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Chapter Author: James D. Smith, Stephen D. Franklin, Guy H. Orcutt

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The Inter-generational Transmission of Wealth: A Simulation Experiment

JAMES D. SMITH
Pennsylvania State University

STEPHEN D. FRANKLIN
Pennsylvania State University

GUY H. ORCUTT
Yale University

I. INTRODUCTION

Better government data and greater access to them have spurred a renewed interest in the analysis of income and wealth distributions. For the most part, this interest picked up where the work of the late thirties and early forties left off—with cross-sectional distributions. Of growing interest, however, has been the inter-generational transmission of wealth. Questions of how much of the observable cross-sectional distribution can be accounted for by inheritance and how much by saving out of earnings have been matters of speculation and some empirical work by Soltow,[1] Morgan,[2] and Projector.[3] However, as Brittain points out, research has not been well structured to capture the importance of inheritance.[4] The issue of inheritance has been, for the most part, a peripheral one in studies concerned with other economic behavior.

In the work reported here, extant data from several sources were used to simulate the transmission of wealth at death. To measure the influence of death taxes and inheritances on inter-generational wealth distributions, simulation experiments were conducted with four death-tax systems. Two tax systems use estate wealth as a base and two use inheritances as a base. An experiment without taxes was also run.

In brief, the procedure followed was to: (a) modify the 1962 Survey of Financial Characteristics of Consumers (SFCC) file from a family file to a file of persons identified as members of specific family units; (b) stochastically attribute to families members living away from home; (c) allocate to individuals all wealth not specifically identified with individual family members in the original file; (d) pass the file and subject each individual to a Monte Carlo death process based upon age-sex-race-marital status-specific mortality rates for 1962; (e) distribute estates of decedents stochastically in accordance with estimated probability patterns of bequests and other transfers to family members at home and away from home, and to nonfamily members and to charity; (f) tax estates or inheritances in accordance with four tax "statutes"; and (g) calculate the before and after characteristics of the distribution of wealth and the yield to the Treasury.

II. RESULTS OF SIMULATION EXPERIMENTS

Simulation 1. Current Estate Tax

The first simulation experiment employs a tax statute which approximates the current federal estate tax law. The tax statute captures the essential features of the present federal estate tax. It provides for a personal exemption of $60,000 for each decedent's estate and a marital deduction of the actual amount bequeathed a spouse or one-half the estate (whichever is less). Charitable bequests, costs of last illness, legal fees, and administrator's commissions are deductible in arriving at taxable estate. After exemptions and deductions are subtracted from the net worth of estates, the remainder is taxed in accordance with current federal estate tax rates (see Table 1).

Features of the federal estate tax which were not captured are the credits for state and foreign death taxes and the reduction in rates applicable to assets which have been taxed in another estate within 10 years. Also missed are assets given away in contemplation of death and certain other lifetime transfers which are constructively part of the estate for federal estate tax purposes.

TABLE 1 Federal Estate Tax Schedule

Taxable Estate Equal to or More than— (1)	Taxable Estate Less than— (2)	Tax on Amount in Column (1) (3)	Rate of Tax on Excess over Amount in Column (1) (Percent) (4)
$ 0	$ 5,000	$ 0	3
5,000	10,000	150	7
10,000	20,000	500	11
20,000	30,000	1,600	14
30,000	40,000	3,000	18
40,000	50,000	4,800	22
50,000	60,000	7,000	25
60,000	100,000	9,500	28
100,000	250,000	20,700	30
250,000	500,000	65,700	32
500,000	750,000	145,700	35
750,000	1,000,000	233,200	37
1,000,000	1,250,000	325,700	39
1,250,000	1,500,000	423,200	42
1,500,000	2,000,000	528,200	45
2,000,000	2,500,000	753,200	49
2,500,000	3,000,000	998,200	53
3,000,000	3,500,000	1,263,200	56
3,500,000	4,000,000	1,543,200	59
4,000,000	5,000,000	1,838,200	63
5,000,000	6,000,000	2,468,200	67
6,000,000	7,000,000	3,138,200	70
7,000,000	8,000,000	3,838,200	73
8,000,000	10,000,000	4,568,200	76
10,000,000	—	6,088,200	77

SOURCE: Federal Estate Tax Return, Form 706 (Re. Sept. 1963).

Using the weighted SFCC sample, slightly modified to represent better the upper tail of the wealth distribution (see Section III), a test of the simulation model was made using the federal estate tax statute. If the simulation model captures behavior in the real world, simulated taxes for decedents with gross assets of $60,000 or more should approach those reported for 1963 by the Internal Revenue Service (IRS). Simulated taxes and those reported by the IRS are compared in Table 2. The comparison shows similar numbers of returns filed for estates with gross

TABLE 2 Comparison of Simulated Results with Internal Revenue Service Data for Returns Filed in 1962

Size of Gross Estate	Simulation	IRS
	Number of Returns	
≧ $2,000,000	803	618
$1,000,000 < 2,000,000	858	1,151
500,000 < 1,000,000	3,493	3,232
100,000 < 500,000	52,701	42,989
60,000 < 100,000	64,133	30,999
Total returns	121,988	78,989
	Taxes	
Tax collected	$2.1 billion	$2.1 billion[a]

[a]Before tax credits. The actual IRS tax collected on 1963 returns amounted to $1.8 billion. See *Statistics of Income: Fiduciary Gift and Estate Tax Returns, 1962*, p. 51

assets above $100,000, but the model generates 64,133 estate tax returns in the range between $60,000 and $100,000 gross assets, compared to only 30,999 returns reported by the IRS. We believe two factors account for the difference. First, there is a lag in filing, and returns filed with the IRS in 1963 are largely for persons who died before 1963, whereas the returns "filed" in the simulation model are only for persons who "died" in 1963.[5] The population and its mean wealth have increased steadily; consequently, IRS filings in a given year understate the number of returns which will ultimately be filed for decedents who die in that year. Secondly, there is strong evidence of noncompliance with the filing provision of the law near the filing threshold.[6] Our purpose at this point is not to test for compliance with the law (a potential use of the model), but to establish the credibility of the model for assessing the impact of alternative tax systems on the distribution of wealth. It does appear, however, that the simulated number of tax returns may be closer to the number of estates with gross assets between $60,000 and $100,000 than that reported by the IRS (see note 6).

In the simulation, 1.75 million persons died.[7] This compares very favorably with the official reported number of 1.76 million deaths in 1962 or the 1.81 million deaths in 1963.[8]

The assets of the simulated decedents totaled $40.4 billion. Estate taxes collected came to $2.1 billion. After allowance for decedents' debts, attorneys' fees, administration costs, last medical costs, funeral expenses, and estate taxes, $32.4 billion of their assets devolved to their heirs and beneficiaries. The simulation logic of inheritance is described in detail in the methodology section, but basically wealth is transmitted along familial lines revealed in the SFCC data.

The question we would answer is: Does this process of death transfers and death taxes alter the distribution of wealth?

It appears (Table 3) that the present estate tax contributes very little to reducing the concentration of wealth. A slight reduction of the number of families at the very bottom of the distribution occurs (see "all units" column in Table 3), but above a net worth of $2,000 no changes are revealed. The changes at the bottom of the distribution are attributable to the deaths of poor older families and the inheritance of wealth by "poor" families from those with substantial wealth.

Distributions by age of head, Table 3, reveal that although the shape of overall distribution is stable, families are moving around within the distribution. For instance, families with a head 65 or older decline in numbers all along the distribution. On the other hand, the numbers of families headed by a person age 30 to 65 and with a net worth of over $15,000 increases. There are also increases in the number of families near the top of the distribution with heads under 30. In the simulation there is no saving function, so all the changes are the result of wealth transfers. It appears, then, that wealth is transmitted from older to younger families who have at least a minimal net worth (more than $1,000) before inheriting. Families also lose wealth because family members die and their wealth is depleted by the cost of dying and taxation before it is inherited by survivors. Just as there is no saving in the model to move families up the wealth distribution, there is no consumption to move them down. So, again, it is the pure effect of death transfers which is observed.

It can be argued that family net worth understates the immediate wealth effect of death on a family. The death of a family member may concentrate wealth in the hands of a smaller number of persons, so average net worth of family members would then increase. The increase in average member wealth could be quite significant if the life of the decedent was well covered with life insurance. The value of human capital is not part of the wealth concept used here. Were human capital to be included, a different view of the wealth effect of death would be in order. To examine the interaction of changing family size and wealth transfers, the before and after tax distributions were tabulated on a per capita family basis, e.g., family net worth divided by family size. The results are shown in Table 4.

Whatever dramatic changes may occur to the average wealth of family members because of changes in family size and inheritances, they do not reveal themselves in the per capita family wealth tabulations of Table 4. If anything, the table suggests more stability on a per capita basis than on an aggregate family basis.

TABLE 3 Distribution of Families by Net Worth and Age of Head Before and After Current Estate Tax, 1962 (Numbers in thousands)

Net Worth	All Units	Head's Age <30	Head's Age 30<65	Head's Age ≧65
		Before Taxes		
< $ 1,000	8,712.7	2,217.3	5,314.1	1,181.3
$ 1,000 < 2,000	5,704.6	1,859.9	3,047.6	797.2
2,000 < 3,000	2,697.0	727.0	1,808.7	161.3
3,000 < 4,000	2,339.6	405.4	1,492.8	441.4
4,000 < 5,000	2,161.1	266.5	1,432.7	461.9
5,000 < 6,000	1,688.7	179.0	1,222.5	287.2
6,000 < 7,000	1,216.6	139.6	907.8	169.2
7,000 < 8,000	1,781.5	183.2	1,245.8	352.5
8,000 < 9,000	1,350.4	23.9	1,047.0	279.6
9,000 < 10,000	1,742.3	288.8	972.1	481.4
10,000 < 15,000	6,381.4	417.6	4,549.0	1,414.8
15,000 < 20,000	4,717.8	197.3	3,715.2	805.3
20,000 < 25,000	3,507.6	79.9	2,911.0	516.6
25,000 < 50,000	7,838.8	269.0	5,678.2	1.891.6
50,000 < 100,000	3,970.8	6.7	2,953.3	1,010.8
100,000 < 200,000	1,226.7	46.1	877.1	303.5
≧ 200,000	889.4	2.6	556.9	329.8
		After Taxes		
< $ 1,000	8,464.2	2,156.6	5,218.0	1,091.3
$ 1,000 < 2,000	5,429.4	1,799.8	2,898.0	732.2
2,000 < 3,000	2,646.9	769.6	1,718.2	159.2
3,000 < 4,000	2,261.8	421.1	1,436.1	404.6
4,000 < 5,000	2,198.6	325.7	1,449.8	423.1
5,000 < 6,000	1,727.4	212.5	1,246.6	268.3
6,000 < 7,000	1,238.4	153.8	923.5	161.2
7,000 < 8,000	1,782.4	195.1	1,262.8	324.5
8,000 < 9,000	1,374.1	48.6	1,036.6	288.8
9,000 < 10,000	1,637.5	266.8	927.3	443.4
10,000 < 15,000	6,398.4	467.0	4,577.9	1,354.6
15,000 < 20,000	4,801.9	221.7	3,787.5	793.2
20,000 < 25,000	3,575.6	105.4	2,939.4	530.8
25,000 < 50,000	7,877.9	287.2	5,772.8	1,819.3
50,000 < 100,000	3,964.2	12.8	3,016.2	935.3
100,000 < 200,000	1,230.5	46.2	887.3	297.1
≧ 200,000	884.3	2.9	561.1	320.4

TABLE 4 Distribution of Families by Per Capita Net Worth and Age of Head Before and After Current Estate Tax, 1962 (Numbers in thousands)

Net Worth	All Units	Head's Age <30	Head's Age 30<65	Head's Age ≧65
Before Taxes				
< $ 1,000	19,551.1	4,907.5	12,667.8	1,975.8
$ 1,000 < 2,000	7,450.7	1,398.4	5,098.7	953.5
2,000 < 3,000	5,371.0	537.2	4,317.5	616.2
3,000 < 4,000	3,622.1	76.6	2,791.7	753.8
4,000 < 5,000	2,514.6	62.4	2,068.2	383.9
5,000 < 6,000	2,084.4	57.0	1,284.5	743.0
6,000 < 7,000	2,011.5	15.5	1,592.7	403.3
7,000 < 8,000	1,613.2	88.3	1,008.7	516.2
8,000 < 9,000	1,395.3	65.5	932.0	397.8
9,000 < 10,000	761.5	46.7	446.4	268.4
10,000 < 15,000	4,005.5	55.7	2,715.0	1,234.8
15,000 < 20,000	2,322.6	91.3	1,548.3	682.9
20,000 < 25,000	1,345.8	0.0	855.1	490.7
25,000 < 50,000	2,446.2	0.0	1,628.7	817.5
50,000 < 100,000	748.1	6.8	389.5	351.8
100,000 < 200,000	460.2	0.5	286.8	172.9
≧ 200,000	223.3	0.4	99.8	123.0
After Taxes				
< $ 1,000	16,096.3	4,258.3	10,342.5	1,498.2
$ 1,000 < 2,000	6,685.3	1,321.8	4,590.8	774.0
2,000 < 3,000	4,876.3	706.1	3,611.6	559.0
3,000 < 4,000	3,802.2	413.3	2,986.6	402.3
4,000 < 5,000	3,244.7	167.3	2,347.3	730.1
5,000 < 6,000	2,273.8	99.9	1,873.4	300.6
6,000 < 7,000	1,555.5	46.8	1,162.8	345.9
7,000 < 8,000	1,793.6	43.7	1,210.8	539.2
8,000 < 9,000	1,359.8	9.6	1,101.1	249.2
9,000 < 10,000	1,429.9	77.4	921.1	431.5
10,000 < 15,000	4,352.1	197.4	2,957.2	1,197.6
15,000 < 20,000	2,497.1	33.2	1,683.4	780.5
20,000 < 25,000	2,032.5	94.2	1,332.0	606.3
25,000 < 50,000	3,446.0	15.7	2,320.9	1,109.5
50,000 < 100,000	1,119.4	6.8	654.0	458.6
100,000 < 200,000	620.2	0.6	391.9	227.7
≧ 200,000	308.0	0.7	170.3	137.0

To examine better the dynamics within the distributions suggested by Tables 3 and 4, a decile matrix of before and after tax rank was constructed (Tables 5 and 6). Families are found to experience considerable decile movement even though the aggregate distribution is stable.

So far, we have demonstrated that our simulation model (a) stochastically generates deaths which are almost identical in number to those reported in the official vital statistics for the U.S.; (b) generates tax collections by the Treasury (with a tax algorithm which replicates the present federal estate tax rules) which are quite comparable to those reported in the official Treasury statistics; and (c) generates estate sizes which are in essential agreement with the size distribution of estates reported by the IRS in the range above $100,000 gross assets. (Below $100,000, we find many more estates than the IRS reports, and there is strong reason to believe the IRS is wrong and the model's results are very close to correct; see note 6). On the basis of the above results we are prepared to use the model to form judgments about the process of inter-generational wealth transfers and death taxes.

By measuring events which occur in the simulation population, it is possible to gain insights into the inter-generational distribution of wealth which are not available from natural data. In Tables 3 and 4, it is shown that when saving and consumption are held constant (set to zero), the distribution of wealth after one year's deaths and associated taxes is little different from that before the events occurred. However, there is a widely held belief that the transmission of wealth at death results in increasing its concentration and that the federal estate tax lessens the concentration by whittling down large estates before they devolve to already rich persons. Both beliefs are intuitive, since there is no empirical data to support either of them. To measure the independent effects of death transfers and estate taxes on the distribution of wealth, the simulation was rerun setting the tax rate to zero for all estates. After the simulation, family distributions of net worth were produced and are shown in Table 7, along with the net worth distributions for families before simulation and after the simulation, using the federal estate tax. The results are rather startling. Taken alone, the transfer of wealth at death does not tend to increase the concentration of wealth but to decrease it slightly. In the first three columns of Table 7, the before-simulation distribution of net worth on December 31, 1962, the percentage change in the intervals of the distribution due to death transfers in the absence of a death tax, and the resultant distribution on December 31, 1963 are shown. There is a pronounced net movement of families out of the four lowest net worth classes and a slight decrease, or no net change, in the numbers of families at the top of the size distribution. The overall effect, then, of death transfers in the absence of a death tax is to

TABLE 5 Before and After Death Tax Family Net Worth Position, Current Federal Estate Tax, 1962 (Figures represent numbers of families in thousands)

Before Tax Family Net Worth Position in Thousands of Dollars (by deciles)	After Tax Family Net Worth Position in Thousands of Dollars (by deciles)									
	1	2	3	4	5	6	7	8	9	10
1	5,630.5	92.3	0.5	0.0	9.5	11.3	0.0	4.8	0.0	0.2
2	129.0	5,381.4	210.3	10.4	0.0	10.9	16.7	0.0	0.0	0.0
3	0.0	261.6	5,043.9	432.8	0.0	6.4	7.2	0.0	0.0	0.0
4	0.0	26.2	431.3	4,637.1	627.0	3.9	0.0	8.9	0.0	1.7
5	0.0	4.5	47.4	565.6	4,338.9	792.3	0.0	0.0	2.3	0.0
6	0.0	0.0	18.5	81.7	688.8	4,263.5	678.6	12.2	0.0	0.0
7	0.0	0.0	11.5	20.2	64.5	575.1	4,418.6	654.2	4.7	3.5
8	0.0	0.0	0.2	17.1	19.6	65.0	474.4	4,389.0	795.1	4.4
9	0.0	0.0	0.0	0.0	12.1	30.6	85.0	313.7	4,563.1	675.6
10	0.0	0.0	0.0	0.4	6.5	4.4	85.2	381.5	401.5	4,929.3
Total	5,759.5	5,766.0	5,763.6	5,765.3	5,766.9	5,763.4	5,765.7	5,764.3	5,766.7	5,614.7

NOTE: Dollar figures in thousands for deciles are as follows:

Decile 1 = 52.3	Decile 6 = 6.1
Decile 2 = 29.3	Decile 7 = 3.3
Decile 3 = 20.2	Decile 8 = 1.4
Decile 4 = 14.2	Decile 9 = 1.0
Decile 5 = 9.9	Decile 10 = Less than 1.0

TABLE 6 Before and After Death Tax Family Per Capita Net Worth Position, Current Federal Estate Tax, 1962
(Figures represent numbers of families in thousands)

Before Tax Family Per Capita Net Worth Position in Thousands of Dollars (by deciles)	After Tax Family Per Capita Net Worth Position in Thousands of Dollars (by deciles)									
	1	2	3	4	5	6	7	8	9	10
1	5,570.4	109.7	14.6	6.1	0.0	4.8	0.0	0.0	0.0	0.2
2	171.2	5,328.3	168.6	18.0	9.6	0.0	0.0	0.0	0.0	0.0
3	13.7	227.0	5,172.6	334.0	4.9	0.0	0.0	0.0	0.0	0.0
4	6.8	64.2	331.6	4,922.9	414.9	4.9	5.6	2.3	1.7	0.0
5	0.0	18.7	39.6	360.2	4,685.8	657.0	5.6	0.0	0.0	0.0
6	0.0	11.9	21.9	49.8	550.6	4,571.1	566.6	6.6	0.0	0.0
7	0.0	5.4	3.5	46.6	75.0	429.2	4,582.3	570.9	0.0	0.0
8	0.0	0.0	7.2	25.8	7.8	57.6	514.1	4,537.1	550.1	9.3
9	0.0	0.0	0.0	0.0	8.3	30.4	65.9	534.1	4,519.8	655.9
10	0.0	0.0	5.0	0.4	8.8	10.9	25.0	112.5	690.7	4,953.1
Total	5,762.1	5,765.2	5,764.6	5,763.8	5,765.7	5,765.9	5,765.1	5,763.5	5,762.3	5,618.6

NOTE: Dollar figures in thousands for deciles are as follows:

Decile 1 = 24.4	Decile 6 = 2.0
Decile 2 = 13.1	Decile 7 = 1.1
Decile 3 = 7.9	Decile 8 = 0.6
Decile 4 = 4.9	Decile 9 = 0.6
Decile 5 = 3.2	Decile 10 = Less than 0.3

TABLE 7 Simulation of Independent Effects of Bequests and Current Estate Tax on the Size Distribution of Family Wealth, 1962

Family Net Worth	Distribution of Families before Simulation (Thousands)	Change due to Bequests (Percentage change)	Distribution of Families after Deaths with Zero Tax (Thousands)	Change due to Current Estate Tax (Percentage change)	Distribution of Families after Current Estate Tax (Thousands)	Change due to Bequests and Estate Tax (Percentage change)
< $ 1,000	8,712.7	−2.9	8,461.9	0.0	8,464.2	−2.9
$ 1,000 < 2,000	5,704.6	−5.0	5,419.0	0.2	5,429.4	−4.8
2,000 < 3,000	2,697.0	−2.5	2,630.1	0.6	2,646.9	−1.9
3,000 < 4,000	2,339.6	−3.2	2,265.7	−0.2	2,261.8	−3.3
4,000 < 5,000	2,161.1	2.1	2,206.9	−0.4	2,198.6	1.7
5,000 < 6,000	1,688.7	1.2	1,708.6	1.1	1,727.4	2.3
6,000 < 7,000	1,216.6	2.5	1,246.5	−0.6	1,238.4	1.8
7,000 < 8,000	1,781.5	0.1	1,783.9	−0.1	1,782.4	0.1
8,000 < 9,000	1,350.4	1.9	1,375.8	0.1	1,374.1	1.8
9,000 < 10,000	1,742.3	−4.8	1,658.2	−1.2	1,637.5	−6.0
10,000 < 15,000	6,381.4	0.0	6,383.2	0.2	6,398.4	0.3
15,000 < 20,000	4,717.8	1.8	4,804.4	−0.1	4,801.9	1.8
20,000 < 25,000	3,507.6	1.8	3,570.7	0.1	3,575.6	1.9
25,000 < 50,000	7,838.8	0.8	7,899.2	−0.3	7,877.9	0.5
50,000 < 100,000	3,970.8	−0.2	3,964.2	0.0	3,964.2	−0.2
100,000 < 200,000	1,226.7	0.3	1,230.5	0.0	1,230.5	0.3
≧ 200,000	889.4	−0.5	884.3	0.0	884.3	−0.5
Total	57,927.0		57,493.0		57,493.0	

lessen concentration. This apparently comes about for several reasons. First, some one-person families, which have a higher probability of being at the bottom of the distribution than do larger families, die off. Secondly, most decedents (over 95 percent in 1962) have estates of less than $60,000 net worth. When these estates are distributed to surviving children and to other families' members, they are parceled into rather small bequests, so that most inheritors are not moved a long way up the wealth distribution. Thirdly, inheritors, contrary to popular opinion, are often at the lower end of the wealth distribution. This is particularly relevant for the findings in the case of children of wealthy parents. The children of the rich are likely to have above-average levels of human capital, because they have longer than average periods of schooling, but that very fact increases the probability that they will inherit wealth before they have accumulated significantly out of their own earnings. In the methodology section, it will be found that one's own wealth is a poor predictor of inheriting; educational level was found to be a much better one.

In column 5 of Table 7, the distribution of families by size of net worth after simulation, with the current estate tax rates in effect, is shown. The difference between the distribution shown in column 3 (zero tax rates) and column 5 is the pure distributional impact of the current estate tax, i.e., independent of the pretax devolution pattern. The tax can, of course, do nothing to move families out of the lower reaches of the distribution, so one would not expect to find negative changes (column 4), but there appears to be a slight increase in the numbers of families at the lower end. This suggests that some of the smaller parcels of wealth intended for families in the range above the lowest three net worth intervals were diminished when the tax was applied. These families who would have ended in richer classes with a zero death tax find themselves at the bottom with the current tax. Such families must have come from some other part of the distributions, and they presumably came from the middle range where the net impact of the tax is to reduce the number of families. Oddly enough, the tax has no measurable impact at the top of the distribution. Whatever gross outflows of families occurred from the intervals above a net worth of $50,000 were offset by movement into the classes by inheritors who were nearer the middle of the distribution. There are a number of reasons for this unexpected result. First, bequests are more often made to persons of less wealth than the decedent than the converse. Secondly, the tax on intrafamily wealth transfers is less than the rates alone would suggest. (When the decedent is married, up to 50 percent of his estate is exempt. The first $60,000 of net worth of all estates is also exempt.) Thirdly, estate planning removes from the purview of the tax law certain assets and distributes them constructively or, in fact, prior to death. Fourthly, the base of the current federal death tax is the net worth after deductions and exemptions of the estate, not the wealth of the inheritor. Thus, the share of the pretax estate inherited by an indigent heir is diminished by the same percentage as that share inherited by an affluent heir.

We are left then with the paradox that a tax whose philosophical foundation is to mitigate a natural process toward inequality is apparently obstructing a natural process toward greater equality.

At this point, we turn to the simulation of three alternative tax structures which differ from the current tax by varying degree.

Simulation 2. Reform Estate Tax

It was noted that the current estate tax had little effect on the distribution of wealth at the top of the distribution, because the generous marital and personal exemptions permit the transfer of substantial amounts of untaxed wealth. Also, the marital exemption discriminates among heirs. We have structured a tax which eliminates discriminatory features, increases the personal exemption of all estates to $100,000, and provides for higher rates on estates over $100,000. The rates are 50 percent on the first $400,000 of taxable estate and 100 percent on amounts in excess of $400,000. It is assumed, of course, that appropriate measures to insure against tax avoidance, such as placing appropriate taxes on inter-vivos gifts, would be implemented.

This simulation was run in exactly the same manner as the first experiment. The same persons selected to die by the Monte Carlo draws in the first experiment were selected again, so, although the selection of deaths is stochastic, the same stochastic selection was used for all experiments to avoid inter-experiment Monte Carlo variation.

This tax reduces inequality on both a straight family basis and on a per capita family basis (see Tables 8 and 9). Although the one-year reduction in equality is very slight, it would, over a number of years, compress the distribution of wealth.

In Table 10 the pure tax effect on the distribution of family wealth is shown. The tax results in a diminution of persons at the top of the distribution, but also increases the number at the bottom. In addition, it results in an increase in the number of families in the middle range. Although there is only a slight difference in the distribution of wealth resulting from this tax, the yield to the Treasury is much greater, $7.2 billion compared to $2.1 billion, under the current federal tax system.

TABLE 8 Distribution of Families by Net Worth and Age of Head Before and After Reform Estate Tax, 1962 (Numbers in thousands)

		Head's Age		
Net Worth	All Units	<30	30 < 65	≧65
		Before Taxes		
< $ 1,000	8,712.7	2,217.3	5,314.1	1,181.3
$ 1,000 < 2,000	5,704.6	1,859.9	3,047.6	797.2
2,000 < 3,000	2,697.0	727.0	1,808.7	161.3
3,000 < 4,000	2,339.6	405.4	1,492.8	441.4
4,000 < 5,000	2,161.1	266.5	1,432.7	461.9
5,000 < 6,000	1,688.7	179.0	1,222.5	287.2
6,000 < 7,000	1,216.6	139.6	907.8	169.2
7,000 < 8,000	1,781.5	183.2	1,245.8	352.5
8,000 < 9,000	1,350.4	23.9	1,047.0	279.6
9,000 < 10,000	1,742.3	288.8	972.1	481.4
10,000 < 15,000	6,381.4	417.6	4,549.0	1,414.8
15,000 < 20,000	4,717.8	197.3	3,715.2	805.3
20,000 < 25,000	3,507.6	79.9	2,911.0	516.6
25,000 < 50,000	7,838.8	269.0	5,678.2	1,891.6
50,000 < 100,000	3,970.8	6.7	2,953.3	1,010.8
100,000 < 200,000	1,226.7	46.1	877.1	303.5
≧ 200,000	889.4	2.6	556.9	329.8
		After Taxes		
< $ 1,000	8,464.2	2,156.6	5,218.0	1,091.3
$ 1,000 < 2,000	5,436.0	1,799.8	2,904.6	732.2
2,000 < 3,000	2,644.6	769.6	1,715.9	159.2
3,000 < 4,000	2,310.3	446.2	1,454.7	409.4
4,000 < 5,000	2,192.5	313.6	1,460.6	418.3
5,000 < 6,000	1,720.3	203.1	1,244.0	273.3
6,000 < 7,000	1,253.5	150.2	941.2	162.2
7,000 < 8,000	1,755.0	195.1	1,236.5	323.3
8,000 < 9,000	1,374.6	61.9	1,017.4	295.4
9,000 < 10,000	1,657.6	253.9	964.8	438.9
10,000 < 15,000	6,384.9	476.8	4,561.1	1,348.0
15,000 < 20,000	4,824.1	220.6	3,794.7	809.2
20,000 < 25,000	3,529.7	96.3	2,918.9	514.4
25,000 < 50,000	7,872.5	287.2	5,767.5	1,819.3
50,000 < 100,000	3,959.5	12.8	3,011.5	935.3
100,000 < 200,000	1,233.0	46.3	889.2	297.6
≧ 200,000	881.0	2.7	558.6	319.9

TABLE 9 Distribution of Families by Per Capita Net Worth and Age of Head Before and After Reform Estate Tax, 1962 (Numbers in thousands)

Net Worth	All Units	Head's Age <30	Head's Age 30 < 65	Head's Age ≧65
	Before Taxes			
< $ 1,000	19,551.1	4,907.5	12,667.8	1,975.8
$ 1,000 < 2,000	7,450.7	1,398.4	5,098.7	953.5
2,000 < 3,000	5,371.0	537.2	4,317.5	616.2
3,000 < 4,000	3,622.1	76.6	2,791.7	753.8
4,000 < 5,000	2,514.6	62.4	2,068.2	383.9
5,000 < 6,000	2,084.4	57.0	1,284.5	743.0
6,000 < 7,000	2,011.5	15.5	1,592.7	403.3
7,000 < 8,000	1,613.2	88.3	1,008.7	516.2
8,000 < 9,000	1,395.3	65.5	932.0	397.8
9,000 < 10,000	761.5	46.7	446.4	268.4
10,000 < 15,000	4,005.5	55.7	2,715.0	1,234.8
15,000 < 20,000	2,322.6	91.3	1,548.3	682.9
20,000 < 25,000	1,345.8	0.0	855.1	490.7
25,000 < 50,000	2,446.2	0.0	1,628.7	817.5
50,000 < 100,000	748.1	6.8	389.5	351.8
100,000 < 200,000	460.2	0.5	286.8	172.9
≧ 200,000	223.3	0.4	99.8	123.0
	After Taxes			
< $ 1,000	16,118.6	4,265.8	10,357.3	1,498.2
$ 1,000 < 2,000	6,687.6	1,324.6	4,590.2	774.0
2,000 < 3,000	4,880.8	707.0	3,606.9	567.3
3,000 < 4,000	3,815.3	420.4	3,001.0	394.0
4,000 < 5,000	3,218.0	148.9	2,339.0	730.1
5,000 < 6,000	2,273.0	102.1	1,865.5	305.3
6,000 < 7,000	1,581.9	44.6	1,189.8	347.5
7,000 < 8,000	1,787.5	43.7	1,200.6	543.1
8,000 < 9,000	1,345.7	12.9	1,094.0	238.8
9,000 < 10,000	1,436.0	74.4	916.6	445.0
10,000 < 15,000	4,340.8	197.0	2,959.8	1,184.0
15,000 < 20,000	2,499.4	33.2	1,675.9	790.3
20,000 < 25,000	2,015.1	94.2	1,324.3	596.6
25,000 < 50,000	3,450.7	15.7	2,325.6	1,109.5
50,000 < 100,000	1,114.9	6.9	649.0	459.1
100,000 < 200,000	623.3	0.7	395.4	227.2
≧ 200,000	304.4	0.5	166.9	137.0

TABLE 10 Percentage Change in Family Wealth Size Distribution Due to Pure Tax Effect of Reform Estate Tax, 1962

Net Worth	Percentage Change Due to Tax
< $ 1,000	0.0
$ 1,000 < 2,000	0.3
2,000 < 3,000	0.6
3,000 < 4,000	2.0
4,000 < 5,000	−0.7
5,000 < 6,000	0.7
6,000 < 7,000	0.6
7,000 < 8,000	−1.2
8,000 < 9,000	−0.1
9,000 < 10,000	0.0
10,000 < 15,000	0.0
15,000 < 20,000	0.4
20,000 < 25,000	−1.1
25,000 < 50,000	−0.3
50,000 < 100,000	−0.1
100,000 < 200,000	0.2
≧ 200,000	−0.4

Simulation 3. Inheritance Tax, Modest Reform

The historical justifications of U.S. death taxes have been wealth redistribution and an impediment to plutocracy. In recent years, however, the annual Treasury yield from the tax has approached $2 billion. Whether redistributive or revenue raising, the burden of the tax would best be distributed on the ability to pay of natural persons with a beneficial interest in the estate. Clearly, there is no beneficial interest of a decedent in his estate. The only persons having beneficial interests are the potential heirs. Two simulation experiments taxing heirs were run.

The first experiment taxes *heirs*, using the current estate tax schedule (Table 1), but the base of the tax is the sum of one's inheritance plus his own net worth. An inheritor is not taxed on any part of his own wealth but the tax rates applicable to his inheritance begin with the marginal rate applicable to the first dollar of inherited wealth in excess of his own net worth. For instance, if the inheritor had a net worth of $60,000, the first $5,000 of his inheritance would be taxed at a 3 percent rate, the next

$5,000 at a 7 percent rate, and so on (see Table 1, page 623). If the total inheritance of this heir were to amount to $20,000, his total tax bill would amount to $1,600 on the $20,000 inheritance. A richer individual receiving the same $20,000 would be taxed at higher rates. For instance, should the inheritor have a net worth of $500,000, entry into the tax table would be at the 35 percent rate. Since the tax rate for amounts between $500,000 and $750,000 is 35 percent, the entire $20,000 would be subject to a 35 percent rate, or a total of $6,000. An heir whose net worth was $12,000 would pay no tax on his $20,000 inheritance. Tables 11 and 12 show the before and after distributions of the tax.

The pure tax effect of this inheritance tax results in greater reductions at the top and smaller increases at the bottom of the wealth distribution than do the present or reform estate tax. Apparently, the high marginal rates on wealthy heirs have a significant impact on affluent heirs within the same family as the decedent, while the exemption for heirs results in a smaller bite being taken from relatively less affluent inheritors (see Table 13).

Simulation 4. Severe Inheritance Tax Reform

To test the effect of a severe inheritance tax, a $50,000 limit was placed on the amount one could inherit from one estate. The tax has almost no direct effect on the distribution of wealth except at the very highest wealth levels (see Table 14). The top two wealth classes are slightly diminished and the third from the top class picks up the few families which are bumped down. The reasons for the small direct redistributive effect of such a severe tax are that (a) very few people inherit amounts in excess of $50,000, and (b) there is no provision in the model for a behavioral change in the bequeathing practices of individuals.

If wealth holders were confronted with either of the inheritance taxes we have simulated, they would presumably change their wills to minimize tax erosion of their estates. If they carried this behavior to its limit, they would avoid all inheritance taxes by bequeathing amounts no greater than $60,000 and $50,000 to individual heirs respectively in the third and fourth simulation experiments. If they were to do so, it would achieve substantial redistribution.

In the modest reform inheritance tax, inheritors are subject to progressive tax rates when the sum of the heirs' prior wealth and inheritance exceed $60,000. The rate will never, however, exceed 77 percent. Under such a tax, testators would evaluate how much they were willing to have their total distribution diminished by inheritance taxes in order to benefit specific heirs. If testators' aversion to having their bequests

TABLE 11 Distribution of Families by Net Worth and Age of Head before and after Modest Reform Inheritance Tax, 1962 (Numbers in thousands)

Net Worth	All Units	Head's Age <30	Head's Age 30<65	Head's Age ≧65
	Before Taxes			
< $ 1,000	8,712.7	2,217.3	5,314.1	1,181.3
$ 1,000 < 2,000	5,704.6	1,859.9	3,047.6	797.2
2,000 < 3,000	2,697.0	727.0	1,808.7	161.3
3,000 < 4,000	2,339.6	405.4	1,492.8	441.4
4,000 < 5,000	2,161.1	266.5	1,432.7	461.9
5,000 < 6,000	1,688.7	179.0	1,222.5	287.2
6,000 < 7,000	1,216.6	139.6	907.8	169.2
7,000 < 8,000	1,781.5	183.2	1,245.8	352.5
8,000 < 9,000	1,350.4	23.9	1,047.0	279.6
9,000 < 10,000	1,742.3	288.8	972.1	481.4
10,000 < 15,000	6,381.4	417.6	4,549.0	1,414.8
15,000 < 20,000	4,717.8	197.3	3,715.2	805.3
20,000 < 25,000	3,507.6	79.9	2,911.0	516.6
25,000 < 50,000	7,838.8	269.0	5,678.2	1,891.6
50,000 < 100,000	3,970.8	6.7	2,953.3	1,010.8
100,000 < 200,000	1,226.7	46.1	877.1	303.5
≧ 200,000	889.4	2.6	556.9	329.8
	After Taxes			
< $ 1,000	8,461.9	2,154.3	5,218.0	1,091.3
$ 1,000 < 2,000	5,422.4	1,802.1	2,888.8	732.2
2,000 < 3,000	2,639.7	753.2	1,724.0	162.5
3,000 < 4,000	2,258.7	425.5	1,431.9	401.3
4,000 < 5,000	2,207.1	330.2	1,453.8	423.1
5,000 < 6,000	1,725.7	220.0	1,237.5	268.3
6,000 < 7,000	1,244.6	150.0	933.4	161.2
7,000 < 8,000	1,791.4	198.9	1,267.9	324.5
8,000 < 9,000	1,369.6	48.6	1,025.5	295.4
9,000 < 10,000	1,645.4	266.8	941.9	436.8
10,000 < 15,000	6,407.3	467.0	4,586.8	1,354.6
15,000 < 20,000	4,818.1	226.6	3,789.9	802.1
20,000 < 25,000	3,560.2	102.3	2,931.6	526.3
25,000 < 50,000	7,900.1	285.4	5,801.3	1,814.9
50,000 < 100,000	3,936.2	12.8	2,985.3	938.2
100,000 < 200,000	1,224.3	46.4	883.3	294.6
≧ 200,000	880.7	2.7	558.2	319.9

TABLE 12 Distribution of Families by Per Capita Net Worth and Age of Head before and after Modest Reform Inheritance Tax, 1962 (Numbers in thousands)

Net Worth	All Units	Head's Age <30	Head's Age 30<65	Head's Age ≧65
		Before Taxes		
< $ 1,000	19,551.1	4,907.5	12,667.8	1,975.8
$ 1,000 < 2,000	7,450.7	1,398.4	5,098.7	953.5
2,000 < 3,000	5,371.0	537.2	4,317.5	616.2
3,000 < 4,000	3,622.1	76.6	2,791.7	753.8
4,000 < 5,000	2,514.6	62.4	2,068.2	383.9
5,000 < 6,000	2,084.4	57.0	1,284.5	743.0
6,000 < 7,000	2,011.5	15.5	1,592.7	403.3
7,000 < 8,000	1,613.2	88.3	1,008.7	516.2
8,000 < 9,000	1,395.3	65.5	932.0	397.8
9,000 < 10,000	761.5	46.7	446.4	268.4
10,000 < 15,000	4,005.5	55.7	2,715.0	1,234.8
15,000 < 20,000	2,322.6	91.3	1,548.3	682.9
20,000 < 25,000	1,345.8	0.0	855.1	490.7
25,000 < 50,000	2,446.2	0.0	1,628.7	817.5
50,000 < 100,000	748.1	6.8	389.5	351.8
100,000 < 200,000	460.2	0.5	286.8	172.9
≧ 200,000	223.3	0.4	99.8	123.0
		After Taxes		
< $ 1,000	16,096.3	4,258.3	10,342.5	1,498.2
$ 1,000 < 2,000	6,690.1	1,321.8	4,590.7	778.8
2,000 < 3,000	4,868.9	706.1	3,599.1	564.2
3,000 < 4,000	3,799.1	401.4	3,005.4	392.3
4,000 < 5,000	3,245.9	171.8	2,344.0	730.1
5,000 < 6,000	2,282.0	109.1	1,872.3	300.6
6,000 < 7,000	1,566.9	41.2	1,179.8	345.9
7,000 < 8,000	1,785.8	47.5	1,199.2	539.2
8,000 < 9,000	1,374.1	11.3	1,113.7	249.2
9,000 < 10,000	1,431.0	78.2	912.4	440.4
10,000 < 15,000	4,346.6	194.9	2,958.5	1,193.3
15,000 < 20,000	2,501.0	35.6	1,689.4	776.1
20,000 < 25,000	2,029.7	91.8	1,326.8	611.1
25,000 < 50,000	3,451.0	15.7	2,330.8	1,104.5
50,000 < 100,000	1,105.2	6.8	636.9	461.5
100,000 < 200,000	614.9	0.7	389.3	224.9
≧ 200,000	304.5	0.5	167.1	136.9

TABLE 13 Percentage Change in Family Wealth Size Distribution Due to Pure Tax Effect of Modest Reform Inheritance Tax, 1962

Net Worth	Percentage Change Due to Tax
< $ 1,000	0.0
$ 1,000 < 2,000	0.1
2,000 < 3,000	0.4
3,000 < 4,000	−0.3
4,000 < 5,000	0.0
5,000 < 6,000	1.0
6,000 < 7,000	−0.2
7,000 < 8,000	0.5
8,000 < 9,000	−0.5
9,000 < 10,000	−0.8
10,000 < 15,000	0.4
15,000 < 20,000	0.3
20,000 < 25,000	−0.3
25,000 < 50,000	0.0
50,000 < 100,000	−0.7
100,000 < 200,000	−0.5
≧ 200,000	−0.4

taxed were stronger than their preference to benefit specific heirs, they would distribute their estate so that no inheritor ended up with more than $60,000 when his prior wealth and inheritance were summed. It is unlikely that all testators have such strong aversions, and many would accept some diminution of their distributed estates in order to benefit preferred heirs at lower marginal tax rates. At higher marginal rates, which come about with increasing size of bequests and increasing prior wealth of heirs, it is suspected that testators' aversion to taxes would overtake their preference for benefiting specific heirs, and they would parcel out some of their bequests in smaller amounts and to less affluent heirs.

The manner in which the modest reform inheritance tax simulation (experiment 3 above) was run has decedent's estates distributed according to patterns observed under the present federal estate tax, that is, without penalty for giving bequests in excess of $60,000 or benefiting heirs whose prior net worth equalled or exceeded $60,000. Consequently, we can think of the experiment as reflecting a limit at which

TABLE 14 Percentage Change in Family Wealth Size Distribution Due to Pure Tax Effect of Severe Inheritance Tax, 1962

Net Worth	Percentage Change Due to Tax
< $ 1,000	0.0
$ 1,000 < 2,000	0.0
2,000 < 3,000	0.0
3,000 < 4,000	0.0
4,000 < 5,000	0.0
5,000 < 6,000	0.0
6,000 < 7,000	0.0
7,000 < 8,000	0.0
8,000 < 9,000	0.0
9,000 < 10,000	0.0
10,000 < 15,000	0.0
15,000 < 20,000	0.0
20,000 < 25,000	0.0
25,000 < 50,000	0.0
50,000 < 100,000	0.4
100,000 < 200,000	−0.7
≧ 200,000	−0.6

testators were insensitive to a tax penalty for contributing to the concentration of wealth.

At the other limit, testators would not make bequests which resulted in an heir's after-inheritance wealth exceeding $60,000. We can approximate the results of such behavior by redistributing the taxes collected by the Treasury in experiment 3. We have no empirical basis for estimating how testators would parcel out their assets, but will arbitrarily assume that testators are indifferent to the wealth of heirs so long as the total inheritance tax remains zero for heirs other than those they would favor under an estate tax. It is also assumed that all taxes are redistributed on a per capita basis. These assumptions make it easy to compare the results of all four tax systems. The effect of the taxes under these assumptions can be measured by redistributing on a per capita basis taxes collected in each of the experiments.

A tax which redistributes net worth toward greater equality will reduce the numbers of family units in the intervals at the tails of the distribution and increase them near the mean of the distribution. In Table

TABLE 15 Percentage Change in Number of Families in Intervals of the Distribution of Net Worth due to the Taxation of Death Transfers and the Redistribution of Treasury Yield

Net Worth	Before Simulation Distribution (Thousands)	No Tax	Current Estate Tax	Reform Estate Tax	Modest Inheritance Tax	Severe Inheritance Tax
< $ 1,000	8,712.7	−2.9	−43.6	−52.1	−52.0	−52.0
$ 1,000 < 2,000	5,704.6	−5.0	55.6	61.2	61.7	61.7
2,000 < 3,000	2,697.0	−2.5	−1.4	10.6	9.5	9.2
3,000 < 4,000	2,339.6	−3.2	−3.7	−6.5	−7.3	−7.3
4,000 < 5,000	2,161.1	2.1	4.1	0.8	1.1	−0.5
5,000 < 6,000	1,688.7	1.2	−6.7	1.7	−2.3	−0.8
6,000 < 7,000	1,216.6	2.5	18.2	23.5	27.7	28.4
7,000 < 8,000	1,781.5	0.1	0.5	−3.7	−3.4	−5.1
8,000 < 9,000	1,350.4	1.9	−0.7	6.7	6.2	6.9
9,000 < 10,000	1,742.3	−4.8	−7.0	−22.0	−20.5	−19.8
10,000 < 15,000	6,381.4	0.0	0.0	4.0	3.7	3.4
15,000 < 20,000	4,717.8	1.8	1.1	2.2	2.3	1.9
20,000 < 25,000	3,507.6	1.8	2.1	−0.2	0.6	1.1
25,000 < 50,000	7,838.8	0.8	1.4	1.9	2.1	2.2
50,000 < 100,000	3,970.8	−0.2	0.5	0.4	−0.1	0.9
100,000 < 200,000	1,226.7	0.3	0.3	0.5	−0.2	−0.4
≧ 200,000	889.4	−0.5	−0.5	−0.9	−0.9	−1.2
Mean net worth	$29,714	$29,930	$29,930	$29,932	$29,934	$29,923
Standard deviation	$446,823	$446,060	$445,615	$445,879	$445,566	$446,544
Relative standard deviation	15.04%	14.90%	14.89%	14.90%	14.88%	14.92%

15, the percentage change in the number of families within intervals due to the joint effect of taxation and redistribution of Treasury collections is shown. The "no tax" column shows the changes due solely to the devolution choices made by testators, and the law, for intestate decedents.

The three hypothetical tax systems which we structured result in greater equality than the current estate tax. It will be recalled that the pure tax effect of the current estate tax is toward inequality, so what is observed in column 3 is mostly the redistribution of Treasury yield (about $2 billion). We have assumed that all citizens benefit equally from Treasury expenditures, so families benefit in proportion to their size. In the case of the modest inheritance tax or the severe inheritance tax, the redistribution of Treasury tax collections is equivalent to a behavioral change on the part of testators to bequest to heirs so as to avoid death taxes. Since the tax yield of the modest inheritance tax, the reform estate tax, and the severe estate tax are all about three and one-half times larger than the current estate tax yield (see Table 16), they all produce greater

TABLE 16 Treasury Yield under Four Simulated Death Tax Systems, 1962 (Millions of dollars)

Current estate tax	2,127
Reformed estate tax	7,214
Modest reform inheritance tax	6,572
Severe reform inheritance tax	6,672

redistributive effects than does the current estate tax. Both of the inheritance taxes result in greater redistribution than does the current reform estate tax. This is apparent from the percentage changes in the number of families within net worth intervals at the tails of the distribution.

When the redistributive effect of government expenditures is taken into account, it becomes apparent that reforms in death taxes can perceptibly change the distribution of wealth even in the short run. Longer-run simulations using the more flexible Orcutt model at the Urban Institute will permit tests of the longer-run consequences of these prototype death tax reforms.

As noted in the beginning of this section, the model takes account of the costs of dying—medical expenses, lawyer's fees, executor's commissions, and funeral expenses. Because these expenses are greater than the total taxes collected under the present estate tax system, some importance attaches to them in considering the impact of death on the distribution of wealth. Many low-wealth families may be driven into debt to bury a family member and settle his estate. In Table 17 we show the simulated costs of dying and related information.

TABLE 17 Characteristics of Decedents and Simulated Costs of Dying, Charitable Bequests and Assets Available for Distribution

Number of decedents	
Gross estate < $60,000	1,625,245
Gross estate ≥ $60,000	121,988
All decedents	1,747,333
Gross assets of decedents	$40,394,000,000
Net assets of decedents	$38,524,000,000
Costs of dying	
Last illness medical expenses	$529,000,000
Attorney's fees	$1,009,000,000
Executor's commisions	$544,000,000
Funeral expenses	$1,944,000,000
Total	$4,026,000,000
Charitable contributions	$1,706,000,000
Net assets available for distribution and taxes	$32,792,000,000

The cost of last illness is estimated at $529 million or about $301 per decedent. Attorney's fees amounted to $1 billion or over 3 percent of the wealth passing from decedent to beneficiary at death. Funeral expenses constituted an even greater share of the total wealth transmitted at death, $1.9 billion out of $38.5 billion, or almost 5 percent. Taking the total estimated cost of dying, $4.0 billion, we find that it amounts to about 10 percent of the total assets left for distribution.

III. METHODOLOGY

To operate the simulation model, a suitably organized sample representation of the U.S. population and a set of behavioral relations characterizing the devolution of wealth at death, by bequest or otherwise, were required. The Survey of Financial Characteristics of Consumers (SFCC) file was modified to that end. Patterns of wealth devolution were estimated using federal estate tax files and files of Washington, D.C., estate tax returns. We turn first to the modification of the SFCC file and then to a discussion of the simulation logic, bringing in the behavioral estimates in approximately the order in which they are used in the simulation.

Modifying the SFCC File

The SFCC file contains observations on 2,557 sample families representing 57.9 million family units in the population on December 31, 1962. The survey in which the information was gathered is the most detailed survey inquiry into family financial data available. Nevertheless, it contains a number of deficiencies which had to be remedied for the purpose to which we put it.

1. Family Composition The SFCC file contains limited information on family members living at home, but none for children who have left home. Since the main inter-generational flow of wealth is from parent to child, it is important to have a basis of simulating the flow of wealth to children who have left home.

Information in the SFCC file combined with information available about the number of children ever born to married women permitted a rough assignment of the number of children living away from home.

The SFCC file contained the following relevant information.

1. Marital status of head
2. Age of head
3. Age of spouse
4. Age of youngest child at home
5. Age of oldest child at home
6. Number of years since marriage

From the 1960 Census of Population, the number of children ever born by age of married women was obtained:

Age of Woman	Number of Children Ever Born
15–19	1.3
20–24	1.8
25–29	2.5
30–34	2.8
35–39	2.9
40–44	2.9
45–49	2.9
50+	3.4

SOURCE: Irene B. Taeuber and Conrad Taeuber, *People of the United States in the 20th Century*, Census Monograph Series, p. 429.

Above age thirty-five the average number of children born appears to be very close to 3.

The following rules were used to expand the family composition information on the SFCC record:

i. It was assumed the first child was never born before mother's age 17.

ii. Mothers under 35 were assumed to have all children living at home. Those 35 and over were eligible to have children living away from home.

iii. All mothers 35 and older were assumed to have no away from home children older than the number of years since their marriage.

iv. The number of children over 18 living away from home were assumed to be equal to the number of years since last marriage minus 18, but women were assumed *never more than 3 living children including those at home.*

v. The number of children living at home was set equal to the number of persons in the family minus 2 for "married couples" and minus 1 in families in which the head was widowed, divorced or separated.

vi. For all families headed by a divorced, widowed, or separated head, the number of children away and at home was calculated as though there were a wife present of the same age as the head. Further it was assumed that the marriage took place at the "wife's" age 20.

vii. When a family was assigned children living away from home, a shadow record for each such child was created in the file.

2. ***Treatment of Asset Composition*** The SFCC file provides far more detail of the composition of family wealth than is needed in the model. Consequently, assets were compressed into two categories: (1) life insurance face value minus policy loans; and (2) all other assets. All debts except life insurance policy loans (which were netted out of gross assets) were lumped together. The only reason for identifying life insurance as a separate category is the particular role that it plays in inter-generational transfers. Only the cash surrender value of the policy is appropriately considered a part of the assets of the living, but the event of death creates an asset equal to the face value less policy loans. (In reality, the owner of a life insurance policy and the insured need not be the same person, but we have not tried to deal with this distinction in the model.)

The SFCC file identifies three classes of persons: (1) family head (always male in a family including a husband and wife), (2) wife of head,

(3) other family members. The file identifies separately the values of the following assets and debts belonging to heads or wives:

1. Checking account balances
2. U.S. savings bonds (face value)
3. Mortgage assets
4. Nonmortgage loans to individuals
5. Life insurance (face value)
6. Savings account balances (includes amounts in savings and loan associations, credit unions, commercial banks, mutual savings banks and other savings institutions not specifically identified)

Each of the above assets held by other family members as a group was also identified. Other family members included both children and other persons living with the family. For our purposes, we assumed that all other family members were children of the head and wife and that they shared equally in the ownership of all assets and debts designated as belonging to other family members.

The following assets were not reported in the file as belonging to a class of persons, but simply as family assets.

1. Treasury bills (par value)
2. Treasury notes (par value)
3. Treasury certificates (par value)
4. Treasury bonds (par value)
5. State and local bonds (par value)
6. Foreign government and corporation bonds (par value)
7. Domestic corporation bonds (par value)
8. Loans to businesses
9. Corporate stock (market value)
10. Value of business assets (book)
11. Loans to business not elsewhere classified
12. Withdrawable amounts in profit-sharing plans
13. Value of family's residences
14. Value of investment real estate
15. Net value of brokerage accounts
16. Automobile value (market)
17. Oil royalties, patents, and commodity contracts

Lacking any data with which reliable estimates of the relative shares of total family assets held by husbands and wives could be made, we summed the values of the above seventeen categories and arbitrarily assigned 65 percent of the sum to the head and 35 percent to the wife, if present, or allocated it entirely to the family head when no wife was present. This procedure reduces some of the variation in relative shares of total family wealth held among husbands and wives and increases each of their shares relative to that of other family members. Since the value of assets held by other family members is relatively very small when compared to that held by the head and wife, the latter adjustment appears to be of little consequence.

Loans against life insurance policies were identified in the original file as obligations of the head, wife, or other family members as a group. The same treatment was applied to these debts in our model as was given assets similarly identified.

The following were designated family debts in the original file:

1. Loans secured by stock (other than margin accounts)
2. Loans secured by bonds
3. Installment debt
4. Noninstallment debt not elsewhere classified

The same treatment was accorded these debt items as was accorded family assets.

3. Pareto Adjustment of Upper Tail of SFCC Wealth Distribution The Survey of Financial Characteristics file is a stratified sample of U.S. noninstitutional population on December 31, 1962. High-income families were relatively overselected in the sample design, a feature particularly appropriate to our use of the file. Nevertheless, it is extremely difficult for a sample survey to capture the elongated upper tail of the wealth distribution. In practice what happens is that one ends up with a sample of a truncated tail. Because the tail of the distribution is of critical importance in a model of death transfers, we fitted a Pareto function to the weighted observations of families with net worth over \$25,000 and spread the 57 (unweighted) richest families out across the function, retaining their original weights so that they continued to represent the same proportion of the total number of U.S. families as in the original file, but they were assigned the midpoint of the net worth interval in which they fell on the net worth argument of the function.

The Pareto function, $P_{nw} = b(NW)^{-\alpha}$ was estimated to have the following parameter values: $b = 213.8$ and $\alpha = 0.74$, where P_{nw} is the percent of the population with net worth (measured in thousands) in excess of *NW*. Once the parameters of the function were estimated, it was possible to derive the value of *NW* which is exceeded by any proportion of the population.

$$NW = \sqrt[-\alpha]{\frac{P_{nw}}{b}}$$

The sum of the weights in the file are equal to the 1963 population of families. If the distribution of wealth were Paretian and the sample were adequate, we would expect the observations on net worth to follow the estimated values of the function. The richest 57 cases in the file had a combined weight of 23,501. This represented 0.0406 percent of the total sum of weights, and hence the lower end of the interval in which the entire 57 cases fell was estimated as $2.24 million. Taking each of the cases and sequentially cumulating their weights, the lower limit of the interval on the Pareto function was calculated.

$$NW_i = \sqrt[-\alpha]{1 - Z_n - \frac{\sum_{i=n+1}^{m} \gamma_m / \sum \gamma}{b}}$$

where Z_n is the ratio of the sum of the weights of the first 2,500 cases to the total sum of weights $\Sigma\gamma$. i runs from 2,501 to 2,557 (the 57 richest cases). The midpoint of the interval within which each case fell was substituted for the reported net worth of the case, and all the asset values of the cases were adjusted in accordance with the ratio of the assigned/original net worth values. Figure 1 and Table 18 show the details of this adjustment.

4. ***Adjustment of SFCC Wealth to National Balance Sheet Totals*** It is characteristic of field surveys that they underestimate the value of assets held in the society. In the case of the SFCC file, consumer durables were not measured and had to be assigned, using 1962 balance sheet figures. The value of consumer durables in 1962 was $150.3 billion. This value was distributed among families as follows: one-half of the $150.3 billion was distributed in proportion to all other assets. The other half was distributed in equal shares to each family.

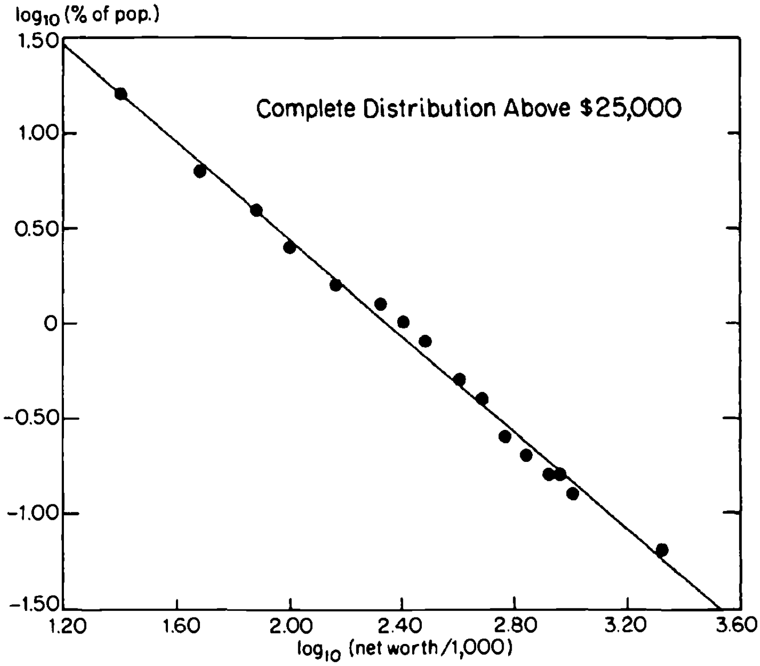
The value of assets other than consumer durables reported in the SFCC file was $1.41 trillion, while that reported in national balance sheets was $1.92 trillion. The Pareto function adjustment, described above, brought the SFCC total to $1.45 trillion. The difference, $510 billion, was assigned to families (heads and wives) in the same proportion as reported assets were held.

Simulation Procedures

Figure 2 is a schematic of the overall simulation model. The following procedures were carried out in the simulation process.

1. ***Replication of File*** The SFCC is a small sample, 2,557 cases. To overcome such Monte Carlo variability, all cases in the file with net worth under $2,000,000 were replicated 10 times and all cases with a net worth of $2,000,000 or more were replicated 100 times and the weights were adjusted accordingly.

FIGURE 1 Log of Percentage of Population Having Greater Than Specified Net Worth Versus Log of Net Worth



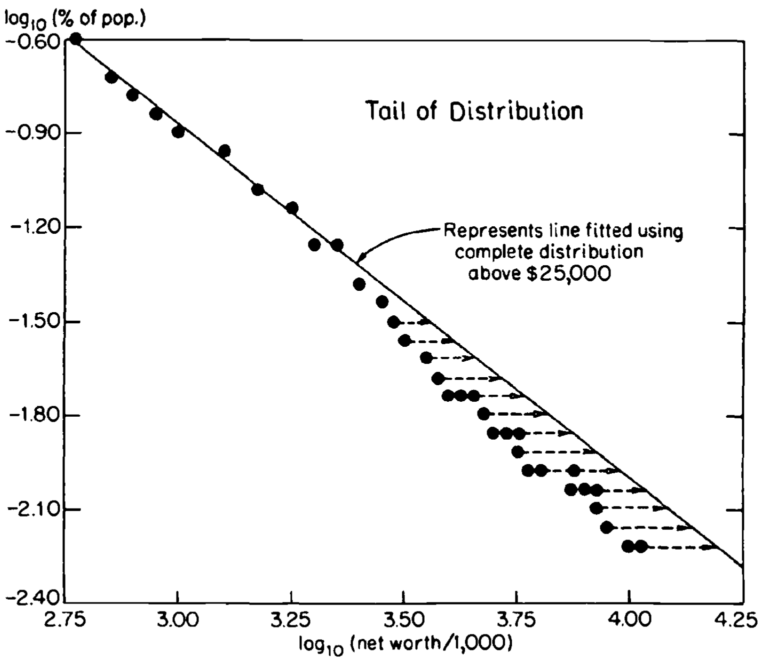


TABLE 18 Adjustment of Upper Tail to Conform to Pareto Function, 1962 SFCC File (Thousands of dollars)

	Original Value	Predicted Value		Original Value	Predicted Value
1.	23,438	180,504	40.	3,005	3,190
2.	14,862	77,327	41.	2,870	3,163
3.	14,491	53,647	42.	2,851	3,139
4.	10,084	11,729	43.	2,738	3,068
5.	9,846	11,115	44.	2,718	3,046
6.	7,943	10,625	45.	2,695	2,993
7.	7,690	10,285	46.	2,598	2,740
8.	7,378	9,318	47.	2,591	2,699
9.	7,098	8,797	48.	2,533	2,649
10.	6,951	8,236	49.	2,486	2,626
11.	6,923	7,722	50.	2,454	2,611
12.	6,714	7,563	51.	2,433	2,569
13.	6,610	7,418	52.	2,381	2,406
14.	6,380	7,262	53.	2,293	2,392
15.	6,013	6,976	54.	2,254	2,361
16.	5,503	6,807	55.	2,249	2,352
17.	5,010	6,694	56.	2,225	2,319
18.	4,886	6,330	57.	2,221	2,308
19.	4,673	6,099	58.	2,198	2,165
20.	4,667	6,016	59.	2,183	2,156
21.	4,389	5,184	60.	2,178	2,143
22.	4,362	5,051	61.	2,158	2,133
23.	4,266	4,981	62.	2,120	2,112
24.	4,228	4,914	63.	2,120	2,102
25.	4,163	4,819	64.	2,101	2,086
26.	4,139	4,723	65.	2,060	2,075
27.	3,903	4,672	66.	2,060	1,980
28.	3,574	4,608	67.	2,057	1,975
29.	3,571	4,552	68.	2,024	1,964
30.	3,450	4,492	69.	1,986	1,954
31.	3,401	4,433	70.	1,967	1,947
32.	3,351	4,390	71.	1,934	1,928
33.	3,341	3,963	72.	1,892	1,921
34.	3,228	3,851	73.	1,871	1,912
35.	3,143	3,818	74.	1,866	1,904
36.	3,112	3,787	75.	1,854	1,898
37.	3,073	3,688	76.	1,842	1,888
38.	3,054	3,657	77.	1,825	1,881
39.	3,010	3,560	78.	1,811	1,875

TABLE 18 (concluded)

	Original Value	Predicted Value		Original Value	Predicted Value
79.	1,788	1,789	90.	1,611	1,688
80.	1,788	1,783	91.	1,597	1,682
81.	1,783	1,776	92.	1,585	1,611
82.	1,762	1,770	93.	1,573	1,605
83.	1,755	1,756	94.	1,572	1,591
84.	1,729	1,744	95.	1,567	1,580
85.	1,729	1,737	96.	1,556	1,574
86.	1,726	1,731	97.	1,556	1,561
87.	1,663	1,726	98.	1,548	1,547
88.	1,658	1,710	99.	1,546	1,534
89.	1,629	1,705	100.	1,483	1,529

2. ***Mortality Probabilities and Death*** The modified SFCC file was passed and each person's record was interrogated by the Stochastic Death Generator to determine the age, sex, race, and marital status of the person. From a set of 1962 age-sex-race-marital status-specific mortality rates, the probability of death was determined. A Monte Carlo draw and the ascertained probability determined if the person died or lived. If the person was to live, the next person's record in the family was interrogated. If it was determined a person was to die, death was effected immediately and his family's record was reconstructed to reflect only the surviving members. If more than one death took place in a family, the family record was reconstructed after the last death. Following the death of a family member as much of the economic process of dying and transfering wealth was captured as data permitted.

3. ***Cost of Last Illness*** Nearly all deaths impose medical costs on the estates of the decedents. In cases where there is a terminal illness of prolonged length, the medical costs may be substantial. The deductibility of these costs for purposes of calculating taxable estate on the federal estate tax return provided a data base to estimate the relation of the cost of last illness to other characteristics of decedents. The cost of last illness was analyzed using AID-III.[9]

   In Figure 3 the result of the AID analysis is shown. The five final groups explain 5.4 percent of the variance in the cost of terminal illnesses as reported on federal estate tax returns. One would not expect to explain a great deal of the variance with the variables available to us, but there is a systematic, positive relationship between net worth and cost of last

FIGURE 2 Generalized Schematic of Simulation Model

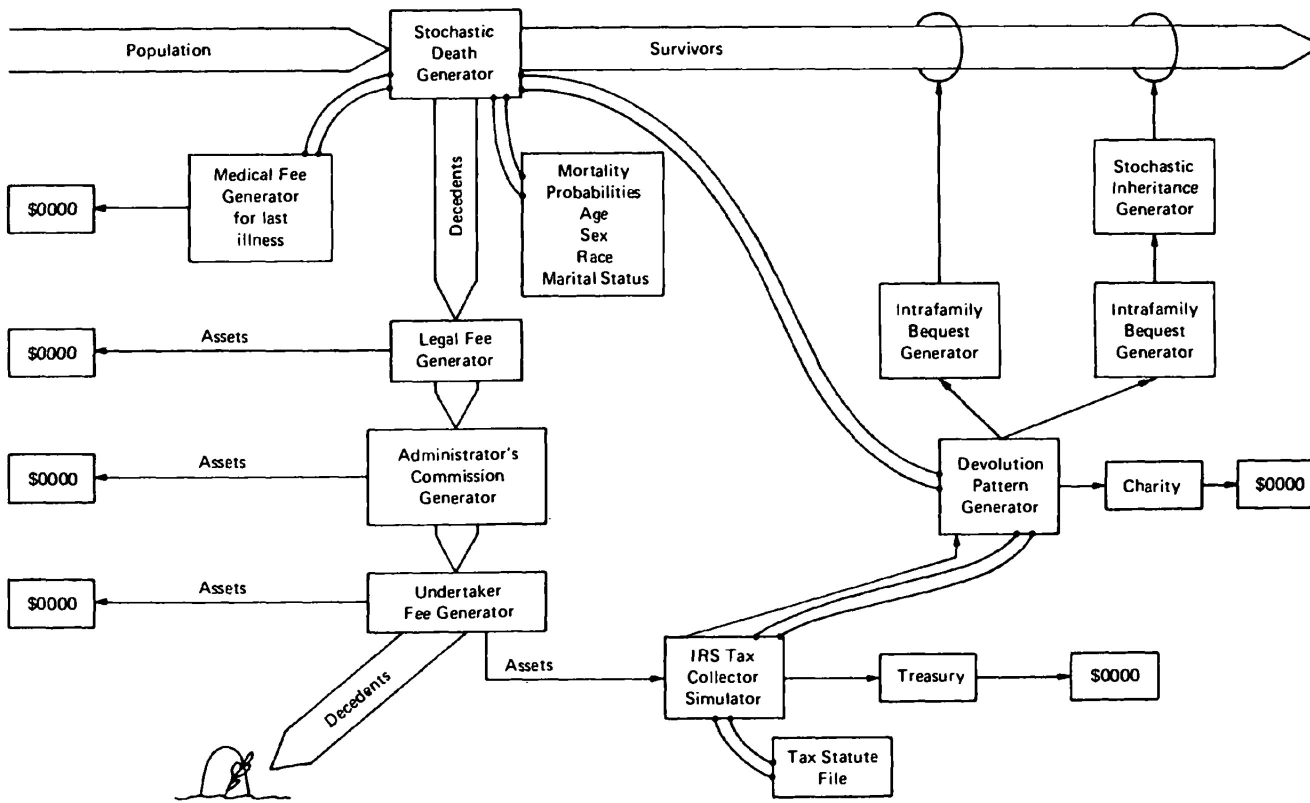
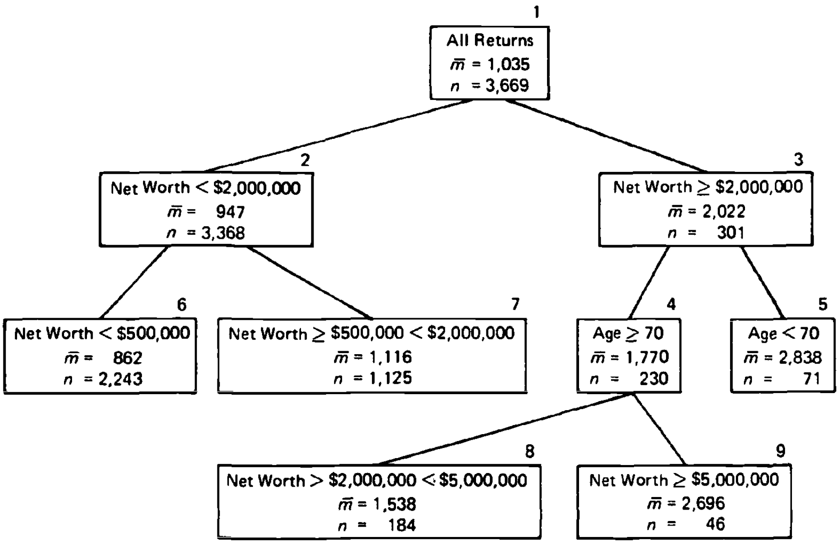


FIGURE 3 Medical Expenses of Last Illness ($\overline{m}$ = Mean Cost in Dollars)

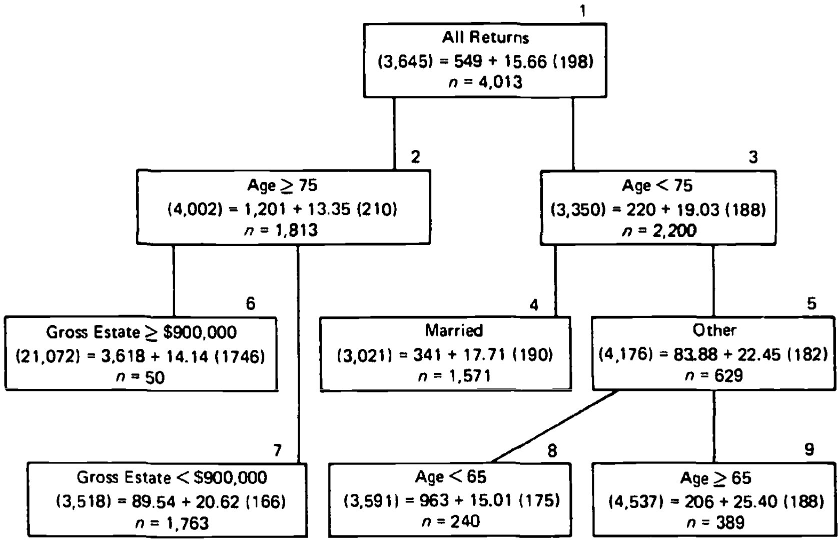


NOTE: Variation explained = 5.4%. Sex was an eligible variable but did not contribute to a significant reduction in variance. n = number of observations in group.

illness. The only other variable which contributed significantly to reducing the original variance was age of decedent. Thus, only these two characteristics of decedents were used in the attribution of last-illness costs. The actual attribution of the cost was unsophisticated, the expected value was assigned within each characteristic class.

4. *Attorney's Fees* Attorney's fees are a deductible item in the federal estate tax. Consequently, they are available from the estate tax return. Using AID to split the population into groups such that a regression of attorney's fees on gross estate within groups would produce the greatest reduction of variance relative to a regression on the total set of observations, 51.1 percent of the variance was explained. Age and marital status of decedent were the only other variables which were able to provide a basis for splitting the population with a significant reduction in variance. In Figure 4 it can be seen that a simple regression of attorneys' fees on gross assets (measured in thousands of dollars) would produce coefficients of a = \$549, b = 15.66. The predicted value \$3,645 is the expected attorney's fee when the mean value of the group's gross assets (\$198,000) is plugged into the equation.

FIGURE 4 Attorney's Fees AID with Regression on Gross Estate (Dollars)



NOTE: For the overall regression, $R^2 = 46.8\%$. Marginal variance explained by subgroup regression = 4.3%. Total $R^2 = 51.1\%$. Sex was also an eligible variable but could not produce a significant reduction in variance. The predicted value of the equation in each group is the value of attorney's fees estimated when gross estate measured in thousands of dollars was at its mean for the group. n = number of observations in group.

5. Executor's Fees The cost of executor's fees was estimated using two regression equations and data from the 1962 federal estate tax file.

$$EXCOM+ = a + b_1(NETWORTH) + b_2(MS1) + b_3(MS2) + b_4(MS3)$$

where net worth is measured in thousands of dollars, $MS1$ is a dummy for married decedents, $MS2$ is a dummy for never married decedents, and $MS3$ is a dummy for all other marital statuses. The equation was fitted separately for decedents with net worth under \$200,000 and those with net worth of \$200,000 or more. The estimated coefficients for the two equations are:

	Net Worth < \$200,000	Net Worth ≧ \$200,000
a	\$172.50	\$2,517.80
b_1	14.8	17.3
b_2	−843.5	−3,575.0
b_3	575.5	4,223.4
b_4	268.0	−648.1
	$R^2 = 17.9$	$R^2 = 32.2$

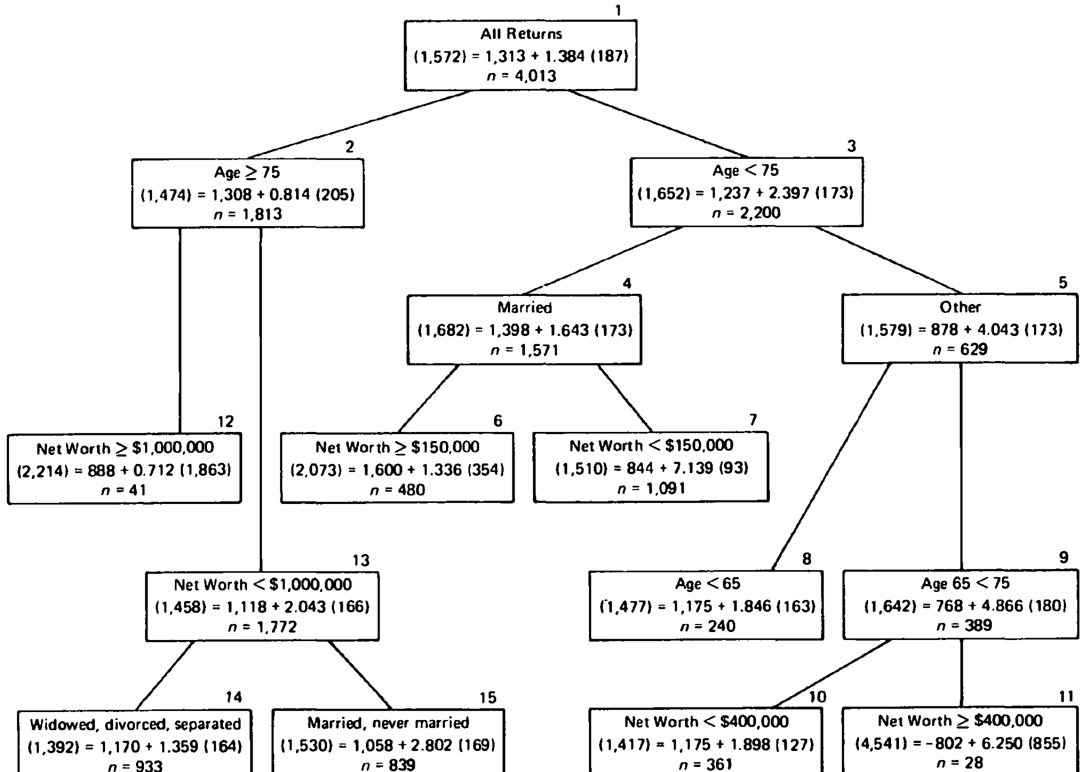
6. ***Funeral Expenses*** In the simulation, they are attributed to decedent's estates on the basis of 8 regression equations fitted in the process of an AID run on the 1962 estate tax file. The combined splitting of the population into eight final groups, and the simple regression of funeral expenses on net worth within each final group, explained 19.2 percent of the variance of funeral expenses. In Figure 5 we show the results of the AID run with group regressions.

In some cases, the total costs of dying exceed the assets of the decedent. This is frequently the case with children. Although they will not generally incur legal or administration fees of any significance, the cost of last illness and funeral will diminish estates of children as well as those of adults. Whether a child or an adult, the cost of last illness, administration fees, lawyer's fees, and funeral expenses are all deducted from their estates in accordance with the AID analyses above. When these costs result in a negative estate, it is transferred to the decedent's heirs in the same manner as a positive valued estate. This conceptualization is consistent with the actual process of cost bearing for decedents.

7. ***Bequest Patterns*** Little information is available about the pattern of transfers set in motion by death. Data available from the IRS identify amounts going to charity and in some years to spouse, but no information about the division of bequests between members of the decedent's family living at home or, for that matter, the total amount remaining in the decedent's family versus that going to noncharitable legatees outside the immediate family. In order to estimate the pattern of estate distribution, a file constructed by Smith from estate tax returns filed in the District of Columbia in 1967 was used.[10] The statutes of the District of Columbia require an estate tax return to be filed for the estates of all decedents with gross assets of $1,000 or more. Thus, the file provided nearly the complete range of estate sizes. Further, the file was constructed to provide information about the distribution of assets among spouse, children, other relatives, nonrelatives and charities (including gifts to governments). The processes of estimating the pattern of estate distribution in a form suitable for Monte Carlo applications is depicted in Figure 6.

The first step was to use AID to estimate the probability that a bequest was made outside the family. A family is defined for this purpose as a head, wife, and children, wherever they live. All never married persons were excluded from the estimation on the grounds that we would follow the arbitrary rule that never married persons had neither spouse nor children and that all their wealth would flow outside the family as defined. The results of the AID analysis are shown in Figure 7. The combination of being married and having a net worth of under $100,000 resulted in a

FIGURE 5 Funeral Expenses AID with Regression on Net Worth



NOTE: The overall regression R^2 = 9.3%. Marginal explained by subgroup regression = 9.9%. Total R^2 = 19.2%. Dependent variable in parentheses is the estimated value of funeral expenses when the independent variable in parentheses, net worth, measured in thousands of dollars is at the mean for the group.

FIGURE 6 Estimation Sequence for Identifying Patterns of Wealth Flows at Death

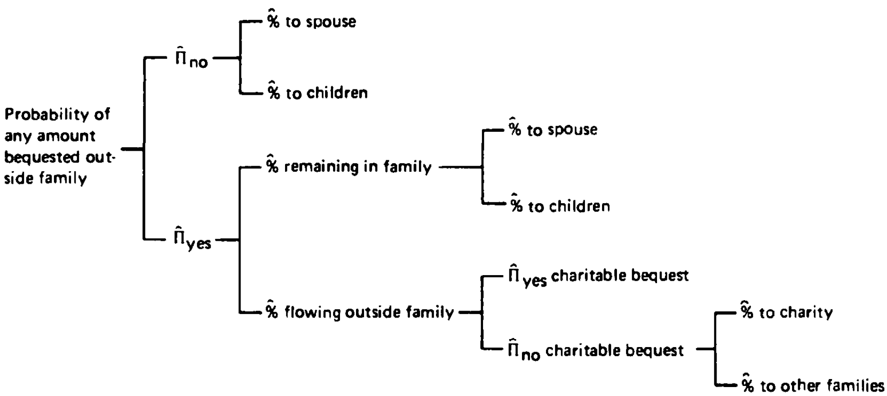
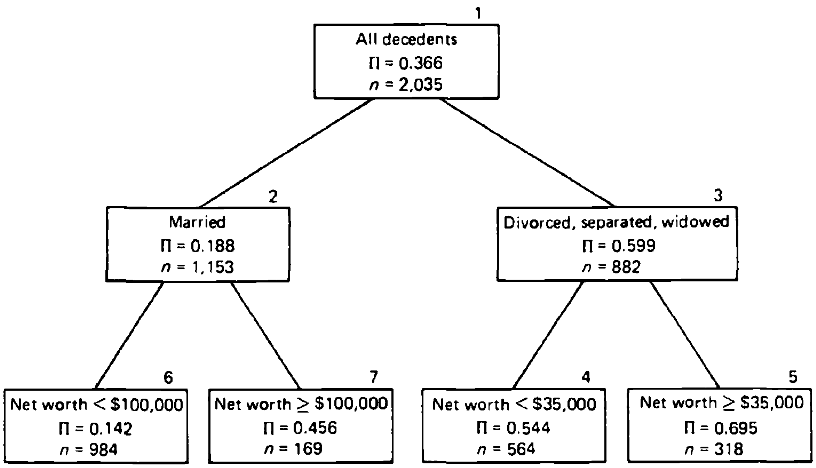


FIGURE 7 Probability of Making a Bequest Outside Family



NOTE: Variance explained = 22.4%. Age and sex were also eligible variables but did not contribute to a significant reduction in variance.

probability of .142 of making a bequest outside the family. If a decedent were not married and had $35,000 or more, on the other hand, the probability of making an outside bequest was .695. The four end groups shown in Figure 7 accounted for 22.4 percent of the variance around the mean probability of outside bequests for all decedents.

In order to estimate the mean share of assets going to a spouse, a sample of 1,090 decedents who were residents of the District of Columbia and married at the time of their death in 1967, was used to calculate the proportion that the value of assets passing to spouse was of the total value of assets passing to children plus spouse, by sex and value of estate. The mean of the ratio was also calculated:

$$\frac{\sum_{i=1}^{n} \frac{\text{spouse}_i}{\text{spouse}_i + \text{children}_i}}{n}$$

These values are shown in Table 19.

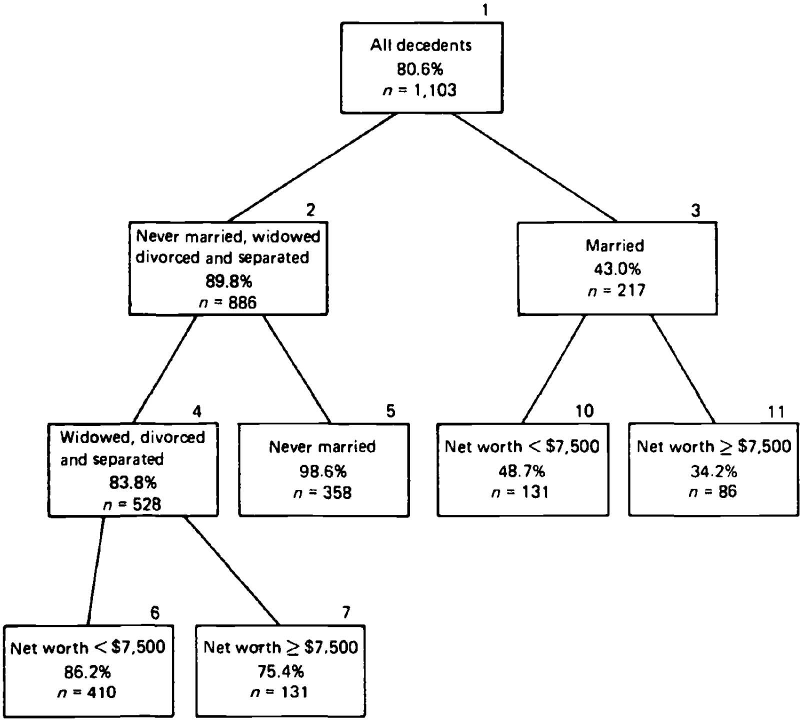
TABLE 19 Wealth Bequeathed to Spouse as a Percent of Total Wealth Bequeathed to Spouse and Children by Sex and Value of Total Net Estate of Decedents, Washington, D.C., 1967

Value of Net Estate (Thousands of dollars)	Mean of Ratio: $\frac{\text{Spouse}}{\text{Spouse + Children}}$ Males	Females	Ratio of Aggregates of Wealth: $\frac{\sum \text{Spouse}}{\sum \text{Spouse + Children}}$ Males	Females
< 5	86.7	79.0	85.7	82.7
5 < 10	90.4	87.3	90.9	86.1
10 < 15	91.7	82.3	92.1	82.9
15 < 20	90.6	86.3	90.9	86.9
20 < 25	95.5	79.9	95.1	80.5
25 < 30	90.7	90.9	91.0	89.7
30 < 35	97.7	83.4	97.7	82.9
35 < 50	96.0	81.3	96.3	81.6
50 < 75	82.9	75.2	82.3	75.6
75 < 100	91.0	66.6	90.9	63.0
100 < 250	79.4	59.0	79.8	55.8
≧ 250	72.1	52.7	75.3	41.8

Females consistently transfer less to their surviving spouse, as a proportion of total transfers to spouse and children, than do males, and the distribution of estates between wives and children shifts in favor of children as the total value of estates increases. The observed patterns with respect to value of estate are consistent with estate planning strategies to minimize repeated taxation of the same bundle of wealth.

Given that we had a basis for predicting the probability that a bequest would be made outside the family, it was necessary to estimate the share of one's estate which would flow outside (or, conversely, remain inside) the family. AID was used again, this time to estimate the proportion of a decedent's assets which were bequested outside the family if any outside bequests were made (see Figure 8).

FIGURE 8 Percent of Decedent's Assets Bequeathed Outside Family for All Decedents Making Outside Bequests

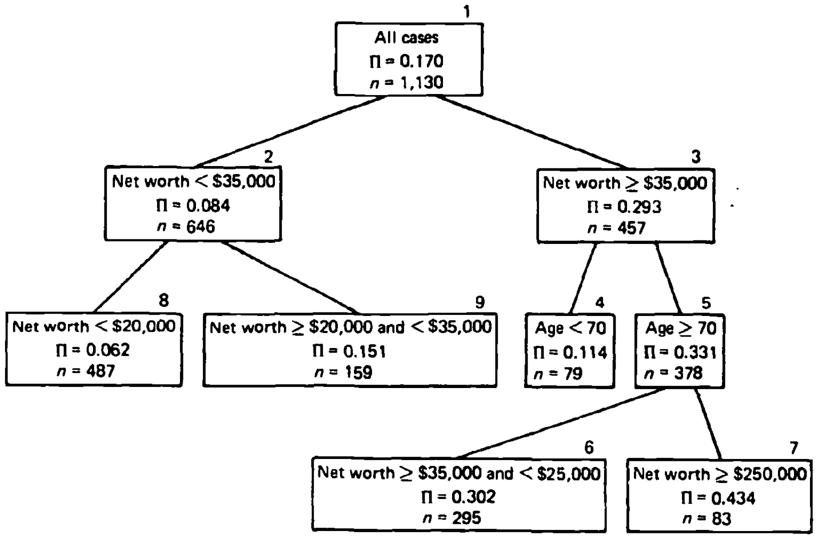


NOTE: Variance explained = 38.4%. Age and sex were eligible variables but did not contribute significantly to the reduction of variance.

As might be expected, married decedents give a smaller share outside their family than do decedents who are other than married. The proportion of one's assets given beyond the bounds of the family decreases with increased wealth, but the absolute amount most likely increases, given the relative small change in the percentage increase associated with increased wealth.

We next estimated the probability that those decedents transferring wealth outside their family made a bequest to charities or governments. The AID tree shown in Figure 9 explained 11.3 percent of the variance in the probability that a charitable transfer took place. The second step in the estimation of charitable bequests was to estimate the share of assets

FIGURE 9 Probability That Bequest is Made to Charity or Government, Given That Some Wealth Was Bequeathed Outside Family



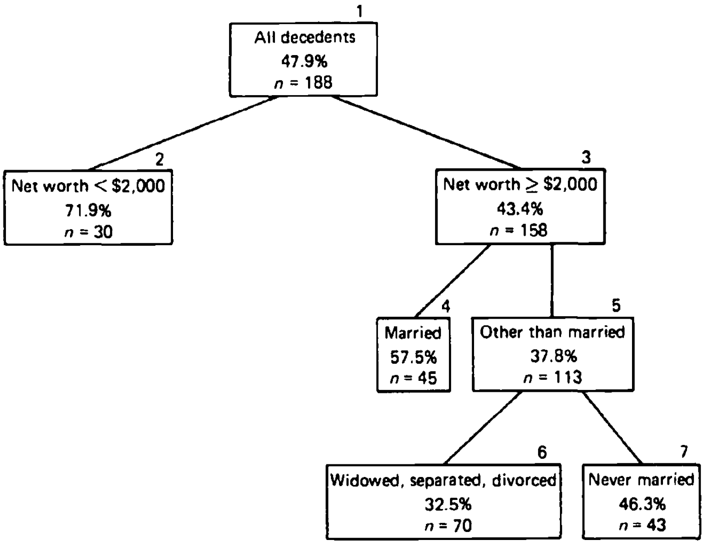
NOTE: Variance explained = 11.3%. Sex and marital status were also eligible variables, but could not contribute to a significant reduction in variance.

leaving the family which went to charities (including gifts to government) for all decedents making charitable bequests. We were able to explain 13.6 percent in the variance in the share of wealth flowing away from decedents which went to charities. The AID tree of Figure 10 shows the result of the AID analysis.

Estimation of Inheritances from Outside Family Unit

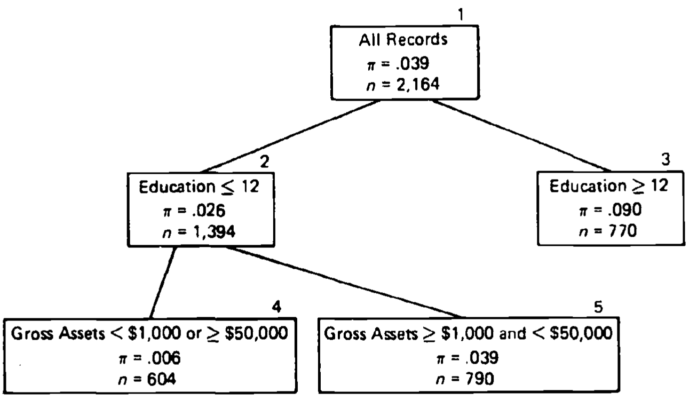
The sum of inheritances and gifts received by 113 families are contained in the SFCC file. The ratio of inheritances generated by estates over $60,000 to the value of gifts greater than $3,000 reported in *Statistics of Income, 1962,* is about seven to one. On this basis, the value of gifts and inheritances in the SFCC file was treated as inheritances only. Estimation of an inheritance pattern was done in two stages. First, the probability that a family will receive an inheritance during the simulated year was estimated using AID. The results of the AID analysis shown in Figure 11 indicate that inheritance from outside the family unit cannot be predicted very well (R^2 = 2.3%) with the information that was available. For the

FIGURE 10 Percent of Estate Leaving Family That is Bequeathed to Charity for Decedents Making Bequests to Charity



NOTE: Variance explained = 13.6%. Age and sex were eligible variables, but could not significantly reduce the unexplained variance. The category of charity includes donations to government.

FIGURE 11 Probability of Receiving an Inheritance



NOTE: Variance explained = 2.3%. Income, age, marital status, sex and race were also eligible variables but did not contribute to a significant reduction in variance.

simulation, each family was assigned an inheritance probability π equal to one of four values in the final AID groups. The second stage was to estimate an equation to predict the size of inheritance using the 113 SFCC families which received an inheritance. The resulting equation has the form:

$$\log_e (INHERITANCE) = a + b_1 (GROSS\ ESTATE) + b_2 (AGE) + b_3 (ED)$$

where *GROSS ESTATE* is measured in thousands of dollars, *AGE* and *ED* are the age and number of years of education of the head, respectively. The estimated coefficients are

$a = 3.58$

$b_1 = 0.0007$ $\qquad R^2 = 21.9\%$

$b_2 = 0.027$

$b_3 = 0.17$

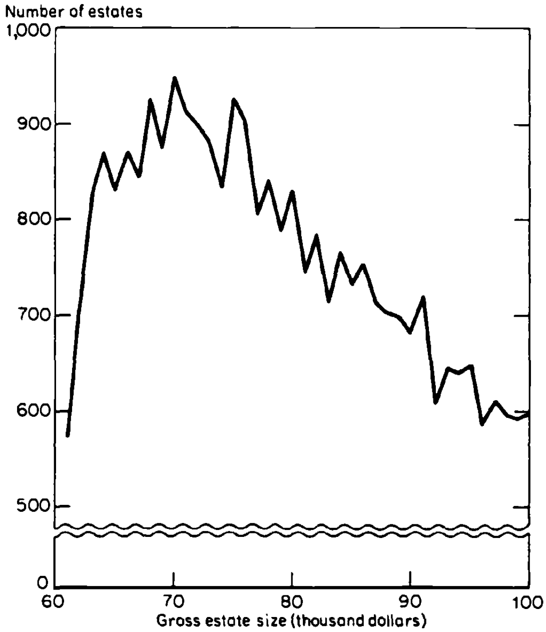
NOTES

1. Lee Soltow, *Toward Income Equality in Norway* (Madison, Wis.: University of Wisconsin Press, 1965).
2. Robin Barlow, Harvey E. Brazer, and James N. Morgan, *Economic Behavior of the Affluent* (Washington, D.C.: Brookings Institution, 1966).
3. Dorothy Projector and Gertrude S. Weiss, *Survey of Financial Characteristics of Consumers*, Federal Reserve Technical Papers, Aug. 1966.
4. John A. Brittain, "The Intergenerational Transmission of Wealth: Prospects for a Research Program," Dec. 1971, processed.
5. Conceptually, the model can most accurately be said to reflect death between July 1, 1962 and June 30, 1963. This comes about because the SFCC sample represents the U.S. population on December 31, 1962. Official mortality rates are available using a July 1, 1962 or July 1, 1963 base. We arbitrarily chose the 1962 base.
6. The number of estates filing tax returns in 1963 are graphed by size of gross assets in the chart below. In contrast to all other evidence about the size distribution of assets, the frequency of estates below about $70,000 declines rapidly. The failure of estates to file is believed to result from the fact that most such estates have a zero tax liability. Discussions with employees of the Internal Revenue Service indicate that they believe substantial nonfiling occurs for estates with "gross" assets of less than $70,000. See figure on next page.
7. No attempt was made to capture the incidence of fetal deaths or deaths of infants at birth, since the SFCC file would not readily provide a basis for such events.
8. U.S. Department of Health, Education, and Welfare, *Vital Statistics of the United States*, Mortality, Part A, 1963.
9. AID-III is a data-searching algorithm which sequentially splits a population into pairs such that the sum of the variance around the mean of the pair or the expected value of a regression is the smallest possible proportion of the variance around the expected values of the group from which the pair was derived. The technique has the advantage

over regression in not requiring an additive set of independent variables. It also imposes no linearity restrictions on relations between variables. For a detailed discussion on AID-III, see John A. Sonquist, Elizabeth L. Baker, and James N. Morgan, *Searching for Structure* (Ann Arbor, Mich.: Institute for Social Research, 1971).

10. James D. Smith, "White Wealth and Black People: The Distribution of Wealth in Washington, D.C., 1967," in James D. Smith, ed., *Personal Distribution of Income and Wealth* (New York: NBER, 1975).

Figure for Footnote 6



15 COMMENTS

John A. Brittain
The Brookings Institution

The role of the inheritance of personal wealth in the perpetuation of economic inequality is an intriguing and important question. A related puzzle is the apparent failure of nominally high death-tax rates to curb inheritance or alleviate inequality to any significant degree. This paper by Smith, Franklin, and Orcutt initiates an interesting and stimulating microsimulation approach to these issues. Their objective is to portray the net direct effect on the wealth distribution of a four-step sequence: deaths, associated costs, the intervention of taxation, and distributions to heirs. While the authors may have raised more questions than they have answered, particularly with respect to the reliability of the output of these simulations, this is a useful pioneering effort.

(It should be noted here that my comments originally presented at the conference have been substantially rewritten because the authors have since revised practically their entire empirical presentation. The main changes here are in Section 2, from which tabulations of my own derivative computations have been dropped; some tentative generalizations from those estimates have been retained, however, in the belief that they are still valid.)

Smith et al. speak modestly of a simulation "experiment," but they also cautiously suggest that its results point to weak tax and inheritance effects, at least in the short run. They also find considerable short-run mobility within the wealth distribution. I shall try to give the gist of their model and findings, along with some running comments on both. A few general observations are reserved for Section 3.

I. THE SIMULATION SCHEME

It may be useful to turn at once to the second half of this paper for details on the underlying simulation model. There is time, however, to convey only its general flavor.

Mortality in the Initial Population

Like the Watergate literature, simulation seems to have an eerie language of its own. There is the usual initial population that is manipulated by operating

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characteristics. In the present paper, there is reference to a complex algorithm which drives the system, but, for brevity, the readers must settle for a flow chart. Even so, the initial population, scenario, and time frame are clear enough. It is New Year's Eve, 1962. The curtain rises to reveal 59 million consumer units, their wealth and other aspects of their private lives. Actually our view of this huge initial cast of characters is provided by a projection of a broad sample known as the "modified SFCC file," and described in detail in the paper. Enter the Stochastic Death Generator, who is nothing more than an objectively selective executioner. He is offered his choice from the modified file of consumer units. Guided by the Census probability of death during 1963 for a person of given age, sex, race, and marital status, the Stochastic Death Generator invokes a Monte Carlo draw to do away with about 400,000 consumer units and 1.7 million individuals. The Generator's victims are not replaced, nor is any adjustment made for growth or inflation in 1963.

Adjustments and Deductions from Gross Estates

The received 1962 Projector-Weiss sample of 2,557 families (SFCC) is adjusted by adding flows to children who have left home and compressing asset categories. The face value of life insurance is removed from the SFCC wealth variants for the living, which clearly understates their wealth by ignoring current cash values. An attempt is made to enrich the information on top wealth holders by extrapolation of a Pareto fit to data on families with net worth under $25,000; the 57 richest families were spread out to conform with this Pareto distribution, but with their relative weight unchanged. This reliance on the Pareto line greatly increases estimated wealth at the top, and a rationale for the procedure seems essential. In any case, to stabilize the Monte Carlo estimates, the modified sample is then replicated tenfold below $2,000,000 and one-hundred-fold above, with weights being adjusted accordingly.

After the rubbing out of each individual, his family record is reconstructed to include only surviving members, and revised to reflect expenses, taxes, and inheritances. This requires an elaborate system of behavioral relationships to portray the main costs of dying (including federal estate taxes), and the effect of wealth transfers at death. For example, medical costs of the last illness deducted on federal estate tax returns are related to net worth and age; attorney's fees are regressed on gross assets within various age groups. Executor's fees are regressed on net worth and marital status dummies within estate size classes; funeral expenses were estimated similarly. The four behavior models were only modestly successful, with the variance explained ranging from 5 percent for medical expenses to 51 percent for attorney's fees. Whether good fits or bad, they were used to estimate the net estates left by 1.7 million individuals tapped by the electronic Grim Reaper. Further deductions, based on various estate tax structures, are presumed to yield the amount available for distribution.

In their lengthy methodological section, the authors do not discuss the role of taxes explicitly. Presumably each federal estate tax structure discussed early in the paper is built into the model to form the link between taxable estate and the amount available for distribution. However, there apparently was no way of allowing for the effect of state death taxes on federal tax liabilities and on the net amount available for distribution. Nor could any account be taken of gift taxes that may have been paid essentially in lieu of estate taxes.[1]

The Pattern of Bequests

Given the estimated amount available for distribution from the 1.7 million estates, the next step was to develop a model to estimate individual bequests. This is a complex problem, involving leakages from the family unit as well as inheritances from without; it also requires a model of the distribution among spouse and children. The last fifth of the paper discusses the estimation procedure, utilizing District of Columbia data on 1957 estates as low as $1,000. It is extremely difficult to appraise the reliability of these inheritance equations and probability distributions, but in general their explanatory power does not seem very great. It would be useful to compare the results to those from simple hypothetical assumptions such as: everything to spouse, if any; otherwise, equal division among children, if any; otherwise, everything to charity. This might indicate how much these manipulations are accomplishing.

An appraisal of the reliability of this microsimulation model is extremely difficult for me (and, no doubt, for the authors themselves). The extermination of 1.7 million consumer units according to a four-way demographic classification is a fairly persuasive beginning. However, the explanatory models of deductions and inheritances seem rather rough, since they do, on the average, no more than about 20 percent of the job. One is, at least, left to wonder how the results from this experiment would compare to the results if more reliable operating characteristics were available.

II. THE FINDINGS: TAX EFFECTS AND REFORMS

The effects of the current and three other tax structures were studied via four simulations. That is, the basic simulation model with a given set of operating characteristics was run repeatedly, with only the tax structures being changed. While useful, it should be noted that this approach stresses the comparative effects of different tax structures, as distinct from an explicit analysis of the effect of inheritance (as modified by these tax structures).

Current Estate Tax

The authors check the size distribution of gross estates generated by their model against returns reported to the Internal Revenue Service in 1963. In this range of estates (over $60,000) the agreement on frequencies seems satisfactory, even though in the range below $100,000 the IRS falls far short; this is presumably due to nonfiling on behalf of nontaxable estates. Thus, the more realistic and larger number of units in the simulation should not seriously undermine its tax estimates, since most of the marginal wealth units would show zero estimated tax liability.

In their Table 3, the authors next compare wealth distributions before and after simulation.[2] A reduction in numbers in the bottom class suggests a slight reduction of overall wealth concentration for which the estate tax can claim little credit; it was probably largely due to the disappearance of elderly poor from the distribution. It is clear that this in itself represents no fundamental change. What one would like to know is the shape of the distribution after the decedents have been replaced by increases in other demographic categories, and after allowance for growth and inflation.[3] In any case, the authors appear to have overlooked an offsetting peculiarity in the table. The postdeath simulation yields higher numbers in four of the six size classes over $15,000—about 1 percent more altogether; this works against any decline in concentration suggested by the reduced number of the poor.

A breakdown of the distribution by age shows, not surprisingly, a general decline in frequencies all along the wealth distribution for those over 65. More significantly, the number of relatively well-off persons under 30 also appears to have increased slightly; 47 percent are above $2,000 after simulation, compared to 44 percent before, and the number in every class above $2,000 increased, with one exception. This seems to indicate inheritance by already relatively well-off young families; this conclusion must be qualified here and in later discussions, however, by the perplexing fact that the number of consumer units in this age group rose from 7.31 to 7.49 million, despite a plausible overall decline of .40 million among all age groups.

It would be interesting to learn how the conflicting tendencies in Table 3 add up in terms of standard measures of inequality. I have made rough estimates of the standard deviation of the logarithmic of wealth based on these distributions. If valid, these confirm some of the authors' points, raise some new questions, and clarify the effects of tax reforms discussed later.[4] My highly tentative figures support the authors' impression of a slight decline in overall concentration under the simulation; it appears that the increased numbers in the top classes did not completely offset the effect of a reduction in numbers at the bottom. Although young people who were already relatively well-off appear to have fared well, the reduction in the numbers at the bottom also suggests some of them may have been moved well up the scale; their gains at the bottom may have outweighed gains at the top. In any case, these developments among young families probably account for most of the overall increase in numbers at the top.

The figures also indicate a plausible 6 percent decline in the numbers of families headed by the aged, and my rough estimate suggests an overall decline in wealth concentration in that group. This decline in concentration among the elderly appears due to a concentration of deaths at the top and bottom, for which I have no ready explanation. My computations also point to one interesting statistical artifact. Despite taxes, expenses, charitable contributions, and other leakages, and with no income growth or inflation in the model, the simulation of deaths yields estimated increases in the overall mean net worth and the mean for each age category. If this is correct, the decline in the number of family units and the increased value of life insurance after death apparently offset the effect of death taxes and other leakages. However, it would be prudent to check the individual results for an explanation.

Smith et al. also present their estimates on a per capita basis to offset the effect of decreased family size. However, the figures reported in Table 4 are quite implausible; for example, after simulation, more than 25 percent of families with heads under 30 had a per capita net worth of $2,000 and above compared to only 15 percent before; about one out of every eight families with net worth under $2,000 was moved up from that class, and the relative frequency in the $3,000–$4,000 class increased from 1 percent to nearly 6 percent. The questionable nature of the figures in Table 4 is perhaps even better illustrated by the data on *all* families with per capita net worth under $1,000. The simulation reduced the number of families in this wealth class by 3.5 million, or 18 percent. Deaths reduced the total number of families by 0.4 million, but it is unlikely that more than 0.2 million of these were among the one-third of families with per capita wealth below $1,000. The authors report that about 1 percent of the population died that year. It is difficult to conceive that they concentrated sufficient bequests among the poorest third of the wealth distribution to raise the per capita wealth of nearly 18 percent of these families above $1,000. If they really did so, the inheritance process would have to be counted as a most remarkable antipoverty institution!

Obviously the data underlying Table 4 should be reinvestigated, but it is possible that the results in the upper ranges are valid. Of course, any substantial overall gain by the better-off young would be an important finding, but it would also be difficult to attribute it all to inheritance; only about 1 percent of the population of *individuals* died and nearly half of them presumably left most of their estate to an elderly spouse. Clearly, the indicated relative gains by well-off young families are rather implausible and deserve further analysis.

A useful attempt is made with 10 × 10 transition matrixes to display the movement among wealth classes. The lack of smoothness in the results is bound to raise some doubts. For example, in Table 5 only 500 families starting in the top tenth fell into the third and fourth "deciles," but 20,800 fell all the way to the fifth or sixth. The matrixes would also be more interesting if an age breakdown were provided as before. The sums of rows and columns are also rather far from checking out. Nevertheless, some aspects of these rank switches are interesting. For example, the table suggests a much greater tendency to rise from the bottom tenth as a result of the death simulation than to fall from the top. About 880,000 families (18 percent) rose at least one notch from the bottom tenth compared to 119,000 (2 percent) who fell from the top. This finding and virtually the same result in Table 6 may, however, be related to the implausible gains by poor families already discussed in connection with Tables 3 and 4.

To sum up, the indicated overall effect of simulated taxes and inheritance is minuscule, but plausible, except for the gains in the lower ranges of Table 4. The key, but unexplained, finding is a relative gain by the wealthier young families, but the *amounts* of wealth involved are small, and the tabulations seem questionable on some counts.

Alternative Tax Structures

Three reforms are studied:

a. Estate Tax Reform: $100,000 exclusion, 50 percent marginal rate on the first $400,000 taxable, 100 percent marginal rate above that.
b. Inheritance Tax, Modest Reform: heirs taxed by estate tax rates, but base equals inheritance plus prior net worth.
c. Inheritance Tax, Severe Reform: first $50,000 of inheritance is exempt, remainder is taxed at a 100 percent rate.

No philosophical cases are presented for these reforms, although some interesting probable consequences are discussed in the authors' concluding observations. In any case, the menu is broad enough to make an empirical study of their effects interesting. From the simulations emerge the most important conclusion of this study. That is the virtually total impotence of even substantially more progressive death taxation as regards moving the wealth distribution toward equality, at least in one year. Despite the importance of this finding, very little time need be spent on it here; the computations based on the simulations of tax reforms (Tables 8–12) yield results only slightly different from those under the current tax. When Smith et al. allocate tax proceeds equally per capita (Table 15) the taxes are found to have a greater effect, especially on the lower wealth classes. However, the differences in effect *among* the alternative taxes remain small. Thus the reforms have no significant effect on the wealth distribution in one year.

The short-run redistributional impotence of death-tax reform also has an important corollary. If so radical a departure from the estate tax as the "severe" inheritance model produces about the same overall results as the estate tax itself, it can be inferred that the latter has little short-run impact on the overall wealth distribution. In fact, none of these tax structures has much effect, even at the top. As a further inference, it is apparent that even the modest changes between "before" and "after" revealed in the many tables of this paper can be attributed more to the decedents' dropping out of the distribution, to inheritance, and to factors other than taxation.

It seems safe to attribute the indicated impotence of estate taxation to two major factors. First, not many individuals die in a given year. Second, of these decedents, only a small fraction have any substantial amounts of material wealth to leave behind.

III. CONCLUDING REMARKS

One experiment always leads to others, so I hope I will not appear insatiable if I mention some thoughts for the future.

Tests of Simulation Model

The minimal redistributive effects observed are important, so further checks of the reliability of the model are in order. There could be more checking of changes in aggregates, such as overall wealth, against components of the change, like taxes, expenses, and charitable contributions; such estimates could be checked against other sources. In the case of the operating characteristics, tests of some alternative or extreme assumptions might be tried, such as primogeniture against equal division.

Broadening the Scope

Integrating this model with a broader one embodying savings, consumption, and growth, as well as feedback effects, will inspire more confidence. This would also allow for new entries into the population replacing the decedents, without which the meaning of the experiment is rather clouded. Behavioral effects of the tax, such as the use of avoidance techniques, need further consideration, especially gifts, insurance, and trust devices and estate-planning strategies in general.

It is vital for any inheritance model to consider also marital selection patterns. Obviously men do not marry women of equal wealth, but neither is the pairing random. It would be useful to estimate the correlation and analyze its effect on the wealth distribution.

Extension of the Model over Time

The above suggestions may be overambitious. Less grandiose and, I should think, readily implemented, would be repeated annual simulations carrying the initial population many years ahead. Perhaps there is suspicion that the operating characteristics will drift, but I am surprised that it has not been tried here. Is the computer already groggy? Is the Stochastic Generator exhausted or finding his work distasteful? I should think the long-run effect of death taxes and inheritance taxes may be fairly substantial despite short-run stability. One might expect inheritance to help perpetuate inequality, whereas the estate tax works to alleviate it. A projection of the model might show which force is stronger. When all is said and done, however, I suspect that the inheritance of *human* wealth will be found to be the major force maintaining the overall inequality of economic status. On the other hand, material wealth undoubtedly does have a powerful influence at the top of the distribution.

NOTES

1. The marital and charitable deductions for estate tax purposes, unlike the previously mentioned expenses, were not treated as expenses out of gross estate. They were allowed for in estimating the tax, however, and their effects on inheritance were also taken into account.

2. The table refers to "Before Taxes" and "After Taxes," but the meaning is actually "Before Deaths" and "After Deaths," with the full effects of costs and inheritances being measured, not tax effects alone. In later tabulations, the authors attempt to separate the two effects.
3. The more elaborate simulation model at the Urban Institute may ultimately offer some insight on this.
4. The logarithmic transformation was used to achieve symmetry, and, consequently, more accurate approximations to the mean and standard deviation. The transformation also yielded approximate normality and a direct comparability of the concentration measures for different age groups, despite their difference in means. The results of my extremely rough approximations are summarized here for what they are worth. The authors, of course, need not depend on frequency distributions and could obtain exact results from the individual observations.