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Can Fiscal Policy be Stabilizing? An Assessment Based on U.S. Data

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I. Introduction

The old debate as to whether or not fiscal policy can be stabilizing, in the sense of containing the business cycle, has been renewed in recent years by several authors. For example, Feldstein recently concluded that "We do not...have...information to be confident that discretionary fiscal policies can reduce the average amplitude of the short-run business cycle" (Feldstein, 1982, p. 18). Because of difficulties in anticipating expectational changes, he argues "the lack of a stable and predictable response implies that it is not appropriate to use changes in taxes and government spending for year-to-year demand management" (ibid., p. 3). An even more extreme position is taken by the so-called new classical macroeconomists who categorically reject a stabilizing role for fiscal policy. 1/

Such arguments appear to have gained currency because of a seeming inability to demonstrate that fiscal policy has contributed to the remarkable reduction in the amplitude of the postwar U.S. business cycle from its interwar level (see Chart 1). Even Perry, who appears sympathetic to aggregate demand management, concluded, "... the overall impression is that fiscal policy has responded too slowly to changing economic conditions to be a successful countercyclical tool" (Perry, 1976, p. 281).

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1/ See especially Barro (1981).

A major obstacle that proponents of a stabilizing fiscal policy have had to contend with is the difficulty in showing, using simple reduced form equations, that fiscal policy has had a significant impact on output. This was, perhaps, most vividly demonstrated in the "St. Louis" equation estimated by Anderson and Jordan (1969), where the output multiplier associated with fiscal policy was totally insignificant. Although the latter's statistical procedures left much to be desired, 1/ alternative attempts have not had much success in demonstrating that fiscal policy has stabilized the real business cycle in the United States. 2/ This is all the more puzzling as there are clear indications that fiscal policy became more countercyclical in the transition from the inter- to the postwar period.

Several possible reasons could explain the inability to detect a significant role for a supposedly countercyclical fiscal policy. These range from the procedures employed for measuring fiscal policy to the econometric tests used. One significant econometric problem is that of simultaneous equation bias that arises if fiscal policy is systematically countercyclical. Goldfeld and Blinder (1972) have addressed this issue comprehensively, relying on Monte Carlo studies involving the generation of randomly drawn sets of data to test the proposition that fiscal policy could have had a significant impact, contrary to the results of the misspecified single equation (reduced-form) approach. However, they do not provide an empirical demonstration, which is the purpose here.

In order to show whether or not fiscal policy can be stabilizing, an econometric assessment is undertaken of some implications of postwar countercyclical fiscal policy by comparing inter- and postwar data on business cycles and fiscal policy in the United States. A related purpose is to assess the adequacy of the business cycle explanation advanced by the so-called new classical macroeconomists. 3/ An examination of the historical record can also provide some indication of the importance of expectational elements in frustrating a stabilizing fiscal policy.

Section II begins with an attempt at establishing the extent to which fiscal policy has been employed in a stabilizing manner, using a simple indicator. On an annual basis it is shown that, in marked contrast to the interwar period, the postwar use of fiscal policy has been countercyclical. In Section III, the hypothesis that a stabilizing fiscal

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1/ See especially Blinder and Solow (1974) and Buiter and Tobin (1980).

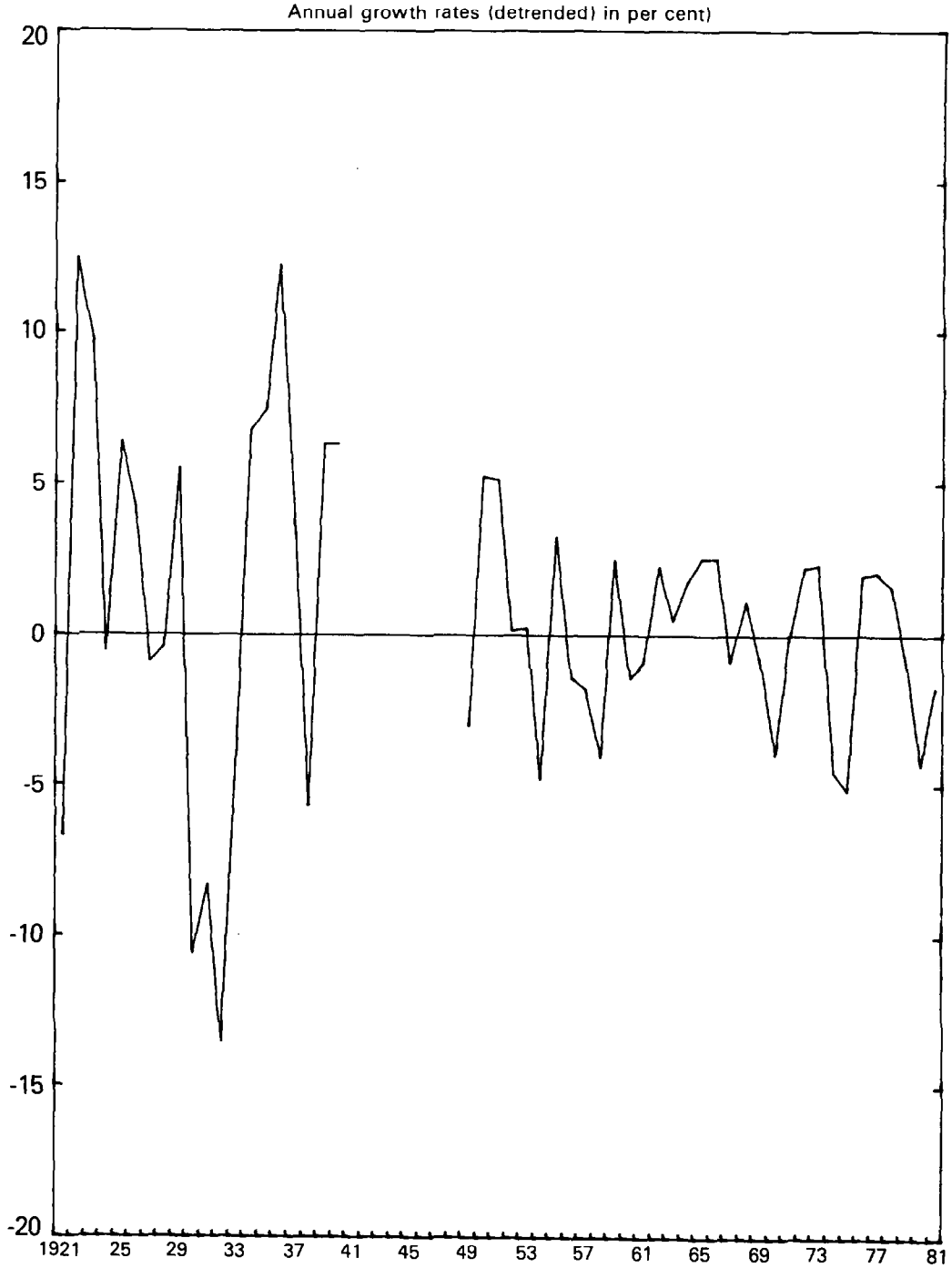
2/ Thus see Blinder and Goldfeld (1976) and Perry (1978). As a commentary on the statistical properties of the "St. Louis" equation, Friedman (1977) re-estimated that equation for an extended sample period and found instead that fiscal policy was quite significant. However, these results are challenged in Carlson (1978) and Hafer (1982).

3/ See, for example, Barro (1981), Sargent (1976), and Lucas (1977). For a detailed critique see Tobin (1980).

CHART 1

THE U.S. BUSINESS CYCLE: (1921-40 AND 1949-81)

Annual growth rates (detrended) in per cent



policy reduced the average amplitude of the short-run business cycle is tested. The econometric analysis undertaken confirms a substantial stabilizing role for fiscal policy. In Section IV some implications for the new business cycle theory are considered. Concluding comments are presented in Section V, while an appendix lists the data sources employed.

II. Indicating the Stance of Fiscal Policy

Typically, fiscal policies for smoothing out short-run business cycles, as have been pursued in a number of countries in the postwar period, rely on adjustments in the rates of growth of government expenditures and/or revenues to counteract destabilizing (amplitude increasing) impulses from designated autonomous variables, such as private investment and exports that are believed to influence employment. The rationale for the approach is provided in Keynes' General Theory (1936), where the emphasis is placed on aggregate demand management for controlling short-run fluctuations in unemployment. In the United States, legal expression for this concern was provided in the Employment Act of 1946. 1/

In order to initiate the analysis it is necessary to have an indicator of the direction of fiscal impact. For this purpose, a simple fiscal indicator of the primary or initial impact of the budget on aggregate demand is employed that is suited to the availability of data over the period to be examined. The indicator set out in equation (1) measures, in real terms, the fiscal impulse, or the contribution of fiscal policy to the growth in aggregate demand. There are two essential steps to constructing the indicator. First, the deviation in the actual rate of growth of government expenditure from n, a trend rate of growth of national output that is taken as the norm for a neutral expenditure policy, is computed to indicate whether or not the expenditure arm of the budget, net of major endogeneous elements, is expansionary. 2/ Next, the deviation is computed of the actual rate of growth of revenue from that which would have occurred had revenue responded equiproportionately to the observed growth in national output, g. The presumption here is that a more than equiproportionate growth in revenue exerts a contractionary effect on aggregate demand, as the familiar tax leak component of the expenditure multipliers would be increased. On netting these two effects

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1/ A related objective is that of stabilizing the price level, but for present purposes these two objectives will be kept separate as the focus here is on stabilizing the real business cycle.

2/ The government expenditure variable is adjusted to exclude payments of unemployment benefits as these are cyclically influenced. Instead, these amounts, which are relatively small, are netted against revenue.

(and dividing by the previous year's level of output, Y_{-1}, so as to render the expression comparable to output growth rates), an indication is obtained of the initial impact of fiscal policy. 1/

$$(1) \quad BI = 100\ [\Delta G - nG_{-1} - (\Delta T - gT_{-1})]/Y_{-1}$$

where G represents expenditure and T is revenue. 2/

The use of this criterion as an indicator of discretionary action requires in one interpretation that the built-in elasticity of response of revenue with respect to nominal GNP growth, in particular, be unity. However, the criterion is still useful in a context where the annual built-in revenue elasticity is not known, or equivalently, information on the revenue effect of the yearly discretionary actions is not available. Under an alternative interpretation, assigning any built-in stabilizer effects in excess of a unit elastic response to the discretionary category can be justified on the grounds that the issue is moot as to whether or not to treat the effect of tax progression as discretionary in the year of enactment only, or in each succeeding year that the tax measure is in force and the authorities could have, but did not, restore an equiproportionate revenue response. Although, by convention, BI is regarded as an indicator of policy, a more accurate description of greater importance to the analysis that follows is that it indicates non-neutral budget stances. 3/

The application of the criterion assumes a sharp separation between processes determining the inflation rate and the rate of growth of output. This can be justified for the shorter run, say, a year, as demand influencing factors have empirically been found to impact primarily on the rate of growth of output in the initial stages and only later, with much longer lags, on the rate of inflation. 4/ As a consequence, for a yearly analysis of fluctuations in real output growth the contemporaneous inflation rate can be assumed exogenous to the equation determining real output growth. This property is used here to simplify the

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1/ This measure is similar to that employed by the Dutch authorities (see Chand (1977)).

2/ See below for the convention that permits calculating real fiscal impulses from nominally valued magnitudes.

3/ In the form stated above (1) assumes a balanced budget multiplier of zero, which is another limitation imposed by simplicity but could easily be handled by adding more structure to the model. No attempt was made to apply a smaller uniform weight to reduce the impact of revenue relative to that of expenditure, partly because the savings rate out of disposable income is low, while interest transfer payments (government expenditure) appears to have a lower demand impact depending on the savings propensity of the recipient.

4/ Concerning the United States, Friedman found that monetary policy impacted on output with a lag of around six months, but it took as long as 23 months to affect the inflation rate. See Friedman (1973).

computations, as it permits nominal data to be employed (in order to derive real inferences) for all variables except trend growth, which is computed as the sum of the annual inflation rate and the underlying real trend rate of growth.

Obviously, the preceding fiscal indicator is simple and should in a more elaborate analysis be refined to take account of the varying impacts of the different components of the budget and their associated lags, that is best undertaken in a properly specified dynamic large-scale model. Unfortunately, there is no unanimity over the "correct" model, and different models yield widely differing estimates of the sizes of impacts and their time profiles. In these circumstances a simple indicator can contribute to analysis by indicating broad outlines that might otherwise be obscured by excessive concern with structural details. 1/

The indicator set out in equation (1) eliminates, for the government expenditure variable, feedback effects exerted by the dependent variable--the rate of growth in output here--thereby preventing one source of bias in the estimation undertaken subsequently. However, from the discussion above, it is more problematic to infer that applying the neutrality criterion also eliminates feedback effects on revenue, unless the built-in response elasticity is unity. But even if the latter were not true (there is some indication that for the United States the elasticity is not far from unity), 2/ it can be argued that applying the criterion will reduce the source of bias. This is because the equiproportionate revenue

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1/ The following statements from Perry (1976, p. 277) are of interest. "In short, economic model building is still far from providing any widely accepted characterization of fiscal impact as a substitute for the high employment surplus. In practice, for analysis over relatively short time periods, it turns out that the changes in the high employment surplus tell the basic story of the impact of fiscal policy on aggregate demand." Perry found his results to be in conformity with those of Blinder and Goldfeld (1976), who employed the MPS (MIT-PENN-SSRC) model.

2/ von Furstenberg (1980) demonstrates that the average tax rate (ratio of the national income and product accounts total of government receipts, excluding Federal grants-in-aid to state and local governments, to Net National Product) over the period 1955 to 1978 moves only negligibly with the cycle. While the observed, secular, elasticity is about unity, annual cyclical elasticities can, of course, vary. Revenue in the United States is generated by more elastic sources such as the individual income tax, and less elastic sources, for example, the payroll taxes and excise duties. For the revenue system as a whole, the ex ante elasticity is probably about 1.2, but periodic discretionary actions such as increasing personal allowances keep the observed value at about unity.

increase induced by a rise in GNP does not itself affect GNP and is disallowed, while only the more than equiproportionate part that exerts a (contractionary) effect, and is conventionlly treated as discretionary, remains in the estimating equation. 1/

An application of the fiscal indicator is shown in Chart 2. The heavy line represents the annual fiscal impulses over the two periods considered, while the dotted line represents the detrended annual growth rate of private employment. The chart clearly shows that fiscal policy was generally procyclical in the interwar years, with the exception of 1931 and 1932 when some relatively mild fiscal offset was applied, essentially through an increase in public works expenditures. These indications are consistent with Brown's observation derived from the application of the full employment balance measure to the 1930s, "Fiscal policy, then, seems to have been an unsuccessful recovery device in the "thirties" --not because it did not work, but because it was not tried," (Brown, 1956, pp. 863-64).

Turning to the postwar period, the chart exhibits a pronounced shift in the stance of fiscal policy. For the most part, fiscal impulses have moved in a direction opposite to that in employment growth, and would thus appear to have functioned in a countercyclical manner. Keynes' prescription with regard to the use of fiscal policy appears to have been well heeded. It should be noted that this indication comes out clearly, using annual time series, but not so much with quarterly data. 2/ A perusal of the annual reports issued by the Council of Economic Advisers

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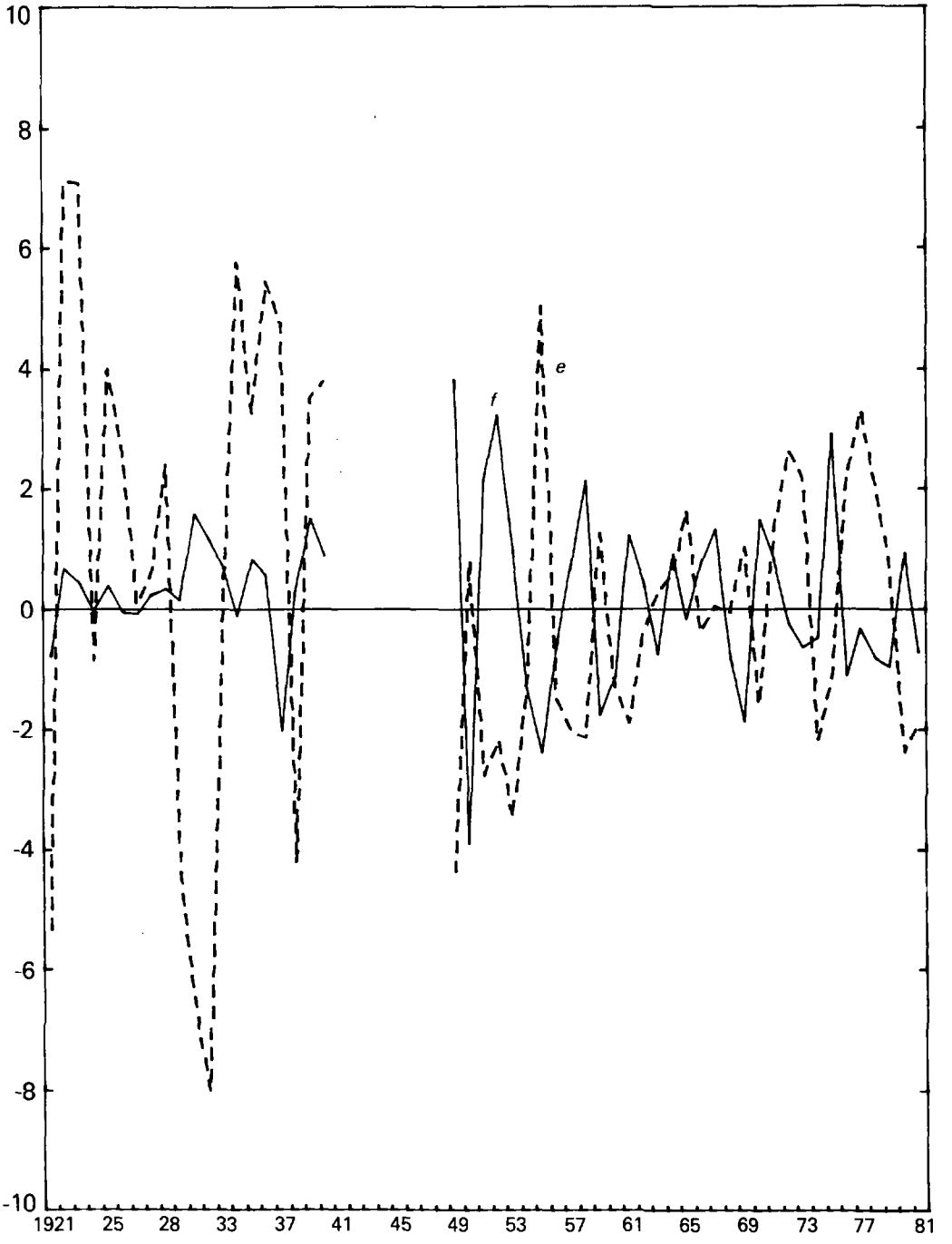
1/ It can also be shown (see Chand (1977)) that equation (1) provides indications that are close to those generated by considering first differences in the full employment balance measure, where the latter explicitly eliminates feedback influences. The minimal data requirements of (1), compared to the full employment balance measure, recommend its use particularly for considering the broad sweep of fiscal policy over a period ranging from 1921 to 1981 for which uniform comprehensive data are not available.

2/ This, perhaps, explains Perry's negative conclusion (based on quarterly computations) regarding the countercyclical use of fiscal policy. The problem is similar to that discussed in Friedman (1973), who provides graphic illustrations of how the money-income relationship can be distorted by noise in using quarterly rather than annual or even longer-period observations. Incidentally, reconverting the quarterly indications of the thrust of fiscal policy provided in Blinder and Goldfeld (1976) for the period 1958-73 to an annual basis shows about 75 per cent directional conformity with the indicator used in Chart 2, the same as that obtained from using the full employment balance.

CHART 2

FISCAL IMPULSES(f) AND GROWTH IN EMPLOYMENT(e): (1921-40 AND 1949-81)[1]



[1]Fiscal impulse in percent of previous year's GNP. Employment as detrended annual growth.

shows, until recently, a clear Keynesian orientation. Although there may not at all times have been a conscious perception that the budget was being fashioned in a countercyclical manner, the feedback to legislators from their constituents, that unemployment was rising and causing hardship, would result in measures that are countercyclical. However, there could be some asymmetry in the opposite direction, when the issue is one of excess economic buoyancy.

In anticipation of some of the results to be derived subsequently, fiscal impulses are plotted against autonomous impulses (to be defined in the next section) in Chart 3. Much the same picture emerges as in Chart 2: fiscal policy is generally procyclical in the interwar years, but becomes markedly countercyclical in the postwar period. By decomposing the fiscal impulse into its expenditure and revenue components, some indication can be obtained of the varying degree to which the authorities relied on these two instruments. These illustrations are presented in the upper and lower panels of Chart 4. It is of interest to note that in contrast to the interwar period, both the expenditure and revenue sides have been employed in the postwar period in a countercyclical fashion. Dating from the late 1960s, however, the fiscal countercyclical impulses appear to have come primarily from the revenue side. Tax adjustment involving, among others, the individual income tax and investment tax credits have been frequent in the later years. 1/

Although Charts 1 and 2 are suggestive and bearing in mind Friedman's remark--"...there is an old Yiddish proverb that one picture is worth a thousand equations" (Friedman, 1973, p. 11)--some econometric tests are needed to establish whether or not fiscal policy has in fact been countercyclical and that it is this feature that flattened the postwar business cycle.

1/ Following the earlier discussion, it can be noted that the revenue impulses shown in Chart 4 represent that part of the annual revenue fluctuation that is deemed to have a non-neutral effect on the economy. Thus if as a consequence of a positive autonomous impulse, GNP rises, but revenue increases more than equiproportionately, the revenue development is stabilizing as it serves to counteract the autonomous impulse. Only if the observed annual elasticity amounted to 1.2, the assumed built-in elasticity of the revenue system, would the stabilizing outcome be attributable to the effect of automatic stabilizers under the strict interpretation of discretionary actions. Annual elasticities have in fact shown sizable fluctuations around 1.2. Hence, multiplication of g in equation (1) by the factor 1.2 does not affect significantly the assessment.

III. Testing For the Contribution of Fiscal Policy

The purpose of this section is first to derive some econometric results for the two periods separately, and second, to attempt an explanation of the observed changes as they concern fiscal policy. Initially, a single equation approach is adopted and, as econometric problems are shown to arise, alternative techniques are used to circumvent the problems.

The maintained hypothesis is that deviations in real output around trend are influenced by so-called autonomous impulses that concern fluctuations in private fixed investment, exports, and state and local government expenditures, and by monetary and fiscal policy impulses, where the last is confined to the operations of the Federal Government. The role of autonomous impulses is similar to that in earlier treatments such as Keynes (1936). 1/

$$(2) \quad y_t = a + bz_t + cf_t + dm_t + u_t$$

where y_t = detrended output growth

z_t = the sum of the investment, export and state and local government expenditure impulses defined as the deviations, respectively in their annual growth from n_t, the trend growth in output, weighted by their respective shares in GNP. 2/

f_t = the fiscal policy impulse defined in equation (1) above.

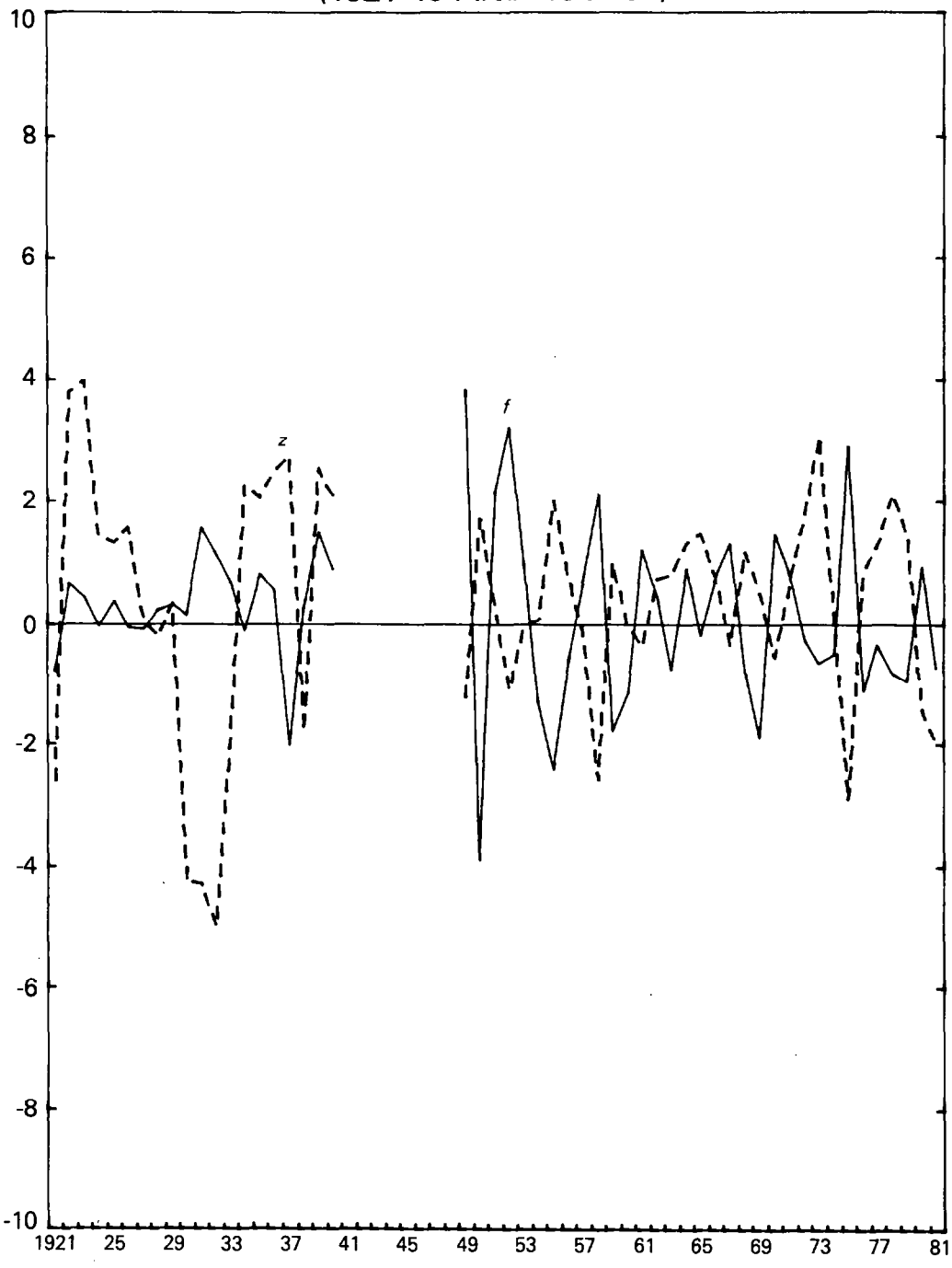
1/ Poole and Kornblith (1973) showed that in post-sample testing of a variety of single equation formulations proposed by Friedman and Meiselman and their critics, the equation that performed best used a definition of autonomous spending that comprised gross private investment (excluding inventories), exports and government spending. The last is shown separately in (2) as part of fiscal policy. Private, fixed investment is autonomous in the sense of not being subject, as a general rule, to contemporaneous influences. This is indicated empirically, e.g., von Furstenberg (1980), and reflects on an essential characteristic of longer gestating fixed investments that are planned in advance and to the extent possible executed on target so as to avoid excessive costs from short-run fine tuning.

2/ $$z = \left(\frac{\Delta I}{I_{-1}} - n\right) \frac{I_{-1}}{Y_{-1}} + \left(\frac{\Delta X}{X_{-1}} - n\right) \frac{X_{-1}}{Y_{-1}} + \left(\frac{\Delta L}{L_{-1}} - n\right) \frac{L_{-1}}{Y_{-1}}$$

where I is private fiscal investment, X is exports and L represents state and local government expenditures.

CHART 3

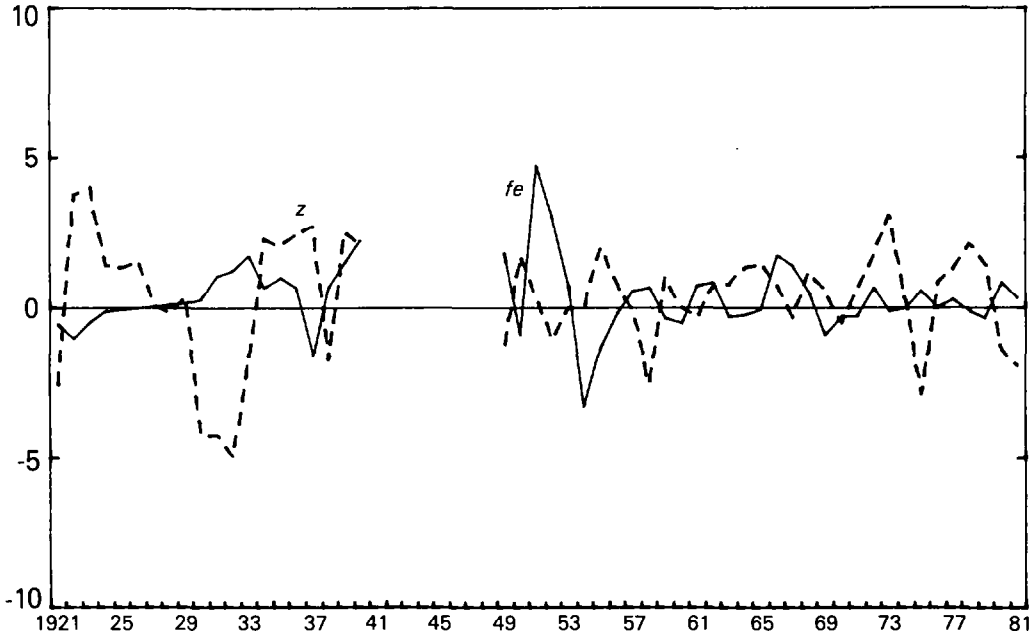
FISCAL IMPULSES(f) AND AUTONOMOUS IMPULSES(z): (1921-40 AND 1949-81)[1]



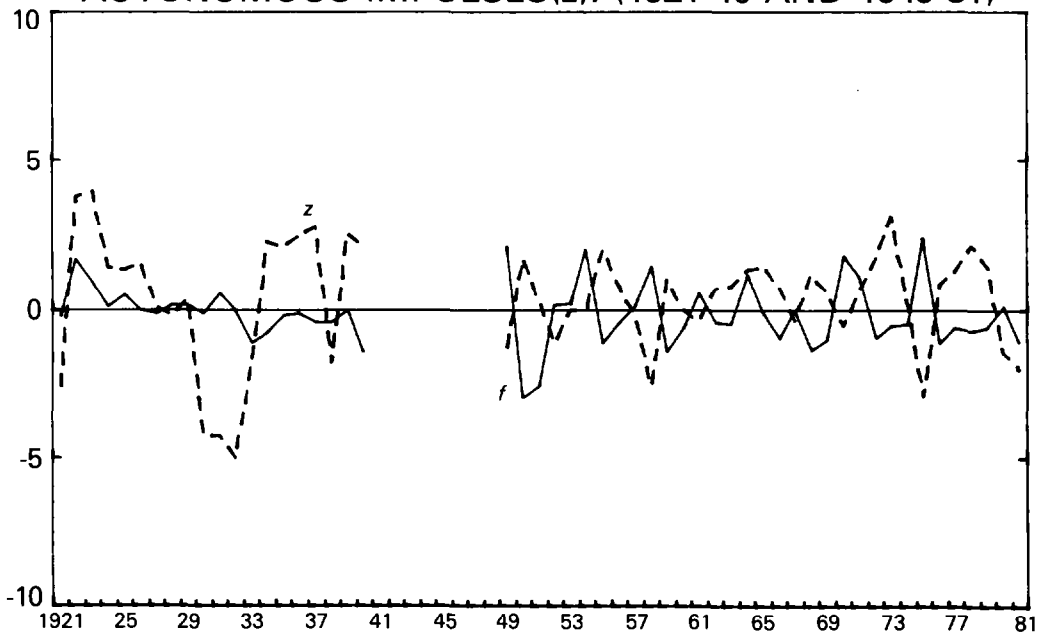
[1]Fiscal and Autonomous impulses in per cent of prevous year's GNP.

CHART 4

FISCAL EXPENDITURE IMPULSES(fe) AND AUTONOMOUS IMPULSES(z): (1921-40 AND 1949-81)[1]



FISCAL REVENUE IMPULSES(f) AND AUTONOMOUS IMPULSES(z): (1921-40 AND 1949-81)[1]



[1]Impulses in per cent of previous year's GNP.

m_t = the monetary policy impulse or the deterended rate of growth of the monetary aggregate (currency and demand deposits as defined in the appendix) lagged one year. 1/

u_t = the stochastic error term assumed to be normally distributed with standard properties.

The monetary impulse variable is defined by reference to the end-of-year change in the stock of money preceding the year for which the flow variables are defined. This procedure is adopted so as to comply with Friedman's (1973) observation that monetary changes generally precede output changes with a lag of six months, and assumes implicitly that the observed annual output change is centered in the middle of the year. Unlike the procedure adopted here to adjust the fiscal policy variable for contemporaneous feedbacks from the dependent variable y, no such attempt is made for the monetary impulse variable. This is because of the built-in six-month lag. It should be noted that considerable controversy surrounds the appropriate definition of monetary policy indicators, raising issues that are beyond the scope of this paper. 2/ However, in order to facilitate comparison, the conventional definition is employed here.

The form of the equation set out in (2), together with the definitions of the variables are intended to meet two of the three major criteria for satisfactory reduced-form single-equation tests that are stated in Blinder and Solow (1974) and that are not met in the "St Louis" approach. First, significant explanatory variables (unless orthogonal to the included variables) should not be left out and thus be impounded in the error term, as this would result in biased and inconsistent estimates. The inclusion of the autonomous impulses in equation (2), that are generally ignored in many single equation tests, is intended to meet this criterion. Second, the explanatory policy variable should exclude feedback effects from the dependent variable, in order to avoid biasing the policy coefficients to zero. As noted above, a rough attempt was made to fulfill this criterion in the case of fiscal policy, while the built-in lag in the monetary policy variable would appear to circumvent the problem. The third criterion concerns taking due account of any systematic interrelationships between policy variables and the target or dependent variable and is considered subsequently.

Within the framework provided by equation (2) several subsidiary equations are tested. Given that the ultimate objective of policy is an acceptable growth in employment, a successful policy must offset major developments that threaten to increase employment, whenever necessary.

1/ $m = (\frac{\Delta M}{M_{-1}} - n)$

2/ See Chand and Otani (1983) for an attempt at constructing a monetary indicator that has more acceptable properties.

A purpose here is to test for the presence of such reaction functions for both fiscal and monetary policies.

The policy response each year is viewed as one of preserving the underlying trend growth in the target variable and correcting for any present deviation of the target variable from this trend. 1/ Defining the policy impulses as deviations in the rate of growth of the active component of policy from trend growth implies that when this value is zero, the policy dosage is set at a level that is compatible with trend growth:

$$(3) \quad f_t = a_0 + b_0 e_t + v_{0t}$$

where e_t is the detrended annual rate of growth in employment, employing different trends for the inter- and postwar periods, and v_{0t} is an assumed random error term, with standard properties. A similar function is defined for monetary policy as well.

Assuming that the rate of growth in employment is determined by the autonomous impulses, the policy reaction functions can be re-expressed in terms of the latter. This requires the hypothesis.

$$(4) \quad e_t = a_2 + b_2 z_t + c_2 f_t + d_2 m_t + v_{2t}$$

Substituting for e in equation (3) results in the following expression for the fiscal policy reaction function.

$$(5) \quad f_t = a_1 + b_1 z_t + d_1 m_t + v_{1t}$$

Ordinary Least Squares (OLS) estimates for the above equations for the interwar period are presented in Table 1. 2/ Several features of interest are indicated. The interwar business cycle is explained with a high degree of resolution using equation (2), but largely by the autonomous impulses. The multiplier associated with z is 2.7 and highly significant. While the multiplier associated with the fiscal impulse is sizable (1.6) it just falls short of being significant. The monetary impulse variable was not found at all significant. This equation was re-estimated in a number of different ways without changing these findings, especially concerning the high significance of z. 3/

1/ This is a standard formulation for a policy reaction function. See Goldfeld and Blinder (1972) for a more detailed discussion.

2/ Several alternative lag structures of the basic equations set out here were estimated but these did not appear to add to the results reported here. In particular, the evidence for the period examined appeared inconclusive that there was fiscal overshooting in the sense of policymakers continuing to react after an upturn in the economy to persisting high levels of unemployment.

3/ In particular, the lagged dependent variable, included as a proxy for any lagged effect, was not at all significant.

Table 1. The Interwar U.S. Business Cycle: Some Regression Results 1/ (1921-40)

Equation Number	Dependent Variable	Constant	z	f	m	e	$\overline{R}^2$	DW
1	y	0.12 (0.59)	2.72** (0.20)	1.55 (0.74)	-0.03 (0.08)		0.91	1.90
2	f	0.36* (0.17)	-0.07 (0.06)		0.04 (0.02)		0.09	1.96
3	f	0.36 (0.18)				-0.03 (-0.04)	-0.03	1.81
4	m	-0.43 (1.67)	0.30 (0.62)				-0.04	1.78
5	m	-0.74 (1.65)				0.39 (0.36)	0.01	1.60
6	e	0.62 (0.35)	1.56** (0.12)	-0.20 (0.45)	0.10 (0.05)		0.91	1.83
7	c 2/	0.09 (0.90)	2.91** (0.31)	-0.18 (1.15)	-0.34* (0.12)		0.83	1.52

Data Sources: See Appendix.

1/ * indicates the coefficient is significant at the 5 per cent level using the t- ratio distribution.
** indicates the coefficient is significant at the 1 per cent level using the t- ratio distribution.

Items in parentheses represent standard errors.

2/ c represents detrended annual rate of growth in private consumption.

There do not appear any discernible systematic policy reaction functions for the period, both in terms of the employment variable and its determinant z, with the observed R^2's indicating virtually random scatters. The autonomous impulses are significant in "explaining" the rate of growth in employment. However, the fiscal policy impulse is not significantly correlated with the monetary policy variable. These results suggest that for the interwar period, equation (2) may be employed as an acceptable reduced form to explain the business cycle. None of the standard econometric problems that would lead to biased estimates appear to be present.

The postwar results for the above equations using OLS are presented in Table 2. Certain differences from the interwar period are now apparent. In the basic equation explaining the real business cycle, the multiplier associated with the autonomous impulses, while still highly significant, has now declined to 1.5 or a little over one half of its interwar level. At the same time, the fiscal multiplier drops to 0.2. As in the interwar period, the monetary policy variable continues to be insignificant. 1/

While the Durbin-Watson test statistic indicates the possibility of autocorrelation, which might affect the significance of the monetary policy variable in particular, more serious econometric problems are now present that could bias the coefficients. Regressing the hypothesized policy reaction functions confirms the indication in Chart 2 that fiscal policy has been pursued in a countercyclical manner, and a significant negative coefficient of around 0.8 is obtained between the fiscal policy impulses and the autonomous impulses. As the latter continue to be highly significant in explaining employment growth, the hypothesized reaction function is also not rejected when expressed in terms of employment growth. The monetary policy variable is now significantly correlated with the autonomous impulses and exhibits a positive (procyclical) coefficient value, but it is not correlated with employment growth. 2/ However, there is no correlation between the fiscal policy variable and monetary policy variables.

These results indicate that the coefficients estimated for z and f in the basic equation exhibit simultaneous equation bias as a consequence of the systematic negative relationship between f and z. In order to

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1/ It should, perhaps, be emphasized that the focus here is on the short-run fluctuations in output. Consequently, phenomena such as crowding-out or the disincentive effects of high marginal tax rates or high unemployment benefits that appear to operate in the medium to long run and bear more on trend growth, are ignored for present purposes.

2/ The estimated equations exhibit high serial correlation, as indicated by the low values of the Durbin-Watson statistic so that correcting for this problem would simply add to the estimated standard errors, further reducing the OLS reported correlation. The only correlation of significance that remains is that between fiscal policy and the autonomous impulses or employment growth.

Table 2. The Postwar U.S. Business Cycle: Some Regression Results 1/ (1949-81)

Equation Number	Dependent Variable	Constant	z	f	m	e	$\overline{R}^2$	DW
1	y	0.91	1.51**	0.22	0.20		0.51	1.47
		(1.15)	(0.35)	(0.27)	(0.14)			
2	f	0.10	-0.75**		-0.04		0.37	1.80
		(0.77)	(0.19)		(0.09)			
3	f	--				-0.48**	0.35	2.19
		(0.20)				(0.11)		
4	m	-7.94**	0.88*				0.15	0.55
		(0.47)	(0.34)					
5	m	-7.60**				0.15	-0.02	0.64
		(0.50)				(0.24)		
6	e	-1.98*	1.01**	-0.35	-0.19		0.56	2.08
		(0.80)	(0.25)	(0.19)	(0.01)			
7	c	1.24	1.01**	-0.45	-0.76**		0.61	2.05
		(0.98)	(0.30)	(0.23)	(0.12)			

Data Source: See appendix.
1/ See footnotes to Table 1.

correct for such bias, equation (2) should no longer be viewed as a legitimate reduced-form equation but rather as a structural equation in a system comprising both itself and the fiscal policy reaction function stated by (3). The reduced form explaining it would then be derived from this system.

On the basis of the regression results reported in Table 2, which indicate both a negligible effect of the monetary impulse on short-term real output growth and, on correcting for serial correlation, no systematic link with either employment growth or the autonomous impulses, the following structure is hypothesized.

(6a) $y_t = az_t + bf_t + u_t$

(6b) $f_t = \alpha z_t + v_t$

The reduced form yielded by the structure has the form

$$(7) \quad y_t = \beta z_t + \varepsilon_t$$

where $\beta = (a + b\alpha)$ and the error term $\varepsilon_t = bv_t + u_t$

As the system represented by (6) is not exactly identified, it is not possible to infer the structural coefficients directly from the estimate of the reduced form coefficient $\hat{\beta}$. The underlying structural parameters will need to be estimated and this is undertaken here using a Full Information Maximum Likelihood (FIML) technique. 1/

In order to facilitate the estimation some prior restrictions were imposed. The hypothesis was introduced that the true annual multiplier associated with the autonomous impulses had not undergone a structural change but exhibited such change only because fiscal policy had become countercyclical. At the same time, the hypothesis that the true underlying multiplier associated with the fiscal impulses has remained unchanged between the two periods is tested.

Pooling time series from the two periods, the following exactly identified structure was estimated and the validity of the basic model, together with the restrictions imposed, tested:

$$(8a) \quad y_t = a(1-\delta)z_t + (b-b')\,(1-\delta)f_t + b'f_t + v_t$$

$$(8b) \quad f_t = (1-\delta)f_t + \alpha\delta z_t + u_t$$

Here b' refers to the second period coefficient and $\delta = (0, 1)$ is a dummy variable taking the value 0 in the interwar years and 1 in the postwar period. As no significant policy reaction function was detected for the interwar years (see Table 1), a unit coefficient restriction was imposed on f_t for that period.

The FIML estimates were as follows:

$$(9a) \quad \hat{y} = \underset{(0.17)}{2.74^{**}z} + \underset{(0.73)}{0.015f_I} + \underset{(0.49)}{1.69^{**}f}$$

$$(b) \quad \hat{f}_{II} = \underset{(0.13)}{-0.76^{**}z_{II}}$$

where subscript I refers to data relating to the interwar years and II to the postwar years. Items in parentheses are asymptotic standard errors, with double asterisks (**) indicating significance at the one per cent level in terms of the t statistic.

1/ The computer program RESIMUL developed by Wymer (1968) was used for this purpose.

The hypothesis that the multiplier associated with fiscal policy has undergone a significant change between the two periods is rejected, since (b-b') is estimated to be insignificant. An estimate of the true fiscal multiplier is, therefore, 1.7, which was found to be highly significant. 1/

In order to test that the over-identifying restrictions are consistent with the sample, a Chi - Square (χ^2) test is applied to the estimated log-likelihood ratio. The estimated χ^2 value of 0.2 is well below the critical level of 9.2 for a test at the one per cent level of significance in the upper region of the χ^2 distribution (with two degrees of freedom). The over-identifying restrictions cannot, therefore, be rejected on the basis of the statistic.

Whether or not the model, as identified, is consistent with the data can be tested using the Carter-Nagar χ^2 statistic. The estimated χ^2 value of 336.9 is well above the critical level of 16.8 for a test at the one per cent level of significance in the upper tail region of the χ^2 distribution (with six degrees of freedom). The hypothesis that the model is not consistent with the data must, therefore, be rejected. 2/

The estimated structural coefficients in (9a) and (9b) imply from equation (7) that

$$(10) \quad \beta = 2.74 - 0.76(1.69) = 1.46$$

The value of 1.46 is close to the 1.51 estimate obtained from the reduced form equation (1) in Table 2.

It would thus appear that the pursuit of a systematic countercyclical fiscal policy was the principal factor in reducing the postwar multiplier associated with the autonomous impulses. The suggestion is also conveyed that other factors influencing the size of the autonomous expenditure multiplier more or less cancelled out. The postwar period witnessed a major increase in reliance on the income taxes (payroll and individual) that in themselves would have increased tax leaks and resulted in a smaller multiplier. However, the savings propensities also declined that on their own would tend to raise the multiplier. 3/

Finally, we apply Friedman's (1953) criterion to assess the contribution of countercyclical policies to the objective of reducing instability. The criterion relied on comparing the variances in observed output growth

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1/ This significance confirms a key prediction of the Goldfeld and Blinder (1972) Monte Carlo study. See also Rhomberg (1971).

2/ The Carter-Nagar System R^2 statistic for the model is 0.76.

3/ Bailey (1978) has argued that the creation of a more stable economic environment in the postwar period reduced the need for precautionary saving to help cope with unemployment.

with those that would have prevailed in the absence of any countercyclical policies and is derived using the following well-known statistical relationship.

$$(11) \quad \sigma_y^2 = \sigma_x^2 + \sigma_p^2 + 2r_{x,p}\sigma_x\sigma_p$$

where y represents observed output growth that reflects the effects of any policies, x denotes output growth in the absence of policies,

p is the effect on output growth of policies,

σ^2 represents the variance of the subscripted variable, and

$r_{x,p}$ represents the (partial) correlation between x and p.

On dividing through by σ_x^2, the criterion for a stabilizing policy can be stated as

$$(12) \quad \sigma_y^2/\sigma_x^2 < 1, \text{ provided } r_{xy} < -(1/2)(\sigma_p/\sigma_x).$$

Any application of policy will add to the variance of the target variable as is evident from equation (11), and therefore, for the policy to be stabilizing, a negative covariance with x that is larger than its variance is required.

Taking variances of (9a), ignoring insignificant terms and rearranging, generates the following expression for a stabilizing criterion

$$(13) \quad \sigma_y^2/a^2\sigma_z^2 < 1, \text{ provided } r_{zf} < -(1/2)(b\sigma_f/a\sigma_z)$$

where a and b are the coefficients estimated from that equation that apply to z and f, respectively. 1/

It is easily established that the criterion for a stabilizing fiscal policy is met. The ratio of the variance of observed output growth to that which would have occurred had only the autonomous impulses been present is 1.02 for the interwar period and 0.59 for the postwar period, respectively. The postwar period clearly represents a shift toward marked stabilization of the cycle, as this ratio is well below unity. This is attributable to a stabilizing fiscal policy; the observed negative

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1/ Note that output growth in the absence of policies, i.e., x in equation (11) is represented here by the term az, where a is estimated from (9a).

correlation betwen fiscal policy and the autonomous impulses of 0.63 was substantially greater than that required for policy to be barely stabilizing. However, this was not true for the interwar period. 1/

IV. Some Implications for Business Cycle Theory

The econometric results in the preceding section confirm that a countercyclical fiscal policy, in reducing the autonomous impulse multiplier, contributed to the marked flattening in the postwar business cycle. During this period the variance of the autonomous impulses also underwent a sharp decline. 2/ It is reasonable to attribute at least part of this improvement to the pursuit of a stabilizing fiscal policy. This is because in a more stable economic environment, where it is widely perceived that the authorities will contain fluctuations that threaten to get out of hand, the risks associated with taking the longer view are reduced. Thus businesses in their investment behavior will place a lower weight on any current shortfall in demand for their product, emphasizing instead the rewards to be reaped from having investments come on stream when the more-or-less assured recovery materializes. 3/

In order to establish the role of fiscal policy in this process a more elaborate model is required that explicitly incorporates rational expectations on the part of agents. The outlines of such a model can be briefly sketched. Economic agents will form expectations of the stabilizing action that the authorities may take and, on calculating the effects of such actions, condition their behavior accordingly. The data on the U.S. business cycle appear to exhibit this process at work. The postwar declines in the variance of private fixed investment can be interpreted as indicating private acceptance of stabilizing actions by the authorities.

Friedman's policy pessimism together with the inability of various studies to show a significant stabilizing role for fiscal policy in particular, appear to have stimulated some far-reaching attempts in

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1/ Obviously, if the only data available for assessing policy related to the interwar years, Friedman's (1953) pessimism that the criteria stated in (12) and (13) could be met would be appropriate, especially on taking account of the various problems that need to be resolved for successful policy, including those of forecasting and implementation.

2/ For the period 1921-40, the variance of the autonomous impulses amounted to 7.5 but had declined to 1.8 for the period 1949-81.

3/ In the criterion that Friedman (1953) proposed no allowance is made for the fact that the pursuit of stabilizing policies can themselves contribute to a decline in the variability of the forcing function, thereby providing an additional source of stabilization. If this aspect were taken into account, the contribution of fiscal policy to the stabilization of the business cycle would be adjudged even greater.

recent years to probe the underlying causes of business cycles. 1/ Rather than begin the explanation of business cycle movements by treating as *autonomous fluctuations in private fixed investments and exports*, an equilibrium theory is formulated that stresses the covariation of all major macroeconomic aggregates. The covariations are then attributed to random factors and monetary surprises (unanticipated monetary actions).

According to this approach, the production behavior, in particular, of agents will differ depending on whether they interpret a price change as representing generalized price inflation or a relative price shift. Price changes resulting from shifts in technology or taste simply change the pattern of resource allocation and are not themselves the source of pronounced business cycle fluctuations. The latter must be traced to monetary surprises and their general misinterpretation by agents as indicating relative price shifts, with consequent over- or under-production.

Relying on such a theory, equation (2) would be replaced by

$$(14) \quad y_t = (m_t - m_t^e) + v_t \quad 2/$$

where m_t represents the actual rate of growth in the money supply,

m_t^e is its expected value for time t, and

v_t is a random disturbance term with standard properties.

The cycle is determined by random disturbances or shocks to which is added the effects of any unanticipated growth in the money supply. 3/ The principal policy implication is that in order to reduce the amplitude of the cycle, monetary surprises must be avoided. This could be achieved if the authorities pursued a stable money supply rule, leaving only the exogenous, irreducible, random shock to generate cycles. Any attempt to pursue a systematic monetary policy to offset the random shocks is of limited avail, as economic agents will anticipate the monetary policy rule and adjust nominal prices. However, depending on the imperfections of the information set that individuals have on which to base their optimal forecasts and the flexibility governing price adjustments, there may be transitional real disturbances.

1/ See especially Lucas (1977) and Sargent (1976). Barro (1981) provides an interim assessment.

2/ See Barro (1981). Lucas (1973) employs an equation (see his equation (11), p. 331) that reduces to (14) above provided the rate of inflation term in his equation is identified with the monetary surprise term.

3/ Given the monetarist orientation, a separate role for "unanticipated" fiscal policy, or any other macroeconomic policies for that matter, is denied.

Several questions can be raised about this approach to business cycle theory, of which two are dealt with here. 1/ One issue concerns the validity of a reduced form expression such as in equation (14). Explicitly adopting the rational expectations approach requires that the traditional behavioral expressions of private agents be modified to allow for expectations and their determination in a rational manner. It is only in a Lucas (1972) type of disaggregated framework that does not allow for any externalities that reduced form expressions of the form shown in equation (14) are derivable.

Suppose, however, that the authorities are pursuing a constant rate of growth of money rule, but that private agents are concerned about the magnitude of the potential losses that could be sustained as a consequence of the random shocks. To the extent that the aggregate of individual intertemporal optimizing decisions is sub-optimal in comparison to a socially attainable optimum, it would pay individuals to enter into a mutual compact with the authorities. It is possible to construct several scenarios that would generate this implication. A shock necessitates adjustment responses that on the part of some agents will require withdrawal of purchasing power from routine expenditures so as to pay for the adjustment, while others enjoy windfalls. Because of imperfections in the information set, and rigidities imposed by the presence of wage and price contracts that might otherwise be optimal institutional innovations, the result could be a magnification of the effects of a shock that should have been localized and handled by the normal mechanisms for the reallocation of resources. A particular consequence could be that of a generalized recession that feeds on itself, as those less directly affected by the shock take anticipatory actions.

In such circumstances, electing or otherwise persuading the authorities to take appropriate action to prevent the recession from getting out of hand would provide sufficient assurance to individuals to enable them to adjust in the same way as they would have done had they had full information. The behavior of individuals thus depends on the policy rule in force. The reduced form for such a model would look different from that of equation (14), as it would now have to provide scope for the inclusion of systematic policy rules, whose effects do not disappear even though they are fully anticipated.

A second issue concerns the extent to which equation (14) may be misspecified as a consequence of omitting exogenous variables that influence the dependent variable, raising the sort of concerns expressed earlier by Blinder and Solow (1974). Of note here is the assumption that the autonomous variables do not exert an influence separate from that of

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1/ Barro (1981) argues that the development of a properly founded equilibrium theory of business cycle theory is still far from complete. However, the questions he raises are not the same as those considered here.

the monetary surprise variable. The argument that major economic aggregates co-move and, furthermore, that there is a single common explanation, does not appear to have been adequately supported by the empirical work.

In the tests undertaken here of equation (2) above, only limited correlation was found between the monetary term m and the autonomous variable z. As the monetary variable measured deviations in actual monetary growth from trend, it can be viewed as a proxy for the money surprise term in equation (14), under conditions where expected money is equated to trend growth. While the proxy may not be perfect, the result obtained suggests that the autonomous variables are not subsumed by the money surprise term. Although further testing is required, it would seem inappropriate to neglect autonomous variables. 1/

An implication of equation (14) of concern to forecasting should also be noted. As a monetary surprise cannot be anticipated (by definition), equation (14) forecasts as a random walk. 2/ While no comparisons are undertaken here with the model based on equation (2), the latter can generate superior forecasts, depending on the accuracy with which the autonomous impulses are predicted. This is suggested in Chart 5 where equation (9a), with nonsignificant terms deleted, is used to track the U.S. business cycle. Moreover, the causal mechanism embedded in equation (9a) indicates that there is scope for influencing the outcome. Although, by definition, the autonomous variables are not directly controllable in the short run, their effects can be offset through the use of policies. In the random walk model this can only be done by the deliberate creation of a monetary surprise.

A somewhat different justification given for the inability to detect potency for fiscal actions is that private individuals will anticipate the future costs of the policy and modify their current behavior in a

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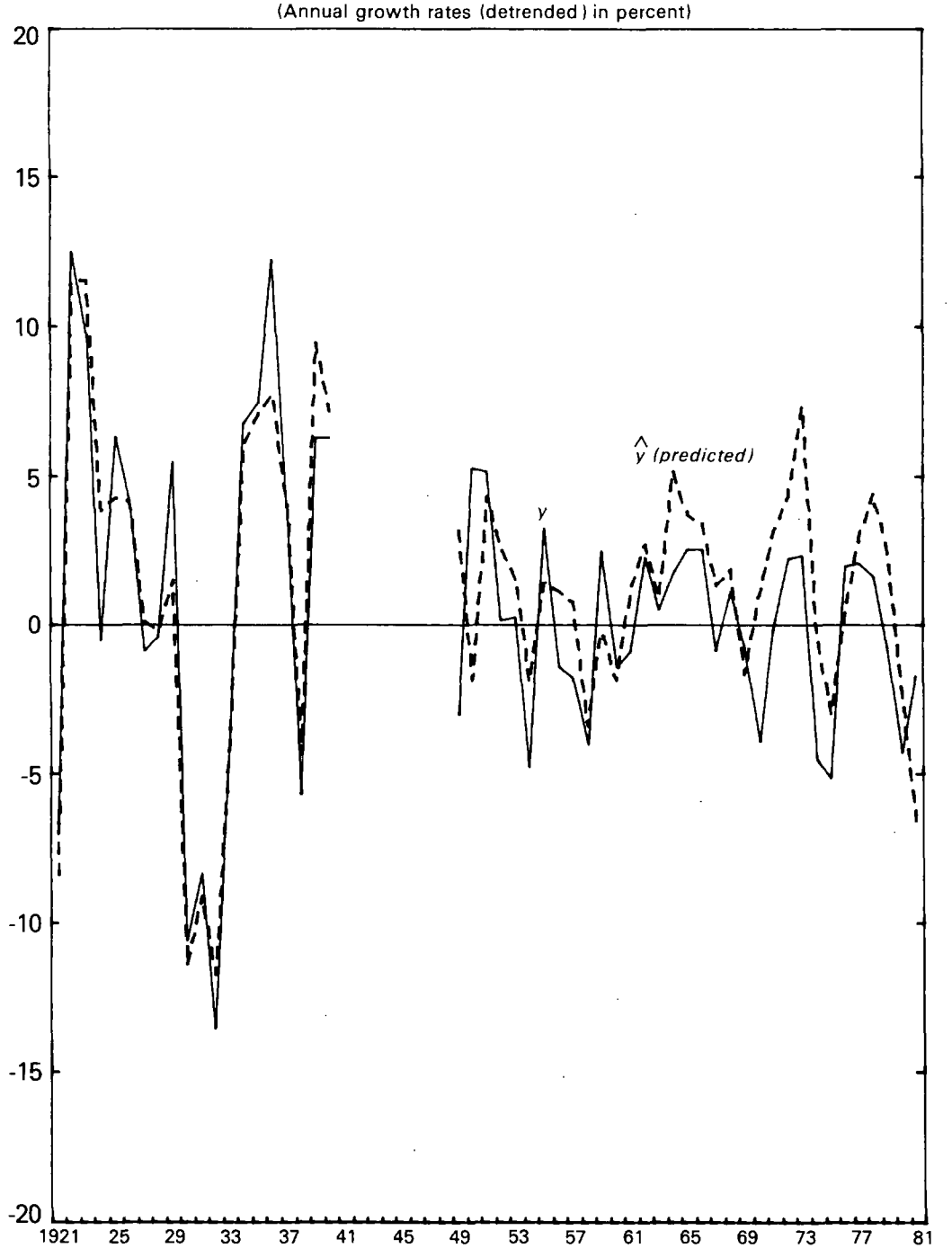
1/ However, the estimation of equation (14) can be undertaken in a manner that gives rise to a spurious impression of excellent fit. Typically, this is done by formulating the expected value of money growth as a lagged function of previous periods' actual money rates of growth, and using mechanical ARIMA (autoregressive integrated moving average) methods to uncover any underlying stochastic process that generated the residuals. See Barro (1981). Out-of-sample forecasts, however, can be extremely poor insofar as the underlying stochastic process changes. If the manifestation of a stochastic process represents in part the omission of a key explanatory variable, the process parameters will shift depending on the movements in the explanatory variable.

2/ This follows from taking first differences of equation (14) and converting it into a stationary series. The resulting stochastic process is white noise, with the implication that the best forecast is one where the first difference is set equal to zero. On integrating, this implies projecting the current observed value. As is well known, a random walk process can create the impression of cycles in the time series.

CHART 5

TRACKING THE U.S. BUSINESS CYCLE: (1921-40 AND 1949-81)

(Annual growth rates (detrended) in percent)



manner that offsets the policy. Following, say, an expansionary fiscal action, individuals may revise their expectations about future fiscal actions: for example, they could anticipate higher future taxes, leading them to reduce their current expenditures, so as to be in a position to pay these higher taxes. This argument is based on a particular variant of the so-called Ricardian equivalence theorem that states there exists an "ex-ante" crowding out in which private consumer behavior responds to offset the effects of fiscal actions on aggregate demand. 1/

In his empirical results, Feldstein (1982) finds no confirmation for the proposition, as the estimated values of the government expenditure coefficients in the private consumption function are around zero rather than unity and insignificant. However, he concludes that the proposition is to be rejected only for the longer run, on the grounds that the estimated coefficients indicate the average responses for his 41-year sample period. In the short run, he argues that private behavior, partly as a consequence of fiscal expectations, is too volatile to allow for predictable effects of fiscal policy. 2/

Results of a direct test appropriate for the short run are reported in Tables 1 and 2 (see equation (7)). The estimated equations relate the annual (detrended) rate of growth in private consumption (and thus the transitory or short-term discretionary component) to the autonomous, monetary and fiscal impulses. The results show that while there is a negative coefficient relating consumption and fiscal policy, both in the inter- and postwar period, it is insignificant and at best provides only weak support for the Ricardian hypothesis. 3/

1/ See especially Buiter and Tobin (1979) for a critical review and Feldstein (1982). The term "ex-ante" is employed to indicate effects that are essentially expectational and that occur prior to any adjustments induced as a consequence of the fiscal action impacting on market adjustment variables such as interest rate or prices.

2/ Feldstein does not provide any evidence to support his argument of short-run instability. The fact that long-term averaging virtually eliminates any trace of fiscal expectations might instead be construed as indicating that these are of secondary importance even in the short run.

3/ An alternative way of resolving the matter is to note that if a countercyclical fiscal policy had induced procyclical consumption behavior, the outcome would have been a neutralization of fiscal policy, essentially because of the heavy weight of consumption in output. But then the coefficient of the autonomous impulses in the postwar regression equations would not have exhibited such a steep decline from the interwar period. We would also have difficulty in explaining the reduction in the postwar amplitude of the business cycle.

Interestingly, the effect of the Ricardian hypothesis of a neutralizing private sector behavior appears to apply more to monetary actions, at any rate as defined here. For both periods, the estimated equations yielded sizable, negative, and significant coefficients relating transitory consumption to monetary impulses. This could explain the singular lack of influence of the monetary variable on real output growth in the short run. One hypothesis to explain the phenomenon would be that a more expansionary monetary policy need not immediately induce higher consumption in the short run (through the wealth effect), but by giving rise to the expectation that wealth will continue to be revalued upwards, the policy could result in higher transitional saving. 1/

Finally, it should be emphasized that the econometric results, while consistent with the hypothesis of a stabilizing fiscal role, should not be interpreted as a rejection of monetary policy. Instead these results point to the difficulty in applying a stabilizing monetary policy for a short run of a year, as has been well noted by Friedman and others. Fiscal policy appears easier to administer over such a time period and with more determinate effects, although, perhaps, not for quarterly or shorter invervals. The importance of monetary policy, as conventionally defined, would seem to be in providing longer-term guidance or steerage and in controlling the rate of inflation. This suggests that a better policy strategy involves maintaining a stable money supply growth rate over time (so as to ensure an acceptable rate of growth in nominal GNP), while fiscal policy is employed for shorter-term countercyclical operations (with a view to keeping real GNP on track). Following this strategy, if fiscal policy is inadequate and the economy becomes excessively buoyant (Chart 3 suggests that both of these factors were present in 1978-79 in the United States), monetary restraint is automatically exercised (but did not appear to be in 1978-79). The longer-run outcomes, particularly with respect to the inflation rate, are likely to be more favorable when adhering to a money supply rule than when monetary policy is accommodative.

V. Summary and Conclusion

The paper set out to examine whether or not fiscal policy contributed to the marked flattening of the postwar business cycle. It was shown initially, using a summary indicator of fiscal stance, that fiscal policy has been systematically countercyclical in the postwar period but not in the interwar period. This feature illuminates the econometric results obtained using a standard single equation (reduced-form) approach, that postwar fiscal policy was both impotent and insignificant. That result was attributed to simultaneous equation bias and confirmed by the finding of a statistically significant policy reaction function, relating fiscal impulses to employment growth or, alternatively, to the autonomous impluses.

1/ Once again alternative causal explanations can be entertained.

Estimating a system that included the policy reaction function showed that the impact multiplier of fiscal policy on output growth was both sizable and statistically significant. Further tests did not result in a rejection of the hypothesis that the marked decline in the postwar autonomous impulse multiplier was caused by the pursuit of a systematic countercyclical policy.

The econometric results are consistent with the hypothesis that the major determinants of business cycle fluctuations are the traditionally defined autonomous impulses. By serving to reduce the multiplier impact of these impulses on output, fiscal policy has been stabilizing. However, its contribution to the stabilization of the business cycle would seem even greater insofar as the general public began to believe, as a consequence of the countercyclical fiscal policy, that the authorities would always intervene to prevent a recession from getting out of hand. This belief would encourage entrepreneurs to take a longer view in their investment behavior. The latter observation is consistent with the sharp postwar decline in the variance of the autonomous impulses. However, the evidence does not support the contemporary interpretation of the Ricardian hypothesis that the attempt at a stabilizing fiscal policy would be frustrated by agents adjusting their expenditures in an offsetting manner.

The econometric results showed that short-term monetary actions, as conventionally defined, exerted limited influence on annual output growth both in the interwar and postwar periods. Nevertheless, it is possible that the pursuit of a stable money supply rule would have further flattened the postwar business cycle, by contributing to a climate of stability.

APPENDIX

The data on an annual basis, were obtained from several sources, with the DRI (Data Research Incorporated) data bank as the principal source (accessed February 2, 1983). Unless otherwise noted, all data for the period 1947 - 81 were obtained from DRI. Data for the earlier period (1919-40) were obtained in the manner shown in tables 3 and 4. Data for the period not covered by DRI are reproduced in table 4 under the DRI code headings (so as to facilitate identification), with the exception of MNYI and EHHC. MNYI for the period 1917 to 1960 was obtained from table 1, column 8, in Friedman, M. and Schwartz A.J., Monetary Statistics of the United States, National Bureau of Economic Research, New York, 1970. This data comprises the sum of currency and demand deposits, seasonally adjusted and on an end of month (year) basis. All monetary stock data were collected on an end year basis.

The employment data were obtained from the Historical Statistics of the United States (see footnote 2, table 3) and is the series D4HS (total employed) less the series Y308HS (total civilian employment of the Federal Government) for the years 1919 to 1940.

Whenever possible, adjustments were made to the data stated in table 4 so as to render them comparable to those obtained from the DRI. The earlier years' fiscal data, which are on a fiscal year basis (July 1-June 30) were converted to a calender year basis by simple averaging of the current and succeeding fiscal year's data. In the case of state and local government expenditures, no annual data was available for the period 1919-1929, as the information was collected initially on a decennial and subsequently on a quinquennial basis before the practice of annual surveys was begun. Kuznets (see Table 4), however, provides a series on wages and salaries. Annual growth rates were computed for this series and employed to project backwards the state and local government expenditures on a national accounts basis that are available for subsequent years. For the remaining series, a simple splicing technique was used to join the series. As the analysis in the text is undertaken in terms of growth rates, the two series would be spliced by taking the year of overlap and computing the growth rate for the last year of the first series and the growth rate for the first year of the second series.

Table 3. Series Derived From The DRI

Variable 1/	DRI Code	Period
GNP	GNP	1919-40
GNP at constant prices	GNP_{72}	1919-40
GNP implicit price deflator	PGNP	1919-40
Private fixed investment	IFIX	1929-40
Exports of goods and services	EX	1929-40
Personal consumption	C	1929-40
Federal government expenditure	GEXPF	1929-40
Federal government receipts	TGF	1929-40
Federal government deficit	DEFGF	1929-40
State and local government expenditure on goods and services	GSL	1929-40
Paid civilian employment	EHHC	1948-81
Federal government civilian employment	EFT & PTGF	1948-81
Federal government unemployment insurance benefits	VUIG	1929-40
Currency and demand deposits and travellers checks (stock data mid-December averages)	MNYI	1959-81

1/ Government data from this source are on a national income accounts basis.

Table 4. Some Historical Series for the United States 1/

(In billions of U.S. dollars)

	IFIX 2/	EX 3/	C 3/	DEXPF 4/	TGF 4/	DFGF 4/	GSL 5/
1918				12.677	3.645	-9.032	
1919	8.313	10.776	52.150	18.493	5.130	-13.363	1.580
1920	10.123	10.264	61.310	6.358	6.649	0.291	1.865
1921	7.753	5.505	56.990	5.062	5.571	0.509	2.113
1922	9.547	4.954	56.120	3.289	4.026	0.736	2.272
1923	12.693	5.494	62.430	3.140	3.853	0.713	2.405
1924	13.167	5.911	66.230	2.908	3.871	0.963	2.558
1925	14.409	6.348	65.800	2.924	3.641	0.717	2.704
1926	15.481	6.381	71.420	2.930	3.795	0.865	2.863
1927	14.690	6.456	71.080	2.857	4.013	1.155	3.073
1928	14.456	5.842	73.320	2.961	3.900	0.939	3.232
1929	14.557	7.034	77.300	3.127	3.862	0.734	3.381

1/ See table 3 for explanation of the column heads.

2/ Kendrick, J.W., Productivity Trends in the United States, National Bureau of Economic Research, New York, 1970.

3/ Historical Statistics of the United States, U.S. Department of Commerce, Bureau of Census, Washington, D.C. 1975.

4/ Fiscal data obtained on an administrative budget basis from The Budget of the U.S. Government, U.S. Office of Management and Budget, 1977.

5/ Local government wages and salaries as estimated by Kuznets in table G2, p. 812, National Income and its Composition, Kuznets, S., New York, 1941.

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