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AN ECONOMETRIC ANALYSIS OF THE STABILIZATION EFFECTIVENESS OF THE UNEMPLOYMENT INSURANCE PROGRAM

By

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ABSTRACT

AN ECONOMETRIC ANALYSIS OF THE STABILIZATION EFFECTIVENESS OF THE UNEMPLOYMENT INSURANCE PROGRAM

by

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This dissertation measures the amount of stabilization that the Unemployment Insurance program provides to the economy of the United States. Past research has shown that the Unemployment Insurance program has been very effective in preventing further declines in aggregate demand in several post-war recessions. This study extends the research in this area by first improving the method by which the stabilization effectiveness of the program is measured during recession and recovery periods, then by using a completely specified model of aggregate demand to estimate the measured effectiveness of the program over any time period. The empirical work covers the period from 1955-1981.

The reaction of the Unemployment Insurance program to income changes is first considered. All previous research assumed the reaction of the program was contemporaneous to income changes, and that the feedback from the program to income also occurred contemporaneously. These assumptions enabled previous researchers to measure the stabilization effectiveness of the program contemporaneously with changes in income. This study tests the validity of these assumptions. The tests reveal that the assumptions are valid concerning the reaction

of benefit payments to income changes, but may not be valid concerning the reaction of tax collections to income changes. The latter is due to institutional factors such as the practice of experience rating used to establish tax rates. However, for simplicity I take the above assumptions as valid for the entire program.

The next part of the dissertation introduces the concept of measured effectiveness and derives a modified version of the measure of stabilization effectiveness of the Unemployment Insurance program originally found in previous research. The measure is simply a ratio of two aggregate demand multipliers, one from a model including the program, the other from a model without the program. The measure shows the amount of a further (percentage) change in income prevented by the inclusion of the program in the model. The modification is obtained by incorporating the trend growth of benefits, taxes, and income in the measure. This modification smoothes the measured effectiveness of the program over recession and recovery. This is in contrast to the asymmetric estimates of the measure found in previous research that showed high effectiveness in recession and almost no effectiveness in recovery. Using the modified version of the measure, I calculate that the average measured effectiveness of the Unemployment Insurance program is half that estimated in previous research. Also, using this measure, I find that every discretionary extended benefit program has detracted from the stabilization effectiveness of the program. This result shows the program to be more effective at meeting the goal of stabilization when it is left to work as an automatic stabilizer.

The final part of the dissertation derives, specifies, and estimates a series of aggregate demand models that enable more accurate estimation of the measured effectivness of the Unemployment Insurance program as an automatic stabilizer. All previous research including that of the proceeding section of the dissertation measured the effectiveness of the program using a misspecified model of aggregate demand by not including a money sector. Allowing for monetary reactions to changes in fiscal policy, such as the Unemployment Insurance program, reduces the measured effectiveness of the program below that found in the previous section of the dissertation. This method of estimating measured effectiveness is conceptually equivalent to estimating the specification error between a misspecified model and a correctly specified model. Incorporating a government budget condition in the model that requires any change in the deficit be financed by an increase in government bonds outstanding and/or an increase in the monetary base, changes the estimated measured effectiveness of the program only slightly. However, the true measured effectiveness of the program is that estimated without the deficit financing condition and the induced wealth and liquidity effects associated with this condition.

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CHAPTER ONE

INTRODUCTION

Of the many policy instruments that are available to policy makers to help them influence economic activity, only a handful are referred to as automatic stabilizers. As income changes in response to autonomous shocks, automatic stabilizers provide countercyclical forces which help reduce the effects of these shocks on the economy. Among this group of policy instruments is the Unemployment Insurance program, which was originally adopted as part of the Social Security Act in 1935. Initially the Unemployment Insurance (hereafter UI) program met the need of providing social insurance to individual workers against the loss of wages as a result of the adverse economic conditions during the Great Depression. Its secondary goal is to help stabilize the economy by maintaining the purchasing power of unemployed workers in order to prevent further prolonged recessions or depressions.

The UI program helps stabilize the economy by impeding changes in income caused by autonomous shocks. Like other automatic stabilizers, the UI program moves the government toward a deficit as income falls by paying out benefits to laid off workers and collecting fewer taxes from employers as their wage bill shrinks. Government spending increases and revenues decrease, causing the deficit to increase, but this slows the decline in income. Conversely, as income rises, tax collections increase as increased employment raises employers' wage bills, and benefits cease, causing the government to move toward a surplus which retards the increase in income.

The purpose of this study is to measure the amount of stabilization effectiveness the UI program gives to the economy. The measure of stabilization effectiveness is taken to be the amount of a further change in income (due to an autonomous shock) that is prevented by the UI program. The policy implications of this study are straightforward. If the UI program can substantially stabilize the economy, policy makers may wish to structure the UI program in such a way that it provides the greatest amount of stabilization effectiveness while still meeting the program's foremost goal: acting as a form of social insurance.

Before detailing the course of action that was undertaken for this study, I first must explain why I chose to analyze the UI program instead of some other fiscal policy. The obvious reason is the fact that it is an automatic program and does not suffer from discretionary policy timing problems, such as the so-called recognition and implementation lags. In this sense, the stabilization effectiveness of this simple program is a better measure of the impact of fiscal policy than that of all fiscal policies together. Another reason the UI program is chosen is that its impact per dollar may be greater than other fiscal policies. Two factors may lead to this increased impact. First, people receiving UI income may be constrained from using their savings to help them supplement their UI income to maintain their lifelong consumption pattern. Secondly, UI recipients tend to be lower-income individuals with higher marginal propensities to consume than non-recipients. The combination of these two factors may increase the impact of the UI program above that of other fiscal policies. Because of this possible larger impact and the automatic nature of the program making it a better measure of the impact of fiscal policy, I have chosen the UI program as the fiscal policy to analyze for purposes of this study.

I examine three stabilization issues in this study. First, I examine whether or not the response of the UI program to changes in income is automatic. If it is not, the stabilization effectiveness cannot be measured contemporaneously with a change in income. Second, I measure the stabilization effectiveness of the UI program in recession and recovery. Lastly, I measure the stabilization effectiveness of the UI program in the context of an aggregate demand model.

Chapter II examines the issues of how quickly the UI program reacts to changes in income, and how soon the feedback from the UI program is felt on income. If the UI program reacts with a lag to income changes, this must be accounted for in the measured effectiveness of the program. I find no conclusive evidence from the quarterly analysis in this study to contradict the assumption that the UI program reacts to changes in income contemporaneously. The tests run in this chapter are designed to test for the presence of independence between variables, not when the independence occurs. It is because of this that I cannot make a definitive statement about the response time of the UI program to income changes.

I measure the stabilization effectiveness of the UI program in the five post-war recession/recovery periods in Chapter III. This issue has been taken up in the past by Clement (1960), Rejda (1966), Lewis

(1963), Eilbott (1966) and von Furstenberg (1976) in the U.S., and by Thirlwall (1969) and Hansen and Burroughs (1969) in the U.K. I employ a more accurate version of the measure of stabilization effectiveness found in these studies (see especially Eilbott (1966)), merely by taking into account the growth of income over time and the dependence of the UI program on this detrended series (rather than levels) of income. Using the same measure as Eilbott, except for this minor change, the measured effectiveness of the UI program falls by nearly fifty percent from that of other studies during recessions. In addition, whereas previous studies found almost no effectiveness during recoveries, I find measures of stabilization effectiveness of nearly the same magnitude for recessions and recoveries due to this minor correction.

Chapter III also analyzes the effect discretionary temporary extended benefits programs have on the measured effectiveness of the overall UI program. These discretionary programs all have a negative effect on measured effectiveness. The primary reason for this is that every one of these discretionary programs began as recovery, measured by real national income turning upward, was underway.

Economic theory suggests that transfer payments, such as UI benefits, should decline as recovery is underway. The negative effect on measured effectiveness indicdates that UI benefits are increasing when extended benefits are included in total benefits, rather than decreasing as theory suggests. This result makes it clear that temporary extended benefit programs must be judged on their social insurance merits (from a policy viewpoint), rather than their contribution to stabilization effectiveness.

Chapters IV and V form the most important contribution to the issue of the effectiveness of the UI program. The analysis in Chapter III and that of all previous studies was done without a single aggregate demand model being estimated to find the aggregate demand elasticities used in the measure of effectiveness. In addition, all previous studies implicitly assumed goods-sector-only aggregate demand models in their analysis. Four models are specified and estimated in Chapter IV for use in calculating the measured effectiveness of the UI program. The principal result from this chapter is that the addition of a money sector in the models, to account for monetary reactions to goods sector shocks, reduces the measured effectiveness of the UI program compared to that of goods-sector-only models.

Chapter V extends the models of Chapter IV by introducing a government budget condition to the analysis. Forcing the government to pay for any deficits created by increased spending has an impact on the measured effectiveness of the UI program. The measured effectiveness increases marginally when deficit financing is considered compared to models that ignore financing. This is due to the countercyclical nature of the program, as deficits will not be as large when income rises in response to increased government spending, since UI benefits fall and UI taxes rise. With a smaller deficit to finance, wealth and liquidity effects increase the measured effectiveness of the UI program. However, this increase in measured effectiveness is small.

Chapter V also examines the effect different monetary targets have on the measured effectiveness of the UI program. A model in which interest rates are pegged and the money supply changes to equilibrate the money sector is associated with greater measured effectiveness than a model in which the model supply is targeted (exogenous). This is not surprising, as accommodating monetary policy prevents private spending from being crowded out by higher interest rates that usually accompany increased government spending and deficits. Although the measured effectiveness of the UI program increases when monetary policy is accommodating, the increase is due to more liquidity being available, not from the fiscal effect of the UI program.

The major contributions of this dissertation lie both in its research methods and its conclusions. Chapter III shows how a seemingly minor correction in methodology can result in a substantial difference in measured effectiveness in both recession and recovery. The results in Chapter III are much more appealing than the rather high measures of effectiveness found in previous studies. I find that only ten to twelve percent of a further change in income has been prevented by this small program, rather than the twenty-five to thirty percent figure found in some of the previous studies. (See Clement (1960) and Rejda (1966).) Chapter III also provides an easy way to dissaggregate total benefits paid into regular program benefits paid and temporary extended benefits paid to assess the latter's impact on the measured effectiveness of the overall UI program. Not surprisingly, the results show a negative impact on overall effectiveness from temporary extended benefits. Most importantly, this study estimates aggregate demand models containing an endogenous UI benefit variable, a money sector, and a government budget condition to measure more accurately the effectiveness of the UI program. This methodology enables decomposition of the measure into the fiscal effect due to the UI program from the monetary and deficit financing effects. This breakdown allows me to show both the measure of stabilization effectiveness of the UI program and the factors contributing to this measure.

CHAPTER TWO

THE RESPONSIVENESS OF THE UI PROGRAM TO INCOME CHANGES

2.1 Introduction

A major factor in choosing the UI program as the fiscal policy to be analyzed in this study concerning stabilization effectiveness is its automatic nature. Unlike discretionary programs, which suffer from timing problems such as the so-called recognition and implementation lags, automatic stabilizers quickly react to changes in economic activity to mitigate these changes. Not only is the reaction of the automatic stabilizer to a change in economic activity assumed to take place soon after the change, but the feedback to the economy is assumed to follow shortly after the reaction. The purpose of this chapter is to answer the following questions:

1. Is the UI program dependent on changes in income, and if it is, how long does it take for the program to react to income changes?
2. When does the feedback from the above reaction of the UI program to a change in income occur, and for how long is the impact felt?

2.2 A Test for the Dependence of the UI Program on Income Changes

The first requirement for a program to be an automatic stabilizer is that it must react to a shock to the economy in order to minimize the effect of the shock on the economy. The second requirement is that this reaction occur shortly after the shock to minimize quickly the effect of the shock on the economy. A policy that does not meet both of these requirements is not considered to be an automatic stabilizer.[1/] This section tests the hypothesis that the UI program meets both of these requirements.

Previous studies ignore question one by implicitly assuming the UI program reacts to changes in income contemporaneously.[2/] This may be correct, and one may gain little by exploring the possibility of a non-contemporaneous reaction, especially for UI benefits. However, there are some institutional arrangements that make the reaction of UI taxes more suspect, for example, the practice of experience rating.

States administer the UI program, even though there are some exclusively federal taxes and benefits as part of the program. Experience rating is the method states have developed to encourage stability in employment practices by firms. This practice makes the firms which generate more unemployment fund the payment of benefits, and enables those firms with little or no unemployment to avoid most of the burden of paying for the benefits going to other firms' employees. Under a program of experience rating, each firm has an account set up by the state UI program. Firms contribute to these accounts via tax payments and are debited for all benefits paid to their employees. The balance of the account of a firm determines the experience of its employment practices, which is used to set the firm's tax rate. Firms with negative balances are assigned higher tax rates, firms with positive balances pay the minimum tax rate.

One result that can be drawn is that tax rates set using this practice of experience rating move countercyclically. This can be shown in a recession, for, as more workers become eligible to receive benefits, a firm's account moves negatively (less payroll means less taxes collected) and tax rates rise. Conversely, tax rates fall during expansions as the firm's account moves toward a surplus. This fact has led some previous studies to conclude that UI taxes are destabilizing.[3/]

Rejda has shown that, although tax rates may move in a countercyclical pattern, tax collections move procyclically.[4/] The following example verifies this claim. During a recession, unemployment increases causing a firm's payroll to decrease and taxes collected to fall. The opposite occurs in an expansion. Employment increases resulting in more taxes being collected. The main point of Rejda's argument is that tax collections, not tax rates, are important in determining stability. But, tax rate changes may offset the change in tax collections and produce a destabilizing effect. Because there are two opposing forces working on UI taxes, it is impossible to tell, *a priori*, if UI taxes are stabilizing or not. This matter must be dealt with empirically, as is done later in this chapter. However, because of these two forces, the measured effectiveness of UI taxes should move toward zero (neutral). If that is the case, running a test for dependence on income may show UI taxes to be independent of changes in income.

Another significant result may be the timing of the effectiveness of UI taxes due to experience rating. Tax rates change with a lag, as the employment "experience" is averaged over a period longer than a year (usually), and reviewed only annually. Thus, tax rates do not change immediately, only at regular intervals. Two results can be obtained from this fact. First, the destabilizing aspects of UI taxes may not be evident immediately, but will depend on the timing of the recession or recovery vis a' vis the annual review. From the discussion above, UI taxes should be no worse than neutral and may possibly even be stabilizing in the short run as tax collections fall. However, over the course of the business cycle, measured effectiveness should move toward zero after tax rate changes have been made. Second, because of lags in the setting of the tax rates, UI taxes may show destabilizing tendencies only after several quarters.[5/]

With this in mind, there still seems to be little gained by not assuming automatic means contemporaneous. One factor that can be tested is the dependence of UI taxes and UI benefits on income. To test this, the Haugh test will be run.[6/]

To carry out this test, two covariance-stationary time series are needed. If the series are not covariance-stationary, they must be made so by prewhitening them by an ARIMA representation. The white-noise residuals obtained upon estimation of the ARIMA representations are used in the test.[7/] The use of ARIMA filters is justified on the grounds that these filters eliminate the nonstationarity in the original series.

The data used for these tests are:

UI taxes, state collections plus federal taxes (FUTA);

UI benefits, regular state program benefits, plus unemployment compensation for federal employees, plus unemployment compensation for ex-servicemen plus automatic extended benefits (EB);

UI taxes and UI benefits are converted from monthly to quarterly series to match the income series; and

Income, seasonally-unadjusted GNP.

Appendix A contains a detailed listing of all data sources. Seasonally-unadjusted GNP is used as the income series to match it with the seasonally-unadjusted UI taxes and UI benefits series. A seasonally-adjusted income series would cause distortions in the tests.

These quarterly series are not covariance-stationary. Box-Jenkins methodology is used to diagnose the ARIMA model, estimate the parameters of the model, and obtain the residuals needed for the Haugh test.[8/] Table 2.1 summarizes the results of the process.

The chi-square tests of the autocorrelation functions of all three models show that the hypotheses that the residuals (e_t) generated by the models are white-noise and cannot be rejected at the .05 level of significance. The white-noise residuals are then used in the Haugh test to check for independence of the series UI taxes and seasonally-unadjusted GNP, and UI benefits and seasonally-unadjusted GNP, respectively.

The hypothesis to be tested is for the independence of the two series, i.e., zero cross-correlation values at all positive and negative lags. For each lag, an S^* statistic is calculated, where

$$(2.1) \qquad S^* = N^2\left(\sum_{j=-k}^{k} (N-|j|)^{-1}\, r^2_{X,Y}(j)\right),$$

with N the number of observations, k the number of lags to be analyzed, and $r^2_{X,Y}$ the cross-correlation value at lag j. For purposes of this

TABLE 2.1

BOX-JENKINS FILTERS FOR UI TAXES, UI BENEFITS, AND GNP

Series		Diagnostic Check	
UI Taxes	$(1-B)(1-B^4)UIT = -.003+(1-.63B -.49B^4)e_{t1}$ (.0016) (.042)(.070)	$X^2 = 20.17$	df = 21
UI Benefits	$(1-B)(1-B^4)UIB = (1+.34B)(1-.655B^4)e_{t2}$ (.080) (.072)	$X^2 = 32.99$	df = 22
GNP	$(1-B)(1-B^4)NSAGNP = (1-.71B^4)e_{t3}$ (.064)	$X^2 = 33.61$	df = 23

NOTES: (1) The B^i represents the back shift operator to the ith power.

(2) e_{tx} is the white noise residual for equation X.

(3) UIT, UIB, NSAGNP are the natural logarithms of UI taxes, UI benefits and not seasonally adjusted GNP, respectively.

(4) The numbers in parentheses under the coefficients are standard errors.

test, "X" will be UI taxes, then UI benefits; and "Y" will be seasonally unadjusted GNP. Lagged and lead values of seasonally-unadjusted GNP are combined with current values of UI taxes and UI benefits (separately) to obtain estimates of the cross-correlation values for each period. Becuase the number of periods is relatively small (15 leads and lags), I use the small sample statistic (S^*) for this test. S^* is distributed as a chi-square with 2k+1 degrees of freedom. The S^* value for k lags is compared to a critical value of a chi-square with 2k+1 degrees of freedom. If S^* is greater than the critical value, the hypothesis of independence is rejected.

A simpler test to determine independence, which the Haugh test improves upon, is to compare the cross-correlations to N^{-1} or $(N-|k|)^{-1}$, which are the asymptotic and small sample variances of the correlation functions. To reject the hypothesis of independence of the two series, one need find only one correlation value greater in absolute value than two standard deviations from the (assumed zero) mean ($2/N^{-1/2}$ or $2/(N-|k|)^{-1/2}$). The cross-correlations for 15 leads and lags for UI taxes and seasonally-unadjusted GNP, and UI benefits and seasonally-unadjusted GNP, and their respective two standard deviation measures (known as the two sigma limit) are given in Table 2-2. For UI taxes and NSAGNP, lags 1 and 2 are greater than the two sigma limit, implying the two series are not independent. Notice, the contemporaneous correlation is not considered significant while the two significant periods, lags 1 and 2, exceed the two sigma limit only slightly. This may be due to the experience rating factor discussed above. However, this conclusion cannot be drawn from this test.

One can see there are several instances where the correlations

TABLE 2-2

CROSS CORRELATION FUNCTIONS

LAG	UIT-GNP CORRELATION VALUE	UIB-GNP CORRELATION VALUE	TWO SIGMA LIMIT
-15	-.0916	.0271	.1890
-14	-.1116	.0891	.1881
-13	-.0335	.0369	.1873
-12	.1480	.1164	.1865
-11	-.0378	-.0244	.1857
-10	-.0820	.0020	.1849
-9	-.1394	-.0941	.1841
-8	-.0137	.0889	.1833
-7	-.0672	-.0320	.1826
-6	-.1238	.1353	.1818
-5	-.0194	.2521	.1811
-4	-.0099	.1658	.1803
-3	.1481	.1575	.1796
-2	.1865	-.1033	.1789
-1	.2646	-.2204	.1782
0	-.0068	-.6311	.1775
1	-.0163	-.1861	.1782
2	.0416	-.1843	.1789
3	.0799	.0357	.1796
4	-.0699	-.0528	.1803
5	-.0720	.2697	.1811
6	-.0586	.0560	.1818
7	.0480	.1840	.1826
8	.1011	-.0425	.1833
9	-.0325	.1488	.1841
10	-.0759	-.0422	.1849
11	.0016	-.1491	.1857
12	.0406	.0352	.1865
13	-.0526	.1187	.1873
14	-.0040	.0396	.1881
15	.0504	-.0703	.1890

NOTE: The two sigma limit is twice the square root of the small sample variance, $2(N-|K|)^{-1/2}$.

between UI benefits and NSAGNP exceed the two sigma limit, including the contemporaneous correlation, as expected. This implies the two series are not independent.

The results of the Haugh test are reported in Table 2-3. The S^* statistics for various lead-lags are given for both the UIT-NSAGNP and UIB-NSAGNP correlation functions. The S^* statistics indicate the hypothesis that UIB and NSAGNP are independent can be rejected at the .005 significance level for all leads or lags k. The hypothesis that UIT and NSAGNP are independent can be rejected for small values of k, but it cannot be rejected for large k. The possibility of UI taxes becoming independent of income changes due to the practice of experience rating was postulated above, and the results of this test do not disprove that hypothesis. However, all that can be shown from the Haugh test is that UI taxes and NSAGNP, and UI benefits and NSAGNP are not independent for at least some leads and lags. One cannot infer any pattern or magnitude of correlation from this test, as it is only a test for independence.

The answer to the question whether the UI program is dependent on a change in income is found to be yes for both UI benefits and UI taxes. The answer to the question of how long does it take for the program to react to this change in income remains to be answered explicitly. As in previous studies, I make the assumption that the UI program reacts contemporaneously to a change in income. This assumption may not be correct at all times, especially for UI taxes, but one loses little by assuming the reaction is contemporaneous in a quarterly study.

TABLE 2-3

HAUGH TEST RESULTS

CORRELATION FUNCTION	$\|K\| = 1$	$\|K\| = 6$	$\|K\| = 12$	$\|K\| = 20$
UIT-GNP	9.00**	21.28***	31.64	41.23
UIB-GNP	61.23*	95.23*	110.96*	135.14*

NOTES: * Significant at the .005 level

** Significant at the .05 level.

*** Significant at the .10 level.

2.3 A Test for the Timing of the Feedback

Answering question one does not provide a quantifiable answer to how effective the UI program is as an automatic stabilizer; it only discusses the issue of when effectiveness begins. Question one is only one side of the "when" issue, though. Question two is the other side of this issue. The answer to this question is usually implied by the model and/or by the theory backing the model. But investigating when an automatic stabilizer reacts and then causes a change in a target variable is an empirical question. It is unfortunate there is no test specifically designed to help answer this question.

Other studies have passed over this issue, again assuming the feedback effect is felt contemporaneously and continues throughout the period in question. The closest test to determine when a variable causes another to change is the Granger direct test.[10/] However, this test does not specifically determine when a variable affects another, only if a variable affects another. If one determines from the test there is a relationship, one can only infer the pattern of the relationship from the coefficients on the appropriate lagged variables. Because of the econometric problems discussed below, this inference is by no means a sound test to determine the timing of the relationship that is being tested.

Care should be taken when employing the Granger direct test to determine when a variable causes another, while not testing whether there is a relationship. First, the test is a two-sided test, but from the assumption made at the end of Section 2.2, a change in GNP causes both UI taxes and UI benefits to change. Since I am assuming causation to run from GNP to UI taxes and UI benefits, the test of that side of the relationship was not run. Second, if UI taxes and UI benefits are automatic stabilizers, they must cause GNP to change. If this is assumed, the Granger direct test is unnecessary, as the direction of causation runs from GNP to UI benefits and UI taxes and back. Since I have not made the assumption that the latter direction of causation holds, I will test the hypothesis that UI taxes and UI benefits cause, in the sense of Granger, NSAGNP to change.

Two econometric problems arise in using this test as planned. First, the Granger direct test was designed to test whether the addition of a variable helps in the prediction of another. If it does, the first variable causes, in the sense of Granger, the other variable. Using only two variables and their past values was not the intent of the test and may bias the results. Second, since past values of the dependent and independent variables are in the same equation, multicollinearity will be present and any results obtained cannot be tested with a high degree of precision, since the variances of the estimates will be large. Because of these problems, the results of the tests should be viewed with caution and skepticism. However, as a preliminary means of answering the question, the use of the test is better than assuming the problem away as previous studies have done.

As in the Haugh test, series for UI taxes, UI benefits and seasonally-unadjusted GNP are used. (See pages 11 and 12 for a list of these series.) Again, the series must be covariance-stationary, but the use of arbitrary filters (and seasonally-adjusted data) distorts the results.[11/] The first difference of the natural logs of the values will be used as the stationary series. Two tests (sets of regression equations) were run, NSAGNP on past NSAGNP and past UI taxes, and NSAGNP on past NSAGNP and past UI benefits. Four specifications are used for each test. They are: six lagged values for both variables; six lagged independent variables and four lagged dependent variables; four lagged independent variables and six lagged dependent variables; and four lagged values of both variables. Table 2-4 summarizes the results of the test.

UI Taxes and NSAGNP

No causal relationship was found for any of the specifications of this test. This is not surprising in light of the multicollinearity problem discussed above, and the experience rating discussed in Section 2.2. This result is supported by (and supports) previous studies which have shown UI taxes to be a weak stabilizing factor. Therefore, any effect on NSAGNP should be negligible.

UI Benefits and NSAGNP

All specifications of this test were found to be significant. As shown in Table 2-5, the largest coefficient is found on the T_{-1} lag of UIB, with the expected negative sign. The other coefficients of lagged UI benefits oscillate in sign and move toward zero in absolute value. One may conclude that the largest effect on NSAGNP from UIB occurs within two quarters. Multicollinearity in the equations makes such a conclusion imprecise, although the results are promising.

TABLE 2-4

RESULTS OF THE

GRANGER DIRECT TEST

A) UIT - GNP

Specification	Number of Quarters Lagged		F Value
1	GNP 6	UIT 6	.704
2	GNP 4	UIT 6	1.06
3	GNP 6	UIT 4	.834
4	GNP 4	UIT 4	1.21

B) UIB - GNP

Specification	Number of Quarters Lagged		F Value
1	GNP 6	UIB 6	4.46
2	GNP 4	UIB 6	5.84
3	GNP 6	UIB 4	5.84
4	GNP 4	UIB 4	7.18

Critical value of F at .05 level of significance:

$F_{4,90} = 2.47$

$F_{6,90} = 2.21$

TABLE 2-5

ESTIMATED COEFFICIENTS FOR THE GRANGER DIRECT TEST

SPECIFICATION	CONSTANT	UIT_{-1}	UIT_{-2}	UIT_{-3}	UIT_{-4}	UIT_{-5}	UIT_{-6}	UIB_{-1}	UIB_{-2}	UIB_{-3}	UIB_{-4}	UIB_{-5}	UIB_{-6}	GNP_{-1}	GNP_{-2}	GNP_{-3}	GNP_{-4}	GNP_{-5}	GNP_{-6}
UIT-GNP																			
1	.017***	.01	.017*	-.0008	.002	.0004	-.012							.126*	-.11	-.246***	.659***	-.338***	-.027
2	.012***	.004	.006	-.017*	-.012	-.008	-.018*							-.096*	-.05	-.196***	.734***		
3	.017***	.01	.007	.001	.004									.124	-.112	-.239***	.665***	-.343***	-.026
4	.012***	.0004	-.005	-.011	-.007									-.108*	-.049	-.187***	.736***		
UIB-GNP																			
1								-.03***	.019*	.021**	-.001	.004	.01*	-.073	-.013	.012	.598***	-.239***	.196*
2								-.031***	.024**	.024**	.0007	.019*	-.001	-.25***	.114	.008	.655***		
3								-.028***	.021**	.022**	-.002			-.067	.053	.046	.626***	-.238***	.057
4								-.032***	.021**	.02**	-.002			-.323***	.16*	.084	.704***		

NOTES:
(1) See Table 2-4 for the specifications of the test.
(*) Significant at the .20 level of significance.
(**) Significant at the .10 level of significance.
(***) Significant at the .05 level of significance.

2.4 Conclusion

The results found in this chapter do not contradict those found by others. However, I have examined the issues of whether changes in UI benefits and UI taxes depend on changes in GNP, and the timing and length of the feedback impact of the UI program, by using tests designed to check for the independence and for a causal relationship of two variables. The use of these tests is superior to the practice of ignoring these issues by assuming them away, as was the case in previous studies.

The Haugh test for independence of two series was used in Section 2.2 to show that both UI benefits and UI taxes are dependent on seasonally-unadjusted GNP. The Granger direct test was used in Section 2.3 to determine if the direction of causation also runs from UI benefits and UI taxes back to seasonally-unadjusted GNP. The results from this section show the direction of causation to run only from GNP to UI taxes, while there is some evidence of a feedback effect on GNP from UI benefits.

On the basis of these tests, I conclude that the assumptions made in previous studies concerning the contemporaneous reaction of the UI program to income changes, and the contemporaneous feedback from the UI program to income, are essentially correct. The Haugh test shows UI taxes may not react contemporaneously to income changes, while the Granger direct test shows the feedback from UI taxes to GNP is negligible. The practice of experience rating may be the reason that these results contradict the assumptions made above. However, for simplicity, these results are overlooked, and the above assumptions are made throughout the remainder of this study.

CHAPTER TWO

NOTES

1/As a result of these requirements, automatic stabilizers automatically increase the size of the government's deficit during recessions. A larger deficit leads to more aggregate spending above what it would be in a world without automatic stabilizers. This extra aggregate spending is not a requirement but rather a side effect, or the result of automatic stabilizers.

2/The major studies that this study evolves from and which this study corrects, refines and expands are: Hart (1954); Clement (1960); Lewis (1962); Eilbott (1966); Rejda (1966); Thirlwall (1969); Hansen and Burroughs (1969); and von Furstenburg (1976).

3/For example, see Hart (1954).

4/Rejda (1966), pp. 202-208.

5/Two other reasons may add to the destabilizing tendency of UI taxes. First, taxes are collected and reported with a lag so the reaction of collections to income changes may occur with a lag. Second, taxes are collected on only part of a firm's payroll, much like the Social Security (F.I.C.A.) tax. Tax collections may fall at year's end because of this and not any income change.

6/This test is discussed in Haugh (1976).

7/Haugh, pp. 377-378.

8/See Box and Jenkins (1970).

9/Haugh, has an example of this on pp. 383-384.

10/This test was first discussed in Granger (1969).

11/Fiege and Pearce (1979) pp. 527-530, give examples why seasonally adjusted data and arbitrary filtering process distort the results of causality test.

CHAPTER THREE

THE EFFECTIVENESS OF THE UI PROGRAM AS AN AUTOMATIC STABILIZER IN RECESSION AND RECOVERY

3.1 Introduction

The measured effectiveness of the UI program in five post-war recessions is calculated in this chapter. Section 3.2 discusses the meaning of measured effectiveness and what is meant by the phrase stabilization effectiveness in this research, and presents a modest survey of previous literature on the stabilization effectiveness of the UI program in recession and recovery. In Section 3.3, I incorporate a minor modification into this measure of effectiveness that produces a significantly smaller result than previous studies. The impact of several discretionary temporary extended benefits programs on measured effectiveness is estimated in Section 3.4. Also in this section, I present and analyze the measures of effectiveness of the UI program calculated in this chapter for five post-war recession/recovery periods.

The minor correction incorporated in Section 3.3 reduces measured effectiveness in recession nearly fifty percent. It also makes measured effectiveness nearly symmetric across recession and recovery which is not the case in other studies. Not surprisingly, the impact of every discretionary temporary extended benefits program is found to detract from measured effectiveness. Comparing the five measures of effectiveness reveals that the UI program has maintained a consistent pattern of effectiveness throughout the period.

3.2 The Concept of Measured Effectiveness

One of the many goals of the UI program is to help reduce the volatility of the U.S. economy.[1/] During periods of declining aggregate demand more individuals begin receiving UI benefits, while UI taxes collected from employers fall as workers are laid off and firms' payrolls decline. Both these actions help slow the decline in income. The first helps the unemployed maintain their purchasing power, which prevents a drastic cutback in consumption. The second action reduces firm's expenses[2/], which increases profits (reduces losses), and thus theoretically reduces their cutback in investment. Since consumption and investment fall less than they would in the absence of the UI program, stability of aggregate demand is achieved. Conversely, in an expansion, fewer workers receive UI benefits, causing total benefits to fall, while UI taxes increase as employment rises. These actions slow the growth of aggregate demand during expansions, which keeps the economy from entering a period of excess aggregate demand and higher inflation.

The impact of the UI program can be shown both algebraically and graphically, as in Figure 3.1. Consider the simple aggregate demand model represented by equations 3.1 through 3.6:

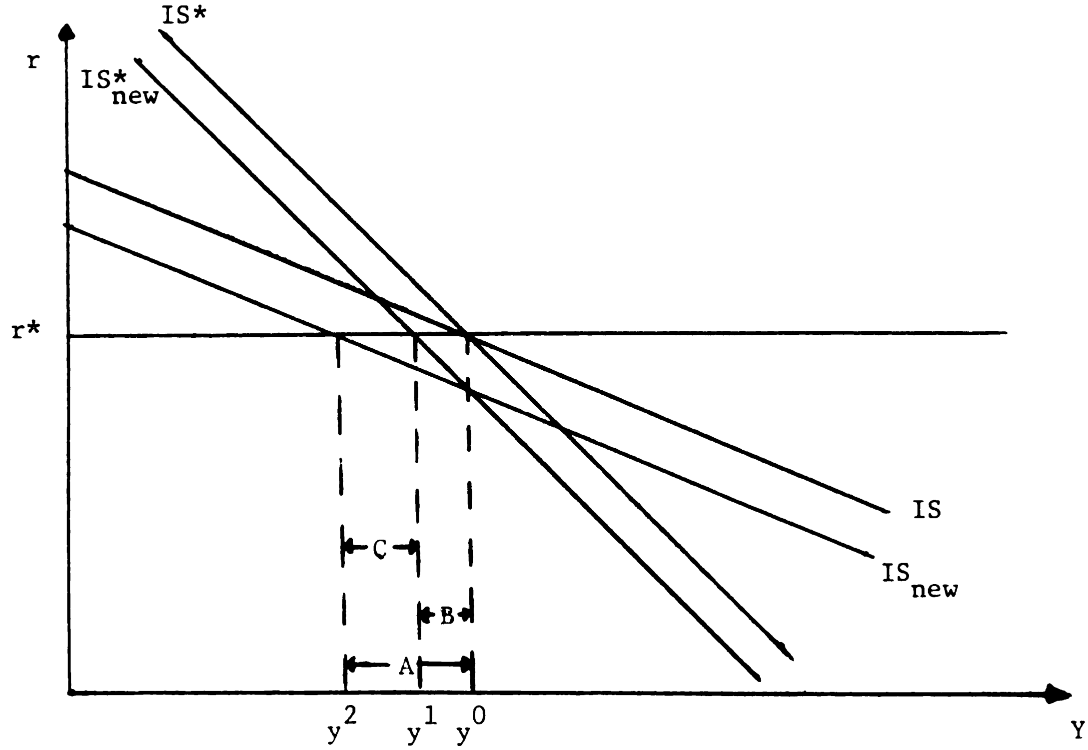


FIGURE 3.1

IS-LM REPRESENTATION OF MEASURED EFFECTIVENESS

(3.1) $y = c + i + g$

(3.2) $c = a + b(y-t)$

(3.3) $i = d - er + fy$

(3.4) $g = g^*$

(3.5) $t = t^*$

(3.6) $r = r^*$

where y is national income;

c is personal consumption expenditures;

i is net investment;

g is government purchases;

t is personal taxes;

r is a nominal interest rate;

a,b,d,e,f are positive coefficients; and

all variables are in constant dollars.

For simplicity I have taken the money sector as given, represented by a fixed interest rate (3.6). The equation of the IS curve in Figure 3.1 is found by simple algebra to be:

(3.7) $r^* = (a + d + g^* - bt^*)/e - ((1-b-f)/e)y.$

The slope of the IS curve is $-(1-b-f)/e$, which is negative.

In a world with the UI program, I replace equation (3.2) with (3.2*), and add equation (3.8) to the model,

(3.2*) $c = a + b(y-t+ui)$

(3.8) $ui = u - zy$

where

ui is UI benefits paid; and

u and z are positive coefficients.

The equation of the IS* curve is given by (3.7*),

$$(3.7^*) \quad r^* = (a+d+bu+g^*-bt^*)/e - ((1-b-f+bz)/e)y.$$

The slope of the IS* curve is ((1-b-f+bz)/e). Comparing the slopes of the two curves, one can see the slope of IS* is larger in absolute value, meaning it has a steeper slope than IS. (See Figure 3.1.) Automatic stabilizers increase the absolute value of the slope of the IS curve relative to an IS curve without automatic stabilizers.

Suppose we decrease government purchases from g* to g**. This reduces the r-intercept term in both equations (3.7) and (3.7*), which causes both the IS and IS* curves to shift downward by an equal amount. The new curves are IS_{new} and IS^*_{new} in Figure 3.1.

Measured effectiveness is the amount of a potential change in income that is prevented by the UI program. This can be seen graphically in Figure 3.1. Without the UI program, income falls to y^2, or the distance A. This distance is given by the impact multiplier of the IS curve, $(1-f-b)^{-1}$, times the change in g. With the UI program in the model, income falls only to y^1, or the distance B. This distance is given by the impact multiplier of the IS* curve, $(1-f-b+bz)^{-1}$, times the change in g. The UI program decreases the impact multiplier of an IS curve relative to an IS curve without the program. The difference y^1-y^2, or the distance C, is the amount of a potential change in income that is prevented by the UI program. The custom has been to represent measured effectiveness as the percent of a further change in income prevented by the UI program. This is given by C/A (=A-B)/A). Noting that A and B represent impact multipliers times the change in government purchases, measured effectiveness is nothing more than one minus the ratio of the impact multiplier of the IS* curve to the impact multiplier of the IS curve.

In this research, the measure of stabilization effectiveness is taken to be the amount of a potential change in income that is prevented by the UI program. The larger the decrease in volatility of the economy, the larger will be the measured effectiveness of the program. I assume the UI program meets the goal of stabilizing by smooothing changes in income. This is how other studies measured the effectiveness of the program. Income is but one of many economic variables that can be used to measure the stabilization effectiveness of the program. One likely candidate is total employment (or unemployment). Increasing UI benefits when employment falls will help the unemployed maintain their spending. This will keep inventories from building up, and employers will call back laid-off workers, increasing employment. As employment increases, UI benefits will fall. The UI program will help prevent further changes in unemployment. Another likely candidate is the gap between actual and potential GNP. As the gap widens, UI benefits increase. This helps maintain spending (income) and prevents a further widening of the gap. Notice in both cases, it is the maintenance and/or change in spending that helps maintain or changes income. The increase in income is evident in the increase in employment and the decrease in the gap, although simultaneous increases in all these variables are not evident. It is because of this relationship between the maintenance and/or change in income and the associated change in the UI program that I measure the effectiveness of the program with respect to income.

The technique to determine how much of a potential change in income that is prevented by automatic stabilizers was introduced by Musgrave and Miller.[3/] Clement[4/] used this approach to measure the impact of all automatic stabilizers in the recession/recovery periods of 1949, 1954 and 1957. He found UI benefits to be a strong countercyclical force in recessions, preventing up to thirty-five percent of a further change in national income. However, UI taxes in both recession and recovery, and UI benfits in recovery were found to be very weak countercyclical forces. Rejda[5/], using the same methodology, but extending the analysis to the 1960-1961 recession/recovery, also found UI benefits to be an excellent stabilizing force in recessions. Like Clement, he found UI taxes, in general, and UI benefits in recoveries to help little to stabilize the economy.

There is a question as to what is meant by stabilization effectiveness in recovery. Automatic stabilizers should help prevent further changes in income. Therefore, during recovery or other periods of increasing income, automatic stabilizers should be retarding the increase in income. In a sense, they are keeping the economy from reaching a level of full employment income as quickly as would be the case in a world without them. The path from trough to full employment cannot be determined in the static model used in this research. I assume the UI program meets the goal of stability during recovery by retarding the growth of income. Small measures of effectiveness in recoveries suggest that the UI program is not helping to retard the increase in income. This may be a desired result if the economy is far from full employment. However, this may lead to excess demand if the economy is near full employment. As above, this cannot be determined in a static model. In recession as well as recovery, the measure of stabilization effectiveness is measured by the amount of a change in income is prevented, i.e., by smoothing the changes in income.

Eilbott[6/] modified the Musgrave and Miller technique slightly. He allowed for a specific transfer payment variable in the consumption function (equation 3.2*), and separated the corporate and household sectors for tax and spending considerations. His measured effectiveness (ME) is given by equation (3.9) which is modified for UI program only, instead of all automatic stabilizers.

$$(3.9) \qquad ME = \frac{-c(E_B B)+i(E_T T)}{1-cX-iZ-cE_B B+iE_T T} ;$$

where

c is the marginal propensity to consume out of disposable income;

E_B is the income elasticity of UI benefits;

B is the ratio of UI benefits to national income at the beginning of the period of analysis;

i is the marginal propensity to invest out of corporate profits after tax;

E_T is the income elasticity of UI taxes;

T is the ratio of UI taxes to national income;

X is the share of a change in national income to the household sector;

Z is the share of a change in national income to the corporate sector, X + Z = 1; and

ME is the measured effectiveness of the UI program.

Z is derived by relating the change in pretax undistributed profits to the change in national income during each period analyzed.

Equation (3.9) is shown in Appendix B to be one minus the ratio of two different IS impact multipliers, one without the UI program, the other with the UI program in the model. The implied model behind the equation is also discussed in Appendix B. Using this equation, I recalculate measured effectiveness to be only in the neighborhood of twelve to eighteen percent in recessions, and less than five percent in recoveries, depending on assumed values of C and i.[7] It is interesting to note that the stabilization effectiveness of UI taxes is actually negative (or destabilizing) for some recessions in Eilbott's study, as in Clement's study. The recalculated stabilization effectiveness of UI benefits ranges from thirteen to twenty percent in recessions, and less than five percent in recoveries, again depending on C and i.

There are two troublesome aspects about the measures of effectiveness found in these studies. First, each study found a very small or destabilizing impact of UI taxes on the economy. The discussion in Chapter II on experience rating shows that although a destabilizing impact is theoretically possible, it should be the case that the measured effectiveness of UI taxes be no worse than neutral. Second, each study shows the UI program, specifically UI benefits, to be a strong countercyclical force in recession, but not in recovery. Theoretically (and intuitively) the UI program should have a more symmetrical countercyclical effect to be a useful automatic stabilizer to reduce the volatility in the economy. In Section 3.3, I incorporate some minor modifications to equation (3.9) to help solve these problems.

3.3 Modifying the Measured Effectiveness Equation

The first modification incorporated into equation (3.9) accounts for the fact that an extra dollar of UI benefits and an extra dollar of other income are not consumed at the same rate. Hamermesh (1982)[8/] tries to explain this behavior by showing some UI benefit recipients are constrained from borrowing and spend all their income (including UI benefits) in an effort to maintain consumption. Aggregating over all UI recipients results in a larger marginal propensity to consume out of UI income than non-UI income. He finds about one half of the UI recipients behave as if they are constrained and spend all their disposable income.[9/]

The first modification is to include two marginal propensity to consume parameters in equation (3.9), one for UI benefits, the other for the household's share of income changes. Let C_1 represent the marginal propensity to consume out of non-UI income, and C_2 be the marginal propensity to consume out of UI income. I will assume the fraction of the UI recipients constrained is one half, thus C_2 equals $.5C_1 + .5$. This assumes half the UI recipients spend all their UI-income, and the other half treat UI income just like non-UI income. Measured effectiveness is now given by

$$(3.9^*) \qquad ME = \frac{-c_2E_BB+iE_TT}{1-c_1X-iZ-c_2E_BB+iE_TT} .$$

The second modification takes into account the trend or growth over time of income, UI profits and UI taxes in calculating the elasticities in (3.9*). The approach is similar to that used by Thirlwall in studying unemployment compensation in England. Instead of measuring the stabilization effectiveness of the UI program as the percent of a potential change in the level of income, this approach measures the stabilization effectiveness of the program as the percent of a potential change from the growth trend of income. This assumes the UI program responds to deviations from the growth of income rather than absolute changes. If this is the case, calculating the elasticities needed in (3.9*) will bias the measure of effectiveness. The amount and direction of the bias depends on the deviation of income from its trend.

Assume that the UI program is such that it is consistent with a growth of five percent in income per period and the associated growth of all other economic variables at five percent income growth, such as the rate of growth of employment and the rate of change of the gap between actual and potential GNP. A growth of income of three percent this period will cause changes in the UI program, with UI benefits increasing and UI taxes falling. Theory would suggest an increase in UI benefits and a decrease in UI taxes if income falls. Using absolute changes in the variables would cause a destabilizing result, as income is increasing while benefits increase and taxes decrease. If income falls absolutely, deviating from its trend by more than the assumed average growth of five percent, the method for calculating the elasticities needed for (3.9*) using absolute changes correctly shows stabilization effectiveness. However, the estimated measure of stabilization effectiveness is biased upward. A small absolute change in income is associated with larger changes in the UI program. Since it is assumed the UI program is set for an economy growing at five percent per period, a decrease in income causes the program to react vigorously. The calculated elasticities are large, yielding a large estimate of the measured effectiveness of the program.

The large changes in the UI program should be paired with a large change in income. It has fallen by more than five percent from its assumed average growth. Using a method to calculate the elasticities needed in (3.9*) that uses deviations-from-trends instead of absolute changes results in a smaller estimate of the measured effectiveness of the program in recession. In recovery, as income increases faster than its average growth trend, this deviation method results in larger estimates of the measured effectiveness of the program than the absolute method. The UI program is assumed to react only to the increase in income over its average growth. Then deviation method yields smaller calculated elasticities than those obtained with the absolute method. Notice the deviation method smoothes the estimates of the measured effectiveness of the program over recession and recovery compared to the asymmetric estimates obtained using the absoute method.

All previous U.S. studies used the absolute method to calculate the elasticities needed in their versions of (3.9*). This is the reason they found very high measures of effectiveness in recession and very low measures of effectiveness in recovery. The deviation method provides a more accurate estimate of the UI program over recession and recovery. The measures of effectiveness shown in the next section are estimated using the correct deviation method. The simple time trends of UI benefits, UI taxes and national income are obtained by regressing each of those variables on time over a period (in most cases, forty quarters) prior to the peak quarter of each recession/recovery period.[11/] Using these estimates, calculations can be made to show what these variables would have been if they had grown at their trend value from the peak quarter rather than deviated. The estimated coefficients for each variable are shown in Table 3-1. The estimated value of TIME in each equation is added to the peak quarter value of the dependent variable for each quarter the recession (or recovery) lasts. These trend values are then compared with the actual values of the variable over the period.

3.4 Empirical Estimates of the Measured Effectiveness of the UI Program in Recession and Recovery

The recession/recovery periods selected to be analyzed are defined by turning points (peak, trough) as established by the National Bureau of Economic Research.[12/] In all cases recessions are analyzed first, then periods of similar length directly after the trough quarter are analyzed as the recovery periods. It should be noted that these recovery periods are of arbitrary length and do not conform to the expansion periods established by the NBER. Reasons for selecting these periods as recoveries will be explained as part of the discussion of the results from those periods as well as in the conclusion of this chapter.

The data sources used in estimating the measured effectiveness of the UI program can be found in Appendix A. UI taxes are the same series used in Chapter II. UI benefits include any relevant discretionary temporary extended benefits programs. To be comparable to other studies and to begin the notion of calculating measured effectiveness in

TABLE 3-1

REGRESSION COEFFICIENTS: TIME TREND ESTIMATION

Period	Dependent Variable	Constant	Time	D2	D3	D4	Mean of Dependent Variable	SEE	$\bar{R}^2$
1957:III-1959:II	UIT	.361 (9.50)	.0055 5.50	-.009 (-1.67)	-.037 (-6.11)	-.095 (-8.17)	.397	.052	.488
	UIB	.285 (5.77)	.0069 (3.05)	-.01 (-2.77)	-.042 (-3.97)	-.039 (04.45)	.342	.117	.211
	Y	205.1 (23.44)	4.27 (9.71)				284.1	10.11	.96
1960:II-19562:I	UIT	.395 (10.62)	.0068 (5.22)	-.007 (-.88)	0.044 (3.75)	-.077 (-9.14)	.462	.062	.473
	UIB	.383 (6.06)	.019 (5.11)	-.034 (-2.33)	-.066 (-3.47)	-.05 (-3.00)	.462	.177	.464
	Y	284.2 (33.33)	4.05 (11.97)				306.9	8.37	.947
1969:IV-1971:IV	UIT	.511 (8.36)	.0034 (1.94)	-.003 (-.37)	-.013 (-4.11)	-.045 (-11.55)	.540	.151	.366
	UIB	.503 (12.21)	-.002 (-2.73)	-.03 (-1.75)	-.013 (-1.88)	-.055 (-9.45)	.481	.192	.182
	Y	478.0 (10.99)	8.72 (7.66)				604.4	14.95	.96
1973:IV-1976:I	UIT	.455 (3.55)	.020 (6.06)	.003 (.09)	-.021 (-1.88)	-.039 (-7.14)	.566	.143	.478
	UIB	.66 (7.43)	.007 (1.90)	-.003 (-.17)	0.025 (-2.04)	-.045 (04.44)	.671	.391	.082
	Y	782.7 (16.51)	7.03 (5.88)				840.4	20.55	.914
1980:I-1981:II	UIT	.505 (2.99)	.033 (3.44)	.007 (.77)	-.011 (-.88)	-.066 (-8.75)	.707	.381	.321
	UIB	.411 (3.88)	.073 (3.82)	-.01 (-3.11)	-.044 (-4.79)	-.031 (-5.66)	.654	.277	.424
	Y	1229.6 (27.88)	1.41 (6.40)				1245.8	17.47	.635

NOTES: (1) The numbers in parentheses below the coefficients are their estimated t-statistics.

(2) UIT, UIB, and Y represent UI taxes collected, UI benefits paid and national income, all in constant 1972 dollars.

(3) D2, D3, and D4 are dummy variables representing the second, third, and fourth quarters of the calendar year to help remove seasonal variation from the UI data.

relation to aggregate demand, national income is selected as the income variable. The rest of the variables used in the estimation of measured effectiveness are: Consumption--personal consumption expenditures; Investment--net private non-residential domestic fixed investment; Corporate profits after tax; Corporate profits before tax, including inventory valuation adjustment and capital consumption allowance; Undistributed corporate profits; Disposable personal income; and the Three-month Treasury bill rate as a proxy for consumer credit conditions. All the dollar-valued variables are converted to constant 1972 dollars using the national income deflator.

Instead of selecting C_1, C_2, and i from a range of values as Eilbott[13/], I estimate these parameters. The values are dynamic propensities[14/] which can be used for quarter-by-quarter as well as overall period analysis. As is the case for the trend estimates of UI taxes, UI benefits, and national income, a forty quarter period up to the peak quarter is used (when possible) as the period over which the marginal propensities are estimated. These figures are then assumed to be the same throughout the recession and corresponding recovery.

The equations used are:

$$(3.10) \quad C_t = C_0 + C_1 \text{ DPY} + C_2 \left[(TBR_t + TBR_{t-1} + TBR_{t-2})/3\right] + C_3 C_{t-1}$$

$$(3.11) \quad NI_t = i_0 + i_1 \text{CPATX} + i_2\left[(TBR_t + TBR_{t-1} + TBR_{t-2})/3\right] + i_3 NI_{t-1}$$

where

C_t is consumption;

DPY_t is disposable personal income minus UI benefits;

TBR_t is this period's three-month Treasury bill rate;

C_{t-1} is lagged consumption;

NI_t is net investment;

$CPATX_t$ is corporate profits after tax; and,

NI_{t-1} is lagged net investment.

To estimate these equations, a two-stage process, similar to that suggested by Johnston[15/] is performed since ordinary least squares (OLS) is inefficient and may have simultaneous equations bias. This procedure is used to correct for autocorrelation caused by the lagged dependent variables in the equations. The error terms of the equations are assumed to be of the form $V_t = \rho v_{t-1} + e_t$, with ρ less than one in absolute value, and e_t assumed to be NID(0, σ_e^2). This method amounts to doing OLS twice, once to get an estimate for ρ, then again on an equation involving ρ-transformed variables in each equation. This process continues iteratively until ρ converges within some specified value. This procedure is a maximum likelihood technique used to estimate equations with errors of the form assumed above.[16/]

Before analyzing specific recession/recovery periods, I estimate the long-run or average measured effectiveness of the UI program from 1955 to 1980. For this measure, I can estimate the average elasticities needed for the measure of effectiveness. This cannot be done in specific recession/recovery periods due to a lack of observations. The equations relating UI taxes and UI benefits to income are log-linear, not only to estimate these elasticities, but also to avoid the problem of growth over time. Table 3.2 summarizes the

TABLE 3-2

LONG-RUN MEASURED EFFECTIVENESS, 1955-1980

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	D.W.	N
$C_1 = .806 \ (=(.054)(1-.933)^{-1})$	$C = -3.53 + .054\ DPY - .50\ (\sum_{i=o}^{2} TBR_{t-i})/_3 + .933\ C_{t-1}$ (-1.53) (2.49) (-3.90) (15.01)	.10 (2.47)	.990		107
$i = .634 \ (=(.334)(1-.528)^{-1})$	$NI = 1.87 + .334\ CPATX - .146\ (\sum_{i=o}^{2} TBR_{t-i})/_3 + .528\ NI_{t-1}$ (.68) (6.84) (-1.55) (8.88)	.78 (2.95)	.939		107
$E_B = -6.35$	ln UIB = .13 - 6.35 ln y + SEASONAL DUMMIES (4.53) (-7.14)		.846	1.57	107
$E_T = 2.23$	ln UIT = .058 + 2.23 ln y + SEASONAL DUMMIES (1.11) (1.88)		.762	2.07	107

CALCULATED PARAMETERS

$C_2 = .5 + .5(C_1) = .903$	X = .702	B = .0062
	Z = .298	T = .0058

LONG-RUN MEASURED EFFECTIVENESS

Overall Program	14.21%
UI Benefits Only	12.51%
UI Taxes Only	2.21%

NOTES:
(1) T-Statistics are in parentheses under the estimated coefficients.
(2) ln represents the natural logarithm of the preceeding variable.
(3) UIB, UIT, and y are UI benefits, UI taxes, and national income, respectively, all denominated in constant 1972 dollars.
(4) See page 31 for derivation of the calculated parameters.

estimates of the elasticity equations as well as the other results of the process to estimate measured effectiveness. The estimates of C_1 and i are the dynamic (long-run) values of these parameters. They are obtained by multiplying the estimated values by the inverse of one minus the estimated coefficient of the lagged variable.[17/]

The results conform to previous studies, in that most of the effectiveness is due to UI benefits. The average effectiveness of the UI program is about that found by Eilbott and Lewis for averages of specific recessions.[18/] However, a better test for the accuracy of the measured effectiveness equation is to look at specific recessions and recoveries to see how it holds up to other studies in a direct comparision.

The Recession of 1957-1958

Table 3-3 and Figure 3.2 summarize the estimates of measured effectiveness in this recession. The deviation method elasticities are calculated using the estimated time trend values for this period shown in Table 3-1. Deviations from the estimated trend values rather than absolute changes in the appropriate values are used in the calculation of these elasticities. For illustrative reasons, the absolute and deviation-from-trend methods of estimating measured effectiveness are compared in Table 3-3 for this recession only. Two important points arise from the results. The first is the considerable difference between the absolute and deviation methods. The results from the absolute method are nearly twice as large for the overall and UI benefit effectiveness, and have the wrong sign (destabilizing) for UI tax effectiveness compared to the more accurate deviation method. These results illustrate the bias inherent in the absolute method. The

TABLE 3-3

MEASURED EFFECTIVENESS, RECESSION 1957:III - 1958:II

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .649\ (= (\sum_{i=0}^{3} (.22)(.80)^i)$	$C = 20.01 + .22\ DPY - .13\ (\sum_{i=0}^{2} TBR_{t-i})/_3 + .80\ C_{t-1}$	.324	.881	19
	(3.00) (2.77) (-1.62) (11.12)	(3.07)		
$i = .29\ (= (\sum_{i=0}^{3} (.13)(.62)^i)$	$NI = -2.07 + .13\ CPATX - .34\ (\sum_{i=0}^{2} TBR_{t-i})/_3 + .62\ NI_{t-1}$	.117	.770	19
	(-1.07) (3.97) (-4.40) (9.79)	(8.07)		

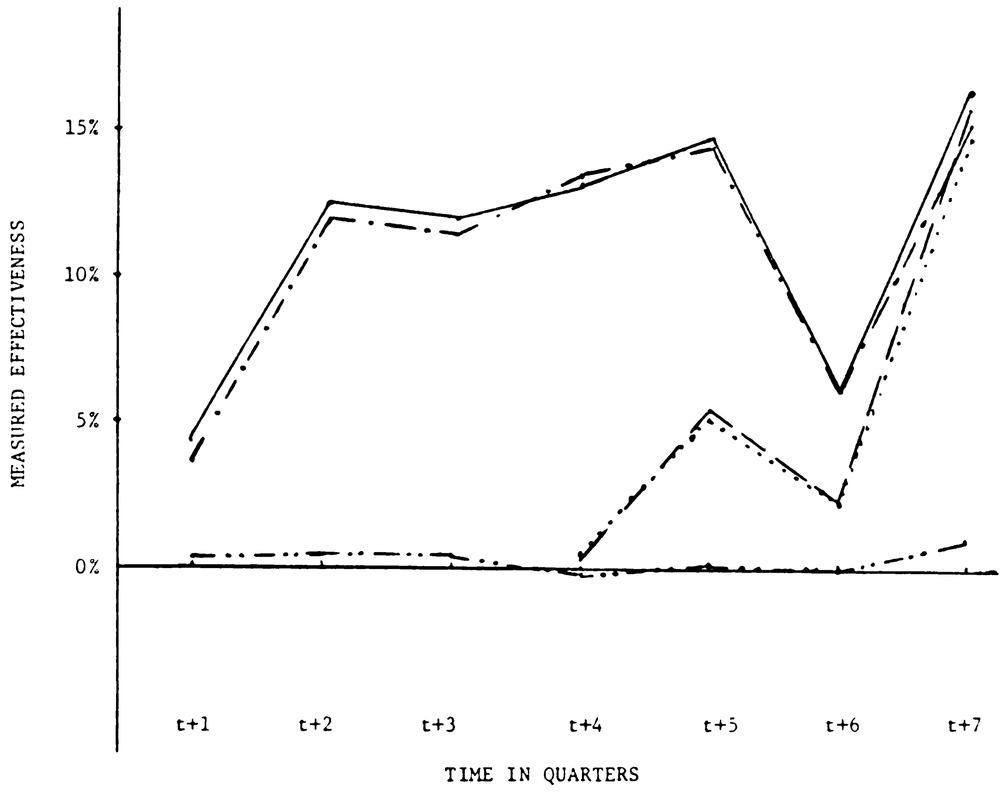
CALCULATED PARAMETERS

				DEVIATION METHOD	ABSOLUTE METHOD
$C_2 = .5 + .5\ (C_1) = .825$	X = .56	B = .004	E_B =	-19.6	-43.6
	Z = .44	T = .005	E_T =	.80	-.85

MEASURED EFFECTIVENESS

	DEVIATION METHOD	ABSOLUTE METHOD
Overall Program	11.45%	21.75%
UI Benefits Only	11.27%	21.84%
UI Taxes Only	.23%	-.24%

NOTES:
(1) T-Statistics are in parentheses under the estimated coefficients.
(2) See Page 31 for derivation of the calculated parameters.
(3) The deviation method is the deviation-from-trend method used in calculating the elasticities in this study. The absolute method is the absolute change method used to calculate the elasticities in most previous studies. The latter is presented here for illustrative purposes only, and only the deviation method results will be reported in subsequent tables.
(4) A minus sign on measured effectiveness indicates destabilization.



——— Overall Program, Without TUC
— — — Overall Program, With TUC

—·—·— UI Benefits Only, Wich TUC
········· UI Benefits Only, With TUC

··—··—·· UI Taxes Only

FIGURE 3.2

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1957:III-1959:II effectiveness measures calculated by the absolute method for all subsequent recessions have the same bias problem as for this recession. Consequently, the results of the absolute method will not be given for the remaining recessions.

The second important point is the estimates of measured effectiveness obtained using the deviation method. About 11.5 percent of a potential change in income is prevented. Almost all of the effectiveness is credited to UI benefits, which confirms the hypothesis that the effectiveness of UI taxes is very small. Putting this measure in dollar terms, with a $20 billion actual change in real income, the measure indicates that the UI program prevented an additional decline in real income of about $2.3 billion.

The recovery period, 1958:II-1959:II, is analyzed next to see how the measure stands up in a recovery. Beginning in 1958:II and lasting over the duration of the recovery, the first discretionary temporary extended benefits program was in effect. This program, enacted under the Temporary Unemployment Compensation (TUC) Act of 1958, provided for additional benefits for up to half (13 weeks) of the regular benefit duration to individuals who had exhausted their regular benefits. The program was voluntary and only 22 states adopted this or their own extended benefits program.[19/] The discretionary nature of this program brought about bad timing from a countercyclical point of view, since the program did not begin until the recovery had started. When these extended benefits are added to the regular benefits, the UI program becomes less effective at stabilizing the economy. See Table 3-4 and Figure 3-2.

Previous studies showed that during recoveries measured

TABLE 3.4

MEASURED EFFECTIVENESS, RECOVERY 1958:II - 1959:II

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .739\ (= \sum_{i=0}^{4} (.22)(.80)^i)$	$C = 20.01 + .22\ DPY - .13\ (\sum_{i=0}^{2} TBR_{t-i})/_3 + .80\ C_{t-1}$ (3.00)(2.77) (-1.62) (11.12)	.324 (3.07)	.881	19
$i = .31\ (= \sum_{i=0}^{4} (.13)(.62)^i)$	$NI = -2.07 + .13\ CPATX - .34\ (\sum_{i=0}^{2} TBR_{t-i})/_3 + .62\ NI_{t-1}$ (-1.07)(3.97) (04.40) (9.79)	.117 (8.07)	.770	19

CALCULATED PARAMETERS

				Without TUC	With TUC
$C_2 = .5 + .5(C_1) = .87$	$X = .58$	$T = .0036$	$B =$	.0092	.010
	$Z = .42$	$E_T = 4.9$	$E_B =$	-10.3	-9.2

MEASURED EFFECTIVENESS

	Without TUC	With TUC
Overall Program	15.85%	15.6%
UI Benefits Only	15.15%	14.82%
UI Taxes Only	1.17%	1.17%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See page 31 for derivation of the calculated parameters.
(3) See page 44 for an explanation of Temporary Unemployment Compensation benefits (TUC).

effectiveness of the UI program was smaller compared to that during recessions.[20/] This may be due to their use of absolute changes in estimating measured effectiveness. Another possible explanation is that employment lags the business cycle; thus in the early stages of a recovery unemployment may be high, keeping UI benefits up and UI taxes down. Since these studies only calculated an average total measured effectiveness for the period in question, the early tendency toward destabilization may have reduced the equivalent of ME.

Two effective measures are calculated, one excluding extended benefits paid under TUC, the other including these benefits. The marginal propensity figures are assumed to be the same as in the recession, but the elasticity and ratio figures are recalculated. The estimates of the time trends necessary to recalculate the elasticities are shown in Table 3-1. Two points can be made about the results. First, because of the limited acceptance of TUC, there is little difference in the measures. Second, the measures are larger than the measures for the recession, counter to the results obtained in previous studies. This is directly attributable to the use of the correct deviation method to estimate measured effectiveness.

The quarter-by-quarter results (Table 3-5) show how measured effectiveness changes each quarter. For example, the t+1 period shows measured effectiveness after one quarter of the recession, computed with the proper dynamic propensities, ratios, and elasticities. The t+3 period represents measured effectiveness after the first quarter of the recovery. Finally, the t+7 period represents measured effectiveness over the entire recovery. These are the results found in Table 3-4. The estimates values of C_1, C_2 and i shown in Table 3-5 are the

TABLE 3-5

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1957:III - 1959:II

Parameters	Period						
	t+1	t+2	t+3	t+4	t+5	t+6	t+7
C_1	.396	.537	.649	.396	.537	.649	.739
C_2	.698	.767	.825	.698	.767	.825	.87
i	.21	.26	.29	.21	.26	.29	.31
X	.62	.56	.56	.71	.72	.66	.58
Z	.38	.44	.44	.29	.28	.34	.42
T	.005	.005	.005	.0036	.0036	.0036	.0036
E_T	1.2	1.1	.60	-1.15	.45	-.03	4.8
B	.004	.004	.004	.0092	.0092	.0092	.0092
B (with TUC)				.01	.01	.01	.01
E_B	-8.9	-25.1	-19.6	-15.9	-12.9	-4.3	-10.3
E_B (with TUC)				-.30	-3.9	-1.3	-9.2

Program	Measured Effectiveness						
	t+1	t+2	t+3	t+4	t+5	t+6	t+7
Overall Program							
Without TUC	3.73%	12.0%	11.45%	13.33%	14.48%	6.13%	15.85%
With TUC				.19%	5.32%	2.21%	15.60%
UI Benefits Only							
Without TUC	3.55%	11.8%	11.27%	13.43%	14.43%	6.14%	15.13%
With TUC				.32%	5.25%	2.22%	14.82%
UI Taxes Only	.19%	.24%	.23%	-.13%	.08%	-.01%	1.17%
		Recession			Recovery		

NOTES: (1) C_1 and i are dynamic multipliers estimated from the regression equations found in Table 3-3. C_2 is calculated using the formula, $C_2 = .5 + .5(C_1)$.

(2) See note 3, Table 3-4.

(3) A minus sign on measured effectiveness indicates destabilization.

cumulative effects of the dynamic propensities estimated using equations (3.10) and (3.11). The cumulative effect (CE) for C_1 is given by

$$(3.12) \quad CE = \sum_{i=0}^{x} (C_1)(C_3)^x ,$$

where C_1 and C_3 are given in equation (3.10). The cumulative figures attempt to represent the dynamic response to a change in the program over the period. I assume the estimates remain constant over the entire recession/recovery but analyze each recession and recovery separately. This is why the cumulative effects for the first quarters of each period are equal. The ratios and elasticities are calculated each quarter by the processes described in Section 3.3, and from the estimates in Table 3-1. Measured effectiveness is calculated each quarter with the proper values of the propensities, ratios and elasticities given in the upper half of Table 3-5.

The quarter-by-quarter results indicate measured effectiveness is not consistent throughout the period, reflecting the fact that the movements in income were not consistent over the business cycle. This can be seen graphically in Figure 3.2. Note that the measured effectiveness of UI taxes is close to zero until the last quarter of the recovery. This is not surprising, considering the practice of experience rating discussed in the previous chapter. UI taxes added to measured effectiveness only well after the recovery was underway, when unemployment began to fall from its (higher) recessionary level.

The results also show that measured effectiveness of the UI program including TUC is very small until the last quarter of the recovery period. By this quarter the program had all but run its course. Benefits also fell significantly as unemployment dropped. The result was a marked rise in measured effectiveness in the quarter. The impact of this program on measured effectiveness is overlooked if one only considers the results for the entire period.

<u>The Recession of 1960-1961</u>

This recession was not so severe as the previous one, and both are considered mild compared to more recent recessions. More employees were covered by the UI program and benefit duration had been increased in some states, both of which led to a larger amount of benefits paid in this period relative to the first. Table 3-6 and Figure 3.3 summarize the estimates of measured effectiveness in this recession. The calculated elasticities are obtained using the estimated time trend values for this period shown in Table 3-1, and the deviation method described earlier. Over twenty-five percent of a potential change in income was prevented by the UI program in this recession, but since the actual change in income was around five billion dollars, the dollar effectiveness was less than the 1957-1958 recession.

Another discretionary temporary-extended benefits program began as the recovery started. This program was enacted in the Temporary Extended Unemployment Compensation (TEUC) Act of 1961. The program was essentially the same as TUC of 1958, except that it was mandatory that all states adopt it. Table 3-7 and Figure 3.3 summarize the estimates of measured effectiveness in this recovery.

Two effectiveness measures are again calculated, one excluding extended benefits paid under TEUC, the other including these benefits. The measures are almost identical since the program was not large, and by March 1962, few people were still eligible for the benefits, either

TABLE 3-6

MEASURED EFFECTIVENESS, RECESSION 1960:II - 1961:I

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .718 \; (= \sum_{i=0}^{3} (.33)(.60)^i)$	$C = 21.10 + .33\,DPY - .50\,(\sum_{i=0}^{2} TBR_{t-i})/_3 + .60\,C_{t-1}$ (3.28)(2.84) (-1.58) (7.23)	.514 (2.40)	.999	26
$i = .716 \; (= \sum_{i=0}^{3} (.32)(.62)^i)$	$NI = 3.96 + .32\,CPATX - .34\,(\sum_{i=0}^{2} TBR_{t-i})/_3 + .62\,NI_{t-1}$ (.933)(9.08) (-2.94) (10.01)	.379 (1.77)	.987	26

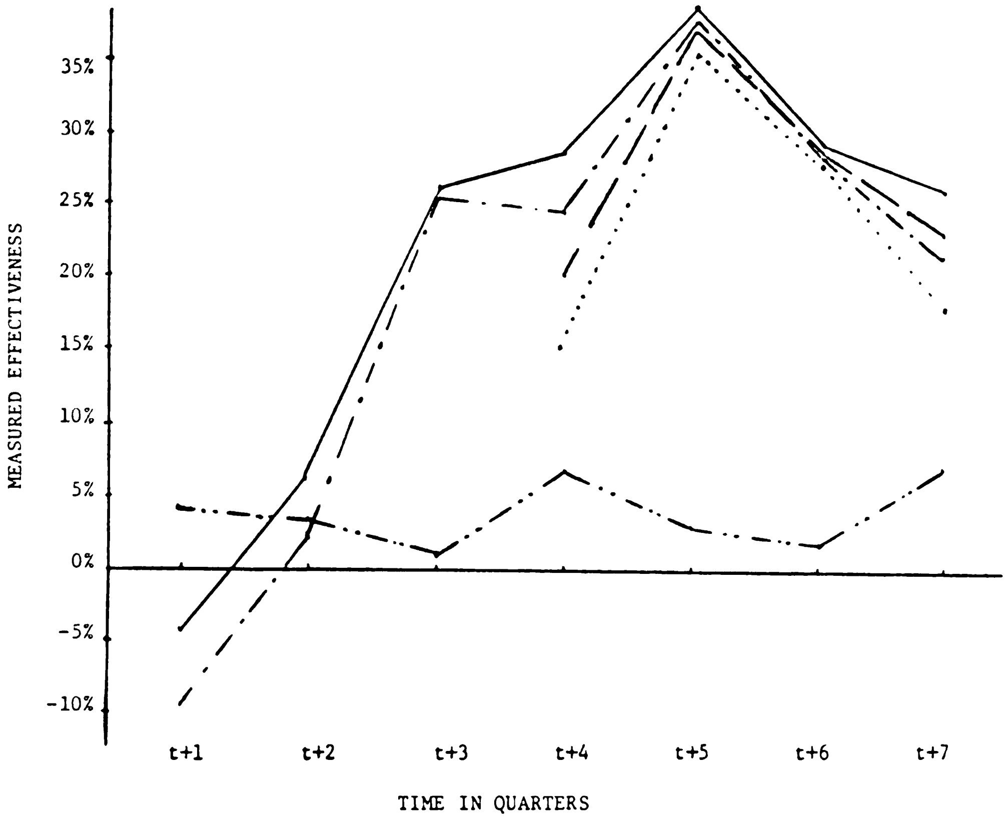
CALCULATED PARAMETERS

$C_2 = .5 + .5(C_1) = .859$	X = .50	B = .0065	$E_B = -18.1$
	Z = .50	T = .008	$E_T = .50$

MEASURED EFFECTIVENESS

Overall Program	26.0%
UI Benefits Only	25.6%
UI Taxes Only	.99%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.



Overall Program, Without TEUC
Overall Program, With TEUC

UI Benefits Only, Without TEUC
UI Benefits Only, With TEUC

UI Taxes Only

FIGURE 3.3

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1960:II-1962:I

TABLE 3-7

MEASURED EFFECTIVENESS, RECOVERY 1961:I - 1962:I

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .761 \; (= \sum_{i=0}^{4} (.33)(.60)^i)$	$C = 21.10 + .33\,DPY - .50\,(\sum_{i=0}^{2} TBR_{t-i})/3 + .60\,C_{t-1}$	.514	.999	26
	(3.28) (2.84) (-1.58) (7.23)	(2.40)		
$i = .763 \; (= \sum_{i=0}^{4} (.32)(.62)^i)$	$NI = 3.96 + .32\,CPATX - .34\,(\sum_{i=0}^{2} TBR_{t-i})/3 + .62\,NI_{t-i}$	.379	.987	26
	(.933) (9.08) (-2.94) (10.01)	(1.77)		

CALCULATED PARAMETERS

				Without TEUC	With TEUC
$C_2 = .5 + .5(C_1) = .88$	$X = .641$	$T = .008$	$B =$	.0093	.011
	$Z = .359$	$E_T = 3.3$	$E_B =$	-8.1	-5.6

MEASURED EFFECTIVENESS

	Without TEUC	With TEUC
Overall Program	26.05%	23.23%
UI Benefits Only	21.22%	18.0%
UI Taxes Only	7.3%	7.3%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See Note 2, Table 3-3.
(3) See page 49 for an explanation of Temporary Extended Unemployment Compensation (TEUC).

because their benefits had been exhausted or they had returned to work. As with TUC, the UI program (especially UI benefits) was less effective with TEUC during the recovery.

Unlike the last recession/recovery period measured effectiveness of the overall UI program is almost identical in the recovery as it was in the recession. The composition of effectiveness changes, as expected, with UI tax measured effectiveness higher, and UI benefit measured effectiveness lower in recovery than recession, as is the case in all other studies. However, UI tax measured effectiveness is surprisingly large (7.3%), which is higher than in any previous study.[22/]

The quarter-by-quarter results for the entire recession/recovery period are listed in Table 3-8 and shown in Figure 3.3. There are three points to be made about the results. First, except for the first quarter of the recovery, the measured effectiveness of the UI program is only slightly lower when considering TEUC compared to that of regular benefits only. Unlike the previous recovery, the temporary extended benefits program in this recovery did not have much of an impact on measured effectiveness. Second, benefits actually declined during the first quarter of the recession indicating the mildness of this recession and the difficulty in establishing turning points. Third, UI tax-measured effectiveness may be influenced by a seasonal effect. The last quarters in the recession and recovery were also the first quarters of calendar years 1961 and 1962, respectively. UI tax collections are larger in the first quarter of a year, as taxes are collected as a percentage of the firm's payroll up to a maximum amount of wages per employee. Since few, if any, employees covered by the UI program reach

TABLE 3-8

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1960:II - 1962:I

Parameters	Period t+1	t+2	t+3	t+4	t+5	t+6	t+7
C_1	.528	.647	.718	.528	.647	.718	.761
C_2	.764	.823	.859	.764	.823	.859	.88
i	.518	.64	.716	.518	.64	.716	.763
X	.334	.597	.50	.599	.692	.745	.641
Z	.667	.403	.50	.401	.308	.255	.359
T	.008	.008	.008	.008	.008	.008	.008
E_T	5.2	2.6	.5	8.2	2.1	.84	3.3
B	.0065	.0065	.0065	.0093	.0093	.0093	.0093
B (with TEUC)				.011	.011	.011	.011
E_B	8.3	-1.9	-18.1	-22.1	-28.7	-14.4	-8.1
E_B (with TEUC)				-10.3	-22.5	-11.9	-5.6

Program	Measured Effectiveness						
Overall Program							
Without TEUC	-4.29%	6.15%	26.0%	28.61%	38.6%	29.09%	26.05%
With TEUC				20.19%	37.0%	28.57%	23.23%
UI Benefits Only							
Without TEUC	-9.43%	2.75%	25.6%	24.78%	37.5%	28.25%	21.22%
With TEUC				15.37%	35.8%	27.97%	18.01%
UI Taxes Only	4.31%	3.59%	.99%	6.65%	2.86%	1.63%	7.30%
	Recession			Recovery			

NOTES: (1) See note 1, Table 3-5.
(2) See note 3, Table 3-7.
(3) A minus sign on measured effectiveness indicates destabilization.

their maximum limit in the first quarter, the entire covered payroll is taxed. As the year goes on and workers reach their maximum taxable limit, tax collections fall short of the first quarter's tax collections. Therefore, tax collections are higher in the first quarter than any other quarter, and far exceed the tax collections in the third and fourth quarters. In the recession, as income fell in 1961:I, UI taxes showed an upward movement due to this institutional seasonal effect. This lowered UI taxes effectiveness in the last quarter of the recession. Conversely, in 1962:I, not only did an increase in employment cause UI taxes to increase, but this seasonal effect caused UI taxes to rise further, enhancing the measured effectiveness of UI taxes in the quarter.

The Recession of 1969-1970

This recession was more prolonged than the previous two recessions, although it was not as deep as the 1957-1958 recession in terms of the actual or percentage decline in income. All but one of the previous studies were done prior to 1969, so no direct comparisons of the results in this study can be made. However, one can compare the measures between periods to see if the UI program has achieved its stability goal as well as in previous recessions. This recession marked for the first time a decline in national income with (considered then) serious inflationary problems, which might affect the measure if constant dollar values were not used. Table 3-9 and Figure 3.4 summarize the results for this period. The calculated elasticities are obtained using the estimated time trend values for this period shown in Table 3-1, and the deviation method described earlier. For both the measured effectiveness of UI benefits and UI taxes, typical results are obtained

TABLE 3-9

MEASURED EFFECTIVENESS, RECESSION 1969:IV - 1970:IV

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .762 \ (= \sum_{i=0}^{4} (.275)(.70)^i)$	$C = 16.34 + .275\ DPY - .35 \left(\sum_{i=0}^{2} TBR_{t-i}\right)/3 + .70\ C_{t-1}$ (3.07) (4.39) (-1.69) (10.16)	.308 (1.99)	.999	40
$i = .82 \ (= \sum_{i=0}^{4} (.29)(.711)^i)$	$NI = -.588 + .29\ CPATX - .46 \left(\sum_{i=0}^{2} TBR_{t-i}\right)/3 + .711\ NI_{t-1}$ (-.336) (4.28) (-1.94) (12.30)	.289 (1.88)	.987	40

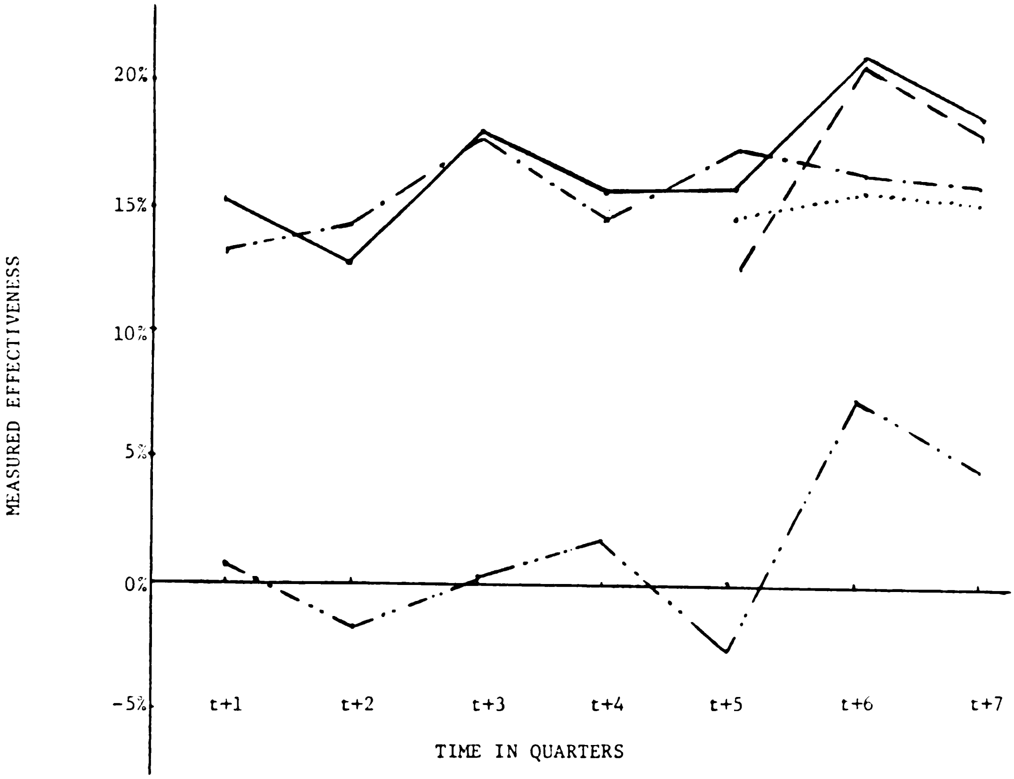
CALCULATED PARAMETERS

$C_2 = .5 + .5(C_1) = .881$	$X = .468$	$B = .003$	$E_B = -17.1$
	$Z = .532$	$T = .005$	$E_T = 1.0$

MEASURED EFFECTIVENESS

Overall Program	15.8%
UI Benefits Only	14.66%
UI Taxes Only	1.8%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.



Overall Program, Without EB (solid line)
Overall Program, With EB (dashed line)

UI Benefits Only, Without EB (dash-dot line)
UI Benefits Only, With EB (dotted line)

UI Taxes Only (dash-dot-dot line)

FIGURE 3-4

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1969:IV-1971:IV compared to previous recessions, as most of the effectiveness is due to UI benefits.

The recovery period is again marked by an extended benefits program enacted as the recovery had just started. However, this program became permanent and automatic, unlike the previous extended benefits programs. The program was part of the Extended Unemployment Compensation Act of 1970, and began as early as October 1970.[23/] This bill called for permanent extended benefits (EB) program, with the benefits to be triggered "on" automatically whenever the insured employment rate (IUR, the unemployment rate of those workers covered by the UI program) for the nation was 4.5% or above for three consecutive months (later changed).[24/] Table 3-10 and Figure 3.4 summarize the results for the recovery. Since the EB program is permanent and automatic, it becomes part of regular benefits, but measured effectiveness can be found with and without EB as part of UI benefits to isolate the impact of the program.

Once again, since this program was essentially started during the recovery, measured effectiveness with EB included is lower. But the difference is minor, since less than half of the states complied during the period. The magnitude of the measured effectiveness of UI taxes is as large as 7.6%, and the measured effectiveness of UI taxes for the overall recovery is 2.5 times that of the recession. One reason for this may be the UI tax part of the EB program. The funding for the EB program included a 0.1% increase in the FUTA tax and also included a clause to raise the taxable wage base from the first $3,000 an individual earns to the first $4,200 the individual earns by January 1, 1972.[25/] However, some states increased the taxable wage base during

TABLE 3-10

MEASURED EFFECTIVENESS, RECOVERY 1971:I - 1971:IV

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .696 \ (= \sum_{i=0}^{3} (.275)(.70)^i)$	$C = 16.34 + 2.75DPY - .35 \left(\sum_{i=0}^{2} TBR_{t-i} \right)/3 + .70C_{t-1}$	.308	.999	40
	(3.07) (4.39) (-1.69) (10.16)	(1.99)		
$i = .746 \ (= \sum_{i=0}^{3} (.29)(.711)^i)$	$NI = -.588 + .29CPATX - .46 \left(\sum_{i=0}^{2} TBR_{t-i} \right)/3 + .711NI_{t-1}$	.289	.987	40
	(-.336)(4.28) (-1.94) (12.30)	(1.88)		

CALCULATED PARAMETERS

				Without EB	With EB
$C_2 = .5 + .5(C_1) = .848$	$X = .674$	$T = .0043$	$B =$	.0058	.006
	$Z = .326$	$E_T = 7.5$	$E_B =$	-26.3	-20.8

MEASURED EFFECTIVENESS

	Without EB	With EB
Overall Program	18.8%	18.1%
UI Benefits Only	16.12%	15.35%
UI Taxes Only	4.49%	4.49%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.
(3) See page 58 for an explanation of the Automatic Extended Benefits (EB) program.

1971. These changes may be the reason the measured effectiveness of UI taxes is higher than some previous recessions.

The quarter-by-quarter results for the entire recession/recovery period are listed in Table 3-11 and shown in Figure 3.4. The recession results follow the same pattern as previous recessions, with the overall program measured effectiveness being primarily due to UI benefit measured effectiveness. The quarter 1970:IV is omitted due to the changing institutional arrangements. The recovery results show the effect of the tax increase clearly, and show a remarkably consistent level of measured effectiveness for UI benefits (with and without EB) throughout the period.

The Recession of 1973-1975

This recession was by far the worst of the period, in terms of length and severity. However, the measured effectiveness of the overall UI program remains about the same as other recessions and slightly above the average measured effectiveness estimated earlier. Table 3-12 and Figure 3.5 summarize the results of this recession's estimated effectiveness measures. The calculated elasticities are obtained using the estimated time trend values for this period shown in Table 3-1, and the deviation method described earlier. Note that EB increased the measured effectiveness of the UI program by about ten percent, and Federal Supplemental Benefits (FSB, discussed below), which began in the trough quarter, increased measured effectiveness another five percent.

The results for the recovery are listed in Table 3-13 and shown in Figure 3.5. As in previous periods, another extended benefits program was enacted during the recession, but not implemented until the

TABLE 3-11

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1969:IV - 1971:IV

Parameters	Period t+1	t+2	t+3	t+4	t+5	t+6	t+7
c_1	.467	.602	.696	.762	.467	.602	.696
c_2	.733	.801	.848	.881	.733	.801	.848
i	.496	.642	.746	.82	.496	.642	.746
X	.45	.333	.452	.468	.572	.60	.674
Z	.55	.667	.548	.532	.428	.40	.326
T	.005	.005	.005	.005	.0043	.0043	.0043
E_T	1.7	-2.0	.12	1.0	-6.0	11.5	7.5
B (with EB)					.006	.006	.006
E_B	-40.0	-25.8	-24.0	-17.1	-26.3	-16.3	-13.8
E_B (with EB)					-20.8	-15.2	-12.7

Program	Measured Effectiveness t+1	t+2	t+3	t+4	t+5	t+6	t+7
Overall Program							
Without EB	15.1%	12.96%	18.0%	15.8%	15.9%	21.88%	18.8%
With EB					13.0%	21.45%	18.1%
UI Benefits Only							
Without EB	14.5%	14.25%	17.9%	14.66%	17.6%	16.48%	16.12%
With EB					14.9%	15.99%	15.35%
UI Taxes Only	.81%	-1.75%	.16%	1.8%	-2.5%	7.6%	4.49%
			Recession			Recovery	

NOTES: (1) See note 1, Table 3-5.
(2) See note 3, Table 3-7.
(3) A minus sign on measured effectiveness indicates destabilization.

TABLE 3-12

MEASURED EFFECTIVENESS, RECESSION 1973:IV - 1975:I

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .93 \ (= \sum_{i=0}^{5} (.28)(.756)^i)$	$C = 1.80 + .28DPY - .56 \left(\sum_{i=0}^{2} TBR_{t-i}\right)/3 + .756\ C_{t-1}$	.171	.974	40
	(1.77)(3.33) (-2.04) (9.03)	(2.00)		
$i = .772 \ (= \sum_{i=0}^{5} (.20)(.82)^i)$	$NI = -2.95 + .20CPATX - .162 \left(\sum_{i=0}^{2} TBR_{t-i}\right)/3 + .82\ NI_{t-1}$	.361	.954	40
	(-.77)(2.99) (-1.81) (13.45)	(2.33)		

CALCULATED PARAMETERS

				Without EB, FSB	With EB	With EB, FSB
$C_2 = .5 + .5(C_1) = .96$	X = .636	T = .0038	B =	.0035	.0037	.0039
	Z = .364	$E_T = 2.0$	$E_B =$	-14.0	-15.2	-15.8

MEASURED EFFECTIVENESS

	Without EB, FSB	With EB	With EB, FSB
Overall Program	15.3%	16.97%	18.0%
UI Benefits Only	13.83%	15.56%	16.68%
UI Taxes Only	1.98%	1.98%	1.98%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.
(3) See note 3, Table 3-10 for an explanation of EB, and see page 65 for an explanation of Federal Supplemental Benefits (FSB).

TABLE 3-13

MEASURED EFFECTIVENESS, RECOVERY 1975:I - 1976:I

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .86\ (= \sum_{i=0}^{4} (.28)(.756)^i)$	$C = 1.80 + .28DPY - .56\ (\sum_{i=0}^{2} TBR_{t-i}/3) + .756C_{t-1}$	.171	.974	40
	(1.77)(3.33) (-2.04) (9.03)	(2.00)		
$i = .698\ (= \sum_{i=0}^{4} (.20)(.82)^i)$	$NI = -2.95 + .20CPATX - .162\ (\sum_{i=0}^{2} TBR_{t-i}/3) + .82NI_{t-1}$	.361	.954	40
	(-.77)(2.98) (-1.81) (13.45)	(2.33)		

CALCULATED PARAMETERS

				Without EB, FSB	With EB	With EB, FSB
$C_2 = .5 + .5(C_1) = .93$	$X = .64$	$T = .0033$	$B =$	.0125	.014	.016
	$Z = .36$	$E_T = -.5$	$E_B =$	-3.0	-1.6	1.8

MEASURED EFFECTIVENESS

	Without EB, FSB	With EB	With EB, FSB
Overall Program	12.1%	7.43%	-12.91%
UI Benefits Only	12.48%	7.85%	-12.3%
UI Taxes Only	-.49%	-.49%	-.49%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.
(3) A minus sign on measured effectiveness indicates destabilization.

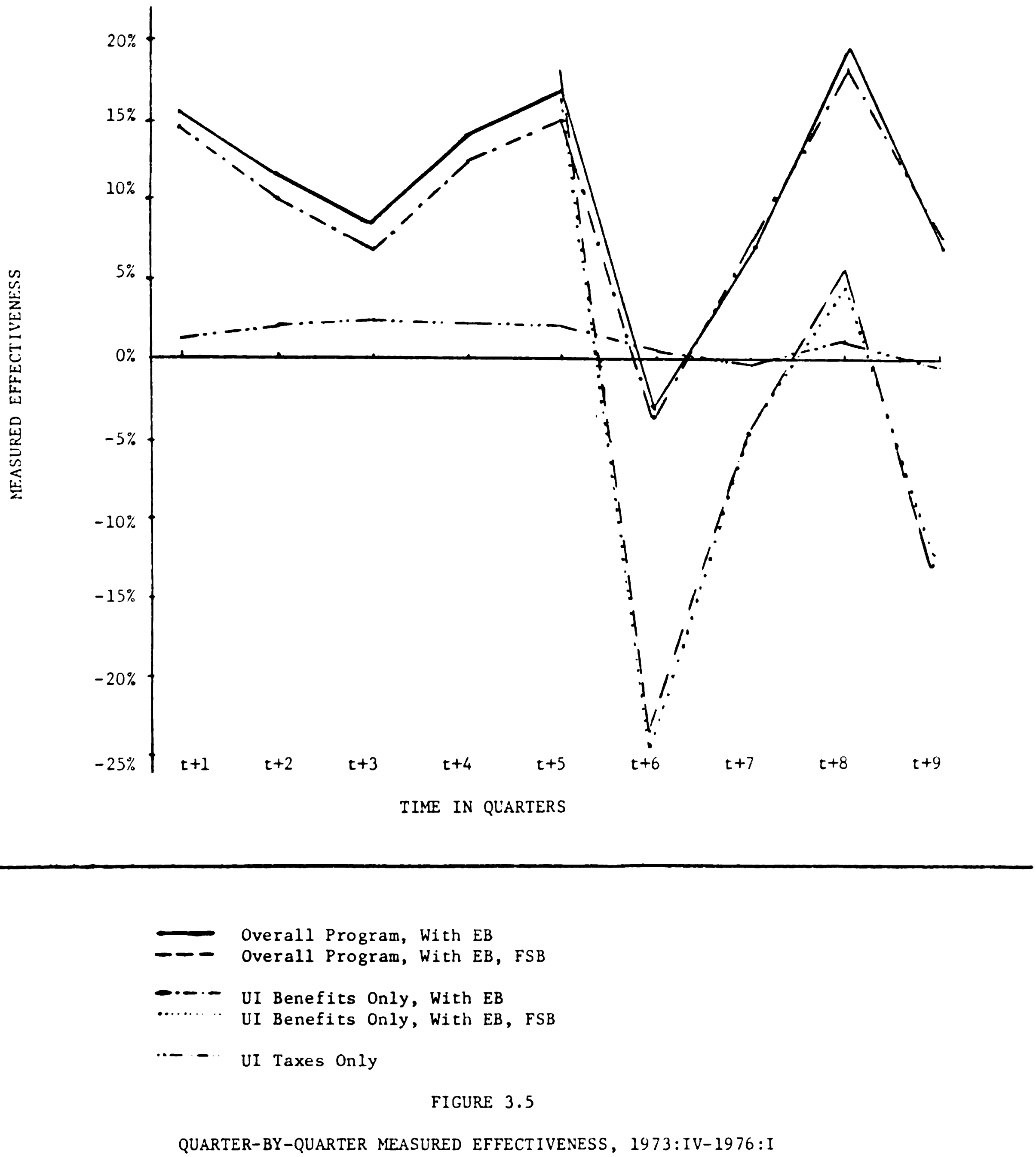


FIGURE 3.5

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1973:IV-1976:I very end of the recession and the beginning of the recovery. Actually, two programs were implemented because of the severity and, more so, the length of the recession, as many individuals exhausted both their regular and (permanent) extended benefits. The first program was the Emergency Unemployment Compensation Act of 1974, referred to as FSB, for Federal Supplemental Benefits. This program supplemented existing regular and extended benefit programs by providing additional weeks of benefits (up to thirteen) to those who had exhausted their benefits under existing programs because of the high rate of and lengthy unemployment.[26/]

The other extended benefits program was enacted in 1975. It added to and changed the provisions of the FSB Act of 1974. This act, The Emergency Compensation and Special Unemployment Assistance Extension Act of 1975, known as SUA, increased FSB's to twenty-six weeks from thirteen weeks, and extended coverage to previously uncovered workers. This program began in the second quarter of 1975.[27/]

These programs took effect as recovery was beginning, but because recovery was not rapid, unemployment remained high and these programs performed their social insurance function. As seen in Table 3-12, the addition of FSB during the recession increased measured effectiveness about five percent. Because of the high insured unemployment rate during the recovery, measured effectiveness was small. The inclusion of FSB and SUA in UI benefits (shown as only FSB in Tables 3-13 and 3-14, and Figure 3.5) caused the measure to indicate that the program had become very destabilizing. The best results were obtained when the regular (no EB) benefits were only considered as UI benefits paid, and this measure was still below the average measured effectiveness. UI

TABLE 3-14

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1973:IV - 1976:I

Parameters	Period t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8	t+9
C_1	.49	.65	.774	.86	.93	.49	.65	.774	.86
C_2	.745	.825	.887	.93	.96	.745	.825	.887	.93
i	.364	.498	.608	.698	.772	.364	.498	.608	.698
X	.266	.272	.231	.45	.636	.87	.66	.67	.64
Z	.734	.728	.769	.55	.364	.13	.34	.33	.36
T	.0038	.0038	.0038	.0038	.0038	.0033	.0033	.0033	.0033
E_T	5.8	4.9	3.6	2.0	2.0	2.2	-.75	2.0	-.5
B (with EB)	.0037	.0037	.0037	.0037	.0037	.014	.014	.014	.014
B (with EB, FSB)					.0039	.016	.016	.016	.016
E_B (with EB)	-38.8	-17.1	-8.5	-10.0	-15.2	1.8	-2.9	-5.2	-1.6
E_B (with EB, FSB)					-16.0	8.6	1.3	-.97	1.8

Program	Measured Effectiveness t+1	t+2	t+3	t+4	t+5	t+6	t+7	t+8	t+9
Overall Program									
With EB	16.02%	11.69%	8.83%	14.02%	16.9%	-3.2%	7.33%	19.22%	7.43%
With EB, FSB					18.0%	-23.42%	-4.9%	5.82	-12.91%
UI Benefits Only									
With EB	15.07%	10.11%	7.01%	12.38%	15.56%	-3.7%	7.59%	18.29%	7.85%
With EB, FSB					16.68%	-24.18%	-4.72%	4.57%	-12.3%
UI Taxes Only	1.31%	1.96%	2.22%	2.13%	1.98%	.5%	-.3%	1.38%	-.49%
			Recession				Recovery		

NOTES: (1) See note 1, Table 3-5.
(2) See note 3, Table 3-13.
(3) A minus sign on measured effectiveness indicates destabilization.

taxes showed a destabilizing effect, because, as unemployment remained high, tax collections did not match the increase in national income.

The quarter-by-quarter results for the entire recession/recovery period are listed in Table 3-14 and shown in Figure 3.5. The pattern of measured effectiveness for the recession indicates the recession was inconsistent. Indeed, in the middle quarters of 1973, real national income rose slightly then leveled off, somewhat below its pre-recession peak. As a result of this, measured effectiveness declines in these quarters. The recovery results show the destabilizing impact of the temporary benefits programs on measured effectiveness. For the first time in any period analyzed, the measured effectiveness of UI taxes was lower throughout the recovery than the recession. Finally, even though the percentage of potential change prevented by the UI program was only about average for this recession/recovery period, the actual dollar change prevented was the highest due to the severity of the recession.

The Recession of 1980

The most recent recession analyzed in this chapter was is the shortest of any studied, but, in terms of actual changes in income, it was more severe than the two earliest recessions studied in this chapter. The length of the recession may have influenced measured effectiveness, as it is smaller than that of any recession studied. Table 3-15 and Figure 3.6 summarize the results of measured effectiveness in this recession. The calculated elasticities are obtained using the estimated time trend values for this period shown in Table 3-1, and the deviation method described earlier. Interestingly, excluding the automatic extended benefits from the calculations show that regular benefits declined over much of the period, producing a

TABLE 3-15

MEASURED EFFECTIVENESS, RECESSION 1980:I - 1980:III

ESTIMATED PARAMETERS	REGRESSION EQUATIONS	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .653 \; (= \sum_{i=0}^{2} (.29)(.726)^i)$	$C = -3.88 + .29DPY - .577 \left(\sum_{i=0}^{2} TBR_{t-i}/3 \right) + .726\, C_{t-1}$	.109	.978	40
	(-2.11)(1.91) (-3.33) (15.06)	(1.82)		
$i = .774 \; (= \sum_{i=0}^{2} (.458)(.47)^i)$	$NI = 30.61 + .458CPATX - .09 \left(\sum_{i=0}^{2} TBR_{t-i}/3 \right) + .47NI_{t-1}$	.761	.943	40
	(3.88)(6.63) (-1.47) (4.82)	(7.49)		

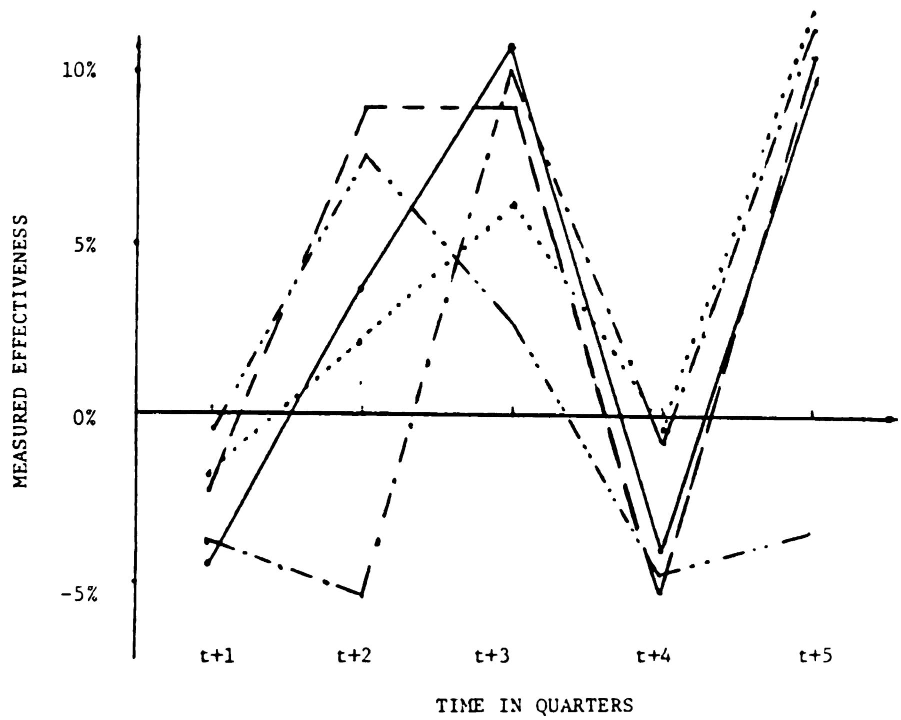
CALCULATED PARAMETERS

				Without EB	With EB
$C_2 = .5 + .5(C_1) = .825$	$X = .485$	$T = .0082$	$B =$	.0074	.0076
	$Z = .515$	$E_T = 4.1$	$E_B =$	2.6	-.86

MEASURED EFFECTIVENESS

	Without EB	With EB
Overall Program	3.2%	9.0%
UI Benefits Only	-5.44%	1.7%
UI Taxes Only	7.7%	7.7%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.
(3) A minus sign on measured effectiveness indicates destabilization.



Overall Program, Without EB
Overall Program, With EB

UI Benefits Only, Without EB
UI Benefits Only, With EB

UI Taxes Only

FIGURE 3.6

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1980:I-1981:II destabilizing effect. Including EB produces a small stabilizing effect, but still the smallest of any recession. The majority of the UI program's effectiveness stems, surprisingly, from UI taxes.

The results of the subsequent recovery are more in line with those of past periods. Higher measured effectiveness is shown during the recovery than was evident in the recession. The exception to the pattern is that UI taxes are destabilizing in the recovery, meaning tax collections fell as income rose. The reason is the insured unemployment rate did not fall enough in the recovery to lead tax collections to rise. The results for the recovery are listed in Table 3-16 and shown in Figure 3.6.

The quarter-by-quarter results for the entire recession/recovery period are listed in Table 3-17 and shown in Figure 3.6. The first quarter after the peak saw a sharp decline in national income, but unlike in past recessions, the UI program failed to be effective in this quarter, and, in fact, was destabilizing. This is surprising, since the decline in income was the largest absolute and percentage decline in any "first" recession quarter studied. In the next quarter, as income remained essentially constant, both UI benefits and UI taxes responded dramatically, yielding an overall program stabilizing effect. This is especially true of UI taxes, as only with EB did UI benefits exhibit the expected effect.

The pattern of measured effectiveness in the recovery is different from past periods. Most notably, UI taxes are destabilizing. Seasonal factors may be the cause for the slip in the measured effectiveness of the overall UI program and UI benefits in 1981:I as benefits increased even though income increased in the

TABLE 3-16

MEASURED EFFECTIVENESS, RECOVERY 1980:III - 1981:II

ESTIMATED PARAMETERS	REGRESSION EQUATION	$\hat{\rho}$	$\bar{R}^2$	N
$C_1 = .761\ (= \sum_{i=0}^{3} (.29)(.726)^i)$	$C = -3.88 + .29DPY - .577\ (\sum_{i=0}^{2} TBR_{t-i}/3) + .726C_{t-1}$ (-2.11)(1.91) (-3.33) (15.06)	.109	.978	40
$i = .82\ (= \sum_{i=0}^{3} (.458)(.47)^i)$	$NI = 30.61 + .458CPATX - .09\ (\sum_{i=0}^{2} TBR_{t-1}/3) + .46NI_{t-1}$	.761	.843	40

CALCULATED PARAMETERS

				Without EB	With EB
$C_2 = .5 + .5(C_1) = .88$	$X = .85$	$T = .0074$	$B =$	.0074	.0084
	$Z = .15$	$E_T = -1.8$	$E_B =$	-8.9	-9.0

MEASURED EFFECTIVENESS

	Without EB	With EB
Overall Program	11.5%	12.8%
UI Benefits Only	14.05%	15.25%
UI Taxes Only	-3.45%	-3.45%

NOTES: (1) T-statistics are in parentheses under the estimated coefficients.
(2) See note 2, Table 3-3.
(3) A minus sign on measured effectiveness indicates destabilization.

TABLE 3-17

QUARTER-BY-QUARTER MEASURED EFFECTIVENESS, 1980:I - 1981:II

Parameters	Period				
	t+1	t+2	t+3	t+4	t+5
C_1	.50	.653	.50	.653	.761
C_2	.75	.825	.75	.825	.88
i	.673	.774	.673	.774	.82
X	.386	.485	.88	.87	.85
Z	.614	.515	.12	.13	.15
T	.0082	.0082	.0074	.0074	.0074
E_T	-.24	4.1	3.0	-2.8	-1.8
B	.0074	.0074	.0074	.0074	.0074
B (with EB)	.0076	.0076	.0084	.0084	.0084
E_B	2.6	2.6	-11.0	-.40	-8.9
E_B (with EB)	1.1	-.86	-5.6	.20	-9.0

Program	Measured Effectiveness				
	t+1	t+2	t+3	t+4	t+5
Overall Program					
Without EB	**-4.14%**	**3.2%**	**11.54%**	**-3.9%**	**11.5%**
With EB	**-1.95%**	**9.0%**	**9.00%**	**-4.99%**	**12.8%**
UI Benefits Only					
Without EB	-3.78%	-5.44%	10.74%	.63%	14.05%
With EB	-1.61%	1.70%	6.55%	-.36%	15.25%
UI Taxes Only	-.33%	7.70%	3.0%	-4.59%	-3.45%
	Recession			Recovery	

NOTES: (1) **See note 1, Table** 3-5.
(2) **A minus sign on measured effectiveness indicates** destabilization.

quarter. Finally, the measured effectiveness of UI benefits with EB is actually higher in 1981:II than that without EB. This result is counter to the results of all previous recoveries. The fact that this recession/recovery period was immediately followed by a severe recession may have caused the uncharacteristic results found in this period.

3.5 Conclusion

This chapter shows how effective the UI program has been as an automatic stabilizer. Although this issue has been studied in the past, this paper presents effectiveness measures for recession-recovery periods not covered by previous studies, including the three recession-recovery periods since 1969. In each period studied, I have disaggregated data on UI benefits into a permanent and temporary program. As in past studies, the permanent component has a significant positive effect on stabilization. However, due to the discretionary nature of temporary benefit programs, they prove to be destabilizing in every period analyzed.

This paper presents effectiveness measures for five recession-recovery periods from 1957 through 1981. Other studies reported the UI program prevented up to an average of twenty-six percent of a further change in income for recessions during the late forties through the early sixties.[28/] The effectiveness measures estimated in this chapter are more accurate than those of previous studies for two reasons. First, a deviation-from-trend method that takes account of growth in variables is used to calculate the elasticities needed in the estimation of the effectiveness measures. Second, the other coefficients needed in the estimation process are themselves estimated instead of chosen at random from a range of possible values. The average potential change prevented by the UI program from 1955-1980 found in this chapter is fourteen percent, which is about the mean of the other studies. For the two recession/recovery periods that are analyzed in this chapter as well as most other studies, I find an average effectiveness measure of about nineteen percent in recessions and eighteen percent in recoveries. The recession average is below that of other studies, while the recovery average is greatly above that of other studies.

Using a slightly modified version of the effectiveness measure developed by Eilbott[29/], and using a procedure used by Thirwall[30/], I measure the stabilization effectiveness of the UI program over selected recession/recovery periods. For specific recessions and recoveries, the measure varies from a maximum of 26.05 percent, to a minimum of 3.2 percent. The results show the bulk of measured effectiveness is generally due to UI benefits, as the seasonality of collections and other institutional arrangements (as experience rating) associated with UI taxes reduce its measured effectiveness and at times cause UI taxes to become destabilizing.

Unlike previous studies which showed the UI program to work effectively in recessions, but have virtually no effect in recoveries, this study shows the effect is nearly equal across recession and recovery. There are two explanations for this. The first is that the recovery periods used here do not correspond to the expansion periods used in earlier studies. Recoveries in this paper refer to an arbitrary length of time (four to five quarters) immediately after the trough quarter of the recession, while previous studies used the entire period from trough to peak for their expansion periods. The length of time may have tempered their results. I would argue my approach is the correct one, for previous studies base their estimates on periods of steady growth, not recoveries. Second, the use of absolute changes by previous researchers biased their results downward. The combination of the two may explain the majority of the disparity.

Finally, the results show the effect of the various extended benefits programs throughout the period. These programs were implemented to aid individuals who experienced lengthy unemployment. They were not designed to achieve stabilization as their primary goal. Since (un)employment lags the business cycle, these programs, begun as recoveries started, reduce effectiveness measures that include them below those that do not. One program, the permanent Extended Benefits (EB) program, did increase effectiveness in later recessions since this program works automatically.

From a policy viewpoint, the most important result found from measuring the effectiveness of the UI program is the destabilizing effect of every (temporary) discretionary extended benefits program. This result is caused by two factors. The first is the fact they are discretionary. Their discretionary nature causes them to be implemented with a lag, after the recession has ended and the recovery has begun. This causes an increase of UI benefits as income rising. Since automatic stabilizers should retard the growth in income in recoveries, the extended benefits programs are detracting from the stabilization effectiveness of the program. The second factor is the concept of stabilization effectiveness used in this research. Stabilization effectiveness is measured with respect to income. Since employment lags beind the movements in income, extended benefits programs meet the goal of social insurance.[31/] If stabilization effectiveness was measured with respect to employment, these programs may be found to meet the goal of stabilization as well. However, since stabilization effectiveness is taken to be the amount of a further change in income prevented by the program, and these programs reduce the amount of a change in income prevented by the program, they detract from the measured effectiveness of the program. All in all, the UI program helps in stabilizing the economy, although its contribution is in the neighborhood of preventing ten percent of a further change in income.

The measures of effectiveness estimated in this chapter should be viewed as the upper limit of effectiveness. One cannot credit the entire change in income to changes in fiscal policy, whether discretionary or automatic. As Appendix B shows, the measured effectiveness of the UI program (ME) estimated in this chapter is based on an implied aggregate demand model that contains only a goods sector. This implied model assumes monetary phenomena have no impact on measured effectiveness.

CHAPTER THREE

NOTES

1/Zell (1977), p. 5.

2/The decrease in UI taxes collected will only reduce firms' expenses relative to a world in which the same taxes are collected but in a manner uncorrelated to the number of employees.

3/Musgrave and Miller (1948).

4/Clement (1960).

5/Rejda (1966).

6/Eilbott (1966), p. 451-455.

7/This result was obtained using the parameters given in Eilbott's paper, except for the UI data which conflicted with the data used in this study. Using the UI data from this study (given in Appendix A) and his parameters, I find a range of 12-18% for measured effectiveness in recession and less than 5% in recovery for the UI program. Hamermesh (1977), p. 63, has an excellent summary of the estimates of measured effectiveness of previous studies.

8/Hamermesh (1982).

9/Hamermesh (1982), p. 110. Especially take note of his footnote 21 on this result.

10/ Thirlwall (1969).

11/In addition to time as a regressor in the UI tax and UI benefit equations, seasonal dummies are included to try to rid these series of their seasonal variation.

12/The turning points established by the National Bureau of Economic Research are: 1957:III-1958:II; 1960:II-1961:I; 1969:IV-1970:IV; 1973:IV-1975:I; and, 1980:I-1980:III.

13/Eilbott choose the values .8, .85, and .9 for c and .3, .4, and .5 for i in his study.

14/Okun, in Heller (1968), uses a similar technique to find the effect of the 1964 tax cut.

15/Johnston (1973), p. 316-318.

16/Actually, the estimation of these equations is an iterative search version of the procedure outlined in Johnston, iterating over rho values that give the equation the smallest standard error of the regression.

17/The term $(1/1-C_3)^{-1}$ is the appropriate value of the geometric series $(1 + c_3 + c_3^2 + c_3^3 + \ldots)$. Multiplying this series (or the above term) by the MPC (c_1) is equivalent to the formula to estimate a dynamic multiplier,

$$\sum_{i=0}^{\infty} c_1 c_3^{\,i} .$$

18/See Hamermesh (1980), p. 63.

19/This information along with a more complete description of the TUC program can be found in "Unemployment Compensation: Final Report," 1980, p. 58.

20/Rejda shows the largest measured effectiveness of 5% in the expansion of 1958-60 compared to his average measured effectiveness in recessions of 24.0%. Clement's largest measured effectiveness is 3% during the expansion of 1949-1953 compared to his average measured effectiveness of 25.2%.

21/See Unemployment Compensation: Final Report," p. 58.

22/See footnote 20.

23/See Unemployment Compensation: Final Report," p. 58-59.

24/Unemployment Compensation: Final Report, pp. 60.

25/Unemployment Compensation: Final Report, pp. 13, 58, 80.

26/Unemployment Compensation: Final Report, pp. 60-61.

27/Unemployment Compensation: Final Report, pp. 61-62.

28/See Hamermesh (1980), p. 63.

29/Eilbott (1966).

30/ Thirlwall (1969).

31/Although ill-timed to achieve stability, these programs are timed well for social insurance purposes. Unemployment lags the business cycle, and is highest at the beginning of recoveries, just as these programs are implemented. In all the periods covered in this study, unemployment rates as high or higher in the first quarter of the recovery as compared to all other quarters in the period.

CHAPTER FOUR

THE STABILIZATION EFFECTIVENESS OF THE UI PROGRAM IN THE CONTEXT OF AN AGGREGATE DEMAND MODEL

4.1 Introduction

Previous studies on the effectiveness of the UI program calculated a measure of effectiveness that compared two aggregate demand multipliers, one with the UI program explicitly included in the multiplier, the other without.[1/] This measure of effectiveness implicitly assumes an aggregate demand model to obtain the necessary multipliers. However, no explicit models were estimted or tested to derive multipliers in any of these studies. The purpose of this chapter is to present an aggregate demand model of the economy, and estimate and test the model under different assumptions and conditions to obtain different sets of elasticities. Using these estimates, I obtain a more accurate measure of the stabilization effectiveness of the UI program than those found in previous studies.

All previous work done on the subject dealt only with the goods sector of aggregate demand. The money sector was simply ignored or assumed to equilibrate whenever the goods sector was in equilibrium. This was apparently done for simplicity by assuming money did not affect the stabilization effectiveness of fiscal policy. These assumptions are at the center of the debate over fiscal and monetary policy of the past twenty years. Much of the debate has focused on the findings of the many studies that have tested these assumptions empirically. Although no conclusive evidence has been found to support fully either the monetarist or fiscalist position, it has been accepted that the issues are best dealt with empirically rather than by assuming them away. This is precisely what I will show in this chapter. Specifically, I show that the inclusion of a monetary sector in an aggregate demand model significantly reduces the measured effectiveness of the UI program as an automatic stabilizer.

This chapter is divided into three sections. Section 4.2 is a brief review of the concept of measured effectiveness and its relation to this chapter. The theory and derivation of the model is covered in Section 4.3. Finally, Section 4.4 covers the estimation and testing of the model, and the results and conclusions drawn from the estimated coefficients.

4.2 A Review of Measured Effectiveness

The measure of effectiveness used by others and adopted for this analysis is a ratio of two aggregate demand multipliers.[2/] Effectiveness is measured as the amount of a further change in some indicator of economic activity that is prevented by the automatic stabilizer, the UI program. It is calculated by comparing two aggregate demand multipliers, the first in a world with the UI program, the second in a world without the program in the model. One minus the ratio of the multiplier with the UI program to the multiplier without the program is taken to be the measure of effectiveness. In Section 4.4, all the models are log-linear, giving estimated elasticities rather than multipliers. Using elasticities rather than multipliers does not alter the results of Appendix B, except that measured effectiveness is now the amount of a further percentage change in income that is prevented by the UI program. The use of a log-linear model alleviates the problems encountered by past studies in their measurement of the stabilization effectiveness of the UI program. Instead of the variables in Appendix B being constant proportions of national income, these relationships become exponential. This helps take account of growth over time, which was shown in Section 3.3 to yield more accurate estimates of measured effectiveness.

This method necessitates estimating a consumption function (and thus the entire model) twice. One estimate of the model includes the UI program explicitly in consumption and aggregate demand, the other estimate excludes the program from the model. This is true for each condition to be imposed on the model, such as exogeneity of the money supply versus interest rates, and models including goods only versus models with both goods and money. Measured effectiveness is the percentage difference between the estimated impact elasticities obtained from the two models.

4.3 The Theory and Derivation of the Model

The structure of the model used in this chapter is to be consistent with conventional macroeconomic theory, except for those additions and changes necessary for the analysis of the effectiveness of the UI program. It contains several basic macroeconomic variables such as consumption, investment, national income, interest rates, unemployment, and wages, as well as policy variables such as a money supply measure and government spending. The model is intended to be sufficient to capture the movements of aggregate demand correctly, yet be as manageable and general as possible. Examples of the models drawn upon for the formulation of this model are: Pindyck and Rubinfeld (1981)[3/]; Kmenta and Smith (1973)[4/]; the Wharton model (1974)[5/]; and the FRB-MIT-MPS MODEL (1968).[6/]

The model consists of a minimum of five equations, of which four are behavioral. As different assumptions and conditions are imposed, the model reaches nine equations, eight of which are behavioral. Throughout the model, all endogenous and exogenous variables are expressed in terms of the natural logarithms of their observed values.

The endogenous and exogenous variables of the model are listed in Table 4-1. It is important to note that some variables are endogenous or exogenous (of course not at the same time) depending on the conditions imposed on the model. Also, some variables only appear in versions of the model that contain the UI program explicitly. The models in order of their estimation are: (1) goods only, no UI program (GNUI); (2) goods only, UI program included (GUI); (3) entire model, no UI program (WNUI); and (4) entire model, UI program included (WUI). The variables are listed with model reference in Table 4-1.

I have limited the number of models in this chapter to four. The real supply of money is assumed exogenous, while interest rates are assumed endogenous in the models that contain a money sector. The analysis of the assumptions of an endogenous money supply and exogenous

TABLE 4-1

VARIABLES IN THE MODELS

VARIABLES		MODELS*
ENDOGENOUS:		
C	Personal consumption expenditures	All
INR	Nonresidential investment	All
IR	Residential investment	All
Y	National income	All
TAX	Total tax receipts	All
UIB	Unemployment Insurance payments	GUI, WUI
U	Insured unemployment rate	GUI, WUI
YD	Disposable Income minus UIB	All
TBR	Three-month Treasury bill rate	WNUI, WUI
RB	Moody's AAA corporate bond rate	WNUI, WUI
EXOGENOUS:		
G	Government spending minus UIB	All
V_0	Fixed Taxes	All
WEALTH	Net household wealth	All
TBR	Three-month Treasury bill rate	GNUI, GUI
RB	Moody's AAA corporate bond rate	GNUI, GUI
PD	Average potential duration	GUI, WUI
COV	Extent of UI coverage	GUI, WUI
WAGEX	Real wage rate	GUI, WUI
YP	Potential national income	GUI, WUI
D2, D3, D4	Seasonal dummy variables	GUI, WUI
P	Implicit price deflator, national income	WNUI, WUI
M1	% change of money supply (M1 definition)	WNUI, WUI

* The four models are: GNUI, goods only, no UI program; GUI, goods only, UI program; WNUI, entire model, no UI program; and, WUI, entire model, UI program.

(1) See Appendix A for the data sources for the variables listed here.

(pegged) interest rates in models containing money is postponed until the next chapter, dealing with the addition of a government budget condition to the models.

National income, Y, and its components, consumption, C, net investment, I, and government pruchases excluding UI benefit payments, G, are all in constant 1972 dollars, as are all other dollar-valued variables. The model assumes a closed economy, so there are no imports or exports included in the identity. Net investment is disaggregated, and separate equations estimated to explain nonresidential (fixed) investment, INR, and residential investment, IR. The national income identity is written as

$$(4.1) \quad Y = C + INR + IR + G.$$

Disposable income is estimated indirectly through estimation of a simple tax function. Total tax receipts are given by a simple equation relating receipts to taxable income. This equation is

$$(4.2) \quad TAX = V_0 + V_1Y.$$

Total taxes are given by fixed taxes, V_0 and a constant marginal tax rate, V_1, times national income. Disposable income is given by the following identity:

$$(4.2A) \quad YD = - V_0 + (1-V_1)Y.$$

The remainder of this section focuses on the specification of the equations of the four models mentioned above. First, I discuss the structure of the goods only models, then I incorporate the equations making up the money sector into these models to generate what I call the entire model.

Goods Sector Equations

The goods-only model has three basic equations; a consumption equation and two investment equations. Nonresidential investment is taken to depend on income.[7/] Since there is usually some period of time between an investment decision and the outlay for investment, income should enter the equation with a lag. Nonresidential investment also should depend on the long-term interest rate and a measure of the capital stock. Since there is no reliable published source of the capital stock, I use a sum of the past periods measure of nonresidential investment as a proxy (CAP) to represent the existing stock of capital. The equation for nonresidential investment is in the form

$$(4.3) \qquad INR = INR(Y, (\sum_{i=0}^{n} RB_{t-i})/n+1 \ , CAP) + e_3 \ .$$

Residential investment is difficult to explain in a small macroeconomic model, but one investment equation did not capture the movements in total investment sufficiently. Residential investment depends on mortgage rates, mortgage availability, and housing construction costs, none of which is included in the model. Therefore, I use proxies for these variables in an effort to capture the movements in residential investment for purposes of this model. I use income, the short-term interest rate, and the difference between the long-term and short-term rates (AVAIL) to explain residential investment. The short-term rate is used as a proxy for the mortgage rate. (It fared better than the long-term rate based on several summary statistics for the equation.) The difference between the long and short rates is used as a proxy measure of mortgage availability. This is done because credit (mortgages) has (have) become harder to obtain as the short rate nears the long rate. Finally, a second-order autoregressive scheme is included in the equation to help explain the cyclical nature of this market. This imposes a distributed lag on income and the interest rate and credit proxy variables. The second-order relationship out-performed a first-order relationship based on summary statistics for the equation. The equation is of the form

$$(4.4) \quad IR = IR(Y, TBR_{t-1}, AVAIL, IR_{t-1}, IR_{t-2}) + e_4$$

The consumption function has two formulations, one explicitly including the UI program to help explain consumption, the other without the program as an argument in the function. First, I look at the model without the UI program. Consumption depends heavily on disposable income, but also on consumer credit and household wealth. The series used for constant-dollar (real) household wealth is derived in a unique way in this section. The amount of real net household wealth in the present period is defined as the sum of last period's real net household wealth (from the U.S. Commerce Department's net household wealth series) plus the change in the real value of money held as currency by the public and financial institutions, and money held as deposits by financial institutions at the Federal Reserve (outside money which is assumed equal to the monetary base), plus the changes in the real value of government bonds outstanding. The reason for this derivation will be made clear in the chapter dealing with the addition of a government budget condition. The consumption function has the form of a geometric lag distribution, with lagged consumption entering the equation. The non-UI consumption function is of the form:

$$(4.5)\quad C = C(YD,\ WEALTH,\ TBR,\ (\sum_{i=1}^{n} C_{t-i})/n) + e_5 \ .\ ^{8/}$$

The consumption function changes when the UI program is introduced into the model explicitly. (The form of the consumption function is that found in Hamermesh (1982)[9/] and adapted for use into this model.) Two features of the function differ from the above equation. First, consumption now depends not only on disposable income, but on disposable income disaggregated into UI income, UIB, and other disposable income, YD. By doing this I can show (and test) that there is a difference between the marginal propensities to consume out of the two sources of income. The reason there should be a difference is that some (not all) individuals who receive UI payments are surprised by the sudden fall in income, and have not saved enough to maintain their lifetime consumption pattern with their lower (UI) income. These people would spend more of an additional dollar of UI income (to try to maintain their lifetime consumption) than other people spend out of an additional dollar of non-UI income. Other UI recipients expect temporary spells of unemployment and save more during employment to be able to maintain their lifetime consumption pattern while receiving UI income. It is assumed there are only two groups of UI recipients, those who save enough during their employment stretches to maintain their consumption pattern, and who thus spend like the individuals who receive no benefits, and those who spend the entire amount of their UI payments (MPC=1) in an effort to maintain their consumption pattern.

The other feature that is different between the two consumption functions is that the UI consumption function depends on the insured unemployment rate, U. The fraction α times U represents the percent of UI recipients who are constrained by too little savings and spend all their benefits. The fraction $(1-\alpha)$ times U represents those UI recipients who behave like non-UI individuals and consume at the same rate out of UI payments as out of other disposable income. The consumption equation in a model with the UI progam included is

$$(4.5^*) \quad C = a_0(a-\alpha U) + a_1 YD + (a_1 - a_1\alpha + \alpha)UIB + a_2 WEALTH + a_3[(\sum_{i=0}^{2} TBR_{t-i})/3] + a_4(\sum_{i=1}^{2} C_{t-i}/2) + e_5^* .$$

In this model, the amount of UI benefits and the insured unemployment rate are endogenous, both negatively related to the level of income. However, instead of using only the level of income to explain these variables, the gap between observed income and potential income is used since it performs better (statistically) in the equations than the level of income. Potential income is derived from the potential GNP series of John Tatom (1982).[10]

The level of real wages is used as a scale variable to explain the amount of UI benefits. A policy variable, the average potential duration of benefit payments in weeks, PD, tries to explain the generosity of the UI program and thus the amount of benefits paid. Finally, a policy variable which tries to capture the extent of and change in coverage of the UI program, COV, the ratio of covered employment to the total labor force, is also included in the UIB function. The real level of UI benefits (measured as the replacement ratio of benefits to wages) remained fairly constant over the period and was not included in the UIB function. The UI equation is of the form

$$(4.6) \quad UIB = UIB(PD, WAGEX, COV, Y-YP) + e_6.$$

In addition to the gap between observed and potential income, the insured unemployment rate is explained by average potential duration, the first-order change in income, and the lagged insured unemployment rate. The function also includes dummy variables to remove the effect of seasonality from the data. The first quarter of the calendar year (winter) finds seasonal workers increasing the insured unemployment rate significantly over the other three quarters of the year. The dummy variables capture this effect in the data. The form of the insured unemployment rate equation is

$$(4.7) \quad U = U(PD, Y-YP, Y-Y_{t-1}, D2, D3, D4, U_{t-1}) + e_7.$$

Money Sector Equations

The main purpose of this chapter is to show that the conclusions about the measured effectiveness of the UI program in a model estimated without a money sector in the model are incorrect. To show this, I add a simple money sector to the model to show that the elasticities of the exogenous variables are lower compared to a model of the goods sector only. In this chapter, I have chosen to take changes in the money supply as exogenous and let interest rates be determined in the model.

There are two interest rates, a short-term rate represented by the three-month Treasury bill rate, and a long-term rate represented by Moody's AAA corporate bond rate. The short-term rate, TBR, is a function of income, changes in lagged income, changes in the money supply and a moving average of current and past inflation rates represented by percentage changes in the implicit price deflator for national income (INF). The last term captures the effects of higher inflation and inflationary expectations on interest rates without adding to the complexity of the model, i.e. introducing expectation generating equations. The form of the equation is

$$(4.8) \quad TBR = TBR(Y,\ Y_{t-1} - Y_{t-2},\ M1,\ INF) + e_8$$

The long-term rate, RB, responds to the level of the short-term rate and to changes in the short-term rate, all with a geometric lag to account for the slow adjustment to these changes. This formulation assumes that changes in the money supply and the price level affect the long-term rate only indirectly through the short-term rate. The equation is of the form:

$$(4.9) \quad RB = RB(TBR,\ TBR\text{-}TBR_{t-1},\ RB_{t-1}) + e_9.$$

4.4 Estimation and Results

All the sets of models were estimated using quarterly data over the period 1955-1 to 1981-3. All the behavioral equations were estimated using three-stage least squares. The national income identity equations, which yield the impact elasticities necessary for the analysis of the effectiveness of the UI program, are then obtained by the derived reduced-form estimation method, using the structural estimates of the models.[11/] The standard errors included with the estimates of the derived reduced-form equations were estimated following the procedure developed by Goldberger, Nagar, and Odeh (1961).[12/] This procedure estimates the asymptotic variances and standard errors of the reduced-form equations using the estimated variances and covariances obtained from the appropriate structural equations. Tables 4-2 through 4-5 contain the results of the estimation of the four models.

The first model considered (Table 4-2) contains a goods sector only and no UI program (GNUI). As indicated in the table, a three-period moving average of the short-term rate is the best proxy for consumer credit conditions in the consumption function. Also, a two-period moving average of past consumption gave the best results for the lagged dependent variable. For the nonresidential investment equation, a four-period moving average of past long-term rates provided the best results for the rate of return on investment. A three-period moving average of the level of nonresidential investment was used as the proxy for the capital stock. All the appropriate signs are found in all the equations.

Adding the UI program explicitly to the model changes the form of the consumption function (Table 4-3). As expected, the coefficient on UI benefits paid exceeds that on other disposable income. The remainder of the model yields coefficients with the expected signs. With the addition of the UI program, one expects to find that the coefficient on

TABLE 4-2

REGRESSION RESULTS, GOODS ONLY, NO UI MODEL (GNUI)

Dependent Variable	REGRESSION EQUATION	N	MEAN OF DEP. VAR.	SEE
C	$= .375 + .115\,YD + .078WEALTH - .02\left(\sum_{i=0}^{2} TBR_{t-i}\right)/_3 + .855\left(\sum_{i=1}^{2} C_{t-i}\right)/_2$	102	6.44	.0078
	(.067) (.004) (.021) (.0034) (.05)			
INR	$= .03 + .09\,Y_{t-1} - .462\left(\sum_{i=0}^{3} RB_{t-i}\right)/_4 - .064\,CAP$	102	5.33	.069
	(.428)(.037) (.034) (.029)			
IR	$= .247 + .242\,Y - .128\,TBR_{t-1} + .023AVAIL + 1.08\,IR_{t-1} - .27\,IR_{t-2}$	102	3.76	.04
	(.274) (.066) (.033) (.017) (.111) (.106)			
TAX	$= 3.89 + .553\,Y$ or $YD = -3.89 + .447Y$	102	5.06	.116
	(.87) (.046) ***			

REDUCED-FORM EQUATION

Y	$= .247 + .11WEALTH - .028\left(\sum_{i=0}^{2} TBR_{t-i}\right)/_3 + 1.21\left(\sum_{i=1}^{2} C_{t-i}\right)/_3 + .127\,Y_{t-1}$
	(.21) (.0075) (.0021) (.08) (.009)
	$- .654\left(\sum_{i=0}^{3} RB_{t-i}\right)/_4 - .091CAP - .181\,TBR_{t-1} + .032AVAIL + 1.53\,IR_{t-1} - .38\,IR_{t-2} + 1.416G$
	(.042) (.009) (.0175) (.021) (.086) (.063) (.096)

NOTES: (1) The structure of the model is log-linear.
(2) Standard errors are the numbers in parentheses under the estimated coefficients.

TABLE 4-3

REGRESSION RESULTS, GOODS ONLY, UI MODEL (GUI)

DEPENDENT VARIABLE	REGRESSION EQUATION	N	MEAN OF DEP. VAR.	SEE
C	$= .374\,(1-.06U) + .09YD + .144UIB + .054WEALTH - .02\,(\sum_{i=0}^{2} TBR_{t-i})/_3 + .94(\sum_{i=1}^{3} C_{t-i})/_2$	102	6.44	.008
	(.108) (.021) (.031) (.023) (.004)			
INR	$= .02 + .077Y_{t-1} - .47\,(\sum_{i=0}^{3} RB_{t-i})/_4 - .066CAP$	102	5.33	.069
	(.236)(.036) (.033) (.029)			
IR	$= .319 + .201Y - .096TBR_{t-1} + .078AVAIL + 1.03IR_{t-1} - .20IR_{t-2}$	102	3.76	.004
	(.213) (.061) (.029) (.055) (.104) (.102)			
TAX	$= 4.09 + .56Y$ or $YD = -4.09 + .44Y$	102	5.06	.12
	(4.47)(10.00) ***			
UIB	$= .26 + .21PD + .22WAGEX + .0115COV - .146(Y-YP)$	102	.184	.074
	(.388)(.041) (.147) (.008) (.041)			
U	$= 1.06 - .18\,(Y-YP) - .063\,(Y-Y_{t-1}) + .59PD - .44D2 - .46D3 - .35D4 + .18U_{t-1}$	102	-3.74	.139
	(.78) (.028) (.034) (.134) (.072) (.038) (.037) (.071)			

REDUCED-FORM EQUATION

Y	$= .434 + .07WEALTH - .026\,(\sum_{i=0}^{2} TBR_{t-i})/_3 + 1.21\,(\sum_{i=1}^{2} C_{t-i})/_2 + .098Y_{t-1} - .607\,(\sum_{i=0}^{3} RB_{t-i})/_4$
	(.255) (.009) (.003) (.111) (.032) (.057)
	$- .085CAP - .124TBR_{t-1} + .10AVAIL + 1.331IR_{t-1} - .258IR_{t-2} + .0196PD + .04WAGEX$
	(.025) (.016) (.043) (.113) (.046) (.011) (.013)
	$+ .0021COV + .021YP + .014D2 + .014D3 + .011D4 - .006U_{t-1} + 1.291\,G$
	(.009) (.019) (.022) (.011) (.012) (.004) (.116)

NOTES: (1) The structure of the model is log-linear.
(2) Standard errors are the numbers in parentheses under the estimated coefficients.

TABLE 4-4

REGRESSION RESULTS, ENTIRE MODEL, NO UI (WNUI)

DEPENDENT VARIABLE	REGRESSION EQUATION	N	MEAN OF DEP. VAR.	SEE
C	$= .395 + .112YD + .056WEALTH - .02\ (\sum_{i=0}^{2} TBR_{t-i})/_3 + .876(\sum_{i=1}^{2} C_{t-i})/_2$	102	6.44	.0077
	(.061) (.047) (.012) (.003) (.059)			
INR	$= .06 + .118Y_{t-1} - .448\ (\sum_{i=0}^{3} RB_{t-i})/_4 - .062CAP$	102	5.33	.07
	(.213)(.037) (.034) (.029)			
IR	$= .278 + .30Y - .137TBR_{t-1} + .026AVAIL + 1.07IR_{t-1} - .26IR_{t-2}$	102	3.76	.041
	(.206) (.057) (.03) (.028) (.111) (.105)			
TAX	$= 3.97 + .555Y$ or $YD = -3.97 + .445Y$	102	5.06	.116
	(.703)(.048) ****			
TBR	$= .49 + .868Y + .059(Y_{t-1}-Y_{t-2}) - .437M1 + .306INF$	102	1.54	.268
	(.26) (.314) (.033) (.206) (.103)			
RB	$= .17 + .059TBR + .20\ (TBR-TBR_{t-1}) + .93RB_{t-1}$	102	1.83	.026
	(.099)(.013) (.043) (.077)			

REDUCED-FORM EQUATION

Y	$= .10 + .0728WEALTH - .026\ (\sum_{i=1}^{2} TBR_{t-i})/_2 + 1.14\ (\sum_{i=1}^{2} C_{t-i})/_2 + .143\ Y_{t-1}\ .01Y_{t-2} - .582\ (\sum_{i=1}^{3} RB_{t-i})/_3$
	(.124)(.026) (.009) (.41) (.068) (.008) (.21)
	$- .081CAP - .061TBR_{t-1} + .033AVAIL + 1.39IR_{t-1} - .338IR_{t-2} - .542RB_{t-1}$
	(.042) (.029) (.019) (.503) (.179) (.195)
	$+ .077M1 - .055INF + 1.30G$
	(.041) (.032) (.467)

NOTES: (1) The structure of the model is log-linear.
(2) Standard errors are the numbers in parentheses under the estimated coefficients.

TABLE 4-5

REGRESSION RESULTS, ENTIRE MODEL, UI (WUI)

DEPENDENT VARIABLE	REGRESSION EQUATION	N	MEAN OF DEP. VAR.	SEE
C	$= .332\ (1-.091U) + .165YD + .235UIB + .025WEALTH - .038\ (\sum_{i=0}^{2} TBR_{t-i})/3 + .72\ (\sum_{i=1}^{2} C_{t-i})/2$	102	6.44	.013
	(.038) (.045) (.081) (.009) (.021) (.087)			
INR	$= .06 + .20Y_{t-1} - .411\ (\sum_{i=0}^{3} RB_{t-i})/4 - .057CAP$	102	5.33	.075
	(.177)(.042) (.037) (.033)			
IR	$= .206 + .293Y - .156TBR_{t-1} + .002AVAIL + 1.16IR_{t-1} - .33IR_{t-2}$	102	3.76	.041
	(.233) (.072) (.037) (.005) (.099) (.095)			
TAX	$= 4.00 + .546Y$ or $YD = -4.00 + .454Y$	102	5.06	.285
	(.97) (.051)			
TBR	$= .024 + 1.15Y + .14\ (Y_{t-1}\ Y_{t-2}) - .39M1 + .077INF$	102	1.54	.232
	(.016) (.285) (.12) (.189) (.069)			
RB	$= .63 + .05TBR + .215(TBR-TBR_{t-1}) + .94RB_{t-1}$	102	1.82	.026
	(.097)(.014) (.037) (.078)			
UIB	$= .19 + .11PD + .17WAGEX + .0055COV - .205(Y-YP)$	102	.184	.053
	(.213)(.035) (.066) (.004) (.061)			
U	$= .94 - .42(Y-YP) - .16(Y-Y_{t-1}) + .425PD - .74D2 - .55D3 + .36D4 + .70U_{t-1}$	102	.374	.116
	(.417)(.165) (.038) (.101) (.066) (.042) (.043) (.091)			

REDUCED-FORM EQUATION

Y	$= .037 + .03WEALTH - .046\ (\sum_{i=1}^{2} TBR_{t-i})/2 + .866(\sum_{i=1}^{2} C_{t-i})/2 + .209\ Y_{t-1} + .024\ Y_{t-2}$
	(.0247)(.0145) (.0215) (.103) (.0843) (.0138)
	$- .494\ (\sum_{i=1}^{3} RB_{t-i})/3 - .068CAP - .082TBR_{t-1} + .0024AVAIL + 1.39IR_{t-1} - .40IR_{t-2}$
	(.0964) (.0579) (.0332) (.0027) (.25) (.111)
	$+ .069M1 - .013INF + .0156PD + .048WAGEX + .0015COV + .042YP - .545RB_{t-1}$
	(.0302) (.0095) (.0081) (.0326) (.00083) (.0259) (.0781)
	$+ .026D2 + .02D3 + .013D4 - .025U_{t-1} + 1.206G$
	(.0221) (.0212) (.0178) (.0114) (.374)

NOTES: (1) The structure of the model is log-linear.
(2) Standard errors are the numbers in parentheses under the estimated coefficients.
(3) See note 3, Table 4-3.

the exogenous policy variable, government spending, declines. For example, a decline in government spending reduces national income, which is then transmitted to declines in consumption and investment leading to a further fall in national income through the multiplier process. However, with the addition of the UI program, disposable income does not fall as much, helping to maintain consumption and preventing income from falling as much as in a world without the UI program. Therefore, the coefficient on government spending should be smaller in a world with the UI program. As expected, the size of the coefficient on government spending is reduced by the inclusion of the UI program in the model. The reduction in the coefficient between the models is 8.83 percent. In reality, the models without an explicit UI program and with no money sector are incorrectly specified. This specification error causes the estimated coefficient on government spending to be biased upward. The amount of specification error is equivalent to the measured effectiveness of the UI program. Table 4-6 shows comparisons of important impact elasticities obtained from the reduced-form equations of the four models. This simple comparison of impact elasticities of exogenous variables is almost what other studies used as their measure of effectiveness of the UI program.

The next two models to be compared are those adding a money sector to the goods sector, with and without the UI program included (Tables 4-4 and 4-5). This comparison can be seen graphically in Figure 4.1. Comparison of the derived reduced-form equation from the two models reveals a 7.20 percent reduction of the impact elasticity on exogenous spending due to the inclusion of the UI program in the model. To simplify Figure 4.1, I assume only one interest rate in the

TABLE 4-6

IMPACT ELASTICITY COMPARISONS

Model	Elasticity	Estimated Value	% Reduction of the Estimated Value Due to the Addition of: The UI Program	A Money Sector
GNUI	Government Spending	1.416	8.83%	
GUI	Government Spending	1.291	((1.416 - 1.291)/1.416)	
WNUI	Government Spending	1.30	7.2%	
WUI	Government Spending	1.206	((1.30 - 1.206)/1.30)	
GUI	Government Spending	1.291		6.6%
WUI	Government Spending	1.206		((1.291 - 1.206)/1.291)
GUI	Potential Duration	.0196		20.4%
WUI	Potential Duration	.0156		((.0196 - .0156)/.0196)
GUI	UI Coverage	.0021		28.6%
WUI	UI Coverage	.0015		((.0021 - .0015)/.0021)

Model	Measured Effectiveness	% Reduction in Measure Effectiveness Due to the Addition of a Money Sector
Goods Only	8.83%	18.46%
Entire Model	7.20%	((9.93 - 7.2)/8.83)

NOTE: See note (*), Table 4-1, for a listing of the different models.

model. IS and IS* are the initial IS curves for models without and with the UI program respectively. A decrease in government spending or some other exogenous variable shifts both curves down by an equal amount. Is_{NEW} and $IS*_{NEW}$ are the IS curves after such a change corresponding to IS and IS*. The addition of the money-sector equations in the model causes the slope of the LM curve to become positive, rather than zero in the goods-only models. The LM curve for a goods-only model is represented by a horizontal line at a fixed interest rate, r*. Above, measured effectiveness was estimated to be 8.83 percent. This is represented in Figure 4-1 as $(Y_4-Y_2)/(Y_4-Y_0)$. The LM curve for a model that includes a money sector (an endogenous interest rate) is represented by the LM curve in Figure 4-1. Measured effectiveness of the UI program was estimated to be 7.20 percent for these models. This is represented in Figure 4-1 as $(Y_3-Y_1)/(Y_3-Y_0)$. (Figure 4-1 is not drawn to coincide with the estimates obtained in Tables 4-2 through 4-5, merely as an aid to illustrate the comparisons found in Table 4-6).

The inclusion of the UI program in the model reduces the impact elasticities of exogenous variables in both models. The percentage reduction of the impact elasticity of exogenous spending is smaller in the model including money. The inclusion of a money sector allows interest movements that affect investment and consumption, and thus income. (This is the crowding out effect.) This effect further reduces the impact elasticity of exogenous spending below that of the goods only, no UI model. Since the reduction in the impact elasticity of exogenous spending due to the addition of the UI program is taken as a measure of the stabilization effectiveness of the UI program, the measured effectiveness of the program is reduced by 18.46 percent when a

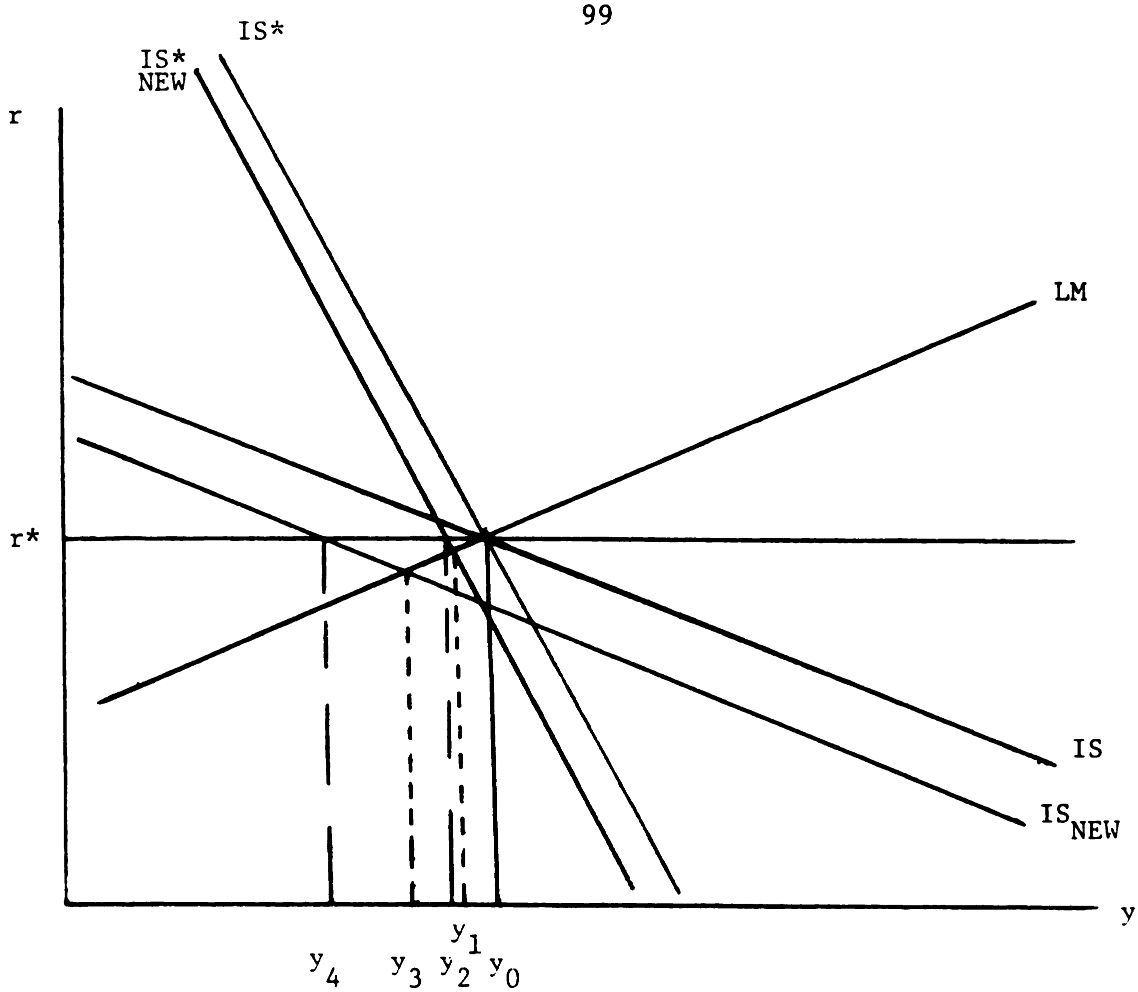


FIGURE 4-1

IS-LM REPRESENTATION OF THE COMPARISON OF MEASURED EFFECTIVENESS BETWEEN GOODS-ONLY AND ENTIRE MODELS money sector is introduced in the model. This figure is just the percentage change in the estimated effectiveness measures of the two models shown in Table 4-6 and Figure 4-1.

One other pair of models can be compared to determine the effect the addition of a money sector has on the effectiveness of the UI program as an automatic stabilizer. Looking at the two models that incorporate the UI program, one can determine the effect the addition of a money sector has on the impact elasticities of average potential duration, UI coverage, and government spending. The impact elasticity of average potential duration is .0196 in the goods-sector-only model. This means that a one percent increase in duration, measured in weeks, will cause national income to rise by .0196 percent. The impact elasticity of UI coverage shows that a one percent increase in the ratio of covered employment to the total labor force will increase national income by .0021 percent. The impact elasticities of average potential duration and UI coverage are reduced to .0156 (a 20.4 percent decrease) and .0015 (a 28.6 decrease) respectively, due to the addition of a money sector to the model. The smaller reduction in the effect of average potential duration shows it may be a better vehicle for maintaining consumption and stabilize the economy than expanding coverage. Expanded coverage would most likely be awarded to those not constrained by too little savings or the inability to borrow at a reasonable interest rate to help maintain their consumption. With a smaller percentage of UI recipients spending all of their UI income, a smaller "bang for the buck" would result, causing the measured effectiveness to decrease.

The government spending elasticity is reduced by 6.6 percent due to the addition of a money sector. This is the crowding-out effect.

This is shown graphically in Figure 4-1. The reduction in the government spending elasticity is $(Y_2-Y_1)/(Y_2-Y_0)$. This reduction is smaller than the two UI policy variables, because a one percent change in government spending induces more of a change in consumption and income than a one percent change in either avarage potential duration or UI coverage. The larger effect on consumption is not as overwhelmed by the interest-induced changes in consumption and investment caused by the monetary reactions to changes in these policies. Therefore, the percentage reduction in the elasticity of government spending is less than that of the two UI program policy variables.

On the basis of the elasticity comparisons above, I conclude that the estimates of measured effectiveness obtained in Chapter III and other previous studies assuming only a goods sector in aggregate demand are overstated by between ten and twenty percent.

4.5 Conclusion

Failing to include a money sector in estimating the measured effectiveness of the UI program causes an overstatement of measured effectiveness by ten to twenty percent. The lack of a money sector ignores the possibility of monetary reactions to fiscal policy (such as crowding out in the Hicksian sense). All previous studies implicitly credited all the dampening of the movements in income during business cycles to the UI program alone by failing to take account of a money sector. No credit was given to changes in the monetary sector produced by fiscal policy nor to any monetary policies. I have shown that this omission is a serious flaw in their analysis, and conclusions drawn from such analyses must be viewed with this in mind.

Another way to explain the overstatement in the measured effectiveness of the UI program when a money sector is not included in aggregate demand is the concept of specification error (bias). Measured effectiveness is equivalent to a measure of the bias in the coefficients obtained by estimating a misspecified model rather than a correctly specified model. Failing to include the UI program in goods-only model produces an upward bias in the estimated impact elasticities of the exogenous variables in the model. I estimate this bias to be 8.83 percent of the coefficients from the correctly specified model. Using the definition of measured effectiveness, I claim that 8.83 percent of a further change in income is prevented by the UI program. However, the model is still misspecified because it does not include a money sector. Therefore, the above estimate of the bias is itself biased upward. Including a money sector reduces the estimate of the bias to 7.20 percent. Failing to include the UI program in aggregate demand produces a 7.20 upward bias in the impact elasticities of the exogenous variables. The estimated measured effectiveness of the UI program is 7.20 percent. This is below the estimates of the average measured effectiveness of the program obtained in previous research.[13/]

The conclusions found in Chapter III must be viewed carefully, as the analysis proceeded implicitly under a goods-only model. What do the findings of this chapter mean in terms of those results? The average effectiveness of five postwar recessions was found to be 15.6 percent, and the average effectiveness of the five subsequent recoveries was found to be slightly lower, 15.2 percent. The findings here suggest these figures should be reduced on the order to (say) fifteen percent. This is the midpoint of the range of the specification error (bias) produced by not including a money sector in models of aggregate demand. This reduces the average effectiveness measures to 13.3 percent and 12.9 percent for recessions and recoveries, respectively.

The results also have an implication for the finding in Section 3.4 that all discretionary extended benefits programs detracted from the effectiveness of the UI program. Since the addition of a money sector reduces the stabilization effectiveness of the program, it should be that the addition of a money sector reduces the destabilization induced by extended benefits. This is indicated by the reduced impact elasticity of the policy variable, average potential duration, when comparing models with and without a money sector and containing the UI program.

CHAPTER FOUR

NOTES

1/ For example, see Clement (1960); Rejda (1966); and Eilbott (1966) for the U.S., and Thirlwall (1969) for the U.K.

2/ In Appendix B, I derived the measured effectiveness equation used to estimate the measured effectiveness of the UI program in recession and recovery (Section 3.4). The model behind the equation was assumed linear, so the estimated coefficients are simple derivations that yield impact multipliers. In this chapter, I assume the model to be log-linear. The estimated coefficients in this model are impact elasticities rather than multipliers. This does not alter the results of Appendix B except measured effectiveness is not the amount of a further percentage change in income that is prevented by the UI program. The use of a log-linear structure alleviates the problems encountered by past studies in their measurement of stabilization effectiveness of the UI program. Instead of disposable income, corporate profits after tax, UI taxes and UI benefits being constant proportions of national income as in Appendix B, these relationships become exponential. This helps take account of growth over time of these variables, which was shown in Section 3.3 to yield more accurate estimates of measured effectiveness.

3/ Musgrave and Miller (1948).

4/ Pindyck and Rubinfeld (1981), Chapter 13.

5/ Kmenta and Smith (1973).

6/ Duggal, Klein, and McCarthy (1974).

7/ Rasche and Shapiro (1968).

8/ Actually, GNP would be more appropriate, but to keep the model simple and to keep the simple tax equation correct (the use of GNP would eliminate the effect of business taxes), income is used instead of GNP throughout the model.

9/ Hamermesh (1980).

10/ The potential GNP series is found in Tatom (1982), p. 16.

11/ Goldberger, Nagar, and Odeh (1961).

12/ See the table listing estimates of measured effectiveness of the UI program obtained by previous studies on p. 63, Hamermesh (1977).

CHAPTER FIVE

THE STABILIZATION EFFECTIVENESS OF THE UI PROGRAM IN THE CONTEXT OF AN AGGREGATE DEMAND MODEL II: ADDING A GOVERNMENT BUDGET CONDITION

5.1 Introduction

The analysis of the stabilization effectiveness of the UI program in the previous chapter focused on an aggregate demand model and on the monetary reactions that accompany changes in exogenous, fiscal policy variables. Impact elasticities for several policy variables were estimated for each of four models, allowing the calculation of several measures of effectiveness of the UI program. The major conclusion of Chapter IV was that the addition of a money sector decreases the measured effectiveness of the UI program. By not taking account of monetary reactions to fiscal policy and of exogenous goods-sector shocks, measured effectiveness is overestimated by ten to twenty percent. This overestimate may lead to an unwarranted reliance on the UI program as an automatic stabilizer by policy makers.

The analysis of the previous chapter dealt only with monetary reactions to changes in the goods sector, whether the changes were autonomous shocks or changes in fiscal policy. This chapter takes the analysis one step further by introducing a government budget condition to each of the models. This condition requires that the government finance deficits that arise due to increased government spending or higher UI benefit payments by selling bonds to the public or to the Federal Reserve. Section 5.2 contains the theoretical background for including a government budget condition to the model. Section 5.3 reports the estimated impact elasticities for the policy variables in the models when the deficit financing constraint is considered. Also in this section is a comparison of these impact elasticities to those estimated in Chapter IV, as well as an analysis of how measured effectiveness is changed due to the addition of the government budget condition to the models. Two new models are estimated in Section 5.4. These models assume that changes in the money supply are endogenous and interest rates are pegged. Impact elasticities for these models are estimated and compared to those of the four models in Section 5.3. This chapter, especially section 5.2, draws heavily on Silber (1970) [1/], Christ (1969) [2/], Blinder and Solow (1974) [3/] and Infante and Stein (1976). [4/]

5.2 Theoretical Background

Assume the government finances any deficits that arise by either: (1) issuing bonds to the public thereby increasing the amount of government bonds outstanding; (2) selling bonds to the public, who then sell these bonds to the Federal Reserve, effectively monetizing the debt by increasing the money supply; or (3) some combination of (1) and (2). Case (3) is the general case with (1) and (2) being the extremes.

In a world without the UI program, the deficit can be described by

(5.1) $DEF = G - TAX + BIP;$

where DEF is the deficit;

G is government spending;

TAX is total tax receipts; and

BIP is the amount of interest paid on outstanding government bonds.

All values are in 1972 dollars. The deficit can be negative, i.e., a surplus, meaning tax receipts more than cover the outlays for interest payments and government spending. An increase in the deficit is analytically equivalent to a decrease in the surplus. This is an important fact when dealing with the UI program, as the UI Trust Fund was in aggregate in surplus through 1981, but the surplus has declined since the 1969-1970 recession.

Deficits can be financed either by a change in the money supply, a change in government bonds outstanding, or both. The deficit equation becomes

(5.2) $DEF = G - TAX + BIP = BASE + B;$

where B is the percentage change in the number of bonds outstanding; and BASE is the percentage change in the monetary base. Government bonds are assumed to be fixed price, variable coupon bonds. The price can be assumed to be fixed at $1.00, so the dollar amount of bonds outstanding equals the number of bonds outstanding. All variables are measured in constant dollars.

These types of bonds introduce a complication into the analysis. When the models involving a money sector with endogenous interest rates are analyzed, the BIP term becomes endogenous. This makes the method of financing endogenous, making everything, including the money supply and/or the number of bonds outstanding, endogenous. Theoretically, this complication can be handled, but problems arise when trying to estimate the model. Specifically, the inclusion of interest payments on government bonds outstanding causes the money supply to become endogenous. This makes the entire money sector endogenous, and causes the model to become underidentified as the number of predetermined variables falls below the number of endogenous variables. The model cannot be estimated when this condition holds. To alleviate this rather difficult problem, I omit interest payments from the deficit equation.[5/] The revised deficit equation is

(5.2*) DEF = G - TAX = BASE + B.

With the addition of the UI program, the deficit equation must also include the amount of UI payments. For simplicity, I assume there are no UI taxes in this analysis. Alternatively, UI taxes could be lumped with total taxes and enter the deficit equation in that manner. The analysis is not substantively affected by either assumption. The deficit equation becomes

(5.3) DEF = G - TAX + UIB = BASE + B.

Each of the four models from Chapter IV is estimated subject to the appropriate government budget condition for that model. Each model is solved algebraically for its reduced-form equation under two assumptions: (1) The government budget condition is ignored; and (2) The government budget condition is considered. The first assumption was implicit in the estimates obtained in Chapter IV. After solving the model algebraically, I substitute in the values of the estimated coefficients obtained in Chapter IV, including the terms involved in the government budget condition when it is considered. The algebraic derivations of the impact elasticities of the models subject to a government budget equation are found in Appendix C. For example, in the goods-sector-only, no UI model (GNUI), the impact elasticity of government spending with respect to income when the deficit financing constraint is considered is

(5.4) $dY/dG_F = [(a_2/D)d(BASE+B)/dG] + (1/D);$

where

dY/dG_F is the impact elasticity of government spending with respect to income when the deficit financing constraint is considered;

$(1/D)$ is the impact elasticity of government spending with respect to income when deficit financing is ignored, i.e., dY/dG_{NF};

d is the total differential operator; and

a_2 is a positive coefficient.

dY/dG_F is the sum of the impact elasticity on government spending when deficit financing is ignored,[6/] plus a term involving changes in wealth.[7/] From Appendix C, the wealth effect is

(5.5) $d(BASE+B) = (a_2/D)(1-V_1(dY/dG_{NF})).$

Substituting this expression into (5.4), then substituting the appropriate values of a_2, V_1, D, and dY/dG_{NF} from Table 4-2 will produce an estimate of dY/dG_F.

Appendix C gives the condition under which the wealth effect is greater than zero. When the wealth effect is positive, the impact elasticity of government spending with respect to income when the deficit financing constraint is considered is larger than that when deficit financing is ignored. This particular result holds true for the goods-sector-only models no matter whether an increase in bonds outstanding or an increase in the money supply is used to finance the deficit. This result is due to the assumptions of an automatically equilibrating money sector and fixed interest rates in this class of models. With no increase in interest rates, income increases by more than the fiscal effect, through the wealth effect on consumption.

5.3 Empirical Results

Following the procedures outlined in Appendix C, I estimate impact elasticities for all four models of Chapter IV. Tables 5-1 and 5-2 contain the result of these estimation procedures, and are analyzed in this section.

Goods-Sector-Only Models

The impact elasticity from the goods-only, no UI model (GNUI) ignoring deficit financing, was estimated in Chapter IV to be 1.416. The parameters necessary for calculating the wealth effect are obtained from Table 4-2. These parameters are: $a_2 = .078$, $V_1 = .533$, $D = .706$, and as indicated above, $dY/dG_{NF} = 1.416$. The estimated wealth effect is .024, giving the estimated impact elasticity of government spending when

TABLE 5-1

IMPACT ELASTICITIES, GOODS-ONLY MODELS

Model	Elasticity	Estimated Value	Wealth Effect	Fiscal Effect
GNUI				
No Financing	Government Spending	1.416		
Financing	Government Spending	1.440	.024	1.416
GUI				
No Financing	Government Spending	1.291		
Financing	Government Spending	1.2972	.0062	1.291
No Financing	Average Potential Duration	.0196		
Financing	Average Potential Duration	.0329	.0133	.0196
No Financing	UI Coverage	.0021		
Financing	UI Coverage	.0028	.0007	.0021

NOTES: (1) The models are: GNUI, goods only, no UI program; and, GUI, goods only, UI program.

(2) The No Financing elasticities are estimated in models where the government budget condition is ignored. The estimated values of these elasticities are taken from Table 4-2 for GNUI, and Table 4-3 for GUI.

(3) The Financing elasticities are estimated in models that are subject to the government budget condition. The estimated values of these elasticities are obtained following the procedure shown in Appendix C.

TABLE 5-2

IMPACT ELASTICITIES, ENTIRE MODELS

Model	Elasticity	Estimated Value	Wealth Effect	Liquidity Effect	Portfolio Effect	Fiscal Effect
WNUI						
No Financing	Government Spending	1.30				
Financing, All Money	Government Spending	1.3382	.02	.021	-.0028	1.30
, All Bonds	Government Spending	1.3172	.02		-.0028	1.30
WUI						
No Financing	Government Spending	1.206				
Financing, All Money	Government Spending	1.215	.0028	.0065	-.0004	1.206
, All Bonds	Government Spending	1.208	.0028		-.0004	1.206
No Financing	Average Potential Duration	.0157				
Financing, All Money	Average Potential Duration	.0249	.0029	.0068	-.00046	.0157
, All Bonds	Average Potential Duration	.0181	.0029		-.00046	.0157
No Financing	UI Coverage	.0015				
Financing, All Money	UI Coverage	.00191	.00013	.0003	-.00002	.0015
, All Bonds	UI Coverage	.00161	.00013		-.00002	.0015

NOTES: (1) The models are: WNUI, entire model, no UI program; WUI, entire model, UI program.
(2) The estimated values for the No Financing elasticities are taken from Table 4-4 for WNUI, and Table 4-5 for WUI.
(3) The estimated values for the Financing elasticities are estimated following the procedure shown in Appendix C.

the deficit financing constraint is considered of 1.44. (See Table 5-1.)

The goods-sector-only, UI model (GUI) is also shown in Table 5-1. As shown in Appendix C, the impact multipliers of the three policy variables can be obtained by totally differentiating the reduced-form equation for income, and assuming changes in all variables except the policy variables are equal zero. When considering the elasticity of government spending with respect to income, dPD = dCOV = 0. The impact elasticity of government spending with respect to income when the deficit financing constraint is considered is written as

$$(5.6) \quad dY/dG_F = (a_2/D)(1-(V_1+f_4)(dY/dG_{NF}) + dY/dG_{NF}.$$

The fiscal effect was estimated as 1.291 in Chapter IV. Using the appropriate estimated parameters obtained from Table 4-3, the wealth effect is .006. Thus, the impact elasticity of government spending with respect to income with the deficit financing considered in this model is 1.297. Table 5-3 shows comparisons of important impact elasticities obtained in this section. The addition of the UI program has reduced the impact elasticity of government spending with respect to income by 9.9 percent in the goods-sector-only models. Thus, 9.9 percent is the measured effectiveness of the UI program in this model.

Comparisons of the changes of the measured effectiveness of the UI program due to the addition of a money sector and the addition of a government budget condition are listed in Table 5-4. The measured effectiveness of the UI program in goods-sector-only models ignoring deficit financing was estimated to be 8.83 percent in Chapter IV. This

TABLE 5-3

A COMPARISON OF IMPACT ELASTICITIES, MODELS WITH A GOVERNMENT BUDGET CONDITION

Model	No UI Program	UI Program	Measured Effectiveness
Goods Sector Only	1.44	1.2972	9.9% (=(1.44 - 1.2972)/1.44)
Entire Model			
Money Finance	1.3382	1.215	9.19%
Bond Finance	1.3172	1.208	8.27%

Model	Government Spending	Average Potential Duration	UI Coverage
Goods Sector Only, UI	1.297	.0329	.0028
Entire Model, UI			
Money Finance	1.215	.0249	.00191
Bond Finance	1.208	.0181	.00161

NOTE: (1) See note 3, Table 5-1.

TABLE 5-4

A COMPARISON OF THE ESTIMATED MEASURED EFFECTIVENESS OF THE UI PROGRAM FROM DIFFERENT MODELS

	Goods Sector Only	Entire Model	(Bond Finance)	(Money Finance)	% Reduction of Measured Effectiveness Due to the Addition of a Money Sector
No Finance	8.83%	7.2%			18.46%
Bond Finance	9.9%		8.27		16.5%
Money Finance	9.9%			9.19%	7.17%

	No Finance	Bond Finance	Money Finance	% Increase of Measured Effectiveness Due to the Addition of a Government Budget Condition
Goods Sector Only	8.83%	9.9%	9.9%	10.8%
Entire Model	7.2%			
Bond Finance		8.27%		12.9%
Money Finance			9.19%	21.6%

compares with 9.9 percent when the deficit financing constraint is considered, an increase of 10.8 percent.

The above increase is due to the wealth effect. The addition of the UI program not only reduces the fiscal effect (by 8.83 percent), but it reduces the amount of the deficit that need be financed. As government spending is increased, the increase is partly funded by an induced increase in tax revenues. In a model with no UI program, the difference between the increased spending and the smaller increased revenue must be financed by selling bonds indirectly to the Federal Reserve through the public (money financing) or directly to the public (bond financing). The addition of the UI program reduces the difference between increased spending and increased revenue via benefit reductions as income (employment) increases in response to the fiscal policy. (With a special UI tax argument in the government budget equation, the difference would shrink further as more revenues would be added.) A smaller deficit requires less financing, which means less of a wealth effect. Because the addition of the UI program reduces both the fiscal and wealth effects when the deficit financing constraint is considered (instead of just the fiscal effect when deficit financing is ignored), measured effectiveness of the UI program increases.

Entire Models

The analysis above is continued for the models containing a money sector, with and without the UI program. However, unlike the goods-sector-only models, the analysis depends on how the increased deficits are financed, since a money sector is included in the models. The wealth effect is still calculated the same way and does not depend on the method of financing. However, if the government sells bonds indirectly to the Federal Reserve through the public to finance the deficit, effectively monetizing the deficit by increasing the money supply, there is a further effect on income, the liquidity effect.[8/] An increase in the money supply causes an excess supply of money beyond what is demanded at the new equilibrium income level and interest rates. Interest rates fall inducing an increase in investment and consumption, and thus in income. The combination of falling interest rates and rising income gives rise to a larger demand for money to equilibrate the money sector. Financing the deficit by selling bonds to the Federal Reserve serves to increase the impact elasticities of the policy variables. The liquidity effect is not evident when bonds are sold to the public since there is no increase in the money supply. Consequently, impact elasticities are smaller under bond financing than under money financing.

When a money sector is added, there is a further effect that reduces impact elasticities in either a bond or money financing regime. This effect is known as the portfolio effect.[9/] Assuming net household wealth plays a role in the decisions about the demand for money, an increase in wealth via an increase in bonds and/or money increases the demand for money. For given levels of income and money supply, people demand more money, causing a shortage when wealth increases. Interest rates rise, and this induces a fall in income through investment and consumption effects. This combination of declining income and rising interest rates equilibrates the money sector by inducing a decrease in money demanded.

If money financing is employed, the combination of wealth and liquidity effects will overwhelm the portfolio effect.[10/] This will make the impact elasticities of the policy variables with respect to income subject to the deficit financing constraint larger than the impact elasticities ignoring deficit financing. However, when there is bond financing, the wealth effect may not be large enough to overwhelm the portfolio effect. Therefore, the impact elasticities subject to the deficit financing constraint may be smaller than the impact elasticities when deficit financing is ignored. This is strictly an empirical matter and a topic which has received much attention in the debate on fiscal versus monetary policy.[11/] Unfortunately, much of the controversy depends on the role that bond interest payments play in the deficit equation and on the stability of the model when these payments are included.[12/] Since I have disregarded bond interest payments in this paper in order to estimate the model, I do not add to the controversy. I only report on how much the impact elasticities fall due to the portfolio effect.[13/]

Impact elasticities for the entire model, no UI program (WNUI), are listed in Table 5-2. From Appendix C, the impact elasticity of government spending with respect to income when the deficit financing constraint is considered is written as

$$(5.7) \quad dY/dG_F = (a_2/D)d(BASE+B)/dG + (1/D)dM1/dG + 1/D + \text{portfolio effect.}$$ [14/]

The term (1/D)dM1/dG enters the elasticity equation only if the money supply is increased to finance the increased government spending. This term is the liquidity effect. For simplicity, I assume BASE and M1 are equal in this chapter and Appendix C. This would be the case if the M1 money multiplier is equal to one. Since it is greater than one, the estimates obtained in this chapter are somewhat overstated. The wealth and portfolio effects are part of the elasticity equation regardless of the method of financing.

In Appendix C, I use the government budget equation to find the values of [(dBASE+dB)/dG] to substitute into equation (5.7). The substitution is:

$$(5.8) \quad dBASE/dG \text{ or } (dBASE+dB)/dG = 1-V_1(dY/dG_{NF}).$$

Using the estimated values of a_2, V_1, D and dY/dG_{NF} from Table 4-4, the estimated liquidity effect is .021 if the deficit is financed by selling bonds to the Federal Reserve, and the estimated portfolio effect is -.0028 using the procedure from footnote 13. The estimated impact elasticity of government spending with respect to income under a bond financing regime is 1.317. The estimate impact elasticity under a money financing regime is 1.338. In the general case of mixed financing, that is, some bond financed and some money financing, the impact elasticity would take on values between 1.317 and 1.338. Notice that the additional effects created by considering the deficit financing condition make very little difference in the estimated impact elasticity of government spending.

The next model introduces the UI program into the structural equations and the deficit equation. The impact elasticity equation is the same as equation (5.7). From Appendix C, the expression substituted into (5.7) for the wealth and liquidity effect is:

$$(5.9) \quad dM1/dG \text{ or } (dBASE+dB)/dG = 1-(V_1+f_4)(dY/dG_{NF}).$$

Using the estimates for V_1, f_4, a_2, D and dY/dG_{NF} from Table 4-5, the estimated wealth effect is .0028. The estimated liquidity effect is .0065 assuming all money financing, and the estimated portfolio effect is -.00043 using the procedure described in footnote 13. The estimated impact elasticity of government spending with respect to income under a bond financing regime is 1.208; under a money-financing regime it is 1.215. Again, the additional effects created by considering the deficit financing condition make very little difference in the estimated impact elasticity of government spending.

As was the case for the goods-sector-only models, Table 5-4 shows comparisons of the changes of the measured effectiveness of the UI program due to the addition of a money sector, and due to the addition of a government budget condition. The measured effectiveness of the UI program for model containing a money sector but ignoring deficit financing is 7.2 percent. When the deficit financing constraint is considered, measured effectiveness increase to 8.27 percent (an increase of 12.9 percent) for all bond financing, and to 9.19 percent (an increase of 21.6 percent) for all money financing. The reason for the increase was explained in the previous subsection. The addition of the UI program reduces the fiscal, wealth and portfolio effects, increasing measured effectiveness.

The estimated impact elasticities for average potential duration and UI coverage with respect to income are listed in Table 5-5. The reduction in these impact elasticities due to the addition of a money sector in models ignoring deficit financing is 20.4 percent and 28.6

TABLE 5-5

A COMPARISON OF IMPACT ELASTICITIES FROM DIFFERENT MODELS

	Goods Sector Only	Entire Model	(Bond Finance)	(Money Finance)	% Reduction of Measured Effectiveness Due to the Addition of a Money Sector
AVERAGE POTENTIAL DURATION					
No Finance	.0196	.0156			20.4%
Bond Finance	.0329		.0181		45.0%
Money Finance	.0329			.0249	24.3%
UI COVERAGE					
No Finance	.0021	.0015			28.6%
Bond Finance	.0028		.00161		42.5%
Money Finance	.0028			.00191	31.8%

	No Finance	Bond Finance	Money Finance	% Increase of Measured Effectiveness Due to the Addition of a Government Budget Condition
AVERAGE POTENTIAL DURATION				
Goods Sector Only	.0196	.0329	.0329	40.4%
Entire Model	.0156			
Bond Finance		.0181		13.8%
Money Finance			.0249	37.3%
UI COVERAGE				
Goods Sector Only	.0021	.0028	.0028	25.0%
Entire Model	.0015			
Money Finance		.00161		6.8%
Bond Finance			.00191	21.5%

NOTE: (1) See note 3, Table 5-1.

percent for average potential duration and UI coverage, respectively.

The calculation of these impact elasticities when the models are subjected to the deficit financing constraint is shown in Appendix C. For example, for the goods-sector-only, UI model (GUI), the deficit-financing constraint when UI coverage is assumed to change is

$$(5.10) \quad d(BASE+B)/dCOV = -(V_1+f_4)(dY/dCOV_{NF}) + f_3.$$

This expression is substituted for the wealth effect term in the impact elasticity equation for UI coverage,

$$(5.11) \quad dY/dCOV_F = (a_2/D)(-(V_1+f_4)(dY/dCOV_{NF}) + f_3) + (dY/dCOV_{NF})$$

After substituting the appropriate values of a_2, V_1, f_4, f_3, D, and $dY/dCOV_{NF}$, the estimated wealth effect is .0007, making the estimated elasticity .0028. Again, this means a one percent increase in the ratio of covered employment to the total labor force increases national income by .0028 percent.

The wealth effect represents a twenty-five percent increase in the elasticity due to considerations of deficit financing. The extra benefit payments from extending coverage do not increase income enough to raise tax revenues sufficiently to reduce the increased deficit substantially. With a larger deficit, more money and/or bonds are injected into the economy to finance the deficit. The ratio of deficit financing to increased spending is higher for an increase in UI coverage than for an increase in government spending. Therefore, the wealth effect is larger relative to the fiscal effect for an increase in UI coverage than for an increase in government spending.

Following a similar approach, the impact elasticity of average potential duration in the goods-sector-only model is .0329. Again, this means a one percent increase in average potential duration will lead to a .0329 percent increase in national income. This impact elasticity increases 40.4 percent (from .0196) due to the addition of a government budget condition. The same reasoning found in the preceding paragraph explains this relatively large increase in the estimated impact elasticity.

Table 5-5 shows the estimated impact elasticities for average potential duration and UI coverage in models containing a money sector and subject to the deficit-financing constraint. There are three important points note when comparing these elasticities. First, it is clear that money financing make these fiscal measures more expansionary than bond financing. Second, the increases in the elasticities due to the addition of a government budget condition in models containing a money sector are similar to those in goods sector only models, only when money financing is used. This is not a surprising result, as money financing prevents interest rates from increasing and is nearly equivalent to the fixed interest rate assumption held in goods sector only models. The increases in the multipliers when all bond financing is considered fall far short of the increases in the goods sector only model. Finally, the estimated portfolio effects are smaller than the estimated wealth effects for these variables. This occurs because a substantial amount of deficit financing is needed when either of these two variables change. The effect of this financing serves to increase income more through the wealth effect on consumption than it does to decrease income through consumption and investment falling in response to higher interest rates brought on by a larger money demand.

5.4 Models with the Money Supply Endogeneous

Up to this point, I have analyzed models with changes in the money supply exogenous and interest rates endogenous. There is nothing sacred about this assumption; however, it does lend itself to easy exposition of the various effects (wealth, liquidity and portfolio) when deficit financing is considered.[15/] For the remainder of this section, I assume changes in the money supply are endogenous while interest rates are exogenous (pegged). As mentioned earlier, I assume that changes in M1 are equivalent to changes in the BASE in this chapter and in Appendix C.

The goods sector of these models contain the same equations as the four models already analyzed. (See Tables 4-2 through 4-5 for these equations.) The interest rate equations are replaced by one money market equation and an identity equating money supply with money demand. The estimated structural equations are shown in Tables 5-6 and 5-7. The standard errors included with the estimates of the derived reduced-form equations were estimated using the procedure described in Chapter IV developed by Goldberger, Nagar, and Odeh.[16/] The money market equation is a standard equation with changes in money depending on lagged changes in money, net household wealth, changes in the short-term interest rate, and change in income. The equation is

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TABLE 5-6

REGRESSION RESULTS, MONEY SUPPLY ENDOGENOUS, NO UI MODEL

Dependent Variable	Regression Equation	N	MEAN OF DEP. VAR.	SEE
C	$= .41 + .136YD + .051WEALTH - .02\,(\sum_{i=0}^{2} TBR_{t-i})/_{3} + .85\,(\sum_{i=1}^{2} C_{t-i})/_{2}$	102	6.44	.008
	(.055) (.047) (.012) (.004) (.051)			
INR	$= .07 + .168Y_{t-1} - .435\,(\sum_{i=0}^{3} RB_{t-i})/_{4} - .059CAP$	102	5.93	.039
	(.57) (.039) (.036) (.031)			
IR	$= .335 + .25Y - .102TBR_{t-1} + .011AVAIL + 1.23IR_{t-1} - .40IR_{t-2}$	102	3.76	.039
	(.261) (.065) (.034) (.0075) (.124) (.119)			
TAX	$= 4.01 + .54Y$ or $YD = -4.01 + .46Y$	102	5.06	.116
	(.51) (.045)			
M1	$= 1.53 + .89M1_{t-1} + .13WEALTH - .18(TBR-TBR_{t-1}) + .095\,(Y-Y_{t-1})$	102	4.03	.027
	(.56) (.049) (.051) (.077) (.031)			
	Reduced-Form Equation			
Y	$= .407 + .086(WEALTH-BASE) - .029\,(\sum_{i=0}^{2} TBR_{t-i})/_{3} + 1.245\,(\sum_{i=1}^{2} C_{t-i})/_{2} - .086CAP + .237Y_{t-1}$			
	(.217) (.011) (.0025) (.075) (.025) (.058)			
	$- .637\,(\sum_{i=0}^{3} RB_{t-i})/_{4} - .133TBR_{t-1} - .015TBR + .016AVAIL + 1.801R_{t-1} - .586IR_{t-2}$			
	(.038) (.019) (.0087) (.0095) (.13) (.071)			
	$+ .076M1_{t-1} + 1.454G$			
	(.009) (.084)			

TABLE 5-7

REGRESSION RESULTS, MONEY SUPPLY ENDOGENOUS, UI MODEL

Dependent Variable	Regression Equation	N	MEAN OF DEP. VAR.	SEE
C	$= .385(1-.034U) + .081YD + .11UIB + .051WEALTH - .018(\sum_{i=0}^{2} TBR_{t-i})/3 + .92(\sum_{i=1}^{2} C_{t-i})/2$	102	6.44	.008
	(.258) (.013) (.032) (.013) (.004) (.09)			
INR	$= .09 + .164Y_{t-1} - .415(\sum_{i=0}^{3} RB_{t-i})/4 - .059CAP$	102	5.93	.071
	(.453) (.041) (.047) (.032)			
IR	$= .43 + .211Y - .069TBR_{t-1} + .058AVAIL + 1.19IR_{t-1} - .351R_{t-2}$	102	3.76	.038
	(.141) (.049) (.024) (.046) (.093) (.089)			
TAX	$= 4.10 + .538Y$ or $YD = -4.10 + .462Y$	102	5.06	.131
	(.58 (.051)			
M1	$= 1.15 + .92M1_{t-1} + .092WEALTH - .098(TBR-TBR_{t-1}) + .053(Y-Y_{t-1})$	102	4.03	.047
	(.511) (.083) (.047) (.058) (.028)			
UIB	$= .134 + .139PD + .24WAGEX + .018COV - .24(Y-YP)$	102	.184	.057
	(.086) (.063) (.131) (.0098) (.077)			
U	$= 1.92 - 1.05(Y-YP) - .40(Y-Y_{t-1}) + .143PD - .99D2 - .607D3 - .36D4 + .97U_{t-1}$	102	-3.74	.161
	(.50) (.066) (.082) (.059) (.089) (.052) (.041) (.138)			

Reduced-Form Equation

Y	$= .532 + .073(WEALTH-BASE) - .023\sum_{i=0}^{2} TBR_{t-i}/3 + 1.196(\sum_{i=1}^{2} C_{t-i})/2 + .203Y_{t-1} - .54(\sum_{i=0}^{3} RB_{t-i})/4$			
	(.352) (.0259) (.0045) (.191) (.0678) (.0898)			
	$- .077CAP - .082TBR_{t-1} - .008TBR + .075AVAIL + 1.55IR_{t-1} - .455IR_{t-2} + .068M1_{t-1}$			
	(.048) (.0205) (.0041) (.0648) (.28) (.157) (.0114)			
	$+ .0174PD + .038WAGEX + .0026COV + .0325YP + .017D2 + .01D3 + .0065D4 - .0165U_{t-1} + 1.30G$			
	(.0073) (.0251) (.00141) (.0084) (.0095) (.0059) (.004) (.0072) (.212)			

NOTES: See Note 3, Table 4-3.

(5.12) $M1 = q_0+q_1M1_{t-1}+q_2WEALTH-q_3(TBR-TBR_{t-1}) + q_4(Y-Y_{t-1})+e_{M1}$

where

q_i, i=1,2....are positive, and all variables are listed in Table 4-1.

To find the exogenous impact elasticity, substitute the disposable income and money supply equations into the consumption equation. Then substitute consumption and both types of investment into the income identity to get

$$(5.13) \quad Y = \text{Constant} + a_1(1-V_1)Y - a_1A_0 + a_2(1+q_2)(WEALTH-BASE)$$

$$+ a_2q_1\ M1_{t-1} - a_2q_3(TBR-TBR_{t-1}) + a_2q_4(Y-Y_{t-1}) + a_2q_2M1$$

$$- a_3 \sum_{i=0}^{2} TBR_{t-i} + a_4 \sum_{i=1}^{2} C_{t-i}+b_1Y_{t-1} - b_2 \sum_{i=0}^{3} RB_{t-i} -b_3CAP$$

$$+ c_1Y - c_2TBR_{t-1} + c_3AVAIL + c_4IR_{t-1} - c_5IR_{t-2} + G .$$

There will be continuous substituting for the BASE term that appears in the wealth term of the money market equation. This continuous substitution produces a geometric series $(1+q_2+q_2^2+q_2^3+...)$ which is equivalent to $(1/(1-q_2))$. This term becomes part of the estimated coefficients of all the terms in the money market equation. Performing this operation gives the intermediate-step equation

$$(5.14)\quad Y = \text{Constant} + a_1(1-V_1)Y - a_1A_0 + a_2(1/(1-q_2))(\text{WEALTH-BASE})$$

$$+a_2q_1(1/(1-q_2))M1_{t-1} - a_2q_3(1/(1-q_2))(TBR-TBR_{t-1})$$

$$+ a_2q_4(1\ 1-q_2))(Y-Y_{t-1}) - a_3(\sum_{i=0}^{2} TBR_{t-i})/3 + a_4(\sum_{i=1}^{2} C_{t-i})/2$$

$$+b_1Y_{t-1} - b_2(\sum_{i=0}^{3} RB_{t-i})/4 - b_3CAP + c_1Y - c_2TBR_{t-1}$$

$$+ c_3AVAIL + c_4IR_{t-1} - IR_{t-2} + G .$$

The reduced-form equation for Y is

$$(5.15)\quad Y = \text{Constant*} - (a_1/D)A_0 + (a_2J/D)(\text{WEALTH-BASE})$$

$$- (a_3/D)(\sum_{i=0}^{2} TBR_{t-i})/3 + (a_4/D)(\sum_{i=1}^{2} C_{t-i})/2 + ((b_1-a_2q_4J)/D)Y_{t-1}$$

$$- (b_2/D)(\sum_{i=0}^{3} RB_{t-i})/4 - (b_3/D)CAP - ((c_2-a_2q_3J)/D)TBR_{t-1}$$

$$- (a_2q_3J/D)TBR + (c_3/D)AVAIL + (c_4/D)IR_{t-1} - (c_5/D)IR_{t-2}$$

$$+ (a_2q_2J/D)M1_{t-1} + (1-D)G ,$$

where

$J = (1/(1-q_2))$; and

$D = (1-a_1(1-V_1)-C_1-a_2q_4J)$.

D^{-1} is the implicit elasticity of government spending with respect to income, dY/dG. This term can be broken down into two parts: the first three terms, $(1-a_1(1-V_1)-C_1)$, and the last term, $(-a_2q_4J)$.

The first part is the simple impact elasticity of government spending in a model with no UI program and no money sector, ignoring deficit financing i.e., the fiscal effect. The second part needs to be explained. With interest rates fixed the money supply responds to changes in income. As (for example) government spending is increased, income rises, raising the demand for money. The supply of money must increase to equilibrate the money market. The assumption of fixed interest rates and an endogenous money supply force the money supply to increase when deficits are increased by fiscal policy. The final term is an aggregation of the wealth, liquidity, and portfolio effects described in the last section. The last term represents how much income must rise to induce money demand to increase to equilibrate the money market at the new higher money supply created by deficit financing. Since interest rates are pegged, the portfolio effect cannot be removed by rising interest rates. It must be dealt with by increasing the money supply. There is a succession of portfolio effects: this shows up in the geometric part of this term, J. Clearly, for stability, $0 < q_2 < 1$, or the money supply and income would increase continually and not approach an equilibrium. This condition holds empirically, as people only demand a fraction of their increased wealth (the higher money supply) as money. (See Tables 5-6 and 5-7 for the value of q_2 in each of the models.) The value of the impact elasticity can be estimated using the proper estimated coefficients from the structural equations of the appropriate model. The estimated impact multiplier for government spending in the model without UI is 1.465.

The reason models with changes in the money supply endogenous were not analyzed until now should be apparent. Explicit in the impact multipliers found in these models are deficit financing considerations, as the money supply changes when income responds to fiscal policy (or autonomous shocks). It is theoretically possible to have mixed finance and to have an additional wealth effect due to the number of bonds outstanding increasing, but it is not possible to have all bond financing. The proportion of bond financing (or additional money financing) can only be as high as (1 - TAXES - dBASE) percent of the increase in spending.

In other words, bond financing is necessary only when the increased tax revenues plus the increased money supply brought on by increased income do not cover or exceed the increase in government spending. The procedure to calculate to amount of bond financing needed and the subsequent wealth effect is found in Appendix C. The amount of bond financing needed is shown by the following equation:

$$(5.16) \quad dB/dG = 1-(V_1+dM/dY)(dY/dG_{NF});$$

where dM/dY is the estimate of q_4 in equation (5.12).
Substituting the appropriate estimates of V_1,k q_4, and dY/dG_{NF} from Table 5-6, the estimated value of bond financing needed is .07. In other words, bond financing need be used for only seven percent of any increased government spending. By substituting for the appropriate values of a_2, J, dY/dG_{NF}, and dB/dG following the procedure in Appendix C, the estimated wealth effect is .006. The impact elasticity on government spending including this wealth effect is 1.471.

Substituting the appropriate estimated coefficients for a_2, D, V_1, f_3, J, and dY/dG_{NF} from Table 5-7, I find the estimated impact elasticity on government spending for the model with the UI program to be 1.30. Following the procedure in Appendix C, I find that additional bond financing is not necessary. The combination of increased tax revenues, decreased UI payments and an increase in money supply to meet the increased money demand, all due to an increase in income brought on by an increase in government spending, more than covers the increased deficit. Therefore, there is no additional wealth effect.

Impact elasticities for average potential duration and UI coverage are also estimated for models with an endogenous money supply. These estimates are shown in Table 5-8. The estimated values of both these elasticities are larger in the model with an endogenous money supply than in models with an exogenous money supply. There is additional bond financing needed for changes in both the UI program policy variables that increases the estimated values of their elasticities with respect to income.

Comparisons of the measured effectiveness of the UI program estimated from the different models are shown in Table 5-9. Measured effectiveness is 11.26 percent for money supply endogenous models, ignoring additional bond financing, and 11.6 percent when additional bond financing is necessary. Notice that the measured effectiveness of the UI program is greater in a world in which interest rates are pegged, compared to a world in which the money supply is exogenous.

The explanation for this is the accommodating action of the endogenous money supply as it reacts to changes in income. As income is increased by expansionary fiscal policy or exogenous, good sector

TABLE 5-8

IMPACT ELASTICITIES, MODELS WITH THE MONEY SUPPLY ENDOGENOUS

Model	Elasticity	Estimated Value	Estimated Value with Necessary Financing
NO UI	Government Spending	1.465	1.471
UI	Government Spending	1.300	1.300
UI	Average Potential Duration	.0174	.0251
UI	UI Coverage	.0026	.00281

NOTE: The estimated value with necessary financing is obtained following the procedure in Appendix C.

TABLE 5-9

A COMPARISON OF MEASURED EFFECTIVENESS OF THE UI PROGRAM FROM DIFFERENT MODELS

	M1 Exogenous	Bond Finance	Money Finance	M1 Endogenous	Mixed Finance	Percent Increase in Effectiveness Due to M1 Being Endogenous
No Finance	7.2%			11.26%		36.0%
Finance						
Bond		8.27%			11.6%	28.7%
Money			9.19%		11.6%	20.6%

shocks, the money supply rises, rather than interest rates. This increase in liquidity maintains investment and consumption whereas an increase in interest rates discourages these types of spending. The increase in liquidity encourages consumption to increase through the wealth effect, and the portfolio effect is removed by continually increasing the supply of money[17/], which increases the impact elasticity further. Therefore, although measured effectiveness of the UI program is larger under an interest-rate-pegging regime, the larger effect is due to monetizing part of the deficit caused by an increase in fiscal policy.

Table 5.10 shows a comparison of impact elasticities for average potential duration and UI coverage estimated from different models. The impact elasticity of average potential duration ignoring financing in a world with the money supply endogenous .0174. This means that a one percent increase in average potential duration, measured in weeks, leads to an increase in income of .0174 percent. This is compared to .0157 percent in a world in which the money supply is exogenous. When the deficit financing constraint is considered, the estimated impact elasticities are .0251 in a world with the money supply endogenous and bond financing is necessary, .0249 in a world with the money supply exogenous and a money financing regime, and .0181 in the same world under a bond financing regime.

The impact elasticity of UI coverage with rspect to income is .0026 in a money-supply endogenous world ignoring deficit financing. This indicates that a one percent increase in the ratio of covered employment to the total labor force will increase income by .0026 percent. This is compared to .0015 percent in a world where the money

TABLE 5-10

A COMPARISION OF IMPACT ELASTICITIES FROM DIFFERENT MODELS

	M1 Exogenous	Bond Finance	Money Finance	M1 Endogenous	Mixed Finance	% Increase in Elasticity Due to M1 Being Endogenous
AVERAGE POTENTIAL DURATION						
No Finance	.0157			.0174		9.77%
Finance						
Bond		.0181			.0251	27.9%
Money			.0249		.0251	0.8%
UI COVERAGE						
No Finance	.0015			.0026		42.3%
Finance						
Bond		.00161			.00281	42.7%
Money			.00191		.00281	32.0%

NOTE: (1) See Appendix C for the procedure used to calculate these impact elasticities.

supply is exogenous and deficit financing is ignored. When the deficit financing constraint is considered, the estimated impact elasticities are .00281 in a world with the money supply endogenous and bond financing necessary, .00191 in a world with the money supply exogenous and a money financing regime, and .00161 in the same world under a bond financing regime.

There are two important points to be made about the results obtained above. First, as with the impact elasticity of government spending, the average potential duration and UI coverage elasticities are larger in the model with the money supply endogenous than in the model with the money supply exogenous. Second, the necessary bond financing (and wealth effect) is relatively larger in estimating the elasticities for these variables than the government spending elasticity. This is because income does not increase significantly in response to changes in these variables, therefore, tax revenues and the money supply do not increase enough to cover as much of the deficit as was the case to an increase in government spending.

5.5 Conclusion

The measured effectiveness of the UI program is influenced by many economic factors. This and the previous chapter have shown that the measured effectiveness of the UI program was not accurately estimated in previous studies because of one serious flaw and two important omissions. The serious flaw was not structuring, estimating and testing any models from which the aggregate demand elasticities (or multipliers) necessary to measure the stabilization effectiveness of the

UI program could be calculated. The previous chapter showed that omission of a money sector resulted in an overestimate of the measured effectiveness of the UI program of ten to twenty percent. This chapter adds a government budget condition to the model and finds the consequences of deficit financing for measured effectiveness of the UI program. In most cases, measured effectiveness increases, as the inclusion of the UI program in the three classes of models (goods-sector-only, entire, and money-supply-endogenous) induced smaller deficits and less financing compared to models without the UI program. This leads to larger differences in impact elasticities between the models, which increases measured effectiveness.

The measured effectiveness of the UI program rises from 7.2 percent in a model with both goods and money sectors but ignoring deficit financing, to 8.277 percent in that same model but under a bond financing regime, to 9.19 percent in the same model but under a money financing regime. Similar increases are found when comparing the impact elasticities of average potential duration and UI coverage across models with and without the deficit financing constraint considered. These are not the true estimates of the measured effectiveness of the UI program. These estimates include the liquidity, portfolio and wealth effects induced by deficit financing. The increase in the estimates of the measured effectiveness of the UI program obtained in this chapter is due to the additional wealth and liquidity in the economy brought on by financing an increase in all types of government spending. The true estimates of the measured effectiveness of the UI program are found in Chapter IV. Those estimates do not include the additional effects caused by deficit financing.

Two new models were estimated in this chapter incorporating the assumptions of an endogenous money supply and fixed interest rates. These models resulted in larger impact elasticities than the corresponding impact elasticities of the models with an exogenous money supply. The reason for this is the accommodating effect of the money supply, as it is forced to increase to maintain money market equilibrium when expansionary fiscal policy raises income. Although the measured effectiveness of the UI program is increased in this world, all of the increase is not due to fiscal policy alone. Part of the effectiveness of the UI program is due to accommmodating monetary policy. This increase in stabilization effectiveness must be weighed against the loss of the controllability of the money supply, which must change continuously to equilibrate the money market as income changes.

CHAPTER FIVE

NOTES

1/ Silber (1970).

2/ Christ (1969).

3/ Blinder and Solow (1973).

4/ Infante and Stein (1976).

5/ If the deficit equation (no UI) is

(N.1) $G - TAX + BIP = dM1 + dB$,

and the deficit changed in a model with interest rates endogenous, the equation would become

(N.2) $dG - dTAX + dBIP = dM1 + dB$, or,

(N.3) $dG - V_1 \, dY + dBIP = dM1 + dB$.

The problem term is dBIP. Since $BIP = B * TBR$,

(N.4) $dBIP = dTBR * B + dB * TBR$.

Consider the easy money financing case first.

(N.5) $dG - V_1 \, dY + dTBR * B = dM$, since $dB = 0$.

Changes in the money supply, assumed exogenous are now tied to changes in the interest rate. Therefore, the increase in money supply is actually endogenous. Following this to its logical conclusion, everything in the model is endogenous, as the model is subject to equation (N.5). If everything is endogenous, the model cannot be estimated. The case of all bond financing is similar, except the increase in the number of bonds outstanding is endogenous. Since all money and all bond financing are just the extremes of a general mixed financing case, in general the model would be underidentified and inestimable with interest payments on the government debt in the deficit equation.

6/ This term is referred to as the fiscal effect in Silber (1970).

7/ This term is referred to as the wealth effect in Silber (1970).

8/ Silber (1970).

9/ Silber (1970).

10/ This would be true even if all the increased wealth was held as money. In that case, the liquidity effect would be offset by the portfolio effect, but the wealth effect is still positive and would cause the impact elasticity to increase.

11/ Blinder and Solow (1973), Infante and Stein (1976), Brunner and Meltzer (1976), and Tobin and Buiter (1976) are four of the many articles that try to analyze this controversy.

12/ See especially Blinder and Solow (1973) and Infante and Stein (1976).

13/ Actually, the portfolio effect cannot be explicitly derived from these models. The portfolio effect represents how much investment and consumption fall due to a rise in interest rates that accompanies an increased money demand. Symbolically, the portfolio effect is

$$\text{(N.6)} \quad dY/dTBR = (dC/dTBR)(dTBR/dWEALTH) + (dINR/dRB)(dRB/dTBR)(dTBR/dWEALTH) \ .$$

The problem lies in the fact that I have no estimate of (dTBR/dWEALTH). Putting wealth into the interest rate equation was judged faulty based on several summary statistics used to test for multicollinearity and goodness of fit. The term (dTBR/dWEALTH) can be written

$$\text{(N.7)} \quad (dTBR/dWEALTH) = (dTBR/dM^D)(dM^D/dWEALTH) \ ,$$

where M^D is money demand. I have an estimate for $(dM^D/dWEALTH)$ when I consider models with the money supply endogenous. The estimated values for that term are in the vicinity of .10. The term $(dTBR/dM^D)$ should be bounded by $-(dTBR/dM^S)$, where M^S is money supply, since it is doubtful an increase in the money supply, thus wealth, is held as all money. If it were, an increase in the supply of money would have no effect on interest rates. Thus, for the term (dTBR/dWEALTH) I am using,

$$\text{(N.8)} \quad (dTBR/dWEALTH) = -(dTBR/dM^S)(dM^D/dWEALTH) \ .$$

This approximation most certainly will be too large (in absolute value). Equation (N.8) is substituted into equation (N.6), and these terms as well as the other terms in this equation are taken from the estimated models of Chapter IV, to produce the portfolio effects shown in Chapter V.

14/ Silber (1970), has a theoretical model with an endogenous money market equation that he substitutes for his endogenous interest rate equation and gets all the effects shown in Section 5.3. However, he assumes an exogenous money supply and solves for the endogenous interest rate to enable him to disaggregate the impact multiplier into wealth, liquidity, and portfolio effects as I have done in Section 5-3.

[15]/ Poole (1970), shows that attempting to control interest rates when there are exogenous goods sector shocks leads to the loss of control of the money supply by the monetary authority.

CHAPTER SIX

CONCLUSION

This dissertation measures the stabilization effectiveness of the Unemployment Insurance program in the context of an aggregate demand model. In addition, the stabilization effectiveness of the UI program in recession and recovery is measured, and the speed of response of the UI program to changes in aggregate demand is examined.

The major results of this study are:

1. Monetary reactions to fiscal policy and financing deficits caused by increased government spending are important factors in measuring the stabilization effectiveness of the UI program. These factors were completely ignored in all previous studies that attempted to measure the effectiveness of the UI program as an automatic stabilizer. 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. Subjecting aggregate demand models to a deficit financing condition increases marginally the measured effectiveness of the UI program by reducing interest rate changes in the models and/or increasing income through a wealth effect.

2. Accommodating monetary policy increases marginally the measured effectiveness of the UI program by keeping interest rates from

rising and thus crowding out private spending. However, the loss of control of the money supply is sacrificed for this increase in stabilization effectiveness.

3. By not taking account of the growth in aggregate demand over time, all previous U.S. studies that attempted to measure the effectiveness of the UI program overestimated the program's effectiveness in recessions and underestimated its effectiveness in recoveries. Taking account of the growth in aggregate demand smoothes the measured effectiveness of the UI program across recession and recovery.

4. Although the UI program aids in stabilizing the economy, discretionary temporary extended benefits programs have decreased the measured effectiveness of the overall UI program. The main causes for this are the timing/lag problems inherent in discretionary policy and the fact that stabilization effectiveness is measured with respect to income, not unemployment rates.

5. Although there is no suitable test to determine how fast the UI program responds to changes in income, one can safely assume the response is within one quarter. Therefore, the stabilization effectiveness of the UI program can be measured contemporaneously with income changes in quarterly (or longer) time series models.

In measuring the stabilization effectiveness of the UI program, this study uses several novel approaches that distinguish it from previous work. First, the empirical work in Chapter IV and V is based on estimation of completely specified models from which impact elasticities can be found that are needed in calculating the effectiveness measure. Secondly, the UI program is incorporated into the model endogenously rather than being an implied exogenous variable. I can measure the stabilization effectiveness of this one fiscal policy in this way, instead of measuring the impact of all fiscal policies together. Most importantly, the models incorporate a money sector and a government budget condition that provide avenues by which there can be monetary reactions to goods sector disturbances, and they also show the effect that deficit financing has on measured effectiveness.

The use of these methods enables me to decompose the effectiveness measure into the part due to fiscal policy, the part due to monetary reactions to the fiscal policy (or goods side disturbances), and the part due to deficit financing and accommodating monetary policy. This decomposition of the effectiveness measure gives a clearer understanding of how effective the UI program is as an automatic stabilizer.

The results of this study lead to several policy conclusions. First, discretionary temporary benefit programs cannot be used to enhance the stabilization effectiveness of the UI program. These discretionary programs may meet the social insurance goal of the UI program by providing needed income to eligible individuals during a prolonged spell of unemployment and/or severe recession. However, all discretionary benefit programs to date have begun as recovery started, decreasing the stabilization effectiveness of the UI program. A more effective way to meet both the social insurance and stability goals is the permanent extended benefits program that is currently part of the UI program. Although this program still has the disadvantage of increasing benefits even as recovery has started, it is an automatic program and is not subject to timing problems as are discretionary programs.

Second, the way in which benefits are extended is a factor in the measured effectiveness of the UI program. Extending benefits produces larger impact elasticities than does expanding coverage. The results of Chapter IV bear this out. Extending benefits to those experiencing lengthy unemployment increases the elasticity of consumption with respect to benefits. Alternatively, expanding coverage would cause this elasticity to decline, as more of the newly covered individuals would likely have enough savings and/or liquidity to tide them over their unemployment spell without spending as much of their benefits as constrained individuals. Further, these individuals are likely to be higher-income individuals, so the combination of higher income and not spending as much of their benefits causes the elasticity of consumption with respect to benefits to decline. This causes the measured effectiveness to decrease.

Further evidence of this difference can be seen when comparing the impact elasticities of coverage and duration in models with and without a money sector. The impact elasticity of coverage falls substantially more than the impact elasticity of duration when money is included in the model. Movements in interest rates cause more of a squeeze on the illiquid UI benefit recipients, causing even more of them to spend all their UI income. This keeps the impact elasticity on duration from dropping as much as the impact elasticity on coverage. This discussion must be tempered by the recognition that duration is usually extended as recovery has started, which was found to detract from stabilization. In fact, expanding coverage in recoveries would also detract from stabilization as more benefits would be paid out when income is rising. In recovery, expanding benefits would have less of a negative impact than extending duration. One can see that the discretionary policy dilemma that arises hinges on recognition of the correct action needed, one of the timing problems encountered by policymakers.

The final policy conclusion has been stated previously when we discussed accommodating monetary policy in general. By trying to hold interest rates fixed while increasing government spending or UI benefits, monetary authorities lose control of the money supply. By causing income to rise (or fall less than if no action was taken), money demand increases above the level that would have occurred in the absence of fiscal policy. In order to equilibrate the money sector without a rise in interest rates, there must be an increase in the money supply. This increases wealth, which causes another increase in money demand and supply, and so on. Monetizing the debt brought on by increased spending also puts in motion the above money demand/money supply reaction process, further reducing control of the money supply. The consolation is that the measured effectiveness of the UI program increases marginally under this regime. Policy makers must weigh the cost of the loss of control of the money supply against the gain in stability in determining what policy to follow.

Further research remains to be done in two major areas. First, the study measures effectiveness by comparing the changes in impact elasticities of various exogenous variables when the UI program is included in the model. A more realistic approach would be to compare dynamic elasticities and time paths of key variables in response to changes in the UI program. Specifically, the conclusions found in

Chapters IV and V may be quite different when a dynamic model is employed.

Second, future research should consider supply-side effects and the effect inflation has on the measured effectiveness of the UI program. This is related to the first area of considering a dynamic model, rather than a static model. Again, such research could substantially affect the results of Chapter V on the measured effectiveness of the UI program when deficit financing is considered.

APPENDICES

APPENDIX A

DATA SOURCES

VARIABLE		SOURCE
Unemployment Insurance	1947-1963	Monthly issues of the Labor Market and Employment Security Review, U.S. Department of Labor
	1964-1976	Monthly issues of Unemployment Insurance Statistics, U.S. Department of Labor, Tables 3 and 4.
	1977-1981	Monthly issues of the Social Security Bulletin, U.S. Department of Health and Human Services, Tables M-36 and M-37.
Unemployment Insurance Taxes	1947-1963	Monthly issues of the Labor Market and Employment Security Review, U.S. Department of Labor.
	1964-1981	Monthly issues of the Social Security Bulletin, U.S. Department of Health and Human Services, Table M-4.
Average Potential Duration	1955-1963	Monthly issues of the Labor Market and Employment Security Review, U.S. Department of Labor.
	1964-1981	Monthly issues of Unemployment Insurance Statistics, U.S. Department of Labor, Table 8.

Coverage	1955-1963	Derived from the ratio of covered employment to total labor force, both found in monthly issues of the Labor Market and Employment Security Review, U.S. Department of Labor.
	1964-1981	Covered employment found in monthly issues of the Social Security Bulletin, U.S. Department of Health and Human Services, Table M-36.
		Total labor force found in monthly issues of the Survey of Current Business, Bureau of Economic Analysis, U.S. Department of Commerce.
Insured Unemployment Rate	1955-1963	Montly issues of the Labor Market and Employment Security Review, U.S. Department of Labor.
	1964-1981	Monthly issues of the Social Security Bulletin, U.S. Department of Health and Human Services.
Seasonally-Unadjusted Gross National Product	1955-1980	Data provided by the Bureau of Economic Analysis, U.S. Department of Commerce.
Net Household Wealth	1956-1981	Data provided by the Bureau of Economic Analysis, U.S. Department of Commerce.
National Income	1947-1981	Data found in Citibank Economic Data Base.
Disposable Personal Income	1947-1981	Ibid.
Implicit Price Deflator, National Income	1947-1981	Ibid.
Non-Residential Fixed Investment	1947-1981	Ibid.
Residential Investment	1947-1981	Ibid.
State, Local and Federal Tax Receipts	1947-1981	Ibid.

State, Local, and Federal Expenditures for Goods and Services	1947-1981	Ibid.
M1	1955-1981	Ibid.
The Three-Month Treasury Bill Rate	1956-1981	Ibid.
Moody's AAA Corporate Bond Rate	1947-1981	Ibid.
Average Hourly Compensation of All Non-Agriculture Employees (Wage Rate)	1947-1981	Ibid.
Potential Income	1947-1981	Derived from the potential GNP series of the St. Louis Federal Reserve, Federal Reserve of St. Louis Review, January 1982, p. 16.

APPENDIX B

THE DERIVATION OF THE MEASURED EFFECTIVENESS EQUATION

In Chapter III, I presented a simple aggregate demand model to algebraically and graphically derive the notion of measured effectiveness. In Section 3.2, I gave an equation formulated by Eilbott (1966), that is a more complex version of the measured effectiveness equation that I derived. This appendix provides a derivation of the measured effectiveness equation (3.9) that is used to get the estimates presented in Section 3.4.

The implied model with the UI program is given in equations B.1-B.6:

(B.1) $Y = C + I + G$

(B.2) $C = a + cDY$

(B.3) $I = b + iCPATX$

(B.4) $G = \bar{G}$

(B.5) $CPATX = kY$

(B.6) $DY = mY$,

where

Y is national income;

C is consumption;

I is net investment;

G is government purchases minus UI benefits;

DY is disposable income minus UI benefits;

CPATX is corporate after tax; and

a,b,c,i,k, and m are positive coefficients.

Solving this system yields the following equation:

$$\text{(B.9)} \qquad Y = (a + b + \bar{G})\ (1 - cm - ik)^{-1} .$$

(l-cm-ik) is the multiplier in a world without the UI program. m is the percentage of a change in national income to the household sector; it is equivalent to X in equation 3.9. k is the percentage of a change in national income to the corporate sector; it is equivalent to Z in equation 3.9.

Adding the UI program to the model changes equations (B.2) and (B.3) to:

$$\text{(B.2*)} \qquad C = a + c\ (DY+UIB)$$

$$\text{(B.3*)} \qquad I = b + i\ (CPATX-UIT) ,$$

where

UIB is UI benefits paid; and

UIT is UI tax collections .

In addition to these changes, equations (B.7) and (B.8) relate UIB and UIT to Y:

(B.7) $$UIB = - uY$$

(B.8) $$UIT = tY ,$$

where

u and t are positive coefficients.

Solving the system yields the following equation:

(B.10) $$Y = (a+b+\bar{G})(1-cm+cu-ik-it)^{-1}.$$

(1-cm+cu-ik+it) is the multiplier in a world with the UI program. (-u) is the change in UI benefits paid caused by a change in national income; it is equivalent to $E_B B$ in equation 3.9. t is the change in UI taxes collected caused by a change in national income; it is equivalent to $E_T T$ in equation 3.9.

Measured effectiveness is one minus the ratio of the multiplier without the UI program to the multiplier with the UI program. This is given by the following equation:

(B.11) $$ME = 1 - [(1-cm-ik)/(1-cm+cu-ik-it)]$$

Collecting terms and simplifying yields the following equation:

(B.12) $$ME = \frac{cu+it}{1-cm-ik+cu+it}$$

Equation B.12 is almost equivalent to equation 3.9 except the term (cu) has the wrong sign associated with it both times it appears in the equation. It was noted above that (−u) was the equivalent to $E_B B$ in equation 3.9. This explains the discrepancy, as the equation is of the form:

$$(B.12^*) \quad ME = \frac{-c(-u)+it}{1-cm-ik-c(-u)+it},$$

and simplifying algebraically produces equation B.12 above. Therefore, the model implied by equations B.1–B.8 can be shown to yield the measured effectiveness equation 3.9 or (B.12*).

APPENDIX C

THE DERIVATION OF IMPACT ELASTICITIES IN MODELS CONTAINING A GOVERNMENT BUDGET CONDITION

The derivation of the impact elasticities used to estimate the measured effectiveness of the UI program is slightly more complicated when the models are subject to a government budget condition. This appendix algebraically derives the impact elasticities for each of the models in Chapter V. The algebraic derivations are then used with the estimated models of Chapter IV and Chapter V to produce estimates of the impact elasticities shown in Chapter V.

Goods-Sector-Only-Models

The following system of equations defines the goods-sector-only, no UI program model (GNUI):

(C.1) $Y = C + INR + IR + G;$

(C.2) $C = a_0 + a_1 YD + a_2 WEALTH - a_3 \left(\sum_{i=0}^{2} TBR_{t-i}/3 \right) + a_4 \left(\sum_{i=1}^{2} C_{t-i}/2 \right) + e_2;$

$$\text{(C.3)} \qquad INR = b_0 + b_1 Y_{t-1} - b_2 \left(\sum_{i=0}^{3} RB_{t-i}/4 \right) - b_3 CAP + e_3;$$

$$\text{(C.4)} \qquad IR = c_0 + c_1 Y - c_2 TBR_{t-1} + c_3 AVAIL + c_4 IR_{t-1} - c_5 IR_{t-2} + e_4;$$

$$\text{(C.5)} \qquad TAX = V_0 + V_1 Y + e_5;$$

$$\text{(C.5A)} \qquad YD = - V_0 + (1-V_1)\ Y;$$

where the variables are those listed in Table 4-1 and all coefficients (a_i, b_i, c_i, V_i, $i = 1,2...$) are positive.

The reduced-form equation for Y for this model is:

$$\begin{aligned} \text{(C.4)} \qquad Y = {} & (a_0+b_0+c_0)/D - a_1V_0/D + (a_2/D)\ WEALTH \\ & - (a_3/D) \left(\sum_{i=0}^{2} TBR_{t-i}/3 \right) + (a_4/D) \left(\sum_{i=1}^{2} C_{t-i}/2 \right) + (b_1/D) Y_{t-1} \\ & - (b_2/D) \left(\sum_{i=0}^{3} RB_{t-i}/4 \right) - (b_3/D) CAP - (c_2/D) TBR_{t-1} \\ & + (c_3/D) AVAIL + (c_4/D) IR_{t-1} - (c_5/D) IR_{t-2} + (1/D)\ G\ ; \end{aligned}$$

where $D = (1-a_1(1-V_1)-c_1)$.

The inverse of D is the impact elasticity of government spending (and other exogenous expenditures) with respect to income, ignoring the deficit financing constraint (dY/dG_{NF}). When the deficit financing constraint is considered, I subject the reduced-form equation to the government budget condition;

$$\text{(C.6)} \qquad DEF = G - TAX = d(BASE + B)\ ,$$

where

DEF is the deficit;

B is the percentage change in government bonds outstanding;

BASE is the percentage change in the monetary base;

d is the total differential operator.

All variables are measured in constant dollars.

Next, totally differentiate the reduced-form equation

$$\text{(C.1B)} \quad dY = d(a_0+b_0+c_0)/D - (a_1/D)dV_0 + (a_2/D)dWEALTH - (a_3/D)d\left(\sum_{i=0}^{3} TBR_{t-i}/3\right) + (a_4/D)\, d\left(\sum_{i=1}^{2} C_{t-i}/2\right) + (b_1/D)dY_{t-1} + (-b_2/D)d\left(\sum_{i=0}^{3} RB_{t-i}/4\right) - (b_3/D)d\,CAP - (c_2/D)dTBR_{t-1} + (c_3/D)dAVAIL + (c_4/D)dIR_{t-1} - (c_5/D)dIR_{t-2} + (1/D)dG \;.$$

Assume government spending increases. From (C.6), an increase in government spending must be financed by an increase in money and/or government bonds outstanding. Also, assume all other exogenous variables remained fixed at their initial levels. These assumptions can be represented by assuming all the terms except dY, dWEALTH and dG in equation (C.1B) are equal zero. The resulting equation is

$$\text{(C.7)} \quad dY = (a_2/D)dWEALTH + (1/D)dG \;.$$

Using the fact (from Chapter IV) that net household wealth can be written as WEALTH = $WEALTH_{t-1}$ + BASE + B, and assuming $dWEALTH_{t-1}$ equals zero, equation (C.7) becomes

(C.7A) $dY = (a_2/D)d\ (BASE+B) + (1/D)G$.

To find the impact elasticity of government spending with respect to income when the deficit financing constraint is considered, (dY/dG_F), divide equation (C.7A) by dG. The resulting equation is

(C.8) $dY/dG_F = (a_2/D)d(BASE+B)/dG + 1/D$.

The impact elasticity of government spending with respect to income when the deficit financing constraint is considered is the sum of the impact elasticity of government spending with respect to income when the deficit financing constraint is ignored, $((1/D) = dY/dG_{NF})$, [1] plus a term involving changes in wealth.[2] The latter is the increase in consumption (thus income) due to an increase in net household wealth brought on by deficit financing.

Using equation (C.6), I can derive the wealth effect by substituting for d(BASE+B)/dG.

(C.6) $d(BASE+B) = G-TAX = G - V_1Y$.

The change in the deficit brought on by a change in government spending equals the change in government spending, dG, minus the increased tax revenues caused by an increase in income, V_1 dY. The deficit financing constraint is

(C.6A) $d(BASE+B) = dG - V_1dY$.

Dividing by dG produces the expression for the wealth effect

$$\text{(C.6B)} \quad d(BASE+B)/dG = 1 - V_1(dY/dG_{NF}) .$$

Substituting (C.6B) into C.8 and recalling $1/D = dY/dG_{NF}$

$$\text{(C.8A)} \quad dY/dG_F = (a_2/D)(1-V_1(dY/dG_{NF})) + dY/dG_{NF} .$$

This equation can now be estimated by substituting the appropriate values of a_2, V_1, D, and dY/dG_{NF} from Table 4-2. As long as V_1 is less than D (since $dY/dG_{NF} = D^{-1}$, V_1 must be less than $(1/D)^{-1} = D$), the wealth effect of an increase in government spending is greater than zero.

A similar procedure to the one just described is used to estimate the impact elasticities of the three policy variables in the good-sector-only, UI program model (GUI). The only changes are that the appropriate equations for UIB and U be included in the model, and the government budget condition is now

$$\text{(C.6*)} \quad DEF = G - TAX = UIB = d(BASE+B) .$$

This can be written as

$$\text{(C.6**)} \quad DEF = G - V_1Y + f_1PD + f_2\ WAGEX + f_3\ COV - f_4(Y-YP)$$
$$= d(BASE+B) ,$$

where the variables are listed in Table 4-1, and the coefficients are all positive.

Since it is assumed all exogenous variables except government spending remained fixed, the deficit financing constraint becomes

$$(C.6A^*) \quad d(BASE+B) = dG - V_1 dY - f_4 dY \; .$$

Dividing by dG produces the expression for the wealth effect

$$(C.6B^*) \quad d(BASE+B)/dG = 1 - (V_1+f_4)(dY/dG_{NF}).$$

This expression is substituted into equation (C.8). The resulting equation can be estimated by substituting the appropriate values of a_2, V_1, f_4, D, and dY/dG_{NF} from Table 4-3.

Impact elasticitities for the policy variables average potential duration, PD, and UI coverage, COV, are found using the same procedure as that of government spending. Instead of a change in government spending creating the need for deficit financing, one of these variables changes while all other exogenous variables remain fixed. The procedure is followed from equation (C.7) using dPD or dCOV (separately) in place of dG. It is important to note the coefficient on dPD and dCOV is not (1/D) as it is for dG. This is because (1/D) represents dY/dG_{NF}. The impact elasticities of PD and COV when the deficit financing constraint is ignored are found in Table 4-3.

Entire Models

As was explained in Chapter V, the method of financing the deficits (either bonds, money or both bonds and money) matters in the estimation of the impact elasticities of the policy variables for models with a money sector. A procedure similar to that used for the (GNUI) model is followed to estimate the impact elasticities for the entire model, no UI program (WNUI). Equations explaining the money sector are added to equations (C.1)-(C.5A) to define the system. A reduced-form equation is found and totally differentiated to produce an equation like (C.1B). Equation (C.6) is the appropriate government budget condition to use for this model.

Government spending is again assumed to increase, while all other exogenous variables except the number of government bonds and/or the money supply remain constant. This produces the equation

$$\text{(C.9*)} \quad dY = (a_2/D)d(BASE{+}B) + (1/D)dM1 + (1/D)dG + \text{Portfolio Effect} ,$$

where the portfolio effect is discussed in footnote 13 of Chapter V. The term (1/D) dM1 represents the liquidity effect discussed in Chapter V. To find the impact elasticity of government spending with respect to income when the deficit financing constraint is considered, divide (C.9) by dG, (this equation is the same as equation (5.7)).

$$\text{(C.9A)} \quad dY/dG_F = (a_2/D)d(BASE{+}B) + (1/D)dM1/dG + (\text{Portfolio Effect})/dG .$$

To estimate the wealth and liquidity effects, I follow the procedure shown in equations (C.6)-(C.8) above. For simplicity, I assume that changes in M1 are equivalent to changes in the BASE in this appendix as well as Chapter IV and Chapter V. Therefore, the estimated value for both the wealth and liquidity effects is given by the expression in (C.6B). This expression is substituted into equation (C.9A) for the wealth effect term regardless of the method of deficit financing, and for the liquidity term when the deficit is financed by monetizing the debt.[3] The estimate of dY/dG_F is found by substituting in the appropriate values of a_2, V_1, D, and dY/dG_{NF} from Table 4-4, and calculating the portfolio effect described in footnote 13 of Chapter V.

The procedure used to estimate the impact elasticities of the three policy variables for the entire model, UI program (WUI), is a combination of the above procedure and that used to estimate impact elasticities for the (GUI) model. The estimated coefficients needed to estimate the impact elasticities for this model are found in Table 4-5.

Money with the Money Supply Endogenous

In Chapter V, I noted that additional bond financing is necessary only when the increased tax revenues plus the increased money supply brought on by the accommodating nature of monetary policy do not cover or exceed the increase in government spending. To calculate if additional bond financing is necessary for a model with no UI program, use the government budget equation

$$\text{(C.10)} \quad DEF = G - TAX = G - V_1 Y = d(BASE+B) \ .$$

The change in the deficit is equal to the change in government spending minus the change in tax revenues caused by a change in income.

$$(C.10A) \quad dDEF = dG - V_1 dY = d(BASE+B)$$

Since M1 is endogenous, the deficit financing constraint is

$$(C.10B) \quad dB/dG = 1 - V_1(dY/dG_{NF}) - dBASE/dG \ .$$

The last term in (C.10B) can be written as $dBASE/dG = (dM1/dY)(dY/dG_{NF})$, since I assume changes in M1 equal changes in the BASE. Substituting this expression into (C.10B) produces the equation

$$(C.10C) \quad dB/dG = 1 - V_1(dY/dG_{NF}) - (dM1/dY)(dY/dG_{NF}) \ .$$

This equation can be estimated by substituting the appropriate values of V_1, dY/dG_{NF}, and $dM1/dY$ ($=q_4$) from Table 5-6.

If the estimated value of dB/dG is less than or equal zero, no additional financing is necessary. If the estimated value is positive, some bond financing is necessary, in which case a wealth effect need be estimated. The wealth effect is estimated following the procedure used in estimating impact elasticities for the (GNUI) model. A reduced-form equation is derived and totally differentiated. All terms of the totally differentiated equation are equal zero except dY, dB, and dG, assuming government spending is changed. To find the impact elasticity of government spending with respect to income when additional bond financing is necessary, divide by dG to get

$$(C.11) \quad dY/dG_F = (a_2(1/(1-q_2))/D)\ dB/dG + dY/dG_{NF} \ .$$

The estimated wealth effect is found by substituting the appropriate values of a_2, $1/(1-q_2)$, and D from Table 5-6, and the estimate of dB/dG above.

A similar procedure is followed to determine if additional bond financing is necessary for the model with the UI program. The government budget equation for this model is

(C.12) $\quad DEF = G - TAX = UIB = d(BASE+B)$.

The procedure follows the steps shown in (C.10)-(C.10C). If additional, bond financing is necessary, the calculation of the wealth effect is similar to that of (C.11) using the appropriate estimated values from Table 5.7.

APPENDIX C

NOTES

[1]This term is referred to as the fiscal effect in Silber (1970).

[2]This term is referred to as the wealth effect in Silber (1970).

[3]When there is mixed financing, both terms are substituted into equation (C.9A), each multiplied by the percentage of the deficit each term finances. For example, if bond financing is 20 percent, the wealth effect term is still 100 percent, the liquidity effect term is multiplied by .80, and the portfolio effect term is also multiplied by .80 in this paper due to its construction (See footnote 13, Chapter V).

BIBLIOGRAPHY

BIBLIOGRAPHY

Blinder, Alan and Robert Solow, "Analytic Foundations of Fiscal Policy," in The Economics of Public Finance. Washington, D.C.: Brookings Institution, 1974.

__________, "Does Fiscal Policy Still Matter"?, A Reply." Journal of Monetary Economics, 2, (1976), pp. 501-510.

Box, G.E.P. and G.M. Jenkins, Time Series Analysis, San Francisco: Holden Day, 1970.

Brunner, Karl and Allan Meltzer, "An Aggregate Theory For a Closed Economy." In Monetarism, ed. Jerome Stein. Amsterdam: North Holland Press, 1976.

Christ, Carl. "A Simple Macroeconomic Model with a Government Budget Constraint," Journal of Political Economy. 76, No. 1 (1968), pp. 63-67.

Citibank, N.A. Citibank Economic Database, 1978.

Clement, M.O. "The Quantitative Impact of Automatic Stabilizers." Review of Econonomics and Statistics. 42, No. 1, (1960), pp. 56-61.

Duggal, V.G., L.R. Klein and M.D. McCarthy. "The Wharton Model Mark III: A Modern IS-LM Construct." International Economic Review. 15, No. 3 (1974), pp. 572-594.

Eilbott, Peter, "The Effectiveness of Automatic Stabilizers." American Economic Review. 56, No. 3, (1966), pp. 450-465.

Fiege, E.L. and D.K. Pearce. "The Casual Causal Relationship Between Money and Income: Some Caveats For Time Series Analysis." The Review of Economics and Statistics. 61, No. 4, (1979), pp. 579-596.

Goldberger, A.S., A.L. Nagar and H.S. Odeh. "The Covariance Matrices of Reduced-Form Coefficients and of Forecasts for a Structural Econometric Model." Econometrica. 29, No. 4, (1961), pp. 556-573.

Granger, C.W.J., "Investigating Causal Relationships by Econometric Models and Cross Spectral Methods," Econometrica. 29, No. 4, (1961), pp. 556-573.

Hamermesh, Daniel S. Jobless Pay and the Economy. Baltimore: Johns Hopkins University Press, 1977.

__________. "Social Insurance and Consumption: An Empirical Inquiry." American Economic Review. 72, No. 1, (1982), pp. 101-113.

Hansen, M.K. and P. Burroughs. The Economics of Unemployment Compensation. London: Tower Press, 1969.

Hart, A.G., Money, Debt and Economic Activity, 2nd edition. New York: Prentice-Hall, Inc., 1953.

Haugh, L.D. "Checking the Independence of Two Covariance Stationary Time Serieds: A Univariate Residual Cross Correlation Approach." Journal of the American Statistical Association. 71, No. 354, (1976), pp. 378-385.

Infante, E.F. and J. Stein. "Does Fiscal Policy Matter?" Journal of Monetary Economics. 2, (1976), pp. 473-500.

Johnston, J. Econometric Methods, 2nd edition. New York: McGraw-Hill Book Company, 1973.

Kmenta, Jan and Phil Smith. "Autonomous Expenditures Versus Money Supply: An Application of Dynamic Multipliers." The Review of Economics and Statistics. 55, No. 3, (1973), pp. 299-307.

Lewis, Wilfred. Federal Fiscal Policy in the Postwar Recessions. Washington: Brookings Institution, 1962.

Maddala, G.S. Econometrics. New York: McGraw-Hill Book Company, 1977.

Musgrave, Richard and M.H. Miller. "Built-In Flexibility." American Economic Review. 38, No. 1, (1948), pp. 122-128.

National Commission on Unemployment Compensation. Unemployment Compensation: Final Report. Washington, D.C.: U.S. Government Printing Office, 1980.

Okun, Arthur, "Measuring the Impact of the 1964 Tax Reduction." In Perspectives on Economic Growth. Ed. W.W. Heller. New York: Random House, 1968.

Pindyck, R.S. and D.L. Rubinfeld. Econometric Models and Economic Forecasts, 2nd edition. New York: McGraw-Hill Book Company, 1981.

Poole, William. "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model." Quarterly Journal of Economics. 84, No. 2, (1970), pp. 197-216.

Rasche, R.H. annd H.T. Shapiro. "The F.R.B.-M.I.T. Econometric Model: Its Special Features." American Economic Review. 58, No. 2, (1968), pp. 123-149.

Rejda, George. "Unemployment Insurance as an Automatic Stabilizer." Journal of Risk and Insurance. 33, No. 2, (1966), pp. 195-208.

Silber, William. "Fiscal Policy in an IS-LM Analysis: A Correction." Journal of Money, Credit and Banking. 2, No. 4, (1970), pp. 461-472.

Tatom, John. "Potential Output and the Recent Productivity Decline." Federal Reserve Bank of St. Louis Review. 64, No. 1, (1982), pp. 3-16.

Thirlwall, A.P. "Unemployment Compensation as an Automatic Stabilizer." Bulletin of the Oxford University Institute of Econmics and Statistics. 31, No. 1, (1969), pp. 23-37.

Tobin, James and William Buiter. "Long-Run Effects of Fiscal and Monetary Policy on Aggregate Demand," In Monetarism. Ed. Jerome Stein. Amsterdam: North Holland Press, 1976.

U.S. Department of Commerce. Survey of Current Business, Volumes 44-61. Washington, D.C.: U.S. Government Printing Office, 1964-1981.

U.S. Department of Health and Human Services. Social Security Bulletin, Volumes 27-44. Washington, D.C.: U.S. Government Printing Office, 1964-1981.

U.S. Department of Labor. Labor Market and Employment Security Review, Volumes 14-30. Washington, D.C.: U.S. Government Printing Office, 1947-1963.

__________. Unemployment Insurance Statistics, Volumes 1-13. Washington, D.C.: U.S. Government Printing Office, 1964-1976.

von Fustenberg, George. "Stabilization Characteristics of Unemployment Insurance." Industrial and Labor Relations Review. 29, No. 3, (1976), pp. 363-376.

Zell, Steven P. Unemployment Insurance: Programs, Procedures, and Problems. Kansas City: Federal Reserve Bank of Kansas City Publication Division, 1977.