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Net Intergenerational Transfers from an Increase in Social Security Benefits

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ABSTRACT

When the age of death is uncertain, individuals will leave bequests—even if they have no desired bequests—simply because they will hold wealth against the possibility of living longer. Bequests are accidental. Starting from a baseline level of Social Security benefits, an increase in benefits will cause consumption to increase. However, consumption may not increase by as much as the increase in Social Security, which would cause wealth to be greater than under the baseline scenario. The higher wealth levels would translate into greater bequests. Therefore, an increase in Social Security benefits may not be a complete transfer from the younger generation to the older generation: some of the increase in benefits may be bequeathed back to the younger generation. Whether this happens depends on the form of the utility function, the amount of bequeathable wealth, and whether there is a bequest motive. The objective of this paper is to quantify for single persons how much of an increase in Social Security benefits would be bequeathed back to the younger generation. We find that, at least for singles, increases in Social Security benefits are unlikely to be offset by bequests.

JEL Classifications: E21, H55

Keywords: Bequests, Social Security

INTRODUCTION

When the age of death is uncertain, individuals will leave bequests—even if they have no desired bequests—simply because they will hold wealth against the possibility of living longer. Bequests are accidental. Starting from a baseline level of Social Security benefits, an increase in benefits will cause consumption to increase. However, consumption may not increase by as much as the increase in Social Security, which would cause wealth to be greater than under the baseline scenario. The higher wealth levels would translate into greater bequests, even when there is no bequest motive and all bequests are accidental. Therefore, an increase in Social Security benefits may not be a complete transfer from the younger generation to the older generation: some of the increase in benefits may be bequeathed back to the younger generation. Whether this happens depends on the form of the utility function, the amount of bequeathable wealth, and whether there is a bequest motive. The objective of this paper is to quantify how much of an increase in Social Security benefits would be bequeathed back to the younger generation. We will use an estimated life-cycle model for consumption by singles.[1]

LIFE-CYCLE MODEL

A broad characterization of the situation at retirement is the following. People reach retirement with an array of economic resources: a claim on Social Security, a claim on Medicare, pension rights, and bequeathable wealth. An appropriate theoretical framework to analyze this situation is the life-cycle model of consumption that goes back to Modigliani and Brumberg (1954), with extensions to account for a bequest motive (Hurd 1989). In life-cycle models of consumption under uncertainty, individuals make choices in the current period based on current information and beliefs so as to maximize the expected discounted present value of utility. The expected discounted present value of utility is the sum of utility in the current period based on current choices and the current state of the world, and the expected discounted present value of future utility, which depends on the probability of survival to each future period, the return to saving, budget

[1] A similar model for couples is much more complex and will be an objective of future work.

constraints, optimal consumption choices at each period in the future, and the value of financial bequests at the death.

We base the analysis on a somewhat restricted version of the life-cycle model. Life-time utility is based on time-separable utility from consumption and from bequests (Yaari 1965); the only uncertainty is date of death; resources are initial bequeathable wealth, rights to pensions, and a stream of annuities, such as Social Security; bequeathable wealth cannot become negative and, therefore, borrowing against future annuities is not allowed. Because it does not have a provision for the choice to work, it is applicable only to respondents after they enter retirement or disability.

MODEL OF CONSUMPTION BY SINGLES

These assumptions lead to the following behavioral model for a single person: maximize expected lifetime utility Ω over the consumption path $\{c_t\}$

$$\Omega = \int_0^N u(c_t)e^{-\rho t}a_t dt + \int_0^N V(w_t)e^{-\rho t}m_t dt \, . \qquad [1]$$

The first term is expected discounted utility from consumption, where

$u(\cdot) =$ the utility flow from consumption;

$\rho =$ the subjective time rate of discount;

$a_t =$ the probability of being alive at t; and

$N =$ the maximum remaining years of life $(a_N = 0)$

The second term is the expected discounted utility of bequests, where $V(\cdot) =$ utility from bequests, which may depend on the personal characteristics of potential inheritors, such as the economic status of any children in an altruistic or strategic bequest model;

$w_t =$ bequeathable wealth at t;

$m_t =$ probability density of dying at t.

The constraints on the maximization are: initial bequeathable wealth, w_0, is given; the nonnegativity constraint, $w_t \geq 0 \quad \forall t$; and the rate at which bequeathable wealth changes is given by:

$$\frac{dw_t}{dt} = r\,w_t - c_t + A_t\,, \qquad [2]$$

in which $r =$ real interest rate (constant and known), and $A_t =$ flow of annuities at time *t*.

The nonnegativity constraint on bequeathable wealth can be justified by a legal ban on borrowing against Social Security benefits. In addition, in the data, very few are observed with negative wealth, and those few tend to have negative wealth as the result of negative business wealth. This is likely to be the result of unanticipated losses rather than borrowing for consumption purposes. The importance of taking account of the corner solution ($w_t = 0$) is seen from the fraction of single elderly with approximately zero nonhousing wealth. In 1993, about 19 percent of those aged 70–79 and about 40 percent of those aged 90–100 had wealth of less than $1,000.

The model places considerable emphasis on annuity income, which is based on the empirical observation of its importance. In 1994, 94 percent of the elderly (65 or over) had some annuity or pension income (including Social Security) and 79 percent had more than half of their income from annuities or pensions.

The solution to the single's problem is (Hurd 1989):

$$\begin{cases} \dfrac{du_t}{dt} = u_t(h_t + \rho - r) - h_t V_t & \text{for } w_t > 0; \\ c_t = A_t & \text{for } w_t = 0, \end{cases} \qquad [3]$$

where w_0 is given and:

$u_t = du(c_t)/dc_t =$ marginal utility of consumption at time *t*;

$h_t = m_t/a_t =$ mortality risk (mortality hazard) at time *t*; and

$V_t = dV(w_t)/dw_t =$ marginal utility of bequests at time *t*.

The model does not admit an analytical solution because of the boundary condition and because of the bequest motive. The optimal consumption path must be found numerically. Conditional on the specification of the utility function, the equation of motion of consumption is given implicitly by [3], and the level is found from the lifetime budget constraint.

A typical solution, as found in prior estimation based on the Retirement History Survey (Hurd 1989), is shown in Figure 1. This is the consumption path for a man aged 75 years with initial bequeathable wealth of $100,000 and Social Security income of $10,000. By age 92, all bequeathable wealth has been consumed and the consumption path will follow the path of Social Security.

Once the optimal consumption path has been found, predicted wealth $\{\hat{w}\}$ is calculated from the equation of motion of wealth [2]. Therefore, for each individual the model can be used to forecast consumption and wealth. Income can be forecast from observed annuity income and from capital income as rw_t.

ESTIMATION OF THE MODEL

In previous work we have estimated the model of consumption by singles (Gan, Gong, Hurd, and McFadden 2004). We specified that the utility function is the constant relative risk aversion utility function:

$$u(c) = \tfrac{1}{1-\gamma} c^{1-\gamma}$$

and that the bequest function is:

$$V(w) = (\alpha_0 + \alpha_1 n) w$$

if n, the number of children, is positive; otherwise $V(w) = 0$. We estimated this model over two waves of data from the Asset and Health Dynamics study (AHEAD).[2]

An important determinant of the consumption path is mortality risk, h_t, in [3]. While prior work simply used life tables to construct h_t for each individual, we use individual reports on subjective survival probabilities (Hurd and McGarry 1995, 2002). A subjective survival probability as measured in AHEAD is a respondent’s estimate of the

[2] See Soldo, Hurd, Rodgers, and Wallace (1997) for a description of AHEAD.

probability of surviving to a “target” age. For example, a 71 year-old would be asked about his or her subjective probability of surviving to age 85, while a 77 year-old would be asked about survival to age 90. Following Gan, Hurd, and McFadden (2005), we estimated individualized survivor curves that depend on both the life table and on subjective survival. Briefly, we used a statistical method to combine them such that someone who reported subjective survival chances greater than the life table survival chances at the target age would be given an individualized survival curve that is greater than the life table curve at all ages. In our estimation at each age, h_t depended on the individualized survival curve.

Our preferred estimation results produced the parameter values conditional on an assumed real interest rate of 0.04, as shown in Table 1. These differ from those in Hurd (1989), which are also shown in the Table. In our simulations we will use both sets of parameters.

EXPECTED BEQUESTS

Our model solves for the optimal consumption path, conditional on initial bequeathable wealth, Social Security benefits (Social Security wealth), age, sex, and the number of children. Then, using the equation of motion of wealth, we find the optimal path of bequeathable wealth. From these paths we can calculate the expected present value of consumption and of Social Security benefits (Social Security wealth). A bequest happens when someone dies holding wealth. The expected bequest at some future time, τ, conditional on surviving to time, t, is just $w_\tau m_\tau$, that is, wealth held at τ times the probability of dying at τ. The expected present value of bequests is just the discounted sum of the $w_\tau m_\tau$. From these calculations we form a lifetime balance sheet. On the receipt side, there is initial bequeathable wealth plus Social Security wealth; on the expenditure side, there is the expected present value of consumption and the expected present value of bequests.

Figure 2 shows the consumption and wealth paths for a single woman initially aged 65. Her initial bequeathable wealth is $100,000 and Social Security income is

$10,000. The consumption path in this figure differs from the consumption path in Figure 1 because it pertains to a woman aged 65 and because it is based on the parameters in Table 1 of Gan et al. (2004).

Our method of finding the effect of changes of Social Security on bequests is to first conduct a simulation such as that which produced the wealth and consumption paths in Figure 2. Then we resimulated the model, but increasing Social Security benefits by some given amount. A comparison of the change in the expected present value of bequests, the expected present value of consumption, and Social Security wealth will show how much of the increase has been used for bequests and for consumption.

Figure 3 shows an example of these simulations. The baseline or initial simulation is for a woman aged 65 with three children. The parameters are from Table 1 (Hurd 1989). The baseline wealth, consumption, and Social Security benefits paths are shown in the thicker lines. Baseline Social Security is $10,000 per year; baseline initial wealth is $100,000. Baseline initial consumption is about $12,900 per year and increases to $17,100 at age 81 and then declines until age 94 when wealth is exhausted. After this age, she would consume $10,000. Wealth declines continuously until age 94 when it reaches zero. Under this scenario expected bequests are $30,200.

The simulation results with Social Security benefits of $20,000 are shown in the thin lines. Initial consumption is $21,000 under this scenario. It increases until age 82 after which it declines until age 93, when wealth is exhausted. Should this women survive until 93, she would consume Social Security benefits of $20,000 until the end of her life. Wealth increases until age 69, after which it declines continuously, reaching zero at age 93. Under this scenario, the expected present value of bequests is $32,500. Even though wealth is exhausted sooner under this scenario, bequests are greater because more wealth is held at ages 75–85 when the probability of death is large.

Table 2 shows a summary of these kinds of simulations. The table pertains to a 65 year-old man. In the two left-side panels are results under the assumption that he has no bequest motive (no children). In the left-most panel, his initial bequeathable wealth is $100,000 and annual Social Security benefits are $10,000. The expected present value (discounted at 4% real interest rate) of Social Security benefits (Social Security wealth) is $107,600. According to the estimated optimal consumption path, the expected present value of consumption is $193,200 and the expected present value of bequests is just $12,800. Thus, the model predicts that 12.8% of initial wealth will be bequeathed, and because there is no bequest motive, these bequests are accidental.

The next panel shows similar figures, but when Social Security benefits are $20,000 each year. Social Security wealth is twice as large, but the expected present value of consumption increases by $109,000, which is more than the increase in Social Security wealth. Because the lifetime budget constraint must be satisfied, the expected present value of bequests must decline, and, indeed, a direct calculation shows that it does. Therefore, for this example, an increase in Social Security benefits is entirely consumed by the receiving cohorts, and they even consume a little more out of their own bequeathable wealth. The net effect is a decrease in bequests.

The right two columns have similar results, but now the man is assumed to have three children. A comparison of columns 1 and 3, which holds Social Security benefits constant but changes the bequest motive, shows that the bequest motive is weak—the expected present value of bequests increases by just $200 or 2.6%. We should not expect, therefore, that increases in Social Security benefits would cause a change in the expected present value of bequests that is much different from the comparisons of columns 1 and 2, and that is the case. As the last two columns show, the expected present value of bequests falls by $2,600 rather than by $2,700, as in columns 1 and 2. Thus, the bequest motive causes an additional $100 in bequests out of an increase in the present value of Social Security benefits of $107,700.

Table 3 has similar results, but they are for a 65 year-old woman. The difference in inputs that cause the difference in results is that women face substantially lower mortality risk and have greater life expectancy. Thus, Social Security wealth is about $15,000 higher. This lower risk causes the optimal consumption level initially to be lower, but consumption is achieved over a longer lifespan so that total consumption is higher than for a 65 year-old man. Because consumption is initially lower, wealth is held for a longer time. Even though more wealth is held, it is held earlier in life when mortality risk is fairly low. Thus, compared with a man bequests are lower.

As with the 65 year-old man, the woman's expected bequests decline when Social Security benefits are increased from $10,000 to $20,000 per year. As shown in the right-hand columns, bequests decrease even when there is a bequest motive.

Tables 4 and 5 have results similar to those in Tables 2 and 3, except that different parameters are used for the model, those shown in Table 1, column "Hurd (1989)." The time rate of discount, is much lower so that the start of the consumption path is lower, causing more wealth to be held. A consequence is that bequests are substantially higher even without a bequest motive (left columns), thus 28%–29% of bequeathable wealth is accidentally bequeathed. Even so, increasing Social Security causes bequests to decrease by $2,200 for the 65 year-old man and $400 for the 65 year-old woman.

Deleted: ρ

When there is a bequest motive, an increase in Social Security benefits does cause an increase in bequests. In the case of the 65 year-old woman, the increase is by $2,100 which is an increase of 6.8%. However, Social Security wealth increased $132,900, so all but a trivial fraction of the increase in Social Security benefits was used for consumption.

CONCLUSION

Although, in principle, an increase in Social Security benefits could result in substantial increases in bequests (whether they are accidental or not), the empirical finding is that they do not, or at least not substantially. In fact, under a model of life-cycle consumption by singles, which was estimated over two different data sets, bequest actually decrease in the absence of a bequest motive. Only in one of the estimated models that allowed for a bequest motive did bequests increase, and even then, the increase was trivial. We explored many more cases, such as variation in the level of Social Security benefits, the number of children, and the age of the single person (not shown). In no simulation did we observe any significant increase in bequests in response to an increase in Social Security benefits. We conclude that, at least for singles, increases in Social Security benefits are unlikely to be offset by bequests.

Results for couples are unlikely to be substantially different simply because at the death of a spouse, about 75% of the wealth goes to the surviving spouse (Hurd and Smith 2001). At that point, the surviving spouse follows the consumption path generated by the singles' model. As we have seen, the singles' model does not produce any important bequest offset to an increase in Social Security benefits.

An unanswered question, however, is the role of *intervivos* transfers. They are fairly large, and perhaps they would be increased in response to an increase in Social Security benefits. To answer that question would require the specification and estimation of a considerably more complex model than the one used here.

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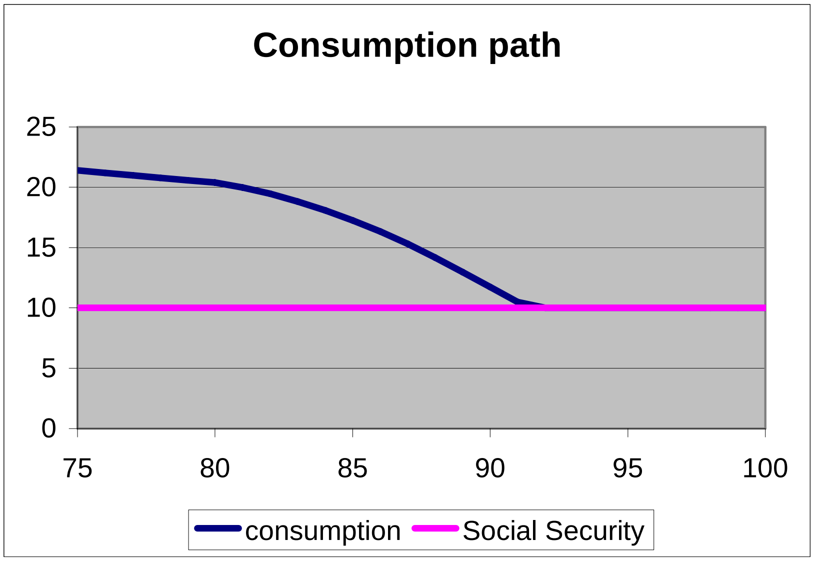
FIGURE 1



Consumption path
25
20
15
10
5
0
75
80
85
90
95
100
consumption
Social Security

FIGURE 2

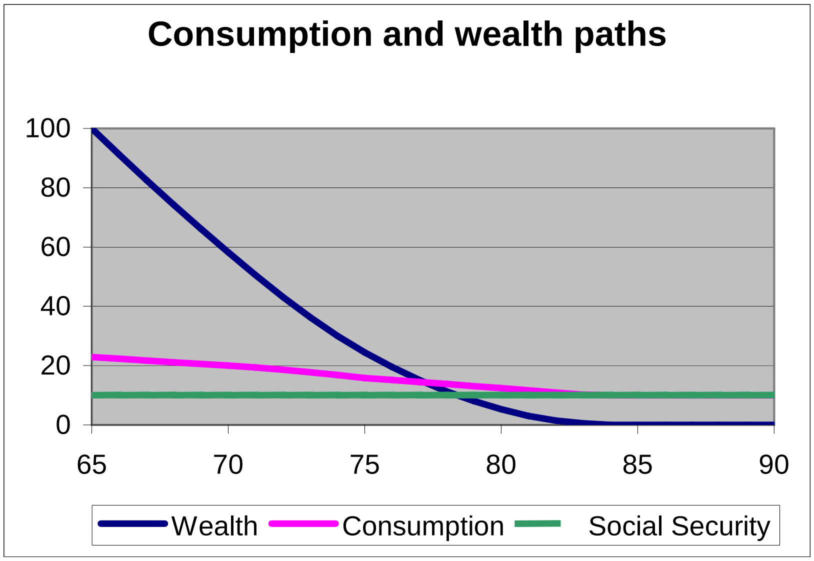
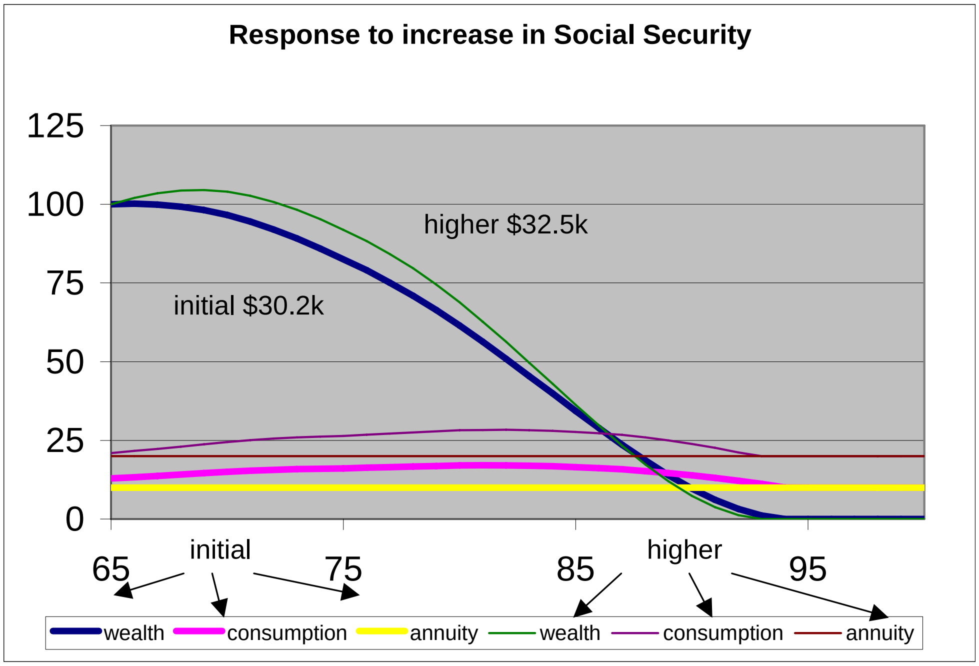

Consumption and wealth paths
100
80
60
40
20
0
65
70
75
80
85
90
Wealth
Consumption
Social Security

FIGURE 3



Response to increase in Social Security
125
100
75
50
25
0
higher $32.5k
initial $30.2k
65
75
85
95
initial
higher
wealth
consumption
annuity
wealth
consumption
annuity

Table 1
Interest rate and utility function parameters

	Gan et al (2004)	Hurd (1989)
r	0.04	0.03
γ	0.986	1.12
ρ	0.058	-0.011
α_0	3.8067e-7	3.8067e-7*
a_1	1.0431e-6	1.0431e-6*

*Hurd estimated a bequest parameter to indicate any children, but not an additional parameter for the number. For that reason we will use the bequest parameters from Gan

Table 2
Bequeathable wealth, Social Security benefits, expected present value of consumption and bequests (in thousands)
65 year-old male, parameters from Table 1 (Gan *et al*)

	No children		Three children	
	Initial Social Security	Increased Social Security	Initial Social Security	Increased Social Security
Initial bequeathable wealth	100.0	100.0	100.0	100.0
Initial Social Security benefits	10.0	20.0	10.0	20.0
Social Security wealth	107.6	215.3	107.6	215.3
Expected PV consumption	193.2	302.2	193.0	302.1
Expected PV bequests	12.8	10.1	13.0	10.4

Table 3 **Bequeathable wealth, Social Security benefits, expected present value of consumption and bequests (in thousands)** 65 year-old female, parameters from Table 1 (Gan *et al*)				
	No children		Three children	
	Initial Social Security	Increased Social Security	Initial Social Security	Increased Social Security
Initial bequeathable wealth	100.0	100.0	100.0	100.0
Initial Social Security benefits	10.0	20.0	10.0	20.0
Social Security wealth	122.6	245.2	122.6	245.2
Expected PV consumption	212.1	335.8	211.9	335.2
Expected PV bequests	9.8	7.5	10.1	7.7

Table 4 **Bequeathable wealth, Social Security benefits, expected present value of consumption and bequests (in thousands)** 65 year-old male, parameters from Table 1 (Hurd)				
	No children		Three children	
	Initial Social Security	Increased Social Security	Initial Social Security	Increased Social Security
Initial bequeathable wealth	100.0	100.0	100.0	100.0
Initial Social Security benefits	10.0	20.0	10.0	20.0
Social Security wealth	115.7	231.5	115.7	231.5
Expected PV consumption	189.5	307.7	188.2	304.1
Expected PV bequests	27.6	25.4	29.0	29.2

Table 5 **Bequeathable wealth, Social Security benefits, expected present value of consumption and bequests (in thousands)** 65 year-old female, parameters from Table 1 (Hurd)				
	No children		Three children	
	Initial Social Security	Increased Social Security	Initial Social Security	Increased Social Security
Initial bequeathable wealth	100.0	100.0	100.0	100.0
Initial Social Security benefits	10.0	20.0	10.0	20.0
Social Security wealth	132.9	265.8	132.9	265.8
Expected PV consumption	206.2	340.3	204.6	336.3
Expected PV bequests	29.2	28.8	30.9	33.0