Intergenerational Transfers and Savings

Laurence J. Kotlikoff

In recent years the role of intergenerational transfers in the process of wealth accumulation has been the subject of substantial empirical and theoretical analysis. The key question stimulating this research is: What is the main explanation for savings? Is it primarily accumulation for retirement as claimed by Albert Ando, Richard Brumberg, and Franco Modigliani in their celebrated Life Cycle Model of Savings? Is it primarily intentional accumulation for intergenerational transfers? Or is it primarily precautionary savings, much of which may be bequeathed because of imperfections in annuity markets?

The answer to the savings puzzle has many policy implications; certain tax structures are much more conducive to some types of savings than others, and certain government insurance programs might appear less attractive if precautionary motives are the main explanation of savings. Knowledge of the primary savings mechanism would also provide the key to understanding the distribution of wealth.

Solving the savings puzzle requires first collecting the pieces and then seeing how they fit together. A major piece of the puzzle is understanding the quantitative importance of intergenerational transfers to the accumulation of wealth. As I argue below, there is strong evidence that intergenerational transfers play a very important and perhaps dominant role in U.S. wealth accumulation. This does not mean, however, that intentional saving for gifts and bequests is the main motive for savings. Significant intergenerational transfers could also arise in the Life Cycle Model in the absence of well-functioning private annuity markets or close substitutes for such markets. In such a setting bequests would be involuntary and potentially quite sizeable (Bevan and Stiglitz, 1979; Kotlikoff and Spivak, 1981; Davis, 1981;

■ *Laurence J. Kotlikoff is Professor of Economics, Boston University, Boston, Massachusetts, and Research Associate, National Bureau of Economic Research, Cambridge, Massachusetts.*

Kotlikoff, Shoven, and Spivak, 1986, 1987; Abel, 1985, Eckstein, Eichenbaum, and Peled, 1983). Let us first look at the evidence on the importance of intergenerational transfers and then turn to the deeper question of why such transfers arise.

The Importance of Intergenerational Transfers to Savings

There are six types of evidence concerning the importance of intergenerational transfers to savings. First comparisons of total U.S. wealth with life cycle wealth, defined as the amount of U.S. wealth there would be in the absence of any net intergenerational transfers. The difference between total wealth and life cycle wealth is defined as transfer wealth. These calculations use age-earnings and age-consumption profiles as well as other data, but they do not use data on transfers since they are concerned with what wealth would be in the absence of transfers. Second, the calculation of transfer wealth as defined above using steady state assumptions and the limited reported data on the flow of transfers. Third, zero transfer, life cycle simulation models that attempt to reproduce in a realistic manner actual wealth to income ratios or actual wealth distributions. Fourth, analysis of the rate of asset decumulation of the elderly. Fifth, evidence from annuity markets. Sixth, historical evidence concerning the correlation of saving rates and changes in the length of retirement.

Each of these types of evidence suggests an important role for intergenerational transfers in savings.

The Calculation of Life Cycle and Transfer Wealth Components

Kotlikoff and Summers (1981) considered the following question: Are the U.S. data broadly consistent with the view that intergenerational transfers play a negligible role in U.S. wealth accumulation? Stated differently, can one reject the null hypothesis that the Life Cycle Model fully explains U.S. wealth? To address this question we divided total wealth W into two components, life cycle wealth L and transfer wealth T and defined life cycle wealth of a cohort as the sum over each age of the accumulated difference between past streams of labor earnings and consumption. Total life cycle wealth equals the sum over cohorts of each cohort's life cycle wealth. Let E and C stand, respectively, for the sum over cohorts of all past accumulated earnings and all past accumulated consumption, then

$$(1) \qquad W = L + T, \quad \text{and} \quad L = E - C.$$

With this definition of life cycle wealth L, transfer wealth T equals the sum over cohorts of the sum of accumulated net transfers received at each age. Calculating life cycle wealth requires knowledge of longitudinal age earnings and age consumption profiles for each cohort. These profiles were derived using data for the period 1900 through 1974 on cross section relative age earnings and age consumption profiles as

well as aggregate earnings and consumption. The procedure involved distributing total earnings and consumption in each year by age and sex; combining these cross section age-sex matrices of earnings and consumption yields longitudinal profiles that are used to form E and C, past accumulated earnings and past accumulated consumption. In our initial paper Summers and I reported a value of life cycle wealth for 1974 of $733 billion, which is only 18.9 percent of total 1974 household wealth of $3,884 billion. We subsequently identified an error in the treatment of durables. In our reply to Modigliani (1984)—Kotlikoff and Summers (1986)—we indicate that a proper correction for durables raises the share of life cycle wealth to 21.9 percent.[1]

While the 21.9 percent is quite small, it is probably an overestimate of the life cycle share of total wealth. In order to generate at least some positive value for life cycle wealth, Summers and I adjusted upwards the standard estimates of the labor income of the self-employed by 20 percent. Since life cycle wealth is the accumulated difference between labor earnings and consumption, larger labor earnings of the self-employed implies a larger calculated value of life cycle wealth. The ratio of self-employed workers to employees was substantially larger in the prewar period than it is today. Hence, the calculated value of life cycle wealth is fairly sensitive to the estimation of the labor earnings of the self-employed. Using standard estimates would reduce life cycle wealth by about $700 billion. In addition, correcting several other intentional biases in our calculation would produce negative values for life cycle wealth. These include our assumption of a quite high ratio of female to male earnings, our assumption of zero earnings after age 75, and our assumption that the age-consumption profile is flat, rather than declining, after age 75.

It may be useful to repeat our basic explanation for why life cycle wealth is so small in the United States. Unlike simple classroom depictions of hump saving in which the age consumption is flat and the earnings profile rises to retirement, actual age earnings and age consumption profiles, such as those in Figures 1 and 2 which are reproduced from our paper, have essentially identical shapes and levels prior to at least age 45. Between ages 45 and 60 there clearly is some hump saving in that earnings profiles exceed consumption profiles; also after age 60 the age consumption profile clearly exceeds the age earnings profile. However, this pattern of hump saving and dissaving (at least relative to earnings) occurs quite late in the life cycle. Hence, one would not expect a large accumulation of life cycle wealth in the aggregate since the life cycle wealth of the more numerous generations below age 45 is so small. The simple fact is that consumption does not rise more rapidly through life than labor income.

An earlier study by Darby (1979) that influenced my study with Summers used cross section data on wealth earnings and consumption to divide current wealth holdings into a fraction that would be consumed and a fraction that would be transferred to succeeding generations. Darby inferred longitudinal age-consumption and age-earnings profiles from the cross section profile and concluded that at most 29

---

[1]The 26 percentage point durable correction referred to by Modigliani in this journal is based on highly suspect steady state assumptions that we do not regard as reasonable.
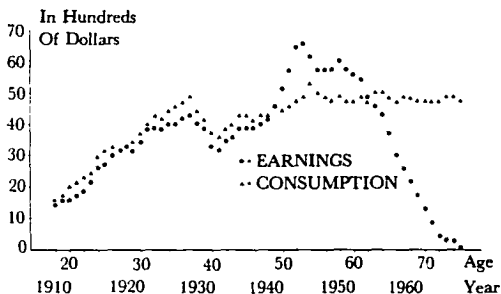
Fig. 1. Sum of male and female longitudinal average earnings and average consumption profiles, age 18 in 1910–age 82 in 1974

percent of U.S. private net worth is devoted to future consumption, with the rest destined for intergenerational transfer. White (1978) used aggregate data on the age structure of the population, age earnings and age consumption profiles along with a variety of parametric assumptions and concludes that the life cycle model can account for only about a quarter of aggregate saving. Though their accounting frameworks are somewhat different and though they use different data, and only cross section data at that, Darby and White reach essentially the same conclusion as Kotlikoff and Summers because the basic shapes of U.S. cross section age earnings and age consumption profiles and the longitudinal profiles that can reasonably be inferred from the cross section profiles are quite different from those of the textbook life cycle model.

Calculations of Life Cycle and Transfer Wealth Using Flow Data

The analyses just described directly calculate life cycle wealth and indirectly infer the stock of transfer wealth. Obviously it would be very useful to corroborate these results with direct evidence on intergenerational transfers. Kotlikoff and Summers
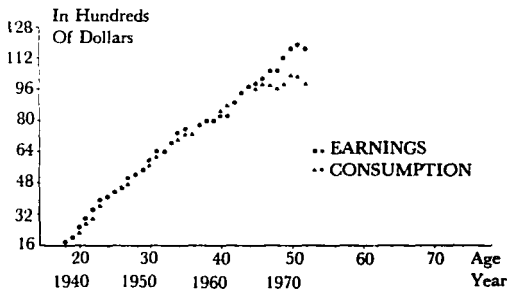

Fig. 2. Sum of male and female longitudinal average earnings and average consumption profiles, age 18 in 1940–age 52 in 1974. Reproduced by permission of the University of Chicago Press.

(1981) also examine the available flow data on intergenerational transfers. We presented a formula, which is valid only in the steady state, that relates the flow of transfers to the stock of transfer wealth.

There are three major problems with this method for calculating T. First, the available flow data on transfers clearly provide a lower bound estimate for total transfer flows; there are no data sources that systematically report intergenerational transfers made in the form of implicit and explicit gifts. Explicit gifts, which may be in kind as well as in cash, are clearly acknowledged as such by donors and recipients. Implicit gifts, such as making one's son an equal partner in a lucrative family business or providing low interest loans to children, may not be viewed as a gift by donors or recipients and would be hard to identify in a survey. Since the U.S. distribution of wealth is highly skewed, implicit gifts, while perhaps small in number, could be very large in value. Hence, any flow estimates of transfer wealth (particularly those of Modigliani in this journal, since he ignores all non-bequest intergenerational transfers), should be viewed as potentially seriously downward biased.

The second problem with using flow data to calculate T is that the assumption of a steady state may be far from justified. It may be, for example, that the flow of intergenerational transfers in relation to the scale of the economy was much greater in the 1920s than in the 1960s and 1970s. Not only must one assume that aggregate variables have been in steady state since at least the turn of the century, but one must also assume that the age distribution of transfers is time invariant.

The third problem is that the simple formula given in equation (2) relating transfer wealth T to the transfer flow (the formula incorporates Modigliani's (1984) correction for a small error) assumes that everyone dies at the same age D, that all transfers are received at the same age I, and that all transfers are made at the same age G. This is obviously unrealistic, and it is not clear what choice of these three ages best approximates reality. The appropriate choice of these ages depends on one's assumption about the steady state interest and growth rate of the economy, r and n, respectively. If half of transfers are received at age 20 and half at age 60, using 40 for approximate I would be inappropriate; transfers received at age 20 should receive more weight in the approximation formula because they are accumulated for a much longer period than transfers received at age 60 and because the accumulation formula is a nonlinear function of age.

$$(2) \qquad T = \frac{t}{(r-m)} e^{(r-n)D} \big[1 - e^{(n-r)(G-I)} \big] e^{(n-r)I}$$

To illustrate the implication of the formula, Summers and I discussed an example in which D equals 55 (a real world age of death of 73 if the age of adulthood is 18), the age gap $(G - I)$ between those leaving bequests and those receiving them equals 30, and $(r - n)$ equals .01. Because of our algebraic error we did not assume a value for the age I that transfers are received. Using a value of I equal to 15 (a real world age of 33) seems justified when r exceeds n, because transfer wealth depends on the period of accumulation, and the appropriate approximation to I should be smaller if

r exceeds n. The resulting value of G of 45 also seems reasonable given the fact that not all transfers are made at death. A similar statement holds for the choice of the age gap $G - I$; thus it seems likely that the choice of 30 for $(G - I)$ is too small given that r exceeds n. But keeping $(G - I)$ at 30 and choosing I equal to 15, the factor multiplying the flow of transfers t in equation (2) is 39. Since the estimated 1974 flow of reported transfers is \$45.5 billion, the "transfer flow" lower bound estimate for T is \$1,771 billion, or 46 percent of 1974 household wealth. Note that using a potentially more appropriate age gap of $(G - I)$ of 45 would yield a lower bound value of T of \$2455, or 63 percent of total wealth.

Modigliani's Critique and Calculations

In his paper in this journal, Modigliani focuses to a very large extent on two issues. The first is "flow" estimates of the importance of intergenerational transfers to savings, and the second is the proper definition of life cycle versus transfer wealth. Modigliani devotes little space to the main contribution of Kotlikoff and Summers (1981), the direct calculation of life cycle wealth. We devoted most of our paper to the direct calculation of life cycle wealth because, as we stressed, the "flow" approach overestimates life cycle wealth due to the absence of data on a variety of transfer flows. In addition, as mentioned, the flow approach requires invoking steady state and other simplifying assumptions that may not be valid.

Defining Life Cycle Wealth. Our definition of life cycle wealth is motivated by the following question: Are the U.S. data on labor earnings, rates of return, consumption, and wealth broadly consistent with the view that intergenerational transfers play a negligible role in U.S. wealth accumulation? Stated differently, can one reject the null hypothesis that the life cycle model without intergenerational transfers fully explains U.S. wealth? We defined life cycle wealth according to the theoretical prediction of the zero intergenerational transfer, life cycle model, namely as the sum over cohorts of the accumulated difference between past streams of labor earnings and consumption. We defined the difference between actual U.S. wealth and life cycle wealth as transfer wealth.

Modigliani focuses on a different definition of the two components of life cycle wealth. He also suggests that we have "redefined" the two components. While Modigliani asserts that our definition of life cycle wealth is non-standard, it is the definition used in the two previous extensive analyses by Tobin (1967) and Darby (1979) of the role of the pure life cycle model in U.S. wealth accumulation. This definition is also the one chosen by Hayashi (1986) in his inquiry into life cycle and intergenerational transfer saving in Japan. Indeed, the practice of comparing the wealth predicted by the zero intergenerational transfer life cycle model with total wealth dates to Modigliani and Brumberg (1954).

Modigliani prefers to define life cycle wealth as L_m, where L_m equals the sum over cohorts of the sum of saving at each age, with saving defined as income less consumption. The problem with his definition is that income may include capital income earned on previously received intergenerational transfers. Hence, since income itself may reflect intergenerational transfers, the sum of saving out of income cannot

be used to test with maximum power the null hypothesis that the zero transfer life cycle model accounts for essentially all of U.S. wealth. Stated differently, under the null hypothesis $L_m = L$, but if there are significant intergenerational transfers L_m could be close to total wealth W, although both L_m and W would be substantially different from L, which is our definition of life cycle wealth. Indeed, Ando (1986) reports calculations of L_m equal to 65 percent of the 75 percent of W for the period 1960 to 1970, while our 1974 calculation of life cycle wealth is only 21.9 percent of 1974 wealth.

Once one finds the data are highly inconsistent with the zero transfer, life cycle formulation, a natural behavioral question to raise is: What would be the impact on U.S. wealth of eliminating all intergenerational transfers? We raised this economic, as opposed to accounting, issue on the first page of our 1981 paper, indicating how our definition and estimate of life cycle wealth could be used to address this unrealistic, but nonetheless interesting, counterfactual. The answer to this economic question is, of course, independent of accounting convention. It takes into account the changes in life cycle wealth that might arise if intergenerational transfers were eliminated. More precisely, in a world of significant transfers some fraction of consumption and leisure may be financed out of such transfers, and their elimination could affect the value of life cycle wealth. Our answer to the economic question, to which we still subscribe, was that totally eliminating intergenerational transfers would, in partial equilibrium, reduce U.S. wealth by at least 50 percent. This economic (as opposed to accounting) statement suggests a much more important role for intergenerational transfers than has generally been thought to be the case.

Bequests Versus Total Intergenerational Transfers. In addition to redefining life cycle wealth, Modigliani redefines intergenerational transfers to include only bequests at death. Thus, his flow calculations of the shares of life cycle and transfer wealth exclude all intergenerational transfers in the form of explicit gifts, college tuition, and implicit gifts such as interest free loans, the transfers of businesses to children though partnership agreements, and so on. In effect, Modigliani treats any adult, regardless of age, who received non-bequest transfers from his or her parents, as a "dependent" and ascribes the consumption resulting from such transfers to the parent(s).

In contrast to this peculiar redefinition of intergenerational transfers and adulthood, Kotlikoff and Summers (1981) defines the age of adulthood as age 18 and treats all payments, either in cash or in kind (including tuition payments), received from parents by children above age 18 as an intergenerational transfer. Support of children prior to age 18 is considered consumption by the parent. Because the consumption of children is ascribed to their parents, the choice of age of adulthood affects the shape of the age-consumption profile of adult cohorts.

Modigliani particularly objects to our labelling college tuition expenditures by parents as an intergenerational transfer. While one may argue about the proper age of adulthood, given the fungibility of money there is no reasonable basis for labeling parental tuition support differently from parental gifts of durables, such as cars, or parental gifts of money; that is, whether the parent pays tuition or gives the child the money to pay tuition is economically equivalent. In addition, there is no reason, as

Modigliani suggests, to classify somehow educational expenditures as a human as opposed to nonhuman wealth transfer. The transfer of funds to pay for education constitutes a transfer of nonhuman capital. The fact that the expenditure leads to smarter or more skilled children as opposed, for example, to fatter children, is quite immaterial to the issue of tracing the origins of nonhuman wealth accumulation.

The choice of the age of adulthood is, however, arbitrary. While age 18 seems reasonable for the postwar period, it may be too old for older 1974 cohorts, some of whom were born in the last century. Many of these older generations entered the labor force at younger ages than is currently typical and they certainly had a much shorter lifespan. Indeed, until the 1950s labor force participation rates were calculated for the population over age 14. Had Summers and I used a younger age, such as 16, for the age of adulthood for the older cohorts that were alive in 1974, we would have reported considerably less life cycle wealth.

Simulation Studies of Life Cycle Wealth and Comparisons with Actual Wealth Holdings

Simulation analyses also call the pure life cycle model into question. Auerbach and Kotlikoff (1985, 1987) point out, using a detailed life cycle simulation model, that realistic specification of U.S. demographics, preferences, and fiscal institutions implies an extremely small, if not negative, wealth to income ratio. These results differ from those of Tobin (1967) because of their inclusion of income taxes and social security and their more realistic assumptions concerning the growth rate of consumption over the life cycle. To generate substantial life cycle savings, Tobin found it necessary to assume that consumption over the life cycle grows at a much faster rate than actually observed. Tobin's calculations which appear to come closest to replicating observed ratios of wealth to income assume that consumption grows at a rate of 5 percent per year over the life cycle. This rate is more than twice the rate actually observed (Kotlikoff and Summers, 1981).

Other simulation studies by Atkinson (1971) and Oulton (1976) point out the difficulty of explaining wealth inequality based on the zero transfer life cycle model. To quote Atkinson, "It is clear from the analysis that life cycle factors cannot explain the upper tail of the current distribution of wealth in Britain." Note that the upper tail of the British wealth distribution in Atkinson's study accounts for about three-quarters of total British wealth holdings. Both Atkinson and Oulton indicate that the substantial inequality in wealth relative to earnings can only be explained by intergenerational transfers. The Bevan and Stiglitz (1979) simulation study explicitly accounted for "altruistic" bequests, but just for lower income children, and showed that even this could not account for the tail. Finally, it appears that even adding the assumption of unintended bequests arising from imperfect annuity markets to the life cycle model cannot explain the tail.

Asset Decumulation of the Elderly

Decumulation of wealth after retirement is an essential aspect of the life cycle theory. Yet simple cross section tabulations of wealth holdings by age (Mirer, 1979;

Kurz, 1984a) or savings rates by age (Thurow, 1976; Danziger *et al.*, 1982–83) do not support the central prediction that the aged dissave. Mirer and Kurz report that wealth holding tends to increase with age.

Thurow reports positive saving rates for persons in all age groups, while Danziger *et al.* report that saving rates increase with age with "the elderly spending less than the nonelderly at the same level of income and (with) the very oldest of the elderly have the lowest average propensity to consume." The most recent cross section study of consumption rates by age is that of Albert Ando (1986a); his regression analysis leads him to conclude that "most families follow a reasonably well defined pattern of savings and net wealth accumulation before their retirement, but they tend to dissave little after retirement."

Cross section analysis of estate data by Atkinson (1971) and Atkinson and Harrison (1978) as well as panel analysis of the estates of individual cohorts by Menchik and David (1983) and David and Menchik (1985) also show that the average amount of wealth of cohorts rises in old age. Shorrocks' (1975) panel study of the estates of a single cohort in England indicates positive wealth accumulation until age 70. Hayashi's (1986) analysis of savings of Japanese cohorts in the 1970s leads him to conclude that "mean asset holdings do not decline as cohorts age," and Ando (1986b) commenting on Hayashi's research on Japan as well as his own states that "the apparent total lack of dissaving by older households in Japan is clearly inconsistent with the life-cycle theory." Menchik and David's longitudinal analyses of American estate data is most relevant for understanding U.S. savings behavior. They examine the estates of four birth cohorts living in Wisconsin in the period 1947 to 1978 and born between 1880 and 1925. In addition to studying within cohort behavior, their analyses control for the lifetime earnings of cohort members. Their results "fail to show individuals decumulating wealth in old age."

In contrast to these studies, the study of King and Dicks-Mireaux (1982), based on cross section Canadian data, suggests a positive rate of decumulation in old age. Burbridge and Robb (1985), on the other hand, reach a somewhat different conclusion from an examination of King and Dicks-Mireaux's data. They report old age asset decumulation only for blue collar workers. For white collar workers the age wealth profile is flat between age 55 and 65 and rises after age 65. Except for the study of King and Dicks-Mireaux, the only other analysis that seems to confirm the life cycle model's prediction of a declining age-wealth profile is the panel regression analysis of Diamond and Hausman (1984). However, as both Bernheim (1986) and Hurd (1986) point out, their subsample from the National Longitudianal Survey may not be representative. Indeed, Diamond and Hausman begin their analysis by excluding low wealth households on the grounds that their behavior is inconsistent with the assumptions of the life cycle model. In addition, their data set is not well suited to a study of the wealth of the elderly after they retire because even at the end of the 10-year panel the ages of the sample range from 55 to only 69.

A number of questions can be raised about many of these analyses of the age wealth profiles and saving rates of the aged. The cross section and several of the cohort analyses (but not those of Menchik and David) may be biased towards a slower

rate of asset decumulation because the rich live longer than the poor. In addition, the composition of the sample by age of retirement changes with the age of the sample. But these findings concerning the failure to decumulate are particularly striking since, as Bernheim (1986) points out, the presence of future social security and pension streams increases the rate of decumulation of other assets implied by the life cycle model.

Probably the best analyses of asset changes among the aged are those of Hurd (1986) and Bernheim (1986) both of which use the panel data in the Retirement History Survey. While panel analysis permits holding constant the individual household, one cannot be sure whether changes in wealth over time reflect conscious household saving decisions or are merely the result of unexpected capital gains or losses.

Bernheim considers change in wealth over two periods, 1969–75 and 1975–79, for two samples of elderly, the retired and the nonretired. He also distinguishes between couples and single individuals. Bernheim's measure of wealth change is the log of the ratio of wealth at the end of the period to wealth at the beginning of the period.

For retired couples Bernheim reports a quite small average rate of asset decumulation (a small average ratio of the logs) for the first period and a small average rate of asset accumulation in the second period. Almost half of retired couples in the earlier period and almost three-fifths of couples in the latter period exhibited positive rates of asset accumulation. For nonretired couples the average rate of wealth change was positive in both periods with roughly three-fifths of the nonretired elderly e. ɪℓ ᴎging in positive accumulation. Nonretired single individuals also had positive accumulation on average in both periods, again with about three-fifths exhibiting positive saving. The only group whose average rate of wealth change was negative in both periods is retired single individuals. This group displayed a reasonably large rate of asset decumulation on average; but even among this group over two-fifths had positive saving.

Bernheim carefully considers these data in light of social security and private pensions and states that (1) "the inclusion of annuities reinforces earlier findings that resources decline only slightly, if at all, after retirement;" and (2) "the pure life cycle hypothesis fails to account for saving behavior after retirement."

Hurd reaches a different conclusion from Bernheim, stating "contrary to many results from cross-section data, the elderly do dissave." However, this conclusion appears to be based on tabulations which exclude housing wealth. When Hurd includes housing wealth, he reports that average total real wealth of all Retirement History Survey couples declined by only 2 percent between 1969 and 1979. For single individuals Hurd reports a decline of 22.4 percent over the 10 year period in average total wealth. The corresponding figures when housing wealth is excluded are 14.5 percent for couples and 36.4 percent for singles.

Hurd views the findings on non-housing wealth as most informative, arguing that increases in housing wealth in the 1970s reflect unexpected capital gains. He fails to point out, however, that the reduction in non-housing wealth over the period may

reflect unexpected capital losses on stocks and bonds. In addition, the elderly may well have responded to capital gains in housing by accumulating less in other forms; that is, in the absence of capital gains in housing, non-housing wealth may have been larger.

Hurd's measure may also be more sensitive to measurement error than Bernheim's; the level of average wealth in either 1969 or 1979 may be biased because of outliers. Hurd has indicated (to the author) that the results based on median wealth are similar, but his study, in contrast to that of Bernheim, tells us little about the distribution of wealth changes across the sample.

In sum, the panel studies of Bernheim and Hurd suggest little if any total wealth decumulation of couples and some limited total wealth decumulation of single individuals. In addition, Bernheim shows that a sizeable fraction of singles as well as couples continues accumulating wealth in old age. Even those panel studies which suggest wealth decumulation, on average, indicate a significant fraction of elderly households continuing to accumulate wealth. This, by itself, is strong evidence against the standard, no intergenerational transfer, life cycle model.

Evidence From Annuity Markets

The strict life cycle model without allowance for bequest motives makes strong predictions about the demand for annuities. Since the date of death is uncertain and since the bequests provide no utility, life cycle models imply that there should be a very strong demand for annuity insurance. Indeed, Kotlikoff and Spivak (1981) demonstrate that, for the commonly used time separable CES utility function of consumption and assuming a risk aversion coefficient of 1.75, the gain to a 55 year old with average mortality probabilities from obtaining access to an actuarially fair annuities market is equivalent to an almost 70 percent increase in his lifetime resources in the absence of such markets.

In fact, the demand for annuities appears to be very weak (J. Friedman and Spivak, 1986). Friedman and Warshawsky (1985) report that the loads on annuity insurance are no higher than the loads on other frequently purchased types of insurance such as property and casualty insurance. Yet annuity purchases are a rarity. Friedman and Warshawsky argue that it is necessary to assume a fairly strong bequest motive to explain this behavior. Friedman and Warshawsky do not, however, take into account uncertainty with respect to inflation risk, which may explain the reluctance of many to purchase nominal annuities. In addition, totally annuitizing one's wealth might leave one illiquid and unable to pay major one time expenses such as medical care. Still, the virtual nonexistence of annuity insurance is quite surprising.

Kotlikoff and Spivak (1981) advance a possible alternative explanation, namely that families will self-insure to a large extent when annuity insurance is only available on very unfavorable terms; family insurance, however, does not appear capable of fully accounting for the widespread failure to annuitize. Bernheim, Shleifer, and Summers (1985) review a number of settings where annuities are available on a fair or even subsidized basis and report that even in these cases there is little demand for annuities. They conclude from this evidence that many consumers must have signifi-

cant bequest motives. Their strongest evidence comes from TIAA-CREF's 1973 Survey of Beneficiaries. In this survey over 70 percent of beneficiaries chose plans other than those providing full annuity protection despite the fact that TIAA-CREF annuities appear to be quite close to actuarially fair.

Historical Evidence

The essential prediction of the life cycle theory is that people save to prepare for their retirement when they must dissave and consume. Without periods of retirement, or a least, significant decreased labor earnings at the end of life there is no life cycle motive for saving. Yet there were substantial positive net national saving rates (net national saving divided by net national product) over the period 1870 to 1930 when retirement was much less common than it is today.

There was some retirement in the latter part of the last century and the pre-Depression years of this century, but the retirement rate of the elderly was small, especially when compared with current rates. During the period 1870 to 1930 the labor force participation rate of males 65 and older exceeded 58 percent and for much of the period it exceeded 70 percent (Moen, 1987a, 1987b). In contrast, the comparable current rate for males 65 and older is 25 percent. Life expectancy for 20 year-old males during the period 1870 to 1930 appears to have been about 65; for much of the postwar period it has been above 70.

Despite this significant increase in the length of retirement, the saving rate in recent decades has been substantially smaller than that observed between 1870 and 1930. The average saving rate, defined as net national saving divided by net national product, recorded from 1870 to 1930 is close to 50 percent greater than the average saving rate in the postwar period.[2] In contrast to the life cycle model, at least one class of bequests models suggests that saving rates may fall with the life span and, ceteris paribus, length of retirement (Skinner, 1985). The intuitive reason is that a reduction in morality probabilities reduces the likelihood of a near term bequest. Hence, there is less of an incentive to save for bequests. Of course, much besides the length of retirement changed over the last century, so the negative correlation between the saving rate and the length of retirement may be spurious. It is, therefore, also useful to examine this correlation over shorter periods. During the period 1869 to 1891 the labor force participation rate of men 65 and older exceeded 73 percent and at times was as high as 78 percent. In contrast, the participation rate between 1902 and 1931 was below 66 percent, and for most of the period it was below 60 percent. Despite this increase in the length of retirement over the two periods, the average rate of net national saving is slightly higher in the later period. There is also a postwar negative correlation between the length of retirement and the saving rate. Kotlikoff and Smith (1983) report that since 1950 the expected duration of retirement and other nonworking periods for the average adult has almost doubled. This change coincided with a secular decline since 1950 of almost 40 percent in the net national saving rate. Of course, the introduction of unfunded social security (Feldstein, 1974) and other

government policies may have reduced saving since 1950, but the life cycle model would still predict a quite substantial offsetting impact arising from the change in retirement (Kotlikoff, 1979).

Understanding Intergenerational Transfers

Explanations for Intergenerational Transfers

Altruistic concern for one's children is the first reason one thinks of for intergenerational transfers. This concern may be expressed mathematically as the parent having direct utility for the utility of the child as in Barro (1974) and Becker (1974). An alternative, nonaltruistic model of bequests (Yaari, 1966; Blinder, 1973) is that parents care about the level of the bequest per se. But a model where utility depends on the size of the bequest seems implausible because it implies that the parent's transfer to the child is independent of the child's economic circumstances.

The altruistic model also seems somewhat implausible because it has such strong neutrality predictions. As is well known, Barro (1974) showed that intergenerational transfers by the government are completely neutralized because parents internalize the effects on all future generations of such transfers. More recently, Kotlikoff (1983) and Bernheim and Bagwell (1986) independently showed that marriage may altruistically link large numbers of parents and other extended family members (if not the entire planet), with the implication that intragenerational government transfers will also be entirely neutralized.

The neutrality properties of the altruistic models hold only if those making transfers are not considered. As an example of such constraints, suppose an altruistic parent would like to transfer from her children to herself but the parent cannot compel her children to make such transfers; in this situation, government redistribution from that parent to her child will have real effects.

An alternative view of transfers from parents to children, which has nothing to do with parental concern for children or a desire per se to leave bequests, is that parents and children form an incomplete annuities market (Kotlikoff and Spivak, 1981). According to this view parents and children enter into implicit risk sharing arrangements. The risk to be shared is the parent's longevity risk. The arrangement involves parents agreeing to transfer their assets to their children at death as a quid pro quo for support payments from the children if the parents live longer than expected. Enforcement of such arrangements is enhanced by having the child make payments to the parent each year, rather than wait until the parent runs out of resources.

Kotlikoff, Shoven, and Spivak (1986, 1987) demonstrate that significant intergenerational transfers could arise in the aggregate in a dynamic equilibrium model of imperfect family annuity insurance. Indeed, they point out that such a model could explain much of the 80–20 split of transfer and life cycle wealth reported by Kotlikoff and Summers (1981). This point is important; it indicates that although intergenerational transfers may be large in the aggregate, fundamental preferences may still correspond to those posited in the generationally selfish life cycle model.

Other researchers, including Sheshinski and Weiss (1981), Davies (1981), Eckstein, Eichenbaum, and Peled (1983), Abel (1983), and Hubbard (1987), have examined the potential for intergenerational transfers when no annuity insurance whatsoever, including implicitly family insurance, is available. These studies also demonstrate clearly that significant intergenerational transfers can arise in the life cycle model if annuity insurance is unavailable.[3]

Even if the life span were certain, individuals may save significant sums for the possibility of substantial end-of-life medical and nursing home expenses (Kotlikoff, 1986). If such medical problems do not arise, the elderly individual may be unable to consume this nest egg before he or she dies, and, consequently, a bequest will arise.

Other individuals may simply strike it rich in their professions and investments and find themselves unable to consume all their resources. It's clear that consumption satiation does occur; there are enough examples of extremely wealthy individuals, many who are quite young, who are unable to consume their wealth over their lifetime, especially when one properly measures consumption as excluding expenditures on durables, but including imputed rent on durables. Additional research is needed to determine how substantial windfalls influence total wealth accumulation. While there is some contradictory evidence concerning the elasticity of how bequests change with respect to changes in resources (Menchik and David, 1983; Kotlikoff, 1977), this elasticity surely exceeds unity for the super-wealthy.

Bernheim, Shleifer, and Summers (1985) advance a fourth explanation for intergenerational transfers: the implicit payment by parents to their children for providing in kind services, such as assisting them with chores, trips to the doctor, and so on. While some intergenerational transfers surely arise as payments for child-provided services, it seems quite unlikely that such transfers would be very large in the aggregate.

Each of these explanations of intergenerational transfers presumably plays some role in explaining aggregate transfers; in addition, there are probably many traditional life cycle households that are well annuitized through private pensions and Social Security and, consequently, leave no intergenerational transfers. This heterogeneous view of preferences and insurance arrangements is espoused by Kurz (1984b).

Empirical Analyses of Alternative Models of Intergenerational Transfers

Empirical analysis of intergenerational transfers has been greatly limited by the available data. To test models of altruism or family insurance arrangements one needs data not only on the transfers, consumption choices, and resources of parents, but also those of adult children; that is, one needs information on the extended family. At the present time there simply are not suitable data sets covering the extended family.

There are, however, data on *inter vivos* transfers and bequests. In his analysis of 379 Connecticut estates with bequests to children with siblings Menchik (1980) finds

[3] I find these life cycle models somewhat unsatisfactory because they simply assume away annuity insurance despite the fact that life cycle agents will have very substantial demands for annuities. In addition, the bequests arising in these models are arbitrarily allocated to children despite the fact that the parents have

strong evidence that "wealth bequeathed to children is shared equally." This study confirmed earlier findings by Sussman, *et al.* (1970) and Brittain (1978). On the other hand, Tome's (1981) findings based on recall data from Cleveland contradict the equal bequest view; but in 1985 Menchik (1985) sampled actual probate records in Cleveland and found equal division in 93 percent of the cases. The finding of equal bequests strongly contradicts the prediction of the altruistic model which predicts that differences in bequests would compensate for differences in children's earnings capacities. Donald Cox (1987) reports another finding at odds with altruism, namely that transfers are positively related to the recipient's income level.

Hurd also finds evidence against the utility of bequest model, and indirectly against the altruism model. Hurd points out that parents with bequest motives should consume their end-of-life resources at a slower rate than those with bequest motives. He then compares the rate of asset decumulation of the elderly who have children with those who do not. He finds no significant difference in the rate of asset decumulation among the two groups. A contrasting finding by Friedman and Spivak (1986) is that people with more children are less likely to purchase annuities.

Bernheim, Shleifer, and Summers (1985) report that in settings with two or more children, children of richer parents spend more time with their parents than children of poorer parents. In contrast, they find no significant impact of parental wealth on the visitation of only children. The authors view these findings as strong support for their model in which parents with two or more children credibly threaten to disinherit those children who are insufficiently attentive. These findings, while suggestive, must be viewed as preliminary; further analysis, taking account of childrens' own wealth position, is needed.

In addition to these micro analyses of intergenerational transfers, Boskin and Kotlikoff (1985) use time series data to test directly one of the key neutrality propositions of the altruism model, namely that aggregated consumption is independent of the age distribution of resources. Their model assumes extended families have identical Barro-type preferences and identical demographic structures. Under these assumptions aggregate household consumption depends simply on the present value of aggregate human wealth, plus national net worth, less the present value of future government consumption. It is independent of the age distribution of resources. Boskin and Kotlikoff show that given the appropriate resource variables, the age composition of income still significantly influences aggregate consumption. Thus they reject their admittedly stylized model of intergenerational altruism. In contrast, Abel and Kotlikoff (1987) using micro data are unable to reject the Barro model's implication that, controlling for demographics, consumption of different age cohorts moves together.

Conclusion

Like most good puzzles, the saving puzzle has a lot of pieces, many of which do not seem to fit together. It seems well-established that intergenerational transfers are sizeable and that the process leading to these transfers is responsible for a sizeable

amount of wealth accumulation. The precise explanation for these transfers remains unclear.

Intergenerational altruism might appear the most likely candidate, but at least some stylized facts, such as the equal allocation of bequests among children, are strongly at odds with the altruism model. Other explanations involving imperfect insurance arrangements or payments for child services do not appear capable of explaining the substantial amounts of transfers actually observed. Sorting out the relative contributions of different models to intergenerational transfers and the precise role of intergenerational transfers in the process of wealth accumulation remains an intriguing and exciting enterprise.

References

Abel, Andrew, "Bequests and Social Security with Uncertain Lifetimes," *American Economic Review*, September 1985, 75:4, 777–91.

Abel, Andrew, and Laurence Kotlikoff, "Does the Consumption of Different Age Cohorts Move Together? A New Non Parametric Test of Intergenerational Altruism," mimeo, 1987.

Adams, Bert, *Kinship in an Urban Setting*. Chicago: Markham Publishing Company, 1968.

Ando, Albert, "Selected Comments on Current Empirical Evidence For or Against the Life Cycle Theory." Paper presented at The International Seminar on the Life Cycle Theory, Paris, 1986a.

Ando, Albert, Comment on Fumio Hayashi's paper in *NBER Macroeconomics Annual 1986*. Cambridge: The MIT Press, 1986b.

Ando, Albert, and Franco Modigliani, "The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests," *American Economic Review*, March 1963, 53:1, 55–84.

Atkinson, A. B., "The Distribution of Wealth and the Individual Life Cycle," *Oxford Economic Papers*, 1971, 23:2, 239–254.

Atkinson, A. B., and A. J. Harrison, *The Distribution of Wealth in Britain*. Cambridge: Cambridge University Press, 1978.

Auerbach, Alan J., and Laurence J. Kotlikoff, *Dynamic Fiscal Policy*. Cambridge: Cambridge University Press, 1987.

Auerbach, Alan J., and Laurence J. Kotlikoff,

"Simulating Alternative Social Security Responses to the Demographic Transition," *National Tax Journal*, June 1985.

Barro, Robert J., "Are Government Bonds Net Wealth?" *Journal of Political Economy*, November/December 1974, 82, 1095–1130.

Becker, Gary S., "A Theory of Social Interactions," *Journal of Political Economy*, November/December 1974, 82:6, 1063–94.

Becker, Gary S., and Nigel Tomes, "An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility," *Journal of Political Economy*, December 1979, 87:6, 1153–89.

Becker, Gary S., and Nigel Tomes, "Child Endowments and the Quantity and Quality of Children," *Journal of Political Economy*, August 1976, 84, S143–S162.

Behrman, J., R. Pollak, and P. Taubman, "Parental Preferences and Provision for Progeny," *Journal of Political Economy*, February 1982, 90:1, 52–73.

Bernheim, B. Douglas, "Dissaving After Retirement: Testing the Pure Life Cycle Hypothesis." In *Issues in Pension Economics*. NBER volume. Chicago: University of Chicago Press, 1986.

Bernheim, B. Douglas, and Kyle Bagwell, "Is Everything Neutral?" NBER Working Paper, 1986.

Bernheim, B. Douglas, Andrei Shleifer, and Lawrence H. Summers, "The Strategic Bequest

Motive," *Journal of Political Economy*, December 1985, *93*:6, 1045–1075.

Bevan, D. and Joseph Stiglitz, "Intergenerational Transfers and Inequality," *The Greek Economic Review*, August 1979, *1*:*1*, 8 + .

Blinder, Alan, "A Model of Inherited Wealth," *The Quarterly Journal of Economics*, 1973.

Boskin, Michael J., and Laurence J. Kotlikoff, "Public Debt and U.S. Saving: A New Test of the Neutrality Hypothesis." Carnegie-Rochester Conference Volume Series, February 1985.

Brittain, John A., *Inheritance and the Inequality of Material Wealth*. Washington, D.C.: The Brookings Institution, 1978.

Burbridge, J. B., and A. L. Robb, "Evidence on Wealth Age Profiles in Canadian Cross Section Data," *Canadian Journal of Economics*, November 1985, *58*:4, 854–875.

Cox, Donald, "Motives for Private Income Transfers," mimeo, 1987.

Danziger, S. et al., "The Life Cycle Hypothesis and the Consumption Behavior of the Elderly," *Journal of Post Keynesian Economics*, Winter 1982–83, *2*, 208–227.

Darby, Michael R., *Effects of Social Security on Income and the Capital Stock*. Washington, D.C.: American Enterprise Institute, 1979.

David, Martin, and Paul L. Menchik, "The Effect of Social Security on Lifetime Wealth Accumulation and Bequests," *Economica*, November 1985. *52*:208, 421–434.

Davies, James, "Uncertain Lifetime, Consumption, and Dissaving in Retirement," *Journal of Political Economy*, June 1981, *89*:3, 561–577.

Diamond, Peter A., and Jerry Hausman, "Individual Retirement and Savings Behavior," *Journal of Public Economics*, February/March 1984, *23*:*1/2*, 81–114.

Eckstein, Zvi, Marty Eichenbaum, and Dan Peled, "Uncertain Lifetimes and the Welfare Enhancing Properties of Annuity Markets and Social Security," mimeo, 1983.

Feldstein, Martin S., "Social Security, Induced Retirement, and Saving," *The Journal of Political Economy*, September/October 1974, *82*:5, 905–925.

Friedman Benjamin, and Mark Wahrshawsky, "The Cost of Annuities: Implications for Saving Behavior and Bequests." NBER Working Paper No. 1682. Cambridge: National Bureau of Economic Research, August 1985.

Friedman Joseph, and Avia Spivak, "Is There Adverse Selection in the Demand for Annuities?" Mimeo, 1986.

Hayashi, Fumio, "Why is Japan's Saving Rate So Apparently High?" *NBER Macroeconomics Annual* 1986. Cambridge: The MIT Press, 1986.

Hubbard, Glenn R., "Uncertain Lifetimes, Pensions, and Individual Saving" In Bodie, Z., J. B. Shoven, and D. A. Wise, eds. *Issues in Pension Economics*, Chicago: University of Chicago Press, 1987.

Hubbard, Glenn R., "Precautionary Saving Revisited: Social Security, Individual Welfare, and the Capital Stock," 1984b.

Hurd, Michael, "Savings and Bequests." NBER Working Paper No. 1826. Cambridge: National Bureau of Economic Research, January 1986.

Ishikawa, Tsuneo, "Family Structures and Family Values in the Theory of Income Distribution," *Journal of Political Economy*, October 1975, *83*:5, 987–1008.

King, Mervyn, and Louis Dicks-Mireaux, "Asset Holding and the Life Cycle," *The Economical Journal*, 1982, *92*, 247–67.

Kotlikoff, Laurence J., "Estimating the Elasticity of Bequests with Respect to Lifetime Resources from a Sample of Potential Decedents." mimeo, 1977.

Kotlikoff, Laurence J., "Social Security and Equilibrium Capital Intensity," *The Quarterly Journal of Economics*, May 1979, *93*, 233–53.

Kotlikoff, Laurence J., "Some Economic Implications of Life Span Extension." In *Biology and Behavior of the Aged*, National Institute of Aging, Academic Press, 1982.

Kotlikoff, Laurence J., "Health Expenditures and Precautionary Savings," NBER Working Paper No. 2008, August 1986.

Kotlikoff, Laurence J., "Theoretical and Empirical Analysis of Altruistic Linkages Within the Extended Family." mimeo, June 1983.

Kotlikoff, Laurence J., and Daniel E. Smith, *Pensions in the American Economy*. Chicago: University of Chicago Press, 1983.

Kotlikoff, Laurence J., and Avia Spivak, "The Family as an Incomplete Annuities Market," *Journal of Political Economy*, April 1981, *89*:2, 372–91.

Kotlikoff, Laurence J., and Lawrence H. Summers, "The Contribution of Intergenerational Transfers to Total Wealth: A Reply." NBER Working Paper No. 1827, February 1986.

Kotlikoff, Laurence J., and Lawrence H. Summers, "The Role of Intergenerational Transfers in Aggregate Capital Accumulation." *Journal of Political Economy*, August 1981, *89*:4, 706–732.

Kotlikoff, Laurence J., John Shoven, and Avia Spivak, "Annuity Market's Savings, and the Capital Stock." In Bodie, Z., J. B. Shoven and D. A. Wise, eds., *Issues in Pension Economics*, Chicago: University of Chicago Press, 1987, 211–234.

Kotlikoff, Laurence J., John Shoven and Avia Spivak "The Impact of Annuity Insurance on

Savings and Inequality," *Journal of Labor Economics*, July 1986, *4: 3*, part 2.

Kurz, Mordecai, "Capital Accumulation and the Characteristics of Private Intergenerational Transfers," *Economica*, February 1984a, *51: 201*, 1–22.

Kurz, Mordecai, "The Life Cycle Hypothesis as a Tool of Theory and Practice." mimeo, 1984b.

Loury, Glen, "Intergenerational Transfers and the Distribution of Earnings," *Econometrica*, July 1981, *49: 4*, 843–867.

Menchik, Paul L., "Primogeniture, Equal Sharing, and the U.S. Distribution of Wealth," *Quarterly Journal of Economics*, March 1980, *94: 2*, 299–316.

Menchik, Paul L., "Unequal Estate Division: Is it Altruism, Reverse Bequests, or Simply Noise?" Paper presented to the 1984 Seminar on Modeling the Accumulation and Distribution of Wealth, Paris, France, 1985.

Menchik, Paul, and M. David, "Income Distribution, Life Time Saving and Bequests," *American Economic Review*, September 1983, *83: 4*, 672–690.

Mirer, Thad W., "The Wealth Age Relation Among the Aged," *American Economic Review*, June 1979, *69: 3*, 435–443.

Modigliani, Franco, "The Contribution of Intergenerational Transfer to Total Wealth." Paper presented to the Paris Conference on Modeling the Accumulation and Distribution of Wealth, September 1984.

Modigliani, Franco, "The Life Cycle Hypothesis of Saving, Twenty Years Later." In Parkin, M., ed., *Contemporary Issues in Economics*. Manchester: Manchester University Press, 1975, pp. 2–36.

Modigliani, Franco, and Richard Brumberg, "Utility Analysis and Aggregate Consumption Functions: An Attempt at Intergation." In Abel, A., ed., *The Collected Papers of Franco Modigliani*. Cambridge: The MIT Press, 1980. Vol. *2*, 128–197.

Modigliani, Franco, and Richard Brumberg, "Utility Analysis and the Consumption Function: An Interpretation of Cross Section Data." In Kurihara, K. K., ed., *Post Keynesian Economics*. New Brunswick, N.J.: Rutgers University Press, 1954, pp. 388–436.

The President's Council of Economic Advisors, "The 1987 Economic Report of the President." Washington, D.C.: U.S. Government Printing Office, 1987.

Moen, John, "The Labor of Older Men: A Comment," *The Journal of Economic History*, September 1987a.

Moen, John, "Essays on the Labor Force and Labor Force Participation Rates: The United States from 1860 through 1950." Unpublished Ph.D. dissertation, University of Chicago, 1987b.

Oulton, Nicholas, "Inheritance and the Distribution of Wealth," *Oxford Economic Papers*, March 1976, *28*, 86–101.

Ransom, Roger L., and Richard Sutch, "The Labor of Older Americans: Retirement of Men On and Off the Job, 1870 to 1937," *The Journal of Economic History*, March 1986.

Sheshinski, Eytan, and Yoram Weiss, "Uncertainty and Optimal Social Security Systems," *Quarterly Journal of Economics*, May 1981, *94: 2*, 189–206.

Shorrocks, Anthony F., "The Age Wealth Relationship: A Cross Section and Cohort Analysis," *Review of Economics and Statistics*, May 1975, *57: 2*, 155–63.

Skinner, Jonathan, "The Effect of Increased Longevity on Capital Accumulation," *American Economic Review*, December 1985, *75: 5*, 1143–1150.

Solow, Robert, "Reflections on Saving Behavior." In *Saving and Government Policy*. Conference Series No. 24. Boston: Federal Reserve Bank of Boston, 1982.

Summers, Lawrence H., "Capital Taxation and Capital Accumulation in a Life Cycle Growth Model," *American Economic Review*, September 1981, *71: 4*, 533–544.

Sussman, M. B., J. N. Cates, and O. T. Smith, *Inheritance and the Family*. New York, Sage, 1970.

Thurow, Lester, *Generating Inequality*. New York: Basic Books, 1976.

Tobin, James, "Life Cycle Saving and Balanced Growth." In Fellner, William *et al.*, eds., *Ten Economic Studies in the Tradition of Irving Fisher*. New York: Wiley, 1967, pp. 231–56.

Tomes, Nigel, "The Family, Inheritance, and the Intergenerational Transmission of Inequality," *Journal of Political Economy*, October 1981, *89: 5*, 928–58.

U.S. Department of Commerce, Bureau of Census, *Historical Statistics of the United States*. Washington D.C.: U.S. Government Printing Office, 1975.

White, Betsy Buttrill, "Empirical Tests of the Life Cycle Hypothesis," *American Economic Review*, September 1978, *68(4)*, 547–60.

Yaari, Menachim E., "Uncertain Lifetime, Life Insurance, and the Theory of the Consumer," *Review of Economic Studies*, April 1965, *32: 2*, 137–150.