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Delaying Social Security payments: a bootstrap

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Abstract

This paper reconciles previous research outcomes and explains why prior studies offer conflicting recommendations regarding the decision to delay Social Security payments. Using a bootstrap, this paper determines the age at which a retiree is better off deferring Social Security payments *when rates of return are not constant*. The expected rate of return affects the breakeven age and the rate of return is a function of asset allocation. When life expectancy and realistic investment returns are incorporated into the analysis, there are few circumstances that warrant postponing Social Security payments for early retirees. © 2006 Academy of Financial Services. All rights reserved.

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1. Introduction

A new retiree at age 62 can optionally take a reduced Social Security payment or wait until a later period and obtain a larger payment. The literature alternately suggests that "earlier may be better" and that "earlier may be worse." The question *appears* to have many complex facets, including inflation, taxes, the longevity of the retiree, and the expected rate of return. As might be expected, conclusions vary accordingly. As will be shown, only the last two items, longevity and expected rates of return (or discount rates) are determining factors; the other elements, under usual circumstances, play no significant role. The literature has generally based its conclusions on assumed constant rates of return, or, alternately, assumed

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constant discount rates. This study synthesizes the previous disparate conclusions and extends the investigation by assuming nonconstant rates of return.

An exceptionally clear expression of the issue is from Muksian (2000, pp. 21–22):

> "This question can be addressed by determining the 'breakeven age.' If you start to receive Social Security benefits now, your total accumulation of Social Security benefits starts sooner; if you delay benefits, your total accumulation starts later but accumulates faster. The breakeven age is the age at which those two total accumulations are equal; at that age, the higher level of delayed benefits have 'caught up' with the lower level of regular benefits in terms of total accumulation, and you will be equally well off whether you delayed benefits or received them at age 65. If you survive past the breakeven age, you will have been better off delaying benefits and receiving the higher payments, and the longer you survive past the retirement age, the greater the 'mistake' in not having delayed."

Using the definition of breakeven age (BA) from above, this paper has two goals:

1. To find the BA for *many* different rates of return, not just one, or two. It is instructive to see how the BAs change as the expected rate of return varies and to see what variables influence that outcome; and
2. To investigate what happens to the BA when the expected rate of return is not assumed to be constant.

In regard to No. 2, the rate of return is, in reality, a weighted sum of returns on various assets (stocks, bonds, etc.) that are in the retiree's portfolio. Thus, asset allocation plays a role in determining the BA. Additionally, returns fluctuate within asset classes. If the assumption of constant rates of return is replaced by fluctuating rates of return, a more realistic view of the BA process may result.

Section 2 notes how other studies have tried to assign a value to the stream of Social Security payments. Section 3 presents the problem of delaying Social Security payments algebraically and provides results when the expected rate of return is constant. Section 4 presents a bootstrap simulation for rates of return that vary and Section 5 concludes the study.

2. Social Security valuation issues

When approaching retirement, there are at least two decisions that must be made about Social Security payments: (1) how to value them in the portfolio asset mix, and (2) whether to delay taking them. Both issues must address the problem of how to value the stream of Social Security payments over a long time period. Each issue can be addressed by either looking at the future value of the Social Security income stream or by the present value of the income stream. The expected rate of return to use in the first instance, or the appropriate discount rate to use, in the second instance, is unclear.

The value of Social Security payments in the portfolio asset mix is addressed in a series of articles by Reichenstein (1998, 2000), and Jennings and Reichenstein (2001, 2003) who urge retirees to include after-tax Social Security payments as part of their asset mix. They argue that the present value of Social Security should be considered a "bond" in the portfolio and that failure to include Social Security payments will likely lead to a portfolio that has a lower stock proportion than realized. Jennings and Reichenstein (2001) and Fraser, Jennings and King (2000) suggest using Treasury Inflation Protected Securities (TIPS) real yield to maturity to discount the expected Social Security income stream when including it in the portfolio. Fraser et al. (2000, p. 297) states: "The notion that Social Security payments are very similar to treasury bond coupon payments is simple, intuitive, and persuasive."

The second problem is whether to postpone Social Security or not. A retiree (with birth year[1] between 1943 and 1954) is faced with the dilemma at age 62 of whether to take a reduced stream of Social Security payments (Stream 1) or receive no Social Security payments until age 66, at which time the payments will be larger (Stream 2). The question has been regularly discussed in popular sources such as the *Wall Street Journal* (Clements, 2002, 2003, 2005, 2006), *Money* magazine (Updegrave, 2004) and applied journals such as *The Journal of Financial Planning* and *AAII Journal*. Detweiler (1999), using a net present value analysis, finds "the probability for males and for females of doing better by taking Social Security at age 62" for various real rates of returns. Jennings and Reichenstein (2001) devote Appendix 1 of their paper to the question. There is strong general agreement on several things: 1) if the Social Security benefits are required for survival, the question of postponing the benefit is moot, and 2) the benefit of postponing payments will not be realized for many years beyond age 66; if life expectancy, based on genetics or gender, does not exceed 80, taking Social Security at age 62 is almost always better. There are also strong disagreements as to whether delaying Social Security payments is advisable or not. As will be shown, the divergent recommendations are not so much a result of the analytic approach taken as they are a result of the assumptions made.

There are at least three ways to analyze the problem: 1) assume no time-value of money and simply compare the size of Stream 1 to Steam 2 to determine at what retiree age they are equal, 2) compare Streams 1 and 2 after putting the Social Security payments into an investment portfolio and letting them grow at the expected rate of return, and 3) calculate the present value of the two income streams. The literature uses all of these approaches. Clements (2002) begins his column with an example of a 3% return and 3% inflation rate, which provides a zero rate of return net of inflation. Updegrave (2004) chooses the investment option and states: ". . . when you take benefits, you can pull less from your retirement savings, and the money you don't withdraw generates earnings." Rattiner (1993), Jennings and Reichenstein (2001), Rose and Larimore (2001), and Cook, Jennings and Reichenstein (2002) use the present value approach.

The conclusions reached vary from "Don't Delay" to "Delay" to "It doesn't matter." Here, for example, are three contradictory recommendations:

{Don't Delay}.
Rose and Larimore (2001) compare the present value, discounted at 4%, of the two income streams, which terminate at the life expectancy age of a 62 year old. They concluded that the value of early retirement at age 62 is greater than waiting for full retirement for both men and women and for retirees from 2005 on.
{Delay}.
Muksian (2004) uses only COLA-adjusted (at 2%) streams of payments and concludes:

"Absent any significant conditions (such as health issues) that would 'mandate' an early retirement, it would appear that one should wait until the normal retirement date . . . ." {It makes no difference}.

Cook et al. (2002) compare the present value of expected benefits payments (assumedly discounted at 3%) for single males and single females and conclude, "the benefits schedule is actuarially fair."

What differs from example to example above is the assumed real rate of return or discount rate, which, as will be shown, has the most impact on the conclusions drawn. In the next section, an algebraic relationship will be derived (assuming constant rates of return) that reveals the relationship between rates of return and BAs. Section 4 further explores the relationship between BAs when rates of return are stochastic.

3. BA with constant returns

3.1. Assumptions

The amount of Social Security payments available to a retiree appears to depend on many variables. Some of these variables, however, are of little significance to the problem at hand and some of no significance at all. For purposes of clarity and simplification, the following assumptions are made for both this section and Section 4.

1. Both Stream 1 and Stream 2 are treated as if they were invested into a portfolio. Alternately, if the Social Security payments are spent, then the equivalent amount of money remains in an investment portfolio; the two views are equivalent.
2. Social Security payments are received at the beginning of a year in a lump sum. (This simplification avoids compounding monthly.)
3. All calculations are in real (inflation adjusted) terms.
4. The retiree's assumed birth date is between 1943 and 1954; thus full retirement age is 66.
5. While the retiree may earn income from work, he or she does not exceed the Earnings Test (see "Exempt Amounts under the Earnings Test, SSA"). (In 2006, for example, the retiree between the ages of 62 and 66 would lose 50% of all Social Security payments in excess of $12,480.) It is assumed that an early retiree who earns more than the earning test amount would always defer Social Security payments until the full retirement age.
6. Because there are various strategies that married couples can use when deciding when to begin Social Security, analysis is restricted to an individual's BA and not the BA for a couple.
7. There are additional assumptions about taxes and the taxable portion of benefits that will be better understood after the discussion below.

Let:

S_F = The annual benefit at the Full retirement age of 66

Table 1 Streams 1 and 2 for ages 62 through 68

n	Stream 1	Stream 2
1	$S_E(1+R)$	0
2	$\{S_E(1+R) + S_E\}(1+R)$	0
3	$[\{S_E(1+R) + S_E\}(1+R)+ S_E](1+R)$	0
4	:	0
5	:	$S_F(1+R)$
6	:	$\{S_F(1+R) + S_F\}(1+R)$
7	:	$[\{S_F(1+R) + S_F\}(1+R)+ S_F](1+R)$

S_E = The annual benefit at the Early retirement age of 62
R = The annual inflation adjusted rate of return on an investment portfolio
n = The time lapsed since age 62. E.g. $n = 1$ is the first year of retirement at 62. n+62 is the retiree's age at the end of year n.

3.2. Delay benefits until age 66

For individuals born between 1943 and 1954, the reduction in payment from the full retirement amount is 25%. Therefore, if a retiree chooses to take a Social Security payment at age 62, he or she will receive

$$S_E = .75S_F. \tag{1}$$

Stream 1 and Stream 2 are shown algebraically in Table 1, beginning at retirement at age 62, and through age 68. Stream 1 is generated as follows: Assume that on the first day of period 1 the retiree receives S_E in Social Security payments which grows at R × 100% throughout the year. At the end of the first year, the total value will be $S_E(1+R)$. At the beginning of the next period, a second Social Security payment of S_E is added to the total, which again grows at R. Stream 2 is generated similarly, but payments do not begin until $n = 5$, when the retiree is 66.

The cumulative value of Stream 1 (hereafter S1) is the familiar formula for the "future value of an annuity due":

$$S1 = \frac{S_E[(1 + R)^n - 1](1 + R)}{R} \tag{2}$$

which is evaluated at the end of year n, when the retiree is n+62 years old.

If the retiree waits until age 66 to collect annual payments of S_F dollars per year, the cumulative value of Social Security payments, Stream 2, (hereafter S2) is given by:

$$S2 = \frac{S_F[(1 + R)^{n-4} - 1](1 + R)}{R} \text{ (subject to n > 4).} \tag{3}$$

The BA is the age, (n+62), at which S1 = S2. If the retiree lives past this BA, he or she would have been better off postponing Social Security payments until age 66. If the retiree does not make it until the BA, he or she would have accumulated more money by taking the reduced payments at age 62.

S1 and S2 can be considerably simplified if the goal is to find the n at which they are equal. Set S1 equal to S2. First, because Eqs. (2) and (3) both share the term, (1+R)/R, that term can be eliminated (cancelled). Second, because $S_E = 0.75S_F$, the S_F terms can be eliminated from each side of both equations. Collecting terms, the BA is the value of n+62 for which:

$$(1 + R)^n = (4/3)(1 + R)^{n-4} - 1/3 \quad (n > 4) \tag{4}$$

The above equation exposes several noteworthy things:

1. The size of S_F is immaterial, as long as S_E is 75% of S_F.
2. The constants, (4/3 and 1/3), come from the 0.75 proportion; if the reduction in Social Security payments is different from 25%, these constants will change. For example, a person born in 1960 and retiring in 2020 at age 62 will receive only 70% of the amount that would have been obtained had the retiree waited until the full retirement age of 67. For this individual, Eq. (4) would be modified to:

$$(1 + R)^n = [(1 + R)^{n-5} - 0.3]/0.7 \quad (n > 5) \tag{4a}$$

3. Incorporating income taxes into this analysis does not affect the outcome.[2] Assume that Social Security payments are taxed at the retiree's marginal tax rate. Then the spendable amount of the payment is $(1\text{-}t)S_E$ at age 62 and $(1\text{-}t)S_F$ at age 66. The expression "(1-t)" would be eliminated from both sides of the equation and would not change the value of n at which Breakeven occurs. As long as the marginal tax rate is the same for both streams, the BA will be unaffected. A retiree may have a large portfolio that is tax deferred (401k), or is tax-exempt (Roth), or where earnings are fully taxable, such as a market portfolio. However, regardless of the taxable nature of the portfolio, as long as S1 and S2 are taxed at the same rate, the BA remains the same.
4. If only a part of the Social Security payment is subject to tax (up to 85%), the BA will not be affected. Let the taxable proportion of the payment be "p"; then the after-tax amount of the full benefit will be $S_F(1\text{-}t(1\text{-}p))$. The after-tax amount of the early benefit will be 75% of this value and, again, n remains unchanged.

Including the taxable portion of Social Security payments or the tax rate in the analysis is generally unnecessary; the same BA will be obtained with any or all of these variables omitted.[3]

Eq. (4) can be solved iteratively for n, for given values of R; unfortunately, no closed mathematical solution exists. Fig. 1 shows the relationship between the BA and the rate of return. While other papers have quite correctly found a single point or two along this curve, Fig. 1 depicts how the BA increases with the rate of return. Rose and Larimore (2001) noted that without adjusting for the time value of money, a retiree with normal retirement age of 66 would reach the BA at 78, and, that at a compound rate of 4%, the BA is 84. Those points are marked for reference as ● and ▲, respectively, on Fig. 1. A third point, marked with ♦ denotes a 2% rate of return. There are two horizontal lines in the figure that represent the average life expectancy of a 62-year-old U.S. male (80.21

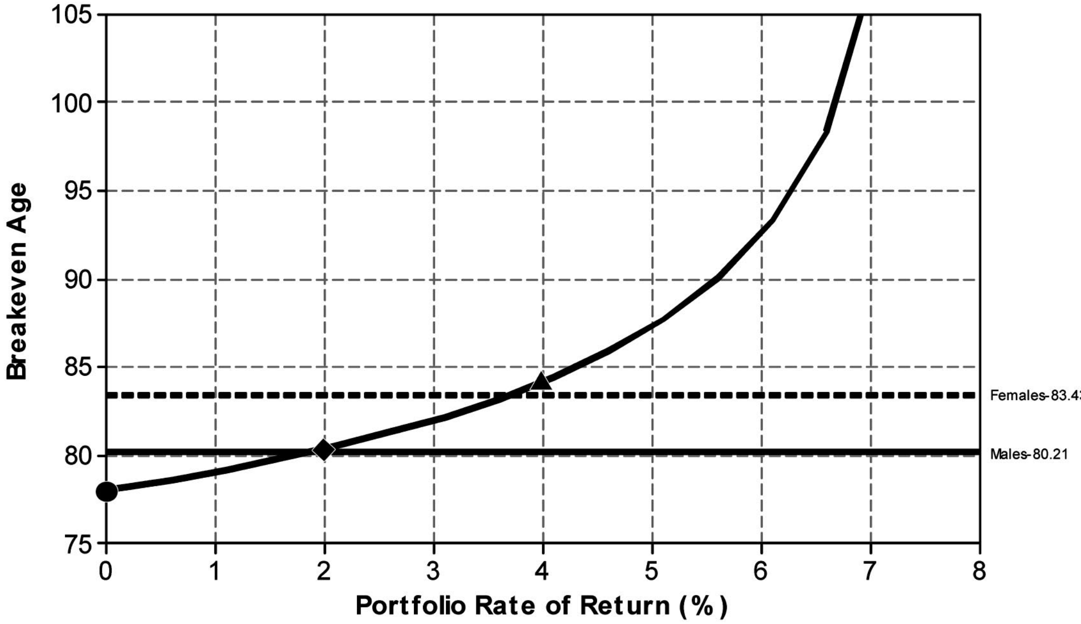

Fig. 1. Social Security BA by rate of return for "fixed-R."

years) and female (83.43 years) (Period Life Table, 2001, SSA). If the BA is below the line, then delaying Social Security is statistically beneficial; above it is not beneficial since the BA occurs after expected death. For example, the BA at a zero rate of return, marked by ●, is 78 years old. Since the retiree expects to live to age 80 (male) or 83+ (female), he or she expects to reap the benefits of delaying Social Security for 2 years (from 78 to 80, if male) or 5+ years (from 78 to 83+, if female.) On the other hand, if the rate of return was 5%, the BA is about 87; the benefits of waiting until age 66 will not be realized until 7 years (male) or 3.5 years (female) after death! Clearly, as life expectancies rise, the benefit of delaying Social Security benefits increases. Although each of the studies used slightly different life expectancy figures, it is apparent that at a 2% rate of return (as in Muksian, 2000) delay is beneficial, at a 3% rate of return (as in Cook et al., 2002) it is actuarially fair, and at a rate of 4% (as in Rose et al., 2001) delay is not recommended.

This section has demonstrated first, that many of the variables commonly associated with the questions of delaying Social Security payments, such as taxes and taxable portions are not of primary importance; the determining factors are rates of return and longevity. Second, prior studies have arrived at diverging recommendations primarily as a result of different assumed rates of return (or equivalently, discount rates.) Third, retirees at age 62 will have many years ahead; asset allocations that provide rates of return greater than 2% or 3% or 4% *are* attainable. At rates of return above 4.0%, and assuming normal life expectancy, deferring Social Security payments is generally not an optimal decision.

3.3. Should one delay even longer than age 66?

For those born in 1943 or later, Social Security adds a delayed retirement credit of 8% for each year between age 66 and age 70; this constitutes a 32% increase in Social Security benefits over S_F. (Rattiner, 1993, p. 31).

Iteratively solving

$$(1 + R)^n = [1.32(1 + R)^{n-8} - 0.57]/0.75 \quad (n > 8) \tag{4b}$$

shows that postponing benefits until age 70 increases the BA over those shown in Fig. 1 by a *minimum* of 2.5 years for any of the interest rates. If delay until age 66 is ill advised, delay until age 70 it is even less beneficial.

Although Fig. 1 provides a visual link between the BA and rates of return, it provides an incomplete picture, since rates of return are neither known nor constant in the real world. The next section explores the question of how delay is affected when the two streams are subjected to fluctuating rates of return.

4. BA with variable rates of return

This section implements a bootstrap simulation that uses historical rates of return. Annual *inflation-adjusted* rates of return from 1926 through 2003 for stocks (S&P 500) and bonds (long-term U.S. Treasury bond) are obtained from *Stocks, Bonds, Bills and Inflation*, *EnCorr Database, 2004 Edition*, Ibbotson Associates. For this period, the average value of the return on bonds, r(b), was 3.25% and the average return on stocks, r(s), was 8.4%.

The two payment streams from Eqs. (2) and (3) look much more imposing when R changes each period. For example, S1 becomes:

$$S1^* = S_E[(1 + R_1)(1 + R_2)(1 + R_3) + (1 + R_2)(1 + R_3) + (1 + R_3)], \tag{5}$$

where R_1, R_2, and R_3, are the annual rates of return for the first three periods of accumulation. S2* would have a similar form, but would begin 4 years after S1*. The determination of when S1* and S2* have equal value is now a stochastic question and not a deterministic one. A bootstrap generating thousands of S1* and corresponding S2* streams can provide insight into what happens to the BA in the real world. The bootstrap approach provides a much more realistic set of outcomes, since rates of return that are reasonably expected to occur can be studied under varying conditions.

The average rate of return on a portfolio depends upon the allocation of assets within that portfolio. Assume that only two assets compose a retiree's portfolio, stocks and bonds. R_t, the rate of return at time t, depends upon the weighted sum of the rate of return on stocks and on bonds; that is, it depends upon an asset allocation decision as well as the stochastic rates of return on the assets themselves. Let λ be the proportion of stocks in the portfolio and (1-λ) represent the proportion of bonds. Then,

$$R_t = \lambda r_t(s) + (1 - \lambda) r_t(b) \tag{6}$$

where r(s) and r(b) are the rates of return on stocks and bonds respectively. R_t will tend to become larger as λ increases, because rates of return on stocks tend, on average, to be higher than rates of return on bonds. The average value of R_t can be easily obtained from Eq. (6), because the average values of r(s) and r(b) are known. If $\lambda = 0$, then the average rate of return is 3.25%, while if $\lambda = 1$, the average rate of return is 8.40%. Different asset allocations will provide different average R_t. For this study, 21 different values of λ are used from 0.00 to 1.00 in increments of 0.05; this is equivalent to 21 different values of average R ranging from 3.25% to 8.40%.

The bootstrap proceeds as follows: Randomly generate (from a uniform distribution) a number between 1926 and 2003 (inclusive), which is the "current year" subscript. Obtain r(b) and r(s) for this "year" from the historical data. (This retains the asset class cross-correlations.) Form R_t from Eq. (6) dependent on λ. The values for S1* and S2* are generated using $S_F = \$1{,}000$. For the first 4 periods, S2* gets no payments, but in subsequent years, both streams will be compounded by the same rates of return in any given year. At the end of each "year," determine if $S2^* \geq S1^*$, which marks a Breakeven year. Store this year for further analysis. Stop the process if the breakeven has not occurred within 40 years (when the retiree would be 102.) This describes finding *one* Breakeven year. The process will be repeated 10,000 times for each of the 21 values of λ.

It was shown in Eq. (4) that the value of S_E and S_F are immaterial in determining the BA, as long they are proportional to each other. Thus, the $1,000 value used above is of no importance. The data obtained provide frequency distributions of the "year" (or retiree age) in which the Breakeven occurred, for each of the 21 λs. For example, there were 1,000 Breakeven occurrences (10%) at retiree age 80 for $\lambda = 0.10$. The probability of any BA at any λ can easily be calculated as the relative frequency. For all λ, the frequency distribution of BA is right-skewed, having a long tail trailing off to the right. Because the right-hand side of the distribution is unbounded, calculating the mean (and variance) is not possible. However, other descriptive statistics, such as percentiles *can* be calculated.

Fig. 2 shows (for all of the λ) three relationships concerning the BA: the median BA (labeled Median), the 25-th percentile of the BA (labeled 25-th %-ile), and the BA when rates of return are constant, the "Fixed-R" line. The Fixed-R line is the same relationship as in Fig. 1, using values of R that were mapped from Eq. (6). Because the average values of r(b) and r(s) are known, R can be calculated for any λ from Eq. (6). Like the static rates of return, the median BAs of the stochastic analysis increase with λ. Most apparent is that the Fixed-R predicts a BA for all λ that is higher than the median age predicted from the stochastic analysis. The Fixed-R and the Median line parallel each other quite closely, with the Median line about 3 years less for $\lambda \leq 0.5$.

The 25-th percentile line is quite "flat"; 25% of the BA are below this line (at each λ) and 75% are above it. Approximately 75% of the BAs are greater than or equal to 82 for $\lambda > 0.35$; only one is as high as 84. While the 50th percentile (median) increases with λ, the 25th percentile is quite stable. The distributions become less peaked as λ increases (stretching out to the right), but the left-most 25% remains near the same BA.

The reference lines showing male and female life expectancy have been repeated in Fig. 2. BAs below these lines indicate that the retiree benefits by delaying Social Security, since expected income will be larger only after expected death. The results do not suggest that

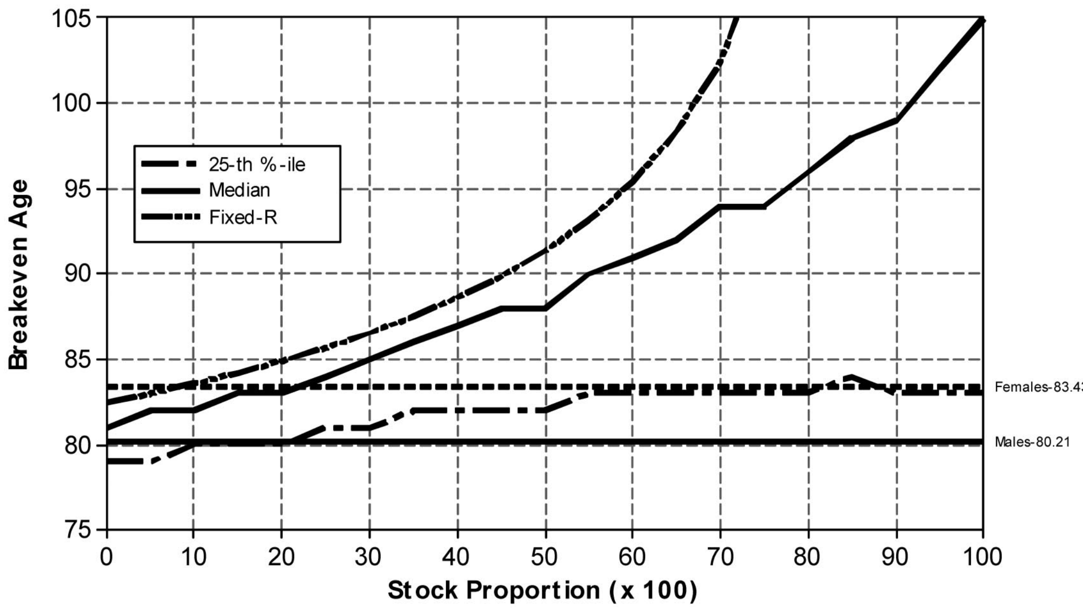

Fig. 2. BA for fixed-R and median BA with 25th percentile for bootstrap as a function of stock proportion.

delaying Social Security is a good choice for males, since the median BA is greater than the expected age of mortality for *all* portfolios (i.e., the Median line is above the Life Expectancy line for males for all portfolio choices shown.) Females, who have greater life expectancy, benefit from delaying Social Security if $\lambda < 0.22$. (If $\lambda = .22$, then from Eq (6), $R = 0.22*8.40 + 0.78*3.25 \approx 4.83\%$). For portfolios with average real rates of return above 4.83%, delaying Social Security benefits is counterproductive for females of normal life expectancy.

The asset allocation decision in retirement is an actively researched question. Conventional wisdom often suggests moving strongly toward bonds. Vora and McGinnis (2000) challenge this contention and suggest that retirees do consistently better with a 100% stock allocation. Bengen (2004) and Cooley, Hubbard and Walz (2003) (in a somewhat different context) suggest that 50% Stock/50% Bond allocations are excellent asset allocation choices for retirees during the portfolio withdrawal process. With a 50%/50% stock/bond allocation, an inflation adjusted withdrawal amount of 4% of the starting value of the retiree's portfolio can be safely withdrawn annually for 30 or more years without exhausting the portfolio. Both studies find that with only 25% in stocks, the probability of the portfolio lasting for 30 year drops significantly. A 50/50 allocation corresponds to an average rate of return of 5.825%. . . much higher than the rates previously reported in the Fixed-R studies. At $\lambda = 0.5$, the BA of the Fixed-R is 91, while the median BA of the bootstrap is about 88. Since both BAs using this asset allocation are well beyond the life expectancy of males or females, delaying Social Security payments cannot be recommended. Neither males nor females with normal life expectancies would benefit by delaying Social Security payment until age 66.

A much more conservative approach to asset allocation is provided by many financial companies like Vanguard, Fidelity, or T. Rowe Price. Each of these companies provides life-cycle portfolios tailored to the age of the investor. For retirees, Fidelity offers "Fidelity Freedom Income Fund" (FFFAX) which has a target allocation of 20% stocks and 80% fixed assets. T. Rowe Price offers a "Retirement Income Fund" (TRRIX) with 40% stocks and 60% fixed income. Vanguard's "Target Retirement 2005 Fund" (VTOVX) has 31% stocks and 68% bonds with 1% short-term reserves. As can be seen in Fig. 2, a stock allocation of 25% or more (T. Rowe Price or Vanguard fund) has median BA greater than life expectancy for both males and females, while a fund with 20% stocks (Fidelity) retains a median BA greater than life expectancy for males but slightly less than life expectancy for females. Thus, even very conservative portfolio allocations suggest that delay in taking Social Security benefits is generally not beneficial for those with normal or less-than-normal life expectancies.

5. Conclusions

For both parts of this study, two income streams are compared to determine when they are of equal value. Both income streams are compounded at the same rate of return. The first income stream consists of annual increments equal to 75% of the full retirement benefit and begins when the retiree is age 62. The second income stream begins at age 66 and is composed of annual increments in the full retirement amount. The second stream has more money added to it each year, but it does not begin accumulating money until year 5 of the accumulation process. Somewhere after year 5, S2 may overtake S1; the age of the retiree at that time is the BA.

Part 1 of this study finds the relationship between the BA and different nonstochastic rates of return. The mathematical derivation reveals that introducing taxes and the taxable proportion of Social Security payments is generally unnecessary. Results indicate that the higher the rate of return is, the greater the BA will be. At an expected (real) rate of return of 4.0% or more, the retiree will be well beyond normal life expectancy before appreciating the benefits afforded by delaying until age 66. Delaying until age 70 for these retirees provides payments that are 76% greater than the payments obtained at age 62; however, delaying until age 70 increases the BA by at least 2.5 years.

Part 2 of the study uses a bootstrap with real rates of return on stocks and on bonds for the years 1926 through 2003. The BA is calculated for 21 different asset allocations (ranging from 100% bonds to 100% stocks). This part finds that

1. Asset allocation does matter to the extent that it changes average rates of return. Because the BA increases with the rate of return, and the rate of return increases with the proportion of stocks, an implied beneficial strategy is for early retirees to have a stock heavy portfolio.
2. The median BA is smaller than the BA calculated with Fixed-R in the previous section.
3. Despite the lower BA found here, delay is not generally advisable. For λ at or above 25% stocks, (R at or above 4.5375) a retiree of either gender is not likely to benefit from delaying Social Security payments until age 66.

This paper has concentrated only on retirees born between 1943 and 1954 with full retirement age of 66. Those born after 1954 will have full retirement ages later than 66, increasing to 67 years old for those born in 1960. This younger cohort will realize a smaller proportion of the full retirement amount and higher BAs; it will find delaying Social Security even less appealing than those born before 1955.

As many previous papers have cautioned, each retiree must decide, based on family history and gender, which Stream to ride. The majority of early retirees opt to take early Social Security payments. Their decision may not have been based on sound finance principles, but they may well have made the correct decision.

Notes

1. For a complete explanation of how Social Security payment amounts are determined, the interested reader should see Muksian (2004) with tables and formulas showing payment reductions for early retirement and payment credits for delayed retirement for birth years from 1938 through 1960.
2. The amount of Social Security benefits subject to tax is based on "Combined Income" defined as Adjusted Gross Income + nontaxable interest + one half of Social Security benefits. At the time of this writing, tax payers filing as "individuals" pay tax on 50% their Social Security benefits if their "combined income" is between $25,000 and $34,000 and up to 85% of Social Security benefits for "combined income" over $34,000. For a joint return, 50% of the Social Security benefits is taxable for a "combined income" between $32,000 and $44,000, and up to 85% of Social Security benefits is taxable above $44,000. (Your benefits may be taxable, Social Security Online, 2006.)
3. There will be some circumstances where the inclusion of taxes or the taxable portion may affect the result. For example, if the larger Social Security payment at age 66 triggers a move to a higher tax bracket, the results might be different. Tax rates may change after age 70.5 if required minimum distributions from a retirement plan move the retiree to a higher tax bracket. These special cases are not included in this analysis.

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