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Measuring the Macroeconomic Effects of Fiscal  
Policy in the United States

This paper reflects the personal opinions of the authors and must not be interpreted as representing the opinion of the Board of Governors, the Council of Economic Advisers, or the Bureau of the Budget.

## I. Introduction<sup>1/</sup>

Measurement of the macro-economic impact of fiscal policy on the economy requires three separate kinds of calculation. First, decisions with fiscal implications taken by the legislative and executive branches must be reflected in a measurable budget. Second, changes in the budget must be quantitatively expressed in a way that is useful for macro-economic analysis. Finally, these changes must be translated into their effects on important macro-economic variables such as GNP, employment, and the rate of inflation.

Section II of this paper describes the budget concepts currently in use in the United States, Section III explains the high employment budget measurement of fiscal policy changes, and Section IV illustrates how the fiscal changes calculated in Section III can be related to movements of the main macro-economic variables. Section V presents some conclusions and qualifications.

## II. Budget concepts and the budget document

The budget of the United States Government serves several purposes. First, it contains the financial plan of the central government proposed by the President to the Congress for the fiscal year ahead.

The Administration's requests to Congress for funds to administer Federal

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<sup>1/</sup> This paper was first prepared in September, 1969 for discussion by the Working Group on Short-term Economic Prospects of the Economic Policy Committee of the OECD. It was recirculated as a Working Group document and further discussed at the Group's meeting on April 15-17, 1970. At the time of drafting, Mr. Branson was a staff member of the Council of Economic Advisers and Mrs. Teeters was on the Staff of the Bureau of the Budget. Mr. Branson is now at Princeton University and Mrs. Teeters is at the Brookings Institution. We owe special thanks to Rosemary Marcuss of the CEA staff, who did the high employment budget calculations and Professor Ray C. Fair of Princeton, a CEA consultant, who ran the simulations described in Section IV, and provided useful advice as well.

programs and the manner in which revenues necessary to finance these programs are to be raised, are shown in great detail in the annual budget. Because it is a plan submitted to Congress, the needs of the Congressional Committees in both Houses determine the primary form of the budget.

However, the budget of any central government serves other functions as well. These are well-known and include: allocation of available resources both between the private and public sectors and within the public sector; accountability, so that it is possible to determine whether expenditures are being made letally; economic stabilization, to meet national economic goals; and economic efficiency, to maximize returns to given levels of expenditures and receipts.

In order to improve the basis upon which these various objectives could be met, a special commission was appointed by the President in 1967 to study budget presentation and concepts. As a result, the budget, which was sent to Congress in January 1968, was considerably modified and presented on the so-called new unified basis. In this new budget concept federal and trust funds, which used to be treated separately, were combined into a unified accounting of total outlays and receipts.

Federal funds are defined as those "which the Government administers as owner (as distinguished from those administered in a trustee or ficuciary capacity)."<sup>1/</sup> The bulk of federal funds consists of receipts from taxes which are not ear-marked for specific purposes and expenditures

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<sup>1/</sup> Special Analysis of the Budget of the United States, Fiscal Year 1971, p. 19.

which require Congressional authorization. However, there are significant exceptions to this general rule.

The federal funds also include:

- a) special funds, which account for receipts earmarked for specific purposes, other than the carrying out of a cycle of operations;
- b) public enterprise funds, which finance a cycle of operations in which outlays generate receipts, primarily from the public; and
- c) intragovernmental revolving and management funds, which facilitate financing operations within and between Government agencies.

The trust funds are those which "are administered in a fiduciary capacity by the Government."<sup>1/</sup> These include funds for social security, medical care for the aged, unemployment insurance, Federal grants to States for highway construction and others. Receipts for the trust funds derive from specific taxes or special sources and expenditures are made for designated purposes of the funds. Any surpluses generated by the trust funds must, by law, be invested in U.S. Government securities, thus reducing the amount of direct borrowing or increasing the amount of net repayment of debt held by the public.

Although the trust funds, in theory, are only administered but not owned by the government, the special commission recognized that:

"There has never been a question of the Federal Government's responsibility for determining the size and shape of the major trust funds programs, or for altering or redirecting

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<sup>1/</sup> Ibid. p. 24.

these programs by appropriate changes in legislation,...it is clear that the current surpluses of the trust funds must be considered in calculating the effect of Federal Government activities on the level of income and employment, in managing Treasury cash balances, in deciding on Treasury borrowing needs, and in program evaluation."<sup>1/</sup>

The unified budget, therefore, combines the two types of funds to obtain a more comprehensive presentation of Federal activities. But even with the addition of trust funds, the unified budget does not provide a full record of the total flow of funds between the government and the private sector. Many of the government's business-type activities, such as the operation of the post office and that of the loan programs, are shown on a net basis only, that is total expenditures less receipts or disbursements less repayments.

Furthermore, lending activities as shown in the budget, do not fully reflect all the credit programs sponsored by the Federal Government. In addition to granting direct loans, the government sponsors five privately owned institutions which administer additional credit programs. Neither these, nor the effects or costs of government loan guarantees insurance, nor interest subsidy programs are reflected in the unified budget, although details are given in Special Analyses appended to the budget document.

The net lending activities included in the budget are shown separately from other expenditures, the sum of the two being called "outlays" (see table 1 below). This distinction is made in part for definitional

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<sup>1/</sup> Report of the President's Commission on Budget Concepts, pp. 26-27.

reasons because loans differ basically from direct expenditures in as much as the recipient assumes a liability for repayment in the future. In addition, it also facilitates the analysis of the implication of the

Table 1: Unified Budget  
(in billions of dollars)

Fiscal Years	1969 actual	1970 estimate	1971 estimate
Receipts	187.8	199.4	202.1
Expenditures	183.1	195.0	200.1
Expenditures account surplus	4.7	4.4	2.0
Loan disbursements	13.1	9.5	8.6
Loan repayments	11.6	6.6	7.9
Net lending	1.5	2.9	0.7
Receipts	187.8	199.4	202.1
Outlays (expenditures and net lending)	184.6	197.9	200.8
Budget surplus	3.2	1.5	1.3

Source: The Budget for Fiscal Year 1971.

Federal budget for monetary and fiscal policy, because it improves the basis for current analysis of the credit activities in the Federal budget. But, partly because the loan account is not really comprehensive, it cannot effectively account for the full monetary impact of the budget. A more complete view of the credit implications of the Federal programs is provided in the Federal sector of the flow of funds data maintained by the central bank (Board of Governors of the Federal Reserve System).

Translation of the Federal budget to the national income accounts basis

Since the national income accounts (NIA) measure those flows of expenditures and receipts which directly affect production and incomes, a main requirement for fitting the government's fiscal activities into a macro-economic framework is a translation of the detailed budget accounts, as published in the unified budget document, into NIA definitions. With the introduction of the unified budget, a number of adjustments were made to bring it and the Federal sector of the NIA into greater conformance. However, a number of differences still remain and table 2 shows the nature and relative magnitude of these adjustments.

Table 2: Relationship of the Unified Budget to the  
N.I.A. Federal Sector  
(in billions of dollars)

Fiscal Years	1969 actual	1970 estimate	1971 estimate
<u>Receipts</u>			
<u>Total unified budget receipts</u>	<u>187.8</u>	<u>199.4</u>	<u>202.1</u>
plus Government contribution for employee retirement	2.1	2.4	2.6
plus Other netting and grossing	1.3	1.4	1.4
plus Adjustment to an accrual basis	1.7	- .9	- .5
plus Other	- .2	- .4	- .2
<u>equals N.I.A. receipts</u>	<u>192.7</u>	<u>201.8</u>	<u>205.4</u>
<u>Expenditures</u>			
<u>Total unified budget outlays</u>	<u>184.6</u>	<u>197.9</u>	<u>200.8</u>
less Loan account	- 1.5	- 2.9	- .7
less Financial transactions in expenditure account	- 1.0	- 1.8	- 1.9
less Expenditures to finance agricultural exports	- .3	- .3	- .2
plus Government contribution for employee retirement	2.1	2.4	2.6
plus Other netting and grossing	1.3	1.4	1.4
plus Defense timing adjustment	.7	1.7	1.3
plus Other	.9	- .2	.5
<u>equals N.I.A. expenditures</u>	<u>186.7</u>	<u>198.1</u>	<u>203.8</u>

Source: Special Analysis, op. cit., p. 15.

The NIA budget, by definition, includes only those activities, which give rise to a current flow of production and income. Therefore, transactions in existing assets, including loan activities are excluded. Consequently, a major difference between the NIA and the unified budget is accounted for by the exclusion from the NIA budget of the loan account and certain credit activities which are included in the expenditure account.<sup>1/</sup> In addition, there are remaining differences in the definitions of receipts versus intra-governmental transactions. The largest of these is the treatment of government contributions to employee retirement funds. The unified budget nets contributions against expenditures, while the NIA budget treats these contributions as receipts. Other netting and grossing adjustments arise because the two concepts differ as to what is a business type transaction and, therefore, shown net and what is a governmental transaction and shown gross.

A second major difference arises from the timing of receipts and expenditures. NIA receipts are on a mixed accrual-cash basis, while the unified receipts are on a cash basis. These timing differences are reflected in the "adjustment to accruals" on the receipts side, the largest of which is the difference between accruals of corporate tax liability and the collection of that liability. On the expenditure side, the largest timing adjustment is made to place defense purchases on a deliveries basis.<sup>2/</sup>

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<sup>1/</sup> Included in the expenditure account are loans for which there are not definite requirements for repayment. These financial transactions are excluded from the NIA expenditures.

<sup>2/</sup> The unified budget records defense expenditures on a cash basis while the NIA budget records such expenditures on a deliveries basis. During periods of expanding defense activities, cash expenditures will exceed defense purchases in the NIA as cash payment are made to contractors for work in progress. During periods of declining defense activities, purchases will normally exceed cash expenditures as the deliveries of finished goods exceed new defense orders.



Expenditures to finance agricultural products are also excluded from the NIA budget because they involve the acceptance of foreign currencies which is considered an exchange of financial assets. The following table shows the NIA budget by the types of receipts or expenditures generally used for economic impact analysis.

Table 3: Federal Sector of the National Income Accounts  
(in billions of dollars)

Fiscal Years	1969 actual	1970 estimate	1971 estimate
<u>Receipts</u>			
Personal tax and nontax receipts	90.5	95.5	93.6
Corporate profits tax accruals	40.0	38.8	38.4
Indirect business tax and nontax accruals	18.6	19.1	20.5
Contributions to social insurance	43.6	48.3	52.9
Total receipts	192.7	201.8	205.4
<u>Expenditures</u>			
Purchases of goods and services	101.1	100.8	96.9
Transfer payments	50.3	56.9	65.0
Grants in aid to State and local governments	18.9	22.4	24.8
Net interest paid	12.3	13.6	13.3
Subsidies	4.1	4.5	4.1
Total expenditures	186.7	198.1	203.8
Surplus	6.0	3.6	1.6

Source: Special Analysis, op. cit., p. 8.

That amount of the gross national product which is bought directly by the Federal government is measured by its purchases of goods and services. These include wages and salaries of civilian and military personnel, purchases of equipment, supplies, and commodities and administrative

expenses of government. Transfer payments are expenditures for which no current services have been rendered. They consist primarily of social security and related benefit payments. Grants in aid payments by the Federal government to State and local governments are of a similar nature. Net interest is interest paid to residents, including State and local governments, less interest received. Subsidies are grants to commercial enterprises, mainly businesses and farms. This category also includes the current surpluses or deficits of government sponsored enterprises.

III. The effect of budget changes as measured by the high employment surplus

As pointed out in the previous section, among the various budget concepts discussed, the budget outturn on a national income basis most appropriately indicates the direct impact of government spending and taxing on the flow of national income. However, the NIA budget, no less than the other concepts, reflects not only to what extent budgetary action has affected the income stream, but also how changes in economic activity in turn have affected the budgetary outturn itself. Thus, for any given period the recorded surplus (or deficit) will be a composite of the level of economic activity and the explicit budget decisions affecting that period. In order to evaluate separately what the budget as such is doing to the economy yet another measure is required.

To make explicit the extent to which the fiscal system responds to the level of economic activity and to isolate the effects of conscious budgetary posture, the "high employment budget" concept has been developed and has been found to be a useful "short-hand" tool. The earliest version of this concept is probably found in a thesis advanced by the Committee for Economic Development in 1947, when they suggested that budget policy should be framed in terms of full-employment assumptions.<sup>1/</sup> But it was not until the early 'sixties that the concept was further developed and its usefulness to actual policy formulation tested.<sup>2/</sup> The "high employment" budget recognizes that a particular budget program will yield different revenue and expenditure patterns at different levels of economic activity because of certain built-in properties of the fiscal system. Thus, cyclical variations will affect tax revenues because of their effects on profits and incomes; expenditures will be affected primarily because of changes in unemployment insurance payments. Furthermore, the automatic features of the fiscal system are not only responsive to cyclical variations, but also to secular changes. In a steadily growing economy incomes will rise and tax revenues with them. In addition, with a progressive tax structure, effective tax rates also increase with rising income so that the total tax burden rises. Under these conditions a

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<sup>1/</sup> Taxes and the Budget, Committee for Economic Development, New York, 1947. See also E. Cary Brown, "Fiscal Policy in the Thirties, A Reappraisal," American Economic Review, Vol. XLVI, December 1956, p.857 ff. for application of this concept.

<sup>2/</sup> For a fuller discussion of the high or full employment budget concept see Economic Report of the President, 1962, p. 78 ff.; Robert Solomon, "The Full Employment Budget Surplus as an Analytical Concept," paper presented at Annual Meeting of American Statistical Association, September 8, 1962; Michael E. Levy, Fiscal Policy, Cycles and Growth. National Industrial Conference Board, 1963.

"passive" budget posture with respect to tax rates, may in fact become a restrictive one unless the secular trend in government expenditures happens to be identical to that of revenues. The economy will then experience a "fiscal drag" reflected in a growing high employment surplus, to the extent that built-in expenditure increases fall short of automatic additions to revenue stemming from secular growth of the economy. Of course the obverse situation can also occur. In either case, the high employment "surplus" or "deficit" is equally useful as a diagnostic tool in short-term forecasting. However, as is pointed out later, the mere existence of a fiscal "drag" or "push," cannot by itself point to the possible policy actions required. The budgetary posture must be evaluated in conjunction with the state of private demand and the government's overall policy goals.

The "high employment budget" attempts to separate the automatic features of the fiscal system from discretionary changes by calculating the outturn of alternative budgetary programs at a fixed level of economic activity; the level chosen as the standard is that of high employment (however defined). Thus the high employment surplus has come to be defined as "that federal budget surplus, that would be generated by a given budget program if the economy were operating at high employment with relatively stable prices throughout the fiscal year."<sup>1/</sup>

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<sup>1/</sup> See Levy, op. cit., p. 82.

Estimating the high employment surplus

The estimates of the high employment surplus shown in table 4 for selected periods are those actually utilized by the Council of Economic Advisers and based on the methodology developed by Mrs. Teeters.<sup>1/</sup> Given the above definition of the high employment surplus, a first requirement is an estimate of high employment GNP. The Council of Economic Advisers has defined high employment GNP as that consistent with high levels of employment of the existing labor force. Since the available labor force changes over time for a variety of reasons, the estimated potential growth rate of GNP will also change. In addition, the rate of accumulation of the stock of capital also affects the rate of growth of high employment GNP. High employment growth rates of real GNP were estimated to be 3.5 per cent between mid-1955 and end 1969, 3.75 per cent from then to end-1964, 4 per cent from 1965 to 1969 and 4.3 per cent from 1970.<sup>2/</sup> Real high employment GNP, thus calculated, is then converted to current dollar high employment GNP by applying the actual GNP deflator in reverse.

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<sup>1/</sup> Earliest estimates were probably presented by David W. Lusher in "Some Key Economic Variables in the 1960's," in J.A. Stockfisch, ed., Planning and Forecasting in the Defense Industries, Wadsworth, 1962; a full consistent series and explanation of methodology appeared first in Nancy H. Teeters "estimates of the Full-Employment Surplus, 1955-1964," The Review of Economics and Statistics, Vol. 47, 1965, p. 309 ff.

<sup>2/</sup> The estimated growth rates have been extensively checked in various econometric studies--see the work done by Liu, Jorgenson, Thurow and others on potential rates of growth in the United States.

In the historical data series, high employment expenditures are defined as those which obtained in fact, except for a few definitely cyclically determined expenditures. This involves primarily unemployment insurance payments. Thus, all Federal expenditures, except unemployment benefits, are in fact assumed to be discretionary. Consequently, in estimating the past data series the major problems occur on the revenue side.

High employment revenues, as used here, are defined as those revenues which would have been generated at high employment income levels given the actual tax structure. This calculation eliminates from the revenue estimates the direct effects of departures in economic activity from high employment levels. The present estimates do not, however, distinguish the effects upon tax revenues of changes in the rate of inflation which accompany fluctuations in growth rates.

For the actual calculations indirect taxes were estimated directly as a function of GNP. For the estimation of income taxes, the share of GNP that corporate profits, and wages and salaries, respectively, would account for at high employment levels was determined by simple regression analysis. Personal income--correspondingly derived--was then reduced to taxable personal income by deducting all non-taxable components, e.g., transfer payments and labor income other than wages and salaries (mainly fringe benefits) and by adding personal contributions to social security funds. In earlier estimates taxable personal income had been

calculated as a fixed percentage of personal income; however, in recent years personal income, as defined in the United States accounts, has been rising more rapidly than its taxable portion making the more elaborate current estimating procedure necessary. This recent revision points to a general problem of consistency as estimates extend over time, e.g., respective income shares cannot reasonably be assumed to remain fixed over long periods of time. Thus, modification in the relationship of components of the high employment tax base to high employment GNP may be necessary from time to time. For example, there may now be some question of the continued validity of the corporate profit share as calculated. Corporate profits after the 1966/67 slowdown never rebounded to the extent implied by past trends and current high employment revenues may be too high to the extent that there may have been a secular downward shift in the corporate profits share of GNP. While over the longer run structural adjustments of this sort need to be made, it still remains true that over shorter periods of time the constant-income-share-in-GNP-approach probably is most efficient in eliminating those changes which reflect cyclical adjustment.

Once the various components of the tax base were estimated, high employment revenues were obtained by multiplying them by effective tax rates. These were calculated from actual effective rates, as implicit in the national income accounts, smoothed to eliminate cyclical variation.

The usefulness of the high employment surplus

This rather summary description of the essential inputs to the high employment surplus calculation glosses over the rather formidable statistical problems involved and abstracts quite deliberately from the estimating problems arising from the particular institutional framework within which the U.S. budget operates. However, it should be quite clear that there are a number of basic problems which cannot be glossed over.

The high employment surplus, as many other analytical tools, is in a number of important ways an artificial construct, which of necessity incorporates many judgmental aspects; therefore it cannot be, and is not intended to be, a fully satisfactory all-purpose tool of fiscal impact analysis. First, as is the case with all budget concepts discussed so far, the actual level of the high employment surplus (or deficit) cannot of itself be taken as an indicator of whether or not budgetary policy is doing the "right" thing. The high employment surplus or deficit is a measure of net government saving at a specified level of economic activity. The "correctness" of its size will depend, among other things, upon the strength of private demand, including private saving and investment and upon the economic goals the government wishes to emphasize. Second, there are a great number of conceptual and statistical problems involved in the three basic steps which go into the making of the high employment surplus estimate, namely a) the definition and estimate of high employment GNP, b) the distinction between discretionary and automatic



revenues and expenditures and c) the quantification of the latter at high employment levels. All these make the estimates of the actual level of the high employment surplus rather tenuous. These problems become particularly serious when the high employment surplus is used for long-term analysis and are accentuated even more when the economy is operating in the "narrow band" around full employment.

However, when changes in the high employment surplus (hereafter called "net fiscal stimulus" or NFS)<sup>1/</sup> are considered, a number of the conceptual problems are eliminated, particularly when the NFS is viewed primarily as a tool of short-term analysis. A change in the NFS over short periods of time will indicate the sort of change which has taken place in discretionary fiscal action (or policy, if it is applied to budget proposals). Thus different budget proposals applying to the same time period can be evaluated as to their restrictive or expansionary posture in terms of the NFS as can changes in budgetary posture from one year to the next. When the time horizon moves further out, arguments about possible changes in potential GNP, about the treatment of trend revenues and expenditures and, in the case of over-full employment, about the effect of price changes on both revenues

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<sup>1/</sup> The high employment surplus was weighted to allow for the differences in the tax and expenditure multipliers by giving revenue changes a weight of 0.9. No attempt was made to account for differences in multipliers within revenues and expenditures. Studies in this area have shown that, particularly over short periods of time, a more elaborated weighting system makes relatively little difference, except at times when there are very large shifts in the structure of expenditures. In Section IV the leakage on the revenue side is accounted for by the use of a marginal propensity to consume schedule, which sums to 0.9.

and expenditures, and perhaps most important, about whether or not all expenditures, except for a few clearly cyclical ones, can be considered to be discretionary, begin to cloud the picture to such an extent that objective analysis and reality may move too far apart--at least in the way the concept has been developed thus far--to make it a reliably objective tool of long-term analysis.<sup>1/</sup>

For these reasons, exposition here has been confined to the use of the NFS as a short-term tool of analysis. The next section shows that it is an efficient tool for a quick approximation of the impact of discretionary budgetary posture on the economy. Assessment of policy needs, however, cannot be abstracted from the assessment of the budgetary impact alone. It depends, in addition, upon the state and structure of private demand, the posture of all other policy instruments, and the objectives of stabilization policy.

#### IV. The effects of budget changes on the economy

With the high-employment budget concept developed in Section III, the procedures for estimating, or forecasting, the effects of changes in the budget on the economy can now be discussed. In general, this is done in three steps: first, an estimate is made of the direct exogenous effect of the proposed changes in budget expenditure or tax rates; second, the effect of these exogenous changes on the path of current dollar GNP

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<sup>1/</sup> The problem of appropriate price assumptions for long-term forecasting is being explored in the various attempts to forecast the so-called "peace and growth dividend" in the post-Vietnam period.

Table 4: Actual and High-Employment Basic Data  
 (quarterly data, seasonally adjusted, annual rates, percentages and \$ billion)

	Real GNP (1958 dollars)	GNP Gap <sup>1/</sup> %	Unemployment Rate %	Change in GNP Deflator %	NIA Budget				High Employment Budget				Net Fiscal Stimulus <sup>2/</sup>
					Receipts	Expenditures	Surplus		Receipts	Expenditures	Surplus		
1962 - II	527.7	-5.1	5.5	+0.4	105.6	110.2	- 4.5		114.3	109.7	4.6		+0.4
III	533.4	-4.9	5.6	+0.8	107.6	110.2	- 2.6		115.7	109.1	6.6		-2.0
IV	538.3	-4.8	5.6	+1.9	109.2	112.4	- 3.2		117.3	111.1	6.2		+0.4
1963 - I	541.2	-5.2	5.8	+1.5	112.0	114.4	- 2.4		120.6	112.5	8.1		-1.9
II	546.0	-5.2	5.7	+1.1	113.9	112.1	1.8		122.3	111.3	11.0		-2.9
III	554.7	-4.6	5.5	+0.8	115.0	113.8	1.2		123.8	113.4	10.4		+0.6
IV	562.1	-4.2	5.6	+2.3	117.2	115.1	2.1		126.0	114.3	11.7		-1.3
1967 - III	678.0	+0.3	3.9	+4.1	152.0	165.3	-13.3		153.7	165.3	-11.6		-0.8
IV	683.5	+0.1	3.9	+4.4	156.4	168.8	-12.4		157.3	168.8	-11.5		+0.1
1968 - I	693.3	+0.5	3.6	+3.7	165.7	174.1	- 8.4		164.3	174.2	- 9.9		-1.6
II	705.8	+1.3	3.6	+4.0	170.8	180.3	- 9.5		168.6	180.5	-11.9		+2.0
III	712.8	+1.4	3.6	+4.0	181.4	184.2	- 2.8		179.1	184.4	- 5.3		-6.6
IV	718.5	+1.2	3.4	+4.3	187.3	187.4	- 0.1		184.6	187.8	- 3.2		-2.1

1/ Difference between actual and potential GNP as a per cent of potential GNP.  
 2/ Period to period change in high employment surplus, sign reversed.

is estimated, third, the projected GNP path is translated into movements in prices--the GNP deflator--real output, and unemployment.

In the following paragraphs the estimating procedures are first described in some detail. Then two illustrative cases are developed to show how this technique may be applied in fact. In the first case, we ask what would have happened over the next 18 months if the high-employment surplus had not been allowed to grow after the first quarter of 1962, and we ask second, what would have happened if the tax surcharge had been passed in the third quarter of 1967 as requested by the President. In each case, the resulting differences in the paths of GNP, prices, and unemployment is related to the changes in the high-employment surplus associated with the budget changes. Finally, some comments are made concerning the reliability of the estimating procedures and the limitations of the results.

#### Estimating the exogenous expenditure effects of fiscal policy

The first step in estimating the macro-economic effects of budget changes is to find the exogenous expenditure effect of that change, including its quarterly timing. Changes in government expenditures are estimated by the Bureau of the Budget. The revenue effects of tax rate changes at projected levels of income are estimated by the Treasury.<sup>1/</sup> In the case of changes in government purchases, the initial effect of the

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<sup>1/</sup> These quarterly estimates are not published.

exogenous change in expenditure is equal to the projected changes estimated by the Bureau of the Budget. In the case of changes in taxation or transfer payments, however, a further step is necessary.<sup>1/</sup> The initial impact on disposable incomes of such changes is not immediately translated into changes in expenditures, but is fully reflected only after some passage of time. How the timepath of the exogenous effect of those budget changes, which directly affect personal disposable incomes, on consumer expenditure can be estimated is illustrated by the marginal propensity to consume schedule (MPC) shown below.

Table 5: Current Marginal Propensity to Consume Schedule  
( \$ billion)

<u>Quarter</u>	<u>Exogenous change in consumption from a \$10 billion increase in disposable income in Quarter 0</u>
0	4.0
1	2.2
2	1.1
3	0.7
4	0.5
5	0.3
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.	
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	<u><u>9.1</u></u>

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<sup>1/</sup> The analysis here is confined only to estimates of the impact of changes in individual income taxes or transfer payments; a similar procedure is employed in the case of changes in business taxes. In the case of incentive taxation, such as the investment tax credit, or in the case of indirect taxation, estimates of the relevant price elasticities are used to estimate the direct effect on investment and consumer spending, respectively.

The illustrative MPC schedule of Table 5 shows that the main difference between the exogenous effects of an increase in government purchases of goods and services and an equivalent decrease in individual income taxes (or increase in transfer payments) is one of timing. An increase in government purchases of \$10 billion in quarter 0 results in an exogenous increase in expenditure by \$10 billion in the same quarter. A cut in personal tax rates yielding a \$10 billion increase in disposable personal income reaches its full effect of a \$9.1 billion exogenous increase in consumer expenditure only in the fifth quarter following the tax cut. The procedures outlined so far provide estimates of the direct effects of changes in tax rates (or transfer payments) on consumer expenditure which are analytically equivalent to the direct effects of changes in government purchases as estimated by the Bureau of the Budget.

#### Estimating the secondary effects

The second step in the estimating procedure is calculating the feedback effects of exogenous expenditure changes on the path of current dollar GNP. A wide range of procedures of varying degrees of mathematical formality are available to accomplish this. The most judgmental of these procedures defines all expenditure components (including changes in inventories) except private consumption as exogenous. Consumption is then estimated implicitly using an equation which relates current changes in GNP to changes in the exogenous variables and to the change in GNP which occurred in the previous quarter. In the case of tax changes, the

direct effects on consumer expenditure are included in the set of exogenous variables. The estimated GNP path, thus adds the multiplier effects to the initial effects on consumer spending. Finally, the savings rate is derived as a residual check on the income side.

At the other end of the spectrum, fully simultaneous models of both the income and product sides of the national accounts, with explicitly stated tax rates, are available from various sources. These serve as a useful check on the overall consistency of results derived in a less formal fashion.

In addition there are various short-term forecasting models which lie between the two extremes. One such, developed by Professor Ray C. Fair of Princeton University, is used in the illustrations below. The Fair model consists of eight simple simultaneous equations explaining the product side of the national income and product accounts. Three equations explain consumption--one each for durables, nondurables, and services; three explain investment--one each for business fixed investment, housing, and inventories; and one explains imports, with exports and all government purchases taken as exogenous. The model is closed by a GNP identity that adds up all the expenditure components to total GNP.<sup>1/</sup>

The equations for expenditure components in the Fair model generally make current dollar expenditures dependent on GNP, various anticipation variables, and lagged endogenous variables. The two main

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<sup>1/</sup> The model is given in the Appendix in functional form. Coefficients are reestimated quarterly.

anticipatory variables are the CBE/SEC plant and equipment investment intention surveys, which are published quarterly giving expected expenditures usually two or three quarters ahead, and the University of Michigan Survey Research Center's index of consumer sentiment, which also appears quarterly. Since the latter enters the consumer expenditure equations with a two-quarter lag, the model can generally forecast two to three quarters ahead on the basis of currently available data; beyond that, estimates of the anticipations have to be made.

#### Estimating the effect on prices and on employment

Once a current dollar GNP path is determined, several subsystems of equations are available to translate it into real GNP, price, and unemployment movements. In general, these consist of modified Phillips' curve equations to predict movements in the GNP deflator as a function of either the real GNP gap or the unemployment rate--sometimes with the addition of a cost-push variable such as lagged price changes or unit labor costs, and a modified Okun's law equation relating movements in the unemployment rate to changes in real GNP. The particular set of equations used in the illustrations below, developed by Professor Fair, includes a straightforward relationship between changes in the unemployment rate and current and lagged real GNP growth, and a non-linear dependence of the rate of price increases on changes in current dollar GNP relative to the real GNP gap.<sup>1/</sup>

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<sup>1/</sup> See Appendix.



For the use of the Fair model for fiscal policy simulation, the net exogenous effect of alternative changes in tax rates, transfer payments and government purchases is derived as described earlier. The combined net expenditure effects of all these changes is then incorporated in the government purchases variable. Finally, simulation of the model adds secondary effects to the direct impacts to arrive at the estimated GNP path.

1962: The growing high employment surplus

Expansionary budgetary policies reduced the high employment surplus, from a peak of about \$15 billion in the first quarter of 1960 to \$4.6 billion in the second quarter of 1962. With the fall in the high employment surplus, mainly through expenditure increases, the unemployment rate fell from a peak of 7 per cent in the second quarter of 1961 to 5.5 per cent in the second quarter of 1962. In mid-1962, however, the movement in the high employment surplus was reversed, and it rose to over \$6-1/4 billion in the second half of the year, and to \$11 billion in the second quarter of 1963. The unemployment rate, meanwhile, stopped falling and rose from 5.5 per cent in the second and third quarters of 1962 to 5.8 per cent in the first quarter of 1963 and remained in the 5.5--5.6 per cent range in the second half of the year.

To reverse the restrictive effect of the budget on the economy, the Administration proposed a tax reform and reduction bill in January, 1963. After considerable delay the tax cut finally became effective in

March, 1964. The question asked here is how the economy would have developed to the end of 1963 if the high employment surplus had been held steady at its second quarter, 1962 level until the end of 1963. In particular, how would the GNP, price and unemployment paths have been changed if personal income taxes had been cut in the third quarter of 1962 just enough to hold the high employment surplus at \$4.6 billion from the third quarter of 1962 through the fourth quarter of 1963, given various other fiscal measures which also affected movements in the high employment surplus?

Our estimates of the answer to this question, using the MPC schedule of table 5 and the current Fair models for GNP, prices, and unemployment, are shown in the top half of table 6. The first four columns of the table give the actual path of GNP and its changes, the annual rate of increase in the GNP deflator, and unemployment rate. The middle three columns show the fiscal impact estimates: the tax revenue change, the exogenous effect on consumption, and the effect on GNP. The last four columns show the resulting paths of GNP, prices and unemployment.

Here the methodology should be made clear. The model was first simulated using the actual values of the exogenous variables to obtain a simulated (not actual) GNP path. Then exogenous changes in consumption derived from the MPC schedule were added, and the model was re-simulated. The difference between the two simulated GNP paths is given in table 6 as the "Effect on GNP." This added to the actual GNP path yields the "Alternative" column in table 6.

Table 6: Two Illustrations of Fiscal Impact  
(quarterly data, seasonally adjusted, annual rates, percentages, and \$ billion)

	Actual		Fiscal impact			Alternative		
	GNP	% $\Delta$ GNPd	Tax add-on	Exog. $\Delta$ C	Effect on GNP	GNP	% $\Delta$ GNPd	U
<b>A. 1962: Growing high employment surplus</b>								
1962 - III	564.4	7.2	0.76	0.8	+1.2	565.6	8.4	5.51
IV	572.0	7.6	1.90	1.1	+1.8	573.8	8.2	5.45
1963 - I	577.4	5.4	1.51	1.9	+3.2	580.6	6.8	5.64
II	584.2	6.8	1.13	3.7	+6.1	590.3	9.7	5.46
III	594.7	10.5	0.75	4.3	+7.5	602.2	11.9	5.19
IV	605.8	11.1	2.26	4.8	+8.5	614.3	12.1	5.20
<b>B. 1967: Tax surcharge delay</b>								
1967 - III	800.4	16.9	4.17	-3.0	-4.5	795.9	12.4	3.99
IV	816.1	15.7	4.48	-4.7	-8.8	807.3	11.4	4.12
1968 - I	835.3	19.2	3.74	-5.6	-9.6	825.7	18.4	3.84
II	858.7	23.4	4.04	-6.2	-10.9	847.8	22.1	3.93
III	876.4	17.7	4.00	-3.5	-7.0	869.4	21.6	3.87
IV	892.5	16.1	4.30	-2.0	-5.0	887.5	18.1	3.60

Similarly, the ratio between the two simulated values of the GNP deflator is applied to the actual deflator to get the alternative deflator and, in turn, the alternative rates of inflation. Finally, the difference between the two simulated unemployment rates is added to the actual rate to obtain the alternative rate. In short, the basic assumption is that the errors in simulation with actual exogenous variables carry over to the simulation with the exogenous consumption change, so that the difference between the two simulations denotes essentially, the "add-on" to the actual GNP path.

The results in table 6 show how holding the high employment surplus at about \$4.6 billion would have resulted in a rising exogenous expenditure impact as the exogenous consumer spending reaction built up through the MPC schedule, and was reinforced by the subsequent multiplier process. By the end of 1963, GNP would have been \$8.5 billion, or 1.4 per cent, higher than it actually turned out to be. In the period of slow growth from the second quarter of 1962 to the second quarter of 1963, the smallest increase in GNP in the first quarter of 1963 was \$5.4 billion. If the high employment surplus had been held constant as the result of the reduction in personal income taxes from the middle of 1962, this quarterly change would have been \$6.8 billion.

The economy was operating with unemployment rates well over 5 per cent during the entire period, indicating the presence of a considerable amount of unutilized resources. Therefore, the additional demand generated by the tax cut could be expected to have its main effect on real output rather than on prices. And this certainly proved to be the

case here. The rate of inflation is not appreciably different on the alternative path; the actual rate during the second half of 1963 was about 1.5 per cent (annual rate) and the estimated rate about 1.6 per cent. But the rate of unemployment is substantially lower in the alternative case, 5.2 per cent in the second half of 1963 as compared with the actual level of 5.5--5.6 per cent.

The figures shown in the "Tax add-on" column indicate approximately the changes that would have had to occur in the high employment surplus in order to arrive at the alternative case. Comparing these with the difference between the changes in actual and estimated GNP shows that the steadily growing net fiscal stimulus (e.g., reduction in the surplus) during fiscal 1963 would have resulted in a growing positive effect on GNP. The relationship between fiscal stimulus and the effect on GNP cannot be precise, both because of the lag between a change in taxes and its direct effect on incomes and expenditure; and the lag between this initial response and its secondary effect on incomes and expenditures. The swing in the high employment surplus, however, is a good indicator for the direction of the swing in fiscal impact on GNP and, thus, can serve as a diagnostic tool. But, in addition, it can also give a rough indication of the magnitude of the effect of fiscal policy actions on GNP. Earlier estimates of the magnitude of the GNP effect relative to the change in the high employment surplus, based on simple regression analysis, would have yielded GNP results for the first four quarters which are roughly similar to those yielded by the Fair model.<sup>1/</sup>

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<sup>1/</sup> See H. Junz "Federal Fiscal Policy and Aggregate Demand, 1956-66" in The Budget Today, Bruges 1967.

1967: Delay in passing the surcharge

Towards the end of 1966, the high employment budget had been in considerable deficit for six quarters. In the first quarter of 1967, the high employment deficit amounted to \$11-1/2 billion and there was no doubt of the expansionary pressure exerted by the government sector on the economy. In January, 1967 the Administration asked Congress to pass a 10 per cent income tax surcharge as an anti-inflationary measure. The surcharge was to become effective in July, 1967. After a year-and-one-half of discussion and debate the surcharge was finally passed in July, 1968, one year later than requested. During that year, the unemployment rate fell from 3.9 per cent 3.6 per cent, and the annual rate of inflation moved irregularly in the range of 3.7--4.5 per cent. What would have happened if the personal income tax surcharge had become effective in the third quarter of 1967 and had been allowed to expire as scheduled at the end of fiscal 1968?<sup>1/</sup> The differential effect on GNP of earlier passage of the surcharge, in 1967 rather than in 1968, when it did go into effect, is essentially similar to that of a temporary tax increase for the year starting in the third quarter of 1967 and ending in the second quarter of 1968. The only effect this earlier passage of the surcharge would have had on developments after mid-1968, when it actually did pass, would be due to the lagged effects of the temporary tax affecting the preceding year. These lagged effects are the continued result of lags in exogenous consumption effects as shown

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<sup>1/</sup> The analysis is confined to the effects of the personal tax surcharge; the effects of the corporate tax surcharge present a much more complicated problem.

in table 1, and the lags in GNP response to these exogenous consumption effects as specified in the Fair model.

Thus, as shown in the bottom half of table 6, earlier passage of the surcharge would have added \$7.4 billion to the high employment surplus in the third quarter of 1967; this increase would have risen, through income growth, to \$7.8 billion by the end of fiscal 1968. The exogenous downward effect on consumption would have grown from an estimated \$3.0 billion in the third quarter of 1968 to \$6.2 billion in the second quarter of 1968. With the actual passage of the surcharge in the third quarter of 1968, the exogenous consumption effect of a twelve months earlier passage would at that time have begun to taper off, as shown in table 6.

Passage of the surcharge in mid-1967 would have lowered the GNP path by amounts growing from \$4.5 billion in the third quarter of 1967 to \$10.9 billion in the second quarter of 1968. From then on the downward effect on GNP would have started to taper off along with the exogenous consumption effect. A short-hand calculation relating the change in the high employment surplus directly to changes in GNP, would have resulted in a similar lowering of the GNP path.

The personal tax surcharge would, it seems, have held the unemployment rate at about 3.9 per cent through the third quarter of 1968. Without the surcharge, the unemployment rate fell to 3.6 per cent in that quarter. Corresponding to the higher unemployment rate in 1968, the rate of inflation, instead of rising from 3.7--4.0 per cent would have fallen to 3.6 per cent (annual rate) by the third quarter of 1968.

Thus, it appears that the year's delay in passing the surcharge reduced the unemployment rate by about three-tenths of a percentage point at the cost of about four-tenths of a percentage point in the rate of inflation. With resources fully utilized, in contrast to the 1962 situation, both the unemployment rate and the rate of inflation would have reacted to fiscal action.

V. Concluding remarks, including numerous caveats and other hedges

In addition to the usual reasons for skepticism regarding the precision of econometric results, there are two specific reasons why it needs to be stressed that the simulation results of Section IV are simply illustrations of estimating techniques and of the use of the high employment surplus. First, the models reflect the effects of changes in monetary policy explicitly only through the anticipations variables on the assumption that if changes in credit conditions influence expenditures, they also presumably influence anticipated expenditures. Beyond these influences, the simulations assume monetary policy to be that which was in effect at the time. Thus, the simulations clearly cannot be used to explain more than they are designed to do: they can indicate only the effect a given fiscal policy will have on GNP--how this effect is modified by the posture of other policy instruments and by exogenous changes in private demand is a far wider and more complicated question than the one dealt with here.



A second reason for viewing at least the second set of the simulations with some skepticism is that there is probably a difference between the effects of a temporary tax change and a permanent one along the lines suggested by the permanent income hypothesis. This would suggest that the effects of passing the surcharge in the third quarter of 1967 may be overestimated. Although there was a noticeable effect of the surcharge in 1968, it came a quarter late and was not quite as large as expected.

This recalls a point raised earlier. Model estimates of fiscal impacts (or anything else, for that matter) will normally tell us what the average of past experience says. And this necessarily must be evaluated in a current context and modified to the extent that current experience is assessed to differ from the average past.

APPENDIX

Equations and variables in the Fair model

1. Determination of current dollar GNP

Behavioral equations:

- (1)  $CD_t = a_1 + a_2 GNP_t + a_3 SC_{t-1} + a_4 SC_{t-2}$
- (2)  $CN_t = a_5 GNP_t + a_6 CN_{t-1} + a_7 SC_{t-2}$
- (3)  $CS_t = a_8 GNP_t + a_9 CS_{t-1} + a_{10} SC_{t-2}$
- (4)  $IP_t = a_{11} + a_{12} GNP_t + a_{13} PAI_t$
- (5)  $IH_t = a_{14} HS_t + a_{15} HS_{t-1} + a_{16} GNP_t$
- (6)  $V_t - V_{t-1} = a_{17} + a_{18} GNP_t + a_{19} V_{t-1} + a_{20} PAI_t + a_{21} (CDN_t - CDN_{t-1})$
- (7)  $M_t = a_{22} GNP_t$

Income identity:

- (8)  $GNP_t = CD_t + CN_t + CS_t + IP_t + IH_t + (V_t - V_{t-1}) - M_t + G_t$

II. Determination of price and unemployment movements

Behavioral equations:

- (9)  $P_t - P_{t-1} = b_1 - b_2 GAP_t + b_3 \left( 0.25 \sum_{i=1}^4 GAP_{t-1} + b_4 \right)^{-1}$
- (10)  $UR_t - UR_{t-1} = b_5 - \sum_{i=0}^2 b_i \left( \frac{RGNP_{t-1} - RGNP_{t-(i+1)}}{RGNP_{t-(i+1)}} \right)$

Definition:

- (11)  $GAP_t = RGNP_t^* - RGNP_{t-1} - (GNP_t - GNP_{t-1})$
- (12) Current dollar GNP identity:

$$GNP_t = RGNP_t (P_t / 100)$$

III. List and description of the variables

Endogenous variables

- GNP = Gross National Product, SAAR.<sup>a/</sup>
- RGNP = Gross National Product (1958 dollars), SAAR.
- P = GNP deflator.
- CD = Personal consumption expenditures for durable goods, SAAR.
- CN = Personal consumption expenditures for nondurable goods, SAAR.
- CDN = CD + CN.
- CS = Personal consumption expenditures for services, SAAR.
- IP = Nonresidential fixed investment, SAAR.
- IH = Residential fixed investment, SAAR.
- V<sup>t</sup>-V<sup>t-1</sup> = Change in total business inventories, SAAR.
- M = Imports of goods and services, SAAR.
- UR = Overall unemployment rate.

Exogenous variables

- G = Government expenditures + exports + farm residential fixed investment, SAAR.
- SC = Michigan survey Research Center Index of Consumer Sentiment.
- PAI = First anticipation of plant and equipment investment, SAAR.
- HS = Quarterly private nonfarm housing starts in thousands of units, SAAR.
- RCGNP\* = Potential Gross National Product (1958 dollars), SAAR.

a/ SAAR = Seasonally adjusted at annual rates; in billions of dollars, current if not otherwise specified.