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Estimates of Effective Marginal Tax Rates on Factor Incomes*

This paper describes a method of calculating summary measures of effective tax rates on the incomes of labor and capital in the United States. This method is employed to compute annual estimates of factor income tax rates for the period 1929–75. The postwar movement in these tax rates is consistent with the Miller-Scholes hypothesis that the federal personal income tax is evolving into a pure consumption tax. It is also consistent with the view that taxation of corporate income at the corporate level has decreased since the 1950s and that this decline has been offset only partially by an increase in the rate of taxation of corporate income at the noncorporate level.

I. Introduction

In recent years, there has been a resurgence of interest in the influence of tax policy on economic activity and, in particular, in the response of factor supply and employment to the taxation of factor income. These effects have been the subject of both theoretical and empirical investigations. Of particular importance are recent empirical studies which indicate that the elasticities of factor supply with respect to after-tax factor returns are larger than had previously been thought. Wright (1969) and Boskin (1978) have estimated non-negligible interest elasticities of private saving. Joines (1979) found the equilibrium level of business fixed investment to be negatively related to tax rates on income from capital. Wales (1973) found important tax effects on the labor supply of self-employed business proprietors, and Rosen (1976) presented similar results for married women. These and other findings that factor supply is responsive to after-tax factor returns have important policy

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implications concerning the effects of tax policy on aggregate economic activity. The fact that nontrivial supply elasticities were estimated with respect to net-of-tax factor returns, whereas previous studies finding negligible elasticities had used gross returns, demonstrates the importance of tax considerations for both theoretical and empirical research as well as for public policy.

At the same time that evidence of the empirical importance of tax rates has been mounting, several theoretical studies have appeared which have examined various aspects of tax policy in a growing economy. See, for example, Diamond (1970), Feldstein (1974*a*, 1974*b*), Miller and Upton (1974), and Joines (1980). An assumption common to all of these studies is that a single, economy-wide tax rate applies to income from capital and, where relevant, another uniform, economy-wide tax rate applies to income from labor. The magnitude of these tax rates has important implications for the amount of market-sector activity taking place and for the distribution of the burden of taxation.

If tax rates are as important as these theoretical and empirical studies seem to indicate, some interesting questions arise as to the magnitude of the relevant tax rates. How high are effective factor income tax rates in the United States? How do current tax rates compare with rates which prevailed in the past? How do effective tax rates on income from labor compare with those on income from capital? Questions such as these might not appear amenable to ready answers in the absence of some summary measures of effective tax rates analogous to those in the theoretical studies cited above. This paper describes one method of distilling such summary measures from readily available U.S. data and reports the resulting calculations.

Summary measures of economy-wide tax rates such as those reported here have several potential uses. First, they may be of some descriptive use in answering questions like those posed above concerning the current state of the U.S. economy. The answers to these questions may, in turn, have important policy implications when combined with relevant parameter estimates such as factor-supply elasticities. For example, estimates of effective tax rates and factor-supply elasticities may be used in the theoretical models cited above to provide rough measures of the welfare loss from and the incidence of our current tax structure.

As mentioned above, one might be interested in the magnitude of the tax on labor income relative to that on income from capital. This comparison is of particular relevance in light of the recent conjecture of Miller and Scholes (1978) that the federal personal income tax is evolving into a pure consumption tax. If the Miller-Scholes hypothesis is correct, we should expect to observe the effective capital income tax rate decline over time relative to the labor income tax rate. In addition, recent papers by Feldstein and Summers (1979), Fama (1979), Holland

and Myers (1980), and Gonedes (1981) provide conflicting evidence on whether the tax burden on the income from corporate-held capital has increased or decreased during the last quarter-century. These questions will be examined in more detail later in the paper.

Finally, the measures of effective tax rates reported here might be useful in empirical research. The importance of incorporating tax rates into empirical work on factor supply is clear from the studies cited above. Many existing labor supply studies were conducted using disaggregated, cross-section data. Such gross, summary measures as those reported here would obviously be of no use in cross-section studies. They would be of use in studies employing aggregate time-series data, however. In fact, the tax rate measures reported here or measures similar to them have been successfully employed in several empirical investigations of time-series data. Wright's study, possibly the first to find an important effect of after-tax rates of return on saving, employed weighted-average marginal tax rates on income from capital similar in spirit to those reported here. In addition, Joines (1979) found a significant negative relationship between business fixed investment and the capital income tax rates reported here.

II. Some Caveats

The estimates of factor income tax rates reported below are intended to be empirically analogous to the corresponding analytical magnitudes which appear in the theoretical papers cited above. Any attempt at empirical measurement of such effective rates of income taxation will inevitably yield quantities which correspond only imperfectly to the theoretical magnitudes under consideration, and there are several factors which make the problem of measuring effective tax rates a particularly difficult one. The first of these problems is that some taxes are not levied directly on the employment of resources in the market sector but are levied indirectly, for example, on consumption. At the theoretical level, it is clear that individuals supply resources to the market in exchange for market output; but, at the empirical level, factor payments take the form of nominal income that must be exchanged for market output. At the theoretical level, it is clear that it makes no difference whether the government appropriates its share of national output when the owners of factors first receive nominal income or when they ultimately spend that income in the market. At the empirical level, however, the multiplicity of different taxes striking at different points in the production-expenditure cycle greatly complicates the task of measuring effective rates of income taxation.

Another complication is that, when the income tax alone is considered, there is only a very imperfect correspondence between nominal and effective tax rates. At both the individual and corporate levels,

the impact of nominal tax rates is modified by a number of provisions concerning deductions, exemptions, and credits.

To complicate matters even further, there is also an imperfect temporal correspondence between certain acts of income generation and the tax consequences of those acts. One example is the taxation of capital gains only when they are realized rather than when they accrue.[1] Another is the investment tax credit, which reduces taxes in the year in which a capital good is acquired but might more properly be viewed as a reduction in the rate of taxation of the income stream produced by that capital good. Finally, neither nominal tax rates nor actual tax revenues incorporate the resources devoted to qualifying for the various deductions, exemptions, and credits.

Given the complexity of these issues, one might conclude that any attempt at measurement of effective tax rates is hopeless. It is obvious that no scheme for incorporating all the effects enumerated above into a single number representing *the* tax rate on income from labor or capital can be more than an approximation—and possibly a very rough one. This paper nevertheless describes such a scheme and reports the resulting numbers.

III. The Nature of Available Data

The design of any method for quantifying effective tax rates must be influenced by the kinds of data available. The present method is obviously not unique, and no claim is made that, among measurement schemes which might be devised, the present one is optimal. Different readers can undoubtedly think of modifications they would regard as desirable, and it would probably be impossible to achieve a consensus as to which method is optimal. The absence of such a consensus should not, however, deter one from making any attempt at measurement. All that is claimed for the present method is that, given the limitations of existing data, it makes reasonable use of the information at hand.

Two major sources of data on income and taxes were used—the *National Income and Product Accounts of the United States* (henceforth *NIPA*) and the *Statistics of Income* series published by the Internal Revenue Service. The *NIPA* provide aggregate values for income from various sources and for taxes of various kinds. The *Statistics of Income* provide more detailed data compiled from individual income tax returns. The data compiled from individual returns include (1) number of returns, (2) federal personal income tax liability, and (3) income from various sources, all of which are classified by adjusted gross income.

1. As Bailey (1969) points out, this deferral lowers the effective tax rate on capital gains.

The classification of income by source in the *Statistics of Income* is consistent with that in the *NIPA*. Each type of income in the *Statistics of Income* falls within one of the types given in the *NIPA*, the income categories in the latter generally being broader than those in the former.

Each type of income was classified as deriving from labor or from capital. For each of these, the aggregate figure reported in the *NIPA* is larger than the total income of that type reported in the *Statistics of Income*, which merely indicates that total income subject to the personal income tax is less than national income.

IV. A Hypothetical Tax Structure

It is desired, for each year, to condense the information from these sources into two numbers, one representing the effective economy-wide marginal tax rate on income from capital and another representing an analogous tax rate on income from labor. The economy-wide marginal tax rate on income from capital is the fraction of an incremental dollar of income earned by the economy's capital stock which is taken by the government in taxes. It thus depends upon the marginal tax rates of the individuals receiving the incremental dollar and upon the distribution of that dollar among those individuals. If we assume that each individual's share in an incremental dollar of income produced by the capital stock is equal to his share in existing capital income, then the economy-wide marginal tax rate is equal to a weighted average of the individual marginal tax rates, with the weights being the shares in existing capital income. A similar calculation will give the economy-wide marginal rate of taxation of labor income.

It is assumed that all taxes are ultimately taxes on the utilization of productive resources in the market sector and can thus be regarded as taxes on the income produced by those resources. All resources are aggregated into two categories—physical capital and labor. Real property is regarded as physical capital. Taxes on the income of these factors are of various types. Some apply to both types of income, while others are specific to one or the other; some are strictly proportional to income, and others are progressive.

The specific tax structure is taken to be as follows: let the income of individual i be given by $y_i = y_{li} + y_{ki}$, where y_{li} = income from labor of individual i, and y_{ki} = income from capital of individual i. The tax liability of individual i is taken to be

$$t_i = \tau_i y_i + \tau_{li} y_{li} + \tau_{ki} y_{ki} + f_{li}(\gamma_{li} y_{li}) + f_{ki}(\gamma_{ki} y_{ki}), \qquad (1)$$

where

τ_i = proportional tax rate on all income of individual i,

τ_{li} = proportional tax rate on labor income of individual i,
τ_{ki} = proportional tax rate on capital income of individual i,
$f_{li}(\ )$ = a function describing a nonproportional tax on labor income of individual i,
γ_{li} = the fraction of such labor income subject to the nonproportional tax,
$f_{ki}(\ )$ = a function describing a nonproportional tax on capital income of individual i, and
γ_{ki} = the fraction of such capital income subject to the nonproportional tax.

The functions $f_{li}(\ )$ and $f_{ki}(\ )$ and the constants τ_{li} and τ_{ki} need not be identical for all individuals. It can be assumed without loss of generality, however, that the fraction γ_{li} is equal to a constant γ_l identical for all individuals. Any differences among individuals in the fraction of labor income subject to the nonproportional tax can be incorporated into the effective tax rate schedule $f_{li}(\ )$. The fraction γ_{ki} can similarly be assumed constant across individuals. It is also assumed that the proportional tax rate τ_i is equal to a constant τ which is identical for all individuals.

Given these assumptions, the marginal tax rates on the income from labor and capital for individual i are

$$MTR_{li} = \frac{dt_i}{dy_{li}} = \tau + \tau_{li} + \gamma_l f'_{li}$$

$$MTR_{ki} = \frac{dt_i}{dy_{ki}} = \tau + \tau_{ki} + \gamma_k f'_{ki}.$$

The marginal tax rates on the income from labor and capital for the entire economy are $MTRK = dR/dY_L$ and $MTRL = dR/dY_K$, where $Y_L = \Sigma_{i=1}^{N} y_{li}$ and $Y_K = \Sigma_{i=1}^{N} y_{ki}$ are economy-wide incomes from labor and capital, respectively, $R = \Sigma_{i=1}^{N} t_i$ is total government tax revenue, and N is the number of taxpayers. Solving for $MTRK$ in terms of the MTR_{ki} gives

$$\begin{aligned} MTRK = \frac{dR}{dY_K} &= \frac{d\sum_{i=1}^{N} t_i}{dY_K} \\ &= \sum_{i=1}^{N} \frac{dt_i}{dY_K} \\ &= \sum_{i=1}^{N} \frac{dt_i}{dy_{ki}} \frac{dy_{ki}}{dY_K} \\ &= \sum_{i=1}^{N} MTR_{ki} \frac{dy_{ki}}{dY_K}. \end{aligned}$$

The assumption that the personal distribution of each additional dollar of capital income in the economy is the same as the personal distribution of existing capital income means that $dy_{ki}/dY_K = y_{ki}/Y_K = w_{ki}$, so that $\Sigma_{i=1}^{N} w_{ki} = 1$. Then

$$\begin{aligned} MTRK &= \sum_{i=1}^{N} w_{ki}(\tau + \tau_{ki} + \gamma_k f'_{ki}) \\ &= T + TK + \gamma_k \sum_{i=1}^{N} w_{ki} f'_{ki}. \end{aligned} \tag{2}$$

Here $T = \Sigma_{i=1}^{N} w_{ki}\tau = \tau\Sigma_{i=1}^{N} w_{ki} = \tau$ is just total receipts from proportional taxes which are neither labor nor capital specific expressed as a ratio to total income $(Y_L + Y_K)$. In addition, $TK = \Sigma_{i=1}^{N} w_{ki}\tau_{ki}$ is the ratio of total receipts from capital-specific proportional taxes to income from capital, Y_K. A similar formula can be derived for *MTRL*:

$$MTRL = T + TL + \gamma_l \sum_{i=1}^{N} w_{li} f'_{li} \tag{3}$$

where $TL = \Sigma_{i=1}^{N} w_{li}\tau_{li}$ is the ratio of total receipts from labor-specific proportional taxes to total labor income, Y_L.

In general, *MTRL* will differ from *MTRK* for several reasons: (1) Labor income and capital income may be subject to different proportional tax rates ($TL \neq TK$). (2) Different fractions of the two types of income may be subject to the nonproportional tax ($\gamma_l \neq \gamma_k$). (3) The personal distribution of labor income subject to the nonproportional tax may be different from that for capital income ($w_{li} \neq w_{ki}$). (4) The nonproportional tax rate schedules may be different for the two types of income ($f'_{li} \neq f'_{ki}$).

V. Relation of Hypothetical Tax Structure to Available Data

The nonproportional tax on income from capital is identified with the federal personal income tax. The nonproportional tax on labor income is identified with the federal personal income and Social Security taxes.

All other taxes are taken to be proportional to income. For some taxes, this assumption may be reasonably accurate. For example, sales taxes, which are one of the larger of the remaining taxes, are proportional to expenditure. Property taxes, also among the most important taxes, are proportional to property values, which are in turn roughly proportional to the income from the property. Corporate income taxes are roughly proportional to corporate income and apply uniformly on a per share basis to all shareholders instead of varying among shareholders on the basis of each shareholder's income. For other taxes, such as state and local income taxes (which are small relative to the

three taxes discussed above), the assumption may be less reasonable. It must nevertheless be made, since the only readily available data on these taxes are total tax receipts.

The tax schedule represented by $f_{ki}(\ )$ is taken to be the effective federal personal income tax schedule, after deductions, exemptions, and credits are taken into account, rather than the schedule listed in the tax codes. An attempt was made to measure this schedule by using data on actual income and tax payments gathered from individual tax returns and reported in the *Statistics of Income*.[2] Since the *Statistics of Income* give only aggregate data for adjusted gross income classes, all individuals within an income class were assumed to be homogeneous. The subscript i now denotes income class rather than individual.

The marginal federal income tax rates f'_{ki} are computed as follows:

let

R_i = total personal income tax liability of members of income class i,
Y_i = total income subject to personal income tax of members of income class i, and
N_i = number of returns in income class i.

Then

$$f'_{ki} = \frac{(R_i/N_i) - (R_{i-1}/N_{i-1})}{(Y_i/N_i) - (Y_{i-1}/N_{i-1})}.$$

The marginal nonproportional tax rates on labor income, f'_{li}, are obtained by adding the appropriate marginal Social Security tax rate to the marginal federal personal income tax rate applicable to income from capital, f'_{ki}. For adjusted gross income classes for which wage and salary income per return is less than the Social Security wage base, the marginal Social Security tax rate is taken to be equal to the average rate and is calculated as

$$SST = 2\left(\frac{V_1}{V_3}\right)\left(\frac{SSE}{1 + SSE}\right) + \left(\frac{V_2}{V_3}\right)SSS, \tag{4}$$

where

SST = effective Social Security tax rate,
SSE = Social Security tax rate applicable to both the employee and the employer,

2. The practice of taking weighted averages of marginal tax rates was also used by Wright (1969). Wright considered only the federal personal income tax in his calculations, and he took the marginal tax rate of each income bracket to be that listed in the tax code. To represent the marginal tax rate on income from capital, Wright took two weighted averages of these legislated rates. One average took the weight on the tax rate for each income bracket to be interest income accruing to people in that bracket as a fraction of total interest income. The other used similar weights constructed from dividend incomes. Wright found that changes in the after-tax interest rate had a significant negative substitution effect on consumption.

SSS = Social Security tax rate applicable to the self-employed,
V_1 = total number of employees contributing to the Social Security system during the year,
V_2 = total number of self-employed contributing to the Social Security system during the year, and
V_3 = V_2 plus the larger of V_1 or average civilian employment during the year.

Equation (4) merely expresses the employer-employee tax rate as a rate on gross-of-tax wages and takes a weighted average of the resulting number and the tax rate on the self-employed. During the early years of Social Security, a substantial fraction of employees were not covered by the system, and hence (V_1/V_3) was substantially less than unity. The self-employed were exempt altogether. That exemption ended in 1951. In addition, coverage was gradually extended to a larger number of employees, until by 1957 the total number of employees contributing to the system during each year exceeded average civilian employment for the year, and the weights (V_1/V_3) and (V_2/V_3) summed to unity. This extension of coverage is a major factor in the upward drift of the effective Social Security tax rate over time. For adjusted gross income classes with labor income per return greater than the Social Security wage base, the marginal Social Security tax rate is taken to be zero, and hence f'_{li} is equal to f'_{ki}.[3]

The proportional taxes are categorized in Appendix A. Some are assumed to apply generally to all income, and some are assumed to be specific to capital. No proportional taxes specific to labor were found.

VI. Some Remaining Issues

Before we proceed further with the tax rate calculations, it is necessary to resolve certain remaining issues. These issues concern (1) the treatment of income which is not readily attributable to either capital or labor, (2) the income base used—either national income or net national product, and (3) whether net capital gains are included in that portion of capital income subject to the personal income tax.

Treatment of Miscellaneous Income

The various types of income reported in the *NIPA* and the *Statistics of Income* were classified as either labor income, capital income, or miscellaneous income.[4] The classification is contained in Appendix B.

3. For the first income class, j, for which labor income per return exceeds the wage base, the marginal Social Security tax rate is taken to be a fraction of SST. The numerator of this fraction is the difference between the wage base and labor income per return in income class $j - 1$. The denominator is the difference between labor income per return in income class j and that in class $j - 1$.

4. Income from capital includes gross rather than net corporate profits since the corporate profits tax rate applicable to a firm is, in general, positive if its profits are

The items classified as miscellaneous consist of labor income and income from capital in proportions that are far from obvious. The problem of allocating miscellaneous income between labor and capital was "solved" by computing different tax rate series under each of two extreme assumptions. Miscellaneous income was treated as pure labor income under one assumption and as pure capital income under the alternative assumption. Only these two polar cases were considered, and there seems no overwhelming reason for preferring one to the other. As will be seen below, the results of the calculations are not very sensitive to the treatment of miscellaneous income.

Income Base

A tax rate is merely a ratio of tax liability to income, either on average or at the margin. The tax rate thus depends on the income base chosen. Since it was desired to calculate general, economy-wide tax rates, an attempt was made to include all taxes in the numerator and to use a comprehensive measure of national income in the denominator. Initially, two such measures seemed reasonable, national income (*NI*) and net national product (*NNP*). Whereas *NI* measures national income (product) at factor cost, *NNP* measures it at market prices. The approximate relationship between the two is $NNP = NI + IBT$, where *IBT* denotes indirect business taxes.

Two procedures were used to deal with the income base. The first excluded *IBT* from both the income base and proportional taxes (*NI* basis), and the second included them in both (*NNP* basis). In going from the *NI* basis to the *NNP* basis, we must allocate indirect business taxes to capital and labor. This was done in two steps. First, general indirect business taxes were allocated between labor and capital in proportion to total national income attributable to labor and capital. Then, indirect business taxes attributable to capital were allocated to capital. The choice of income base affects only the proportional tax rates T, TL, and TK and the fractions γ_l and γ_k. It does not affect the weights w_{li} and w_{ki} or the marginal personal income tax rates f'_{li} and f'_{ki}.

The *NI* basis, as defined here, seems less sensible than the *NNP*

positive and zero otherwise. It is desired to measure *TK* in such a way that it is affected by changes in the positive component of the effective corporate tax schedule, which suggests including gross corporate profits in income from capital. If net corporate profits were used instead, *TK* would rise with a decrease in the difference between gross corporate profits and corporate losses, even if the positive component of the corporate tax schedule remained unchanged. This would induce a spurious negative association between *MTRK* and many broad measures of economic activity and could lead to incorrect inferences concerning relationships between the two. In particular, the resulting bias would be in the direction of overstating any apparent deterrent effect of tax rates on economic activity. Empirical work performed using both the tax rate series reported here and earlier series computed without this correction suggests that the bias could be severe. I am indebted to Paul Evans for pointing out the potential seriousness of this source of error.

basis, and it definitely understates the size of the wedge which taxes drive between gross- and net-of-tax values. To see this, assume there is only one factor of production, say, labor, which is paid for working in the market sector. The wage rate is denominated in terms of market goods. Assume that the only taxes in the economy are indirect business taxes. The market for labor is shown in figure 1.

In figure 1, national income is given by area B, indirect business taxes by area A, and NNP by $A + B$. According to the NNP basis, the size of the wedge is given by $A/(A + B)$, whereas, according to the NI basis, the wedge is zero.

The ratio A/B would seem to have some meaning, so using this as the NI basis might be worthwhile. One possibly unappealing feature of this revised NI method is that taxes and after-tax income sum to more than national income. Thus, it is theoretically possible for the wedge to be greater than 100%. For these reasons, the NNP basis seems to provide the best measure of the size of the wedge and is used in the calculations reported below.

Treatment of Capital Gains

Excluding net capital gains from income subject to the personal income tax will not affect total national income attributable to either capital or labor. It will merely reduce capital income subject to the personal income tax (assuming total net capital gains are positive). In addition, it will alter the weights γ_k and w_{ki} and the computed marginal nonproportional tax rates f'_{li} and f'_{ki} while leaving the proportional tax rates T, TL, and TK unaffected.

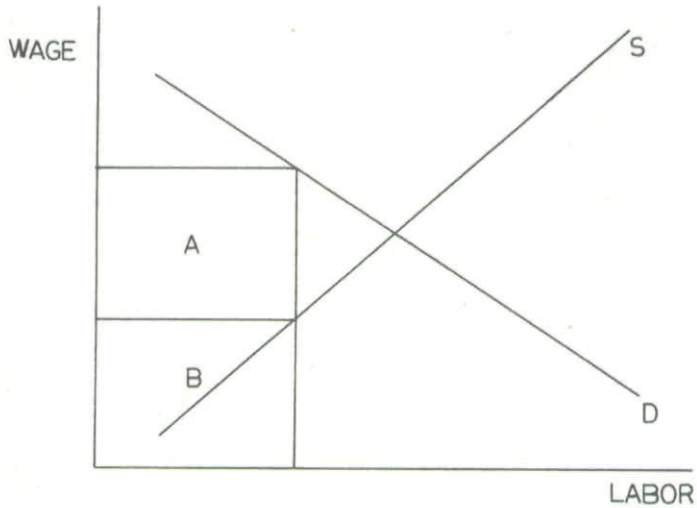

FIG. 1.—Alternative methods of treating indirect business taxes in computing effective tax rates.

Capital gains can result from at least three causes: (1) inflation, (2) relative price changes, and (3) appreciation of equity securities because of retention of earnings by firms.

Inflation-induced capital gains do not constitute real income and should be excluded. Relative price changes result in offsetting capital gains and losses. Unless such changes are biased so as to benefit some income classes at the expense of others, net capital gains of the various income classes should not be greatly affected by price fluctuations of this sort. The third type of capital gain does reflect real income, but the income need not be earned in the year that the capital gains are realized. This timing problem does not shift national income from one year to another, however.

If the effects of relative price changes do net approximately to zero, and if one makes the assumption that capital gains of the third type are more important than those induced by inflation during most of the sample period, then it seems preferable to include net capital gains in income subject to the personal income tax. Nevertheless, since the case for including capital gains is far from overwhelming, separate tax rate series were calculated with capital gains excluded from income subject to the personal income tax.

VII. Alternative Tax Rate Series

The above discussion thus suggests four methods of calculating marginal tax rates, each differing in its treatment of miscellaneous income and capital gains. The four methods of calculation are summarized in table 1. The results of these calculations are presented in tables 2 and 3.

Table 4 shows a correlation matrix of the eight marginal tax rates. Since all the tax rates appear to have a common upward trend, the high correlations among them are probably the result of this common trend. Table 5 shows a correlation matrix of the first differences of the tax rates. The relevant correlations are, in general, still quite high. The first differences of the labor income tax rate computed by one method are very highly correlated with those computed by other methods, and the same situation holds for the capital income tax rates. The correlations

TABLE 1 **Alternative Methods of Calculating Weighted-Average Marginal Tax Rates**

Method	Capital Gains	Miscellaneous Income Attributed to
1	Included	Labor
2	Included	Capital
3	Excluded	Labor
4	Excluded	Capital

TABLE 2 Weighted-Average Marginal Tax Rates on Income from Labor

Year	*MTRL1*	*MTRL2*	*MTRL3*	*MTRL4*	Year	*MTRL1*	*MTRL2*	*MTRL3*	*MTRL4*
1929	3.51	3.34	3.88	3.55	1953	20.83	20.78	21.12	21.01
1930	3.60	3.54	3.63	3.57	1954	19.20	19.13	19.66	19.48
1931	3.82	3.79	3.81	3.78	1955	19.76	19.66	20.38	20.14
1932	4.89	4.85	4.91	4.86	1956	20.31	20.08	20.83	20.48
1933	6.79	6.63	6.90	6.70	1957	22.19	22.16	22.62	22.53
1934	7.47	7.33	7.49	7.34	1958	21.47	21.39	21.90	21.72
1935	7.44	7.29	7.51	7.34	1959	22.34	22.15	22.96	22.64
1936	8.03	7.75	8.16	7.86	1960	22.84	22.75	23.33	23.15
1937	8.06	7.92	8.10	7.95	1961	23.05	22.86	23.79	23.44
1938	8.25	8.13	8.30	8.16	1962	23.14	22.86	23.68	23.30
1939	8.25	8.09	8.28	8.12	1963	23.33	23.06	23.87	23.49
1940	9.05	8.70	9.06	8.71	1964	22.08	21.71	22.64	22.13
1941	11.78	11.21	11.76	11.18	1965	22.20	21.84	22.84	22.31
1942	15.37	14.65	15.45	14.69	1966	21.70	21.34	22.25	21.75
1943	17.83	16.80	18.09	16.93	1967	22.12	21.79	22.92	22.41
1944	18.84	17.94	19.16	18.14	1968	24.20	23.71	25.27	24.51
1945	19.71	18.52	20.39	18.92	1969	25.02	24.71	25.77	25.28
1946	18.79	17.63	19.55	18.15	1970	24.79	24.30	25.21	24.62
1947	19.25	18.47	19.71	18.81	1971	23.34	23.11	23.86	23.50
1948	16.13	15.77	16.48	16.04	1972	25.06	24.71	25.82	25.32
1949	16.15	15.91	16.39	16.10	1973	25.81	25.54	26.44	26.05
1950	17.95	17.40	18.74	17.95	1974	27.24	26.82	27.70	27.20
1951	19.69	19.54	20.14	19.86	1975	27.35	26.90	27.78	27.26
1952	20.50	20.47	20.86	20.74					

TABLE 3 **Weighted-Average Marginal Tax Rates on Income from Capital**

Year	*MTRK1*	*MTRK2*	*MTRK3*	*MTRK4*	Year	*MTRK1*	*MTRK2*	*MTRK3*	*MTRK4*
1929	29.45	20.22	29.51	20.59	1953	59.92	43.87	59.42	43.82
1930	27.76	20.03	27.98	20.19	1954	54.93	40.78	54.29	40.77
1931	28.59	21.16	28.74	21.26	1955	55.38	42.32	54.58	42.31
1932	33.12	26.32	33.25	26.42	1956	56.52	43.36	55.80	43.32
1933	41.08	31.09	41.13	31.21	1957	55.23	42.80	54.65	42.73
1934	41.00	29.78	40.98	29.78	1958	54.00	41.41	53.27	41.31
1935	41.44	27.86	41.37	27.85	1959	54.29	43.28	53.37	43.17
1936	46.20	31.37	46.01	31.36	1960	54.89	44.08	54.29	44.03
1937	44.43	28.96	44.53	29.05	1961	54.55	43.96	53.62	43.92
1938	41.36	28.13	42.17	28.64	1962	51.45	42.68	50.93	42.71
1939	42.55	28.99	42.87	29.19	1963	51.69	43.29	51.07	43.24
1940	45.12	31.91	45.34	32.05	1964	49.80	42.13	49.02	42.02
1941	55.81	39.13	56.06	39.29	1965	48.91	41.54	47.97	41.41
1942	59.96	41.76	59.93	41.85	1966	48.39	41.19	47.68	41.12
1943	61.99	43.95	61.68	44.10	1967	49.25	41.99	48.20	41.86
1944	59.96	42.70	59.35	42.74	1968	53.60	46.21	52.22	46.11
1945	62.89	43.43	61.50	43.61	1969	53.76	46.16	52.87	46.15
1946	61.71	40.09	60.42	40.34	1970	51.55	45.10	50.86	44.97
1947	59.21	40.65	58.45	40.71	1971	51.15	44.13	50.32	43.95
1948	52.90	35.79	52.35	35.80	1972	51.41	44.99	50.23	44.68
1949	49.92	34.99	49.72	35.07	1973	52.51	45.05	51.40	44.73
1950	62.03	43.99	62.05	44.77	1974	53.43	47.06	52.52	46.74
1951	64.05	45.21	63.41	45.24	1975	49.31	44.47	48.47	44.12
1952	60.23	43.07	59.59	43.03					

TABLE 4 Correlation Matrix of Tax Rates

	MTRL1	*MTRL2*	*MTRL3*	*MTRL4*	*MTRK1*	*MTRK2*	*MTRK3*	*MTRK4*
MTRL1	1.000							
MTRL2	.999	1.000						
MTRL3	1.000	.999	1.000					
MTRL4	.999	1.000	.999	1.000				
MTRK1	.704	.689	.702	.687	1.000			
MTRK2	.944	.938	.943	.937	.862	1.000		
MTRK3	.677	.662	.675	.660	.999	.845	1.000	
MTRK4	.940	.933	.939	.932	.869	1.000	.853	1.000

TABLE 5 Correlation Matrix of First Differences of Tax Rates

	Δ*MTRL1*	Δ*MTRL2*	Δ*MTRL3*	Δ*MTRL4*	Δ*MTRK1*	Δ*MTRK2*	Δ*MTRK3*	Δ*MTRK4*
Δ*MTRL1*	1.000							
Δ*MTRL2*	.991	1.000						
Δ*MTRL3*	.989	.968	1.000					
Δ*MTRL4*	.992	.994	.986	1.000				
Δ*MTRK1*	.669	.624	.708	.655	1.000			
Δ*MTRK2*	.706	.664	.734	.689	.929	1.000		
Δ*MTRK3*	.663	.619	.697	.647	.997	.933	1.000	
Δ*MTRK4*	.693	.647	.726	.675	.929	.998	.935	1.000

of the first differences of the labor and capital income tax rates computed by any one method are between 0.66 and 0.72.

For reasons outlined above, tax rates which include capital gains in income subject to the personal income tax seem preferable to those which do not. Methods 1 and 2 meet this criterion and differ only in whether miscellaneous income is attributed to capital or to labor. There seems little reason to prefer either of these two methods over the other. Furthermore, it is unlikely that the choice between method 1 and method 2 will materially affect the conclusions drawn from any statistical analysis performed using these tax rates. As all of the estimated tax rates exhibit mean nonstationarity, the differenced series should probably be used in statistical work. Since the correlation between the first differences of the labor income tax rates computed by methods 1 and 2 is 0.999 and the correlation between the first differences of the two capital income tax rates is 0.929, there is little reason to believe that any empirical results will be very greatly affected by the choice. Not only are the year-to-year movements in the alternative tax rate series very similar, as evidenced by these high correlations, but the levels of the labor income tax rate computed by one method are very close to the levels computed by the other methods. The same cannot be said of the capital income tax rates, however. The level of the capital income tax rate is higher according to methods 1 and 3, which attribute miscellaneous income to labor, than according to methods 2 and 4, which attribute miscellaneous income to capital.

The reason for this phenomenon is that the proportional tax rate *TK* is substantially higher according to methods 1 and 3 than according to methods 2 and 4. The tax rate *TK* is the capital-specific proportional tax receipts listed in Appendix A expressed as a fraction of income from capital. The numerator of this fraction is the same for all methods of calculating the tax rates. The denominator is larger, however, and the tax rate is correspondingly smaller when miscellaneous income is attributed to capital. Since no labor-specific proportional taxes were found, the allocation of miscellaneous income has no such effect on the labor income tax rates. This allocation merely affects the weights w_{li} used in constructing the weighted-average nonproportional tax rate on labor income. The fact that *MTRL1* is slightly greater than *MTRL2* (and *MTRL3* is greater than *MTRL4*) indicates that, on average, miscellaneous income accrues to people in somewhat higher tax brackets than does labor income. This effect is small, however, since the difference between *MTRL1* and *MTRL2* is generally less than half a percentage point, except during and immediately after World War II. It thus appears that miscellaneous income is taxed at the personal level in a manner quite similar to labor income.

One curious fact apparent from tables 4 and 5 is that the correlation between $\Delta MTRK1$ and $\Delta MTRK2$ is higher than that between *MTRK1*

and *MTRK2* and similarly for the levels and first differences of *MTRK3* and *MTRK4*. Also, the levels of the capital income tax rates computed by methods 2 and 4 are more highly correlated with the labor income tax rates than with *MTRK1* and *MTRK3*. This curiosity has a simple explanation. Since miscellaneous income is becoming less important over time relative to other types of income, the difference between, for example, *MTRK1* and *MTRK2* is also diminishing over time. This imparts a sharper upward trend to the latter than to the former. Both of these series increased dramatically between 1929 and 1951. Since then, *MTRK2* has increased slightly and has remained above its mean value for the 47-year sample of 38.78. On the other hand, *MTRK1* has declined from its 1951 peak. As a result of this decline, *MTRK1* has been below its mean of 50.82 during 5 of the 15 years between 1961 and 1975 and has barely been above the mean in 5 other years. This has served to reduce the computed correlation between *MTRK1* and *MTRK2*. The labor income tax rates have exhibited a positive trend over the entire sample period and are thus highly correlated with *MTRK2*. Because of the common trends, however, these correlations are probably spurious in the sense discussed by Granger and Newbold (1974). The first differences of *MTRK2* are more highly correlated with $\Delta MTRK1$ than with the first differences of the labor income tax rates.

Since miscellaneous income appears to be taxed at the personal level in a manner so similar to labor income, and since most of the capital-specific proportional taxes listed in Appendix A do not apply to miscellaneous income, it is probably more appropriate to attribute such income to labor than to capital when discussing the levels of the tax rate series. Consequently, only the series computed by method 1 will be discussed in the remainder of the paper. Since most of the income to which *MTRK1* applies derives from residential and corporate capital, this tax rate can be interpreted as a weighted average of the rates applicable to those two types of income.

VIII. Behavior of Tax Rates over Time

It is worthwhile to examine the behavior over time of the tax rate series and their components to see whether this behavior is broadly consistent with the major changes in tax policy which occurred during the sample period. Figure 2 is a time-series plot of *MTRK1* and *MTRL1* (henceforth referred to as *MTRK* and *MTRL*, respectively). Throughout the entire 47-year period, *MTRK* is greater than *MTRL*. The two series follow similar patterns from 1929 until the early 1950s. Both exhibit noticeable upward movements during the 1930s, a period of increasing federal income tax rates, and reach unprecedented levels during World War II. They decline after the war, but not to prewar levels, and then rise sharply again during the Korean conflict.

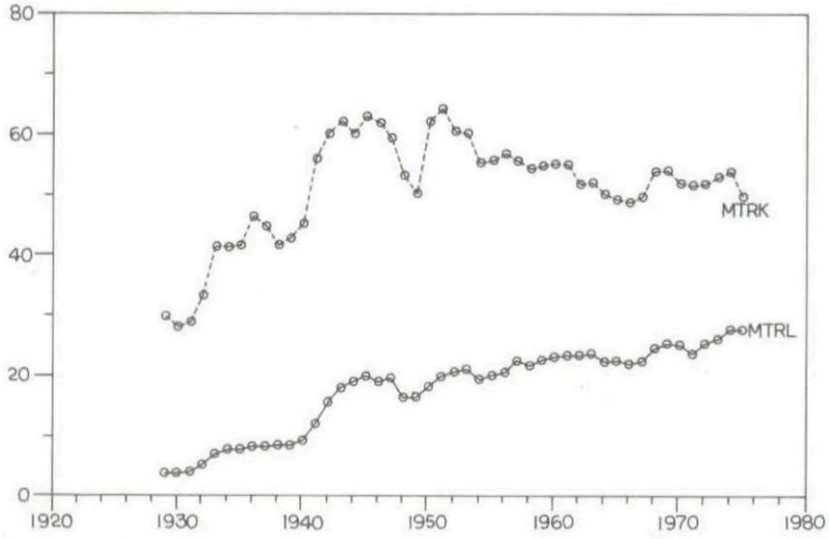

FIG. 2.—Marginal tax rates on income from labor and income from capital

Since the early 1950s, the two tax rates have moved much less closely together. During this period, *MTRL* has followed an irregular upward trend whose only major interruption occurred in the years immediately following the federal income tax rate cuts of 1964. This hiatus ended with the Vietnam surcharge, which was in effect from 1968 to 1970. The steady rise in *MTRL* from 1971 until 1975 appears to be largely the result of increased Social Security taxes and of taxpayers being pushed into higher nominal income brackets by inflation rather than by any readily identifiable change in statutory personal income tax rates.

In contrast to this behavior, *MTRK* exhibited an overall downward movement from the early 1950s until the imposition of the Vietnam surcharge in 1968. This downward trend was aided by the 1964 income tax cuts but was well under way before then. The two largest yearly decreases in *MTRK* during this entire period occurred in 1954, when accelerated depreciation was first permitted for tax purposes, and in 1962, when the federal investment tax credit was enacted and new service lives were adopted for calculating depreciation.[5]

More insight into the behavior of *MTRL* and *MTRK* can be gained by examining the components of each tax rate. A common component of both series is the general proportional tax rate T. A second component of *MTRK* is the capital-specific proportional tax rate TK. The analogous quantity TL is equal to zero, since no labor-specific proportional tax rates were identified. The third component of *MTRK* is the contri-

5. The investment tax credit did not take effect until 1963.

bution of the federal personal income tax to the overall tax rate on income from capital, defined as $PCK = \gamma_k \Sigma_{i=1}^{N} w_{ki} f'_{ki}$. This is merely the third term in equation (2). A similar designation could be made for the third term in equation (3), which defines *MTRL*. This term, however, includes the contributions to *MTRL* of both the federal personal income tax and the Social Security tax. These two contributions may be isolated by noting that the marginal federal personal income tax rate applicable to labor income is equal to that applicable to income from capital; f'_{ki} and f'_{li} differ only by the relevant marginal Social Security tax rate. The contribution of the federal personal income tax to the overall tax rate on labor income is thus defined as $PCL = \gamma_l \Sigma_{i=1}^{N} w_{li} f'_{ki}$. The contribution of the Social Security tax is defined as $SSC = \gamma_l \Sigma_{i=1}^{N} w_{li} SST_i$, where SST_i is equal to the constant *SST* for adjusted gross income classes with labor income per return less than the Social Security wage base and is equal to zero otherwise.

Figure 3 shows *MTRL* as the sum of its components, which are listed in table 6. By far the largest component is *PCL*, although *SSC* has become increasingly important since the late 1950s and is the source of roughly half of the increase in *MTRL* from that time until 1975. These increases in the contribution of Social Security to the tax rate on labor income at the margin are due to increases in both the Social Security tax rate and the wage base. In fact, the latter is, if anything, a more important factor than the former. This can be seen by noting that the largest single year-to-year increase in *SSC* occurred between 1964 and 1965, a period during which the employer-employee tax rate was constant but the wage base was increased from $4,800 to $6,600.

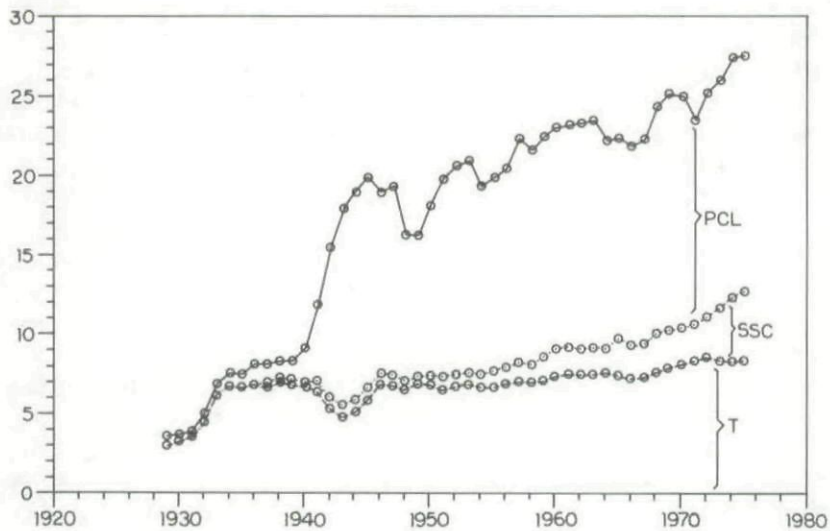

FIG. 3.—Components of the marginal tax rate on income from labor

TABLE 6 Components of the Marginal Tax Rate on Income from Labor

Year	*T*	*SSC*	*PCL*	*MTRL*	Year	*T*	*SSC*	*PCL*	*MTRL*
1929	2.96	.00	.55	3.51	1953	6.81	.65	13.37	20.83
1930	3.20	.00	.41	3.60	1954	6.60	.78	11.82	19.20
1931	3.54	.00	.28	3.82	1955	6.64	1.00	12.12	19.76
1932	4.39	.00	.51	4.89	1956	6.88	.92	12.51	20.31
1933	6.08	.00	.71	6.79	1957	6.96	1.17	14.06	22.19
1934	6.71	.00	.76	7.47	1958	6.89	1.13	13.45	21.47
1935	6.60	.00	.85	7.44	1959	7.02	1.47	13.85	22.34
1936	6.78	.00	1.25	8.03	1960	7.28	1.65	13.91	22.84
1937	6.62	.25	1.19	8.06	1961	7.44	1.61	14.00	23.05
1938	6.96	.27	1.03	8.25	1962	7.42	1.52	14.20	23.14
1939	6.77	.32	1.16	8.25	1963	7.44	1.63	14.26	23.33
1940	6.62	.29	2.15	9.05	1964	7.52	1.49	13.07	22.08
1941	6.30	.63	4.85	11.78	1965	7.36	2.29	12.55	22.20
1942	5.26	.71	9.40	15.37	1966	7.12	2.08	12.50	21.70
1943	4.71	.78	12.34	17.83	1967	7.20	2.02	12.90	22.12
1944	5.06	.71	13.07	18.84	1968	7.54	2.42	14.24	24.20
1945	5.81	.72	13.19	19.71	1969	7.81	2.32	14.89	25.02
1946	6.83	.67	11.30	18.79	1970	8.01	2.29	14.49	24.79
1947	6.73	.65	11.86	19.25	1971	8.27	2.24	12.84	23.34
1948	6.50	.43	9.19	16.13	1972	8.47	2.54	14.06	25.06
1949	6.84	.42	8.88	16.15	1973	8.24	3.27	14.30	25.81
1950	6.78	.56	10.61	17.95	1974	8.21	4.02	15.01	27.24
1951	6.42	.80	12.47	19.69	1975	8.27	4.28	14.79	27.35
1952	6.71	.70	13.10	20.50					

The behavior of the proportional tax rate *T* is somewhat unusual and deserves comment. This rate is made up almost entirely of state and local taxes, the largest of these being sales taxes. After rising sharply in the early 1930s, *T* has remained fairly stable except for a noticeable decrease during World War II. Part of this wartime decline might have been due to actual reductions in state and local tax rates. It is almost certain, however, that this decrease in *T* was at least in part induced by federal tax policy. Assume for the moment that *T* consists entirely of sales taxes and that taxable sales are proportional to disposable income. If the federal government were suddenly to institute large increases in personal and corporate income tax rates, as it did during World War II, this would reduce disposable income, and hence sales and sales taxes, as fractions of national product. It seems quite likely that at least part of the reduction in *T* during World War II can be attributed to such a preemption of the tax base by the federal government.

Figure 4 shows *MTRK* as the sum of its components, which are listed in table 7. The largest of these, *TK*, is made up entirely of property and corporate profits taxes. Its movement largely determines that of *MTRK*. The contribution of the federal personal income tax, *PCK*, is fairly stable (at roughly between six and eight percentage points) during the postwar period.

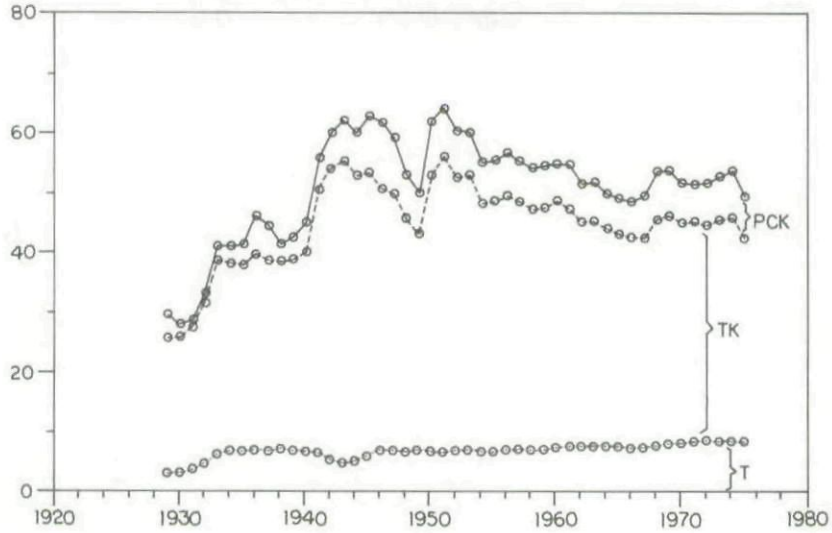

FIG. 4.—Components of the marginal tax rate on income from capital

Miller and Scholes (1978) have advanced the argument that the federal personal income tax is evolving into a pure consumption tax. If this were the case, one would expect to see the tax on income from capital become less important relative to that on income from labor. As was noted above, figure 2 provides some evidence that this has in fact occurred since the early 1950s. Since the Miller-Scholes hypothesis is expressed in terms of the federal personal income tax, however, more insight into its applicability can be gained by examining the contribution of this tax to *MTRL* and *MTRK*. Figure 5, a time-series plot of *PCL* and *PCK*, provides even more striking evidence in support of Miller and Scholes than did figure 2. While *PCK* is larger than *PCL* before World War II, the reverse is true thereafter. Furthermore, the difference between *PCL* and *PCK* becomes quite large by 1951 and seems to grow during the remainder of the sample period.

It should be noted that the behavior of *PCL* and *PCK* is determined not only by the weighted-average federal personal income tax rates but also by the fractions (γ_l and γ_k) of labor and capital income subject to that tax. It is thus possible that the pattern in figure 5 is due entirely to movements in γ_l and γ_k. To examine this question, it is necessary to isolate movements in *PCL* and *PCK* due to γ_l and γ_k from those due to the weighted-average personal income tax rates on labor and capital themselves. These rates are defined as $PTL \equiv \sum_{i=1}^{N} w_{li} f'_{ki}$ and $PTK \equiv \sum_{i=1}^{N} w_{ki} f'_{ki}$, respectively.

Figure 6 is a time-series plot of γ_l and γ_k, which are listed in table 8. The most striking feature of this graph is the sharp increase in γ_l over

TABLE 7 Components of the Marginal Tax Rate on Income from Capital

Year	*T*	*TK*	*PCK*	*MTRK*	Year	*T*	*TK*	*PCK*	*MTRK*
1929	2.96	22.64	3.85	29.45	1953	6.81	46.17	6.94	59.92
1930	3.20	22.64	1.91	27.76	1954	6.60	41.40	6.93	54.93
1931	3.54	23.90	1.14	28.59	1955	6.64	41.86	6.88	55.38
1932	4.39	27.13	1.61	33.12	1956	6.88	42.52	7.12	56.52
1933	6.08	32.46	2.53	41.08	1957	6.96	41.40	6.87	55.23
1934	6.71	31.35	2.94	41.00	1958	6.89	40.19	6.91	54.00
1935	6.60	31.29	3.55	41.44	1959	7.02	40.34	6.93	54.29
1936	6.78	32.81	6.60	46.20	1960	7.28	41.31	6.30	54.89
1937	6.62	32.04	5.77	44.43	1961	7.44	39.82	7.29	54.55
1938	6.96	31.49	2.91	41.36	1962	7.42	37.67	6.36	51.45
1939	6.77	32.04	3.75	42.55	1963	7.44	37.75	6.50	51.69
1940	6.62	33.57	4.94	45.12	1964	7.52	36.36	5.92	49.80
1941	6.30	44.30	5.21	55.81	1965	7.36	35.71	5.84	48.91
1942	5.26	48.71	6.00	59.96	1966	7.12	35.47	5.80	48.39
1943	4.71	50.57	6.71	61.99	1967	7.20	35.24	6.82	49.25
1944	5.06	47.83	7.07	59.96	1968	7.54	37.98	8.09	53.60
1945	5.81	47.56	9.52	62.89	1969	7.81	38.13	7.83	53.76
1946	6.83	43.88	11.00	61.71	1970	8.01	36.88	6.67	51.55
1947	6.73	43.11	9.37	59.21	1971	8.27	36.75	6.14	51.15
1948	6.50	39.16	7.23	52.90	1972	8.47	35.96	6.98	51.41
1949	6.84	36.20	6.88	49.92	1973	8.24	37.13	7.15	52.51
1950	6.78	46.04	9.21	62.03	1974	8.21	37.62	7.60	53.43
1951	6.42	49.62	8.01	64.05	1975	8.27	34.03	7.01	49.31
1952	6.71	45.80	7.72	60.23					

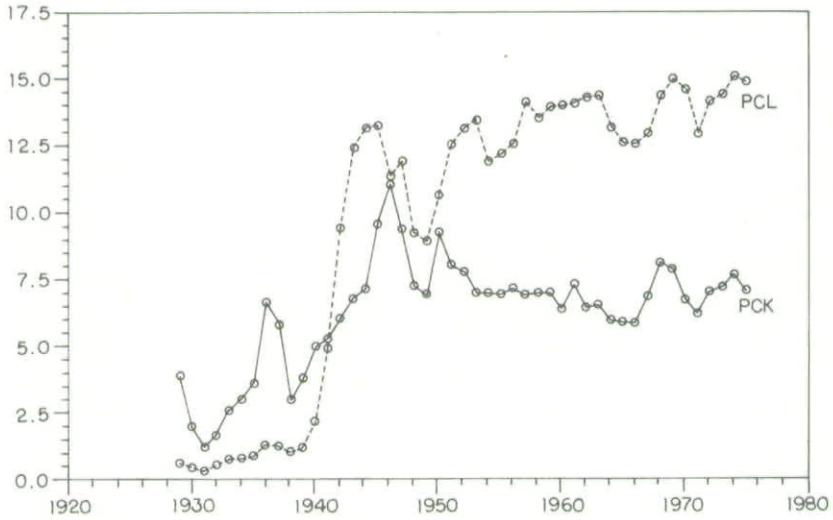

FIG. 5.—Contribution of the federal personal income tax to overall marginal tax rates.

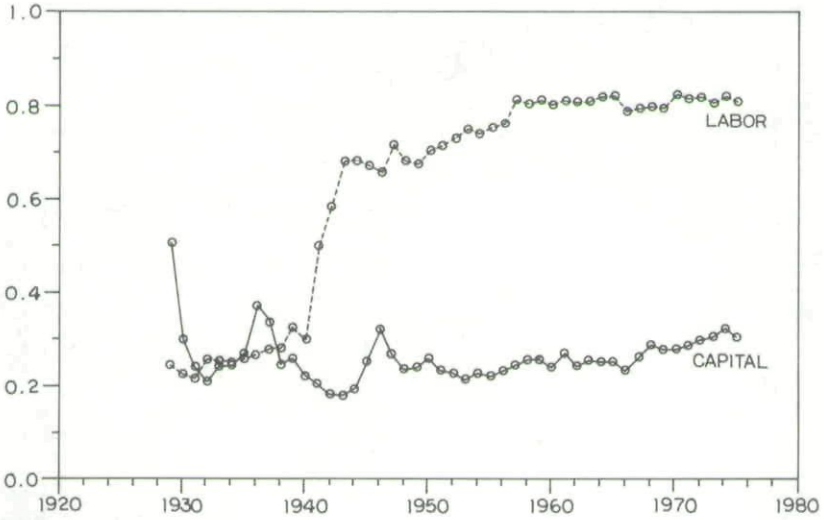

FIG. 6.—Fractions of income from labor and income from capital subject to the federal personal income tax.

TABLE 8 **Fractions of Income Subject to Federal Personal Income Tax**

Year	Labor	Capital	Year	Labor	Capital
1929	.243	.505	1953	.745	.211
1930	.223	.298	1954	.735	.225
1931	.214	.238	1955	.748	.220
1932	.255	.207	1956	.757	.231
1933	.251	.240	1957	.809	.242
1934	.247	.241	1958	.801	.253
1935	.256	.269	1959	.808	.252
1936	.265	.370	1960	.799	.236
1937	.276	.334	1961	.806	.267
1938	.279	.242	1962	.804	.241
1939	.323	.256	1963	.805	.253
1940	.298	.219	1964	.817	.248
1941	.499	.204	1965	.817	.250
1942	.582	.179	1966	.785	.231
1943	.677	.177	1967	.790	.262
1944	.679	.190	1968	.793	.284
1945	.669	.250	1969	.791	.275
1946	.654	.319	1970	.819	.277
1947	.712	.264	1971	.811	.284
1948	.677	.235	1972	.814	.293
1949	.673	.239	1973	.802	.304
1950	.702	.258	1974	.814	.319
1951	.712	.232	1975	.805	.301
1952	.728	.226			

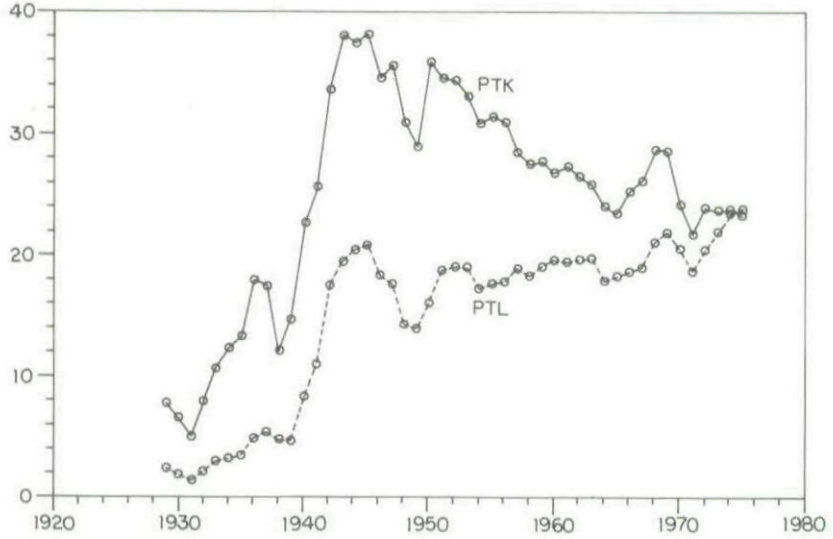

FIG. 7.—Federal personal income tax rates on income from labor and income from capital.

time and the relative constancy of γ_k. Starting from levels comparable to γ_k, γ_l rose dramatically during World War II and has continued to increase since then, rising to a level of roughly 0.8 by 1975. During the entire postwar period, in contrast, γ_k remained at levels comparable to those of the 1930s and was approximately 0.3 in 1975. It thus appears that part of the upward drift in *PCL* since 1950 may be due to a similar upward drift in γ_l. It also appears that there has been an upward drift in γ_k since the early 1950s that would tend to increase *PCK*.[6] Thus, the relative movements of *PCL* and *PCK* cannot be explained entirely in terms of γ_l and γ_k.

Figure 7 shows the behavior of the weighted-average personal tax rates *PTL* and *PTK* over time. These tax rates are listed in table 9. In the early years of the sample, *PTK* is greater than *PTL*, and the difference between the two generally increases until the end of World War II. Beginning in 1950, *PTK* follows a downward path, interrupted briefly by the Vietnam surcharge. During the same period, *PTL* exhibits an irregular upward drift, until by 1975 it is, for the first time, greater than *PTK*. This figure again provides suggestive support for the Miller-Scholes hypothesis.

6. It should be noted that, while a decrease in γ_k tends to decrease *PCK*, it will not necessarily be associated with a decrease in *MTRK*. In fact, it may be the result of an increase in *TK* and thus in *MTRK*. E.g., if the government increases corporate income tax rates, *TK* will increase. However, since a smaller fraction of income from capital remains to be subjected to the personal income tax, γ_k will fall. The increase in γ_k since the early 1950s might well be due to the fall in *TK* during that period.

TABLE 9 Federal Personal Income and Social Security Tax Rates

Year	*SST*	*PTL*	*PTK*	Year	*SST*	*PTL*	*PTK*
1929	.00	2.27	7.63	1953	2.74	18.83	32.87
1930	.00	1.79	6.41	1954	3.61	17.14	30.76
1931	.00	1.31	4.81	1955	3.69	17.55	31.29
1932	.00	1.99	7.78	1956	3.72	17.74	30.84
1933	.00	2.82	10.57	1957	4.28	18.82	28.41
1934	.00	3.07	12.22	1958	4.29	18.20	27.34
1935	.00	3.31	13.23	1959	4.73	18.96	27.53
1936	.00	4.70	17.87	1960	5.67	19.47	26.68
1937	1.41	5.22	17.29	1961	5.67	19.37	27.26
1938	1.43	4.64	12.02	1962	5.89	19.55	26.35
1939	1.46	4.58	14.61	1963	6.77	19.75	25.73
1940	1.47	8.17	22.57	1964	6.78	17.83	23.91
1941	1.61	10.99	25.55	1965	6.83	18.17	23.32
1942	1.71	17.38	33.50	1966	7.85	18.58	25.15
1943	1.73	19.39	37.93	1967	8.20	18.89	26.04
1944	1.70	20.31	37.31	1968	8.21	21.00	28.49
1945	1.74	20.79	38.03	1969	9.04	21.75	28.50
1946	1.75	18.31	34.50	1970	9.04	20.50	24.08
1947	1.70	17.58	35.49	1971	9.76	18.59	21.58
1948	1.66	14.21	30.73	1972	9.76	20.40	23.81
1949	1.61	13.83	28.85	1973	10.89	21.92	23.55
1950	2.42	15.92	35.74	1974	10.89	23.38	23.84
1951	2.67	18.65	34.49	1975	10.89	23.70	23.26
1952	2.72	18.96	34.22				

As a final check on the reasonableness of the computed tax rates, various components of these rates are compared with readily available summary measures of federal tax policy. Figure 8 is a time-series plot of *PCL* and the statutory minimum-bracket federal personal income tax rate, denoted *TMIN*. Figure 9 is a similar time-series plot of *PCK* and *TMIN*. Even though the minimum-bracket rate provides a very incomplete summary of the entire federal personal income tax structure, it is striking how closely *TMIN* tracks both *PCL* and *PCK*. Furthermore, the two most noticeable discrepancies can be explained in terms of rates applicable to higher brackets. One of these occurs during the Vietnam surcharge of 1968–70. Another occurs during the mid-1930s, when the maximum-bracket rate rose from 25% to 79% even though the minimum-bracket rate remained roughly constant.

Figure 10 shows *TK* plotted along side the maximum-bracket federal corporate profits tax rate, denoted *TCORP*. The two move reasonably closely together until 1951 and again after the 1964 federal income tax cuts. The major discrepancy occurs between 1952 and 1963, during which period *TK* shows a steady downward movement while *TCORP* is constant. As was noted above, however, this was the period when liberalized depreciation rules and the investment tax credit were instituted. Those modifications, together with the subsequent statutory rate reductions, give rise to the overall downward drift in *TK* over the last

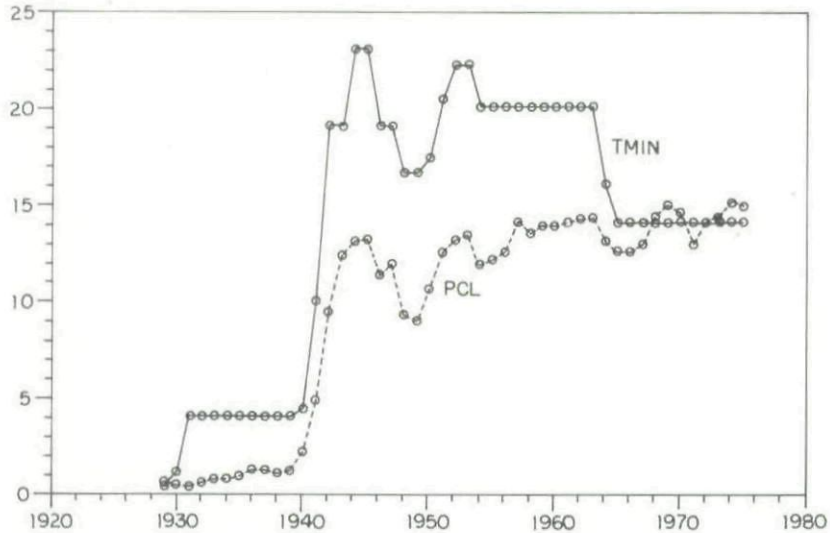

FIG. 8.—*PCL* and bottom-bracket federal personal income tax rate

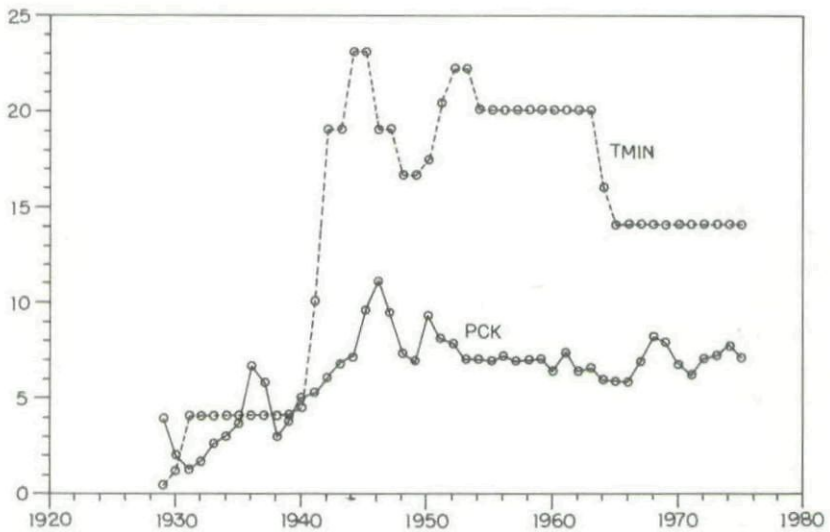

FIG. 9.—*PCK* and bottom-bracket federal personal income tax rate

25 years of the sample period. It thus appears that the Miller-Scholes hypothesis might be extended to include taxes other than the federal personal income tax.

In this connection, it is interesting to note that several recent studies have presented evidence that the corporate tax burden has decreased since the 1950s. Among these are Fama (1979), Holland and Myers

FIG. 10.—*TK* and top-bracket federal corporate income tax rate

(1980), and Gonedes (1981). Holland and Myers compute effective corporate tax rates, using data on actual tax payments. They take the effective tax rate to be the ratio of total federal, state, and local profits tax payments to net operating income, defined as the sum of interest payments and before-tax profits with capital consumption and inventory valuation adjustments. Holland and Myers compute effective tax rates for manufacturing corporations and for all nonfinancial corporations for the years 1947 through 1978. Both tax rate series peak in the early 1950s, decline until the late 1960s, and rise somewhat thereafter. However, they do not, in general, return to the levels of the 1950s.

Fama (1979) discusses a similar tax rate series for nonfinancial corporations, also computed using actual tax payments, for the period 1946 through 1977. He takes the effective tax rate to be the ratio of total federal, state, and local profits tax payments to net corporate cash flows, defined as the sum of monetary net interest payments, depreciation charges, and before-tax corporate profits. Gonedes computes an analogously defined tax rate series for all corporations.

The tax rates estimated by Fama and Gonedes are lower than those estimated by Holland and Myers since net operating income is less than net corporate cash flows. However, the year-to-year movements in these tax rates are quite similar to each other and to the year-to-year changes in the series *TK* reported above. Table 10 lists *TK*, the Fama and Gonedes series, the Holland and Myers series for nonfinancial corporations, and other tax rate series to be discussed shortly. As the table reveals, *TK* and the estimates of Holland and Myers and Fama all reach a postwar high in 1951, while the Gonedes series peaks in 1950.

TABLE 10 Alternative Measures of the Effective Tax Rate on Capital

Year	*TK* (1)	Holland and Myers (2)	Fama (3)	Gonedes (4)	Feldstein and Summers Corporate (5)	*PCK* (6)	Feldstein and Summers Noncorporate (7)	*MTRK* (8)	Feldstein and Summers Total (9)
1947	43.1	52.1	30.0	29.4	...	9.4	...	59.2	...
1948	39.2	44.2	29.2	27.5	...	7.2	...	52.9	...
1949	36.2	38.7	27.0	34.9	...	6.9	...	49.9	...
1950	46.0	55.4	34.6	41.7	...	9.2	...	62.0	...
1951	49.6	61.5	41.6	38.4	...	8.0	...	64.1	...
1952	45.8	56.5	37.7	37.6	...	7.7	...	60.2	...
1953	46.2	59.3	36.9	33.1	...	6.9	...	59.9	...
1954	41.4	51.7	31.7	33.5	51.6	6.9	11.9	54.9	63.5
1955	41.9	50.8	32.7	32.6	51.1	6.9	10.9	55.4	61.9
1956	42.5	53.2	31.6	31.5	54.8	7.1	13.5	56.5	68.4
1957	41.4	51.3	30.0	29.8	53.4	6.9	15.2	55.2	68.5
1958	40.2	49.4	27.3	30.9	50.6	6.9	16.3	54.0	67.0
1959	40.3	48.4	29.4	30.1	49.2	6.9	13.6	54.3	62.8
1960	41.3	46.9	27.9	29.7	47.7	6.3	15.1	54.9	62.8
1961	39.8	47.2	27.7	27.9	47.4	7.3	14.9	54.6	62.2
1962	37.7	41.7	26.0	28.4	42.4	6.4	14.7	51.5	57.1
1963	37.8	41.6	26.4	27.6	42.4	6.5	14.7	51.7	57.1
1964	36.4	38.7	25.2	26.7	39.1	5.9	14.2	49.8	53.3
1965	35.7	37.6	25.0	26.7	38.3	5.8	14.3	48.9	52.5
1966	35.5	37.5	25.0	25.5	38.7	5.8	15.2	48.4	53.9
1967	35.2	36.5	23.2	28.0	37.5	6.8	16.7	49.3	54.2
1968	38.0	40.9	25.6	27.2	42.7	8.1	18.0	53.6	60.8
1969	38.1	41.9	24.3	24.4	44.5	7.8	21.5	54.8	66.0
1970	37.9	39.8	20.7	24.1	42.5	6.7	25.4	51.6	67.8
1971	37.8	39.0	20.5	23.3	40.5	6.1	21.8	51.2	62.3
1972	36.0	36.8	20.0	23.7	38.0	7.0	20.0	51.4	58.0
1973	37.1	40.0	20.4	22.9	43.9	7.2	26.1	52.5	70.0
1974	37.6	47.9	19.5	21.1	56.0	7.6	38.7	53.4	94.9
1975	34.0	37.7	18.0	...	40.8	7.0	28.5	49.3	69.3
1976	...	40.0	20.2	...	42.5	...	22.4	...	64.9
1977	...	39.8	20.4	...	42.5	...	23.8	...	66.3

Following a sharp decline in 1954, the year accelerated depreciation was first permitted for tax purposes, *TK* and the Holland-Myers and Fama series exhibit a continued irregular decrease, reaching a trough in 1967 in the wake of the Kennedy tax cuts. From that point on, there is some discrepancy in the behavior of the various series. Both *TK* and the Holland-Myers series generally remain above the 1967 level throughout the remainder of their respective sample periods. The Fama series, on the other hand, exhibits only a temporary upturn coincident with the Vietnam surcharge of the late 1960s. By 1970, it is below its 1967 value and remains there throughout the rest of the sample period. The Gonedes series behaves in a similar manner. All of the series (except that of Gonedes, which ends in 1974) exhibit a sharp drop in 1975. Although this is the final year of the sample for *TK*, the subsequent behavior of the other series indicates that this drop was a temporary phenomenon. The extraordinary sharpness of the drop in the Holland-Myers series in 1975 is due in part to the fact that this series had reached a relatively high level of 47.9% in 1974. All of these series, however, remain throughout the 1970s at levels below those of the 1950s.

The fact that the Fama and Gonedes series remain at such low levels during the 1970s, even when compared with those of the late 1960s, may appear somewhat surprising. The decade of the 1970s was a time when inflation was high by historical standards, and inflation has the effect of creating illusory inventory profits and understating true economic depreciation. These two factors result in an overstatement of real corporate profits and thus raise the effective tax rate on the true income of corporations. On the other hand, inflation raises nominal interest rates and increases the real tax shield associated with a given amount of real interest payments by corporations. This is because corporations can deduct for tax purposes the inflation premium as well as the real component of nominal interest payments. Fama and Gonedes interpret their series as evidence that the increased tax shield on interest payments, along with liberalized depreciation rules and the investment tax credit, have more than offset the tendency of inflation to increase effective corporate tax rates.

This contention is not universally shared, however. Feldstein and Summers (1979) argue that any apparent decline in the rate of taxation of the income from corporate capital in the 1970s is illusory and that effective tax rates on such income have in fact risen markedly since the late 1960s. They argue that the income from corporate-held capital is taxed not only at the corporate level but also at the personal level and that personal taxation of such income has increased more than enough to offset any decreases in rates of taxation at the corporate level.

Feldstein and Summers report estimates of the effective corporate tax rate for the period 1954 through 1977 which are similar to the

estimates of Holland and Myers, Fama, and Gonedes. Like those estimates, the Feldstein-Summers series is computed from actual tax payments. Specifically, it is defined as the ratio of federal, state, and local corporate profits tax payments to a modified version of net operating income. The modification consists of deducting from net operating income as defined by Holland and Myers an amount equal to the inflation-induced reduction in the real value of certain nominal assets of the corporate sector. The nominal assets in question are liabilities of the government or of the corporations' customers. This series, shown in column 5 of table 10, behaves in a manner quite similar to the series reported in columns 1 through 4. In particular, it reaches a trough in 1967 and generally remains in the 1970s at levels below those prevailing before the Kennedy tax cuts. It exhibits a sharp drop in 1975, but, as with the Holland-Myers series, this drop is from the very high level reached in 1974. Since 1974 was a year of severe recession, and since both the Holland-Myers and Feldstein-Summers series use some modification of net rather than gross profits of the corporate sector in the denominator, both probably overstate the positive part of the effective corporate tax rate schedule for that year. Such an overstatement can occur for reasons outlined in Section VI above.[7]

Column 7 of table 10 shows the Feldstein-Summers estimates of the effective federal personal tax rate on the income of corporate-held capital. Unlike the effective tax rates discussed up to now, these estimates are not based primarily on actual tax payments. Instead, Feldstein and Summers attribute certain noncorporate tax rates to corporate income. These rates depend upon the form in which the income accrues to the noncorporate sector and upon who receives that income. The effective noncorporate tax rate on corporate income is just a weighted average of these various rates. For example, the weighted average tax rates on dividends and capital gains are taken to be 28.7% and 4.7%, respectively.

The numbers shown in column 7 are the Feldstein-Summers estimates of the total contribution of noncorporate taxes to the overall tax rate on the income of corporate capital. Unlike the effective corporate rate, this noncorporate rate increased markedly in the late 1960s and the 1970s. Its average level during the last 5 years of the sample was approximately twice the average during the first 5 years. Column 9 of table 10 shows the Feldstein-Summers estimates of the total effective tax rate on corporate income, which is the sum of the corporate and noncorporate contributions in columns 5 and 7. As can be seen from the table, the increase in the noncorporate contribution more than outweighs the decline in the corporate contribution, and by 1969 the overall tax rate had returned to the levels prevailing before the Ken-

7. See specifically n. 4 above.

nedy tax cuts. Of particular interest is the extreme value of 94.9% in 1974.

Table 10 also shows the overall capital income tax rate *MTRK* which incorporates the effects of personal as well as corporate taxes. As can be seen from the table, there is a discrepancy between the behavior of *MTRK* and that of the Feldstein-Summers combined tax rate series in column 9. In particular, after the 1964 tax cuts *MTRK* never returns to the levels it had reached during the 1950s. There are two readily apparent explanations for the discrepancy between *MTRK* and the Feldstein-Summers series. The first is that *MTRK* is an estimate of the average tax rate on all income from capital—from both corporate and noncorporate sources. If *MTRK* is regarded as a weighted average of the effective tax rates on the incomes of corporate and noncorporate capital, then it is quite possible that the tax rate on the income from corporate capital could increase over time even if the weighted average rate did not. This could occur if the tax rate on income from noncorporate capital decreased over time or if the share of corporate capital income in total capital income decreased over time (assuming income from corporate capital is taxed more heavily than income from noncorporate capital).

In fact, both these effects appear to have been at work. During the first 5 years for which both *MTRK* and the Feldstein-Summers series exist (1954–58), the Feldstein-Summers measure of the income of corporate capital averages 56.5% of total income from capital relevant for computing *MTRK*. During the last 5 years for which both series exist (1971–75), this share falls to 45.7%. Using such shares, one can calculate for each year the implied tax rate on that portion of national income accruing to noncorporate capital required to make *MTRK* and the Feldstein-Summers series mutually consistent. This implied tax rate averages 13.0% between 1954 and 1958 and only 5.1% between 1971 and 1974. It is curious that this implied tax rate could fall dramatically during the same period that the Feldstein-Summers noncorporate tax rate on the income of corporate capital roughly doubled. A decline in effective rates of taxation of income from residential capital might have contributed to such a result, but it is difficult to believe that this factor alone could have accounted for a drop in the taxation of noncorporate capital income of the magnitude required to make *MTRK* and the Feldstein-Summers series mutually consistent.

A second explanation of the discrepancy between *MTRK* and the Feldstein-Summers series is that the various noncorporate tax rates which Feldstein and Summers impute to the income of corporate capital may be higher than the effective rates faced by taxpayers. This could occur if taxpayers were able to use certain of the devices discussed by Miller and Scholes to shelter ordinary income from taxation. For example, Feldstein and Summers assume that dividends are taxed

at a weighted-average marginal rate of 28.7%. However, Miller and Scholes suggest mechanisms by which taxpayers can convert dividends into capital gains for tax purposes. According to Feldstein and Summers, the effective tax rate on capital gains is only 4.7%. If taxpayers are in fact successful in converting a substantial amount of ordinary income into capital gains for tax purposes, then actual tax payments would be lower than implied by the rates assumed by Feldstein and Summers. Consequently, effective tax rates computed from actual tax payments, like *MTRK*, would be lower than the rates assumed by Feldstein and Summers, who rule out by assumption any "clientele effects" operating to reduce effective rates of taxation at the noncorporate level.[8]

IX. Uses of Components of Tax Rates

As was discussed in Section IV, the overall tax rate on income from capital can be written as $MTRK = T + TK + PCK$, where T is treated as a proportional tax on all income, TK is a proportional tax striking only income from capital, and PCK is the contribution of the federal personal income tax to the overall tax rate. Empirically, T can be identified largely with sales taxes, while TK is composed entirely of property and corporate profits taxes. The overall tax rate on income from labor can be written as $MRTL = T + SSC + PCL$, where SSC and PCL are the contributions of the Social Security tax and the federal personal income tax, respectively, to the overall tax rate. The question arises as to what the uses of these components of the overall tax rates might be. Unfortunately, their use is probably largely descriptive, and extreme caution should be exercised in employing any of these components in statistical analysis.

To see why this is so, consider a hypothetical economy in which all capital is held by firms, in which all income of such firms is taxed at a constant rate τ_c, in which all of a firm's after-tax earnings are distributed to its shareholders and are taxed at a constant rate τ_p, and in which there is a flat-rate sales tax equal to τ_s. In such a world, the overall tax rate on income from capital is

$$\tau_k = 1 - (1 - \tau_c)(1 - \tau_p)(1 - \tau_s), \tag{5}$$

which can be rewritten as

$$\tau_k = \tau_c + (1 - \tau_c)\,\tau_p + (1 - \tau_c)(1 - \tau_p)\,\tau_s. \tag{6}$$

8. It is interesting to note that the evidence reported in Fama (1975) is consistent with the hypothesis that the marginal personal tax rate on interest income relevant for pricing U.S. Treasury bills is in fact zero. A zero tax rate for the marginal investors in Treasury bills does not imply that all individuals face marginal tax rates of zero on ordinary income, however. The weighted average of such tax rates would thus in general be positive, even if the rates were lower than those assumed by Feldstein and Summers.

The three terms on the right-hand side of equation (6) can be defined as the contributions of the corporate income tax, the personal income tax, and the sales tax, respectively, to the overall tax rate τ_k. One may think of these terms as theoretical analogues of *TK*, *PCK*, and *T*, respectively, although the empirically defined tax rate *T* incorporates some taxes other than the sales tax discussed here. Since the three individual tax rates enter equation (5) in identical fashion, the arrangement of terms on the right-hand side of equation (6) is arbitrary. For example, that equation could have been written to include a term equal to τ_p, and this term could have been defined as the contribution of the personal income tax to the overall tax rate τ_k. The effect of a multiplicity of taxes striking at different points in the income-expenditure cycle is thus to obscure the individual impact of each tax. Nevertheless, when the definitions embodied in equation (6) are used, it is obvious that the change in τ_k resulting from a change in any individual tax rate is equal to neither the change in the tax rate nor, except for τ_s, the change in its "contribution" to τ_k. It is also obvious that, except for τ_s, a change in an individual tax rate may induce changes in the contribution of the other tax rates, even though those rates remain constant. It was argued in Section VIII that this interaction of tax rates was largely responsible for the drop in the proportional tax rate *T* during World War II.

Since the contributions of the individual tax rates to the overall rate are defined in such an arbitrary manner, one should exercise extreme caution in employing them in statistical analysis. This applies both to the components of *MTRK* and to the components of *MTRL*.

Even if one were to identify empirical analogues to the individual tax rates τ_c, τ_p, and τ_s, however, it would still be impossible to identify the effect on most economic decisions of a change in any of these individual rates. This is because the effect of any one tax rate depends upon its interaction with all other rates.[9] If the interaction of the different rates is as in equation (5), and if overall tax rate τ_k is relevant for economic decisions (e.g., investment in physical capital), then empirical analysis should proceed by using only the empirical analogue for τ_k rather than any attempted measures of τ_c, τ_p, and τ_s. Similar considerations apply to the tax rate on income from labor.

X. Summary

This paper describes a method of calculating summary measures of effective factor income tax rates in the United States by using readily available data. The numbers resulting from application of this method

9. The effect of the interaction among different tax rates has been emphasized in a different context by Miller (1977) and Miller and Scholes (1978).

are reported, and some of their possible uses are discussed. The estimated factor income tax rates behave over time in a manner quite consistent with the behavior of other broad measures of federal tax policy. The postwar movement in the tax rate on income from labor relative to that on income from capital (or, more accurately, the relevant components of these tax rates) provides suggestive support for the Miller-Scholes hypothesis that the federal personal income tax has been moving in the direction of a pure consumption tax. The tax rates reported here are consistent with other studies that show a decrease since the 1950s in rates of taxation at the corporate level of income from corporate-held capital. They are also consistent with the view that rates of taxation of such income at the noncorporate level have risen but not quite sufficiently to offset the decline in the corporate tax burden.

Appendix A
Classification of Proportional Taxes

I. General taxes
  A. Federal
    1. Personal taxes
      Estate and gift taxes
    2. Indirect business taxes
  B. State and local
    1. Personal taxes
      Income taxes
      Death and gift taxes
      Motor vehicle licenses
      Other taxes
    2. Indirect business taxes
      Sales taxes
      Motor vehicle licenses
      Other taxes

II. Taxes specific to capital
  A. Federal
    1. Corporate profits taxes
  B. State and local
    1. Personal taxes
      Property taxes
    2. Corporate profits taxes
    3. Indirect business taxes
      Property taxes

General taxes are used in computing the proportional tax rate T, and taxes specific to capital are used in computing the proportional tax rate TK.

Appendix B
Classification of Income

I. National income accounts
  A. Labor income
    Compensation of employees
  B. Capital income
    Rental income of persons
    Corporate profits with inventory valuation and capital consumption adjustments
    Net Interest
  C. Miscellaneous income
    Business and professional
    Farm

II. Statistics of income
  A. Labor income
    Wages and salaries
  B. Capital income
    Dividends
    Interest
    Rents
    Royalties
    Estates and trusts
    Fiduciary
    Capital gains (in some calculations; see Section VI)
  C. Miscellaneous income
    Business and professional
    Partnership
    Farm
    Annuities
    Small business corporations
    Other

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