

Any views expressed in the Departmental Memoranda (DM) Series represent the opinions of the authors and, unless otherwise indicated, should not be interpreted as official Fund views.

DM/84/24

INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

The Economic Impact of Deficit Finance

Prepared by Laurence J. Kotlikoff*

Approved by Vito Tanzi

April 12, 1984

	<u>Contents</u>	<u>Page</u>
I.	Introduction	1
II.	The Life Cycle Model--The Standard Neoclassical Framework for the Analysis of Deficit Policy	4
	1. The life cycle model--intergenerational transfers to the living from the unborn	5
	2. Intergenerational altruism--the competing neoclassical model	7
III.	The Crowding-Out Process	8
IV.	Simulation Analysis of Economic Deficits	10
	1. Economic deficits arising from unfunded retirement programs	15
	2. Structural tax change, investment incentives, and other subtle ways of running economic deficits and surpluses	18
V.	Economic Deficits and the Potential for Fiscal Illusion	20
VI.	Empirical Analysis of Economic Deficits	23
VII.	Deficit Finance in the Presence of Liquidity Constraints	24
VIII.	Summary and Conclusion	26
Text Table		
	1. Crowding Out Under Alternative Deficit Policies	12

*Professor Kotlikoff is with Yale University and The National Bureau of Economic Research. This paper was written while the author was a visiting scholar in the Fiscal Affairs Department of the International Monetary Fund. The views expressed here are solely those of the author.

I. Introduction

The current combination of large budget deficits among industrialized countries and exceptionally high short-term real interest rates has rekindled interest in crowding out and its potential effects on saving, capital formation, and financial variables. This paper describes how fiscal policies that result in economic deficits alter an economy's saving behavior. Depending on the economy's size and degree of openness the changes in domestic savings arising from deficit finance can produce major changes in domestic investment, real interest rates, and real wage rates. Even if pretax returns to capital and labor are unaltered by deficits, because of international capital mobility and factor price equalizing commodity trade, economic deficits can dramatically lower an economy's long-run level of welfare. This paper provides a quantitative sense of precisely how burdensome the "burden of the debt" may be.

Section II briefly summarizes the basic neoclassical life cycle model that underlies most discussions of crowding out. This model provides a framework for defining economic deficits as redistribution across generations. A serious shortcoming in the current deficit debate is the failure of many to distinguish economic deficits from what are recorded as deficits by government accountants. A second objective of this paper is to clarify just how poorly conventional measures of deficits describe a government's underlying fiscal policy. This point is emphasized in various sections of the paper in three different ways. First, the actual operational steps taken by the government in transferring resources across generations are described without reference to terms such as "taxes," "spending," and "bond finance," since these labels have been applied quite arbitrarily to particular government receipts and payments. Describing economic deficit policy in accounting-free terms suggests immediately that the critical operations--the receipts from, and payments to, particular generations--involved in economic deficit finance can, in many circumstances, equally well be conducted by the government under the titles "taxation," "spending," or the "net sale of bonds." The second method of exposing the misleading reporting of policy is to show how a government, armed with a clever accountant, could radically change the reporting of official government debt with potentially no change whatsoever in real economic debt policy. The third admonition against letting accountants characterize policy is delivered by illustrating that the quantitative impacts of unreported economic deficits can far exceed those that eventuate in very large reported official deficits.

Section III discusses crowding out as a dynamic process, whose dimensions cannot be reliably inferred from short-run responses to policy changes. While crowding out, as defined here, refers to a reduction in national wealth accumulation, a second concept, typically referred to as "financial crowding out," is often advanced as the causal link between current U.S. deficits and high short-run interest rates.

Much of the concern with financial crowding out ultimately appears to revolve around the actual transaction of selling bonds as opposed to concern with the government's underlying real policy. Surely, the argument goes, a government's sale of bonds, regardless of its use of the proceeds, raises the total supply of bonds on the market. The greater supply of bonds, according to this view, means a lower bond price, that is, a higher interest rate, which reduces (crowds out) the private supply of bonds (private borrowing).

This line of argument ignores the fact that if the course of government policy, including monetary policy, is held fixed, the demand for government bonds by the private sector is, over the range being considered, likely to be highly elastic; in the United States alone, private holdings of real wealth exceed \$12 trillion. Suppose the U.S. Government sought to borrow \$12 trillion tomorrow and could promise to its lenders with absolute certainty the return of this principal plus the capital income that would otherwise have been earned. For the private sector the purchase of bonds in this case simply represents swapping one portfolio of assets for an identical portfolio. Ignoring transactions costs, the private sector should be perfectly indifferent to such a policy and be perfectly elastic with respect to swapping its real assets for identical real government claims. The point here is that the magnitude of the Government's gross financial transactions may have nothing at all to do with its real policy, and it is the real policy of the Government that should ultimately influence market clearing prices, including interest rates. As described below, economic deficits that ultimately crowd out a significant fraction of an economy's real wealth, may involve little or no increase in short-term real interest rates, although they produce potentially sizable increases in long-term interest rates. While there are channels by which economic deficit policies can raise short rates, such channels have nothing to do with the volume of government transactions per se in bond markets.

Section IV provides the reader with a sense of the potential quantitative impact of policies that crowd out saving and capital formation. The presentation here draws on simulation findings from a dynamic neoclassical life cycle model developed by the author and Alan J. Auerbach. The policies considered include economic deficits arising from short-term, medium-term, and longer-term tax cuts, economic deficits associated with unfunded government retirement programs, structural tax policy, and changes in investment incentives. The general message of this research is that economic deficits, if sufficiently large and maintained for a sufficient period of time, can greatly reduce a life cycle economy's long-run stock of wealth and level of welfare.

The discussion of investment incentives indicates that governments can generate major economic deficits and surpluses in very subtle and unreported ways. In the case of investment incentives, economic deficits and surpluses are generated by altering equity values on the stock market.

Recent public discussions of official deficits have totally ignored these and most other unofficial intergenerational transfer programs. For many countries, including the United States, unofficial and unreported postwar economic deficit policies appear to swamp policies that were reported as producing deficits when such policies are measured by their ability to crowd out savings and capital formation. The excessive focus on accounting deficits suggests that fiscal illusion, defined here as the misreading of fiscal policy, is widespread. Section V dramatizes the potential problem of fiscal illusion by describing what is ultimately an accounting policy that entirely eliminates official debt without necessarily altering real economic policy in the slightest.

The proper response to the problem of fiscal illusion is not to construct more elaborate accounting definitions of government liabilities. Revised bookkeeping of the type advocated by Buiter (1982) and Eisner (1983) is open to the same type of manipulation and misreading as the current bookkeeping. The proper response involves describing fiscal policy in terms of its impact on underlying household intertemporal budget constraints. Since household budgets depend only on marginal prices and inframarginal endowments, describing fiscal policy in terms of its effects on these variables leaves policy descriptions and discussions free of accounting conventions. Obviously, characterizing the lifetime budgets of each household in an economy is infeasible; but for many policies, such as economic deficits, examination of a quite small subset of budget constraints is sufficient. For the analysis of economic deficits, which redistribute resources across generations, the household's age is central. The major features of the government's economic deficit policy can potentially be illustrated by describing changes in the budgets of as few as three representative households, one young, one middle age, and one elderly.

Section VI discusses empirical attempts to test whether the life cycle assumptions needed to produce crowding out actually hold. For reasons that will become clear as the discussion proceeds, distinguishing life cycle from alternative forms of economic behavior is a subtle enterprise. Direct tests of the hypothesis requires either cohort-specific time series data or particular types of cross-section data covering extended families. No such data, at least for the industrialized countries, is currently available; in its absence, economists have used the available data to conduct indirect tests of life cycle behavior, the results of which are best described as inconclusive.

Much of this paper adopts the neoclassical assumption that households optimally choose consumption and leisure over their lifetimes and have access to capital markets that permit both borrowing and lending. Section VII discusses how certain conclusions about deficit finance are altered by dropping the assumption that all households can freely borrow at the margin. Under the assumption that the great majority of young- and middle-age households are liquidity constrained at the margin,

traditional accounting definitions of deficits represent somewhat better indicators of underlying economic deficits. The assumption of widespread liquidity constraints appears, however, at odds with some broad features of at least U.S. time series data. In addition, empirical analysis of U.S. consumption and income data suggest that, at most, a small minority of U.S. households face such constraints.

The final section summarizes the paper and emphasizes the very considerable down-side risks of running sizable economic deficits.

II. The Life Cycle Model--The Standard Neoclassical Framework for the Analysis of Deficit Policy

Resources are generally scarce both at a point in time and over time; hence, any positive (negative) net transfer made to older generations must typically be paid for by negative (positive) net transfers from younger or future generations. Economic deficits, as defined here, are government policies that redistribute resources from younger to older generations. This definition of economic deficits, as inter-generational transfer policies, may seem odd to those accustomed to viewing deficits as the excess of "spending" over "taxes." However, as is spelled out at length below, official definitions of "spending," "taxes," and "deficits" are quite arbitrary and provide little basis for a systematic discussion of government policy. To the extent that officially reported deficits raise concerns about crowding out of saving and investment, such official deficits must be associated with fundamental government policy changes. While redistribution among generations is only one of several fiscal policies, such redistribution has historically been the basis for concerns about deficit finance, and properly provides the focus for this discussion.

The life cycle model, developed by Modigliani and Brumberg (1954) and Ando and Modigliani (1963), provides strong predictions about the saving impact of intergenerational transfers. The life cycle model describes the behavior of economies in which households optimally choose how much to save and work over their lifetimes. These decisions are constrained by lifetime budgets that restrict households from spending more (in present value) on consumption goods than they earn (in present value) in the labor market. In the strict version of the model considered here, households are assumed neither to make net transfers to, nor to receive net transfers from, an older or younger relative, with the exception of supporting young children. This feature of intergenerational selfishness is critically important for the proposition that economic deficits alter national saving.

Since each generation in the selfish life cycle model is basically out for itself, each generation consumes any net transfers that come its way, even if these resources are extracted by the government from

their own (adult) children. The fact that net government transfers are consumed by generations receiving them does not, by itself, imply any change in national saving. Consider, for example, a net transfer from the current young to the current old. In principle, the increased consumption of the old arising from this transfer could be matched dollar for dollar by reduced consumption of the young, that is, the marginal propensities to consume of the young and the old could be the same. Such equivalence of marginal consumption propensities across age groups is not, however, consistent with optimizing life cycle saving behavior. According to the life cycle model the marginal propensity to consume is an increasing function of age. To understand this key proposition, take the case of selfish life cycle individuals with one remaining year of life. Such individuals will exhaust all their remaining resources in their final year of life and, hence, have a marginal propensity to consume (calibrated on an annual basis) that equals unity. Next, consider the second oldest age group with two remaining years of life. Since this age group is concerned with next year's consumption, as well as this year's, it will allocate a fraction of any additional resources to increasing next year's consumption and consume the remaining fraction this year. Hence, its marginal propensity to consume is less than unity. In the simplest version of the life cycle model the marginal consumption propensity equals one divided by the number of remaining years of life. For the second oldest generation the marginal consumption propensity, in this case, is one half.

In the life cycle model the fact that older generations consume, in the current period, a greater fraction of transfers than younger generations means that redistribution from younger to older age groups increases total current private consumption and reduces national saving. Stated differently, a dollar transferred from a younger to an older household increases the older household's consumption by an amount that exceeds, in absolute value, the reduction in consumption of the younger household. If the policy of transferring from the current young to the current old is permanent, that is, it occurs each period, the economy's consumption level each period will be greater relative to that which would occur if the policy were immediately halted. As a consequence, a permanent policy of transferring from the young to the old has a permanent depressing effect on saving. Note that a real world policy of permanently shifting from taxes levied primarily on the elderly to taxes levied primarily on the young constitutes exactly this type of economic deficit.

1. The life cycle model--intergenerational transfers to the living from the unborn

Intergenerational transfers need not occur only among the living. If it so chooses, the government can redistribute to all currently living generations at the expense of future generations. Since generations that are not yet born have marginal propensities to consume that equal

zero, while all living life cycle generations have positive propensities, such a policy obviously raises current consumption and lowers current saving.

At first glance it might appear impossible to redistribute in the current period from future generations to current generations, since future generations are not yet alive. Operationally, this redistribution is conducted in the following manner. First, the government acquires resources from current generations in a manner that does not alter their consumption or welfare. Next, the government turns around and hands these resources back to the same current generations, leading them to increase their current consumption. This leaves current generations better off and, as will be immediately apparent, future generations worse off. Ignoring for the moment incentive effects and liquidity constraints, the government can acquire some, and potentially all, of the economy's real wealth without altering any living household's current consumption if it promises to return these resources in the future with interest. Such a policy leaves private intertemporal budgets unchanged, giving households no reason, under the stated assumptions, to alter their current consumption. In the real world, governments can gain access to real resources either by issuing what they call "official bonds," levying what they call "taxes," cutting what they call "spending," and/or creating base money that is used to purchase real resources. The government's future return (inconclusive of interest) of the resources it currently acquires from the private sector can take the form of households receiving payments labeled by the government "return of interest plus principal on official government debt," "government transfer payments," or "tax reductions." Reducing future levels of money creation is another mechanism by which the return of the initial resource receipt can be effected. In this case the lower rate of money creation means higher private real money balances that can be traded for more real resources.

Once the government gets possession of current real resources, it can immediately distribute them to current generations, thus expanding their lifetime budgets and, accordingly, raising their current consumption. As described thus far, the transaction involves (1) the government's taking from the private sector resources which it promises to return and does return (with interest) in the future, and (2) immediately transferring to the private sector these current resources, which it treats as a net additional to lifetime income. The impact of this policy is thus greater current consumption and less current national saving. In addition, since the real resources needed by the government to adhere to its future repayment commitments to initial generations are taken (in the future) from future generations, the policy just described involves a real resource transfer from future to current generations.

The description of this economic deficit policy is not yet complete; one needs to specify precisely which future generation will pay the bill for the welfare improvement of current generations. The governments can delay, up to a limit, imposing an added burden on future generations by rolling over repayment commitments. In this case, it collects resources to meet its previous repayment commitments while simultaneously promising additional future repayments to compensate households who are surrendering these current resources. While such a policy is feasible in the short run, it cannot be sustained indefinitely. Ultimately, the government has to start extracting, in present value, net resources from successive generations to at least meet the interest component (adjusted for growth) of the repayment commitments.

One option before the government is to extract sufficient resources from a subset of future generations to retire completely its repayment commitments. In this case, the economy will, after a transition period, return to the same steady state growth path and level of real wealth that it would have experienced in the absence of the transitory economic deficit. Alternatively, the government may choose to maintain a constant (adjusted for growth) stock of outstanding promises to future repayments through a rollover policy and simply cover interest payments (adjusted for growth). In this case the economy's growth path and level of wealth are permanently altered. Each future generation living under this long-run fiscal regime is forced by the government to give up resources to meet these interest payments, that is, since the principal component of the stock of promises is never retired, there will always be an interest burden on future generations and a corresponding reduction in their consumption that represents part of the payment for the increased consumption of initial recipient generations. Since a part of the burden of the initial resource transfer will always be paid by generations as yet unborn, in the form of reduced consumption, at any time the initial positive increase in consumption of early recipient generations will not yet have been fully offset by reduced consumption of ensuing generations. As a consequence, a transfer policy that involves perpetual outstanding government repayment promises means a perpetually smaller stock of real wealth. In closed economies where investment equals domestic saving, this implies a smaller capital stock as well as a smaller capital-labor ratio than would otherwise have prevailed. Reductions in capital-labor ratios, in turn, imply lower (pretax) real wage rates and higher (pretax) real returns to capital. Such general equilibrium changes in factor returns means reductions in the standards of living of future generations. These reductions are in addition to their welfare loss from the burden of meeting interest payments.

2. Intergenerational altruism--the competing neoclassical model

The implications of intergenerational transfers are very different in altruistic models in which each generation cares about the welfare of its children. As Barro (1974) points out, if such redistribution is

already being conducted within families, economic deficits may simply substitute for private intergenerational redistribution, with no net impact on the economy. Ignoring the incentive effects of economic deficits, and assuming identical families, Barro's intergenerationally altruistic households respond to the receipt of net government resource transfers by maintaining their level of consumption and passing the full amount of these receipts to successive generations of descendants. These additional private transfers provide future relatives with the resources needed to meet the government's eventual offsetting net transfers. Private behavior can also offset negative government transfers to older generations. In this case the generations making these payments maintain their consumption levels and pass fewer resources to future generations. This leaves the position of future generations unchanged since the initial negative government transfers imply eventual positive government transfers to future generations. Since the behavior of altruistic families completely offsets public redistribution, economic deficits per se have no impact in such economies; in particular, apart from possibly altering household saving and work incentives and redistributing among altruistic households, there is no change in the consumption or labor supply of any generation and, therefore, no change in the economy's level of output or its accumulation of wealth over time.

III. The Crowding-Out Process

The standard neoclassical definition of crowding out is a reduction in national (private plus public) wealth accumulation that arises from government policies. Accumulated national wealth is simply the sum of past levels of net national saving, which, in turn, corresponds to the difference between net national product and national consumption. If government policy succeeds in reducing national wealth, it must also reduce net national saving in some, if not all, periods during which the policy is in place. A decline in net national saving in any particular year requires either an increase in national consumption, holding national product fixed, a decline in national product, holding national consumption fixed, or a simultaneous change in national product and consumption that lowers their difference.

A government-induced reduction in saving in a particular year will automatically lower the amount of national wealth available in the following year. Since national product includes capital income earned on national wealth, a decline in national saving this year means less capital income next year. The decline in next year's capital income implies a change in next year's national saving unless labor income or national consumption change by precisely the amounts required to leave national saving unchanged. The direct link between current saving and future output and the influence of future output on future saving indicates that crowding out is a dynamic process whose impact cannot be fully discerned by considering only short-term changes in saving.

Another aspect of the dynamics of crowding out is that short-term policy changes almost invariably require adjustments in future policies. The connection between current and future policies arises from the requirement that the government's short-, medium-, and long-run policies be mutually compatible. An example of incompatible short- and long-run policies is (1) cutting tax rates permanently and, thereby, reducing the government's acquisition of real resources from the private sector, while (2) significantly and permanently raising government consumption. Such a policy involves the government increasing its absorption of resources through time with no corresponding reduction in the absorption of resources by the private sector. Since the economy's possibility frontier is limited both at a point in time and through time, such a policy is generally infeasible. Current cuts in tax rates require either future increases in tax rates, changes in the time path of government consumption, or changes in the government's creation of base money (its use of "printing press" finance).

The extent of crowding out associated with any short-term policy depends critically on the nature and timing of future policy adjustments. Thus, the time path of crowding out from a temporary cut in income tax rates will be quite different if the tax cut lasts 1 year, 5 years, or 20 years; it will be different still if these changes are accompanied by changes in the time path of government consumption, changes in the time path of money creation, or changes in the time path of other tax rates. This sensitivity to the precise path of accommodating policy applies to the entire time path of crowding out, that is, the short, medium, as well as long runs. As described below, policies that produce long-run crowding out may involve short-run crowding in. "Short run," in this case, usually means several years, but could exceed a decade. The fact that a policy that ultimately lowers savings could increase saving in the short run suggests the need for considerable caution in assessing policies based on short-run outcomes.

Since the limitations on feasible intertemporal government policies necessarily require adjusting future policy instruments in response to changes in current instruments, one cannot meaningfully discuss the impact of deficits per se. Rather, one is obliged to compare the effects of fully specified alternative time paths of mutually feasible policies. Given this restriction, one is, however, free to concentrate on those sets of feasible policy paths that involve significant intergenerational redistribution. To isolate crowding out resulting from economic deficits from crowding out associated with changes in the time path of government consumption, the following discussion is restricted to feasible intertemporal policies that hold constant the time path of government consumption. Since the central concern of this analysis of deficits is saving as opposed to inflation, the discussion ignores the use of money creation as a fiscal instrument for redistribution across generations.

IV. Simulation Analysis of Economic Deficits

In the life cycle model, each household makes independent choices, but the combined behavior of more than 70 contemporaneous, living, adult cohorts enters into the determination of the general equilibrium transition path of a life cycle economy. The economy's transition path also depends on the future decisions of generations not yet in existence; today's generations base current economic choices partly on information about future wages and interest rates. These future prices are determined not only by the saving and labor supply decisions of those currently alive, but also by the saving and labor supply behavior of succeeding generations; today's twenty-year old's expectations about wage rates when she reaches thirty is partly influenced by her expectations of the labor supply of twenty-year olds 10 years from now whose labor supply, in turn, depends on expectations of the labor supply of twenty-year olds 20 years from now, and on and on.

The complexity of the multicohort life cycle model as well as its extensive, if not unlimited, data requirements, has led many economists to simulate rather than empirically estimate the effects of government policy in nonaltruistic neoclassical environments. Simulation analysis of steady (or stationary) state predictions of life cycle economies dates from Ando and Modigliani (1963), Tobin (1967), and Atkinson (1971). Papers by Tobin and Walter Dolde (1971, 1981), Eytan Sheshinski (1978), and Kotlikoff (1979 a) simulate the impact of social security on steady state labor supply and savings. Summers (1981) presents a steady state simulation analysis of other government fiscal policies, in particular, structural tax policy. Merton Miller and Charles Upton (1974) and Summers (1981 a) simulate effects of selected government policies on the growth path of life cycle economies under the assumption of myopic expectations.

In a series of articles, Auerbach and Kotlikoff (1983 a, 1983 b, 1983 c, 1982) and Auerbach, Kotlikoff, and Jon Skinner (1983) extended this research by developing a perfect foresight general equilibrium life cycle simulation model. "Perfect foresight" in this context means that households make economic choices based on common projections of future wages, interest rates, and tax rates, and these decisions, in the aggregate, produce equilibrium time paths of these variables equal to those projected. The model incorporates variable labor supply and a wide range of fiscal instruments, including investment incentives, progressive taxes, and social security. Its chief contribution, however, is determining the equilibrium transition path generated by fiscal policies.

Simulation analysis is certainly no substitute for empirical research; rather, it provides a methodology for exploring the full implications of empirical findings. Unfortunately, there is no large scale neoclassical econometric model that can be simulated to estimate

the general equilibrium savings impact of policy. The computer simulation model used here incorporates CES utility and production functions, which are frequently posited in empirical studies. In addition, the parameterization of the model is based on empirical findings.

Equation (1) presents the CES utility function of consumption, C , and leisure, l , underlying the life cycle simulation results.

$$U = \sum_{a=1}^{55} (1/(1+\delta))^{a-1} [\mu C_a^{(1-1/\rho)} + (1 - \mu)l_a^{(1-1/\rho)}] \frac{1-\gamma}{1-1/\rho} \quad (1)$$

In (1) δ is the time preference rate, ρ is the "static" elasticity of substitution between consumption and leisure at each age a , and γ is the intertemporal elasticity of substitution between consumption and leisure at different ages. The reciprocal of γ equals the coefficient of relative risk aversion. Baseline parameter values for δ , γ , ρ , and σ , the elasticity of substitution of capital for labor in the production function are .015, .25, .8, and 1. These figures are mid-range estimates based on a variety of empirical studies, many of which are cited in Auerbach, Kotlikoff, and Skinner (1983).

The simulated economy has an initial steady state capital-output ratio of 3.7, a capital-labor ratio of 5, a pretax wage normalized to 1, a 6.7 percent pretax real interest rate, a 3.7 percent net national saving rate, and a 15 percent proportional tax on all income. Since, in the initial steady state there are no transfer programs conducted either through "official" or "unofficial" mechanisms, receipts from the 15 percent income tax are solely used to finance government consumption.

Table 1 presents simulations of three economic deficit policies that would produce increases in officially recorded liabilities according to conventional accounting procedures. In each simulation, the time path of government consumption per capita is held fixed, and the income tax rate is temporarily cut from 15 percent to 10 percent. The three simulations involve tax cuts lasting 1, 5, and 20 years. During the period that rates are lowered, the government's official debt is endogenous; in these years the government issues precisely the amount of debt needed to maintain its consumption, given the loss in receipts from the income tax, as well as meet interest payments on previously issued debt. After the tax cut is terminated, the income tax rate becomes endogenous, while the per capita stock of official liabilities is held fixed. The income tax rate is chosen annually to provide the government with sufficient receipts to purchase its fixed level of per capita consumption and to meet interest payments adjusted for the amount of new debt that can be financed by population growth.

Table 1. Crowding Out Under Alternative Deficit Policies

Initial Steady State	$\frac{S}{Y}$	$\frac{y}{Y}$	$\frac{W}{Y}$	$\frac{r}{Y}$	$\frac{L}{Y}$	$\frac{K}{Y}$
	.037	.150	1.000	.067	19.10	95.1
<u>1-Year Income Tax Cut</u>						
Year	$\frac{S}{Y}$	$\frac{y}{Y}$	$\frac{W}{Y}$	$\frac{r}{Y}$	$\frac{L}{Y}$	$\frac{K}{Y}$
1	.049	.100	.991	.069	19.80	95.1
2	.034	.152	1.002	.067	19.04	95.4
3	.034	.152	1.001	.067	19.04	95.3
4	.035	.152	1.001	.067	19.04	95.3
5	.035	.152	1.001	.067	19.04	95.3
10	.036	.153	1.000	.067	19.05	94.9
30	.037 $\frac{1}{4}$	.153	.998	.067	19.07	94.2
60	.037 $\frac{1}{4}$	.153	.997	.068	19.08	93.9
90	.037 $\frac{1}{4}$	.153	.997	.068	19.08	93.9
Final Steady State	.037 $\frac{1}{4}$	.153	.997	.068	19.08	93.9
<u>5-Year Income Tax Cut</u>						
Year	$\frac{S}{Y}$	$\frac{y}{Y}$	$\frac{W}{Y}$	$\frac{r}{Y}$	$\frac{L}{Y}$	$\frac{K}{Y}$
1	.046	.100	.992	.069	19.76	95.1
2	.045	.100	.992	.068	19.74	95.3
3	.044	.100	.993	.068	19.73	95.6
4	.043	.100	.994	.068	19.71	95.8
5	.026	.161	1.006	.066	18.83	95.9
10	.028	.161	1.002	.067	18.87	94.6
30	.032	.162	.992	.069	18.96	91.3
60	.036	.163	.987	.070	19.02	89.9
90	.036	.163	.987	.070	19.02	89.7
Final Steady State	.036	.163	.987	.070	19.02	89.7
<u>20-Year Income Tax Cut</u>						
Year	$\frac{S}{Y}$	$\frac{y}{Y}$	$\frac{W}{Y}$	$\frac{r}{Y}$	$\frac{L}{Y}$	$\frac{K}{Y}$
1	.034	.100	.994	.068	19.58	95.1
2	.033	.100	.994	.068	19.56	95.0
3	.031	.100	.994	.068	19.55	94.9
4	.030	.100	.994	.068	19.53	94.8
5	.029	.100	.993	.068	19.51	94.6
10	.023	.100	.991	.068	19.45	93.3
30	-.014	.246	.964	.075	17.72	76.1
60	.011	.284	.888	.096	18.08	56.0
90	.020	.297	.867	.103	18.11	50.8
Final Steady State	.023	.304	.856	.107	18.13	48.5

$\frac{1}{4}$ This saving rate is below that in the initial steady state to the fourth decimal.

As indicated in Table 1, the long-run income tax rates, τ_y , resulting from cutting income tax rates by one third for 1, 5, and 20 years, are 15.3 percent, 16.3 percent, and 30.4 percent, respectively. The long-run reduction in per capita capital, k , is 1.3 percent for the one-year tax cut, 5.7 percent for the five-year tax cut, and 49.1 percent for the twenty-year tax cut. Per capita labor supply, L , falls by a trivial amount in the case of one- and five-year tax cuts, but by 5.1 percent for the twenty-year tax cut.

The transition paths displayed in Table 1 reveal a number of surprising and important features of crowding out processes. First, the one-year and five-year tax cut policies exhibit crowding in prior to the year tax rates are increased. In the case of the one-year tax reduction, the simulated economy's saving rate rises by 32 percent in the first year of the transition. However, in the second year of this simulation, after taxes have been raised, the saving rate is 8 percent lower than its initial steady state value. In contrast to the two shorter-term tax cuts, the twenty-year tax cut exhibits immediate crowding out. The short-run differences in these simulations clearly reflect the predominance of substitution over income effects in the case of the short period tax cuts and the converse for the twenty-year tax cut; in the case of the one-year tax cut all but the oldest generation alive in the first year will face higher tax rates through the rest of their lives. Young generations will face the higher tax rate for such a long period that their budget possibilities and levels of welfare are actually reduced. While the income effects experienced by most current age groups from the change in the time path of tax rates are trivial, if not negative, each age group has strong incentives to substitute future for current consumption and leisure in response to the very short-term rise in after-tax wage rates and returns to capital. The key lesson of these short tax cut simulations is that policies that inevitably crowd out saving and investment can look quite effective in promoting capital formation if one evaluates such policies using only the first few years of information.

A second point illustrated by the table is that crowding out is typically a slow and gradual process. While the twenty-year tax cut reduces the capital stock (per capita) by almost half its initial value, the reduction during the first 10 years of the policy is only 1.9 percent. Indeed, most of the reduction in capital formation occurs after the first 30 years of the policy's enactment. The crowding out process, once it begins, is also slow for the shorter duration tax cuts. For economies of the type described in the simulation model, economic deficits can have a barely discernible impact on the economy in any particular year, although their cumulative impact is quite dramatic. A reasonable analogy is a slowly growing tumor that initially can barely be detected, and, once detected, may be misdiagnosed as benign. Indeed, the very dangerous tumor might conceivably be beneficial, in the short run, in mitigating other ailments.

Unlike a malignant tumor for which there are possible cures, there is no way to escape the long-run costs of short-run deficit finance. This is the third important lesson of these simulations and the standard life cycle intertemporal theory on which they are based. While one might wishfully think that, having crowded in capital through short-term tax cuts, one could adopt a painless policy for eliminating the accumulated debt (meeting repayment commitments), such is not the case. One cannot postpone indefinitely raising tax rates, and once these rates are raised, the stimulus to saving through substitution effects is reversed; in addition, the cross-generational income effects that are at the heart of the crowding-out process ultimately play a decisive role in reducing national saving. Consider those older initial households, who, in large part, escape (through death) the eventual tax increases. These elderly, in the case of short-run tax cuts, may delay consuming their increases in lifetime resources until tax rates are raised, but once these rates are raised, their planned increase in consumption from their expanded after-tax lifetime budgets proceeds *pari passu*.

Table 1 also indicates that the extent of crowding out is a nonlinear function of the duration of the tax cuts. The reduction in capital in the twenty-year tax cut is 8.6 times that in the five-year tax cut. This nonlinearity is not surprising given other well understood nonlinear features of such economies. One example is the long established proposition that tax distortions rise as the square of the tax rate. Note that the increase in the income tax rate under the twenty-year deficit policy is 11.8 times that under the five-year deficit policy. Hence, the inefficiency in the former economy's final steady state is considerably greater than that of the latter, and much of the response to the much greater tax distortion appears to take the form of considerably less saving.

The long-run welfare reduction associated with the twenty-year tax cut policy is quite significant. Generations born in the new steady state experience a level of welfare that is 12 percent below that of generations in the initial steady state; the welfare reduction is measured as the fraction of lifetime resources one would need to take from a generation in the initial steady state to leave that generation with the new (lower) steady state level of welfare. The size of the welfare loss inflicted on future generations is, perhaps, more easily understood by observing that the long-run after-tax wage falls 14 percent, while the after-tax return to capital rises by less than 1 percent.

Note that the before-tax return to capital rises considerably, from 6.7 percent to 10.7 percent, but also quite slowly; the policy raises thirty-year yields by less than 1 percentage point. Intuitively, the slow change in pretax yields, in this standard neoclassical growth model, arises because interest rates are set by pretax marginal returns to capital, which, in turn, depend on the ratio of the stock of capital to the economy's labor supply. While there is some short-term variation

in labor supply, the capital stock is fixed in the immediate period of a policy change and, as is expected of stock variables, changes rather slowly through time.

Introducing costs of adjusting the representative firm's level of capital input (e.g., time and monetary costs of installing new equipment or putting up a new plant), breaks the tight connection between short-term interest rates and the marginal product of capital. If one models capital adjustment costs by positing that a firm's currently installed capital is useful in installing additional capital, then the amount of installed capital at a point in time is a quasi-fixed factor that earns inframarginal rents on its ability to install new capital. These inframarginal rents are reflected in the price of installed capital. If a firm is undergoing a policy of expanding its capital input, the market price (stock market value in the case of listed firms) of its installed capital will be high. Over time, as the installation proceeds, the market price will fall because less installation is required in the future, meaning smaller prospective rents from capital installation. If the firm is engaged in reducing its capital stock, the opposite circumstances hold with respect to the price of the firm's existing capital. In this case the price of its capital is low, but rises through time, reflecting the fact that there are fewer periods in the future during which a part of the firm's capital must be removed. In models with adjustment costs of this type (Abel (1982), Lipton and Sachs (1980), Summers (1981 a), Auerbach and Kotlikoff (1982)), initial period interest rates equal that period's marginal product of capital plus the expected end-of-period capital gain or loss. Hence, this model frees up the tight linkage between interest rates and marginal products of capital. In the case of an economic deficit policy in which firms are reducing their capital intensity, these neoclassical adjustment cost models produce short rates in excess of the short-term marginal productivity of capital, with the difference equal to expected end-of-period capital gains. Introducing very sizable adjustment costs within the Auerbach-Kotlikoff life cycle simulation model does indeed produce immediate increases in short rates in response to economic deficits; but the simulated short-rate increases, even in the case of very sizable economic deficits, such as Table 1's twenty-year tax cut policy, are less than a single percentage point. Based on these conventional models of neoclassical growth, it appears quite difficult to argue that even enormous economic deficits would be associated with dramatic increases in short rates.

1. Economic deficits arising from unfunded retirement programs

A twenty-year tax cut of the dimensions indicated may appear unrealistic and perhaps not worth worrying about. It is important, therefore, to know that an economy could arrive to the final steady state generated by the twenty-year tax cut through a sequence of economic deficits; that is, one could envision a succession of governments enacting

temporary tax cuts which, in toto, produce the long-term reduction in capital and welfare illustrated in the twenty-year tax cut simulation.

Another aspect of the twenty-year tax cut simulation that might, at first glance, appear unrealistic is that over half of final steady state tax revenues are used to service interest on the government's accumulated debt. While for most industrialized countries the ratio of official interest payments to official government revenues is much smaller than one half, there is nothing in the model that distinguishes official from unofficial debt. For most developed countries, unfunded retirement policies potentially represent their largest form of economic debt. If one chooses the "right" accounting procedures, one could easily arrive at an expanded definition of interest payments, such that redefined, interest payments totaled over half of reported tax revenues in most industrialized nations.

Consider, as an example, the unfunded U.S. social security system. While the U.S. Government chooses to label worker's contributions to social security "taxes," it could just as well label such payments "loans." Similarly, the U.S. Government could label social security benefit payments "return of principal plus interest." Note that from the worker's point of view, social security "tax" payments and "benefit" receipts involve payments to the Government when young and receipt of payments back when old. But making payments now and receiving payments back in the future is exactly what the worker experiences when he or she purchases a U.S. treasury bill or bond. Hence, from the worker's point of view, social security "tax" contributions are, in most respects, equivalent to the purchase of a government liability. While the mean return and risk properties of invisible social security bonds may differ from those of official government bonds, such differences in risk properties provide no basis for labeling one set of payments "taxes" and the other set of payments "loans." ^{1/} If the U.S. Government were to drop its current arbitrary definition of deficits and arbitrarily broaden it to include social security payroll "taxes," the Government's

^{1/} The decision to label particular government prospective expenditures "official liabilities" has real effects to the extent that it alters the probability that such expenditures will be made. While the default risk may be smaller for official than for implicit liabilities, the real return to official liabilities may still be highly risky. In the United States, for example, official commitments to future nominal expenditures do not correspond to commitments to future real expenditures. During the 1970s the U.S. Federal Government accrued \$365.5 billion, measured in 1980 dollars, in real capital gains on its official liabilities while never missing a nominal principal or interest payment. This default on the real value of official liabilities through inflation is documented in the 1982 Economic Report of the President, Chapter 5.

1983 deficit would increase by over \$200 billion. If we also arbitrarily labeled benefit payments "principal plus interest," rather than "spending," the U.S. budget would appear quite bloated with interest payments.

The next section explores more fully concerns about fiscal illusion arising under any particular arbitrary accounting definition of "taxes," "spending," and "deficits." Labeling particular payments or receipts one thing or another does not, of course, demonstrate anything; in particular, relabeling the receipts and payments of unfunded retirement programs does not indicate how such programs could alter the intergenerational distribution of resources. The assertion that unfunded retirement programs produce economic deficits, that is, redistribute toward early generations', rests on the following line of argument. Holding other government policies fixed, introducing an unfunded retirement program means there is an initial set of elderly and middle-age generations who receive retirement benefits in excess of their own contributions plus interest. This increase in the welfare of initial old generations comes at the cost of lower welfare of young and future generations. In an unfunded retirement program the rate of return paid on contributions into the system eventually equals the economy's growth rate. If the growth rate is less than the pretax market return to private saving, successive generations of workers end up paying contributions that exceed, in present value, their receipt of retirement benefits. Future generations are worse off as a consequence of being forced to participate in such a program just as future generations are worse off in Table 1's conventional deficit policies as a consequence of being forced to meet interest payments on accumulated official debt. In addition, if factor returns are altered as a consequence of crowding out associated with unfunded retirement programs, these changes imply even further reductions in long-run welfare.

The simulation model can also be used to study economic debt arising from unfunded retirement programs. Starting from the initial steady state indicated in Table 1, introducing an unfunded social security system that replaces 60 percent of lifetime earnings produces a 15.1 percent reduction in the long-run (per capita) capital stock, a 4.2 percent decline in the pretax wage, and a 11.8 percent rise in the pretax return to capital.

Note that the long-run crowding out of capital in this simulation of an unofficial economic debt policy is 2.7 times that arising under the five-year tax cut policy of Table 1. Hence, in terms of its economic impact, unofficial and unreported economic deficits appear as important, if not more important, than many officially reported economic deficit policies.

2. Structural tax change, investment incentives, and other subtle ways of running economic deficit and surpluses

Structural tax change provides another means by which governments can redistribute toward early generations. One example is a policy of switching from consumption to wage taxation. Such a policy shifts the tax burden from the current elderly, who are largely retired, to young and middle-age workers as well as future generations. While these latter generations escape consumption taxation, the present value of the wage taxes exceeds the present value of the consumption tax payments they would otherwise have paid. Hence, their lifetime tax burden is increased by the policy. Except for the nature and timing of tax distortions, structural tax changes of this kind are quite similar to economic deficits arising from short-term tax cuts or those arising from unfunded government retirement programs. Each of these policies makes an initial set of generations better off at the expense of later generations.

The switch from consumption to wage taxation leads to a 13-percent long-run decline in the simulated economy's (per capita) capital stock for the time paths of government consumption assumed in Table 1. This is well over twice the reduction in capital formation that arose from cutting income tax rates for five years by one third.

Another subtle method by which governments run economic deficits and surpluses is by altering investment incentives. Investment incentives are defined here as tax provisions that discriminate in favor of newly produced capital. An example of such a policy is permitting the expensing of newly produced capital, while, at the same time, denying expensing for capital that was produced in the past. Expensing permits the purchaser of a new capital good to immediately deduct its acquisition cost. In the United States investment incentives, including expensing and depreciation allowances, but excluding the investment tax credit, are, in principle, available to previously produced (old) as well as newly produced (new) capital; effectively, however, old capital is, in large part, excluded by provisions that require a change in ownership of old capital for it to be offered the same depreciation and expensing tax treatment as new capital. In addition, a recapture tax must be paid on the difference between the sale price of the old capital and its adjusted tax basis. The U.S. recapture tax, in the case of equipment, is sufficiently steep to render turnover of old equipment unprofitable (Auerbach and Kotlikoff (1983)). For plant, the gain in turning over old capital and taking advantage of investment incentives available to new capital is quite small, that is, old plant, like old equipment, is essentially excluded from new investment incentives.

The connection between these issues and economic deficits revolves around the pricing of old capital. Since each unit of old capital is at a tax disadvantage relative to a unit of new capital (for which

investment incentives are available), its price must be less than that of a new unit of capital by exactly the present value difference in tax treatment. For example, if expensing is the investment incentive available to new capital, and the rate at which new capital can be expensed (immediately written off) is τ , then the price of old capital equals $(1-\tau)$ times the price of new capital. If τ is .3, the price per unit of old capital is 70 percent of the per unit price of new capital. As τ increases, the tax advantage of expensing rises, and the relative price of old capital falls. A decline in the relative value of old capital implies capital losses and an equivalent reduction in real resources for the owners of such capital. While increases in capital income tax rates in the presence of investment incentives constitute an implicit tax on the owners of old capital, for individuals seeking to accumulate capital there is a corresponding gain; savers are now able to purchase new or old capital either directly or by buying stocks at a lower net price. The lower net acquisition price implies a higher effective after-tax rate of return. This ignores, however, the higher taxes that must be paid on the capital's future stream of returns. As described below, even if effective capital income tax rates remain unchanged or even rise, there are other channels through which the capital losses to early generations redound to the benefit of latter generations.

The capital losses incurred by owners of old capital coupled with the gains to those acquiring additional capital constitute intergenerational redistribution, in this case, from older to younger and future generations, that is, an economic surplus; in the life cycle model, old- and middle-age generations are primary holders of old capital at any point in time. Younger generations, as well as unborn generations, represent the principal current and future purchasers of capital. Hence, raising capital income tax rates in the presence of investment incentives redistributes from the old and from a large fraction of the middle age to their descendants. Alternatively, lowering capital income tax rates in the presence of investment incentives or reducing investment incentives in the presence of significant capital income tax rates constitutes a subtle mechanism for running sizable economic deficits.

Simulating the elimination of investment incentives in the model described above provides a sense of the potential impact of these unreported intergenerational transfers and of their importance relative to other economic debt policies. Starting in a steady state with Table 1's level of per capita government consumption, a proportional uniform tax on capital and labor income, and full expensing, eliminating expensing leads to a 19 percent long-run decline in the economy's (per capita) capital stock. If only half of purchases of new capital are initially permitted expensing, the elimination of the partial expensing provision lowers long-run (per capita) capital by 9.8 percent. These figures are quite sizable relative to the crowding out associated with the "official" debt policies of Table 1.

Investment incentives, like temporary tax cuts, involve changes in marginal saving and labor supply incentives. For certain changes in investment incentives, however, it is unambiguously clear that inter-generational income effects are driving the results. Consider starting in a steady state with a 15 percent proportional income tax and full expensing. The marginal effective tax on capital income in such an economy is zero. While investors in capital must pay taxes at rate τ as its return, they receive an immediate subsidy of τ percent per dollar invested. This subsidy is received either directly in the form of the government's expensing subsidy or indirectly in the form of purchasing old capital at a cheaper price. This marginal subsidy exactly offsets in present value the marginal taxes paid on the return to the investment, leaving the effective tax on capital income equal to zero. Now, increasing the tax rate on the capital income component of total income raises both the initial investment subsidy and the future stream of tax payments. In present value the subsidy and the taxes remain exactly offsetting, and the effective tax on capital income stays equal to zero. While leaving unaltered the direct incentive to saving, the higher capital income tax generates capital losses for elderly and middle-age owners of capital. Their increased tax payments as well as the expansion of the tax base associated with their reduced consumption and the consequent crowding in of capital produces more tax revenue through time for the government. To maintain a feasible policy in which the claim of the government on the economy's real resources does not become indefinitely large, some other tax instrument must adjust that lowers the tax burden on the young and future generations. A natural candidate here is lowering the tax rate on labor income. A simulation of this kind was conducted involving an increase in the capital income tax rate from 15 percent to 50 percent in the presence of full expensing; the wage tax rate was adjusted downward annually such that government tax receipts exactly equaled government consumption. This policy resulted in more than a 70-percent increase in the long-run (per capita) capital stock. Obviously, reversing the policy (running an economic deficit) by cutting capital income tax rates from 50 percent to 15 percent leads to an equivalent absolute decline in per capita capital. The results of this economic deficit policy far exceeds anything reported in Table 1 and certainly does not rest on increased disincentives for saving, since nominal capital income tax rates are cut by over two thirds, while effective capital income tax rates remain equal to zero.

V. Economic Deficits and the Potential for Fiscal Illusion

The fact that the sizable economic deficits underlying a large set of fiscal policies receive such little notice, while the difference between arbitrarily defined "taxes" and arbitrarily defined "spending" receives such concentrated attention suggest endemic misreading of fiscal affairs. While the current unprecedented peacetime official

U.S. deficits are rightfully raising major concerns, no similar concerns were voiced in nonacademic circles during the 1960s and 1970s when the United States enormously expanded its unfunded social security, civil service, and military retirement programs. Another example of partial, if not inconsistent, discussions of deficits is the failure of most analysts of the current U.S. deficits to recognize either the significant economic surplus imbedded in the 1981 legislated investment incentives or those arising from the recent U.S. shift away from income taxation toward a hybrid wage/consumption tax structure.

The concern with fiscal illusion is further heightened by understanding that even the economic deficits arising from Table 1-type tax cuts could go unreported. To see this point, assume, for the moment, that the government, in the simulated economy of Table 1, can impose lump-sum per capita head taxes and also make lump-sum per capita transfers. Suppose, during the period the tax cuts of Table 1 are in place, the government levies lump-sum per capita head "taxes," rather than issuing official "bonds," in order to "balance the budget." If it simultaneously promises to make lump-sum per capita transfer payments in the future to each taxpayer (or his heir/estate) in an amount exactly equal to the lump-sum head tax plus interest, the budget constraints of households in the model would be unaffected. For each household the future lump-sum transfers would exactly offset the new lump-sum tax in present value; under the assumption of no liquidity constraints, these current lump-sum taxes and future lump-sum subsidies leave household budgets and household behavior unaffected. They do, however, permit the government to report zero deficits, that is, each year that the government would otherwise sell what it calls "bonds" to collect receipts, it instead levies an equal volume of lump-sum "taxes," promising with absolute certainty future repayment in the form of lump-sum "subsidies." To the household the purchase of a bond is equivalent to the payment of lump-sum taxes, combined with the assurance of future repayment with interest in the form of lump-sum transfers. For the government, however, labeling the receipts from the lump-sum taxes "taxes" rather than "bonds" permits it to report zero official deficits and zero official debt through eternity, despite running potentially enormous economic deficits.

The point of describing this alternative method of conducting the same real policy is to illustrate that a government could, in principle, run any feasible tax cut (or tax increase) policy, generating a corresponding path of eventual crowding out (crowding in), and yet always report official budget balance. While governments do not appear to have such lump-sum fiscal instruments at their disposal, the example raises the question of whether governments, intentionally or unintentionally, use distortionary taxes and transfer payments, in a similar manner, to obscure fundamental economic deficits.

A different set of concerns about fiscal illusion and economic deficits involves the propensity to consider various economic policies in isolation, ignoring the potential simultaneous determination of policies. For example, the introduction of an unfunded government retirement program may be accompanied by, and, indeed, explain increases in tax rates that leave the economy's economic deficit little altered. In such circumstances one would observe actual simultaneous changes in retirement programs and tax rates and would, presumably, be able to evaluate their joint effect relative to no change in policy, that is, the status quo. It should, however, be further recognized that the status quo is a quite arbitrary benchmark for evaluating individual or comprehensive policy changes. Rather than take current policy, for example, constant tax rates and no government unfunded retirement programs as the benchmark for considering changes in policy, one could argue that a path of rising tax rates and no unfunded retirement programs was the actual course of policy from which the government had deviated. Alternatively, one might argue that in the absence of establishing unfunded retirement programs, the government would have reduced taxes, particularly on the elderly, and that the unofficial economic debt arising from such programs simply substituted for officially reported debt policies that would otherwise have been enacted. Since the choice of a benchmark set of conditions is quite arbitrary, calculating "the" economic deficit and crowding out arising from any particular policy is predicated on subjective judgments about the counterfactual policies that would otherwise have been undertaken.

While these considerations may appear esoteric relative to what appear to be pressing concerns, such as reducing the current sizable U.S. economic deficits, they are of direct relevance when one considers precisely which taxes might be varied to reduce these deficits. If the source of additional tax revenues is increased business taxation, and such increased taxation takes the form of rolling back the recently enacted investment incentives, much of the reduction in the official U.S. deficit will have been achieved by increasing unofficial economic debt. Recall that reducing investment incentives raises the relative price of old versus new capital, and thus redistributes toward older generations. If the trade-off is only between running essentially equivalent explicit (officially reported) or implicit (not officially reported) economic deficits, then economic deficit policy is, for practical purposes, predetermined. In such an environment where, for practical or other reasons, the intergenerational distribution of resources cannot be significantly altered, advocates of changing that distribution presumably suffer from delusions that such changes are feasible, or illusions that officially reported deficits are reliable measures of economic deficit policy.

Two points summarize this section. First, officially reported deficits may have little or nothing to do with underlying economic deficits, and reliance on the former to estimate the latter is symptomatic

of fiscal illusion. Second, policies are not formulated in isolation, and labeling any particular policy the cause of economic deficits presupposes knowledge of what other policies would have been in its absence. Since suppositions about what policy would otherwise have been are inherently subjective, estimating "the" impact of economic deficits ultimately appears to be a normative enterprise. While examining alternative counterfactual policies is of no practical importance if the intergenerational distribution of resources is fundamentally predetermined, such analyses provided important guides to successfully reducing economic debt when comprehensive changes in the intergenerational distribution of resources are feasible.

VI. Empirical Analysis of Economic Deficits

Much of the recent empirical research relating to the effects of economic deficits falls into three categories: time series analysis of the savings impact of intergenerational transfers, cross-sectional analysis of social security's impact on household wealth accumulation, and estimates of the extent of intergenerational transfers in the economy.

The time series analysis (Feldstein (1974, 1982), Barro (1978), Darby (1979), Leimer and Lesnoy (1980, 1981), and numerous others) has proved inconclusive; the econometrics here is plagued by problems of aggregation, simultaneity, and errors in defining variables such as social security wealth. Auerbach and Kotlikoff (1983) demonstrate the problem of the time series statistical approach by running the standard time series specification on simulated data that conformed perfectly to the nonaltruistic, life cycle hypothesis. The coefficients on the critical social security wealth variable as well as many other variables proved extraordinarily sensitive to the choice of sample period. Auerbach and Kotlikoff concluded that the standard time series approach could easily accept the altruistic hypothesis even if it were false; that is, the standard time series approach has very little power with respect to rejecting the strict life cycle, no altruism hypothesis. While improving the time series specifications would be useful, what is ultimately needed for sharp time series tests is cohort-specific time series data on consumption and human and nonhuman wealth. Such data could be used to test whether the intergenerational distribution of resources determines the intergenerational distribution of consumption, which is a direct implication of the life cycle model.

The cross-sectional analysis has also been plagued by data problems as well as conceptual errors in formulating rejectable hypotheses concerning altruism. A variety of studies, including those of Feldstein and Pellechio (1979) and Kotlikoff (1979), involve regressions of household private wealth on social security tax and transfer variables. The central question posed in much of this literature is whether households

reduce their private asset accumulation when young because of the anticipation of receiving net windfall transfers when old. The evidence here is mixed, but even if each of these studies had strongly confirmed the proposition that expected future windfalls lead to higher current consumption and, therefore, less private wealth accumulation, the results would still leave unresolved the issue of altruism; the altruistic hypothesis, like the life cycle hypothesis, suggests that increases in the future resources of a particular household should raise that household's consumption and lower its own savings. In the altruistic case, however, the future windfall to the household in question would presumably also raise the consumption of all other altruistically linked households in the extended family. A central proposition of the altruism hypothesis is that the consumption of particular family members depends on the resources of other extended family members. Unfortunately, this latter proposition is not tested in the empirical literature dealing with developed countries, nor does it appear capable of being tested for these countries, given current data sources.

The third source of evidence bearing on the issue of altruism is provided by estimates of the extent of intergenerational transfers in the U.S. economy. Recent studies by White (1978), Darby (1979), and Kotlikoff and Summers (1981) suggest that over two thirds of U.S. private wealth holdings can be traced to intergenerational transfers; longitudinal age-earnings and age-consumption profiles are far from consistent with predictions of the strict, nonaltruistic life cycle model (Modigliani and Brumberg (1954)). This finding does not, however, preclude the possibility that the majority of households conform to the selfish life cycle model. The majority of households could have such preferences, but simply have very little "hump" savings. The distribution of wealth in the United States and many western countries is highly concentrated, and the distribution of bequests and other transfers is accordingly highly concentrated. It may well be that ours is a mixed society consisting of a minority of quite wealthy, altruistic households, and a majority of rather poor, life cycle households. While life cycle households may currently own little, if any, of the stock of wealth, their response to new government policies, in particular, intergenerational transfers, could dictate the economy's short-run saving behavior, where "short-run" here corresponds to several decades. Hence, for the issue of deficits and saving, it is important to assess the degree of intergenerational altruism among the masses of middle- and lower-income households.

VII. Deficit Finance in the Presence of Liquidity Constraints

An extremely simplified two-period, closed economy model of deficit finance under liquidity constraints has the following elements: (1) life cycle labor supply is exogenous; (2) young individuals, because of liquidity constraints, consume precisely their after-tax labor earnings

plus any government transfers; (3) old individuals also consume precisely their disposable income. Both the young and the old, in such a model, have unitary marginal propensities to consume; since the old are in their last period, they fully consume any net additions to their resources. For the young, their desire to transfer consumption from the future to the present, a desire that is thwarted by market restrictions on borrowing against future resources, implies a unitary consumption propensity.

Since both the young and the old have unitary consumption propensities, redistribution between them has no effect on national consumption or saving, and, therefore, implies no crowding out of investment. Since redistribution among the living implies no crowding out, any intergenerational redistribution that alters national saving must, therefore, be between the living and the unborn. As mentioned, the unborn have zero current marginal consumption propensities; hence, if the government can engineer net transfers to those currently alive and finance such transfers with net taxation on further generations, it will succeed in crowding out saving. In the model described, however, the private sector holds no real wealth whatsoever, since it never engages in any saving. Hence, if there is any wealth in the economy it must be owned by the government. If the government owns no wealth, there is no way it can alter the economy's consumption, since all of national output is already being consumed, and the economy has no wealth to consume. Clearly, the government, in such a setting, cannot cut taxes and sell bonds to the young generation; assuming the young remain liquidity-constrained, they consume all income flows and have no funds left over for bond purchases.

For the government to reduce national wealth in this setting, it must initially own some wealth. In this case the government can finance increased private sector consumption by allocating some or all of its initial wealth to those currently alive. Future generations are worse off because they have to finance the reduction in the government's capital income. In addition, the reduced stock of national wealth, all of which is owned by the government, means general equilibrium changes in factor returns that are also detrimental to future generations.

In this economy only officially reported debt policies, involving declines in the government's official surplus, would generate crowding out. Policies such as unfunded retirement programs or structural tax policies that involve transferring resources between the current young and old would have no crowding-out effects. Economies of this type would, however, exhibit zero or very small holdings of private wealth relative to variables such as income or consumption. For the United States, in contrast, ratios of private wealth to income range between 3 and 4, while ratios of wealth to consumption range between 4 and 5.

A less extreme model involving liquidity constraints results from relaxing the assumption that all first-period young are constrained. Suppose, instead, that a small minority of the young do save positive amounts. In this case, the government could sell bonds to this minority of the young and distribute the proceeds from the sale of these instruments to current young and old in the form of transfer payments or tax cuts. Since the interest on this debt would be paid for through higher net taxes levied on future generations, officially reported policies of this type would produce crowding out. On the other hand, redistribution from the masses of current liquidity-constrained young to the masses of elderly through unfunded retirement programs, structural tax changes, or changes in investment incentives, will have negligible effects on aggregate private consumption, implying rather minor crowding out effects.

While models in which the large majority of young and middle-age households are liquidity-constrained place conventional reporting of economic deficits in a better light, the empirical relevance of such models appears quite doubtful. Studies by Hall and Mishkin (1981), Diamond and Hausman (1982), and King and Dicks-Mireaux (1982) suggest that less than one quarter of U.S. households face liquidity constraints. Since these are among the poorest of American households, one would expect such households to account for a much smaller fraction of total U.S. consumption, and depending on the particular policy, a much smaller fraction of changes in U.S. consumption.

Other stylized facts about U.S. saving behavior cast doubt on liquidity constraints as a dominating factor influencing the effects of policy toward savings. First, U.S. private wealth is quite large relative to annual consumption, and very large relative to the increase in consumption that would arise from unofficial economic deficit policies. Second, the time series on U.S. net national product is considerably more variable than that of U.S. national consumption, particularly when consumption of durables is properly measured; that is, there is very considerable consumption smoothing in the U.S. time series data, a finding that is at odds with a view of widespread liquidity constraints.

VIII. Summary and Conclusion

This paper has taken a close look at the cause and consequences of economic deficits from the perspective of neoclassical models of saving. Analysis of the crowding-out mechanism led immediately to defining economic deficits as redistribution toward older generations. Once one observes that such intergenerational redistribution underlies arguments about deficits, crowding out, and saving, it becomes apparent that numerous fiscal policies, none of which lead to officially reported deficits, also constitute economic deficits. Conventional accounting of U.S. deficits appears to have missed most of the significant U.S.

economic deficits of the postwar period, with the exception of those currently underway. The failure of conventional accounting to provide sensible indicators of intergenerational redistribution, coupled with the intense public focus on these figures, suggests that fiscal illusion is widespread. There is a clear and compelling need to develop alternative ways of describing fiscal policy that are not sensitive to accounting conventions. Ultimately, this appears to require describing the underlying budget constraints facing representative households in the economy.

While empirical research has failed to distinguish among neoclassical models with respect to the concerns of crowding out, as well as between neoclassical and nonneoclassical models in general, the fault primarily lies with the data, not with the quality of the analyses. Discriminating among neoclassical models requires probing fairly subtle issues of household preferences, and sharp differentiating tests of these preferences require types of data quite different from what are now available. While empirical resolution of the crowding out hypothesis appears off in the future, the simulation analyses provide strong warnings about the potential long-term detrimental consequences of economic deficits. The simulations also indicate that crowding out is a slow and surprisingly complex dynamic process, whose full dimensions cannot be discerned by consideration of short-term policy effects.

References

- Abel, A., "Dynamic Effects of Permanent and Temporary Tax Policies in a q Model of Investment," Journal of Monetary Economy (Amsterdam), Vol. 9 (1982), pp. 353-73.
- Ando, Albert, and Franco Modigliani, "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests," American Economic Review (Nashville), Vol. 53 (March 1963), pp. 55-84.
- Auerbach, Alan J., "Social Security and the Economics of the Demographic Transition" in Henry Aaron and Gary Burtless, Retirement and Economic Behavior (Washington, D.C.: The Brookings Institution, 1984, forthcoming).
- Auerbach, Alan J., and Dale W. Jorgenson, The First Year Capital Recovery System, Harvard Institute of Economic Research, Discussion Paper No. 740 (Cambridge, Massachusetts: Harvard Institute of Economic Research, February 1980).
- Auerbach, Alan J., and Laurence J. Kotlikoff, Investment Versus Savings Incentives: The Size of the Bang for the Buck and the Potential for Self-Financing Business Tax Cuts, National Bureau of Economic Research, Working Paper No. 1027 (Cambridge, Massachusetts, November 1982).
- _____ (1983a), "An Examination of Empirical Tests of Social Security and Savings" in Social Policy Evaluation: An Economic Perspective, edited by Elhanan Helpman and others (New York and London: Academic Press, 1983), pp. 161-79.
- _____ (1983b), "National Savings, Economic Welfare and Structure of Taxation" in Behavioral Simulation Methods in Tax Policy Analysis, edited by Martin Feldstein (Chicago: University of Chicago Press, 1983), pp. 459-93.
- Auerbach, Alan J., Laurence J. Kotlikoff, and J. Skinner, "The Efficiency Gains from Dynamic Tax Reform," International Economic Review (Osaka), Vol. 24, No. 1 (February 1983), pp. 81-100.
- Barro, Robert J., "Are Government Bonds Net Wealth?," Journal of Political Economy (Chicago), Vol. 82, No. 6 (November/December 1974), pp. 1095-1118.
- Barro, Robert J., with Martin Feldstein, The Impact of Social Security on Private Saving: Evidence from the U.S. Time Series (Washington, D.C.: American Enterprise Institute for Policy Research, 1978).

Darby, Michael R., Effects of Social Security on Income and the Capital Stock (Washington: American Enterprise Institute for Public Policy Research, 1979).

Diamond, Peter A., "National Debt in a Neoclassical Growth Model," American Economic Review (Nashville), Vol. 55, No. 5 (December 1965), pp. 1126-50.

Diamond, Peter A., and J. Hausman, "Individual Retirement and Savings Behavior," May 1983, mimeo.

Feldstein, Martin, "Social Security, Induced Retirement, and Aggregate Capital Accumulation," Journal of Political Economy (Chicago), Vol. 82, No. 5 (September/October 1974), pp. 905-26.

_____, "The Surprising Incidence of a Tax on Pure Rent: A New Answer to an Old Question," Journal of Political Economy (Chicago), Vol. 85, No. 2 (April 1977), pp. 349-60.

Feldstein, Martin, and A. Pellechio, "Social Security and Household Wealth Accumulation: New Microeconomic Evidence," Review of Economic Studies (Edinburgh), Vol. 61, No. 3 (1979), pp. 361-68.

Hall, Robert E., and F. Mishkin, "The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households," Econometrica (Evanston, Illinois), Vol. 50 (March 1982), pp. 461-82.

Hayashi, Fumio, The Effect of Liquidity Constraints on Consumption: A Cross-Sectional Analysis, National Bureau of Economic Research Working Paper No. 882 (Cambridge, Massachusetts, 1982).

King, M. A., and L. Dicks-Mireaux, "Asset Holding and the Life Cycle," Economic Journal (London), Vol. 92, June 1982, pp. 247-67.

Kotlikoff, Laurence J. (1972a), "Social Security and Equilibrium Capital Intensity," Quarterly Journal of Economics (Cambridge, Massachusetts), Vol. 93 (May 1979), pp. 233-54.

_____, (1972b), "Testing the Theory of Social Security and Life Cycle Accumulation," American Economic Review (Nashville), Vol. 69, No. 3 (June 1979), pp. 396-410.

_____, "National Savings and Economic Policy: The Efficiency of Investment vs. Savings Incentives," American Economic Review, May 1983, Vol. 73, No. 2, pp. 82-89.

Kotlikoff, Laurence, and Lawrence H. Summers, "The Role of Intergenerational Transfers in Aggregate Capital Accumulation," Journal of Political Economy (Chicago), Vol. 89, No. 4 (1981), pp. 706-32.

- Lesnoy, S. P., and D. R. Leimer, Social Security and Private Saving: New Time Series Evidence with Alternative Specifications, Social Security Administration Working Paper No. 22, September 1981.
- Lipton, David, and Jeffrey Sachs, Accumulation and Growth in a Two-Country Model: A Simulation Approach, National Bureau of Economic Research Working Paper No. 572 (Cambridge, Massachusetts: National Bureau of Economic Research, October 1980).
- Miller, Merton H., and C. W. Upton, Macroeconomics: A Neoclassical Introduction (Homewood, Illinois: R. D. Irwin, 1974).
- Modigliani, Franco, and Richard Brumberg, "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data" in Post Keynesian Economics, edited by Kenneth K. Kurihara (New Brunswick, New Jersey: Rutgers University Press, 1954), pp. 388-436.
- Mossin, Jan, "Taxation and Risk-Taking: An Expected Utility Approach," Economica (London, February 1968), pp. 74-82.
- Poterba, James M., Inflation, Income Taxes, and Owner Occupied Housing, National Bureau of Economic Research Working Paper No. 553 (Cambridge, Massachusetts, September 1980).
- Sheshinski, Eytan, "A Model of Social Security and Retirement Decisions," Journal of Public Economy (Amsterdam), Vol. 10, No. 3 (December 1978), pp. 337-60.
- Summers, Lawrence H. (1981a), "Capital Taxation and Accumulation in a Life Cycle Growth Model," American Economic Review (Nashville), Vol. 71, No. 4 (September 1981), pp. 533-44.
- _____ (1981b), "Taxation and Corporate Investment: A q Theory Approach," Brookings Papers on Economic Activity, (Washington), Vol. 2, No. 1 (1981), pp. 67-127.
- Tobin, James, "Life Cycle Saving and Balanced Growth" in Ten Economic Studies in the Tradition of Irving Fisher, edited by William Fellner and others (New York: Wiley, 1967), pp. 231-56.
- Tobin, James, and Walter C. Dolde, "Wealth, Liquidity, and Consumption" in Consumer Spending and Monetary Policy: The Linkages; Proceedings of a Monetary Conference, Nantucket Island, Massachusetts, June 1971 (Boston: Federal Reserve Bank of Boston, Conference Series No. 5, June 1971), pp. 99-156.

Tobin, James, and Walter C. Dolde, "Mandatory Retirement Saving and Capital Formation" in The Determinants of National Saving and Wealth, edited by Franco Modigliani and Richard Hemming (International Economic Association Conference in Bergamo, Italy), (McMillan Press, Ltd., 1983), Chapter 3, Part 1.

White, Betsy Buttrill, "Empirical Tests of the Life Cycle Hypothesis," American Economic Review (Nashville), Vol. 68, No. 4 (September 1978), pp. 547-60.