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SUPPLY SIDE TAX CUTS, MONETARY RESTRAINT AND ECONOMIC GROWTH

A STUDY

PREPARED FOR THE USE OF THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

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LETTER OF TRANSMITTAL

MAY 31, 1983.

To the Members of the Joint Economic Committee:

I am pleased to transmit herewith a study prepared for the use of the Joint Economic Committee entitled "Supply Side Tax Cuts, Monetary Restraint and Economic Growth."

Much of the opposition to the Reagan Economic Program has centered on the claim that marginal tax rate cuts and monetary restraint are contradictory policies.

This study shows that the often used "fiscal accelerator-monetary brake" analogy is incorrect. Because they encourage saving and investment, marginal tax rate cuts increase the flow of non-human income relative to human income. This, in turn, decreases the rate of increase of money demand, enabling the monetary authorities to reduce the growth rate of the money supply. The result is an increase in the rate of rise of velocity and, for any rate of money growth, a higher rate of GNP growth.

The results of this study confirm that tax cuts and a responsible monetary policy need not result in a collision in the credit markets. In fact, the steep decline of interest rates since December 1981 confirms the findings of this study. Sound economic policy requires that we take account of a study so embedded in reality.

Sincerely,

ROGER W. JEPSEN,
Chairman, Joint Economic Committee.

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SUPPLY SIDE TAX CUTS, MONETARY RESTRAINT AND ECONOMIC GROWTH

By Timothy P. Roth*

I. Introduction

Opposition to the Reagan Economic Program has centered on one recurring theme. Opponents claim that cuts in marginal tax rates cannot be reconciled with reductions in the rate of increase in the Nation's money supply. On this view, this is akin to putting one foot on the fiscal accelerator and the other on the monetary brakes.

Central to this thinking is the idea that the rate of increase of nominal or money Gross National Product [GNP] is the sum of the rate of increase of the money stock and the rate of increase of velocity.[1] Over the post-war period the secular rate of rise of M_1's velocity has been roughly 3.2 percent per year.[2] Granting this, a hypothetical 7 percent increase in M_1 would result in a 10.2 percent increase in nominal GNP, a 5 percent increase in M_1 would result in an 8.2 percent increase in nominal GNP, and so on.[3] Assuming, then, that cuts in marginal tax rates have no effect on the rate of rise of velocity a reduction in M_1's growth rate would reduce the rate of increase of nominal GNP. How, then, the critics ask, can cuts in marginal tax rates be counted upon to stimulate economic growth?

The purpose of this study is to show that policies designed to increase the real after tax rate of return to saving and investment are reconcilable with monetary restraint precisely because such policies are not asymmetric. Policies that encourage saving and investment do not affect only the market for goods and services. They must also affect the demand for money. More precisely, policies that encourage saving and investment—including but not limited to cuts in marginal tax rates—tend to increase the ratio of non-human to human income and this, in turn, impacts upon the demand for money.

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*Professor of Economics, University of Texas at El Paso. Dr. Roth is indebted to Mark Policinski, senior economist, Joint Economic Committee, and his colleague Elba Brown for very helpful comments and suggestions.

[1] Velocity is the dollar value of GNP divided by the stock of money, however defined. For example, M_1's velocity equals the average dollar value of GNP in a given period divided by the average of M_1 outstanding in the same period.

[2] See, for example, Robert E. Weintraub. *The Impact of the Federal Reserve System's Monetary Policies on the Nation's Economy,* House Committee on Banking, Finance and Urban Affairs, Subcommittee on Domestic Monetary Policy, December 1980, p. 10. See also G. J. Santoni and Courtenay C. Stone, "What Really Happened to Interest Rates?: A Long-Run Analysis," Federal Reserve Bank of St. Louis *Review,* November 1981, p. 11, and Mack Ott, "Money, Credit and Velocity," Federal Reserve Bank of St. Louis *Review,* May 1982, p. 29.

[3] See Appendix II for the definition of M_1. Attention centers on M_1 for a number of reasons: (1) The relationship between M_1 and general economic activity is closer than that between any of the broader money aggregates and the economy; (2) M_1 is more closely related to the monetary base than are the other money aggregates, and (3) Monetary control procedures seem best adapted to M_1. See, for example, R. W. Hafer, "Much Ado About M_2," Federal Reserve Bank of St. Louis *Review,* October 1981; Patrick J. Lawler, "The Large Monetary Aggregates as Intermediate Policy Targets," Federal Reserve Bank of Dallas *Voice,* November 1981, p. 13; and Robert P. Black, "Monetary Policy—The Possible and the Impossible," Federal Reserve Bank of Richmond *Economic Review,* September/October 1981, p. 3.

The empirical results outlined below suggest that policies designed to increase the ratio of non-human to human income tend to reduce the rate of increase of the demand for money. This is the same as saying that policies designed to encourage saving and investment tend to increase the rate of rise of velocity. Granting this, reductions in the growth rate of the money stock need not imply a reduction in nominal GNP growth. Quite the opposite. Supply-side tax incentives, when coupled with reduced money growth are an engine for non-inflationary economic growth.

II. The Empirical Results

The aggregate money demand equation is hypothesized to be

$$(1) \qquad (M_1/P)_t = f[MTR_t, ATR_t, (Y_N/Y_H)_t, i_t, RGNP_t]$$

where $(M_1/P)_t$, my measure of real cash balances, is M_1 divided by the GNP deflator, MTR_t and ATR_t are the marginal and average tax rates confronting taxpayers filing joint returns, $(Y_N/Y_H)_t$ is the ratio of real non-human to real human income, i_t is the real interest rate, $RGNP_t$ is real Gross National Product, and t refers to the current year.[4]

Equation (1) was empirically estimated to determine the responsiveness of money demand to changes in each of the independent variables. Interest centers on determining the percent change in money demand that will result, other things equal, given a percent change—in either direction—in MTR_t, ATR_t, $(Y_N/Y_H)_t$, i_t, and $RGNP_t$.

Based upon data covering the 1954–1979 period the logarithmic estimate of equation (1) is [5]

$$(2) \qquad \begin{aligned} ln(M_1/P)_t = 3.88 &- 0.31\ lnMTR_t + 0.001\ lnATR_t - 0.14\ ln(Y_N/Y_H)_t \\ &\quad (-3.09) \qquad (1.02) \qquad (-0.82) \\ &- 0.011\ lni_t + 0.125\ lnRGNP_t \\ &\quad (-1.70) \qquad (1.87) \end{aligned}$$

$R^2 = 84.1$.
$F = 21.17$ for 5 and 20 degrees of freedom.

where t refers to the current year and the numbers in parentheses are the t-statistics.

While potentially useful, equation (2) is encumbered by strong collinearity between the $(Y_N/Y_H)_t$ and $RGNP_t$ variables. A partial correlation coefficient of 0.95 between the two variables suggests that the regression coefficients relating each of these variables to money demand are not unambiguously interpretable. With this in mind either $(Y_N/Y_H)_t$ or $RGNP_t$ should be deleted from equation (1). With $RGNP_t$ deleted we have

$$(3) \qquad \begin{aligned} ln(M_1/P)_t = 4.57 &- 0.26\ lnMTR_t + 0.002\ lnATR_t - 0.34\ ln(Y_N/Y_H)_t \\ &\quad (-2.74) \qquad (2.85) \qquad (-4.17) \\ &- 0.011\ lni_t \\ &\quad (-1.56) \end{aligned}$$

$R^2 = 82.6$.
$F = 24.94$ for 4 and 21 degrees of freedom.

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[4] The microeconomic foundations of equation (1) are discussed in Appendix I. See Appendix II for definitions of the variables in equation (1).

[5] Equation (1) was estimated in logarithmic form because the resulting regression coefficients are the elasticity coefficients. That is, each of the regression coefficients expresses the percent change in money demand with respect to a percent change in the appropriate independent variable.

Equation (3) is my preferred equation.[6]

Equation (3) enables us to estimate the magnitude of the effect on money demand of given percent changes in MTR_t, ATR_t, $(Y_N/Y_H)_t$ and i_t. We have that, other things equal—

A 10 percent increase (decrease) in marginal tax rates will cause a 2.6 percent decrease (increase) in money demand;

A 10 percent increase (decrease) in average tax rates will cause a 0.02 percent increase (decrease) in money demand;

A 10 percent increase (decrease) in the ratio of non-human to human income will cause a 3.4 percent decrease (increase) in money demand; and

A 10 percent increase (decrease) in the real rate of interest will cause a 0.11 percent decrease (increase) in money demand.

The R^2 indicates that more than 82 percent of the variation in money demand is accounted for by variation in marginal tax rates, average tax rates, the ratio of non-human to human income and real interest rates. The F value of 24.94 for 4 and 21 degrees of freedom means that we can be 99.5 percent confident that there is some relationship between money demand and the full set of independent variables.

Finally, and perhaps most important, the t-statistics for each of the independent variables—the numbers in parentheses in equation (3)—indicate that—

We can be 98 percent confident that there is some relationship between money demand and marginal tax rates;

We can be 99 percent confident that there is some relationship between money demand and average tax rates;

We can be 99 percent confident that there is some relationship between money demand and the ratio of non-human to human income; and

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[6] The empirical results that emerged with $(Y_N/Y_H)_t$ deleted and $RGNP_t$ retained were strikingly similar. The resulting equation

$$ln(M_1/P)_t = 3.58 - \underset{(-3.23)}{0.32}\ lnMTR_t + \underset{(0.77)}{0.001}\ lnATR_t - \underset{(-1.81)}{0.012}\ lni_t + \underset{(4.43)}{0.19}\ lnRGNP_t$$

R^2=83.6.
F=26.72 for 4 and 21 degrees of freedom.

has roughly the same explanatory power [as measured by R^2 and F] as does equation (3), with the shared elasticities remarkably close.

Choice between equation (3) and a money demand equation incorporating $RGNP_t$ is not, however, a matter of indifference. My preference for equation (3)—and therefore for use of the ratio $(Y_N/Y_H)_t$ rather than $RGNP_t$—is based in part upon an important empirical result.

$RGNP_t$ is the sum at any cross section of time of real non-human and real human income: $RGNP_t = Y_{Nt} + Y_{Ht}$. Substituting Y_{Nt} and Y_{Ht} for $RGNP_t$ we have that

$$ln(M_1/P)_t = 4.02 - \underset{(-3.01)}{0.30}\ lnMTR_t + \underset{(1.12)}{0.001}\ lnATR_t - \underset{(-1.64)}{0.011}\ lni_t - \underset{(-0.39)}{0.08}\ lnY_{Nt} + \underset{(1.59)}{0.20}\ lnY_{Ht}$$

R^2=83.7.
F=20.51 for 5 and 20 degrees of freedom.

These results suggest that Y_{Nt} and Y_{Ht} may be substituted for $RGNP_t$ without impairing the explanatory power of the money demand equation. Moreover, the statistically significant positive sign on Y_{Ht} and the statistically insignificant negative sign on Y_{Nt} suggest that whereas increases (decreases) in Y_{Ht} will, other things equal, increase (decrease) money demand, increases (decreases) in Y_{Nt} have a relatively weak, presumably negative, effect on money demand. These results are consistent with the statistically significant negative sign on the ratio $(Y_N/Y_H)_t$ in equation (3).

We can be 80 percent confident that there is some relationship between money demand and real interest rates.

The asymmetric effects on money demand of changes in marginal and average tax rates merit some discussion. Because they change the relative prices of income and leisure and of consumption and saving, marginal tax rate changes generate a substitution effect. Changes in average tax rates, on the other hand, are associated with an income effect; a change in behavior predicated upon a change in real disposable income, holding relative prices constant. The empirical results summarized in equation (3) suggest that the substitution effect associated with marginal tax rate changes is negative, while the income effect associated with average tax rate changes is positive. Notice, however, that the income effect is relatively weak: A hypothetical 10 percent increase (decrease) in average tax rates results only in a 0.02 percent increase (decrease) in money demand. In short, changes in average tax rates have relatively little effect on the demand for money.

The direction and magnitude of the effect on money demand of changes in i_t are consistent with the monetarist view that while there may be an inverse relationship between money demand and real interest rates the effect is relatively weak.

Finally, the empirical results suggest an inverse relationship between money demand and the ratio of non-human to human income. Just as important, the magnitude of the regression coefficient suggests that a given percent change in the ratio of non-human to human income has a relatively powerful effect on the demand for money. This is important precisely because it suggests that policies designed to increase the flow of non-human income [relative to human income] will depress the rate of increase of money demand.

Based upon data covering the 1954–1979 period I conclude that a 10 percent decrease (increase) in marginal tax rates would, other things equal, increase (decrease) the ratio of non-human to human income by 3.3 percent.[7] Using equation (3) a 3.3 percent increase in the ratio of non-human to human income would, other things equal, reduce the rate of increase of money demand by 1.12 percent. Thus, while equation (3) tells us that a 10 percent decrease (increase) in marginal tax rates would, by itself, increase (decrease) money demand by 2.6 percent, this is not the end of the story. The same 10 percent decrease

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[7] The logarithmic equation linking the ratio of non-human to human income to various independent variables is

$$ln(Y_N/Y_H)_t = 4.34 - 0.33\ lnMTR_t + 0.001\ lnATR_t + 0.007\ lni_t - 1.09\ lnRW_t$$
$$(-2.63) \qquad (1.71) \qquad (0.74) \qquad (-7.42)$$

$R^2 = 89.7$.

$F = 45.71$ for 4 and 21 degrees of freedom.

where RW_t is the real wage rate at t.

The signs are as expected, with the ratio of non-human to human income inversely related to marginal tax rates and the real wage, and positively (though weakly) related to the real rate of interest. The sign and magnitude of the coefficient on the average tax rate variable are consistent with my conclusion that changes in marginal and average tax rates have asymmetric effects on money demand.

These results suggest that cuts in marginal tax rates will, other things equal, increase the ratio of non-human to human income. Using equation (3)—and recognizing the potential problem of simultaneity—this implies that the increase in money demand attributable to the cut in marginal tax rates will be at least partially offset by the increase in the ratio of non-human to human income induced by the cut in marginal tax rates. Just as important, these money market relationships are reconcilable, both theoretically and empirically, with the Roth-Policinski commodity market results: namely, an apparent inverse relationship between personal saving and marginal tax rates, and a positive relationship between personal saving and the ratio of non-human to human income. See footnote 8.

(increase) in marginal tax rates would increase (decrease) the ratio of non-human to human income and thereby dampen the rate of increase of money demand by 1.12 percent. It follows that supply-side tax cuts—including cuts in marginal tax rates and saving incentives generally—can be reconciled with steady, systematic reductions in the rate of increase of the Nation's money supply.

III. Conclusion

The idea that tax cuts and reduced money growth are contradictory policies has gained wide currency. The presumption is that "stimulative" fiscal policy must inevitably clash with "tight" money policy, pushing up interest rates and choking off economic growth.

"Stimulative" fiscal policies are not, however, created equal. Cuts in marginal tax rates do not affect behavior because they change disposable income. Because they increase the relative prices of consumption and leisure they encourage the accumulation of both non-human and human capital. If the resulting increases in saving and investment cause non-human income to increase relative to human income money demand will increase at a slower rate. [8] Given slower money demand growth steady reductions in the growth rate of the money supply need not increase interest rates. Just as important, for given increases in GNP, slower money growth implies an increase in velocity. Slower money growth need not, therefore, result in slower GNP growth. With velocity's rate of rise up a given percentage increase in nominal GNP can be achieved with a smaller increase in the money supply.

Precisely because they are designed to increase saving and investment supply side tax incentives encourage reductions in the growth rate of money demand. Reduced money growth and supply side tax incentives are therefore complementary policies. The key to reconciling these policies is to recognize that marginal tax rate cuts and saving incentives generally affect both the commodity and the money markets. The danger in cutting marginal tax rates and reducing money growth is not that the tax cuts may be too large. It is that the tax rate cuts may be too small.

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[8] Roth and Policinski have shown that cuts in marginal tax rates and increases in the ratio of non-human to human income increase personal saving. This is the commodity market analog for the inverse relationship between money demand and the ratio of non-human to human income. Just as important, these results suggest that the process has an inertial property: Cuts in marginal tax rates lead to increases in personal saving which can lead to increases in the ratio of non-human to human income leading to further increases in personal saving [and to reductions in the growth rate of money demand] and so on. See Timothy P. Roth and Mark R. Policinski, *Marginal Tax Rates, Saving, and Federal Government Deficits* (Washington, D.C.: Government Printing Office, 1981). See also footnote 7, above.

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Appendix I. THE MICROECONOMIC FOUNDATIONS OF THE MODEL

In what follows I adopt the basic framework of the asset or portfolio approach to money demand.[1] It follows that the decision environment envisioned is one in which individuals seek to maximize utility subject to an appropriately defined constraint. In doing so, individuals decide, among other things, in what form(s) they will hold their wealth.

With the asset portfolio approach as the point of departure I emphasize the role in money demand of relative prices and wealth. More precisely, the aggregate money demand equation is assumed to contain variables which generate substitution and scale effects.[2]

Because of the covariance of rates of return among financial and physical assets I employ a single interest rate as a measure of the opportunity cost of holding money.[3] Whatever interest rate is employed, however, it is the real after tax rate of return to asset holding that properly determines the opportunity cost of holding money. This suggests not only that the nominal interest rate must be deflated, but that tax rates must be explicitly introduced. The logic is symmetrical for the scale variable, whether income or wealth. That is, the demand for real cash balances is taken to be constrained by real after tax income, wealth, or both.

Real after tax wealth is understood to be the sum of the capitalized values of real after tax human and non-human income

$$W=\frac{Y_H-t_H(Y_H)}{r_H}+\frac{Y_N-t_N(Y_N)}{r_N},$$

where W is wealth, Y_H is real human income, Y_N is real non-human income, t_H and t_N are, respectively, the tax rates on human and non-human income, r_H is the discount rate on human income, r_N is the discount rate on non-human income and, by assumption, $r_H > r_N$.[4]

The introduction of tax rates is not so straightforward as might, however, be supposed. The structure of the progressive income tax system is such that both marginal and average tax rates have basic relevance. Changes in marginal tax rates change the relative prices of work effort and leisure and of saving and consumption. Increases (decreases) in marginal tax rates decrease (increase) the after tax rate of return to incremental work effort and saving. This substitution effect is to be distinguished from the income effect associated with a change in average tax rates. An increase (decrease) in the average tax rate decreases (increases) the after tax return to a given amount of work effort or saving.[5]

Because changes in the labor and commodity markets have analogs in the money market it is clear, then, that both marginal and average tax rates must enter the money demand equation.[6]

On the assumption that there is high covariance between the marginal and average tax rates on human and non-human income I introduced only one marginal and average tax rate as a measure of both.

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[1] See, for example, John P. Judd and John L. Scadding, "The Search for a Stable Money Demand Function," *Journal of Economic Literature*, Volume 20, September 1982, p. 994.

[2] See, for example, Allan H. Meltzer, "The Demand for Money: The Evidence From the Time Series," *Journal of Political Economy*, Volume 71, June 1963, pp. 133–134.

[3] *Ibid.*, pp. 132–133. See also Judd and Scadding, *op. cit.*, p. 1007, and Thomas F. Cooley and Stephen F. LeRoy, "Identification and Estimation of Money Demand," *American Economic Review*, Volume 71, December 1981, p. 835.

[4] See Boris P. Pesek and Thomas R. Saving, *Money, Wealth and Economic Theory* (New York: Macmillan, 1967), esp. Chapter 10.

[5] See Timothy P. Roth and Mark R. Policinski, *Marginal Tax Rates, Saving, and Federal Government Deficits* (Washington, D.C.: Government Printing Office, 1981), esp. Appendix III.

[6] Moreover, failure to include the average tax rate would have the effect of biasing upward the estimate of the regression coefficient relating changes in money demand to changes in marginal tax rates.

The logic outlined above allows not only for the explicit introduction of tax rates, but for an analytically convenient treatment of human and non-human income. As Pesek and Saving have emphasized, the non-transferability of human capital suggests that the discount rate associated with the human income stream, r_H, exceeds r_N, the discount rate associated with non-human income.[7] It follows that, for a given total income stream, a redistribution of income away from human and toward non-human income makes the individual wealthier. On this logic the ratio of non-human to human income might heuristically be regarded as a proxy for wealth or for "liquidity." [8]

This approach has much to commend it. At the least, to the extent that the ratio of current non-human to current human income is properly regarded as a proxy for wealth, none of the usual heroics are required. We need not argue, for example, about the appropriate magnitudes of the discount rates, or about the method of generating single valued estimates of the streams of non-human and human income.[9]

To the skeptic who cannot accept the idea that a ratio of non-human to human income can be regarded either as a proxy for wealth or for liquidity I offer an alternative interpretation. Analytically, non-human and human income are flows generated by stocks of non-human and human capital. At a cross section of time, therefore, the ratio of non-human to human income measures the relative rates of return to non-human and human capital. On this interpretation the ratio of non-human to human income is not a proxy for a scale variable; rather, it is a relative price variable. Presumably, changes in the relative rates of return to investment in non-human and human capital will affect asset portfolio decisions. Granting this the ratio of non-human to human income is properly entered as an argument in the money demand equation.

Finally, whether the ratio of non-human to human income is regarded as a scale or a relative price variable, there remains the question of whether real income should be entered as a separate argument in the money demand equation. If one adopts the view that the ratio of non-human to human income is more properly regarded as a relative price variable the answer is clear: Real income would properly enter the money demand equation as a scale variable. If, on the other hand, the ratio of non-human to human income is regarded as a proxy for wealth or for "liquidity" it is at least arguable that another scale variable would be redundant.

My approach is pragmatic. On the one hand there are those who would insist that the ratio of non-human to human income is in no sense a proxy for a scale variable. On the other hand, there is ample precedent for the inclusion of both a wealth and a real income variable in money demand equations.[10] On this logic my basic money demand equation includes both the ratio of non-human to human income and real income.

The money demand equation to be subjected to empirical test is therefore

$$(M_1/P)_t = f[MTR_t,\ ATR_t,\ (Y_N/Y_H)_t,\ i_t,\ RGNP_t]$$

where MTR_t and ATR_t are the marginal and average tax rates confronting taxpayers filing joint returns, $(Y_N/Y_H)_t$ is the ratio of real non-human to real human income, i_t is the real interest rate, $RGNP_t$ is real Gross National Product, and t refers to the current year. Finally, $(M_1/P)_t$ my measure of real cash balances, is M_1 divided by the GNP deflator [see Appendix II].

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[7] Pesek and Saving, *op. cit.*, and G. S. Laumas, "Discount Rate and Wealth," *Journal of Political Economy*, Volume 89, February 1981.

[8] This assumes, among other things, that there is a secular tendency for nominal human income to rise. That is, as population rises, aggregate salary, wages, and human income generally will rise, whether or not changes in factor payments are partially driven by inflation and productivity increases. On this logic increases (decreases) in the ratio of non-human to human income are generally accounted for by changes in aggregate non-human income relative to secularly rising human income. In fact, over the period for which the data base is defined [1954–1979], human income rose monotonically. This suggests, among other things, that while the aggregate human income flow is not invariant with respect to the business cycle, transfer payments serve to mitigate the effects of cyclical variations in wage and salary disbursements.

[9] I avoid, among other things the problem of choosing between the adaptive and rational expectations approaches to estimating the two income streams.

[10] See, for example, Martin Bronfenbrenner and Thomas Mayer, "Liquidity Functions in the American Economy," *Econometrica*, 1960. See also David Laidler, *The Demand for Money: Theories and Evidence* (New York: Dun-Donnelley, 1977), esp. pp. 139–142.

Appendix II. VARIABLE DEFINITIONS [1]

$(M_1/P)_t$, my measure of real cash balances, is M_1 divided by the GNP deflator, where M_1 is currency held by the nonbank public plus commercial bank demand deposits held by the nonbank public (excluding those held by foreign banks and official institutions) and other checkable deposits of all depository institutions plus travelers' checks.

MTR_t and ATR_t are calculated as follows: Aggregate taxable income of those taxpayers filing taxable returns is divided by the number of taxable returns.[2] This yields, for each year over the period 1954–1979, the average taxpayer's taxable income. On the assumption that he filed a joint return, the marginal tax rate confronting the taxpayer during any year was determined by appeal to that year's tax rate schedule. The marginal tax rate was taken to be the marginal tax rate associated with the tax bracket into which the average taxpayer's taxable income fell. The average tax rate in any year is understood to be the base tax for the bracket into which the average taxpayer's taxable income falls divided by the lower bound of the income bracket.

$(Y_N/Y_H)_t$ is the ratio of real non-human to real human income, where non-human income is the sum of proprietor income, rental income, personal dividends, and personal interest. Human income is wage and salary disbursements plus other labor income plus transfer payments.

i_t, my measure of the real interest rate is the Aaa corporate bond rate minus the GNP deflator.

$RGNP_t$ is real Gross National Product in any year, t.

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[1] Unless otherwise indicated the data source is various issues of the *Economic Report of the President*, with the data base defined for the 1954–1979 period.

[2] The data source was the Office of the Secretary of the Treasury, Office of Tax Analysis.

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