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The purpose of this paper is to explore the effect of capital gains on aggregate consumption. Capital gains have been an important source of income in the United States in recent years. During 1947-64, about $150 billion of realized gains were reported for tax purposes, but accrued gains (whether realized or not) have been much larger and amounted to about 20 per cent of personal income in some years.[1] Most time-series studies of the aggregate consumption function in the United States have relied on the official estimates of income and saving which do not include capital gains; consequently, capital gains have been generally ignored.[2] What is puzzling, however, is that in one or two instances where such gains were included (e.g., Arena 1963 and 1965), it was found that they had no significant influence on aggregate consumption or consumer spending. Conclusions like this are used to justify the present lenient taxation of capital gains in the United States, and no tax at all in many other countries because the capital gains tax would be paid largely out of savings, and a tax on savings is not conducive to economic growth.

The insignificance of capital gains discovered in earlier studies is explained by pointing out that capital gains accrue mainly to upper income groups, are mostly "transitory" in character, and are not treated as income because accrued gains may never be realized and spent if asset prices decline. These arguments, by and large, are inconclusive. Gains do not have to be realized to be spent; savings in other forms can be reduced, or one can borrow on the security of the appreciated value of one's asset holdings. Not all gains are "windfalls", but even if they were, there is some empirical evidence to show that marginal propensity to consume out of windfalls need not always be zero,[3] and the effect of transitory income on consumption depends on the source of income variation and may not be negligible in all cases.[4]

The burden of the present paper is that capital gains have not been studied in an appropriate theoretical model in the existing literature, nor have any direct estimates of gains been used in empirical estimation.[5] We incorporate capital gains into the permanent income framework and test several hypotheses about the effect of capital gains on aggregate consumption in the light of new, and in many ways, more consistent estimates of accrued capital gains derived by Bhatia (1969). To anticipate the conclusions of the paper, when an appropriate distributed lag function is specified, capital gains turn out to be a significant variable in the aggregate consumption function.

The theoretical structure for the paper is developed in Section I, Section II contains a description of capital gains during 1948-64, the time period covered by this study, the empirical estimates are presented in Section III, and Section IV deals with the policy implications of our results. For brevity, the term "gains" is used to denote both capital gains and losses.

II. Theoretical Considerations

Whenever wealth or consumer net worth is used to explain consumer behavior, capital gains, which reflect changes in the value of assets held by consumers, are implicitly included in the consumption function. Thus, in the "life-cycle" hypothesis of saving suggested by Modigliani and Brumberg where consumption is proportional to the present value of total resources that would accrue to an individual during the rest of his life, and in studies by Spiro (1962) and Ball and Drake (1964) in which households' net worth is used as an explanatory variable, capital gains are incorporated. In their tests of the "life-cycle" hypothesis for example, Ando and Modigliani (1963) fit the following equation:

$$(1) \quad C_t = \alpha_1 Y_t + \alpha_2 Y_t^e + \alpha_3 A_{t-1}$$

where C_t, Y_t, Y_t^e and A_{t-1} represent aggregate consumption, current non-property income, expected annual non-property income and net worth respectively. However, as Arena (1964) points out, in their computations, net worth for the period is based on the average price during the year; therefore, it includes part of the gains accruing in that year.

Arena (1963) postulates consumption as a function of the gap between desired target wealth (W_t^*) and potential target wealth, the latter consisting of initial wealth (A_{t-1}) and expected capital gains (G_t^e). Arena assumes that expected gains are a linear function of current period gains ($G_t^e = a_1 + a_2 G_t$), and derives a consumption function of the following form:

$$(2) \quad C_t = \beta_1 + B_2 Y_t + \beta_3 A_{t-1} + \beta_4 G_t$$

where Y_t is current disposable income, and capital gains now appear as an explicit variable in the function. Arena found that β_4 was insignificant, and β_3 and β_4 did not differ significantly.

It is not correct to conclude from these results that capital gains have no significant effect on consumption because only current period gains appear in equation (2). Given the nature of capital gains, it is likely that people would revise their estimates of wealth after gains have accrued for some time, and consumption would respond with a lag longer than one period.

These considerations can be easily incorporated into the analysis in terms of the permanent income framework which we shall adopt to formulate some hypotheses about the influence of capital gains on aggregate consumption.

The Model

Following the simplest version of the permanent income hypothesis, we postulate that consumption is a constant function of permanent income:

(3) $$C_t = kY^p_t + u_t .$$

$C_t - u_t$ can be interpreted as planned consumption. Although capital gains have been treated as a part of wealth in almost all the earlier studies in this area, many income theorists would treat capital gains like any other income and include them directly in a comprehensive income concept. Therefore, it is useful to distinguish between the "income" and the "wealth" approach to study the effect of capital gains on aggregate consumption. Within the framework of our model, the main difference between the two approaches would be in the specification of permanent income.

The Income Approach

If gains are included in income directly, permanent income is the sum of expected disposable income (Y^e_t) and expected capital gains (G^e_t). Equation (3) can then be rewritten as

(4) $$C_t = k_1 Y^e_t + k_2 G^e_t + u_t .$$

By assuming that G^e_t and Y^e_t are derived from the same distributed lag function of gains and disposable income respectively, we can use the Koyck transformation on equation (4) to derive (5) which is easier to estimate.[6]

(5) $$C_t = k_1(1-\lambda)Y^d_t + k_2(1-\lambda)G_t + \lambda C_{t-1} + u_t - \lambda u_{t-1} ,$$

where Y^d_t is disposable income. If capital gains affect consumption, their coefficient should be positive and significant. Furthermore, if capital gains are like other types of income, k_1 should equal k_2 in equation (5). This suggests our first two hypotheses:

(H1) k_1 is positive and significant, and

(H2) $k_1 = k_2$.

The Wealth Approach

If capital gains affect consumption via wealth, we can assume that permanent income depends on expected labour income (Y_t^w) and income from wealth (W_t),

$$(6) \qquad Y_t^P = Y_t^w + \beta W_t$$

where β is the "normal return" on wealth. We further assume that the current level of wealth depends on the wealth at the end of the previous period, and a lagged function of accrued capital gains,

$$(7) \qquad W_t = W_{t-1} + W(L)\, G_t$$

where W(L) is a lag-generating function.

Equation (7) implies that people do not feel richer or poorer with every movement in asset prices. However, some sort of an average of past accrued gains gets incorporated into their estimation of wealth and affects consumption. We can substitute $W_{t-2} + W(L)G_{t-1}$ for W_{t-1} in (7); W_t can thus be expressed in terms of distributed lag functions of past capital gains only. For example, if capital gains follow a geometric lag distribution, i.e., $W(L)G_t = \alpha_2 \Sigma \alpha_1^i G_{t-i}$, equation (7) can be rewritten as

$$(8) \qquad W_t = \alpha_2 \sum_{\tau=0}^{\infty} \alpha_1^{\tau} X_{t-\tau}$$

where $X_t = \sum_{i=0}^{\infty} G_{t-i}$, and in general,

$$(9) \qquad W_t = L(Z)X_t ,$$

where L(Z) is a lag-generating function. Substituting equation (9) into (6) and (6) into (3) we get:

(10) $C_t = kY_t^e + k\beta L(Z)X_t + u_t$.

As in the income approach, if we assume that expectations about income and gains are approximated by the same geometric lag function, we can apply the Koyck transformation to (10) and derive

(11) $C_t = \alpha C_{t-1} + k(1-\alpha)Y_t^s + (1-\alpha)k\beta X_t + u_t - \alpha u_{t-1}$,

where Y_t^s is labor income. Expected variables in equation (10) are thus replaced by observed variables. If our specification is valid, the coefficient of X_t in (10) should be positive and significant; the third hypothesis, therefore, is

(H3) $k\beta > 0$ and significant.

However, if $k\beta$ is found to be not significantly different from zero, or negative, we can conclude that capital gains have no significant influence on aggregate consumption.

The Role of Realized Gains

In a world of perfect capital markets and equal taxes on all types of income, a distinction between realized and accrued gains would be unnecessary. However, at present, borrowing on the security of some asset-types (e.g., corporate stock) is restricted; so some people might believe that a bird in hand is better than two in the bush and treat realized gains as more "real" income than accrued gains. Besides, accrued gains are taxed more lightly than realized gains; therefore, it is likely that the two types of gains might affect consumption differently. Tax considerations would lead to a smaller coefficient for realized gains, but other considerations might offset, and even reverse this tendency. Accordingly, we shall estimate equations (5) and

(11) for both realized and accrued gains in Section III.

In the next section we discuss various aspects of capital gains accruing during 1948-64, the period covered by this study. Empirical estimates of the various equations are presented in Section III.

II. Postwar Capital Gains

It is widely believed that capital gains are "windfall income" or "one-shot affairs", and accrue mostly to upper income groups mainly on corporate stock. Table 1 presents annual data on realized gains reported on individual income tax returns and gains accruing on four asset-types which are recognized as "capital assets" for purposes of income tax.[7] The estimates show that during 1948-64 accrued net capital gains on corporate stock, real estate and livestock owned by individuals amounted to $682.46 billion which implies that gains accrued at an average rate of about $40 billion a year. Corporate stock accounted for more than 60 per cent of all accrued gains during this period but in many years, especially before 1955, gains and losses on real estate (columns 2 and 3 in Table 1) exceeded those on corporate stock. Realized gains amounted to $146.77 which is much smaller than accrued gains. It is difficult, however, to estimate precisely what proportion of gains accruing during these years was actually realized.[8]

To get an idea of relative magnitudes, personal income and personal saving estimated in the U.S. National Accounts is also reported in Table 1. It is clear that realized gains have rarely amounted to 3 or 4 per cent of personal income but in many years, accrued gains have been as much as 25 per cent of personal income. For the entire period, realized gains are about 47 per cent of personal saving but accrued gains are much larger and amount to more than twice the official estimate of personal saving.

TABLE 1

ACCRUED AND REALIZED CAPITAL GAINS, 1948-64

(billion dollars)

	Corporate Stock (1)	Nonfarm Residential Real Estate (2)	Farm Real Estate (3)	Live-Stock (4)	Total Accrued Gains (5)	Total Realized Gains (6)	Reported Personal Income (7)	Reported Personal Saving (8)
1948	- 0.65	11.89	3.11	1.2	15.55	4.20	210.2	13.4
1949	10.19	-12.41	-0.81	-1.7	- 4.73	3.01	207.2	9.4
1950	23.44	15.95	6.59	3.6	49.58	5.81	227.6	13.1
1951	16.07	16.80	8.34	1.4	42.61	6.02	255.6	17.3
1952	10.47	16.88	2.43	-5.3	24.48	4.86	272.5	18.1
1953	- 1.62	- 4.02	-1.41	-3.0	-10.05	4.00	288.2	18.3
1954	57.18	5.35	2.15	-0.8	63.88	6.66	290.1	16.4
1955	52.37	15.98	4.55	-0.6	72.30	9.33	310.9	15.8
1956	6.34	29.36	7.29	0.7	43.69	8.97	333.0	20.6
1957	-34.65	4.90	7.33	3.1	-19.32	6.93	351.1	20.7
1958	91.89	2.43	7.85	3.2	105.37	8.58	361.2	22.3
1959	35.05	15.63	5.77	-2.9	53.55	12.33	383.5	19.1
1960	-14.40	17.51	3.61	0.3	7.02	10.38	401.0	17.0
1961	81.38	18.70	4.92	0.4	105.40	16.12	416.8	21.2
1962	-52.95	- 6.75	6.34	0.3	-53.06	11.01	442.6	21.6
1963	73.91	7.85	8.75	-1.9	88.61	12.85	465.5	19.9
1964	59.07	30.42	9.29	-1.2	97.58	15.71	497.5	26.2
	413.09	186.47	86.10	-3.2	682.46	146.77		310.4

Source: Cols. 1 - 4: See Bhatia (1970).
Col. 5: Sum of cols. 1 - 4.
Col. 6: Derived from The Statistics of Income, Individual Income Tax Returns, various years.
Cols. 7 - 8: Economic Report of the President, January 1969, Table B-15, p. 244.

TABLE 2

REALIZED CAPITAL GAINS AS PER CENT OF REALIZED INCOME[a]

Income Bracket (000) \ Year	1950	1955	1960	1964
Below 25	3.2	2.9	2.0	1.9
25-50	9.1	12.6	8.8	10.5
50-100	13.4	19.9	17.1	17.9
100 and above	37.9	49.1	54.2	49.1

[a]Based on data reported in U.S. Internal Revenue Service, The Statistics of Income, Individual Income Tax Returns, various years. Realized income is derived by including all realized gains in adjusted gross income.

Income Distribution of Capital Gains

Tables 2 and 3 present some data on the income distribution of realized gains for a few years. It is apparent from Table 2 that the upper income groups realize large portions of their income in capital gains. However, Table 3 shows that individuals with incomes below $25,000 account for more than 40 per cent of all gains realized in a given year. This is due to the relatively large number of individuals in this income category.

TABLE 3

PER CENT OF ALL CAPITAL GAINS REALIZED BY VARIOUS INCOME BRACKETS[a]

Income Bracket (000) \ Year	1950	1955	1960	1964
Under 25	50.4	47.6	47.6	41.2
25-50	12.4	15.0	13.0	16.0
50-100	10.5	12.2	12.0	13.1
100 and above	26.7	24.9	27.4	29.7

[a]Based on data reported in Statistics of Income, Individual Income Tax Returns, various years.

Similar statistics cannot be presented for accrued gains because not much is known about their income distribution. However, for the few years for which attempts have been made to estimate their income distribution, the results suggest that the top 5 per cent of income recipients account for about 50 per cent of all accrued gains, and less than 20 per cent of all gains accrue to the lowest three income quintiles.[9]

Are Capital Gains "Transitory" Income? Transitory income is defined to include income due to all factors "...that are likely to be treated by the unit affected as 'accidental' or 'chance' occurrences, though they may, from another point of view, be the predictable effect of specifiable forces... In statistical data, the transitory component includes also chance errors of measurement."[10] In terms of this definition, it is very difficult to decide whether capital gains are transitory income because the data do not give us much information on how individuals treat such gains. Some light on the matter, however, could be shed by statistics on the duration of asset holdings, i.e., the time period for which an asset is held before gains are realized.

In 1962--the only year for which such data are available--about 5 per cent of gross gain on corporate stock was realized on stock held for less than six months, about 6 per cent on that held between six months and a year, and about 20 per cent on corporate stock held for five-to-ten years. The number of long-term transactions was more than twice that of short-term transactions.[11] Real estate assets owned for a year or more accounted for approximately 75 per cent of gross gain realized on such assets in 1962, and about 50 per cent of the gain was realized on real estate held for ten years or more. It is clear that a sizable amount of the gains realized in 1962 had accrued over several past years. Since the observation relates to only one year which also happened to be an abnormal year, at least for corporate stock, no definite conclusions can be derived from it about the nature of capital gains. The evidence, however, does question the putative notion that all capital gains are transitory or windfall.

To summarize the discussion in this section, during 1948-64 accrued capital gains have been quite large relative to personal income and saving, realized gains have been much smaller than accruals, and might not always be transitory or windfall income. Although corporate stock accounts for the bulk of capital gains, accrued gains on other assets have not been negligible.

III. Empirical Verification and Estimation

In this section we present empirical estimates of the model outlined in Section I. The period of observation is 1948 through 1964. Consumption, C_t, defined as personal expenditures on non-durable goods and services, plus depreciation on consumer durable goods, labor income net of taxes, Y_t^s, personal disposable income, Y_t^d, accrued gains, G_t, and realized gains, G_t^r, are all measured in billions of current dollars.[12]

The Measurement of Expected Variables

Equations (4) and (10) derived in Section I have several variables which cannot be directly observed. The income approach uses expected disposable income, Y_t^e, the wealth approach relies on Y_t^w - expected non-property income, and expected capital gains appear everywhere. Several hypotheses have been suggested in the literature about the formation of income expectations. Following Friedman (1957), most studies of the permanent income have relied on the distributed lag approach, which implies that expected income is an exponentially weighted average of past incomes. Mincer (1960) defined Y_t^w as full employment labor income, and Ando and Modigliani (1963) defined average expected income as current income adjusted for a possible scale factor--the scale factor being substantially smaller for those currently unemployed than that for the fully employed.[13] The only precedent for expected capital gains is Arena (1963) who defined expected gains simply as a linear function of current period gains.

We shall adopt the distributed lag approach for expected gains because, given the nature of capital gains, their effect on consumption is likely to be spread over more than one year. The various hypotheses about income expectations are theoretically plausible, but they all require arbitrary decisions on many points: for example, the weights in the distributed lag approach, or the definition and measurement of full employment labour income, etc. However, if we adopt the distributed lag approach for income also, the estimation becomes somewhat less complicated as illustrated by equations (5) and (11), and for this reason we shall assume that expectations about income and gains are based on past experience. For the results reported in Table 4, we assume that all expected variables follow the same distributed lag function, but this restriction is relaxed later on.

Regression Results

Estimates for equations (5) and (11), for both accrued and realized gains, are presented in Table 4.[14]

All the coefficients have the expected signs (positive). In the income approach (equation 5), the income coefficient is highly significant but that of accrued gains is very small and insignificant. In the wealth approach (equation 11), the income variable is significant at 95, and expected gains at 90 per cent level of significance; the coefficient of gains, however, is much smaller than the income coefficient. We, therefore, reject H(1) and H(2), and accept H(3); given the validity of our model, accrued capital gains do not affect consumption via income, but only through their effect on wealth.[15]

Although accrued gains are not very significant, realized gains tell a

TABLE 4

ESTIMATES OF THE COEFFICIENTS OF THE CONSUMPTION FUNCTION

Coefficients and (t-values)[a]

Equation Number	Accrued Gains					Realized Gains				
	C_{t-1} α	Y^d_t $k_1(1-\alpha)$	G_t $k_2(1-\alpha)$	Y^W_t $k(1-\alpha)$	X_t $k\beta(1-\alpha)$	C_{t-1} α	Y^d_t $k_1(1-\alpha)$	G_t $k_2(1-\alpha)$	Y^W_t $k(1-\alpha)$	X_t $k\beta(1-\alpha)$
(5)	0.440 (5.63)	0.460 (7.66)	0.002 (0.24)	-	-	0.453 (6.42)	0.501 (8.46)	0.280 (1.42)	-	-
(11)	0.430 (5.86)		-	0.461 (8.41)	0.004 (1.46)	0.467 (6.10)	-	-	0.560 (6.88)	0.052 (2.26)

[a]The t-value for each coefficient is enclosed in parentheses. Expected income and expected gains follow the same geometric lag function. Where no estimate is shown, the variable is excluded from the equation.

different story: in the income approach, the coefficient of realized gains is smaller than the income coefficient but significant at the 90 per cent level. In the wealth approach, realized gains are significant at the 95 per cent level; the coefficient of realized gains is larger than that of accrued gains, though it is still much smaller than the coefficient of expected income.

It must be pointed out that the above conclusions hold only if expectations about income and gains are formed according to the same geometric lag function on which equations (5) and (11) are based. Thus, in rejecting H(1), we could be rejecting the assumption about the implicit lag function rather than the importance of capital gains in the aggregate consumption function. In order to isolate these two tests, we let income and gains follow different distributed lag functions for the results reported in Table 5. Specifically, let

$$Y_t^e = (1-\alpha) \sum_{i=0}^{\infty} \alpha^i Y_{t-i}^d, \quad \text{and}$$

$$G_t^e = (1-\lambda) \sum_{i=0}^{\infty} \lambda^i G_{t-i} .$$ [16]

Once again, accrued gains are not significant in the income approach, but the coefficient of realized gains is greater than zero at the 95 per cent level of significance. In the wealth approach, both realized and accrued gains are highly significant. The most important figure reported in Table 5, however, is the Durbin-Watson statistic which falls considerably short of 2 in all cases, indicating a marked positive serial correlation in the residuals of equations (4) and (10). Consequently, although the coefficients would be unbiased, their reliability is in serious doubt. The serial correlation, therefore, should be corrected before interpreting these results.

In Table 6, we report estimates of equations (4) and (10) derived by using the Cochrane-Orcutt procedure.[17] The Durbin-Watson statistic for

Table 5

ESTIMATES OF THE COEFFICIENTS OF THE CONSUMPTION FUNCTION

Coefficients and (t-values)[a]

Equation Number	Accrued Gains							Realized Gains						
	Const.	Y^e_t	G^e_t	Y^w_t	X_t	R^2	D.W.	Const.	Y^e_t	G^e_t	Y^w_t	X_t	R^2	D.W.
(4)	-7.62 (-3.20)	0.962 (123.0)	-0.007 (-0.72)	–	–	0.999	0.95	0.211 (0.02)	0.897 (17.31)	1.171 (1.15)	–	–	0.999	0.86
(4)	–	0.953 (356.9)	-0.007 (-0.48)	–	–	0.999	0.61	–	0.899 (102.0)	1.159 (3.78)	–	–	0.999	0.83
(10)	84.582 (6.30)	–	–	0.559 (7.89)	0.175 (8.08)	0.999	1.30	41.96 (2.48)	–	–	0.812 (8.33)	0.447 (3.58)	0.999	0.82
(10)	–	–	–	1.037 (140.6)	0.036 (5.84)	0.999	0.81	–	–	–	1.031 (128.18)	0.157 (6.01)	0.999	0.89

[a] t-values are enclosed in parentheses. Expected income and gains follow different geometric lag functions (see text). Effective number of observations in each case is 13.

Table 6

ESTIMATES OF THE COEFFICIENTS OF THE CONSUMPTION FUNCTION

(Cochrane-Orcutt Estimates)

Coefficients and (t-values)[a]

Equation Number	Accrued Gains							Realized Gains						
	Const.	Y^e_t	G^e_t	Y^w_t	X_t	R^2	D.W.	Const.	Y^e_t	G^e_t	Y^w_t	X_t	R^2	D.W.
(4)	-10.96 (-3.52)	0.971 (102.07)	-0.004 (-0.72)	—	—	0.999	0.74	-6.038 (-0.855)	0.931 (22.25)	0.599 (.076)	—	—	0.999	0.88
(4)	—	0.953 (228.53)	-0.005 (-0.67)	—	—	0.999	0.64	—	0.899 (101.94)	1.16 (3.77)	—	—	0.999	0.83
(10)	79.077 (13.79)	—	—	0.584 (8.36)	0.169 (7.86)	0.999	1.73	21.378 (-0.931)	—	—	1.152 (9.12)	0.055 (0.36)	0.999	1.76
(10)	—	—	—	1.02 (147.81)	0.048 (8.86)	0.999	1.70	—	—	—	1.019 (114.66)	0.189 (6.89)	0.999	1.23

[a] t-values are in parentheses. Effective number of observations in each case is 12.

equation (4) is still very low, but that for (10) is much improved. The results presented in Table 5 change but little: the R^2 remains extremely high, and the coefficients have roughly the same magnitudes and t-values as before. In the income approach, accrued gains have negative coefficients but these are never significantly different from zero. Realized gains are significant, but when disturbance terms are positively autocorrelated, the standard errors of regression coefficients could be underestimated and the t-values overstated.[18] The significance of realized gains in equation (4), therefore, might be spurious. However, after the serial correlation in the residuals of equation (10) is adjusted for, the coefficients and their standard errors change only slightly. Since the basic data for both the income and wealth approaches are the same, it is likely that the sampling variances of the regression coefficients of (4) are not grossly understated, in which case realized gains would be significant in the income approach. Further, in comparing the coefficients of Y_t^e and G_t^e in equation (4), we cannot reject the hypothesis that the coefficient of expected gains is equal to that of expected income.[19]

The results are much sharper in the wealth approach: both accrued and realized gains are highly significant in equation (10). In three out of the four estimates presented in Table 6, the Durbin-Watson statistic is 1.7 or larger which suggests that the disturbance terms are now serially independent. The coefficient of gains is smaller than that of income in all cases, but realized gains have a larger coefficient than accrued gains.[20]

IV. Economic Implications

The findings reported above have important implications for taxation and other areas of economic analysis and policy. At present, capital gains enjoy special tax treatment: gains are taxed on realization, the tax rates are lower than those on other forms of income and accrued gains on assets transferred by bequest escape taxation altogether. This policy is supported, inter alia, by the argument that gains do not significantly affect consumption; therefore, the capital gains tax is paid largely out of savings.[21] Our analysis shows that capital gains, both realized and accrued, affect consumption significantly. Besides, in all likelihood, people treat realized gains like any other income. The present taxation of capital gains has been strongly criticized for its inequity and economic effects.[22] The results presented above question one of the strongest economic arguments in favor of continuing this tax policy.

It is often suggested that either gains should be taxed on accrual or realized gains should be taxed more heavily. If accrued gains are taxed, other things being equal, smaller amounts of gains would be realized. An increase in the rate of tax on realized gains, without a tax on accruals, would also discourage realization of gains, but accrued gains would tend to increase. The coefficient of realized gains is larger than that of accrued gains in most cases. Therefore, it is likely that these two policies would have different effects on consumption. Moreover, the coefficient of realized gains is not much different from that of expected income in equation (4); thus, an increase in capital gains tax or the personal income tax would reduce consumption by roughly the same magnitude. This has a clear bearing on stabilization policy.[23]

Our formulation of the consumption function is very similar to that used by Ando and Modigliani:

$$(1) \qquad C_t = \alpha_1 Y_t + \alpha_2 Y_t^e + \alpha_3 A_{t-1} .$$

They test the hypothesis that expected non-property income is the same as actual current income, except for a possible scale factor, i.e.,

$$Y_t^e = \beta' Y_t \; ; \quad \beta' \simeq 1 .$$

Alternatively, if $\alpha_1 \simeq \alpha_2$, we can combine Y_t and Y_t^e. Using the former result, equation (1) can be rewritten as follows:

(12) $$C_t = (\frac{1}{\beta'} + \alpha_2)\ Y_t^e + \alpha_3\ A_{t-1}$$

Recall that A_{t-1} is based on the average price during the year. We can, therefore, isolate the capital gains implicit in A_{t-1} by evaluating net worth at prices prevailing at the beginning of the period.

(13) $$A_{t-1} = W_{t-1} + \gamma' G_t\ ,$$

where W_{t-1} is net worth computed from asset prices at the beginning of the year, and γ' represents the fraction of current period gains concealed in A_{t-1}. Substituting equation (13) into (12), we get:

(14) $$C_t = \delta_1 Y_t^e + \delta_2\ W_{t-1} + \delta_3 G_t$$

where $\delta_1 = \frac{1}{\beta'} + \alpha_2$, $\delta_2 = \alpha_3$, and $\delta_3 = \alpha_3 \gamma'$.

Using equations (7) and (6), we can rewrite (3) as:

(3*) $$C_t = kY_t^W + k\beta\ W_{t-1} + k\beta W(L) G_t .$$

Apart from the restrictions on parameters, and the use of G_t instead of $W(L)G_t$, equation (14) is of the same form as (3*). It is well known that a consumption function of this type can explain both the long-run stability and the cyclical variability of the saving-income ratio observed in empirical studies of the U.S. economy.[24] However, as suggested elsewhere, if capital gains are included in personal income, unrealized gains have to be included in personal saving. The resulting saving-income ratio shows much greater cyclical variation than that recorded in national income statistics.[25] The main purpose of this paper has been to analyze the effect of capital gains on aggregate consumption; the behavior of the saving-income ratio _per se_, does not concern us here, but the results derived above would be useful in explaining changes in the saving-income ratio.

Concluding Remarks

Accrued gains on corporate stock and other asset-types have been an important source of personal income in the United States in recent years, but gains are not included in the national accounts. It is commonly believed that capital gains do not affect consumption although most studies of aggregate consumption, relying on national income data, have not fully analzed the effects of gains on consumption. In this paper, capital gains are incorporated into the permanent income framework, and several hypotheses about the effects of gains on aggregate consumption are tested. Our results suggest that capital gains are a significant variable in the aggregate consumption function. Realized gains are likely to be treated as income from any other source, but there is stronger evidence that gains would be included in wealth in the first instance. These findings have many implications for alternative schemes of taxing capital gains and stabilization policy. The results would also be useful in analyzing the empirical behavior of the saving-income ratio.

FOOTNOTES

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1. Accrued gains represent the true change in the economic position of individuals and would be included in a comprehensive income concept like those proposed by Haig (1921), Hicks (1946), and Simons (1938).

2. The inclusion of capital gains in national income has been a debatable topic for a long time. For a discussion of the controversy, see Bhatia (1970) and McElroy (1970).

3. Bodkin (1959) concludes that "the true (population) value of the marginal propensity to consume out of windfall income is, in all likelihood, quite high." Also see the references cited there, especially Klein and Liviatan (1957).

4. Mincer (1960) shows that transitory income caused by short-run changes in employment significantly affects consumption.

5. Arena (1965) is an exception, but only stock market gains are used in that study.

6. The lag function implicit in going from (4) to (5) is:

$$Y_t^e = (1-\lambda) \sum_i \lambda^i Y_{t-i}^d$$

7. Throughout this paper we shall follow the definitions used in the Internal Revenue Code. Thus, we define capital gains as nominal gains without any adjustment for changes in the general price level. Although many assets are treated as "capital assets" for tax purposes, the four asset categories on which data are presented in Table 1 account for most of the gains accruing to the household sector. It is difficult to make comparable estimates of accrued gains for other types of assets due to inadequate data.

8. There are many reasons for this statement. Ignoring the problem of under-reporting of realized gains, the estimates of accrued gains most likely provide a lower bound because all asset categories could not be covered. Besides, some of the gains realized during 1948-64 could have accrued before 1948.

9. Cf. McElroy (1970), Chapter V. Unfortunately there are no basic data on the income distribution of accrued gains and losses. These results are derived by piecing together information from several indirect sources and may not be very accurate. Also, the concepts used by McElroy are somewhat different from those in this paper.

10. Friedman (1957), p. 22.

11. In income-tax parlance, short-term transactions denote a sale within six months of the purchase, i.e., a holding period of less than six months. All other transactions are long-term.

12. I would like to thank George Craig, Northern Illinois University, for providing me with data on C_t, and Y_t^w. These data can be found in his Ph.D. thesis (1968) and have been obtained by procedures described in Ando and Brown, (1963, Data App.). Data on Y_t^d, G_t and G_t^r are from Bhatia (1969).

13. Cf. Ando and Modigliani (1963).

14. In deriving these results we have proceeded on the assumption, also utilized by Nerlove (1958), and Zellner, Huang and Chau (1965) that the error terms in equations (5) and (11) are non-autocorrelated. A more general specification is presented later. Both the equations were first estimated with a constant term, but the constant was not significantly different from zero and was dropped. The equations were reestimated as reported.

15. This is the expected result if capital gains are treated as "transitory income" so that they are added to wealth in the first instance. See, for example, Landsberger (1970).

16. We have retained the geometric lag form for ease of computations. Gains and income now have different variables of "adjustment"--λ and α respectively. Y_t^e and G_t^e are weighted moving averages of past incomes and gains respectively--weights adding up to unity in each case. This is similar to the formulation used by Friedman (1957).

The computations were done by an iterative program, SCAN, written by the author. The procedure involves varying α and λ over a predetermined range, calculating Y_t^c and G_t^e, estimating equation (4), and selecting those values of the regression coefficients for which the residual sum of squares is minimized. This process is repeated for equation (10). If the model is correctly specified and the search procedure adequate, these estimates would be maximum likelihood estimates. Cf. Griliches (1967).

For the results reported in Table 5, we used $\alpha = (1-B+A)$, where B is the initial period weight, and A a trend variable (equal to 0.3). For details of this procedure, see Wright (1969). α and λ were allowed to vary from 0.1 to 0.99. Because of the small number of observations, we computed only 5 yearly moving averages. The weights added to unity in all cases.

17. The procedure uses an ordinary least square regression to form an initial guess of ρ, the first order serial coefficient. All data are transformed by ρ(e.g.: $X_t - \rho X_{t-1}$), regression is run on transformed data, a new ρ is estimated and the process continues.

Cf. Cochrane and Orcutt (1949).

18. See, for example, Johnston (1963), Ch. VII.

19. The t-value for the null-hypothesis that the two coefficients are equal is very small. The magnitude of the gains' coefficient might raise some questions, but it is not significantly different from unity.

20. Since the constant term is insignificant when realized gains are used, the regression has been forced through the origin. It is this equation which should be compared with the results reported for accrued gains.

21. Cf. Wallich (1965), pp. 140-41.

22. See, for example, David (1968), Chs. I, V, and X.

23. The model as stated, however, cannot be used to compare the relative stabilizing influence of the personal income tax and the capital gains tax. Suppose, gains are taxed more heavily; corporate retained earnings, which are the main source of stock market gains, would be reduced, but dividends, and hence disposable income (excluding capital gains) would increase. The effect on consumption, therefore, is ambiguous.

24. Cf. Ando and Modigliani (1963), pp. 76-79 and the references cited there.

25. Cf. Bhatia (1970).

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