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"ON THE NATIONAL DEBT AND ECONOMIC GROWTH"*

by

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I. Introduction

A proposition derived from social accounting is that an internally held national debt does not, in and of itself, impose a significant burden upon the economy.[1] The argument runs that the only relevant effects of a domestically owned government debt are due to the transfer payments it makes necessary. Of course, interest recipients may be different economic units than those that pay the higher taxes which are imposed in order to service the debt. But, unless there are significant differences in the marginal rate of substitution between income and leisure of debt holders and taxpayers, the existence of an internally held national debt need not affect the economy's full employment real income. In addition, since the effects upon income distribution of the distribution of ownership of a national debt can, if desired, be counteracted by a properly designed tax system, the consequences to the community's welfare of the existence of a national debt can be ignored in static analysis.

Even though the neutrality of a national debt as far as static considerations are concerned is well established, the dynamic effects of the existence of a national debt are still not settled.[2] In this paper we will show that when growth considerations are taken into account, benefits to, as well as burdens upon, an economy result from the existence of a national debt.

Given the amount and distribution of ownership of private real wealth and the underlying productivity and utility relations (which include the preferences of the state as well as those of private persons) it will be argued that there exist various combinations of interest rates, government expenditures, tax receipts and the national debt which yield full employment at constant prices. However it can be shown that the different combinations have different implications for growth.

In this paper it is assumed that government expenditure and tax schedule policies are reflections of social policy,[3] so that the maintenance of full employment at constant prices is to be achieved by varying the tax take (keeping the tax schedule unchanged) and the level of interest rates. At first the level of interest rates and the economy's productive capacity are assumed fixed. It is shown that under these conditions there exists an optimum national debt which yields full employment at stable prices with a balanced budget. Then the assumption that the economy's productive capacity does not change is relaxed. The result is derived that the national debt which yields full employment at constant prices must grow as income grows. It obviously follows that in a growing economy, the correct fiscal policy normally involves budget deficits.[4]

Lastly the assumption that interest rates are constant is removed so that the level of money interest rates becomes

a policy variable. It is shown that various combinations of interest rates and government budget surpluses or deficits can yield full employment at constant prices. These different combinations result in different rates of growth of the income generated in the private sector and of the national debt. Ultimately, therefore, the appropriate rate of change of the national debt in a dynamic economy depends upon the choice that is made, through the various agencies that determine economic policy, between current consumption and the rate of growth of income. It is shown that if the aim is to maximize the rate of growth of income generated in the private sector (the government expenditure bill reflects social policy and is independent of these considerations) the appropriate policy is to maintain the lowest possible rate of interest and use taxes to contain inflationary pressures as they develop. Nevertheless in spite of the monetary ease-fiscal constraint that results if the rate of growth is to be maximized, the proposition that in general the national debt must grow as productive capacity grows remains valid.[5]

An old fashioned assumption underlies this paper: that full employment and price stability are compatible. Of course there is a certain degree of flexibility built into the definitions of full employment and price stability, however it is clear that we assume that price increases result from too much and unemployment from too little demand. If the economic mechanism is such that an acceptably low unemployment

rate yields an unacceptably high rate of increase in prices, then the economic policy questions become either

a) how to modify the economic mechanism so that these policy objectives are compatible, or

b) how much is the economy willing to pay in terms of unemployment, foregone output, and a lower rate of growth for any degree of price stability.

We do not intend to enter into the debate on these deep problems at this time.

II. Attributes of a National Debt

To determine the effects that a domestically owned national debt has upon growth, we have to specify the relevant attributes of such a debt. An internally held national debt is an asset of households, ordinary business firms, and financial intermediaries (including the banking system), which is neither a debt of any household firm or financial intermediary nor a representation of ownership of property (specie is considered as a special type of property).[6] Two types of national debt, interest bearing and non-interest bearing exist. Non-interest bearing national debt is in the form of state money, including the subsidiary coinage.

In a modern state, even though there is some state money, most of the money supply is in the form of currency and demand deposits, which are liabilities of the banking system. The banking system consists of the consolidation of the central bank and the commercial banks. (We abstract from the fact that almost all commercial banks also have liabilities which are not money.) As the banking system is characterized by fractional reserve banking, the banking system owns assets. Aside from specie and an insignificant amount of other property, the assets of banks consist of debt, national or private.

A money supply based upon banks owning government debt is fully equivalent in its effects upon the functioning

of the economy to a money supply consisting of state money. With a modern banking system, the substitution of state money for interest bearing national debt and the acquisition of national debt in exchange for bank money by the banking system are mechanically trivial transactions. However these simple transactions have important repercussions. Given the portfolio preferences of households and firms, the division of the national debt outstanding between money (state and bank) and interest earning debt determines the level of interest rates on interest bearing national debt. The larger the proportion of the debt represented by money the lower the interest rate, unless the interest rate is at a Keynesian low level trap. This division also is a determinant of the interest rate on private loans and the rate used in making private investment decisions. These private interest rates influence the division of income generated in the private sector between consumption and investment activities. Hence the division of the national debt between money and interest bearing forms is a determinant of the pace of investment which in turn is a determinant of the rate of growth of an economy.

In addition the level and structure of interest rates affects the present value of all outstanding private income yielding wealth. Any decision affected by the ratio of the value of wealth to income depends upon the extent to which the national debt has been put into non-interest bearing forms either by the state or by the banking system.

Whereas money can always be used in transactions, interest-bearing national debt usually cannot. To acquire current command over goods, services, and assets, the owner of interest-bearing national debt must exchange it for money. To an individual owner, this transaction may involve realizing capital gains or losses, depending upon the relation between interest rates on the buying and selling dates. In particular, the transitory capital gains which can be realized at any one time are an incentive to transform debt into money, whereas the transitory capital losses tend to inhibit such transactions.

The appropriate use of monetary policy results in transitory capital losses being associated with tendencies for prices to rise, and transitory capital gains being associated with tendencies for employment to fall. (These gains and losses have to be transitory so that expectations of a future trend, which have perverse effects, are not set off.) Hence, with the existence of interest-bearing debt as well as money, a locking-in and unlocking effect[7] upon expenditures will be associated with changes in interest rates.

In addition, if interest rates are not at their lower limit, a general tendency for owners of interest bearing debt to exchange debt for money will result in capital losses and the opposite tendency, to exchange money for interest bearing debt, will result in capital gains. If with the entire national debt in the form of money interest rates are at their lower limit, then it is necessary to issue sufficient

interest bearing national debt so that any general desire to finance spending by selling government debt cannot be effected without generating interest rate increases and capital losses. The function of the interest rate on national debt is to build into the asset structure a penalty against tendencies toward inflationary spending.

As an aside from our main argument it can be pointed out that from the above argument it follows that

1) The term structure of the interest-bearing national debt should be such as to generate significant capital gains and losses with interest rate changes--the debt should be in long term issues.

2) Any central bank peg which guarantees that the exchange of national debt for money can be made at all times without penalty eliminates the very reason for issuing interest bearing national debt.

If more interest bearing national debt has been transformed into money than is necessary for interest rates to be at their floor, then increased expenditures can be financed without generating capital losses. In this case the possibility of inflation due to velocity increase exists. Where the possibility of inflationary spending exists, the largest amount of the national debt that should be exchanged for money is the smallest amount that can yield the floor interest rate. Any larger amount eliminates the penalty against inflationary spending.

The impact of the national debt upon the functioning of the economy is due not only to the differences between the national debt and money but also to the differences between the national debt and the income earning assets generated in the private sector. In developed Western economies, the national debt is unique among all income-earning assets that are available for ownership by private economic units, including the banking system, for there is no default risk attached to this asset.[8] As far as nominal values are concerned, whatever the contract says will take place does, in fact, occur. This means that, for dated debt, both the income payments and the eventual debt repayments (for the individual unit, as the debt typically will be refunded) are certain to take place. Even though there is no default risk attached to public debt, there remain two identifiable risks which the owners of such debt must carry. These are the risks that the interest rate and the price level may change. These risks of debt ownership may result in losses or gains to the debt owner. Note, however, that the gain to private owners of the public debt when the price level falls is not offset by losses to other private units.

Aside from the national debt, the other assets available to economic units are either debts of other economic units (including banks) or claims upon material wealth (including precious metals). In a closed economy every debt

owned is balanced by a debt owed. The ownership of debt tends to increase whereas owing debt tends to decrease both consumption out of income and the willingness to bear risks. However, unless specific and untested assumptions about differences in the behavior of owners and of issuers of private debt are made, the effects upon saving and risk taking of private debt cancel out when the economy is summed.[9] In particular, as private debt is both an asset and a liability of private economic units, the total wealth of private units equals the value of things in the economy plus the value of the national debt.

The two risks attached to public debt also exist for similarly dated private debt. In the case of private debt, however, a fall in the price level results in an increase in the debtor's burden so that the stimulating gain to the debt owner is offset by an inhibiting loss to the debtor. However, the benefits that may accrue to the debt owner due to a fall in the price level are limited by the equity of the debtor. Too great a fall in the price level will transform a debt owner into an owner of property, and will wipe out the debtor's equity. Hence, the benefits to a debt owner from a fall in the price level are more secure if he owns public rather than private debt.

In addition, private debt carries some positive risk that the income payments and eventual repayment of the debt

will not be made--even in nominal units and without any fall in the price level. Private debt represents a protected or prior claim to the value of an income stream associated with a bundle of assets or to the market value of a bundle of assets (the present value of the discounted future stream). In a rapidly growing economy with changing technology these risks are significant. Yesterday's blue chips may have no market value today.

In addition to public and private debts, portfolios of households and firms contain titles to things. Capital goods, whose value depends upon the expected value of the particular stream of goods and services they are expected to yield in the future, are the most important class of things for our purposes. As any such specific future stream necessarily is uncertain, the owner of capital goods must carry risk. To the extent that the ownership of capital goods is financed by debt instruments, the risk carried by the owner of the capital goods is amplified.

The peculiar attribute of the precious metals is that they are material wealth which do not yield a stream of future returns and whose nominal value is fixed and positive. The precious metals and the national debt owned by the banking system are similar in that both do not have as their counterpart some debt of private economic units. The precious metals differ from the national debt in that the stock of precious

metals can be increased only by the use of resources to produce or purchase them (through international trade), whereas with appropriate fiscal policy the national debt can be increased by using resources to produce whatever the community desires.

Private debt may be owned by the banking system. The exchange of money for private debt does not decrease the risk borne by the debt issuer. Non-bank private units own money rather than the original debt; they "indirectly" finance the debtor.[10] As this money is protected against default by the power of the banking system, the non-bank private owners own a safer asset than they would have held if the banks had not exchanged the private debt for money. However the default risk in the original debt is unchanged. To the extent that the banking system owns private debt, the banking system carries the various risks associated with this debt. In periods when the central bank and government guarantee of bank money was not as complete as it is today these risks concentrated in the banking system from time to time gave rise to financial crisis. If we did not assume that the central bank can prevent such a crisis (in the last resort by substituting state money by bank money) the ratio of government debt plus specie to private debt in banking system's portfolio would be a determinant of the likelihood of such a crisis occurring.

Even if we ignore the relation between this ratio and the possibility of financial crisis, the assets held by the banking system affects how any given money supply affects the economy. As private debt tends to inhibit both consumption and risk taking by the debtor whereas no such inhibiting effects exist for public debt the extent to which the money supply is a stimulant to private consumption and investment depends not only upon its amount but also upon the type of debt owned by the banking system.[11] Without a national debt, the assets of the banking system are almost wholly private debt whereas with a national debt the assets of the banking system typically include some public debt. If, for example, private debt is substituted for national debt in the portfolio of the banking system without changing the money supply, then the expansionary effect of the money supply decreases. In such cases even though the quantity of the money supply hasn't changed, its quality has deteriorated.

From the above it becomes apparent that the existence of a national debt implies that: 1) the net worth of households is greater by the market value of the public debt than the value of the stock of things owned by the private sector, and 2) the greater the ratio of the value of the public debt to the value of things, the greater the proportion of relatively risk-free assets in the portfolios of the ultimate-owning units. Thus, whether the national debt is held by the

banking system or by households, the existence of a government debt provides the economy with a certain quantity of a relatively risk-free asset. Just like monetized metal, government debt is not offset by a corresponding liability of households and firms. As it serves to satisfy the liquidity and security needs of the private economic units, the national debt has stimulating effects upon the economy.

III. The Effects of The National Debt

Before we can investigate the effects of a national debt upon growth, we must specify our assumptions concerning the government's fiscal policy. We assume that the appropriate level of government expenditures is determined by the optimum division of full employment output between the public and the private sectors. Similarly, we assume that the particular tax structure chosen by the community strikes a desired balance between equalitarianism and national income, in the sense that the economy willingly pays whatever price, in terms of a loss of output, is necessary in order to achieve the realized income distribution. Hence, if, in the interest of income stabilization, adjustments in expenditures were undertaken, the allocation of the national product between the public and the private sectors will be nonoptimal at full-employment. If, on the other hand, stability were attained by changes in marginal tax rates, some sacrifice of the distributional aims of taxation would be necessary. Therefore, in order to achieve stability without sacrificing either the optimal allocation of full employment income between the private and government sphere or the optimal income distribution among classes of households, it is necessary to change the average level of taxes without changing marginal tax rates, and without affecting the relative distribution of disposable income. This feat can be approximated with the

following tax structure which minimizes but does not wholly eliminate, the effects upon the distribution of income of changes in the tax take necessary to achieve stability. We assume the existence of two distinct types of income taxes: taxes upon income derived from property, and taxes upon income stemming from work. An alteration in the tax take is attained by modifying taxes upon income derived from work. Specifically, the desired change in tax revenues is achieved by a variation in exemptions such that the change in exemptions is the same proportion of labor income for all income classes.[12] Since this change in exemptions is equiproportional for all income receivers, it does not affect the relative distribution of disposable income. In this manner the desired deficit or surplus can be achieved without perceptibly violating the other welfare conditions upon fiscal policy. Furthermore, since exemptions are equivalent to negative "head taxes," their change will also not affect the income-leisure choice of the community, for it leaves marginal rates unchanged.[13] Therefore, even though, in general, the average tax and the average taxable income is higher in an economy with a national debt than in an economy without one, the marginal conditions relating to the supply of effort as against leisure are well-nigh independent of the size of the debt.

The marginal and average tax rates upon property income are equal. The property tax schedules are set at a level which is designed to satisfy the equalitarian aim of

social policy. These tax rates are assumed to vary neither with current income nor with the size of the debt. Thus variations in the debt which result from the stabilization goals of fiscal policy will not lead to changes in the income net of taxes from existing property (both capital assets and national debt) which is capitalized to determine the value of current wealth. Consequently, if changes in the debt do not result in changes in interest rates, the value of pre-existing wealth is unchanged by variations in the debt.

To examine the effects of a national debt upon growth we have to examine how a national debt affects the amount of consumption out of income and the willingness to take risks, given the productivity of investment. We shall approach this problem in two stages: First, we shall isolate the impact of these upon growth assuming that no changes in the level of interest rates takes place. We will assume that the composition of the public debt as between interest-bearing and interest-free forms is varied in such a way that changes in the size of the debt do not change the level of interest rates on government debt. We shall make this assumption throughout sections III and IV. Later we shall relax the hypothesis of a fixed level of interest rates. In particular, we shall investigate how the size of the national debt which is consistent with full employment at stable prices varies with the level of interest rates and

how these factors interact to determine the rate of growth of national income.

We will argue that the greater the national debt, the greater the consumption out of income, the greater the willingness to finance expansion by engaging in risky investment, and the greater the amount of investment induced by consumption expenditures will be. The above are the growth-stimulating effects of a national debt. The growth-retarding effect of a national debt is that it does tend to hold down household saving, and this by itself tends to retard the growth of full employment income.

With regard to the impact of the debt upon consumption, we assume the existence of a generalized Pigou effect.[14] That is to say, we postulate that the greater the ratio of the net worth of consuming units to their current disposable income, the greater the proportion of current income consumed. However, the security that a given portfolio yields depends not only upon the size of the portfolio relative to the income of the household, but also upon the composition of the portfolio. It will be recalled that an increase in public debt is achieved, in our system, without affecting either interest rates or tax rates upon property income. The larger the national debt in relation to income, therefore, the greater is the average net worth relative to income. And the higher the ratio of public debt to real assets in a portfolio, the smaller the risk that the portfolio represents, and hence the

more secure the portfolio owner. This means that with an unchanging price level, an increase in the value of the stocks of real assets in the economy or of the national debt will shift the consumption-income and the consumption interest rate relations upward.

Even though the existence of such a wealth effect upon consumption is assumed, unemployment equilibrium can still exist. For given the existence of a floor to interest rates, it is possible that at low rates of interest insufficient investment may be generated to maintain full employment. The price stability objective of the economy makes the labor market-price flexibility path to full employment--which operates by changing the real value of fixed nominal amount of government debt--[15] unavailable.

Let us see, now, what consequences the presence of a national debt will have for the rate of expansion of real output. The rate of growth of the productive capacity of an economy depends upon the rate of increase in its capital stock, the rate of growth of its labor force, and changes in the productivity of the factors of production. We shall take both of the latter forces to be exogenously determined.[16] Therefore, the impact of a debt upon the growth of productive capacity depends upon its impact upon capital accumulation, both in the public and in the private sector of the economy. The quantitative and qualitative nature of private investment

undertaken depends, on the one hand, upon the demand for increments of capital goods, and on the other, upon the willingness to finance investment.

On the demand side, we assume that the productivity of investment, with a given capital stock, is independent of the size of the national debt. As the marginal tax rate on property income is assumed to be independent of the size of the debt, the marginal net return to investment is unaffected by the existence of a government debt. However, since the ratio of consumption to income is higher at each level of income, the larger the national debt the smaller the amount of investment required to yield any income level. In an economy with a large national debt the high level of consumption expenditures means that a relatively small amount of excess capacity will appear during a recession. Hence, the downward pressure exerted upon the investment schedule by the existence of idle capacity will be smaller in an economy with a relatively large public debt than in an economy with a small debt. Not only will this effect tend to sustain investment during a recession, but this is likely to result in more investment demand being generated by a given increment to consumption in the subsequent expansion phase.

Ceteris paribus, the size of the national debt has two opposing effects upon the willingness to finance investment. On the one hand, since the greater the public debt the greater the average propensity to consume out of current disposable

income, the average rate of savings of the economy is lower. To the extent that this lower rate of savings results in a lower rate of capital formation by the private sector of the economy, the national debt inhibits the growth of the economy's productive capacity. On the other hand, at a given rate of interest on government debt, the willingness to invest in private enterprise, to acquire equities rather than debts, to engage in direct rather than in indirect finance, depends upon the relative satiation of the demand for security. If the units that are increasing their net worth by saving predominantly desire security, then they will attempt to increase the amount of risk-free assets, such as money and national debt, in their portfolios. Saving units will be willing to finance private units only if a premium over the rate that is available on government debt is offered for accepting this risk. If the demand of saving units for security is relatively satiated by the existence of a large ratio of public debt and riskless money to risk assets in their portfolio, then the premium that saving units will require in order to finance private investment will be relatively small. At a given rate of interest on government debt, a larger amount of risky (i.e., private) investment will be financed if the ratio of riskless to risk assets in the economy is high, than if this ratio is low. The supply of venture capital depends upon the extent to which desired

safety has been achieved. This is particularly true of an economy in which a large portion of total savings is done by a multitude of small savers. A national debt, large relative to both current income and the current market value of private real capital, yields a relative satiation of the desire for security. Therefore the greater the national debt relative to the value of private capital goods, the greater the willingness to finance private investment by acquiring risk assets.

In summary, it would appear that a public debt has two opposing effects. On the one hand, it stimulates the rate of growth of output by enhancing consumption, investment demand, and the willingness to take risks. On the other hand, it tends to retard the rate of expansion of the economy's productive capacity by decreasing savings.

The buoyant fifties have been characterized by a high level of national debt relative to income[17] as compared with the thirties. The fifties have also been characterized by a desire to invest too much on private account, given the private consumption propensities and the government levy on productive resources. The high-level consumption propensities were at least in part responsible for the expanded desire to invest. Had the desire to save been greater, the investment necessary to fill the gap between consumption and capacity income might not have been forthcoming. For prolonged

periods of expansion to exist it is necessary for consumption demand to be high enough so that large pockets of excess demand appear to compensate for the various pockets of excess supply that may result as productive capacity is increased. The national debt helps generate high-level demand and therefore helps generate the investment necessary to offset savings.

The buoyancy of the fifties has been characterized as much by the mildness of its recessions as by the vigor of its booms. The mildness of the recessions can be imputed to the way in which consumption demand has been holding up whenever unemployment appears. This in turn can be attributed to the high net worth of households due to the size of the national debt. The maintenance of consumer demand during recessions has tended to prevent excess capacity from becoming generalized, which has prevented investment demand from collapsing during recessions. Perhaps due to the existence of the national debt insufficient resources are freed for investment purposes during prosperous periods to maintain a high rate of growth. But because of the national debt, investment demand does not collapse during recession periods. The continued accumulation of capital during a recession period makes possible a high rate of growth of income during the recovery phase. Post-war experience certainly does not generate evidence that the rate of growth of real income is necessarily retarded by the existence of a large national debt.

IV. The Optimum Size National Debt

The question this paper is designed to answer, whether an optimum size national debt exists and if it exists how it changes as income grows can now be attacked. Within a static framework, the optimum size national debt is that debt which is most favorable to the maintenance of full employment at constant prices. Within a dynamic framework the optimum size national debt is the one which tends to maximize the rate of growth of income while maintaining stable prices. Both the static and dynamic optima are subject to the constraints which have been discussed earlier: social policy with regard to government expenditures and taxation. Naturally these optima are also subject to the underlying utility schedules, productivity relations and initial distribution of skills and wealth in the community.

In this section we will assume that the level of interest rates on government securities does not change. We will first determine the optimal national debt within an artificial static framework where productive capacity is not allowed to vary. Then we will relax this restriction on productive capacity. In the next section we will relax the assumption that the interest rate on government debt is fixed.

In the static case a most artificial assumption must be made about the effects of private investment. It must be postulated that even though private investment is a part of

aggregate demand, this investment will not increase productive capacity[18] and therefore it cannot increase the net worth of households. In this case the only way the net worth of households can change is by changes in the government debt.

Assume that aggregate demand (private investment demand, plus private consumption demand, plus government demand) is less than productive capacity. With unchanging interest rates, taxes must be lowered sufficiently to yield full employment. With lower taxes the government will either run a larger deficit, have a balanced budget, or run a smaller surplus than hitherto.

If the government is running a deficit, the national debt is being increased. This tends to raise private demand with an unchanging disposable income. Deficits will continue to be needed until the debt becomes large enough so that private demand with a balanced budget plus government demand equals full employment output at constant prices.[19]

If under conditions of underemployment of resources the government is running a surplus, then the debt is being reduced. This lowers the consumption and investment relations. To raise private demand, taxes have to be lowered. This decreases the surplus. However, as long as the surplus exists, the debt will be decreasing, which in turn requires a further reduction in taxes. This process will continue until the debt reaches the size for which private demand out of

disposable income plus government demand, given a balanced budget, equals full employment income at constant prices.

If, as a result of lowering taxes in order to move towards full employment, a balanced budget and full employment are achieved, the optimum sized debt will be attained. There is nothing in this static world that would disturb this equilibrium.

Consider now the opposite situation--that is, let private and public demand exceed current productive capacity. Under this circumstances taxes must be raised. If they have to be raised so high that price stability and full employment are achieved with a surplus, then the debt is being decreased. This lowers private demand with the given disposable income so that taxes have to be reduced to maintain full employment. As long as surpluses exist, the national debt and taxes are being reduced. When the national debt reaches its optimum level, then the budget will be balanced. A symmetrical argument holds if after taxes are raised, there is still a deficit. The increase in the debt implies that taxes must be raised further to offset increases in aggregate demand due to the growing debt. This process eventually leads to an optimum debt with a balanced budget.

So far we have shown that there exists a debt such that taxes equal government expenditures at full employment with constant prices, and public and private demand are

optimum slices of an invariant pie. We have not, however, shown that this optimum debt is positive. This we cannot show without recourse to a dynamic argument.

Let us remove the restrictions that investment does not increase productive capacity and that it does not increase the net worth of households and firms. Also we assume that a portion of public expenditure increases productive capacity.

In discussing the optimum national debt under conditions where private investment increases private productive capacity, we assume that the investment process does not result in an exhaustion of investment opportunities. Rather we assume that as the economy's full employment income grows, and all other things grow at the same rate as full employment income, the amount of investment that would result at constant interest rates grows at the same rate. That is under appropriate conditions investment will be a constant proportion of full employment income regardless of the level of full employment income. This assumption will be relaxed later.

We still assume that interest rates on government debt are fixed and the price level is not allowed to vary.

Consider a growing economy with full employment and a balanced budget. Then, full employment income is increasing in proportion to the amount of private and public investment.

With a balanced budget, the increase in net worth of households equals the value of the net private investment. All the additions to portfolios are in the form of risky assets, private debts or titles to things. The increase in net worth tends to raise the consumption function. However, as the entire increase in net worth has been in the form of risky assets, wealth owners attempt to increase their security by adding riskless assets to their portfolios. As this is not allowed to change the level of interest rates on government debt, the differential between the interest rates applicable to private and public debt increases.[20] This implies a decrease in the value of private investment being financed for any given investment schedule. Even if the increase in net worth due to the private investment results in a marginal propensity to consume equal to the average propensity to consume, realized investment will tend to decrease rather than increase. Hence, if we started from a full employment situation, unemployment will now appear.

Unemployment implies that taxes have to be lowered or government spending increased. As full employment income increases, some of the growth in productive capacity will be allocated to public demand in the optimum social division of the full employment product. Whatever the desirable combination of decreased taxes and increased government

spending, the result will be a deficit and an increase in the public debt. This will tend to raise the consumption function, and by furnishing risk-free assets to households' portfolios, it will tend to satisfy the demand for liquidity and safety. As a result the interest rate differential applicable to private investment will decrease, which will increase private investment, thereby tending to restore full employment. With stable prices, constant interest rates on the public debt and the assumed neutral behavior of the investment relative sustained growth at full employment requires increasing positive increments to the national debt. Therefore, the optimum national debt will become positive as income rises. We can assume that in a rich country such as the United States the optimum debt is positive.

Indeed, we can formulate more exact requirements upon the time path of the optimum size national debt for the special case of a growing economy in which the capital-output ratio is constant. Then the wealth that represents privately owned capital goods increases proportionately with private capacity. However, if the national debt is positive, and the budget is balanced, total wealth will not increase in the same proportion as private productive capacity. If the saving propensity is determined to a considerable extent by the net-worth income ratio, then the same percentage increase in the national debt as occurred in private capital is

required to maintain a constant saving-income ratio at full employment. With our assumed behavior of the investment schedule a deficit that increases the national debt at the same rate as productive capacity and private wealth is increasing, is necessary to sustain growth.

V. The Level of Interest Rates and The Optimum National Debt

As stated earlier, given the size of the national debt, and of government expenditures, there exists various combinations of interest rates and tax receipts that yield full employment at constant prices. Interest rate changes affect aggregate demand in two ways: The first influence of interest rate variations is upon the amount of investment that will take place with an unchanged investment schedule. The second is upon wealth. With an unchanged stream of expected net returns, the lower the interest rate, the greater the ratio of wealth to income. As explained in Section III, an increase in this ratio raises both the consumption and the investment schedules. Hence the lower the interest rate, other things being the same, the greater aggregate demand.

If full employment were realized at a particular interest level--budget surplus or deficit constellation--lower interest rates would result in an inflationary situation. To offset the effects of the lower interest rates, taxes would have to be raised. This decreases the deficit or increases the surplus. Hence the time path and equilibrium level of the national debt are affected. Similarly, the net worth and the ratio of risk-free to risky assets in the various portfolios are changed. It will be argued here that even though there exist various combinations of interest

rates and government budget positions which yield full employment at stable prices, these full employment results are different. The variations in interest rates compensated by tax changes affect the breakdown between consumption and investment in the private sector of the economy. Hence, the rate of growth of productive capacity and of full employment income is affected by the interest rate-government budget pair chosen to maintain full employment. This enables us to select a national debt-interest rate combination that maximizes the rate of growth of the national product produced in the private sector.

We will assume that a floor to interest rates exists, at least in the sense that the rate of decrease of interest rates once this floor is reached is so small that for economic policy considerations no reliance can be placed upon further decreases in interest rates. Let sufficient interest-bearing government debt be monetized so that the interest rates applicable to government debt are at this floor. Then, given the size of the national debt, there exists a maximum value to the present value of future net income, and hence there exists a maximum amount of investment which will take place given the existing investment schedule. If at these interest rates private consumption and investment are insufficient to yield full employment, then the only way income can be affected while maintaining stable prices is by

lowering taxes. This case has been examined in the previous section. However, if with a balanced budget, private demand (consumption plus investment) at floor interest rates is greater than the output allocated to the private sector, then full employment at stable prices can be achieved by raising taxes, raising interest rates, or by some combination of the two.

If interest rates remain at the floor and taxes are raised, the ratio of disposable to aggregate income is lowered. The immediate effect is upon consumption demand, which is lowered. Investment demand remains the largest amount possible with the given investment schedule. Hence, the rate of growth of productive capacity, to the extent that it is determined by the amount of private investment, is at a maximum. However, the surplus which is generated by the tax rise lowers the debt, which by itself tends to lower consumption and investment. This is counteracted by the increase in private wealth due to the investment. As this buoyant economy is constrained by surpluses, the ratio of private to public assets in portfolios increases. This acts as a deterrent to growth by decreasing the willingness to assume the risks involved in investing in the private sector. To compensate for this depressing tendency, taxes have to be reduced. The end result is a growing economy with interest rates at the floor and a national debt growing at a sufficient

rate to maintain the willingness of saving units to assume the risks of investing in the private sector. This case, therefore, becomes the same as the one examined in the previous section.

Assume now that in the buoyant economy, the budget is left balanced but interest rates on government debt are raised sufficiently to remove the inflationary pressure. The rise in interest rates decreases the current value of the national debt and of private capital and hence total wealth. However, since part of government debt is in the form of money and short dated securities the ratio of risk-free to risky assets increases. The differential in interest rates applicable to private investment will decrease. It is assumed that this effect does not fully compensate for the original rise in interest rates. Therefore, the amount of investment that would take place with an invariant investment schedule decreases. In addition, the decrease in wealth tends to lower both the consumption and investment schedules. By comparison with the case in which stable prices are achieved by raising taxes without varying interest rates, consumption will now constitute a larger share of the national product of the private sector. For, as was pointed out earlier, raising taxes decreases the amount of consumption out of gross income while leaving investment unchanged. Furthermore, while raising the interest level lowers both the

consumption and investment schedules through the wealth effect, the rise of interest rates probably tends in and of itself to depress investment more than consumption. For the interest rate affects investment both by shifting the schedule and moving along the schedule, and it only affects consumption by the shift of the schedule. Due to both the tax and the interest effects, the share of investment will be lower with high interest rates and low taxes than with low interest rates and high taxes. Hence, the rate of growth of the private sector will be smaller in the case where interest rates are used to constrain a buoyant economy than where taxation is used for this purpose.

If, in a growing economy, the budget is always balanced, the growth in net worth that takes place will all be in private assets. The ratio of risk-free to risky assets will fall. Even if the upward shift of the consumption function due to the rise in net worth is sufficient to make the ratio of consumption to income at full employment a constant, the change in the composition of portfolios will raise the rate of interest that is applicable to private investment. To induce sufficient investment to maintain full employment it will become necessary to lower the rate of interest on the national debt. The path that will be described by this economy will result in full employment being attained by lowering the interest rate on the national debt as the differential

between the rate applicable to private and public investment is increased. With unchanging desire for security, this differential will continue to increase as long as the ratio of risky to riskless assets keeps growing. Eventually, the interest rate on the national debt will hit the floor that has been posited to exist. At that point, the maintenance of full employment will require a lowering of taxes and a running of a deficit. The further development of the economy will from then on be the same as in the earlier cases.

The difference between using budget surpluses and using high interest rates to achieve full employment at stable prices in an otherwise buoyant situation, is that high interest rates tend to depress private investment more than private consumption, whereas the budget surplus would tend to weigh more heavily upon private consumption than on private investment. Thus the low interest rate economy would tend to grow faster than the high interest rate economy. To the extent that the buoyancy which an excessively large national debt induces is offset by raising interest rates rather than raising taxes, too large a national debt can tend to reduce an economy's rate of growth.

Of course, various combinations of interest rates above the floor rate and of budget surpluses can maintain full employment at a stable price level in an otherwise buoyant situation. Due to the continual deterioration of

private portfolios, all these cases will evolve to situations where the interest rate on government debt is at a minimum and further full employment growth requires deficits. But even though these various situations lead to a similar end result, they are not equivalent. For the greater the reliance on interest rate changes, the greater the impact on private investment and the slower the rate of growth. Even though all policies converge to the minimal interest rate--secular deficit solution--the different initial policies will leave a permanent residue through their effect upon the economy's transitory rate of growth.

In the case where inflation would result with the floor interest rate and a balanced budget, it is possible to maintain stable prices with high enough interest rates and a budget deficit. The situation can even be such that no changes in the differential rate of interest applicable to private investment takes place, and that the rate of growth of the national debt which takes place is sufficient to maintain full employment. However, as the constraint upon the private sector will mainly be upon private investment, this policy permanently constrains the rate of growth of the economy.

As compared to the minimal interest rate--budget deficit position which maintains full employment at constant prices--higher interest rates yield full employment at stable

prices with larger budget deficits, so that the minimal interest rate minimizes the rate of growth of the national debt. In addition, as the minimal interest rate tends to maximize private investment, it tends to maximize the rate of growth of the economy. That the minimal interest rate minimizes the rate of growth of the national debt is a small virtue; that it maximizes the rate of growth of income generated in the private sector is a major virtue.

VI. Postscript

The following propositions summarize the results that have been achieved:

1) Continuing and increasing deficit financing is necessary to sustain growth.

2) There is no unique full employment rate of growth of income, but rather the full employment rate of growth of income depends upon the chosen monetary and fiscal policy.

3) The monetary policy which minimizes the level of interest rates tends to maximize the rate of growth of income.

The first proposition is only in part novel. All those who argue that the money supply must increase at the same rate as productive capacity are really arguing the same thing.[21] However, if the increased money supply is the result of the monetization of private debt, the effect upon household and investing units' behavior is not as conducive to sustained growth as increases of public debt and state money. For, if the assets acquired by the banking system are liabilities of private units, these liabilities inhibit private expenditures.

Nonbank financial intermediaries[22] redistribute, but do not effectively change, the risk inherent in the ownership of private capital goods. However, by making possible specilization in risk bearing, and by extending the insurance

benefits of diversified portfolios to small portfolios, their operations result in decreasing the premiums required for owning risky rather than riskless assets. By diversifying its portfolio and by protecting its liability owners by its own "net worth," the financial intermediary decreases the risk borne by the owner of the liabilities of the financial intermediary. However, as the inherent risk of the private capital goods which are financed in this manner is not changed by these financial interrelations, the decrease in risk borne by the owners of the liabilities of the financial intermediary is transferred to the owners of the net worth of the financial intermediary. To the extent that the community can be divided into personality types who are risk seekers and risk averters,[23] the risk concentration that financial intermediaries make possible may tend to lower the differential between the interest rate on public debt and the interest applicable to a private liability of a given inherent riskiness. However, with a given set and scope of financial intermediaries in existence, this effect is built into the existing interest rate structure. In this paper we ignore the possibility of institutional change in financial markets.[24]

Within the gold standard monetary framework the part of the money supply represented by the gold supply is an asset of the public that is not offset by liabilities of the public to the banking system. The gold supply is equivalent

to the national debt in terms of its effect upon consumption and investment behavior. During periods in which the economy's gold supply is being increased either by a favorable balance of payments or the production of gold, the equivalent to deficit financing is taking place. The increased gold production represented both an increase in the deficit, which is directly expansionary, and an increase in risk-free no-offsetting liability assets which is indirectly expansionary through its effect upon consumption and investment.

However, by relying upon gold to generate the right volume of pure money assets the gold standard forces the economy into a straight jacket. This straight jacket is not the traditional one of international stability implying domestic instability, but the more serious one that the rate of growth of the economy has to be adjusted to the rate at which gold is acquired.

The second and third propositions are rather more novel. That the full employment--stable prices--rate of growth depends upon the chosen monetary and fiscal policy is inconsistent with the knife edge equilibrium of Harrod.[25] Although Solow[26] did generate various rates of growth of the economy, this was based upon an analysis of production functions which allowed for substitution in production. Our analysis, on the other hand, is based upon the assumption

that the rate of growth of productive capacity is determined by the rate of private investment, which can be affected by monetary and fiscal policy.[27]

The proposition that a minimum interest rate tends to maximize the rate of growth of income and that government surpluses should be used to constrain inflationary demand if maximum growth is desired, has obvious implications for economic policy.

In the course of the argument of this paper we made rather special assumptions about the behavior of the willingness to bear risks and the investment schedule as income grew. These assumptions are that the preferences of wealth owners with respect to the division of their portfolios between risky and risk-free assets are independent of the absolute size of their portfolios, and that the amount of investment forthcoming at any rate of interest grows at the same rate as full employment income.

The optimum level of public debt at each income and the optimum rate of change of the public debt depends upon the portfolio preferences of the public. If, as income and wealth grow the public as a whole is willing to hold a higher ratio of risk to riskless assets, then the optimum rate of growth of national debt decreases. If the economy is willing to use interest rates greater than the floor rate to constrain inflationary pressures, such an evolution of risk preferences

may result in making possible continuing growth even though the budget is balanced. However, the rate of growth of income will not be as great as that which could be achieved by following a floor interest rate policy. The "orthodox" position that a balanced budget implies a maximum rate of growth of income is valid if the change in wealth owners' preference systems compensates for the change in composition of the portfolios that occurs when interest rates are at the floor.

We assume that technological change occurs smoothly, and that the absolute size of the shift of the investment schedule induced by any technological change is proportional to the full employment income of the economy. Hence, no exhaustion of private investment opportunities could occur. If private investment opportunities can be exhausted, as was assumed by the secular stagnation theories, then, under the policy prescriptions described earlier, the economy's development would be towards the classical stationary state by means of increasing the national debt by way of decreasing deficits. The smooth occurrence of technological change also implied that investment opportunities did not increase suddenly due to a run of investment inducing innovations. Such a run would decrease the optimum size and rate of change of the national debt. In particular, it can transform a deflationary situation where a deficit is necessary to prevent unemployment, into an inflationary situation where it is

necessary to constrain the economy either by budgetary surpluses or by higher interest rates. However, if maximum growth is to be achieved, interest rates should remain at the floor and the economy should be restrained by surpluses.

In conclusion, it may be reaffirmed that the static aspects of deficits, that they increase demand, may well be less important than the dynamic aspects of deficits, that they increase the national debt. A deficit is a one-shot affair, whereas a permanent increase in the national debt will tend to permanently raise consumption and investment. And not only are deficits stimulants to growth, but in the long run increasing deficits are necessary to sustain growth.

Of course, nothing in the above argument is to be taken to imply that the high ratio of national debt to income was not a factor tending to generate inflation during the post World War II period. Periods in which the national debt is too high relative to both the national income and the willingness to tax can occur. However, the inflation itself tends to lower the ratio of national debt to current income and brings closer the day when further increases in the national debt are necessary to sustain growth.

In an inflationary period which is due to excess demand, deficits are an evil to be avoided. However, there always is a danger in the formation of economic policy that today's policy is the correct one for yesterday's situation. An emerging anti-deficit dogma may reflect such a policy lag.

FOOTNOTES

[1]See, for example, A. P. Lerner, Economics of Control, (Macmillan, 1944), pp. 302-5. Much of the following discussion is related to the principles of Functional Finance. See A. P. Lerner, Economics of Employment (McGraw Hill, 1951), pp. 270 ff. Also R. A. Musgrave, The Theory of Public Finance (McGraw Hill, 1959), Ch. 10, 11, pp. 205-56.

[2]In a recent article (June 1958) in the Oxford Economic Papers, v. 10, pp. 163-183, on "The Burden of the Debt," Professor J. E. Meade has stressed that "a domestic debt may have far reaching effects upon the incentives to work, to save, and to take risks," p. 163. He argued that since the existence of a national debt tends to lower the supply of effort and the rate of capital accumulation of the community, it will tend to retard the economy's rate of growth. Therefore, the existence of a public debt imposes a "dynamic" burden upon the economic system. This position was attacked by A. H. Hausen, "The Public Debt Reconsidered," Review of Economic Statistics, v. XLI, Nov. 1959, pp. 370-79. See also Gardner Ackley, "The Wealth Saving Relationship," Journal of Political Economy, v. 59, No. 2, pp. 154-161 (April, 1951), and Franz Gehrels "Government Debt as a Generator of Economic Growth," Review of Economics and Statistics, v. 39, No. 2, p. 183 (May, 1957), as well as Musgrave, op. cit., ch. 22, pp. 526-55.

[3]P. A. Samuelson, "The New Look in Tax and Fiscal Policy," Federal Tax Policy for Economic Growth and Stability, Joint Committee on the Economic Report, 84th Congress, 1st Session, Nov. 9, 1955, pp. 229-235.

[4]This point was also made in H. P. Minsky, "Monetary Systems and Accelerator Models," American Economic Review, XLVII, (December, 1957), p. 883, and Gehrels, op. cit.

[5]This conclusion runs counter to the recently announced goal of United States fiscal policy. "Both Mr. Anderson (Secretary of the Treasury) and Mr. Straus (Director of the Bureau of the Budget) emphasized the new basic budget policy--that the surpluses in the budget during prosperity should more than offset the inevitable deficits in slumps, and that the national debt should gradually be reduced. Mr. Straus said he hoped there would be some repayment of the debt 'every year from here on out.'" New York Times, Jan. 19, 1960, p. 1 and p. 16.

[6]It should be noted that here we deal with combined rather than consolidated balance sheets of households and firms.

[7]R. V. Rosa, "Interest Rates and the Central Bank," in Money, Trade and Economic Growth--Essays in Honor of J. H. Williams, (Macmillan, 1951), pp. 270-295. Of course these effects depend upon the length to maturity of the debt. If the debt is working in short term securities this effect will be well nigh absent.

[8]Government guarantees of private liabilities are really a peculiar type of government debt. In terms of the ratio of risk-free to risky assets that private portfolios hold, the government guarantee is fully equivalent to an equal increase in government debt (this is assuming that there is no time, trouble, etc., involved in exercising the guarantee). In terms of the liability of the government, the government guarantee equals the risk of default times the amount guaranteed. In terms of the ratio of net worth to the value of private productive capacity, it depends upon what is guaranteed. Typically, such guarantees are used to aid in the financing of private investment. Hence, guarantees do not tend to raise the ratio of net worth to private productive capacity aside from their effect upon the interest rate used to discount the returns from the guaranteed assets. We will ignore the possibility of substituting such government guarantees of private debt for government debt.

[9]J. Tobin, "Liquidity Preference as Behavior Toward Risk," Review of Economic Studies, No. 67 (Feb., 1958), p. 72.

[10]J. G. Gurley and E. S. Shaw; "Financial Aspects of Economic Development," American Economic Review, Vol. XLV, No. 4 (Sept., 1955), pp. 515-538.

[11]Meade, op. cit., pp. 176-177, assumes that such considerations do not affect the effects of the money supply.

[12]In this way we also avoid the difficulty that a change in marginal tax rates modifies the relative returns from interest and noninterest earning assets as between two economies which differ only with respect to the size of their national debt. This difficulty was encountered by Meade, op. cit., Cf. J. E. Meade, "Is the National Debt a Burden? A Correction," Oxford Economic Papers, n.s., v. 11 (February, 1959), pp. 109-110.

[13]Marginal tax rates are not entirely independent of exemptions for some tax paying units. Some households will be shifted from one marginal tax bracket to another, with a change in exemptions. We will ignore this second order effect. Furthermore, it should be noted that empirical evidence on this point indicates that changes in marginal tax rates affect the supply of effort very little, if at all. Cf., G. F. Break, "Income Taxes and Incentive to Work, An Empirical Study," American Economic Review, XLVII (September, 1957), pp. 529 ff.

[14]A. C. Pigou, "The Classical Stationary State," Economic Journal, LIII (1943), pp. 343-51, and A. C. Pigou, "Economic Progress in Stable Environment," Economica, n.s., XIV, (1947), pp. 180-190.

[15]O. Patinkin, "Price Flexibility and Full Employment," American Economic Review, v. 38 (1948), pp. 543-64. Even though such an equilibrium price level exists, the dynamic powers involved are such that the achievement within a reasonable time of this equilibrium by price flexibility is doubtful.

[16]Although the large postwar increase in population, which will result in a lagged increase in the labor force, may be imputed in part to the postwar security engendered by the large national debt. See also N. Kaldor, A Model of Economic Growth, Economic Journal, Vol. LXVII, No. 268 (December, 1957), pp. 591-624.

[17]During the thirties the gross public debt represented between 23 per cent to 57 per cent of national income, while for the period 1950-57 the comparable percentages ranged between 75 per cent to 107 per cent.

[18]This is the assumption of Pigou's short-period flow equilibrium. A. C. Pigou, Employment and Equilibrium (Macmillan & Co., 1952), p. 43.

[19]This is consistent with M. Friedman, "A Monetary and Fiscal Framework for Economic Stability," American Economic Review, XXXVIII (1948), pp. 245-64, insofar as taxes are being changed, rather than expenditures in order to achieve full-employment income.

[20]This change in the interest rate applicable to private investment also changes the rate at which future incomes from private capital are being discounted, thereby lowering the value of private capital. This problem is taken up in the next section; here we assume that the change in the differential is transitory.

[21]As suggested by the Chicago School. Cf., e.g., L. W. Mintz, Monetary Policy for a Competitive Society, (McGraw Hill, 1950), pp. 191-96.

[22]J. G. Gurley & E. S. Shaw, "The Growth of Debt and Money in the United States, 1800-1950: A Suggested Interpretation," Review of Economics and Statistics, v. XXXIX (1957), pp. 250-62.

[23]J. Tobin, "Liquidity Preference as Behavior Towards Risk," Review of Economic Studies No. 67 (Feb., 1958), p. 72.

[24]For a discussion of this aspect, see H. P. Minsky, "Central Banking and Money Market Changes," Quarterly Journal of Economics, v. LXXI (1957), pp. 171-87.

[25]R. F. Harrod, Towards a Dynamic Economics (London, 1948).

[26]R. M. Solow, "A Contribution to the Theory of Economic Growth," Quarterly Journal of Economics, LXX (1956), pp. 65-94.

[27]J. Tobin, "A Dynamic Aggregative Model", Journal of Political Economy, v. LXII,(April 1955), pp. 103-115.