12	0.5	-0.18	-0.6	0.00	0.1	0.03	0.1
DX3L4	-3.58	-1.4	-0.28	-0.2	-2.11	-0.9	0.05	0.3	-6.25	-1.8
DX3L5	-0.19	-2.1	0.05	0.9	-0.17	-2.1	0.00	-0.6	-0.05	-0.4
DX3L6	-0.03	0.0	-0.45	-1.0	0.03	0.1	0.01	0.2	-1.39	-1.5
DX4L1	0.26	1.0	0.22	1.2	0.23	1.0	-0.02	-1.2	0.03	0.1
DX4L2	-0.24	-0.8	-0.40	-2.1	-0.34	-1.4	0.01	0.6	0.70	1.8
DX4L3	-0.55	-1.7	-0.07	-0.3	-0.55	-2.0	0.02	0.9	-0.19	-0.4
DX4L4	4.77	1.7	0.36	0.2	3.77	1.6	0.04	0.2	4.02	1.1
DX4L5	-0.12	-1.3	-0.05	-0.8	-0.04	-0.5	0.01	1.3	0.23	1.9
DX4L6	1.10	1.6	-0.04	-0.1	1.28	2.2	0.02	0.5	0.02	0.0
D1	-0.66	-2.4	0.04	0.2	-0.67	-2.8	0.00	-0.1	1.39	3.7
D2	-1.00	-3.4	-0.22	-1.1	-0.86	-3.4	0.01	0.5	0.27	-0.7
D3	-0.46	-1.5	-0.04	-0.2	-0.22	-0.8	0.02	0.9	0.40	1.0
LX7	-0.04	-0.6	-0.06	-1.3	0.00	0.0	0.00	-0.1	0.36	4.2
R^2	.8683		.4311		.8856		.3916		.9526	
F-STATISTIC	8.948		1.028		10.504		.873		27.293	
DF	38		38		38		38		38	

TABLE B-10

GEORGIA

DEPENDENT VARIABLES

INDEPENDENT VARIABLE	DX1 Parameter Estimate	DX1 T for HO: Parameter=0	DX2 Parameter Estimate	DX2 T for HO: Parameter=0	DX3 Parameter Estimate	DX3 T for HO: Parameter=0	DX4 Parameter Estimate	DX4 T for HO: Parameter=0	DX5 Parameter Estimate	DX5 T for HO: Parameter=0
INTERCEP	2.39	4.4	0.30	1.0	2.02	3.8	-0.04	-1.3	-1.73	-6.4
DXL1	-0.56	-1.3	0.14	0.6	0.47	-1.1	-0.04	-1.4	-0.56	-2.5
DXL2	0.91	2.2	-0.23	-1.0	0.79	2.0	0.01	0.2	0.03	0.1
DXL3	-0.14	0.3	-0.15	-0.6	-0.00	-0.0	0.05	1.9	0.34	1.4
DXL4	-6.50	-1.8	-3.30	-1.6	-5.53	-1.6	0.18	0.9	2.74	1.5
DXL5	-0.07	-0.3	-0.05	-0.4	-0.23	-1.1	-0.01	-0.5	-0.14	-1.3
DXL6	0.43	0.6	0.41	1.0	0.51	0.7	-0.08	-1.9	-0.37	-1.0
DX2L1	-0.29	-0.6	-0.00	-0.0	-0.44	-1.0	0.03	1.2	0.18	0.8
DX2L2	0.22	0.5	-0.13	-0.6	0.31	0.7	0.00	0.0	0.09	0.4
DX2L3	0.17	0.3	0.13	0.5	-0.27	0.6	-0.03	-1.3	-0.49	-2.1
DX2L4	-3.51	-1.0	0.18	0.1	-3.91	-1.1	0.31	1.4	-1.92	-1.1
DX2L5	0.48	2.1	-0.13	-1.0	0.51	2.2	0.01	0.7	-0.20	-1.7
DX2L6	-0.10	0.1	-0.29	-0.7	-0.15	-0.2	0.03	0.6	0.43	1.1
DX3L1	0.22	0.5	0.13	0.5	0.41	0.9	0.03	1.1	0.07	0.3
DX3L2	-0.05	-0.1	-0.18	-0.9	0.02	0.1	-0.00	-0.2	0.15	0.8
DX3L3	-0.01	0.0	0.02	0.1	-0.24	-0.5	-0.03	-1.1	-0.14	-0.6
DX3L4	-8.15	-2.2	1.20	0.6	-7.33	-2.0	0.13	0.6	-0.21	-0.1
DX3L5	-0.51	-2.1	-0.11	-0.8	-0.54	-2.3	0.01	0.8	-0.07	-0.6
DX3L6	-0.45	-0.6	0.06	0.1	-0.32	-0.4	0.04	0.8	-0.77	-2.0
DX4L1	-0.60	-1.3	0.16	0.6	-0.54	-1.1	-0.01	-0.2	0.27	1.1
DX4L2	0.35	0.9	-0.30	-1.4	0.31	0.8	-0.00	-0.0	-0.21	-1.1
DX4L3	0.63	1.3	-0.07	-0.3	0.54	1.1	-0.00	-0.0	-0.26	-1.1
DX4L4	6.37	1.7	-0.64	-0.3	5.26	1.4	0.11	0.5	1.42	0.8
DX4L5	-0.23	-1.2	0.08	0.8	-0.15	-0.8	0.01	0.6	0.39	4.0
DX4L6	-0.51	-0.6	0.00	0.0	-0.51	-0.6	0.03	0.6	-0.11	-0.3
D1	-0.93	-1.9	-0.41	-1.5	-1.09	-2.3	0.03	0.9	0.94	3.9
D2	-1.35	-2.5	-0.09	-0.3	-1.01	-1.9	0.03	1.1	0.22	0.8
D3	-2.07	-3.3	-0.03	-0.1	-2.07	-3.4	0.01	0.2	0.36	1.2
LX7	-0.16	-2.3	-0.02	-0.5	-0.12	-1.7	0.00	0.9	0.19	5.3
R^2	.8391		.3851		.8302		.4951		.9920	
F-STATISTIC	7.078		.850		6.636		1.331		167.639	
DF	38		38		38		38		38	

TABLE B-11

MASSACHUSETTS

	DEPENDENT VARIABLES									
	DX1		DX2		DX3		DX4		DX5	
INDEPENDENT VARIABLE	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0	Parameter Estimate	T for HO: Parameter=0
INTERCEP	0.76	1.4	0.16	0.4	0.34	0.7	-0.04	-1.1	-1.30	-3.0
DXL1	-0.21	-0.5	-0.22	-0.8	-0.10	-0.3	-0.08	-3.3	-0.64	-2.0
DXL2	0.42	2.0	-0.32	-2.1	0.30	1.6	0.00	0.4	0.09	0.5
DXL3	-0.25	-0.5	0.68	1.9	-0.33	-0.8	0.08	2.9	0.63	1.6
DXL4	-4.69	-1.7	-4.83	-2.4	-3.35	-1.4	0.32	2.1	2.45	1.1
DXL5	-0.07	-0.4	0.08	0.6	0.06	0.4	0.00	-0.1	-0.23	-1.7
DXL6	0.62	1.4	0.14	0.5	0.71	1.9	-0.06	-2.5	-0.31	-0.9
DX2L1	0.02	0.1	-0.35	-1.2	-0.10	-0.3	0.05	2.3	-0.52	-1.6
DX2L2	0.49	2.1	-0.28	-1.7	0.31	1.5	0.01	0.6	-0.24	-1.3
DX2L3	-0.18	-0.4	0.71	2.0	0.02	0.1	-0.08	-2.8	0.62	1.6
DX2L4	1.96	0.6	-0.52	-0.2	0.47	0.2	0.08	0.5	-1.65	-0.7
DX2L5	-0.03	-0.1	0.02	0.2	-0.16	-0.9	-0.01	-1.1	-0.22	-1.3
DX2L6	-0.34	-0.8	-0.10	-0.3	-0.24	-0.6	0.06	2.2	-0.01	0.0
DX3L1	0.34	0.9	0.22	0.8	0.20	0.6	0.01	0.4	0.35	1.1
DX3L2	0.29	1.2	0.04	0.3	0.17	0.8	0.01	0.5	-0.13	-0.7
DX3L3	-0.61	-1.2	-0.01	0.0	-0.26	-0.6	-0.02	-0.6	-0.43	-1.1
DX3L4	0.76	0.3	-2.11	-1.0	-0.21	-0.1	0.20	1.2	-2.07	-0.9
DX3L5	-0.24	-1.2	0.17	1.1	-0.09	-0.5	0.01	1.2	0.02	0.2
DX3L6	0.01	0.0	-0.34	-1.2	-0.29	-0.8	-0.02	-0.7	-0.26	-0.8
DX4L1	0.21	0.5	0.59	2.1	0.32	0.9	-0.01	-0.3	0.48	1.5
DX4L2	-0.04	-0.2	-0.20	-1.4	-0.15	-0.8	0.00	-0.3	-0.10	-0.6
DX4L3	-0.35	-0.7	-0.52	-1.4	-0.38	-0.8	0.01	0.4	-0.62	-1.5
DX4L4	2.58	0.9	2.88	1.4	2.05	0.8	0.08	0.5	-0.19	-0.1
DX4L5	-0.27	-1.3	0.12	0.9	-0.16	-0.9	-0.03	-2.6	0.41	2.6
DX4L6	-0.12	-0.3	0.29	0.9	0.00	0.0	0.01	0.6	0.45	1.3
D1	-0.58	-1.0	0.13	0.3	-0.43	-0.9	0.10	3.1	1.25	2.7
D2	-0.78	-1.7	0.32	1.0	-0.55	-1.4	0.02	0.9	0.58	1.7
D3	-0.76	-1.4	0.37	1.0	-0.12	-0.2	0.04	1.4	0.54	1.3
LX7	-0.03	-0.5	-0.05	-0.9	-0.01	-0.1	0.00	-0.1	0.10	1.7
R^2	.8275		.5199		.8382		.5382		.9898	
F-STATISTIC	7.879		1.779		8.51		1.914		158.672	
DF	46		46		46		46		46	

TABLE B-12

TEXAS

DEPENDENT VARIABLES

INDEPENDENT VARIABLE	DX1 Parameter Estimate	DX1 T for HO: Parameter=0	DX2 Parameter Estimate	DX2 T for HO: Parameter=0	DX3 Parameter Estimate	DX3 T for HO: Parameter=0	DX4 Parameter Estimate	DX4 T for HO: Parameter=0	DX5 Parameter Estimate	DX5 T for HO: Parameter=0
INTERCEP	1.08	4.4	0.39	2.0	1.54	4.7	-0.01	-0.5	-1.72	-3.7
DXL1	-0.08	-0.2	0.24	1.3	0.22	0.7	0.02	0.8	-0.06	-0.1
DXL2	0.44	1.4	-0.12	-0.8	0.29	1.1	-0.04	-2.3	-0.17	-0.5
DXL3	-0.30	-0.6	-0.23	-1.0	-0.62	-1.6	-0.03	-1.2	-0.42	-0.8
DXL4	-1.57	-0.6	0.14	0.1	-1.65	-0.8	0.00	0.0	5.13	1.7
DXL5	0.00	0.1	0.02	0.3	0.00	-0.1	0.00	-0.4	-0.01	-2.0
DXL6	1.43	2.7	0.33	1.3	1.32	3.1	0.03	0.9	0.03	1.1
DX2L1	0.14	0.4	0.06	0.3	-0.05	-0.2	0.04	1.6	0.00	0.1
DX2L2	0.63	1.9	0.11	1.7	0.71	2.7	-0.06	-2.9	-0.01	-0.3
DX2L3	-0.38	-0.8	-0.05	-0.2	-0.23	-0.6	-0.04	-1.5	0.02	0.8
DX2L4	-1.64	-0.6	0.10	0.1	-1.81	-0.8	0.21	1.3	0.00	0.2
DX2L5	0.22	2.2	-0.04	-0.8	0.11	1.4	0.00	1.2	0.02	2.2
DX2L6	-0.04	-0.1	0.09	0.3	-0.15	-0.3	0.01	2.1	0.01	1.2
DX3L1	0.70	1.8	-0.16	-0.9	0.54	1.7	0.02	0.9	0.02	1.6
DX3L2	0.17	0.5	0.20	1.2	0.25	0.9	-0.02	-1.3	-0.06	-1.7
DX3L3	-0.77	-1.5	0.13	0.5	-0.73	-1.8	-0.01	-0.4	-0.01	-0.3
DX3L4	-4.15	-1.6	-2.01	-1.7	-4.13	-2.0	0.30	1.9	0.01	0.3
DX3L5	-0.12	-1.2	-0.08	-1.5	-0.06	-0.7	0.00	0.9	-0.04	-1.2
DX3L6	0.89	1.6	-0.43	-1.6	0.70	1.5	0.00	0.6	-0.01	-0.4
DX4L1	0.45	1.1	0.19	1.0	0.33	1.1	-0.03	-1.3	0.04	1.5
DX4L2	0.42	1.3	-0.23	-1.5	0.51	2.0	0.00	-0.3	0.02	0.9
DX4L3	-1.02	-2.0	-0.46	-1.9	-0.86	-2.1	0.06	1.9	0.06	2.4
DX4L4	-0.32	-0.1	0.27	0.2	-1.45	-0.8	-0.07	-0.5	-0.09	-0.7
DX4L5	0.11	1.2	-0.03	-0.8	0.11	1.5	0.00	0.3	-0.10	-0.7
DX4L6	0.27	0.4	0.97	3.3	0.47	0.9	-0.04	-1.0	-0.15	-1.1
D1	-1.00	-3.1	0.02	0.1	-0.86	-3.4	0.00	0.1	-0.02	-0.2
D2	-0.60	-2.1	-0.13	-1.0	-0.38	-1.7	0.00	-0.3	0.12	1.9
D3	-1.07	-3.4	0.17	1.1	-0.63	-2.5	-0.02	-0.9	-0.16	-1.9
LX7	-0.15	-2.6	-0.05	-1.9	-0.14	-3.0	0.00	0.9	0.12	1.4
R^2	.7280		.5111		.7950		.4763		.9683	
F-STATISTIC	4.396		1.717		6.369		1.494		50.245	
DF	46		46		46		46		46	

TABLE B-13

Tests for Deleting Lags of Variables
Selected States
I/1970 - IV/1989

	Colorado	Georgia	Massachusetts	Texas
Test Statistic for Deleting Fourth Lag Other Than Dependent Variable				
Value of test statistic	1.093	1.899	1.617	2.239
Degrees of freedom	30,190	30,190	30,230	30,230
Marginal significance level (percent)	34.80	0.54	2.71	0.05
Test Statistic for Deleting Third Lag Other Than Dependent Variable				
Value of test statistic	1.691	1.366	1.234	1.666
Degrees of freedom	30,190	30,190	30,230	30,230
Marginal significance level (present)	1.91	10.96	19.65	2.02

fourth lag. Because it is somewhat more consistent with the data, we delete these third lags in order to execute tests for Colorado and Georgia.

Table B-14 presents F-statistics for testing the hypothesis that the coefficients in each of the states do not change in the fourth quarter of 1979. With the continued exception of Texas, the data are not consistent with the hypothesis of constant coefficients at the 5 percent marginal significance level. The conclusions for Massachusetts and Texas are the same as they were when four lags of all variables were included. The conclusions of coefficient instability for Colorado and Georgia, however, are conditional on the acceptability of deleting the third lag of variables, a hypothesis that received some, but not complete, support from the data. We conclude that there has been a change in the responsiveness of UI benefits and taxes to the economy in some states but, given the results for Texas, possibly not all states. In our sample, the results for Colorado, Georgia, and Massachusetts generally are consistent with the hypothesis that the responsiveness of UI benefits and taxes to the economy was different in the 1970s than in the 1980s.

The conclusions from the estimates are discussed more thoroughly in Chapter 6.

TABLE B-14

Tests for Coefficient Stability
Selected States
I/1970 - IV/1989

	Colorado	Georgia	Massachusetts	Texas
		Test Statistics for Constant Coefficient		
Value of test statistics	1.983	4.878	1.622	1.143
Degrees of freedom	46,40	46,40	46,56	46,56
Marginal significance level (percent)	1.46	0.00	4.20	31.51

Appendix C
Description of Data

APPENDIX C

DESCRIPTION OF DATA

THE UNITED STATES

THE UNEMPLOYMENT INSURANCE SYSTEM

The variables used to examine the unemployment insurance system are unemployment insurance benefits, unemployment insurance taxes, the insured unemployment rate, and the coverage ratio. The coverage ratio is the ratio of covered employment to total civilian employment. The sources for covered employment are discussed in this section and the sources for total civilian employment are discussed in the next section.

Unemployment insurance benefits

These data are monthly for January 1950 to December 1989. These data are from various issues of the Social Security Bulletin and Business Statistics.

The Social Security Bulletin includes data on payments under state laws for January 1966 to December 1989. These data are in the table titled "Unemployment Insurance: Selected Data on State Programs" from 1966 to the end of the period. This series is not available earlier in the Social Security Bulletin.

This series is available, however, in various issues of Business Statistics for the earlier years, with the exception of 1956 and 1957. In 1956 and 1957, the data in Business Statistics include benefit payments under Unemployment Compensation for Federal Employees (Title XV of the Social Security Act as amended, with the acronym UCFE.) Using the data in Business Statistics, 1963, benefit payments under UCFE in 1959 were about 1.5 percent of payments under state laws. For the purposes of the graphs, this is not likely to be important. Nonetheless, because the data for these two years include payments under UCFE, the statistical analysis cannot use data before January 1958.

None of the data from the Social Security Bulletin are adjusted to exclude voided benefit checks and transfers under the interstate combined-wage plan. Through 1972, the data include payments under state (but not federal) temporary extended unemployment insurance provisions; from January 1973 on, payments under state temporary extended unemployment insurance provisions are excluded.

The Federal-state Extended Benefits Program of 1970, which paid benefits from 1971 through 1982, is included in the benefits paid for 1971 and 1972 and excluded thereafter. The amounts included are $664 million and $482 million in 1971 and 1972, respectively. These values can be compared to total regular benefits paid of $4,952 million and $4,484 million in 1971 and 1972, respectively. The amounts are not small: 11.8 and 9.7 percent of total benefits in these two years.

In summary, the major discontinuities in the data series from 1950 through 1989 are: the data for 1956 and 1957 include payments under UCFE; and the data for 1971 and 1972 include payments under the Federal-state Extended Benefits Program of 1970.

Unemployment Insurance Taxes

Data on unemployment insurance taxes are available monthly for January 1950 to December 1989 from various issues of the Social Security Bulletin. There is data on both the state and federal share of these taxes. The federal share is allocated to state administration of UI.

This report uses the data on the state share of these taxes. From 1950 through 1989, the data represent deposits in state clearing accounts of contributions plus penalties and interest collected from employers and, where applicable, employees' contributions.

Insured Unemployment Rate

The insured unemployment rate is insured unemployment this month relative to average monthly covered employment in a recent twelve months.

For January 1965 to the end of the period, these data are available in various issues of the Social Security Bulletin in the table titled "Unemployment Insurance: Selected Data on State Programs." These data do not include people covered by UCFE.

For January 1956 to the end of the period, similar data are available in Business Statistics. For 1956 and 1957, these data include those covered by UCFE. For later years, UCFE is excluded. In sum, these data are on a consistent basis from January 1958 to the end of the period.

Covered Employment

Data on covered employment from January 1946 through March 1975 are available in Employment and Wages. This source is used through the end of 1974. The data for January 1975 through December 1989 are from the Actuarial Statistics, Department of Labor. These data include employees covered on a taxable and on a reimbursable basis.

THE ECONOMY

Gross National Product

Gross National Product in current prices is from the Federal Reserve Bank of St. Louis for the first quarter of 1947 through the third quarter of 1985. Revised data for the first quarter of 1985 through the second quarter of 1987 and updated data through the fourth quarter of 1989 are from the July 1989 and April 1990 issues of the Survey of Current Business. The implicit price deflator is from the same sources.

Note that the GNP implicit price deflator is used to convert all dollar magnitudes into real terms.

Unemployment Rate

The unemployment rate is the percentage of the civilian labor force that is not employed. The not seasonally adjusted (NSA) unemployment rates for December 1964 through December 1989 are from various issues of the Social Security Bulletin.

Civilian Labor Force

The civilian labor force employed NSA for January 1950 through December 1988 is from Business Statistics. These data are updated through the end of 1989 from the Survey of Current Business.

THE UNEMPLOYMENT INSURANCE SYSTEM

Unemployment Insurance Benefits

These data for March 1964 through December 1989 are benefits paid for all types of compensated unemployment. These data are from miscellaneous issues of the Social Security Bulletin for the whole period. In all periods, these data: exclude programs for federal employees and for ex-servicemen; include unemployment compensation for state and local government employees where covered by state law. In addition, for part of the period, they are: (May 1965) adjusted for voided benefit checks and transfers under interstate combined, wage plan - include payments made under temporary unemployment insurance provisions; (June 1965 - August 1965) not adjusted for voided benefit checks and transfers under interstate combined, wage plan - include payments made under temporary extended unemployment insurance provisions; (September 1965 - January 1973) voided benefit checks and transfers under the interstate combined, wage plan not deducted - include payments made under temporary extended unemployment insurance provisions; (February 1973 - June 1986) voided benefit checks and transfers under interstate combined, wage plan not deducted - exclude payments made under temporary extended unemployment insurance provisions; (July 1986 - December 1989) voided benefit checks and transfers under the interstate combined wage plan not deducted - exclude payments under temporary unemployment insurance premiums.

Data for November 1972 are missing for Georgia, Massachusetts, and Texas. The April 1973 Social Security Bulletin presents the state and national numbers for October 1972. The May 1973 Social Security Bulletin presents the state and national numbers for December 1972. The annual totals are available in ET Handbook for 1971, 1972, and 1973. These annual totals differ from the monthly data because the annual data are adjusted for voided benefit checks and transfers under the interstate combined-wage plan, while the monthly data are not. The total benefits paid are close to the summed monthly values for 1971 and 1973. Hence, the values in November 1972 for Georgia and Massachusetts are estimated by subtracting the 11-month totals from the annual totals. The value for Texas, $7.436, would be 25

percent more than the value in any other November. The data for October and December show no such extreme behavior. A simple average of the October and December values, $5.301 and $5.307, is used instead. This does not seem far out of line from inspection of the seasonal pattern. The resulting values seem reasonable.

Data for September 1972 through January 1973 are missing for Colorado. The value for the single month of January 1973 is estimated in the same way as the values for the other states in November 1972. The missing values for September 1972 through December 1972 are a harder problem to solve. In addition, the value of benefits for August, $1.475 is quite large. It is 50 percent bigger than the highest value of benefits in any prior August from 1964. Furthermore, the annual total for Colorado of $13.815 million does not indicate large benefits over the course of the year relative to other years. On the assumption that the value for August is an error, possibly related to the failure to report values for the rest of the year, benefits paid for August through December is estimated. The value of benefits in each month is forecasted using a 12th-order autoregression for the logarithm of benefits with monthly seasonal dummies. The predictions for the 5 months total $4.272 million. The annual benefits paid minus the first 7 months imply benefits paid in these months of $4.611 million. The monthly predictions are adjusted by the ratio of 4.611 to 4.272 so that the 12 monthly values add up to the annual total. While the annual total is adjusted for voided checks and transfers under interstate combined, wage plan and the monthly data are not, the results of this adjustment are likely to be more accurate than ignoring the information about the annual total.

Benefits paid in October 1973 for Texas quite apparently are wrong. Benefits paid are $4.624 million in September 1973, $52.203 million in October 1973, and $5.127 million in November 1973. There is no corresponding drastic increase in the number of beneficiaries, weeks compensated, or average weekly benefits. Benefits paid are assumed to be $5.223 million in October 1973. It would make virtually no difference to the analysis if they are $5.203 million, an alternative plausible value.

Unemployment Insurance Taxes

These data are all based on deposit data from three different sources at the Actuarial Division of the Department of Labor. Data on deposits into UI trust fund

accounts maintained in the files of the division are available for the first quarter of 1962 through the second quarter of 1980. These data are used through the end of 1978. The data for January 1979 through December 1989 are from two separate computer files maintained by the Division. The first covers deposits from January 1979 through December 1981 and the second covers deposits from October 1981 through December 1989. The quarterly values of the three overlapping series only agree within millions of dollars. There is no way to avoid using all three series and have a continuous data set from the start of 1970 through the end of 1989. The data used are: from the accounts in the Actuarial Division's files for the first quarter of 1962 through the fourth quarter of 1978; from the first computer file for the first quarter of 1979 through the end of 1981; and from the last computer file for the first quarter of 1982 through the fourth quarter of 1989.

Insured Unemployment Rate

The insured unemployment rate is average weekly insured unemployment as a percent of covered employment for March 1964 through December 1989. These data are from miscellaneous issues of the Social Security Bulletin. For the entire period, these data: exclude programs for federal employees and for ex-servicemen; include unemployment compensation for state and local government employees where covered by state law; and are based on average covered employment for the most recent twelve month period.

THE ECONOMY

Personal Income

Quarterly total personal income for states is SA at annual rates. The source for 1969 through 1985 is State Personal Income 1929-87 (U.S. Department of Commerce, Bureau of Economic Analysis, pages 18-22, table 5.) The source for the first quarter of 1986 through the fourth quarter of 1989 is the April 1990 Survey of Current Business (U.S. Department of Commerce, Bureau of Economic Analysis, page 55, table 1.)

Unemployment Rate

The unemployment rate is seasonally adjusted from DRI. These data are available for the first quarter of 1972 through the fourth quarter of 1989 for Colorado and Georgia. These data are available for the first quarter of 1970 through the fourth quarter of 1989 for Massachusetts and Texas.

Appendix D
References

APPENDIX D

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