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Kul B. Bhatia

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THE ESTIMATION OF ACCRUED CAPITAL  
GAINS ON CORPORATE STOCK

by

Kul B. Bhatia

April, 1970

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The Estimation of Accrued Capital  
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Kul B. Bhatia\*

Corporate stock has been the most important source of capital gains for individuals in the United States in recent years. In 1959 and 1962, the only two years for which data on realized capital gains by asset class are available, individuals realized more capital gains on corporate stock than on any other asset. The distinction between realized and unrealized gains is crucial for income tax but for all intents and purposes, accrued gains (whether realized or not) represent the true change in the economic position of an individual. Market value of corporate stock held by the household sector has increased from \$100.3 billion in 1947 to \$727.5 billion in 1967 and accrued capital gains have contributed the bulk of this increase in value.<sup>1</sup>

At first glance, the problem of estimating accrued gains appears to be rather simple. Thanks to the active stock markets and regulatory agencies like the Securities and Exchange Commission, many data series on market value, stock prices etc. are available. Several estimates of capital gains accruing on corporate stock have been made in recent years but the various studies differ in scope, methodology and data sources used.<sup>2</sup> Market value of corporate stock outstanding estimated by various government agencies differs by more

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\*Assistant Professor, University of Western Ontario. This paper was completed during the author's term as a Brookings Research Fellow. The views expressed here, however, do not necessarily represent the views of the trustees, officers or staff-members of the Brookings Institution. Helpful comments by Arnold C. Harberger, Larry A. Sjaastad and Robert J. Gordon on an earlier version of this paper are gratefully acknowledged.

than \$50 billion in some years and it is not surprising that the estimates of capital gains also diverge considerably. In 1960 for example, the accrued loss indicated by Bailey's study exceeds the amount computed from Flow-of-Funds (F-of-F) data by more than three times while McClung's data show an accrued capital gain.

Most researchers in this area are content to note that accrued gains have been much larger than realized gains; the pros and cons of alternative methods of estimation are not discussed nor is any attempt made to reconcile the divergent estimates of accrued gains and losses. This paper deals with some of the theoretical and empirical problems which arise in estimating accrued gains on corporate stock and presents an analytical framework for deriving consistent estimates of capital gains. The method is adapted from a more general model proposed elsewhere<sup>3</sup> and is used to estimate capital gains accruing on corporate stock held by individuals in the United States during 1947-64.

The basic model used here is presented in section II where the alternative approaches suggested in the literature are also examined. Section III discusses some of the problems involved in estimating the inputs of the model; the actual estimates are presented in section IV and some of the assumptions used in deriving these estimates are relaxed in section V to test the sensitivity of our results. The results are summarized in section VI where some economic implications of these estimates are also discussed. The model treats gains and losses symmetrically and the term "gains" is used to refer to both capital gains and losses.

II

The Basic Model

Let  $V_t$  = market value of all corporate stock outstanding at the end of year  $t$ ,

$O_t$  = market value of stock owned by institutions at the end of year  $t$ ,

$a_{ti}$  = net acquisitions by individuals during  $i^{\text{th}}$  quarter of year  $t$ ,

$g_{ti}$  = capital gains accruing during  $i^{\text{th}}$  quarter of year  $t$ ,

$P_{ti}$  = the stock price index at the end of  $i^{\text{th}}$  quarter of year  $t$

$A_t$  = net acquisitions of corporate stock by individuals during year  $t$ ,

$G_t$  = capital gains accruing on individuals' holdings during year  $t$ ,

$H_t$  = the market value of corporate stock held by individuals,

$$= V_t - O_t.$$

As a first approximation

$$G_t = H_t - H_{t-1} - A_t \quad (1)$$

But net acquisitions and the stock-price index can be incorporated more directly to derive quarterly gains. Let us define the market value of corporate stock held by individuals at the end of  $i^{\text{th}}$  quarter of year  $t$  as follows:

$$H_{ti} = H_{t,i-1} + a_{ti} + g_{ti} \quad (2)$$

Issues and retirements of corporate stock are taking place all the time.

Assuming a rectangular distribution for  $a_{ti}$ ,<sup>4</sup> capital gains accruing in the  $i^{\text{th}}$  quarter of year  $t$  can be estimated by the equation

$$g_{ti} = (H_{tj} + 0.5 a_{ti}) \left( \frac{P_{ti}}{P_{tj}} - 1 \right) \quad (3)$$

where  $j = i-1$

$$G_t = \sum_{i=1}^4 g_{ti} \text{ and}$$

$$A_t = \sum_{i=1}^4 a_{ti}$$

$$\hat{H}_t = H_{t-1} + G_t + A_t \quad (4)$$

The model thus simply allocates the change in the market value of individuals' holdings of corporate stock during a year to its two components: price appreciation and net acquisitions. Equation (4) also provides a check on the results to be obtained by this model because if we estimate  $G_t$  and  $A_t$  correctly,  $\hat{H}_t$  should equal  $H_t$  and equation (4) would be the same as equation (1). In other words, if  $P_t$  and  $A_t$  measure stock-price changes and net acquisitions accurately, equations (1) and (3) will yield the same result and the value of holdings at the beginning of the period together with net acquisitions and capital gains during the period will equal the market value of holdings of corporate stock at the end of that period. But if  $A_t$  underestimates net acquisitions and equation (1) is used,  $G_t$  will overestimate the true accrued gains. Similarly, if capital gains are estimated directly from  $H_t$  and  $P_t$  as some of the existing studies suggest, and  $P_t$  does not measure changes in stock prices correctly, equation (4) will not be satisfied.

#### Comparison with Other Models

Bailey's Model.-Bailey estimates capital gains on all corporate stock outstanding.

$$G_t = V_{t-1} \left( \frac{P_t}{P_{t-1}} - 1 \right) \quad (5)$$

But  $V_t$  can be estimated by adjusting  $V_{t-1}$  for price changes and net additions to all corporate stock outstanding ( $N_t$ ).

$$V_t = V_{t-1} \left( \frac{P_t}{P_{t-1}} \right) + N_t \quad (6)$$

so that

$$G_t = V_t - V_{t-1} - N_t \quad (7)$$

If  $V_t$  is derived by equation (6) both equations (5) and (7) will yield the same estimate of accrued capital gains. But  $V_t$  can be estimated in many different ways. In Bailey's study for instance,  $V_t$  is estimated by blowing up the value of corporate stock listed on the NYSE.<sup>5</sup> In such cases it is necessary to incorporate some test like equation (4) into the model to check the accuracy of the results. Two alternative tests are possible. If equation (5) is used to compute capital gains,  $G_t$  estimated by (5) can be substituted into equation (7) to derive an estimate of net additions to corporate stock outstanding ( $\hat{N}_t$ )

$$\hat{N}_t = V_t - V_{t-1} - G_t \quad (8)$$

$\hat{N}_t$  can be compared with some independently derived estimates of net additions to corporate stock. Alternatively, if capital gains are calculated from equation (7) the price index implied by equation (5) can be compared with some other index of stock prices. Since Bailey uses equation (5) to estimate capital gains, we apply the first test.  $\hat{N}_t$  computed from equation

(8) is compared with  $N_t$  estimated by the Securities and Exchange Commission (SEC) in Figure 1. It is obvious that there are big differences between the two series.<sup>6</sup>

If the holdings of non-individuals are excluded from  $V_t$  and  $N_t$ , Bailey's method can be used to estimate capital gains accruing to individuals who are the main interest of this paper. But in Martin David's study [5] where Bailey's approach has been applied to estimate capital gains of the household sector, the problem illustrated in Figure 1 becomes more acute.

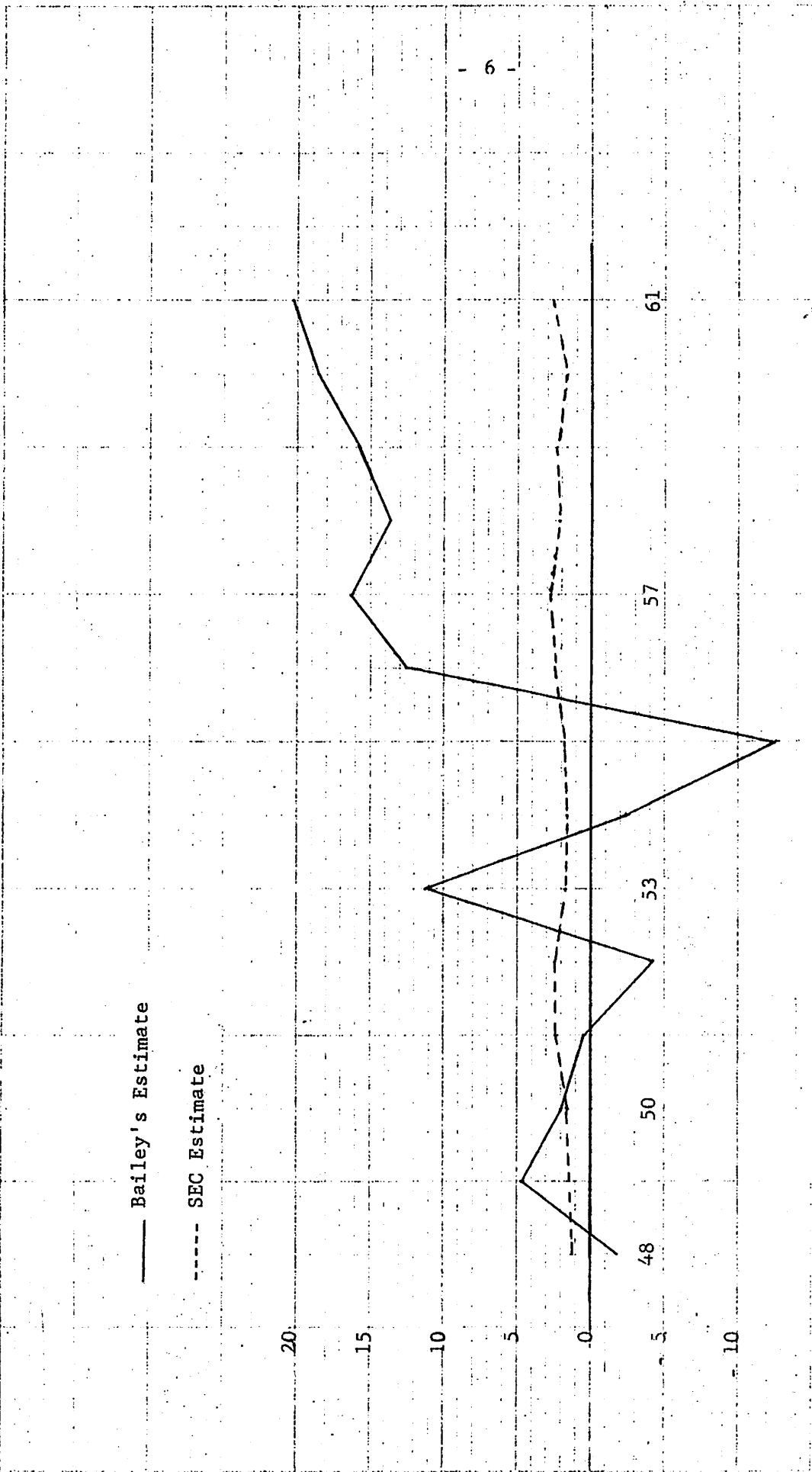


Fig.-1 Comparison of SEC and Bailey's Estimate of Net Additions to Corporate Stock Outstanding (billion dollars).



David's estimates of accrued gains imply that net additions to listed stock owned by the household sector would have amounted to -\$12.7 billion in 1955, \$52.91 billion in 1958 and \$53.91 billion in 1963. The Flow-of-Funds estimates of net acquisitions of all corporate stock by the household sector for these years are \$1.1, 1.6 and -0.3 billion respectively and if these figures are used to estimate capital gains according to equation (1), David's estimates will change considerably. The Flow-of-Funds estimates have their limitations: they are estimated by subtracting the net acquisitions of institutional investors from the amount of new issues of corporate stock so that any errors of estimation would be reflected in the residual;<sup>7</sup> but the net acquisitions implied by David's estimates are incredible and illustrate the perils of not including a test like equation (4).

Bailey derives annual estimates of capital gains and since equation (5) is used, net additions to corporate stock outstanding are not incorporated in this approach except in so far as they are implicitly included in estimates of  $V_t$ . Our model is analytically similar to Bailey's approach but it makes quarterly estimates of accrued gains and incorporates individuals' net acquisitions of corporate stock directly.

Arena's Model.-Arena [1] made quarterly estimates of capital gains accruing to the household sector during 1946-64 but he does not explain his estimation procedure fully. For example, it is not clear what assumption is made about the timing of net acquisitions but the essential steps in Arena's computation can be reconstructed.

Arena starts with the value of corporate stock held by households at the end of 1945 ( $H_{45}$ ). Capital gains for the first quarter of 1946 are computed as follows:

$$g_{46,i} = H_{45} \cdot \left( \frac{P_{46,i}}{P_{45}} - 1 \right)$$

$$\hat{H}_{46,i} = H_{45} + g_{46,i} + a_{46,i}$$

$$g_{tj} = (\hat{H}_{t,j-1}) \left( \frac{P_{tj}}{P_{t,j-1}} - 1 \right) \quad (8)$$

From the second quarter onwards, capital gains are estimated according to equation (9) assuming that net acquisitions take place at the end of each quarter.

Arena's model is similar to the one proposed here; it calculates capital gains in a manner similar to equation (3) but only the first observation in the  $H_t$  series is used. Equation (9) uses  $\hat{H}_t$  and not  $H_t$ . Thus if any observation in the  $P_t$  or  $a_t$  series does not represent stock price changes or net acquisitions correctly, the error would cumulate and affect estimates of capital gains for all the succeeding periods. A comparison of  $H_t$  and  $\hat{H}_t$  provides a simple test of the accuracy of Arena's results because, as equation (4) implies, if capital gains and net acquisitions are estimated correctly,  $\hat{H}_t$  and  $H_t$  should be equal. But even a small difference between  $H_t$  and  $\hat{H}_t$  could indicate a large error in  $G_t$  because accrued gains in most years are a small fraction of the value of corporate stock outstanding. In Arena's computations  $H_t$  and  $\hat{H}_t$  often differ<sup>8</sup> and suggest the possibility of significant errors in the estimates of accrued capital gains.

Like Bailey's method, the main drawback of Arena's model is that it does not incorporate a test for checking the accuracy of its results. Arena uses the F-of-F estimates of  $a_t$  and the Standard and Poor's 500 stock price index ("S and P 500"). Implicitly therefore, Arena is placing greater confidence in these series than in the F-of-F estimates of  $H_t$ . The estimates of net acquisitions and the stock price index, however, have limitations: the "S and P 500"

is based on only 500 stocks listed on the NYSE; it may not represent the movements in all stock prices adequately, and as discussed above, the F-of-F series on net acquisitions may be subject to substantial errors of measurement. Arena's procedure cumulates these errors. Estimates of  $H_t$  are relatively better but the market value of corporate stock outstanding in the initial period only is used in Arena's computations.

McClung's Approach. -McClung has proposed a theoretical framework to analyze the process of accrual of capital gains and to make direct estimates of unrealized gains.<sup>9</sup> As soon as a corporate share changes hands it acquires a new basis for reckoning further capital gains. The net new issues of corporate stock are cumulated upto a year  $t$  and turnover rate in  $t$  is used to determine the proportion of total value of corporate stock which acquires a new basis in that year. The model then estimates the fraction of asset value that does not acquire a new basis again until the end of year  $n$  by applying the probability of a share being held continually through  $n$  and the probability of its not being retired before then. The price change between the base year and the terminal year is then estimated by using a price index. The model thus generates a cumulative total of gains that have remained unrealized to a given terminal date and also the distribution of unrealized gains by holding time.

Theoretically it is a very interesting model but it is difficult to estimate some of the key parameters accurately. For example, the probability of a corporate share being continually held between two points in time has been estimated from the rate of turnover on the NYSE, and as McClung carefully points out, some of the adjustments made in these calculations are based on shaky assumptions.<sup>10</sup>

Unlike McClung, we do not directly estimate a cumulative total of capital gains that have gone unrealized to a given date. Capital gains

computed by our model are estimates of total gains, not just unrealized gains and it is difficult to determine what proportion of the annual price appreciation is actually realized in a given year.<sup>11</sup>

Thus all the models use the same basic inputs  $V_t$ ,  $a_t$  and  $P_t$  but none of the other models has built-in checks on the consistency of the results derived by it. Bailey's method relies too heavily on  $V_t$  and  $P_t$ , and if at all,  $N_t$  is incorporated indirectly. Net acquisitions and the stock price index are the key variables in Arena's approach but, except the first observation, no use is made of  $V_t$  or the value of corporate stock held by the household sector. As the discussion in this section shows, both these methods yield inaccurate estimates of capital gains and imply highly incorrect estimates of variables which play the minor role in computations. A test like equation (4) is crucial and should be incorporated in every model. Our model gives equal weight to all the variables and checks the results for consistency.

### III

#### Some Analytical Considerations<sup>\*</sup>

To estimate accrued capital gains according to any of the models, we need data on market value of corporate stock outstanding ( $V_t$ ), institutional holdings ( $O_t$ ) or direct estimates of stock owned by individuals ( $H_t$ ), net acquisitions ( $a_{ti}$ ) and a measure of changes in stock-prices. But it is very difficult to estimate these variables accurately.

Direct estimates of  $H_t$  can be made by (1) surveys of stock ownership or individuals' assets holdings, or (2) by capitalizing dividend receipts reported by individuals on their income-tax returns. But survey data on stock ownership in the United States do not provide a good measure of  $H_t$ . The

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<sup>\*</sup>If the reader is interested mainly in the results of the model he may proceed directly to section IV.

Survey of Consumer Finances (SCF) has some information on stock ownership but these surveys do not cover the upper income groups adequately and might be subject to large sampling errors.<sup>12</sup> In deriving market value by capitalizing reported dividends, there are problems of estimating appropriate price-dividend ratios, of estimating value of stocks which do not pay dividends in a given year and of adjusting for dividend receipts that are under-reported or not reported at all.<sup>13</sup>

Since direct estimates are unsatisfactory,  $H_t$  has to be estimated by subtracting the market value of holdings of non-individuals from the value of total corporate stock outstanding. In this approach  $V_t$  becomes the key variable in computing accrued capital gains but estimating  $V_t$  is not much easier than estimating  $H_t$ .  $V_t$  can be estimated by surveys of stockholders, by capitalizing dividends, from corporate records or from the records of the various stock exchanges.<sup>14</sup> But the necessary data are not available for every year and estimates for only a few years can be derived by using one or more of these sources. None of these methods automatically excludes inter-corporate holdings and the problem of extending the benchmarks to other years still remains. The alternative  $V_t$  series used in the various studies are summarized in Table 1 and they differ by as much as 40 per cent in some years. While no attempt is made here to reconcile the divergent estimates of  $V_t$ , it is interesting to see how some of the problems mentioned above are tackled in the existing studies.

Three of the four series in Table 1 are based on Goldsmith's estimates and yet they differ considerably. The differences arise because the various series start with different years and more importantly, they use very different procedures for extending the benchmark estimates to other years.

TABLE 1  
 MARKET VALUE OF CORPORATE STOCK OUTSTANDING IN THE  
 UNITED STATES (V<sub>t</sub>)  
 (billion dollars)

	Bailey	Flow-of-Funds	Goldsmith, Lipsey and Mendelson	McClung
	(1)	(2)	(3)	(4)
1945	154.2	119.0	148.40	165.73
1946	143.4	111.0	134.23	147.69
1947	142.7	109.0	132.17	144.78
1948	140.2	108.0	132.93	145.07
1949	159.5	120.0	148.70	163.26
1950	196.0	146.0	180.80	201.50
1951	228.9	170.0	205.61	230.25
1952	251.8	186.0	222.26	248.96
1953	245.2	179.0	220.87	246.07
1954	353.4	258.0	302.19	342.27
1955	434.1	317.0	368.70	420.08
1956	458.1	338.0	386.34	438.80
1957	408.8	299.0	351.73	395.87
1958	578.3	418.0	470.65	534.13
1959	643.1	454.0		576.42
1960	641.6	451.0		581.30
1961	810.5	574.5		706.38
1962		505.7		642.25
1963		597.0		719.18

Source by Column: 1: Bailey [2], Table 1.

2: [6], pp. 174-75.

3: Goldsmith, et al., [9], Tables IV-b-16  
and IV-b-17.

4: McClung [12], Table 4, Col. 6 and Col. 8.

Annual and Benchmark Estimates

Goldsmith, Lipsey and Mendelson (GLM) [9] use Goldsmith's benchmark estimates for 1945 and 1949 from which estimates for other years are derived by interpolation and extrapolation by using "S and P 500" and data on new issues. McClung however, uses only the benchmark for 1922 and like a perpetual inventory estimate, he builds up a cumulative series from data on additions, disappearances and the "S and P 500". In McClung's notation if  $w_t$  is the market value of corporate stock outstanding at the beginning of the period and  $a_t$  and  $d_t$  represent additions and disappearances respectively

$$w_{n-x-1} = \left[ \sum_0^{n-x-1} \left( \frac{p_{n-x}}{p_t} \right) a_t - \sum_1^{n-x-1} \left( \frac{p_{n-x}}{p_t} \right) d_t \right]$$

where  $p_t$  is the index of stock prices.<sup>15</sup>

Nothing is wrong with these procedures except that the quality of post-war data is much better than the earlier estimates and one can have greater confidence in Goldsmith's 1949 benchmark than in the one for 1922. McClung's estimate for  $V_t$  is much higher than GLM's for most years, at least Goldsmith's estimate for 1949 could have been used by McClung as a check on his estimation procedure. As it stands, McClung's estimate for 1949 exceeds that of GLM by about 10 percent and the differences becomes larger over time.

Bailey also starts from Goldsmith's estimates but he uses the value of all shares listed on the NYSE to derive annual estimates as follows:

$$V_t = L_t \cdot F_b$$

where  $L_t$  is the market value of stock listed on the NYSE and  $F_b$  is the ratio of Goldsmith's estimate to  $L_t$  in the benchmark year.<sup>16</sup>

The biggest shortcoming of Bailey's method is the use of  $F_b$ . He

applies the same factor 2.09 for the years 1949-61. Over the years, more and more stocks have been listed on the New York and other stock exchanges. On June 30, 1960 for example, the ratio of the market value of all domestic holdings to that of stocks listed on the NYSE was 1.30.<sup>17</sup> The factor used by Bailey is too high and leads to an overestimate of market value. Bailey's estimate for 1958 for example is \$578.3 billion which is much higher than the other estimates presented in Table 1.

The use of market value of stocks listed on the NYSE as an interpolator assumes that the ratio of market value of all new issues to that of new issues listed on the NYSE is the same as the corresponding ratio for existing stock. Bailey's procedure will yield biased results if this assumption does not hold and the size of the bias will depend on the value of unlisted stock and stocks listed on exchanges other than the NYSE.

#### The Problem of Intercorporate Holdings

If  $V_{it}$  is the value of  $i^{\text{th}}$  stock outstanding in year  $t$ ,

$$V_t = \sum_i V_{it}$$

but this will lead to an overestimate of  $V_t$  because of intercorporate holdings. If  $V_t$  includes investment company shares also, the problem becomes more serious because investment company shares derive their value mostly from other corporate stock. In recent years intercorporate holdings have amounted to more than 20 per cent of the value of all corporate stock outstanding and it is necessary to exclude them from  $V_t$  to avoid double counting.<sup>18</sup>

Following David, the value of intercorporate holdings ( $V_t^c$ ) can be estimated from the ratio of dividends received by corporations ( $d_t$ ) to all dividends ( $D_t$ )



$$V_t^c = \delta_t V_t$$

where

$$\delta_t = \frac{d_t}{D_t}$$

is the proportion of all dividends paid by the corporate sector to itself.

This procedure is rough and inadequate. Dividends can be a proxy for the value of corporate stock if one price-dividend ratio applies to all corporate stock. In practice, price-dividend ratios differ and the best way to estimate market value of intercorporate holdings thus is to capitalize the dividend receipts of corporations by using the price-dividend ratio applicable to the paying corporation. Such data are hard to gather and even if they were available, the problem of estimating market value of stock on which no dividend is paid still remains. These are the reasons why most existing studies have been able to exclude only a portion of intercorporate holdings. For example, Goldsmith's benchmark estimate for 1949, which has been used in some other studies also, excludes only the stock of wholly owned subsidiaries.

But the problem of intercorporate holdings has been compounded in some of the earlier studies. For instance, the new issues series used by GLM in their computations includes sale of investment company shares.<sup>19</sup> The series on market value of stock listed on the NYSE used by Bailey to estimate the blow-up factor includes intercorporate holdings so that  $F_b$  is incorrectly estimated. Bailey, however, makes no attempt to exclude intercorporate holdings from  $L_t$  or from his own series. This is another reason why Bailey's estimates of  $V_t$  are too high (Table 1, col. 1).

Intercorporate holdings and the derivation of annual estimates from benchmarks have been handled somewhat more satisfactorily in

the estimates published by the SEC.<sup>20</sup> The SEC series is based on the benchmark derived by Crockett and Friend [4] who were able to exclude most intercorporate holdings because of the detailed sample available to them. Estimates for other years are derived from this benchmark by using "S and P 500" and the SEC series on  $N_t$ . Our main interest however, is  $H_t$  for which also the SEC has published some estimates.

The above discussion illustrates a few of the problems involved in estimating  $V_t$ ,  $H_t$ ,  $a_{ti}$  and  $P_t$  which are the basic inputs of the model. It also gives an idea of the quality of some of the existing data series. Because of the limitations of these series some adjustments will be necessary before the final estimates of capital gains accruing to individuals can be derived by the model outlined in section II.

#### IV

##### The Actual Estimates

Equation (3) is used to derive quarterly estimates of capital gains accruing on corporate stock held by individuals.<sup>21</sup> Both quarterly and annual estimates are presented in Table 2. Data on  $a_{ti}$  are derived from Flow-of-Funds accounts, the "S and P 500" is used as the measure of changes in stock prices and the value of individuals' holdings of corporate stock is derived by adjusting the SEC estimates to include investment company shares and to exclude stock held by nonprofit institutions. These adjustments are necessary because the SEC series does not include investment company shares nor does it exclude the holdings of nonprofit institutions like foundations, colleges and universities, etc. Investment company shares account for most of the discrepancy between the SEC and F-of-F estimates of  $H_t$  and it is fairly

TABLE 2

ACCRUED CAPITAL GAINS ON CORPORATE STOCK  
(billion dollars)

Year	Quarter				Yearly Total
	I	II	III	IV	
1947	-0.82	0.25	-0.63	1.21	.01
1948	-1.42	10.71	-8.08	-1.88	-0.67
1949	-0.91	-5.86	9.26	7.71	10.20
1950	3.47	2.62	11.56	6.31	23.96
1951	6.50	-2.90	15.18	3.38	22.16
1952	3.82	3.76	-2.69	13.01	17.90
1953	-7.83	-7.05	-4.85	8.97	-10.76
1954	13.84	14.78	20.19	23.90	72.71
1955	3.65	27.09	16.08	11.04	57.86
1956	17.97	-9.05	-9.72	7.94	7.14
1957	-15.39	19.64	-29.86	-14.66	-40.27
1958	13.04	19.44	29.90	31.97	94.35
1959	1.42	18.71	-9.82	18.59	28.90
1960	-28.59	9.93	-21.36	28.82	-11.20
1961	43.25	-2.62	13.02	30.02	83.67
1962	-12.39	-91.60	9.39	42.14	-52.46
1963	21.36	17.21	14.30	20.35	73.22
1964	24.29	16.63	15.29	3.50	59.71
				Grand Total	= 436.43

easy to estimate their market value but the holdings of nonprofit institutions pose a more serious problem.<sup>22</sup>

These institutions are believed to have held \$25 to \$30 billion worth of corporate stock during the early 'sixties<sup>23</sup> and the main reason for not excluding them "...is the absence of sufficiently reliable or detailed annual data on their assets and liabilities."<sup>24</sup> Perhaps for the same reason nonprofit institutions are not excluded from the household sector in the Flow-of-Funds Accounts. The market value of corporate stock held by these institutions should be separated from the holdings of individuals in the household sector; otherwise, capital gains accruing to individuals would be grossly overstated. Our estimate of the value of these institutional stock holdings is based mainly on several research reports on institutional ownership issued by NYSE. The NYSE data on listed stocks is adjusted for unlisted stocks and separate estimates are made for foundations, college and university endowments and "other" nonprofit institutions. (See Data Appendix, col. 3).<sup>25</sup>

#### Checking for Accuracy

Do the estimates presented in Table 2 satisfy the test specified in equation (4)? In our calculations  $H_t$  and  $\hat{H}_t$  are quite close in most years but are rarely equal. Generally they differ by 2 or 3 per cent and the maximum difference is about 6 per cent, but even small differences like these can make a big difference to the estimates of capital gains because accrued gains have rarely amounted to more than 20 to 25 per cent of the value of corporate stock held by individuals.

The differences between  $\hat{H}_t$  and  $H_t$  are not surprising because most of

the data series used in estimating capital gains are subject to errors of measurement. They should all be adjusted separately but it is not possible to estimate the sign or magnitude of the errors from year to year. We have considerable confidence in the SEC series on the market value of corporate stock held by individuals and it has been duly adjusted to include investment company shares and to exclude the holdings of nonprofit institutions. The  $a_t$  and  $P_t$  series have not been adjusted at all. Since the main object of this study is to estimate accrued capital gains accurately and we do not know how to adjust  $a_t$  and  $P_t$  separately, whenever  $\hat{H}_t$  and  $H_t$  differ we adjust  $g_{ti}$ --the estimates of capital gains. The adjustment factor

$$f_t = \frac{H_t - H_{t-1}}{\hat{H}_t - H_{t-1}}$$

and  $g_{ti}^* = g_{ti} \cdot f_t$ .

The amounts of adjusted capital gains ( $g_{ti}^*$ ) are reported in Table 3 as the final estimates of capital gains accruing to individuals on corporate stock held by them during 1947-64. The adjustment procedure, in effect, adjusts both  $a_t$  and  $P_t$  series. The unadjusted series are used merely to allocate the total change in the market value of corporate stock during a year to its two components--capital gains and net acquisitions.

Capital gains accrue in more years than losses but, on balance, gains

TABLE 3

FINAL ESTIMATES OF CAPITAL GAINS ACCRUING ON CORPORATE STOCK, 1947-64  
(billion dollars)

Year	Quarter				Yearly Total
	I	II	III	IV	
1947	-1.49	0.46	-1.15	2.19	0.01
1948	-1.38	10.42	-7.86	-1.83	-0.65
1949	-0.91	-5.85	9.25	7.70	10.19
1950	3.39	2.57	11.31	6.17	23.44
1951	4.71	-2.10	11.01	2.45	16.07
1952	2.23	2.20	-1.57	7.61	10.47
1953	-1.18	-1.06	-0.73	1.35	-1.62
1954	10.89	11.62	15.88	18.79	57.18
1955	3.31	24.52	14.55	9.99	52.37
1956	15.96	-8.04	-8.63	7.05	6.34
1957	-13.24	16.90	-25.69	-12.62	-34.65
1958	12.70	18.93	29.12	31.14	91.89
1959	1.72	22.69	-11.91	22.55	35.05
1960	-36.76	12.77	-27.46	37.05	-14.40
1961	42.06	-2.54	12.66	29.20	81.38
1962	-12.51	-92.46	9.48	42.54	-52.95
1963	21.56	17.37	14.44	20.54	73.91
1964	24.03	16.45	15.13	3.46	59.07
				Grand total	= 413.10

exceed losses. During 1947-64, net capital gains accruing on corporate stock held by individuals amounted to \$413.10 billion. In general, gains and losses closely follow the pattern of stock price movements. In 1948, 1953 and especially in 1957 and 1962 when stock prices declined considerably, fairly large amounts of losses are recorded.

V

Alternative Assumptions\*

The estimates presented in Table 3 have been made from SEC data, assuming a rectangular distribution for net acquisitions and using the Standard and Poor's 500 stock composite price index. The question arises: How will these estimates change if other data series and assumptions were used? This sensitivity analysis is performed here under the following alternative assumptions:

1. The above assumptions but replacing "S and P 500" by the NYSE index.
2. "S and P 500" but assuming that net acquisitions occur at the beginning of each quarter.
3. "S and P 500" but assuming that net acquisitions occur at the end of each quarter.
4. "S and P 500", rectangular distribution for net acquisitions but using the Flow-of-Funds series on  $H_t$ .

The resulting estimates ( $G_1$ ,  $G_2$ , etc., with subscript referring to the assumption number) are presented in Table 4. For simplicity, only annual estimates are presented.

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\* I am indebted to John Bossons for suggesting this section.

Using the NYSE index in place of the "S and P 500" does not alter the estimate for the entire period significantly and except for a few years, the two estimates are quite close. The NYSE is more comprehensive than the "S and P 500" and includes all the common stocks listed on the NYSE but the quarterly price-relatives derived from the two indices move very closely in Figure 2. Differences between the two are significant in one or two years but in many cases the price relatives just coincide.

Again there is hardly any difference between  $G_2$  and  $G_3$  and both these estimates are virtually the same as those presented in Table 3. This result is to be expected because net acquisitions have been very small relative to the holdings of corporate stock and different assumptions about their timing do not make much difference.

#### Comparison With Earlier Estimates

It is tempting to compare our estimates with those derived by Bailey and McClung and note the rather significant differences, but as mentioned above, these studies neither relate to the same time period nor cover the same sectors of the economy as the present paper. The estimates as such are not comparable. Arena's study is the only other study in which comparable estimates of capital gains accruing to the household sector have been derived, but Arena's methodology differs from the model presented here. His computations are based on F-of-F data and he does not exclude the holdings of non-profit institutions from the value of corporate stock held by the household sector. For a proper comparison, either his method should be applied to our data or our model to the F-of-F data used in Arena's study.

Accrued gains estimated by Arena's method (equation 9) from the data used in our computations (SEC data from which the holdings of nonprofit institutions have been excluded) are presented in Table 4 (as  $G_5$ ). To make comparisons easier, only annual estimates are reported which agree in sign with



—— "C&P 500"  
----- NYSE Index

1.15

1.00

0.90

0.75

47

50

55

60

64

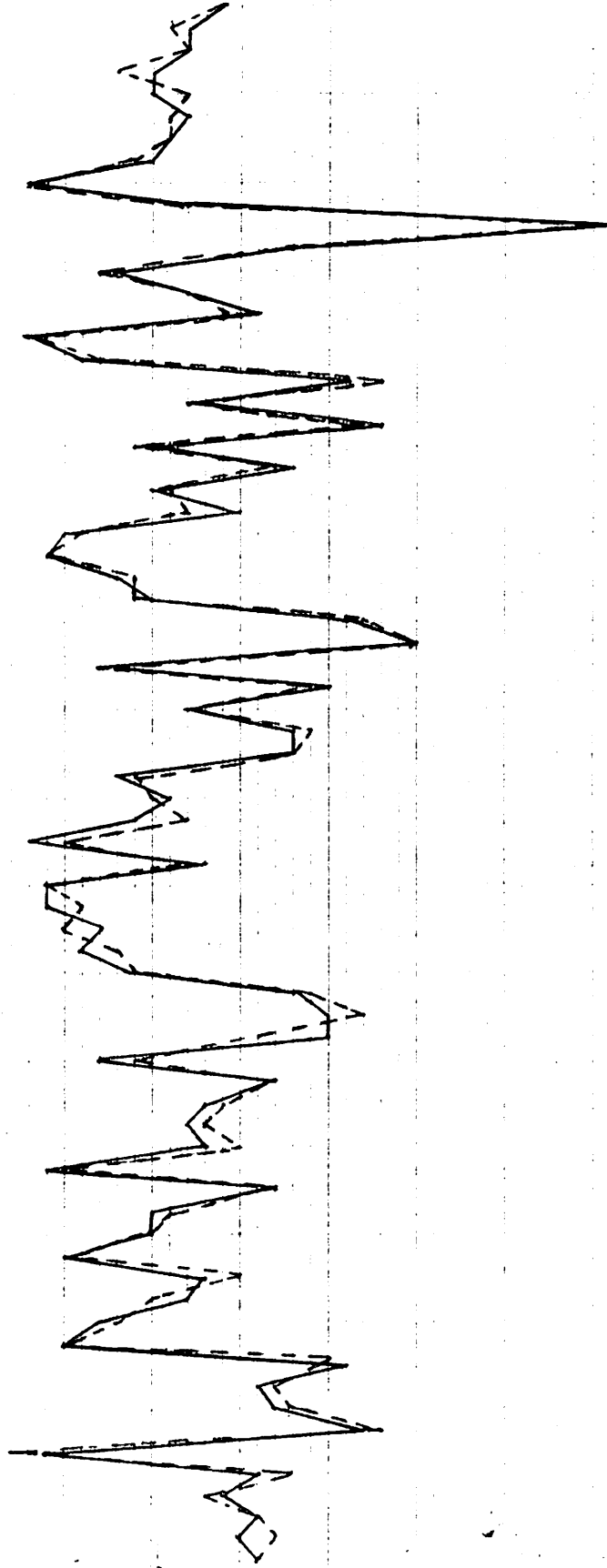


Fig.-2 Comparison of NYSE and "S and P 500" Stock Price Indices.

our estimates but the amounts in Table 4 ( $G_5$ ) exceed those in Table 3 in almost every year. For the entire period, Arena's method results in an overestimate of about 14 per cent. When one model is applied to F-of-F data (after excluding the holdings of nonprofit institutions), estimates of capital gains ( $G_4$  in Table 4) still differ from those reported in Table 3. Total accrued gains for the eighteen-year period are higher by about 10 per cent now but in two years the signs of the estimates do not agree.

In this context it is interesting to note that although there are marked differences in the quarterly and annual estimates, for the period as a whole, capital gains computed in Arena's study exceed our estimates only by 5 per cent.<sup>26</sup>  $G_4$  and  $G_5$  are higher than our estimates by 10 and 14 per cent respectively.  $G_4$  differs from the estimates in Table 3 only in the data used (F-of-F, instead of the SEC series on  $H_t$ ) and  $G_5$  only in methodology (Arena's model instead of ours). Thus it is very likely that there are compensatory errors in Arena's computations.

## VI

### Conclusion

Corporate stock is the most important source of capital gains and although capital gains accruing on corporate stock have been estimated in several studies, the estimates differ, often by large amounts. This paper proposes an analytical framework for estimating accrued gains and reviews the methodology and data sources used in earlier studies. The goal is to derive consistent estimates of gains accruing to individuals on corporate stock during 1947-64 and the main conclusions are as follows:

1. Market value of corporate stock held by individuals increased from about \$97 billion in 1947 to \$519 billion in 1964. Capital gains were the main source of increase in market value to which net acquisitions contributed less than 5 per cent.

TABLE 4

ESTIMATES OF CAPITAL GAINS UNDER ALTERNATIVE ASSUMPTIONS  
(billion dollars)

Year	G <sub>1</sub>	G <sub>2</sub>	G <sub>3</sub>	G <sub>4</sub>	G <sub>5</sub>
1947	4.66	0.01	0.01	-0.01	0.01
1948	0.50	-0.65	-0.65	2.21	-0.67
1949	10.19	10.19	10.19	9.10	10.12
1950	23.43	23.45	23.44	22.05	23.75
1951	15.81	16.07	16.07	19.62	22.06
1952	9.83	10.47	10.47	11.77	18.59
1953	-1.63	-1.62	-1.62	-8.80	-11.72
1954	57.15	57.18	57.18	68.15	75.10
1955	52.18	52.37	52.37	48.46	64.04
1956	6.38	6.34	6.33	12.28	8.06
1957	-34.75	-34.65	-34.65	-36.38	-45.58
1958	91.83	91.89	91.89	100.58	104.39
1959	35.27	35.05	35.05	25.31	32.20
1960	-14.48	-14.40	-14.40	-5.06	-12.27
1961	81.40	81.38	81.38	98.72	92.50
1962	-52.97	-52.95	-52.95	-59.45	-58.28
1963	74.04	73.92	73.91	74.58	81.53
1964	<u>59.08</u>	<u>59.07</u>	<u>59.07</u>	<u>69.86</u>	<u>66.40</u>
Total	417.92	413.12	413.09	452.99	470.23

2. Most of the existing studies overstate capital gains accruing to individuals. The stock holdings of nonprofit institutions are not excluded from the value of corporate stock held in the household sector and in most cases, the estimation procedure does not have any built-in checks to test the consistency of results nor is any attempt made to correct the upward bias in some of the data series.

The estimates derived here have important implications for taxation and other areas of economic analysis and policy. A large portion of capital gains on corporate stock is probably tax induced; the preferential tax treatment of capital gain permits enormous savings in taxes if corporate earnings are transmitted to stockholders in capital gains than in the form of dividends. Capital gains accrue mainly to upper income groups and since only a portion of realized gains is taxed, the personal income tax structure in effect, is much less progressive than the nominal tax rates would indicate.<sup>27</sup> Moreover, by taxing capital gains at a lower rate than other forms of income, the existing tax structure creates far reaching effects on resource allocation in the economy. Several schemes of taxation have been proposed in recent years which seek to tax accrued gains in one form or another. Suggestions have also been made to integrate corporate and personal income taxes. Estimates of the type developed here would be very useful in evaluating alternative schemes of taxation.

Several studies have been made in recent years to relate the increase in stock prices to retained earnings of corporations,<sup>28</sup> and to analyze the effects of capital gains taxation on portfolio turnover (the problem of "lock-in" of funds, as it is commonly called). Consistent estimates of capital gains accruing on corporate stock provide a good starting point for studies of this nature.

The economist's definition of income is broader than the concept of "measured income" which has generally been employed in studies of economic behavior like the consumption function. The theorist thus would include capital gains and several other forms of income which the conventional measures exclude. But to incorporate capital gains in a comprehensive measure of income, it would be necessary to estimate accrued gains on other types of assets also for which the model presented in this paper would be useful though different data problems are likely to arise in their case.

Footnotes

<sup>1</sup>Net acquisitions of corporate stock have accounted for less than 10 per cent of the increase in the value of corporate stock held by the household sector. These estimates are based on Flow-of-Funds data (see, for example, Flow of Funds Accounts 1945-1967).

<sup>2</sup>Bailey [2] and McClung [12] estimate capital gains on all corporate stock, not just on the stock held by individuals. In addition, McClung estimates a cumulative total of gains that go unrealized until a given date. David estimates capital gains on listed stocks only [5]. Arena [1] estimates capital gains accruing in the household sector; McClung, Brennan and Copeland [13] and Okun [15] estimate only the "decedents' unrealized gains." Besides, sufficient data are reported in [6] and [8] from which capital gains can be estimated.

<sup>3</sup>See [3], Chapter II.

<sup>4</sup>Any other assumption about the distribution of  $a_{ti}$  will not affect the final estimates of capital gains significantly, for as we shall see later, net new issues of corporate stock have been a very small proportion of total stock outstanding and have been overwhelmed by increases in stock prices during this period.

<sup>5</sup>See pp. 13, 14 infra.

<sup>6</sup>Bailey is aware of the problem. He states, "Although gains, if perfectly measured, would be algebraically less than the change in... $V_t$  by the amount of net new issues, the incomplete coverage of the Standard and Poor's price index...means that the correspondence will be less than perfect. ...the

implied net new issues are implausible. However, these errors may be assumed to cancel each other over the whole period." (italics provided). [2], p. 19. Even if the errors cancel out over the period as a whole, year to year estimates of capital gains will be inaccurate but as the later discussion in this paper shows, the culprit is not the price index but Bailey's procedure of estimating  $V_t$  which introduces inaccuracies in his estimates of the value of corporate stock outstanding.

<sup>7</sup>Net acquisitions of corporate stock by the household sector are estimated as follows:

$$a_{ti} = a_{ti}^n - a_{ti}^o$$

where  $a_{ti}^n$  is the amount of net new issues of corporate stock in the  $i^{th}$  quarter of year  $t$  and  $a_{ti}^o$  is the value of net acquisitions by investors other than individuals. These estimates are based mainly on data compiled by the Securities and Exchange Commission. Since most new issues have to be registered with the SEC and the SEC collects a lot of information on retirements of corporate stock, it is believed that data on  $a_{ti}^n$  are quite satisfactory but there are obvious gaps in estimates of  $a_{ti}^o$ . For example, there is no systematic information on corporate stock acquired by eleemosynary institutions. Thus any errors or omissions made in estimating  $a_{ti}^o$  will be reflected in the residual. Cf. [3], pp. 38-41 and 58-59.

<sup>8</sup>For example:

	$\hat{H}_t$	$H_t$
	(billion dollars)	
1953	170.8	160.9
1955	307.6	284.9
1961	493.9	500.0

A comparison of our results and the results derived by applying Arena's method to our data is made in section V.

<sup>9</sup>McClung [12]. A generalized version has been presented in McClung, Brannon and Copeland [13].

<sup>10</sup>For a fuller discussion of McClung's computations see [3], pp. 43-46.

<sup>11</sup>But comparable estimates can be derived from McClung's data. In terms of his notation

$$G_t = w_t - w_{t-1} - a_t + d_t .$$

<sup>12</sup>The 1958 SCF for example, contained a note of caution: "Clearly the survey is not a reliable source of information for aggregate holdings of corporate stock or for holdings by various groups. The findings are more reliable on the proportion of spending units owning stock and the distribution of units by size of holding below a reasonable upper limit." ["1958 Survey of Consumer Finances - The Financial Position of Consumers," The Federal Reserve Bulletin, XLIV, No. 9 (September, 1958), 1060].

The surveys conducted by the NYSE also have similar shortcomings. (See for example, [14]). For 1962 however, much better data are available. (See Projector and Weiss [16]). Obviously, a consistent time-series on  $H_t$  cannot be built from survey type data.

<sup>13</sup>The "dividend gap" has been quite significant in recent years. See Holland [11], pp. 88-91.

<sup>14</sup>For an excellent discussion of alternative ways of estimating  $V_t$  see Goldsmith [7], pp. F-1 - F-60.

<sup>15</sup>McClung [12], p. 44.

<sup>16</sup>Bailey [2], p. 19.

<sup>17</sup>Crockett and Friend [4], Table 1.4, p. 153.

<sup>18</sup>Ibid.



<sup>19</sup>Federal Reserve Bulletin, XLII (December, 1956), 1348, cited by GLM [9], p. 316.

<sup>20</sup>The series appears in the Statistical Bulletin from time to time.

The SEC is directly involved in controlling stock-market activity in the United States and is the primary source of a lot of data in this area. Somewhat similar information is available in the Flow-of-Funds accounts but these are based on SEC data.

<sup>21</sup>Since only annual data are available on  $H_t$ ,  $H_{tj}$  for second, third and fourth quarters of each year is an estimate

$$\hat{H}_{tj} = H_{t,j-1} + g_{tj} + a_{tj}$$

and

$$g_{ti} = (\hat{H}_{tj} + 0.5 a_{ti}) \left( \frac{P_{ti}}{P_{tj}} - 1 \right) \quad \begin{array}{l} i = 2,4 \\ j = i-1 \end{array} \quad (3')$$

Equation (3') is used in the actual estimation of capital gains. For the first quarter ( $i=1$ ) however,  $H_{t-1}$  is used in place of  $\hat{H}_{tj}$  in equation (3').

<sup>22</sup>Separate estimates of value of investment company shares for 1950 and 1955-64 were supplied by the SEC. For other years value estimates were based on data on equity in investment companies reported in GLM [9].

<sup>23</sup>Flow-of-Funds Accounts [6], p. I-33.

<sup>24</sup>Goldsmith and Lipsey [8], p. 26.

<sup>25</sup>Earlier estimates and the procedures and data sources used here are discussed in detail in [3], Appendix A.

The SEC series on  $H_t$  is not flawless. For example, no data are

available for 1947-49 and 1951-54. These gaps are filled by regressing the SEC series on the estimates made by Goldsmith, Lipsey and Mendelson [9]. Their series relates to 1945-58 and moves quite closely with the SEC series. The regression equation  $Y = 2.46 + .97 X$  ( $R^2 = .99$ ) was estimated by using the observations for 1955-58. This and other data adjustments are described in detail in [3], pp. 51-62.

<sup>26</sup>This computation relates to the period between 1947 and the second quarter of 1964--the last quarter included in Arena's study. The differences in annual estimates of capital gains can be illustrated as follows:

	<u>Arena's</u> (billion dollars)	<u>Ours</u>
1948	- 0.3	- 0.7
1954	71.7	57.2
1963	87.1	73.9

<sup>27</sup>Cf. Bailey [2], pp. 33-38.

<sup>28</sup>Bailey [2].

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DATA APPENDIX  
(billion dollars)

Year End	SEC Series	Value of Investment Co. Shares	Holdings of Nonprofit Institutions	Value of Individuals' Holdings ( $H_t$ )	Net Acquisitions $A_t$
	(1)	(2)	(3)	(4)	(5)
1947	98.96	3.4	4.04	97.42	1.1
1948	99.14	3.5	3.99	98.65	1.0
1949	109.89	4.3	4.56	109.63	0.8
1950	134.20	5.2	5.64	133.76	0.7
1951	151.23	6.4	6.64	150.99	1.6
1952	162.30	7.5	7.41	162.39	1.6
1953	160.31	7.9	7.27	160.94	1.0
1954	218.40	11.1	10.84	218.66	0.7
1955	271.60	13.5	13.07	272.03	1.1
1956	281.10	15.0	15.87	280.23	2.0
1957	246.20	14.0	13.33	246.87	1.5
1958	337.30	20.4	17.38	340.32	1.6
1959	372.50	23.7	19.98	376.22	0.7
1960	356.80	23.3	18.67	361.43	-0.3
1961	435.80	32.6	25.19	443.21	0.5
1962	380.80	30.1	22.36	388.54	-1.8
1963	452.00	34.8	26.97	459.83	-2.5
1964	510.00	39.8	30.80	519.00	0.1

Source: Col. 1: 1950, 1955-64: obtained from SEC; other years: estimated from GLM's series (see text).

Col. 2: 1950, 1955-64: obtained from SEC; other years: estimated on the basis of equity in investment companies (GLM [8], pp. 168-69).

Col. 3: [3], Table 26, p. 153.

Col. 4: Col. 1 + Col. 2 - Col. 3.

Col. 5: Obtained from F-of-F.