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# 3 The Perpetuation of Wealth: A Simulation Model

Michael Patrick Allen

Inequality of wealth is a persistent characteristic of American society. Historical comparisons of the distribution of wealth over the past two centuries suggest that an extremely small segment of the total population has invariably owned a disproportionately large share of the total wealth (Lampman 1962; Soltow 1975; Pessen 1973; Smith and Franklin 1974). Specifically, one percent of the population has typically owned between twenty and thirty percent of the total personal wealth in the United States. In general, it is possible to distinguish between two types of wealth; original and inherited. Original wealth, on the one hand, is wealth that has been accumulated over the course of a single generation. If this wealth is very large, then the rate of accumulation must be very rapid. Indeed, Thurow (1975) refers to original wealth as "instant" or "spontaneous" wealth. On the other hand, inherited wealth is wealth that has been accumulated over the course of several generations. One of the most important theoretical issues raised by the persistence of the inequality of wealth is the extent to which this distribution of wealth is attributable to inheritance rather than the creation of original wealth.

The present analysis represents somewhat of a departure from previous studies of the intergenerational transmission of wealth (Ward and Beuscher 1950; Dunham 1962). Indeed, it proceeds from the assumption that the intergenerational transmission of wealth is only one element, albeit an integral one, of a more general process responsible for the perpetuation of wealth. In particular, this analysis addresses the problem of whether or not it is possible for the members of a wealthy family to perpetuate their wealth over several generations. There are, of course, factors which operate to perpetuate the wealth of a family as well as factors

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which operate to reduce this wealth. Wealth is perpetuated by intergenerational transfers of wealth, while it is reduced by the imposition of progressive inheritance and estate taxes. The present analysis attempts to examine the effects of these and other factors on the perpetuation of wealth within families over the course of several generations. Therefore, the unit of analysis is the individual as a member of a kinship group defined as the lineal descendents of an original wealthholder.

It must be noted at the outset that the presently available information on wealthholding and the intergenerational transmission of wealth does not permit a direct empirical analysis of this problem. Even if information on patterns of wealthholding and intergenerational transfers were available on any systematic basis, a longitudinal analysis spanning several decades would be required to examine the problem of the perpetuation of wealth in any detail. For these reasons, this analysis employs a simulation model of the perpetuation of wealth. The purpose of this model is to generate projections concerning the transmission, distribution, and accumulation of wealth among the members of a family over the course of several generations. Whenever possible, the parameters of this model are derived from empirical research. For example, estimates of the intragenerational and intergenerational transfers of wealth by deceased wealthholders are obtained from an analysis of the estate tax returns filed in 1972. Other parameters of the model are based upon the findings of other researchers. However, some of the parameters required by this model have not been the subject of much empirical research. Therefore, the simulation model must rely, at least in part, upon certain assumptions. As a result, the empirical adequacy of this model and its projections rests upon the validity of these assumptions as well as the accuracy of these parameters.

### 3.1 The Perpetuation of Wealth

This analysis assumes that the perpetuation of wealth is the result of three conceptually distinct but empirically related processes. These three processes involve the transmission of wealth from one generation to succeeding generations, the distribution of this wealth among the lineal descendents of a deceased wealthholder, and the accumulation of this inherited wealth over the course of a generation until the death of the inheritor. Indeed, these three processes form a cycle which is repeated with each succeeding generation. Any systematic analysis of the problem of the perpetuation of wealth must consider each of these three processes and their relationship to one another. The simulation model employed in this analysis incorporates each of these processes.

It is apparent that the process of the intergenerational transmission of wealth is a central component of any systematic model of the perpetuation of wealth. Without any inheritance or estate taxes, virtually all of the wealth held by a deceased wealthholder, reduced only by funeral and administrative expenses, could be transferred to his or her descendants. However, inheritance and estate taxes, at the state and federal levels, ensure that only a portion of the wealth owned by one generation is transferred to succeeding generations. Typically, these taxes are progressive so that large estates are taxed at higher rates than small estates. The federal estate tax in effect until 1976, for example, reached a maximum marginal rate of 77 percent on taxable estates in excess of $10 million. Conversely, a taxable estate of $100,000 was taxed at a rate of only 21 percent. Clearly, inheritance and estate taxes represent the major barriers to the intergenerational transmission of wealth, particularly for large estates.

In addition to the intergenerational transmission of wealth, a systematic model of the perpetuation of wealth must consider the distribution of any intergenerational transfers of wealth among the lineal descendants of the deceased wealthholder. Obviously, for any given intergenerational transfer of wealth, the wealth inherited by each descendant depends both upon the number of descendants and upon the proportional distribution of the aggregate transfer of wealth among these descendants. If there is only a single descendant, then he will inherit the entire residual estate available for distribution after deductions for funeral and administrative expenses, debts, charitable contributions, and taxes. However, if there are four descendants, each receiving an equal share of the estate, each will inherit only one-quarter of the residual estate available for distribution after deductions. Moreover, there is the possibility that the aggregate intergenerational transfer is to be distributed over more than one generation. It is not uncommon for deceased wealthholders to bequeath part of their estates to their grandchildren.

Finally, the third process in the perpetuation of wealth is the accumulation of wealth over the course of a generation. One of the most important characteristics of both inheritance and estate taxes is that these taxes are ordinarily imposed upon wealth only once each generation. In short, they are taxes on the transfer of wealth from one generation to succeeding generations and not taxes on the ownership of wealth or property as such. An estate is taxed upon the death of a wealthholder, and is not subject to taxation again until the death of the descendant. In the interim, a period equivalent to a generation, this wealth is generally free from taxation except as it is received by the descendant in the form of income or realized capital gains. During this generation, it can accumulate at some annual rate which is related to the average rate of return

on investment. As a result, there is the possibility that the wealth inherited by each descendant will accumulate enough over the course of a generation to offset the reduction attributable to estate taxes and other expenses.

These three processes can be concatenated to construct a simulation model of the perpetuation of wealth. This model is presented in schematic form in figure 3.1. It begins with the initial wealth of an original wealthholder. This initial wealth corresponds to the net estate of a wealthholder at the time of death. The model continues with the transfer process which determines the aggregate wealth, for any given level of initial wealth, that is transferred from one generation to succeeding generations. In other words, this transfer results in a residual estate which is equal to the initial net estate minus deductions for funeral and administrative expenses, charitable contributions, and taxes. Next, there is the distribution process which determines how much of the aggregate wealth transferred from the original wealthholder is received by each descen-

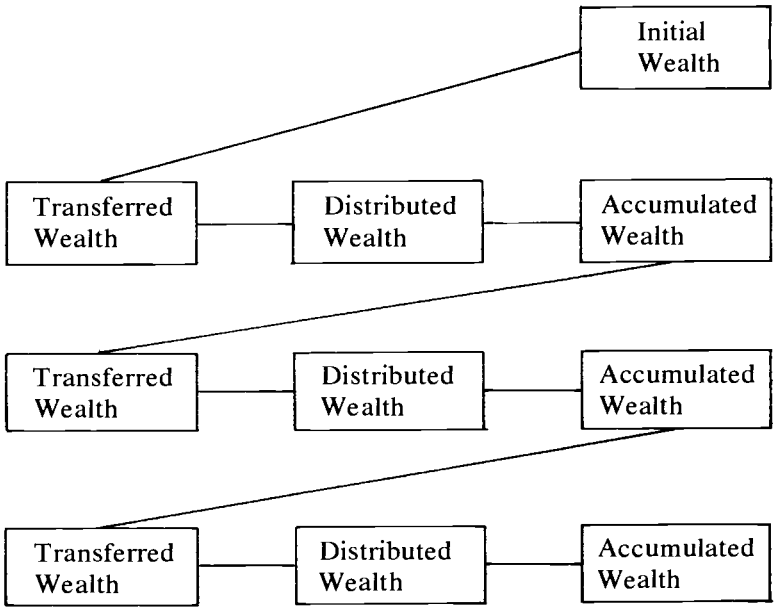


**Fig. 3.1** Simulation Model of the Perpetuation of Wealth

dant. This process depends upon the number of descendants and distribution of the residual estate among these descendants according to the bequest pattern established by the deceased wealthholder or by the succession pattern established by state law. Finally, there is the accumulation process which determines the value of the inherited wealth after the period of a generation. This process depends upon both the annual rate of accumulation for wealth and the number of years in the accumulation period. This sequence of processes can be iterated to determine the wealth of the individual members of a family after each generation.

In order to demonstrate the logic of this model, a graph of the rise and fall of the aggregate wealth of a family over the course of three generations, showing the effects of estate taxes and the accumulation of inherited wealth, is presented in figure 3.2. In this hypothetical example, the rate of wealth accumulation just offsets the rate of estate taxation, so that the aggregate wealth of the family remains relatively constant at any given point in the cycle. The model of the perpetuation of wealth represented by this graph does not involve any distribution process, since the graph depicts the wealth of a family and not the wealth of its individual members. It must be noted that this graph is adapted from a similar graph presented by Tait (1967). Indeed, this model for the perpetuation of wealth is based, in large part, upon his discussion of the effects of capital accumulation upon the effectiveness of estate taxes.

## 3.2 Parameters of the Model

The central process in this model of the perpetuation of wealth is the transfer of wealth from one generation to succeeding generations. This process involves two related quantities: the initial wealth of the original wealthholder prior to death, and the total wealth inherited by his or her descendants. The first quantity can be referred to as the "net estate" of a wealthholder and corresponds to his or her net worth. Specifically, it is equal to the gross estate of the wealthholder minus deductions for debts and mortgages. The second quantity can be referred to as the "residual estate" and represents the total wealth inherited by the various descendants of the original wealthholder. It is equal to the net estate minus deductions for funeral and administrative expenses, charitable bequests, and taxes. The federal estate tax returns contain information on all of these deductions with only one exception, the state death taxes paid by an estate. Almost all states have some form of inheritance or estate tax. However, the federal estate tax does permit a limited credit for the payment of state death taxes. The best available estimate of the total tax liability of an estate, based upon the federal estate tax return, is provided by the federal estate tax liability before any credits for the

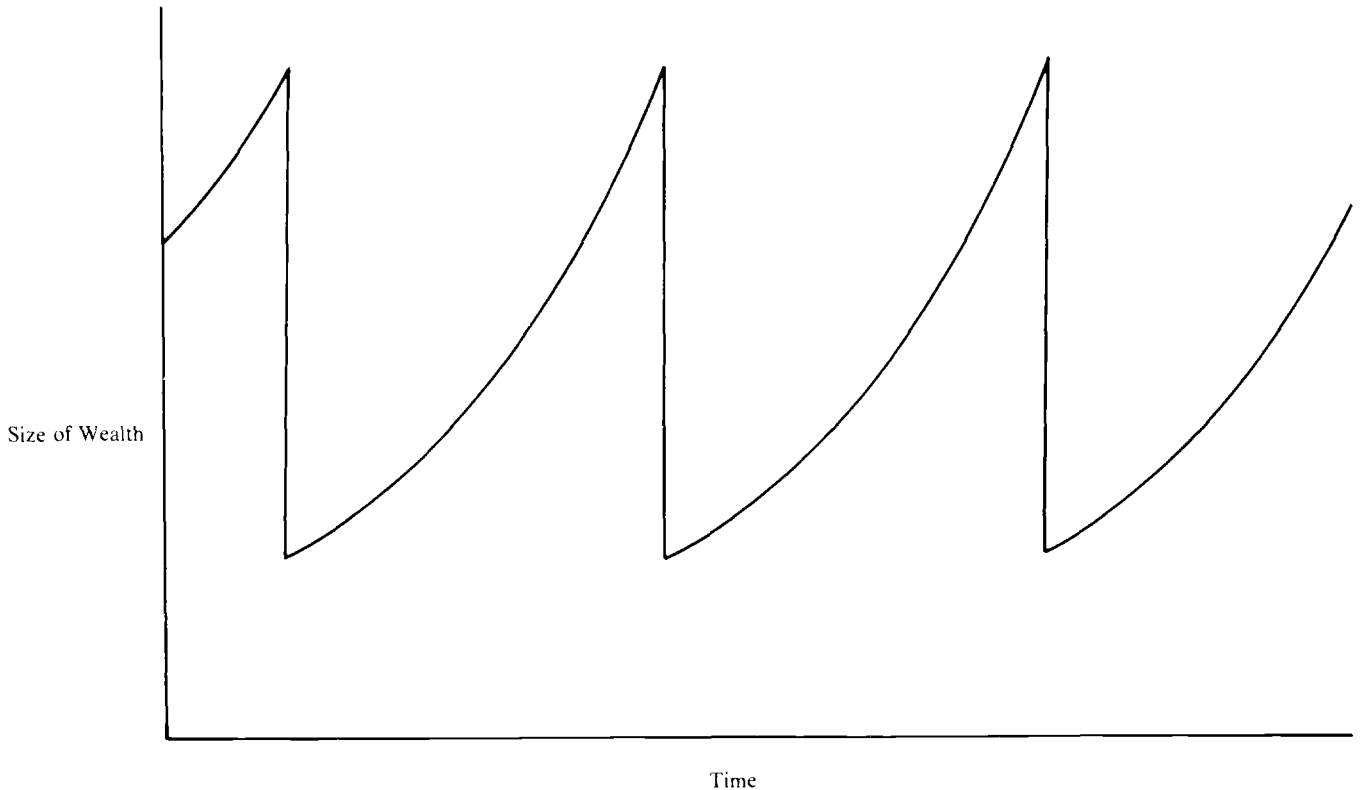


**Fig. 3.2** Rise and Fall of Family Aggregate Wealth over the Course of Three Generations

payment of state death taxes. To the extent that the state death tax may exceed the maximum credit permitted by the federal estate tax, this procedure may underestimate the total tax liability of an estate.

Given the net estate and the corresponding residual estate for a representative sample of deceased wealthholders, it is possible to estimate a function which predicts the size of the residual estate for any given size of net estate. A function which estimates the residual estate from a net estate can be referred to as a "transfer function." This function estimates the total wealth that is transferred to the heirs of an estate. One major complication arises from the fact that the federal estate tax contains a marital deduction which permits a deceased wealthholder to transfer one-half of his or her adjusted gross estate, defined as the gross estate minus deductions for debts and expenses, to a surviving spouse without any estate tax liability. Therefore, it is necessary to construct separate transfer functions for deceased wealthholders with and without surviving spouses. Once again, the federal estate tax return contains information on the actual bequests to surviving spouses.

The present analysis relies upon three separate transfer functions. The first function estimates the size of the intergenerational transfer for any given size of net estate for those deceased wealthholders without surviving spouses. In this case, the intergenerational transfer is defined as the residual estate of the deceased wealthholder. An analysis of the estate tax returns filed in 1972 indicates that 41.6 percent of decedents with net estates in excess of $100,000 were not survived by their spouses. The two remaining transfer functions pertain to deceased wealthholders with surviving spouses. One is an intragenerational transfer function which estimates the size of the bequest to the surviving spouse from the size of the net estate. The other function estimates the size of the intergenerational transfer, defined as the residual estate minus the bequest to the surviving spouse, for any given size of net estate. These functions were established using the regression of each type of transfer on the net estate for the 75,608 deceased wealthholders in 1972 with net estates in excess of $100,000.

The estimation of these transfer functions entails certain methodological difficulties. Given the fact that the federal estate tax is highly progressive, it might be expected that the sizes of both the intergenerational and intragenerational transfers would be nonlinearly related to the size of the net estate. Consequently, several nonlinear transformations of the variables were employed in an attempt to identify the transfer functions with the best fit. Contrary to expectations, the size of both the intergenerational and the intragenerational transfer were approximately linearly related to the size of the net estate for the case of a deceased wealthholder with a surviving spouse; the linear correlation is 0.779 in the first case, 0.892 in the second case.

However, a simple linear function is not appropriate for predicting the size of the intergenerational transfer from the size of the net estate for those deceased wealthholders without surviving spouses. Several nonlinear functions, involving various monotonic transformations of the variables, were examined but they yielded inappropriate estimates of the size of the intergenerational transfer for net estates of less than $1 million. Therefore, the function adopted represents a concatenation of three separate linear functions, each appropriate for a limited range of net estates. Although this is not a particularly elegant solution to the estimation problem, it does provide reasonable estimates of the size of the intergenerational transfer for every size of net estate. The correlation between the size of the intergenerational transfer and the size of the net estate is 0.799 for the case of decedents without surviving spouses.

Although these intergenerational transfer functions predict the aggregate wealth that is available for distribution among the descendants of a deceased wealthholder, there is little direct evidence on the actual distribution of this wealth among these descendants. This information is not available on the estate tax returns filed in 1972. Therefore, this stage of the analysis requires a series of assumptions concerning the distribution of the aggregate transfer of wealth among the lineal descendants. It must be recalled that this analysis is specifically concerned with the ability of wealthholders to perpetuate their wealth among their descendants over several generations. Consequently, the distributions of transferred wealth employed here assume that all of the residual estate not transferred to a surviving spouse is transferred to the children of the deceased wealthholder. This analysis does not consider the possibility of intergenerational transfers of wealth to grandchildren, although this contingency is amenable to analysis using a more complex simulation model. Moreover, it does not consider the possibility of bequests to individuals other than members of the immediate family. In general, this last assumption is supported by the available evidence on patterns of inheritance (Sussman, Cates, and Smith 1970).

The intergenerational transfer and distribution of wealth among the descendants of a deceased wealthholder represent only two elements of a systematic model of the perpetuation of wealth. The third element involves the accumulation of inherited wealth over the course of a generation. It has been noted that estate and inheritance taxes are ordinarily imposed upon wealth only once each generation. In the interim, this inherited wealth generally accumulates without significant taxation, except for the taxable income that it returns to the wealthholder. For the purposes of this analysis, it is assumed that the period of wealth accumulation for each generation is approximately twenty-two years. This period represents a somewhat low estimate of the average age of parents at the birth of their first child.

This analysis also examines the effects of the accumulation of wealth on the overall perpetuation of wealth using different estimates of the annual rate of wealth accumulation. To simplify matters, the rate of wealth accumulation can be stated in real terms adjusted for inflation. Specifically the analysis uses two different real annual rates of wealth accumulation: 1 percent and 3 percent. These estimates of the real annual rate of wealth accumulation are well within the limits suggested by the real annual rates of return for alternative types of investments over the past several decades (Brittain 1967). Since the wealth of top wealthholders is disproportionately concentrated in corporate stocks, these rates are certainly conservative, and are employed because they correspond to real rates of wealth accumulation after deductions for the living expenses of the wealthholder. It is implicitly assumed that wealthholders with relatively small net estates also receive supplemental incomes from other sources.

It is possible to demonstrate the basic operation of the model of the perpetuation of wealth using a simple example, the case of a deceased wealthholder with a net estate of $1 million. To simplify the analysis, it will be assumed that for each generation there is no surviving spouse and only a single descendant. According to the intergenerational transfer function for deceased wealthholders without spouses, the estimated intergenerational transfer for a net estate of this size is $584,380. The remainder of the net estate goes to funeral and administrative expenses, charitable contributions, and taxes. The distribution function for this example dictates that the entire intergenerational transfer goes to a single descendant; The accumulation function, that the inherited wealth accumulates at a real annual rate of 3 percent for a period of 22 years. The accumulated interest on $584,380 compounded annually at a rate of 3 percent for 22 years is $535,330. Therefore, the accumulated wealth of the single descendant is estimated to be $1,119,710. This process can be repeated for each successive generation. Using these assumptions, the accumulated wealth of the third-generation descendant is $1,310,060.

### 3.3 Simple Models of the Perpetuation of Wealth

The simplest possible model for the perpetuation of wealth over the course of several generations is the case of a deceased wealthholder without a surviving spouse and only a single descendant. It involves only the intergenerational transmission of wealth and the accumulation of wealth processes. The distribution of wealth process is not required in the case of a single descendant. The results of this model are presented in table 3.1 for several different levels of initial wealth and the two different rates of wealth accumulation. The estimates of wealth represent the accumulated wealth of the third-generation descendant of the original wealth-

**Table 3.1** **Estimated Wealth after Three Generations by Initial Wealth and Rate of Accumulation for Case of No Spouse and One Descendant**

| Initial Wealth | 1 Percent per Annum | 3 Percent per Annum |
|---|---|---|
| 100 | 132 | 374 |
| 200 | 166 | 500 |
| 300 | 209 | 657 |
| 400 | 252 | 814 |
| 500 | 295 | 939 |
| 600 | 338 | 1,039 |
| 800 | 411 | 1,184 |
| 1,000 | 469 | 1,310 |
| 1,200 | 516 | 1,436 |
| 1,400 | 560 | 1,561 |
| 1,600 | 595 | 1,687 |
| 1,800 | 629 | 1,813 |
| 2,000 | 663 | 1,938 |
| 3,000 | 836 | 2,567 |
| 4,000 | 1,008 | 3,195 |
| 5,000 | 1,171 | 3,790 |
| 10,000 | 1,319 | 4,147 |
| 50,000 | 1,917 | 4,560 |
| 75,000 | 2,044 | 4,640 |
| 100,000 | 2,172 | 4,720 |

*Note*: Amounts are expressed in thousands of dollars.

holder. This is the wealth held by the single descendant after three intergenerational transfers of wealth and three generations of wealth accumulation. This is the simplest possible model because the wealth is passed from a single individual in one generation to a single individual in the next generation. Although this process obviously concentrates the wealth of the original wealthholder in the hands of a single descendant, it also serves to maximize the tax liability of each successive estate, since no use is made of either the marital deduction or the distribution of wealth among several descendants.

The estimates of the wealth accumulated by the third generation descendant of the original wealthholder presented in table 3.1 demonstrate a pattern which obtains in more complex models of the perpetuation of wealth. Specifically, there is the tendency for relatively small wealthholdings to increase over time and for relatively large wealthholdings to decrease, especially with higher rates of wealth accumulation. This general pattern is a logical consequence of a tax structure which levies a progressive tax on the intergenerational transmission of wealth but does

not tax the accumulation of wealth over the course of a generation. Among relatively small wealthholdings, the effective estate tax rate permits the growth of these wealthholdings. Conversely, among relatively large wealthholdings, the effective estate tax rates result in the diminution of these wealthholdings. It is important to note that differences in the level of initial wealth yield significant differences in the wealth held by the third-generation descendants. These results suggest that it may require several generations, certainly more than three, to eliminate the differences in the wealthholdings of descendants of top wealthholders.

It has been noted that the model of wealth perpetuation involving no surviving spouse and only one descendant serves to maximize the tax liability of each successive estate because it does not use the marital deduction. It is interesting to compare the results obtained for the case of a single descendant and no surviving spouse with those obtained for that of a single descendant and a surviving spouse. The case of a surviving spouse and a single descendant is presented in table 3.2. It must be noted that in this case the intergenerational transfer of wealth occurs in

**Table 3.2** **Estimated Wealth after Three Generations by Initial Wealth and Rate of Accumulation for Case of Spouse and One Descendant**

| Initial Wealth | 1 Percent per Annum | 3 Percent per Annum |
|---|---|---|
| 100 | 193 | 455 |
| 200 | 228 | 535 |
| 300 | 231 | 547 |
| 400 | 245 | 596 |
| 500 | 258 | 644 |
| 600 | 272 | 693 |
| 800 | 299 | 791 |
| 1,000 | 325 | 889 |
| 1,200 | 352 | 987 |
| 1,400 | 379 | 1,085 |
| 1,600 | 406 | 1,183 |
| 1,800 | 432 | 1,277 |
| 2,000 | 455 | 1,362 |
| 3,000 | 571 | 1,702 |
| 4,000 | 677 | 2,016 |
| 5,000 | 777 | 2,329 |
| 10,000 | 1,237 | 7,149 |
| 50,000 | 3,317 | 9,997 |
| 75,000 | 4,163 | 11,933 |
| 100,000 | 5,009 | 13,970 |

*Note*: Amounts are expressed in thousands of dollars.

two stages. First, there is the intergenerational transfer of wealth which occurs simultaneously with the intragenerational transfer of wealth to the surviving spouse. Second, there is the intergenerational transfer of wealth which occurs with the death of this surviving spouse. Without loss of generality, it can be assumed that both spouses die within the same year. It is apparent from a comparison of the estimates of wealth provided by each model that the existence of a surviving spouse facilitates the perpetuation of wealth at the highest levels of initial wealth. The effect of a surviving spouse on the perpetuation of wealth is much less pronounced and even somewhat inconsistent at the lower levels of initial wealth.

The assumption that there is only one descendant in each generation serves a certain analytical purpose, but it is patently unrealistic in terms of the demographical characteristics of the population of top wealthholders. It is somewhat more realistic to assume that there are two descendants in each generation. This model requires a simple distribution process which divides the aggregate intergenerational transfer of wealth for each generation between both descendants. The results of this model are presented in table 3.3 for the case of no surviving spouse and two descendants. The estimates of wealth represent the accumulated wealth of the third-generation descendant of the original wealthholder. A comparison of these results with those obtained for the case of no surviving can be drawn from a comparison of the case of a surviving spouse and significantly reduces the wealth of each descendant. Similar conclusions spouse and only one descendant indicates that this distribution process two descendants with the case of a surviving spouse and only one descendant. The results of the model assuming a surviving spouse and two descendants are presented in table 3.4. In general, the wealth of each descendant is reduced when there are two descendants in each generation instead of one.

These models of the perpetuation of wealth have been concerned solely with the accumulated wealth of the individual descendants of the original wealthholder. However, these individual descendants can also be considered as members of the same family. In this case, the family is defined as the lineal descendants of the original wealthholder. Given the assumption of two descendants in each generation, there are two siblings in the first generation of descendants, four first cousins in the second generation, and eight second cousins in the third generation. Therefore, the aggregate wealth of the family comprising third-generation descendants of the original wealthholder is simply eight times the wealth accumulated by each third generation descendant. The estimates of the aggregate wealth accumulated by the third-generation descendants, in the case of no surviving spouses from preceding generations and two descendants each generation, are presented in table 3.5 by the different levels of ini-

**Table 3.3** **Estimated Wealth after Three Generations by Initial Wealth and Rate of Accumulation for Case of No Spouse and Two Descendants**

| Initial Wealth | 1 Percent per Annum | 3 Percent per Annum |
|---|---|---|
| 100 | 24 | 88 |
| 200 | 36 | 90 |
| 300 | 41 | 110 |
| 400 | 50 | 129 |
| 500 | 58 | 149 |
| 600 | 60 | 169 |
| 800 | 68 | 202 |
| 1,000 | 76 | 231 |
| 1,200 | 83 | 260 |
| 1,400 | 91 | 285 |
| 1,600 | 99 | 306 |
| 1,800 | 107 | 327 |
| 2,000 | 115 | 349 |
| 3,000 | 146 | 448 |
| 4,000 | 175 | 526 |
| 5,000 | 203 | 601 |
| 10,000 | 228 | 668 |
| 50,000 | 389 | 1,113 |
| 75,000 | 482 | 1,171 |
| 100,000 | 506 | 1,230 |

*Note*: Amounts are expressed in thousands of dollars.

tial wealth. Similar estimates of the aggregate accumulated wealth of the family, in the case of a surviving spouse and two descendants each generation, are presented in table 3.6. It is apparent that, although the existence of two descendants in each generation reduces the wealth accumulated by each individual descendant, it increases the aggregate wealth accumulated by the family. In short, the distribution of wealth among more than one descendant serves to preserve the aggregate wealth of the family by reducing the tax liability of each individual estate.

Finally, it is apparent from an examination of these various estimates of the wealth accumulated by the third-generation descendant that the perpetuation-of-wealth model is very sensitive to changes in the real annual rate of wealth accumulation. A two percent difference in the rate of wealth accumulation, from one percent per annum to three percent, yields estimates of accumulated wealth which differ by a multiple of three for all but the highest levels of initial wealth. For these highest levels, this same percentage difference produces estimates of accumulated wealth which differ only by a multiple of two instead of three. This differential

**Table 3.4** **Estimated Wealth after Three Generations by Initial Wealth and Rate of Accumulation for Case of Spouse and Two Descendants**

| Initial Wealth | 1 Percent per Annum | 3 Percent per Annum |
|---|---|---|
| 100 | 24 | 88 |
| 200 | 48 | 148 |
| 300 | 51 | 155 |
| 400 | 60 | 161 |
| 500 | 63 | 168 |
| 600 | 66 | 171 |
| 800 | 75 | 179 |
| 1,000 | 83 | 190 |
| 1,200 | 91 | 202 |
| 1,400 | 99 | 214 |
| 1,600 | 107 | 226 |
| 1,800 | 115 | 238 |
| 2,000 | 120 | 249 |
| 3,000 | 122 | 301 |
| 4,000 | 133 | 354 |
| 5,000 | 148 | 404 |
| 10,000 | 215 | 632 |
| 50,000 | 538 | 1,688 |
| 75,000 | 707 | 2,120 |
| 100,000 | 849 | 2,506 |

*Note:* Amounts are expressed in thousands of dollars.

impact of a two percent change in the rate of wealth accumulation over the course of a generation is attributable largely to the progressive nature of the estate tax, particularly among the largest estates. Moreover, it must be noted that these two estimates of the real annual rate of wealth accumulation represent relatively conservative estimates of the historical rate of capital accumulation adjusted for inflation, especially since the wealthholdings of the top wealthholders are disproportionately concentrated in corporate stocks.

## 3.4 Conclusions

The general simulation model of the perpetuation of wealth presented in this analysis yields results which are important even though they are not entirely unexpected. They are important because they demonstrate, in some detail, the relationships among the processes governing the transmission, distribution, and accumulation of wealth over the course of several generations. They are not entirely unexpected because each of these

processes has been the subject of prior research. This model provides results which are simply the logical consequences of the interaction among these separate processes. The value of such a simulation model is that it attempts to integrate these different processes into a more general model which can provide projections concerning the perpetuaton of wealth over several generations.

In general, the federal estate tax reduces the wealth held by the descendants of the original wealthholder, particularly those with relatively large estates. At the other extreme, the federal estate tax does not, at least by itself, reduce the wealth held by the descendants of those wealthholders with relatively small estates. The distribution process, involving the distribution of intergenerational transfers of wealth among more than one descendant, accounts for much of the reduction in the wealth held by the descendants of the original wealthholders. Finally, the federal estate tax, since it taxes the estates of individuals, does not reduce the aggregate wealth of a family, comprising the lineal descen-

**Table 3.5** **Estimated Aggregate Wealth of Family after Three Generations by Initial Wealth and Rate of Accumulation for Case of No Spouse and Two Descendants**

| Initial Wealth | 1 Percent per Annum | 3 Percent per Annum |
|---|---|---|
| 100 | 192 | 704 |
| 200 | 288 | 720 |
| 300 | 328 | 880 |
| 400 | 400 | 1,032 |
| 500 | 464 | 1,192 |
| 600 | 480 | 1,352 |
| 800 | 544 | 1,616 |
| 1,000 | 608 | 1,848 |
| 1,200 | 664 | 2,080 |
| 1,400 | 728 | 2,280 |
| 1,600 | 792 | 2,448 |
| 1,800 | 856 | 2,616 |
| 2,000 | 920 | 2,792 |
| 3,000 | 1,168 | 3,584 |
| 4,000 | 1,400 | 4,208 |
| 5,000 | 1,624 | 4,808 |
| 10,000 | 1,824 | 5,344 |
| 50,000 | 3,112 | 8,904 |
| 75,000 | 3,856 | 9,368 |
| 100,000 | 4,048 | 9,840 |

*Note*: Amounts are expressed in thousands of dollars.

dants of a wealthholder, except for those wealthholders with the largest estates. In short, the federal estate tax facilitates the accumulation of relatively small wealthholdings and inhibits the accumulation of relatively large wealthholdings among individual descendants of the orignal wealthholder.

The present analysis represents only a preliminary attempt to construct a comprehensive model of the perpetuation of wealth. Any conclusions drawn from it must be tempered by a consideration of its inherent limitations. The models examined were extremely simple. The assumptions employed can be considered as plausible hypotheses at best. Moreover, many of the parameters require further research. Indeed, one of the major contributions of this kind of analysis is that it suggests potentially productive directions for new research. Although each of the three processes comprising this model require additional research and refinement, the one which requires the most attention is the distribution process. There is the need for detailed research on the actual distribution of

**Table 3.6** **Estimated Aggregate Wealth of Family after Three Generations by Initial Wealth and Rate of Accumulation for Case of Spouse and Two Descendants**

| Initial Wealth | 1 Percent per Annum | 3 Percent per Annum |
|---|---|---|
| 100 | 192 | 704 |
| 200 | 384 | 1,184 |
| 300 | 408 | 1,240 |
| 400 | 480 | 1,288 |
| 500 | 504 | 1,344 |
| 600 | 528 | 1,368 |
| 800 | 600 | 1,432 |
| 1,000 | 664 | 1,520 |
| 1,200 | 728 | 1,616 |
| 1,400 | 792 | 1,712 |
| 1,600 | 856 | 1,808 |
| 1,800 | 920 | 1,904 |
| 2,000 | 960 | 1,992 |
| 3,000 | 976 | 2,408 |
| 4,000 | 1,064 | 2,832 |
| 5,000 | 1,184 | 3,232 |
| 10,000 | 1,720 | 5,056 |
| 50,000 | 4,304 | 13,504 |
| 75,000 | 5,656 | 16,960 |
| 100,000 | 6,792 | 20,048 |

*Note*: Amounts are expressed in thousands of dollars.

wealth among lineal descendants and others. Once the empirical parameters governing the transmission, distribution, and accumulation of wealth have been established, it will be possible to develop more complex and more accurate models of the perpetuation of wealth. These models may provide projections which might suggest changes in the present federal estate tax.

## Comment

Thad W. Mirer

I have three points to raise about Michael Allen's interesting simulation analysis of the perpetuation of wealth over several generations. The first two are brief and regard what is not in the paper; the third is more substantial and regards what is.

First, as this paper presents only the preliminary work on a more comprehensive model, I feel free to suggest that Allen go on to determine transfer functions for estates smaller than $100,000, and then combine his model with a sample of initial wealthholders so that he can simulate changes in the size distribution of wealth over time.

Second, I was disappointed that he did not elaborate on the results of his estimation of the three transfer functions. Of the three elements in his simulation (i.e., the transfer function, the division rule, and the rate of accumulation), only the transfer function embodies the results of Allen's own empirical research. These functions are of considerable interest in themselves, because they measure the real impact of inheritance tax laws. They estimate the "effective" inheritance tax, and are comparable to the work that others have done measuring the effective tax rates in the personal income tax and in the Aid to Families with Dependent Children program, for example.

Also, it would be helpful to have the characteristics of the transfer functions analyzed, so that the reader could make his own evaluation of the simulations. For example, we are told that in the case where there is never a surviving spouse, the transfer function is composed of three linear segments. One has to presume that this is a concave function. In the case where there is a surviving spouse, the two linear transfer functions interact to yield a grand intergenerational transfer function that is also linear, as I understand it. We have no clear idea from the paper of how the effective tax compares to the nominal rate structure. It would be especially interesting to see how high the rates actually get.

My third point addresses the conclusion that the federal estate tax "inhibits the accumulation of relatively large wealthholdings among in-

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dividual descendants of the original wealthholder." This certainly is supported by a quick glance at the tables in the paper. In none of the cases illustrated does a great-grandson of a man with $100 million end up with more than 14 percent of the initial wealth. There would seem to be a tremendous decrease in wealthholdings as a result of taxation and distribution over three generations. I see the possibility of the opposite conclusion, however.

One way to examine the effect of the inheritance tax in Allen's simulation model is to determine the "break-even" levels of wealth—i.e., the levels of initial wealth that are just maintained through the system. For initial wealth levels above the break-even levels, the wealth of the third generation is smaller than that of first, while for initial wealth levels below the break-even level the wealth of the third generation is larger. Examining Allen's tables 3.1 and 3.2 for cases of one descendant, we find that if wealth accumulates at 1 percent annually, then the break-even levels of wealth are roughly $150 thousand if there is no spouse and $225 thousand if there is one. At 3 percent growth, the break-even levels are roughly $1,850 thousand and $775 thousand in the cases of no spouse and spouse, respectively. These are all large amounts of money—especially those at 3 percent—and the simulations show us that only above these levels does the inheritance tax serve to diminish wealthholdings. (In tables 3.3 and 3.4, for cases of two descendants, the break-even levels occur below $100 thousand—the smallest levels given.)

If higher rates of accumulation (i.e., rates of growth of wealth) had been chosen for illustration, the break-even levels would be higher. How much higher? This is impossible to determine fully from the paper, because the transfer functions are not specified. It is possible to make some inferences, however. For a given transfer function, each level of wealth is associated with a particular (average) effective rate of inheritance "taxation," which includes both true tax and administrative costs. Presumably, the transfer function shows that this effective rate would increase with the wealth level. Simple calculations will enable one to determine what rate of accumulation is necessary if the wealth level that has associated with it an effective tax rate of $X$ percent is to be the break-even level. We shall examine only high tax rates, which might be associated with very large levels of wealth.

In the case where there is one descendant, if the (average) effective tax rate were 50 percent, then wealth would have to double during each generation span of 22 years in order for the wealth level to exactly "break even." This would call for an annual growth rate of only 3.2 percent. If the effective tax rate were 75 percent, the required rate of growth would be 6.5 percent. If the effective tax rate were 90 percent—which would have to include high administrative costs—the required rate of growth would be about 11 percent.

When we consider cases involving two descendants, the rates of growth (accumulation) necessary for the break-even condition are higher. If the effective tax rate were 50 percent, then the wealth held by each descendant would have to quadruple in order for his wealth to break even with his father's; this would require a growth rate of 6.5 percent. If the effective tax rate were 75 percent the required rate of growth would be 9.9 percent, and if the tax rate were as high as 90 percent the required growth rate would be 14.6 percent.

If we assume that only the largest estate is subject to an (average) effective tax as high as 75 percent, then the required rates of growth are 6.5 and 9.9 percent, in the cases of one and two descendants, respectively. Are these "reasonable"? As Allen mentions, the rate of accumulation is determined by consumption out of interest income, as well as by the rates of interest and capital appreciation. Additionally, if the holding of inherited wealth makes the creation of "spontaneous" wealth easier, then the simulated rate of accumulation might be adjusted upward to measure this opportunity. Although I have no data to present, rates of accumulation between 6 and 10 percent strike me as reasonable and these could lead to the conclusion on the basis of the simulations that all descendants end up better than their benefactors. The line of logic leading to this conclusion contains many assumptions, and hence the real point that I have to make is that one must use care in accepting the result of any simple simulation model as a measure of reality.

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