July 1, 2002 (Revised)

## Electing Normal Retirement Social Security Benefits Versus Electing Early Retirement Social Security Benefits

Sometimes an individual must elect one among an array of available options, where one option can provide better value than another even though both alternatives achieve a person's objectives. This is the case when a retiree decides the date to start receiving Social Security benefits. Should he elect such benefits at the full retirement age (currently 65 for those born in 1937 or earlier, but scheduled to increase gradually to age 67 for those born in 1960 or later) or at an earlier age? The earliest age a person is eligible to receive Social Security benefits, at a reduced level, is age 62. This paper will establish a framework to help people understand the financial implications of these decisions.

## Present Value Calculations

One way to determine if one alternative is financially more advantageous than another, is to compute the present values of the two alternatives as of a chosen starting date. These calculations should be based on realistic assumptions for interest, mortality and expenses. When an individual is involved, taxes can affect the calculation and should be included in the analysis. If the present value of one alternative exceeds the other, the selection of that alternative would be financially advantageous if the assumptions underlying the calculation are reasonably accurate.

Let us use this framework to discuss the financial implications for a person trying to decide whether to receive early retirement reduced benefits at age 62 under the Social Security system instead of waiting until the full retirement age at which time unreduced benefits would be received. The full retirement age would be $65 \frac{1}{2}$ for a person reaching age 62 in 2002.

Under the current Social Security formulae, the individual's Primary Insurance Amount (PIA), which is used to compute Social Security income benefits, is computed when the worker is first eligible for benefits at age 62. For a worker retiring prior to the full retirement age, the calculated PIA is reduced by $5 / 9$ of $1 \%$ for each of the first 36 months that the worker retires prior to the full retirement age, or $20 \%$ for the 36 months between ages $621 / 2$ and $65 \frac{1}{2}{ }^{1}$. For a worker retiring at age $65 \frac{1}{2}$, and assuming no earned income between age 62 and $65 \frac{1}{2}$, the full PIA calculated at age 62 is increased by changes in the CPI from age 62 to age $65 \frac{1}{2}$. In addition, there would be no percentage reduction in these benefits, for a person retiring at age 65 $1 / 2$ in 2005. See the table below for the schedule of increases in the full retirement age and the percentage of full retirement age benefits that would be paid to someone electing benefits at age 62.

Age to Receive Full Social Security Benefits

| Year of Birth | Full Retirement Age (FRA) | Age 62 Benefits as \% of <br> FRA Benefits |
| :---: | :---: | :---: |
| 1937 or earlier | 65 | $80 \%$ |
| 1938 | 65 and 2 months | $791 / 6 \%$ |
| 1939 | 65 and 4 months | $781 / 3 \%$ |
| 1940 | 65 and 6 months | $771 / 2 \%$ |
| 1941 | 65 and 8 months | $762 / 3 \%$ |
| 1942 | 65 and 10 months | $755 / 6 \%$ |
| $1943-1954$ | 66 | $75 \%$ |
| 1955 | 66 and 2 months | $741 / 6 \%$ |
| 1956 | 66 and 4 months | $731 / 3 \%$ |
| 1957 | 66 and 6 months | $721 / 2 \%$ |
| 1958 | 66 and 8 months | $712 / 3 \%$ |
| 1959 | 66 and 10 months | $705 / 6 \%$ |
| 1960 and later | 67 | $70 \%$ |

[^0]If the calculated PIA at age 62 is $\$ 1,000$ per month ( $\$ 12,000$ per year) for a pension reaching age 62 in 2002, this amount will be increased by 3.5 years of CPI changes for someone retiring at age $65 \frac{1}{2} .^{2}$. If we assume CPI increases of $3 \%$ per year, the $\$ 1,000$ PIA calculated at age 62 will increase to $\$ 1,108$ per month for workers electing Social Security benefits at the full retirement age of $651 / 2$. This assumes the recipient does not earn Social Security covered wages between ages 62 and age $65{ }^{1 / 2}{ }^{3}$. If he, instead, elects Social Security benefits at age 62 , he will receive $\$ 775$ per month or $\$ 9,300$ annually ( $77.5 \%$ of the age 62 calculated PIA).

## Determining Whether Early Retirement is Financially Advantageous

To determine the most financially advantageous option, a person must compute the present value of each option at the time he makes the decision. This would be at age 62. Let us now examine this calculation for an individual trying to decide whether to elect social security benefits (1) at the full retirement age $65 \frac{1}{2}$, or (2) at early retirement age 62 , assuming he does not plan to work and receive a salary between the ages of 62 and $65 \frac{1}{2}$. Let us further assume that the individual will not lose benefits between age 62 and $651 / 2$ because of the Social Security earnings test ${ }^{4}$ and that CPI increases will be exactly $3 \%$ each year.

[^1]If the individual's Primary Insurance Amount (PIA) at age $65 \frac{1}{2}$ is assumed to be $\$ 1,108$ per month or $\$ 13,296$ per year (calculated previously), this is the amount of income, increased by CPI changes each year thereafter, to be received for life. If the individual instead elected lifetime income starting at age 62 , he would receive $\$ 775$ per month or $\$ 9,300$ per year (also calculated previously) and this amount would similarly increase by CPI changes each year.

## Assumptions for the Present Value Calculations

Let us now compute the present value at age 62 for these two income streams to determine if one option produces better value than another. In order to do this we must determine appropriate values for mortality, expenses, taxes, CPI increases and interest rates. The following are reasonable.

## Mortality Rate Assumption

Since we are assuming lifetime payments for a healthy individual, it would be appropriate to use a mortality table that insurers might use for the purchase of immediate annuities. The A2000 MGM set back 2 years ${ }^{5}$ was chosen for this purpose.

## Expense Rate Assumption

There would be no expenses assumed under either of these present value calculations.

[^2]
## Tax Rate Assumptions

There are two distinct tax assumptions. One would be for taxes paid on the Social Security benefits themselves and the second tax rate would be on any earnings associated with the fund established to accumulate either the early retirement or normal retirement Social Security benefits. For the first tax rate, (the one on Social Security benefits) let us assume that the marginal tax rate is the same for any benefits received at age 62 or at age $651 / 2$ (as you will see, this factor will cancel out when the two present value equations are compared). For the second tax rate (on interest earnings), let us assume it equals $20 \%$ (we will adjust the earned interest rate to account for it). In effect, we will calculate an after tax interest rate to discount the Social Security benefits. This will be discussed further when we determine the interest rate assumption to be used in these calculations.

## CPI Assumption

For the CPI increase assumption, let us assume that it is $3 \%$ per year. This is close to historical CPI increases.

## Interest Rate Assumption

Let us assume that an individual can earn $9 \%$ on a fund set-up to accumulate Social Security benefits. These earnings would be reduced to $7.2 \%$ to take into account a marginal tax rate of $20 \%$. In effect, we will be assuming an after tax earnings rate of $7.2 \%$ to discount the Social Security benefits. The $7.2 \%$ earnings must be further reduced by the $3 \%$ CPI increase assumption, using the formulae (1.072/1.03) - 1 , and this result would equal approximately $4 \%{ }^{6}$.

[^3]This would become our after tax, after CPI adjusted earnings rate. A common sense way of viewing the CPI adjustment to the interest rate is to say that $3 \%$ of the $7.2 \%$ after tax interest earnings will be used to increase benefits each year, and therefore only $4 \%$ of the interest earnings will be available to discount the lifetime benefits ${ }^{7}$.

## Lifetime Annuity Costs

Using the selected mortality rates and 4\% interest earnings, a \$1 per year lifetime annuity (payable monthly) is $\$ 14.30$ at age $65 \frac{1 / 2}{}$ and $\$ 15.43$ at age 62 .

## Present Value Costs

Therefore, the present value (P.V.) of each option at age 62 is:

## Option I: Full Retirement Age $651 / 2$ Election

| P.V. | $\left.=\mathrm{B}_{\underline{62}} \frac{(1+\mathrm{c})^{3.5}(1-\mathrm{T}) \mathrm{a}_{65.5}}{[1+\mathrm{i}(1-\mathrm{t})]^{3.5}} \underline{(\underline{3.5}} \underline{\mathrm{P}}_{62}\right)$ |
| ---: | :--- |
| where $\quad$ | $\mathrm{B}_{62}$ |
| c | $=$ full Social Security benefit calculated at age 62 |
| T | $=$ rate of CPI increase |

[^4]then P.V. $\quad=\quad \underline{B}_{62} \frac{(1-\mathrm{T}) \mathrm{a}_{65.5}}{(1+\mathrm{e})^{3.5}} \frac{\left(3 \mathrm{P}_{62}\right)}{3}$
where e $=$ the after tax, after CPI adjusted earned interest rate or
$$
\frac{[1+i(1-t)-1]}{(1+c)}
$$
\[

$$
\begin{array}{ll}
\text { then P.V. } & =(12)(1000)(1-\mathrm{T})(14.30)(.980) /(1.04)^{3.5} \\
& =146,200 *(1-\mathrm{T})
\end{array}
$$
\]

## Option II: Early Retirement Age 62 Election

$$
\text { P.V. } \quad=\quad(.775) \mathrm{B}_{62}(1-\mathrm{T}) \mathrm{a}_{62}
$$

where (.775) is the actuarial reduction factor for early retirement at age 62

$$
\begin{array}{ll}
\text { P.V. } & =(.775)(12)(1000)(1-\mathrm{T})(15.43) \\
\text { P.V. } & =143,500 *(1-\mathrm{T})
\end{array}
$$

## Analysis

Under the above assumptions, an age $651 / 2$ elections would appear slightly preferable from a financial perspective. Therefore, when the individual's after tax interest earnings (using any combination of earnings and tax rates) is $7.2 \%$, the age $651 / 2$ election is slightly preferable. However, the gain is small, equal to less than a $1 \%$ gain, on average, for each year that the election is postponed until age $65 \frac{1}{2}{ }^{8}$.

In general, the lower the after tax interest earnings assumption, the more advantageous the age $65 \frac{1}{2}$ retirement election would be from a financial perspective. Conversely, the higher the after tax interest earnings assumption, the more advantageous the early retirement election

[^5]from a financial perspective. This conclusion also follows from general reasoning. If a person can earn more on the funds he receives early than he will obtain through actuarial adjustments from the Social Security Administration because of the deferral of payments, he is financially advantaged if he receives the funds early. The following subsidiary observations follow from this:

1. Since a lower before tax interest earnings assumption will lower the after tax interest assumption, the lower the before tax interest assumption, the more advantageous the normal retirement age (age $65 \frac{1}{2}$ ) election. Conversely, the higher the before tax interest assumption, the more advantageous the early retirement age (age 62) election from a financial perspective.
2. Since a higher tax assumption will also lower the after tax interest assumption, the higher the tax assumption, the more advantageous the age $65 \frac{1}{2}$ retirement election. Conversely, the lower the tax assumption, the more advantageous the early retirement election from a financial perspective.

In addition, if a person expects to live beyond a normal life expectancy, as represented by the A2000 MGM mortality table set back 2 years, the more advantageous the age $651 / 2$ retirement election. Conversely, if a person does not expect to live a normal life expectancy, the more advantageous the early retirement election from a financial perspective. Under the interest, CPI and marginal tax rate assumptions used in this analysis, it would take about 19 years for the accumulated funds for a person electing normal retirement age $651 / 2$ benefits to exceed the accumulated funds for a person electing early retirement age 62 benefits. This is less than the 23-year life expectancy assumed for an age $65 \frac{1}{2}$ retiree under the A2000 MGM mortality table set back 2 years and, once again, illustrates the financial advantage, however small, of waiting until age $65 \frac{1}{2}$ to start receiving Social Security benefits. The 23 -year life expectancy calculated under this mortality table should also help persons in good health and their advisors appreciate
how long $651 / 2$ year-old retirees can expect to live on average during retirement. Lastly, this calculation demonstrates that persons who are in poor health, and who would not expect to live 19 or more years in retirement, can consider electing early retirement Social Security benefits.

## Break Even Interest Rate

Instead of choosing an interest rate and tax rate in advance to perform present value calculations, we can calculate an after tax earnings rate such that the present values of the early retirement and normal retirement elections are equal, assuming that the CPI and mortality assumptions remain as previously stated. Under this calculation, the after tax break even interest rate would be about $8.0 \%$. This means that if an individual could earn $8.0 \%$ after taxes on his investments, there would be no financial reason to choose early retirement instead of normal retirement Social Security benefits, and vice versa. ${ }^{9}$

This after tax rate of $8.0 \%$ would be equivalent to a before-tax interest rate of about $10 \%$ assuming a tax rate of $20 \%$ on any interest earnings. Of course, the $8.0 \%$ after tax rate could be based on many combinations of earnings and tax rates. For example, it would also be equivalent to a before tax earnings assumption of about $11.5 \%$ for an individual in the $31 \%$ marginal income tax bracket.

It was also assumed that these calculations were performed for an individual in good health. If a retiree were not in good health, the break-even interest rate would be lower than the $8.0 \%$ rate calculated above. And for a person in very poor health, strong consideration should be given to electing early retirement income.

[^6]
## Social Security Benefits for a Couple

If Social Security benefits were paid to a worker and spouse (both assumed to be the same age), and based on the worker's indexed wages, they would receive 1.5 times the worker's benefits while both were alive and 1 time the worker's benefits when only one person of the couple survives. A present value test similar to the one made previously for a worker only can be made for this hypothetical couple. The only significant difference is that the calculated annuity factor would be for a couple instead of a single person with the income dropping by $1 / 3$ upon the death of either the worker or spouse. Using the same assumptions that were used previously ( $9 \%$ interest, etc.), the present value calculations would be

## Option I: Full Retirement Age $651 / 2$ Election for a Couple

$$
\text { P.V. }=232,600^{*}(1-\mathrm{T})
$$

## Option II: Early Retirement Age 62 Election for a Couple

$$
\text { P.V. }=225,600^{*}(1-\mathrm{T})
$$

Once again, the values are relatively close. There is a larger financial advantage for a couple postponing retirement to age $65 \frac{1}{2}$ than for an individual, but it is still about a $1 \%$ per year financial gain. This is understandable because the probability of payments being made for a longer period of time increases when a couple is involved. The after tax break-even interest rate for a couple would be $8.5 \%$, instead of the $8.0 \%$ calculated for an individual. The analysis and the comments made previously when we compared the early and normal retirement present values calculated for a single person would also apply here.

## CPI Increase Assumption

We assumed a CPI increase rate of $3 \%$ for all calculations, which is reasonable based on historical data. However, if the CPI increase rate was assumed to be higher than $3 \%$, and all other assumptions remained the same ( $9 \%$ interest rate, etc.), this would have the effect of further
reducing the after tax, after CPI adjusted interest rate, which was used to compute the present values. This change would also make the age $65 \frac{1}{2}$ elections a little more preferable than previously calculated. This is because it would further reduce the after tax, after CPI adjusted earnings rate.

## The Impact of An Individual's Marginal Tax Rate

Another way of viewing the combination of interest rate, tax and CPI assumptions is to say that if the after tax, after CPI adjusted earned interest rate (using any combination of earnings, tax and CPI assumption) is $4 \%$, then the age $65 \frac{1}{2}$ election is slightly preferable.

An $8.0 \%$ after tax break even interest rate in a $3 \%$ CPI environment would convert to approximately a $5 \%$ after tax, after CPI adjusted, interest rate. This means that any combination of tax rates, interest earnings and CPI increase assumptions that equaled approximately $5 \%$ would produce equivalence for the two Social Security benefit election alternatives. The exact formulae for computing the after tax, after CPI adjusted earnings rate would be:

$$
\begin{array}{ll}
{\left[\frac{1+i(1-t)]}{1+c}-1,\right. \text { where }} & \begin{array}{l}
i=\text { the assumed earnings rate } \\
t=\text { the assumed tax rate, and } \\
c=\text { the assumed CPI increase rate }
\end{array}
\end{array}
$$

It might be appropriate to discuss the interaction of the assumptions at this point and how they might affect an individual. Both the interest assumption and the CPI assumption would be based on circumstances that are not necessarily unique to an individual, although the interest earnings assumption might depend to some extent on an individual's investment portfolio. However, it should not vary dramatically from person to person. This is not the case with the assumption for marginal tax rates. There can be very dramatic differences in marginal tax rate from individual to individual, as low as $0 \%$ for some and as high as $45 \%$ for a high-income earner in a highly taxed state. Therefore, as difficult as it might be to explain to a person, his
marginal tax rate may be the most important assumption in determining if early or normal retirement is financially advantageous. For a person in a low tax bracket, an early retirement election would appear appropriate from a financial perspective because the before tax earnings rate would not be reduced significantly because of taxes. In addition, an early retirement election might be appropriate in this case for other reasons. This individual might need the Social Security funds to live on starting at age 62.

For a person in a high marginal tax bracket, deferral of the election until normal retirement age would appear to be financially advantageous because any earnings on these funds could be reduced significantly because of taxes. In addition, a person in a high marginal income tax bracket would most likely be in a position to defer the receipt of income until normal retirement age. The best way to explain the advantage of deferral to a person in a high marginal tax bracket is to explain that Social Security benefits are adjusted in a reasonable manner to compensate for any deferral of income. Therefore, if an eligible person can afford it, it could be beneficial to obtain a deferral of the taxes that he would otherwise pay on the earnings he receives from personally invested Social Security funds. In effect, he is not paying taxes between ages 62 and $651 / 2$ on the actuarial adjustments being credited to his account by the Social Security administration.

## Additional Consideration

There may be other situations that could make the age 62 elections more preferable than calculated above. This occurs if a retiree can get extra benefits for a short period of time because he 1) has a wife under age 62 , who is taking care of a child who is under age 16 or is disabled. 2) has children under age 18, children age 18 or 19 that are full-time students (through grade 12) or children over age 18 that are disabled.

## Conclusion

Based on the above, it would appear that for many individuals a decision to elect early retirement or normal retirement benefits need not be made for financial reasons. The gain or loss under either scenario would not be large. An early retirement election should be considered if a retiree is in a low tax bracket and in need of income, and would otherwise have to borrow funds to maintain a standard of living. A person should also consider an early retirement election if he is in poor health, or has a circumstance that would allow him to receive extra benefits for a short period of time, or if he would use the funds to pay off a high interest rate loan, etc. Deferral of income should be a consideration for persons in good health, especially those persons in a high marginal income tax bracket, who will most likely save and invest any Social Security income.

## Calculation When Full Retirement Age is 67

As indicated earlier, the full retirement benefit is available currently at age 65 , but will increase gradually to age 67. At that time, the actuarial reduction factor will remain at $5 / 9$ of $1 \%$ for each of the first 36 months that the worker retires prior to the full retirement age and 5/12 of $1 \%$ for each month beyond that for up to two years. Let us compare the present value calculations under these conditions, assuming retirement benefits are elected at the full retirement age of 67 versus the early retirement age of 62 . All other assumptions remain the same. In order to make the comparison, we once again compute the present value of each option at age 62 as follows:

## Option I: Full Retirement Age 67 Election

$$
\begin{align*}
& =\quad \underline{\mathrm{B}}_{62}(1-\mathrm{T}) \mathrm{a}_{67}\left({ }_{5} \mathrm{P}_{62}\right) \\
& (1+\mathrm{e})^{5}  \tag{1.04}\\
& =\quad \frac{(12)(1000)(13.79)(.97)(1-\mathrm{T})}{(1.04)^{5}}
\end{align*}
$$

$$
=\quad 131,400 *(1-\mathrm{T})
$$

## Option II: Early Retirement Age 62 Election

$$
\text { P.V. }=(.7) \mathrm{B}_{62}(1-\mathrm{T}) \mathrm{a}_{62}
$$

Where (.7) is the actuarial reduction factor for early retirement at age 62

$$
\text { P.V. }=(.7)(12)(1000)(1-T)(15.43)
$$

$$
\text { P.V. }=129,600 *(1-\mathrm{T})
$$

Once again, we see that the age 67 elections appear slightly preferable. It is equal to less than a $.5 \%$ gain, on average, for each year that the election is postponed to age 67. This is under the assumption of a $9 \%$ earned interest rate, a $7.2 \%$ after tax interest rate and a $4 \%$ after tax, after CPI adjusted earnings rate.

The after tax breakeven interest rate, which would make the two present values equivalent is $7.6 \%$ in a $3 \%$ CPI increase environment. This would convert to about a $4.5 \%$ after tax, after CPI adjusted breakeven interest rate and would be valid for any combination of earnings, tax rates and CPI increase assumptions that equaled about 4.5\%.

## Additional Conclusion

The present value calculations for early and normal retirement are actually closer to each other when age 67 becomes the normal retirement age than when age $65 \frac{1}{2}$ is used as the normal retirement age. In addition, the after tax breakeven interest rate at $7.6 \%$ is close to, but slightly less than, the age $65 \frac{1}{2}$ breakeven rate of $8.0 \%$. This is understandable because the actuarial reduction factors for the additional two years of early retirement are less than for the first three years. However, the analysis and conclusions drawn previously (for age $65 \frac{1}{2}$ normal retirement age situation) do not change materially when the normal retirements age becomes age 67 .

## Delaying Retirement Beyond Age 65, but Prior to Age 70

A retiree also has the option of delaying receipt of Social Security benefits beyond the full or normal retirement age and he will receive a delayed retirement credit for each year delayed, up to age 70. The delayed retirement credit is currently $6 \%$ for persons retiring in 2000 and 2001. It will rise by $1 / 2$ of $1 \%$ every two years until it reaches $8 \%$ in 2008 , at which time the full retirement age will be 66. Let us compare the present value calculations at age 66 for someone 1) electing full Social Security benefits at age 66 versus 2) electing enhanced Social Security benefits at age 70 ( $32 \%$ greater because of an $8 \%$ per year increase for four years) using the same assumptions as previously ( $9 \%$ before tax interest rate, etc.). Once again, we compute the present values according to the formulae below:

## Option I: Full Retirement Age 66 Election in 2008

$$
\begin{aligned}
\text { P.V. } & =\underline{\mathrm{B}}_{62}(1+\mathrm{c})^{4} \mathrm{a}_{66}(1-\mathrm{T}) \\
& =\underline{(12)(1000)(1.1255)(14.13)(1-\mathrm{T})} \\
& =190,800 *(1-\mathrm{T})
\end{aligned}
$$

## Option II: Enhanced Retirement Benefits Age 70 Election

$$
\begin{aligned}
\text { P.V. } & =\frac{\underline{\mathrm{B}}_{62}(1+\mathrm{c})^{4}(1.32)(1-\mathrm{T})\left(\mathrm{a}_{70}\right)\left({ }_{4} \underline{\mathrm{P}}_{66}\right)}{(1+\mathrm{e})^{4}} \\
& =\frac{(12)(1000)(1.1255)(1.32)(12.74)(.966)(1-\mathrm{T})^{4}}{(1.1735)} \\
& =187,000 *(1-\mathrm{T})
\end{aligned}
$$

As you can see, delayed retirement does not appear advantageous under this scenario, which is a $4 \%$ after tax, after CPI adjusted earnings rate. However, the present value calculations are still so close that any decision should be made without a concern for financial advantage under these assumptions. The breakeven after tax, adjusted earnings rate would be about $6.4 \%$. As state earlier, this $8 \%$ delayed retirement credit is not yet in effect. It is currently $6 \%$. The breakeven after tax, earnings rate when the delayed retirement credit is $6 \%$ would be
about $3.9 \%$. This calculation, of course, assumes full retirement at age 65 and delayed retirement to age 70 .

## $\underline{\text { Analysis }}$

As with the prior calculations and analysis, the decision to defer or not defer Social Security benefits until age 70 should be made without regard to financial advantage for most individuals. For persons in poor health or in need of the income, postponement would not be recommended. However, for persons in a high marginal income tax bracket, postponement may have merit.

## Delay of Social Security Benefits Beyond Age 70

There is clearly no advantage to postponing the election of Social Security beyond age 70. There is no delayed retirement credit for such postponement.

## Conclusion

This paper outlined some of the decisions facing retirees who must decide when to start collecting Social Security benefits. It also analyzed the financial advantages for postponing the election of benefits. There appears to be some small financial advantage to postponing the receipt of Social Security benefits for persons in good health under the assumptions used, but the differences are not great. In most situations, persons can make a decision about when to begin Social Security benefits that are unrelated to the potential for a slight financial advantage for one option versus another. However, for persons in poor health or who have dependent children, an early election is probably preferable for the reasons stated in the paper. And for persons in a high marginal income tax bracket, who will invest the funds, consideration can be given to postponing the election to receive Social Security benefits, but not past age 70.


[^0]:    ${ }^{1}$ There is a further reduction of $5 / 12$ of $1 \%$ for each early retirement month that exceeds 36 . This additional reduction could affect individuals electing early retirement benefits as early as 2000 as the Social Security normal retirement age is being increased to age 67 gradually. For a person reaching age 62 in 2002, the full retirement age would be $65 \frac{1}{2}$.

[^1]:    ${ }^{2}$ For persons born between January and June of 1940 and reaching age 62 between January and June 2002, their PIA will be increased by 3 years of CPI increases if they wait until age $65 \frac{1}{2}$ to receive benefits. For persons born between July and December of 1940 and reaching age 62 between July and December of 2002, their PIA will be increased by 4 years of CPI increases if they wait until age $651 / 2$ to receive benefits since they will cross over a calendar year. For purposes of this paper, we assumed 3.5 years of CPI adjustments for persons born in 1940 and who wait until age $651 / 2$ to receive benefits. This is a reasonable assumption for a persons reaching age 62 in 2002 since the benefits received at age $651 / 2$ will be greater than the age 62 benefits by three CPI increases for six months and by four CPI increases for six months.
    ${ }^{3}$ If an individual works between ages 62 and the full retirement age, his PIA might be increased. This would occur if the Social Security indexed wages he earns in any of these years exceeds the Social Security indexed wages earned prior to age 62. In this situation, the higher indexed wages would be substituted for a smaller index wage earned prior to age 62 . For most persons, this change would not be dramatic. This could make a difference for persons, perhaps women, who were absent from the workforce for a number of years.
    ${ }^{4}$ If an individual loses Social Security Benefits between ages 62 and $651 / 2$ because of the Social Security earnings test, his benefits will be adjusted upwards using Social Security actuarial equivalence factors at the normal retirement age to compensate for such loss. The adjustment is intended to be fair. For example, if he loses all age

[^2]:    62 to age $65 \frac{1}{2}$ Social Security benefits because of the earnings test, he will receive full (unreduced) retirement benefits starting at the normal retirement age.
    ${ }^{5}$ The A2000 MGM set back 2 years is a merged gender mortality table with a life expectancy of about 26 years for a person age 62 and a life expectancy of about 23 years for a person age $651 / 2$. If sex distinct tables were used instead, the male life expectancies would be about two years less than the unisex values while the female life expectancy would be about two years more. As you will see later, this assumption will affect the calculation. The shorter a person's life expectancy, the more favorable an early retirement election.

[^3]:    ${ }^{6}$ More precisely, this calculation would produce an interest rate of $4.08 \%$ and this is the rate that will be used in all calculations, even though we will round it to $4 \%$ in the text of the paper.

[^4]:    ${ }^{7}$ I have adjusted the interest rate to reflect the effect of taxes and CPI increases on the calculations. This assumes that taxes are paid, or withheld, uniformly over the year. For CPI increases, which take place each January 1, it is tantamount to assuming that CPI increases occur approximately six months after benefits begin. This is appropriate for a July 1 entrant for Social Security benefits. Therefore, it is a good approximation for a July 1 entrant, will slightly understate the annuity factor for an August through December entrant and slightly overstate the annuity factor for a January through June entrant. In addition, if we did make a modal adjustment to the annuity factor for entrants at various months during the year, any modal adjustment to the annuity factor would be the same for both the early (age 62) and normal (age $651 / 2$ ) calculations. Therefore, when the early and normal retirement present values are compared, any modal adjustment factor would cancel out.

[^5]:    ${ }^{8}$ If a test were to be made to determine if it is financially advantageous for a retiree to start receiving Social Security benefits at age $641 / 2$ instead of age $65 \frac{1}{2}$, the gain for postponing retirement to age $651 / 2$ would be less than $1 / 4$ of $1 \%$ and not the less than $1 \%$ average over the three year period under the stated assumptions. This is because the interest and mortality factors affecting the early retirement calculations are compounded over the three-year period whereas the actuarial reduction factor is not.

[^6]:    ${ }^{9}$ Under the breakeven interest rate of $8.0 \%$, the age $65 \frac{1}{2}$ retiree would be expected to live to his life expectancy of 23 years as calculated under the A2000 MGM set back 2 years mortality table. And the accumulated Social Security benefits for a person electing normal retirement age $65 \frac{1}{2}$ benefits would equal the accumulated Social Security benefits for a person electing early retirement age 62 benefits by the $23^{\text {rd }}$ year.

