Income Security Programs
Simulations of Incentive Effects of Private and Public Pensions

Strategic Evaluation and Monitoring
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Prepared by:
Morley Gunderson

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1. Background

There is growing recognition that pension plans are not just a form of savings and hence income security for older workers, but that pension plans also embody important financial incentives that can affect retirement decisions.[1] This is important because such retirement decisions themselves can have significant policy implications. This is especially the case today, since the baby-boom-age population is now beginning to enter its mid-50s — ages at which retirement decisions are being made.

In the demographic circumstances of the 1990s and beyond, there may be increased pressure for public policy initiatives to encourage early retirement as a form of worksharing, especially to open job and promotion opportunities for younger workers. Early retirement is also often generally regarded as a viable adjunct to downsizing. This is especially so if downsizing is done through voluntary incentives. As issues of eldercare become more prominent in the future, especially associated with the ageing population and the shift from institutional to community- and family-oriented health care, retirement may be regarded as an important component of facilitating such family-based care. For example, some people may wish to retire to care for older family members in fragile health.

Pressures on public policy may also work in the other direction to reduce the financial incentives towards early retirement, and especially to reduce unintended incentives that may discourage older persons from continuing to work if they so choose. The recent downsizing that has occurred in many organizations, often occurring in relation to early retirement programs, has given rise to some reconsideration of the viability of such policies because of the extent to which they have led to the loss of older talent with accumulated firm-specific knowledge and networks.

Older workers are often regarded as an important pool for filling possible impending labour shortages, especially if their preferences for part-time retirement may mesh with the needs of employers for a flexible workforce. Improvements in health and life expectancy and shifts to less onerous, white-collar jobs also means that individuals may be able to continue working past the (historic) age of usual retirement.

As well, with longer life expectancy, increased pressures on seniors' public pension programs, including the Canada/Quebec Pension Plan (CPP/QPP), may give rise to pressure to facilitate continued employment in order to reduce financial demands on such

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1 Early U.S. studies on public pension plans include Boskin (1977), Boskin and Hurd (1978), Blinder, Gordon and Wise (1980, 1981), Campbell and Campbell (1976), with more recent studies reviewed in Quinn, Burkhauser and Myers (1990). For U.S. private pension plans see Allen, Clark and McDermed (1988, 1993), Burkhauser (1979), Ippolito (1986, 1989, 1990), Kotlikoff and Wise (1985, 1989), Lazear (1983, 1990), Mitchell and Fields (1982, 1984), and Mitchell and Luzadis (1988). Canadian studies include Pesando and Gunderson (1988, 1991), Pesando, Gunderson and Shun (1992), Pesando, Hyatt and Gunderson (1992), and Gruber (1997).

systems. The financial pressures are likely to be exacerbated by the impending increase in health care costs associated with an ageing population.

Clearly, pressure on public policy may be in the direction of encouraging early retirement or in the opposite direction of facilitating continued labour market employment of older persons. In either circumstance, it is important to understand the financial incentives that are embedded in public and in private employer pension plans and that may affect the retirement decision.

The purpose of the following analysis is to illustrate such financial incentives as they exist in representative defined-benefit private, employer-sponsored pension plans in Canada,[2] and to show how they combine with public plans, such as the employment-based CPP/QPP, the universal Old Age Security (OAS) system, the means-tested Guaranteed Income Supplement (GIS) and the Spouses Allowance (SPA). Particular attention is paid to the institutional features of such employer plans, including early and special retirement features and integration features with CPP/QPP. The financial features of the employer-sponsored pensions are illustrated through simulation models adapted from earlier studies by Pesando, Gunderson and Hyatt.[3] Those studies also document the representative nature of the institutional features of employer pensions that are used in the subsequent simulations. The assumptions underlying those simulations are explicitly laid out in the next section where the alternative models are outlined.

While the emphasis is on the financial incentives of such private pensions, these are integrated with the financial incentives of the public plans based on the simulations presented in Gruber (1997).[4] The public plans include CPP/QPP, OAS, GIS and SPA.[5] These are labelled as the Social Security (SS) benefits.

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2 Of the 42% of the labour force and of paid workers belonging to a Registered Private Pension (RPP) in 1995, 88% belonged to defined-benefit plans, the most important category of RPPs (see Statistics Canada, *Pension Plans in Canada*, January 1, 1996, p. 19, p. 35).

3 Pesando and Gunderson (1988, 1991) and Pesando, Hyatt and Gunderson (1992).

4 See Jonathan Gruber, "Public Pension Incentives for Retirement in Canada," Massachusetts Institute of Technology, 1997.

5 CPP is a federal/provincial/territorial public pension plan, established in 1966 as a compulsory and contributory social insurance program. It is funded largely on a pay-as-you-go basis. It provides contributors and their families with a basic level of protection against the loss of earnings due to retirement, disability, or death of the contributor to the plan. All employed Canadians who are 18 years and over and have minimum earnings contribute to CPP/QPP. In return, they are guaranteed a pension at retirement. The OAS Program provides basic income security to Canadian citizens and residents who meet age and residency requirements. Currently there are three benefits payable under the *Old Age Security Act* — the basic OAS pension, as well as the GIS and the SPA components of the OAS. The basic OAS pension is available to all applicants who are 65 years and over, and who meet the Canadian residence requirements. The GIS is an income support component of the OAS Program, which is income-tested but not taxable. SPA is an income-tested, non-taxable allowance available to OAS pensioner's spouses, who are 60 to 64 years of age, and to widow and widowers age 60 to 64, who have lived in Canada (or a country with which Canada has a reciprocal agreement).

2. The Simulation Model

2.1 Pension Wealth Accruals

The simulation model essentially involves calculating the present value of the changes in expected pension wealth accruals associated with each year of employment for representative employees at different ages. This is expressed as a percentage of the employee's wage or annual earnings in each year. To be consistent with Gruber, the wage is assumed to be constant throughout the working life. Pension wealth in a given year is the discounted present value of the stream of pension payments[6] to which the employee would be entitled if the employee retired and left the plan at the end of that year. The change in pension wealth, or pension benefit accrual in that year, is the change in that wealth if the employee remains in the plan for that year. An annual pension wealth accrual of 20% of an employee's wage at age 59, for example, would mean that if the employee worked and remained in the plan until the age of 60, the increased value of their pension wealth would be the equivalent of 20% of their wage for that year. If their annual earnings for that year, for example, were $50,000 then their pension wealth increases by $10,000 if they work that year and retire at the end of the year. In effect, their total compensation including the change in their pension wealth would be $60,000 ($50,000 from wages and $10,000 from increases to their pension wealth).

Clearly, such changes in pension wealth can have important incentive effects on the retirement decision — augmenting those that exist from wages themselves. This is especially the case when, as illustrated below, large "spikes" or discontinuities in year-over-year pension wealth accruals are associated with institutional features of such plans, including early and special retirement.

2.2 Three Representative Types of Plans

To illustrate the financial incentives or disincentives embodied in such private plans, three representative types of final-earnings defined-benefit plans are considered. Each embodies specific plan features so that successive comparisons of the pension wealth accruals associated with each type of plan can illustrate the different financial incentives they embody. While the pension plan features are representative, they do not necessarily exist in all pension plans. The representative plans and their key features (highlighted in italics) are as follows: the Basic Plan; subsidised early retirement; and early and special retirement. These are described in the next few pages.

6 The pension benefits are assumed to last for the worker's remaining life expectancy, as given in Statistics Canada, *Life Tables, Canada and Provinces*, No. 84-537, 1995.

Basic Plan: In this defined-benefit plan RPP,[7] the normal retirement pension benefit formula is 2% of final (three-year) average earnings for each year of service up to a maximum of 35 years of service. The pension payment commences at the normal retirement age of 65. For example, if the employee had 35 years of service and they retired at the age of 65, their employer pension would be 70% of their final, three-year average earnings. Additionally:

- Reflecting the recent legislative requirements in Canada, the plan vests after two years of service; that is, the person has a right to both their own contribution and that of their employer after two years of service.

- The plan is *integrated* with CPP/QPP in that there is an offset or reduction in employer pensions associated with the receipt of CPP/QPP. That offset in this plan is 0.6% of earnings up to the Year's Maximum Pensionable Earnings (YMPE) as established by CPP; that is, the benefit formula is 1.4% of earnings up to YMPE and 2% on earnings in excess of YMPE. This integration occurs at age 65, upon receipt of normal CPP/QPP (its being offset by a possible bridging supplement and the age of early retirement is discussed below).

- Unsubsidised early retirement is available at age 55 or beyond, with at least 10 years of service; that is, there is an actuarially fair reduction of benefits designed to reduce the annual benefits to exactly compensate for the fact that they are received sooner and for a longer period of time.

- The Basic Plan does not have *subsidised early retirement or special retirement* (both discussed below).

- As with all other plans, the benefit accruals under the Basic Plan are calculated with and without bridging supplements. Bridging supplements effectively waive the integration offset for persons who take early retirement (as early as 55) in advance of receiving CPP/QPP at age 65. In the simulations developed in this report, this means that if the employee retires under an early or special retirement feature, the benefit is calculated as a flat 2% of final earnings until the age of 65, thereby compensating for the typical offset of 0.6% as discussed above, on earnings up to YMPE. Thereafter, when the employee is in receipt of regular CPP/QPP at age 65, the integration offset applies. In effect, the bridging supplement is a bonus to early retirement since it applies at the age of early retirement and is designed to bridge the gap in income that otherwise would prevail if the employee retired early and did not receive CPP/QPP until age 65.

7 A defined-benefit RPP is one where the benefit formula is specified in advance. It is to be contrasted with the defined-contribution type of RPP where only the contribution formula is defined and benefits are determined by their investment return.

- With respect to postponed retirement, if the employee works beyond the age of 65, they can no longer accrue additional pension credits, but the pension that is normally payable at age 65 is actuarially increased at the time the employee does retire and commences to receive their delayed pension. The actuarial adjustment is fair in that it is designed to exactly compensate for the fact that the pension is received later and for a shorter expected period of time.

Subsidised Early Retirement: The subsidised early retirement plan is the same as the Basic Plan except that the early retirement benefit that is available at the age of 55 and with at least 10 years of service is reduced by 5% per year for each year of age that early retirement precedes normal retirement at 65. This involves a subsidy because the benefit reduction is less than the actuarially fair reduction that would reduce the annual benefits to exactly compensate for the fact that they are received sooner and for a longer period of time.

Subsidised Early and Special Retirement: The subsidised early and special retirement plan is the same as the subsidised early retirement plan except that a special retirement feature is also available when the employee attains the age of 60 with at least 20 years of service. Special retirement essentially involves a larger subsidy in that there is no reduction in annual benefits (i.e., the reduction formula is zero) to compensate for the fact that they are received earlier (at age 60) and for a longer period of time.

2.3 Format of Results

For each of the three plan types, we show the pension benefit accruals expressed as a percentage of annual wages, separately for when a bridging supplement is provided (the integration offset waived if the employee retires between the ages of 55 to 65) and when a bridging supplement is not provided (the integration feature applies).

As indicated previously, the bridging supplement applies at the age of early or special retirement and continues until the receipt of normal CPP/QPP at age 65. The calculations are provided for each age between 55 and 69 since these are the ages that encompass the main institutional features such as early, special, normal and postponed retirement as well as the integration features and bridging supplements.

For each of these six calculations (three defined-benefit plan types with and without bridging supplements), the public pension benefits are then integrated to estimate total private and public pension wealth accruals. As discussed previously, the public plans, labelled SS[8] benefits, include the employment-based CPP/QPP, the universal OAS system, and the means-tested GIS and SPA.

8 They are characterized as social security benefits in Gruber (1997).

The private pension benefits are combined with the public benefit accruals. The assumptions used with respect to key factors include a real discount rate of 3%[9] and a "base case" scenario, which is a median-wage[10] male born in 1930 and who commenced working in the organization at the age of 30, and whose wife was three years younger and who never worked. The employee is assumed to have worked continuously at the median wage. By the age of 65 he would have worked 35 years. Life expectancy estimates are based on Statistics Canada Life Tables, No. 84-537, 1995.

This analysis yields 12 sets of calculations of pension benefit wealth accruals (three defined-benefit plan types, with and without bridging supplements, and private pension accruals as well as private and public accruals). These 12 sets of calculations are illustrated in Table A (see end of report) for the base-case scenario, which assumes employees earn the median wage. The calculations are then repeated, respectively in Tables B to D, for employees whose wages are at the extreme bottom 10th percentile (as used by Gruber)[11] and at 1.5 and 2.0 times the base-case median wage.

The juxtaposition of each set of calculations highlights how the pension wealth accruals, and hence the financial incentives on retirement, are affected separately by each of the changes (e.g., subsidised early retirement, special retirement, bridging supplements, public pensions) for persons of different wage levels. The age of 65 corresponds to the year 1995 in these tables and the figures that follow.

The pension wealth accruals associated with the private employer-sponsored plans are first discussed so as to highlight the effect of the different institutional features of those plans. Then the impact of combining these pension wealth accruals with those of the public pension plans are presented and discussed.

Financial Incentives Created by Pension Wealth Accruals: The extent to which pension wealth accruals create an incentive to retire or to continue working is not only determined by the accruals themselves, assuming they are known by the worker. The retirement decision also depends upon the disutility of continued employment or the reservation wage associated with continued employment. That disutility likely increases with age, especially if health deteriorates, work becomes more onerous, one's spouse retires, and one accumulates more assets.[12] As such, large and increasing pension wealth

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9 This is the rate of return that would correspond to the real return on long-term (30 years) risk-free investment assets such as Government of Canada bonds. This rate was also used in the Gruber study.

10 This is the median wage as used by Gruber and is similar to the average wage. Specifically, the median annual earnings in 1995 was $37,022 for males based on the *Survey of Consumer Finances* (Statistics Canada, *Earnings of Men and Women*, No. 13-217 XPB, 1995). This exceeded the year's maximum pensionable earnings under CPP/QPP of $34,236 in 1995. The average annual earnings in 1995 was $40,610 for males based on the same survey.

11 The bottom 10th percentile is used to demonstrate the effect of extreme dependency of the household on the means-tested GIS and SPA benefits.

12 See, for example, Anderson and Burkhauser (1985), Anderson, Clark and Johnson (1980), Bazzoli (1985), Breslaw and Stelcner (1987), Hausman and Wise (1985), Moffitt (1987), Sammartino (1987), and Wolfe (1985).

accruals may be necessary to provide the financial incentives to continue working and offset the increased disutility of work, especially if wage growth also declines with older age.

In such circumstances, pension wealth accruals may not induce retirement in any of the following circumstances: they are small; they are constant with age and hence do not offset any increased disutility of work; they decline with age; they decline immediately after a large positive spike; and, certainly, if they become negative and hence a penalty on continued employment. These various dimensions should be kept in mind when interpreting the financial incentives to retire that are created by pension plans. These dimensions will be illustrated in the examples that follow.

A Caveat

While the analysis applies to a necessarily simplified set of base cases and not necessarily typical of many workers, it is nevertheless illustrative of such potential effects. In particular, the assumption is made of a continuous work history at the median wage with no interruptions, of a male, with a spouse who never worked.[13] In respect of private pensions, the focus is on workers who have defined-benefit RPPs of varying types (less than half the workforce).

13 The base case worker has not availed himself of the CPP general drop-out privilege for low earnings years or non-employed years. (a maximum of 15% of working years between the ages of 18 and 65 after 1966 when the CPP came into effect). Such workers only represented 10 to 16% of workers born in 1930.

3. Simulation Results: Private Employer Plans[14]

3.1 Basic Plan: Base-Case, Median Earnings

As indicated in the second column of Table A (and in Figures A and D), in the basic type of employer pension plan, pension benefit annual accruals[15] increase smoothly from 13% of wages at age 55 to 28% of wages at age 65, and then they drop abruptly to 0% since maximum years of pensionable service occur at age 65. Notable features of those accruals include:

- Private pension benefit accruals are substantial, averaging around 20% of wages between the ages of 55 and 65. These are equivalent to a 20% subsidy on more years of work. This highlights the importance of pensions as an aspect of total compensation.

- In such basic plans, the accruals in pension wealth continually increase because with each additional year of work, employees increase their service credits and possibly wages,[16] both of which enhance their pension benefits.

- Such basic plans create no strong incentive to retire before the age of 65. In fact, the incentive is in the opposite direction, to continue working and accumulate the growing accruals associated with increased service credits and seniority-based wage increases upon which such pension benefits are based.

- The abrupt drop in pension wealth accruals at the normal retirement age of 65 (from 28% of wages at 65 to 0% at 66) highlights the significant monetary disincentive to continue working past the age of normal retirement, even if one can continue working. The drop in pension wealth accruals is equivalent to a 28% wage cut in that year. The drop occurs in spite of the fact that the pension benefit itself is adjusted on an actuarially fair basis to exactly compensate for the fact that it is received later. The reduction occurs solely because the individual is not accumulating additional service credits upon which the pension calculations are based. Moreover, the employee would not receive pension increases from any wage increases that might have been earned.

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14 In the figures that accompany these tables, two formats are followed. Figures A, B and C represent the three panels of the base-case scenario of Table A, respectively showing the Basic Plan (Figure A), the Subsidized Early Retirement Plan (Figure B) and Subsidized Early and Special Retirement Plan (Figure C). For each, four graphs are shown, giving the private pension accrual with and without a bridging supplement, and with and without the Public Social Security Pensions. Figures D through F provide an alternative portrayal with each of the four charts showing the private pension accrual with and without a bridging supplement, and with and without the Public Social Security Pension, and contrasting the three types of plans: the Basic Plan; Subsidized Early Retirement; and Subsidized Early and Special Retirement.

15 As discussed previously in the section on Pension Wealth Accruals, accruals essentially are the annual increments in pension benefit wealth from working one more year and retiring at the end of that year. Accruals are expressed as a proportion of annual earnings in that year. They are not additive since the worker must retire at the end of the year to get the pension benefit accruals.

16 The private pension plan simulations are integrated with those of the public plans. Constant wages are assumed over the worker's working life, although pension wealth can be affected by wage changes.

- The shape of the private pension accruals highlight how such pensions lead to significant "backloading" of compensation, coming later in the employee's career, creating a strong incentive for the employee to remain with the organization, but also creating significant wealth losses if the employee is terminated.

3.2 Bridging Supplement

Column 4 of Table A (also illustrated in Figures D, F and G) provides the comparable calculations with the bridging supplement that waives the integration offset. The integration offset would otherwise have led to a reduction in the employer pension if the employee retired early at age 55, since the pension benefit formula with the integration offset would have been 1.4% of earnings instead of 2% of earnings without the offset up to YMPE.

The bridging supplement leads to a large increase in pension wealth at age 55 (68%) since that is the age of eligibility for early retirement and hence for the bridging supplement. In effect, with the bridging supplement, the employee's pension will be based on 2% of their earnings for the years between the ages of 55 and 65, rather than 1.4% of their earnings if the bridging supplement were not in place and the integration feature applied. This is obviously a large amount and it gets capitalized into the pension wealth at the age of eligibility for early retirement at 55, even if there are no further financial incentives towards earlier retirement.

The increase in pension wealth at age 55 is large because the "value" of an additional year of service for that year is the enhancement to pension wealth associated with that additional year of service plus the value of the cumulative service credits prior to age 55 since those credits are all capitalized into the age 55 calculation. Their "value" would not be enhanced by the bridging supplement at age 54 since the supplement is not available for persons at that age. Similarly, the value of one more year of service credit associated with working to age 56 is simply the enhancement to pension wealth associated with one more year of service credit, since the value of the credits prior to age 55 have already been capitalized into the age 55 calculation. The stock or total pension wealth is still higher at age 56 (13% higher), reflecting the large increase in the total pension wealth that was capitalized in at age 55; however, that total wealth changes only marginally after age 55.

The large "spike" in pension benefit accruals associated with the bridging supplement at the age of eligibility for early retirement (at age 55) obviously can have important effects on the incentive to retire. Clearly, employees have a strong incentive not to retire just before the age of 55 because they would forgo the option for the bridging supplement at age 55. In effect, by working during that year, the employee gets total compensation (wages plus pension benefits) that is 168% of their wage — an amount that is more than receiving an overtime premium of time-and-one-half for every hour they work in that year.

After the spike in pension wealth accruals at age 55 associated with the bridging supplement, the accruals drop to a more modest 13% of wages each year until age 65. This

creates a modest incentive to continue to work to accumulate the positive pension wealth accruals, albeit that incentive is not as large as when there was no bridging supplement and the positive accruals increased in magnitude until the age of normal retirement at 65.

As discussed previously, the accruals themselves do not provide the full story with respect to the financial incentives to retire. They must be compared to what is likely to be an ever-increasing disutility of work and hence reservation wage associated with continued employment. In that vein, the bridging supplements enhance the likelihood of retiring earlier for a number of reasons: they create a large spike at age 55; they reduce the magnitude of subsequent accruals; and the accruals become constant rather than increasing over time.

3.3 Subsidised Early Retirement

The middle panel of Table A (also Figures B and D) illustrates the effect of subsidised early retirement at the age of 55 for employees with at least 10 years of service in their private pension plan (RPP). These are the defining characteristics of subsidised early retirement, as discussed previously when the assumptions underlying the three representative types of plans were outlined. The subsidy occurs because the benefit reduction is less than the actuarially fair reduction that would reduce the annual benefits to exactly compensate for the fact that they are received sooner and for a longer period of time.

In the subsidised early retirement plan, the employee receives a large pension wealth accrual (equal to 24% of earnings in that year) at age 55 when the early retirement feature becomes available. The wealth accrual is highest at age 55 since the subsidy is extended over a 10 year period — the subsidy existing for every year that early retirement precedes normal retirement. After age 55, the wealth accrual steadily declines since employees effectively forgo a year of subsidy for each year they continue to work past the age of subsidised early retirement.

It is true that the employee does accumulate positive pension wealth accruals by working longer and accumulating service credits and potential wage increases (both of which could enhance pension benefits), but this is totally offset by negative wealth accruals associated with forgoing the subsidy that is involved by not working an additional year and obtaining the early retirement subsidy. Clearly, the early retirement incentives can serve their intended purpose of encouraging employees to retire early to obtain the subsidy. The incentive is particularly strong at the "milestone" date of 55 when the subsidy first applies.

The incentives to retire early are particularly strong when compared to the incentives under the Basic Plan. In that plan, the accruals continually increased from 13% of wages at age 55 to 28% of wages by age 65, reflecting the pension wealth enhancement of additional service credits and possible wage increases. In contrast, in the Subsidised Early Retirement Plan, these features are at work but they are vastly outweighed by the early retirement subsidy, the value of which declines as the employee continues working up to age 65. As such, the "trend" in accruals is reversed, reaching a peak at the age of eligibility

of 55 and thereafter declining steadily from 24% of wages at the age of 55 to 9% of wages by age 65. Clearly, this creates an incentive to work at least until the age of 55 so as to be eligible for the large increase in pension wealth at that time, and then to retire early so as to maximize the subsidy.

As in the Basic Plan, in the Subsidised Early Retirement Plan the bridging supplement gives rise to a huge "spike" in pension wealth at age 55 (74% of wages) since that is the age of eligibility for early retirement and hence for the bridging supplement. In effect, the value of the accumulating of previous service credits all get capitalized into the pension wealth at the age of eligibility for early retirement and the bridging supplement at 55; hence the large increase in the stock of pension wealth at that time. Thereafter, the stock of pension wealth remains high, but it changes only marginally when associated with an additional year of service credit and possible wage increase.

3.4 Special Retirement

The third panel in the right side of Table A (also Figures C and D) illustrates the pension wealth accruals when special retirement also exists at age 60. Under special retirement, the employee qualifies for an immediate and unreduced pension; that is, there is no actuarial adjustment to reduce the pension for the fact that it is received earlier and for a longer period of time. The employee does forgo the possibility of additional service credits and wage increases that could enhance pension wealth, but this is more than offset by the fact that they receive their full pension early.

This leads to a huge increase in their pension wealth at that particular milestone age of 60 when they are first eligible for the special retirement benefit. Specifically, the increase in their pension wealth is almost twice (1.71) their wage earnings for that year. Their total compensation for that year is almost three times their annual wage. This is the equivalent of being paid "triple time" for working that year.

This large increase in pension wealth occurs in that particular year because the effect of receiving the full pension for the additional five years between the ages of 60 to 65 all gets capitalized into the pension wealth at age 60. By retiring early at that time, the employee does forgo any additional service credits and possible wage increases that could enhance pension wealth if they continued to work between the ages of 60 and 65, but this is more than offset by the receipt of the full pension for an additional five years; hence, the large spike in pension wealth at age 60.

After that, the pension wealth accruals become negative. For example, as illustrated in the fourth last row in Table A, at age 61 the pension wealth accruals are minus 17% of the person's wage; in effect, their total compensation for working that year would be 83% of their wage. The total stock of pension wealth remains high at that year since the person could still retire at age 61 and receive their unreduced pension for four more years, compared to five years if they retired at age 60. They would also accumulate one more year of service credit, not to mention a possible wage increase, both of which would enhance their pension wealth. Nevertheless, their total pension wealth actually drops if

they work one more year because they forgo that full year of unreduced pension benefits and this pension loss is greater than the gain they would have by working one more year and accumulating an additional year of service credit, not to mention a possible wage increase.

Clearly, these private pension wealth accruals can have strong incentive effects on the retirement decision. Specifically, there would be a strong financial incentive to continue working until the age of special retirement to get the large pension wealth increase during that year, and then to retire and avoid the negative accruals that occur after that time.

The bridging supplements have the same effect that they had in the previous plans, augmenting the wealth accruals at age 55 when they would first apply. When they are added to the plan with subsidised early and special retirement, they effectively create two substantial spikes — one at age 55 when the bridging supplements apply, and one at age 60 when special retirement applies. The second spike at age 60 could offset some of the effect of the spike at age 55 since if the person takes advantage of the spike at age 55 and retires, they effectively forgo the opportunity to receive the second spike at age 60. In such circumstances, employees should consider the full range of financial incentives that are involved at different ages in making their retirement decision.[17]

Low-Wage Employees and Private Employer Plans: Table B shows the private pension plan wealth accruals for the very extremely low-wage employees, defined as employees at the 10th decile of wage earners. All calculations otherwise are the same as in Table A so that a comparison of the two tables shows the difference for low-wage versus median-wage employees.

The results for the private employer-sponsored plans are fairly similar for the low-wage employees of Table B when compared to the base-case median-wage employees of Table A. Obviously, low-wage employees have smaller absolute values of pension wealth accruals, since they are based on wages. However, expressed as a percentage of their lower wages, the relative values of the accruals are fairly similar. There are, however, three small differences.

First, for persons who retire before the normal retirement age of 65, the pension wealth accruals when there is no bridging supplement are slightly smaller for low-wage employees relative to the median-wage employee of Table A. This occurs because the low-wage employee earns less than the YMPE while the high-wage employee earns more than the YMPE. As such, the benefit formula for the low-wage earner is 1.4% of earnings per year of service (without the bridging supplement), while it is 2.0% of earnings over YMPE for the median-wage employee. This is due to the integration of private (RPP) plans with the SS components (CPP/QPP, OAS/GIS, SPA).

17 They could do that only if they had the required information.

Second, when the bridging supplement (i.e., the waiving of the CPP/QPP integration offset) is available, the pension wealth accrual, as a proportion of the wage, at age 55 (when the employee qualifies for early retirement) is greater for the low-wage employee than for median-wage employees. This, again, is the result of the fact that the bridging supplement means that the 2% benefit formula is applied to earnings under YMPE, as discussed previously in the section on bridging supplements, when the assumptions underlying the simulations were laid out. For the low-wage employee, this implies that the 2% formula applies to all of their wage, since they earn below YMPE. While it is also true that bridging supplement implies that the pension benefit payable to the higher-wage earner is calculated at a rate of 2% of their entire wage, less than 100% of their wage is affected by the bridging supplement (since they were receiving 2% on income above YMPE without the bridging supplement).

Third, even though bridging supplements have a larger effect on enhancing pension wealth for low-wage persons compared to higher wage persons at age 55 when the effect of the bridging supplement would first apply, the changes or accruals in pension wealth after age 55 are smaller for the low-wage individuals. At first glance, this seems odd since the relevant benefit formula is 2% of all wages at all ages when the bridging supplement applies. The phenomenon occurs, however, because when the bridging supplement first applies at age 55 it has a much larger proportional effect on low-wage employees, as documented subsequently. As such, because the relative stock or base of pension wealth is higher for low-wage persons, the increase or accruals that are calculated from that larger base are relatively smaller. A given change in pension wealth is smaller when it is calculated relative to a larger base. (Recall that the pension wealth accrual at a given age is the difference between pension wealth this period less pension wealth last period). This also explains why pension wealth accruals credited to the plan member upon qualifying for special retirement at age 60 are smaller for lower-wage earners than for their higher-wage counterparts.

While there are these three differences between the private pension wealth accruals for low-wage employees in our plans, the fact remains that these differences are relatively small in magnitude. The potential incentive effects of private employer-sponsored pension plans are fairly similar for low-wage and high-wage employees, at least with respect to how the pension wealth calculations are affected by wage differences.

The fundamental lesson from the combined public and private pension accruals analysis is that lower-wage individuals face stronger financial incentives to retire early than do higher-wage individuals. With the exception of the subsidised early and special retirement plan, combined wealth accruals after the spike are smaller for lower-wage employees, and turn negative earlier than is the case for higher-wage employees. The subsidised early and special retirement plan features create a very large financial incentive for all employees to remain employed until qualifying for the benefit, and to retire. The negative SS wealth accruals after age 55 are offset by the private pension accruals leaving a subsidy to continued work until age 60. After that point, both public and private pensions work in concert to penalize continued work.

High-Wage Employees and Private Employer Plans: Tables C and D show the pension wealth accruals for plan members earning 150% and 200%, respectively, of the base wage. The relative pension benefit accruals (expressed as a percentage of the person's wage) are not much different for high-wage persons compared to median-wage persons except for the following three factors. First, early retirement accruals when there is no bridging supplement increase slightly with wages. Second, the bridging supplement creates smaller spikes in benefits for higher-wage persons at age 55 when it first applies.[18] Third, because the relative base or stock of pension wealth is smaller for high-wage persons (relative to their high wage) under the bridging supplement, the relative increment to that base is higher for high-wage persons.[19] That is, a given change is larger when it is relative to a smaller base.

These differences by wage level occur because as earnings increase above YMPE, proportionately less of the pension benefit for higher-wage employees is based on the 1.4% formula, and proportionately more is based on the 2.0% formula. Thus, in the presence of a bridging supplement, higher income earners experience a proportionately smaller boost to their pension benefit than do lower income earners.

For these higher-wage employees, the negative incentives to continued work created by the public pension plans are reduced because public pensions become a relatively smaller component of total pension wealth as earnings increase. This means that additional years of work beyond age 55 generate higher pension wealth accruals for higher-wage earners.

18 For example, in the Basic Plan, with the bridging supplement, the spike in private pension wealth at age 55 is 48% of wages and 200% of the base-case wage (Table D), while it is 68% of wages at the base-case media wage (Table A).

19 For example, in the Basic Plan with the bridging supplement, the increment in pension wealth associated with working to the age of 56 (one year payment when the bridging supplement first applies) is 15% of wages and 200% of the base-case wage (Table D), while it is 13% of wages and the base-case median wage (Table A).

4. Simulation Results: Private and Public Plans

The previous discussion highlighted the potential incentive effects of the different features of private, employer-sponsored pension plans for employees of different wage levels. In this section, those incentive effects are analyzed when they are combined with those of public pension plans based on the simulations employed in Gruber (1997). The public plans include the employment-based CPP/QPP, the universal OAS system, and the means-tested GIS and SPA. These are subsequently described as SS benefits as in the Gruber study. To highlight the effect of combining the public plans with the private plans, the combined accruals are presented in every second column in each of the previously discussed Tables A through D.

Basic Plan: As indicated in Table A, for the base-case situation, the pension wealth accruals in the public plans are generally in the opposite direction of those of the private plans. Specifically, the accruals (year-over-year increases in the present value of pension wealth) under the public plans are negative albeit smaller than those of the private plans until the age of 65. As such, they reduce but do not reverse the positive accruals of the private plans. After age 55, the total accruals are fairly constant at around 13% of earnings. At age 65, however, the total accruals become sharply negative as a result of the negative effect of the public plans.

Overall, the combined effect of private and public pension plans, when the private plans have no early or special retirement features, is to create a mild incentive to continue working between the ages of 55 and 65, so as to accumulate pension wealth accruals typically of around 13% of earnings. This is the result, however, of the negative incentive effects of the public plans being more than offset by the positive incentive effects of the private plans. After age 65, there are strong financial disincentives emanating solely from the public plans.

Bridging Supplements: When bridging supplements are added, so that the CPP/QPP integration offset is waived for persons who take early retirement, a similar pattern prevails as when there is no bridging supplement, with two notable differences. The bridging supplement gives rise to a huge spike or pension wealth accrual at age 55, as occurred previously under the private plans alone. Similarly, the subsequent changes in accruals are smaller, more in the neighbourhood of 6% of wages until the age of 65. This reflects the fact that the "value" of the bridging supplement is capitalized into pension wealth at the age of 55 when it first becomes available; thereafter, although the stock of pension wealth remains higher, the increments to that wealth are smaller because they are already capitalized into the larger base from which the increments are calculated.

Overall, the total private and public financial incentives under the Basic Plan with bridging supplements are to encourage early retirement at age 55 when the bridging

supplement first applies. If one does not retire at that age, there is a mild incentive to continue working since total pension wealth is augmented slightly because the positive wealth accruals from the private plans slightly offset the negative accruals from the public plans. Whether the small positive pension wealth accruals are sufficient to offset any increased disutility of work is an open question. At age 65, however, there is a strong incentive to retire since pension wealth accruals become negative at that age.

Subsidised Early and Special Retirement: Combining the public pension plans with the private pension plans has a similar effect when the private pension plans have subsidised early retirement and subsidised early and special retirement. Essentially, the pattern of positive pension wealth accruals from the private plans prevail, but that pattern is increasingly offset by the negative accruals that emanate from the public plans between the ages of 55 and 60, totally offset after the age of 60 as a result of the large negative effects from the public plans.

Summary of Private and Public Base-Case Accruals: After age 55 the public pension plans can be characterized as having negative accruals that become increasingly negative with each year, and with a large negative drop at age 65.[20] This pattern is imposed on the pattern of the private pension plans. That pattern is more varied, with large spikes or positive accruals in particular years, such as when a person turns 55, when bridging supplements and subsidised early retirement may apply, or age 60, when special retirement may apply. Usually the spikes associated with the early and special retirement features are followed by declining accruals that become negative (and substantially so) around age 65 and even after age 60 if special retirement applies.

Clearly, both public and private plans create financial incentives that can have a potentially important effect on the retirement decision. The public plans themselves generally create an inducement to retire early because of the negative pension wealth accruals associated with continued work. Certainly, there is a strong incentive to retire before age 65, after which the "penalties" become substantial, in the order of 30% of wages each year for a median wage earner.

The financial incentives of private pension plans are more complex, reflecting the different institutional features of those plans. When combined with the public plans, they may offset the negative pension wealth accruals associated with continued work, at least if there are no bridging or early and special retirement features.

Bridging supplements and subsidised early and special retirement features create strong incentives to work until those milestone dates when those features first apply, and then to retire. Nevertheless, the positive pension wealth accruals that generally prevail even after those milestone dates still provide an incentive to continue working and accumulate the additional pension wealth. The total combined public and private pension wealth accruals become negative only after age 60 when there is subsidised early and special retirement, and around age 65 when there is no subsidised early or special retirement.

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20 See Gruber (1997).

Total Private and Public Accruals for Low-Wage Employees: Table B gives the total private and public pension accruals for the extreme case of a very low-wage employee at the bottom 10th decile of the wage distribution. As indicated in the third row, the total accruals drop more rapidly for a low-wage employee (Table B) compared to a median-wage employee (Table A), and they take on larger negative values around and after the age of normal retirement of 65.

This pattern is entirely a result of the negative public pension wealth accruals that increase with age under the public pension plans and that are especially prominent for low-wage employees. The negative accruals are more prominent for low-wage employees because, if they continue to work, they face clawbacks or reductions in public pensions that are means tested. Low-wage employees face higher (implicit) taxes on earned income than do higher wage employees because their means-tested benefits are reduced if they continue to work and earn income. This is a natural by-product of transfer programs that are targeted to the poor but that try to reduce spillover benefits to the non-poor by reducing the transfer as income rises.

Such clawbacks, however, can have adverse work incentive effects, especially when they involve implicit taxes of just over 50% as is common for older, very low-wage employees who would work beyond the age of 65 as shown in Table B.[21] The irony is that low-wage employees may have little financial incentive to continue working to alleviate any poverty condition. This occurs not only because of the low-wage they receive, but also because of the high (implicit) taxes they face. The taxes may be implicit in that they involve reductions in transfer payments, but that is no less real than taxes that are explicitly levied.

Total Private and Public Accruals for High-Wage Employees: The total private and public pension wealth accruals for employees at 150% and 200% of the median base-case wage are illustrated respectively in Tables C and D.

Negative accruals are much smaller and come much later because high-wage employees are not subject to the clawbacks of public pension plans. Otherwise, the general pattern of incentives are similar to those of median-wage employees (Table A).

There is some limited international comparative analysis for public pension wealth effects. Pension accrual effects at older ages are an important consideration in the retirement decision in many countries[22] Canada compares favourably with respect to disincentives to continued working at older ages. One measure — implicit tax on further work between the ages of 55 and 69 from social security programs — suggests that work disincentives in Canada are among the lowest in the industrial world, only marginally higher than the U.S., Japan and Sweden and much lower than most Western European countries.[23]

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21 This is the case for the worker in the household being simulated who, if he or she works in the 66th year, faces an implicit tax of 52% (the combined negative private and public accrual rate without the bridging supplement). These estimations are for the 10th deciles of the wage distribution.

22 See Organization for Economic Cooperation and Development, *Maintaining Prosperity in an Aging Society*, (Chapter 3 Ageing Populations, Labour markets and The Retirement Decisions), 1998.

23 See Jonathan Gruber and David Wise, eds. *Social Security Programs and Retirement Around the World*, A National Bureau of Economic Research Conference Report. Chicago and London: The University of Chicago Press, 1999.

5. Summary Picture of Pension Accruals and Retirement Incentives

The simulation results indicate that the pension wealth accruals under the combination of public and private pensions can potentially affect retirement decisions.

- The pension plan simulations illustrate how Canada's public and private pension system gives rise to a complex set of pension wealth accruals at different ages for recent retirees who experienced a continuous work history. These positive or negative pension wealth accruals act as a form of implicit subsidy or tax on income earned in a given year. The resulting financial incentives or disincentives might potentially be expected to have important effects on retirement decisions. The wealth accruals and associated financial incentives vary by such factors as the individual's wage as well as the institutional features of defined-benefit employer-sponsored private plans (RPPs), bridging supplements (where the CPP/QPP and private pension plan integration offset is waived) and subsidies to early retirement and special retirement. When pension wealth accruals and associated financial incentives were estimated for selected households under a restricted set of conditions the following conclusions emerged:

- In "basic" private plans (defined-benefit RPPs) with no bridging supplements and no early or special retirement features, accruals tend to increase with age, but abruptly drop to zero at the age of normal retirement of 65. This pattern potentially creates an incentive to continue working to age 65 and then to retire. Private pension plan accruals are potentially substantial, averaging around 20 percent of annual wages between the ages of 55 and 65 for a wide range of incomes. These are equivalent to an average 20 percent subsidy on more years of work.

- Private pension (defined-benefit) plans with CPP bridging supplements and subsidized early/ special retirement tend to create large positive spikes in pension wealth accruals at the dates when such features apply. Such spikes, followed by declining and possibly negative accruals, create financial incentives to work up to the milestone date, and to retire early.

- Although low-wage employees have smaller total private pension wealth, since it is based on their wage, their relative pension wealth accruals (expressed as a percent of their wage) is fairly similar to that of high-wage employees.

- Within the assumptions of the base cases, the combined effect of the public and private pension plans (defined-benefit RPPs) might potentially encourage retirement soon after 60 to maximize pension wealth for a recent retiree. For such base case workers potential disincentives (negative accruals) arising from public pensions, especially after age 60,

work in the opposite direction to the incentives from the private plans (positive accruals) for employees in basic defined-benefit plans with no "early or special retirement features" at later ages but are not large enough to offset the private plan incentives. Total pension wealth accruals remain positive at least until around age 65 when they become substantially negative because of certain aspects of public plans, notably the income-testing of GIS and SPA for low-income seniors.

- For private pension plans with "subsidized and special retirement", combined pension wealth accruals are potentially very large and positive, or peak at 55 and 60, and become negative after age 60. They become negative at the age of 64 in the case of private plans with only "subsidized early retirement". After age 60, the negative accruals of the public plans augment the retirement inducing effect of the private plans.

- The retirement-inducing potential of both private and public pensions combined was prominent for low-wage recent retirees since they were more likely to experience a rapid drop in accruals, especially larger negative public pension accruals (OAS/GIS/SPA), if they continued working. There were implicit taxes as high as 50% on paid employment beyond age 65. This would have occurred primarily because low-wage employees faced high clawbacks in income-tested public pensions (GIS/SPA) if they continued to earn income.

- Private pension wealth accruals are potentially zero after maximum years of service which in the modelling is age 65 in private pension plans, and they are potentially substantially negative in combined private/public plans at that age, without any special/early retirement benefits, or CPP bridging supplements.

- RRSPs and defined-contribution private pensions (RPPs) do not contain these retirement incentive effects. They do not have the clawbacks of pension benefits that exist in the public plans that are income-tested, nor do they have the early and special retirement features of private defined benefit plans. Thus, even though RRSP accumulations are important for persons at higher levels of pre-retirement income, they do not give rise to the spikes in pension wealth accruals that would influence retirement decisions at specific ages for large numbers of near-retirees.

- There is some limited international comparative analysis for public pension wealth effects. Pension accrual effects at older ages are an important consideration in the retirement decision in many countries. Canada compares favourably with respect to disincentives to continued working at older ages. One measure — implicit tax on further work between the ages of 55 and 69 from social security programs — suggests that work disincentives in Canada are among the lowest in the industrial world, only marginally higher than the U.S., Japan and Sweden and much lower than most Western European countries.

The public and private pension system should be regarded not only as a form of saving for retirement, but also as a system that has a potentially important set of incentives that can affect retirement decisions. This analysis has not assessed the extent to which the retirement income system affects how widespread these incentives are, and the decision to retire.

It is important to note that pension wealth accruals is only one measure of potential incentives to retire. For instance, even where pension wealth accruals are low or negative, the income replacement rate may be so low as to strongly encourage continued working. In addition other factors affect an individual's decision to retire.

TABLE A

Private and Total (Private Plus SS) Pension Wealth Accruals as Proportion of Wages, By Plan Type With and Without Bridging Supplements Median Wage Base-Case Earnings History

Age	Basic Plan				Subsidised Early Retirement				Subsidised Early and Special Ret.			
	No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement	
	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS
55	0.13	0.18	0.68	0.73	0.24	0.29	0.74	0.79	0.24	0.29	0.74	0.79
56	0.14	0.14	0.13	0.13	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
57	0.15	0.11	0.13	0.09	0.23	0.19	0.23	0.19	0.23	0.19	0.23	0.19
58	0.16	0.12	0.13	0.09	0.22	0.18	0.21	0.17	0.22	0.18	0.21	0.17
59	0.17	0.13	0.13	0.07	0.21	0.17	0.18	0.14	0.21	0.17	0.18	0.14
60	0.18	0.12	0.13	0.07	0.19	0.13	0.15	0.09	1.71	1.65	1.83	1.77
61	0.20	0.13	0.13	0.06	0.17	0.1	0.11	0.04	-0.17	-0.24	-0.30	-0.37
62	0.21	0.15	0.13	0.07	0.16	0.1	0.07	0.01	-0.19	-0.25	-0.32	-0.38
63	0.23	0.16	0.13	0.06	0.14	0.07	0.03	-0.04	-0.20	-0.27	-0.34	-0.41
64	0.26	0.09	0.13	-0.04	0.11	-0.06	-0.02	-0.19	-0.21	-0.38	-0.36	-0.53
65	0.28	0.00	0.13	-0.15	0.09	-0.19	-0.07	-0.35	-0.22	-0.5	-0.39	-0.67
66	0.00	-0.32	0.00	-0.32	0.00	-0.32	0.00	-0.32	0.00	-0.32	0.00	-0.32
67	0.00	-0.26	0.00	-0.26	0.00	-0.26	0.00	-0.26	0.00	-0.26	0.00	-0.26
68	0.00	-0.20	0.00	-0.20	0.00	-0.20	0.00	-0.20	0.00	-0.20	0.00	-0.20
69	0.00	-0.23	0.00	-0.23	0.00	-0.23	0.00	-0.23	0.00	-0.23	0.00	-0.23

TABLE B

Private and Total (Private Plus SS) Pension Wealth Accruals as Proportion of Wages, By Plan Type With and Without Bridging Supplements 10th percentile

Age	Basic Plan				Subsidised Early Retirement				Subsidised Early and Special Ret.			
	No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement	
	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS
55	0.12	0.18	0.78	0.84	0.22	0.28	0.83	0.89	0.22	0.28	0.83	0.89
56	0.13	0.13	0.11	0.11	0.23	0.23	0.24	0.24	0.23	0.23	0.24	0.24
57	0.14	0.1	0.11	0.07	0.22	0.18	0.21	0.17	0.22	0.18	0.21	0.17
58	0.15	0.11	0.11	0.07	0.21	0.17	0.19	0.15	0.21	0.17	0.19	0.15
59	0.16	0.12	0.11	0.07	0.19	0.15	0.16	0.12	0.19	0.15	0.16	0.12
60	0.17	0.06	0.11	0.00	0.18	0.07	0.12	0.01	1.60	1.49	1.74	1.63
61	0.18	0.06	0.11	-0.01	0.16	0.04	0.09	-0.03	-0.16	-0.28	-0.31	-0.43
62	0.20	0.09	0.10	-0.01	0.15	0.04	0.04	-0.07	-0.17	-0.28	-0.33	-0.44
63	0.22	0.1	0.10	-0.02	0.13	0.01	0.00	-0.12	-0.18	-0.3	-0.36	-0.48
64	0.24	-0.03	0.09	-0.18	0.11	-0.16	-0.05	-0.32	-0.19	-0.46	-0.38	-0.65
65	0.26	-0.21	0.07	-0.4	0.08	-0.39	-0.11	-0.58	-0.21	-0.68	-0.41	-0.88
66	0.00	-0.52	0.00	-0.52	0.00	-0.52	0.00	-0.52	0.00	-0.52	0.00	-0.52
67	0.00	-0.4	0.00	-0.4	0.00	-0.4	0.00	-0.4	0.00	-0.4	0.00	-0.4
68	0.00	-0.36	0.00	-0.36	0.00	-0.36	0.00	-0.36	0.00	-0.36	0.00	-0.36
69	0.00	-0.41	0.00	-0.41	0.00	-0.41	0.00	-0.41	0.00	-0.41	0.00	-0.41

TABLE C
Private and Total (Private Plus SS) Pension Wealth Accruals as Proportion of Wages, By Plan Type With and Without Bridging Supplements 150% of Base-Case Wage

Age	Basic Plan				Subsidised Early Retirement				Subsidised Early and Special Ret.			
	No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement	
	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS
55	0.14	0.17	0.58	0.61	0.25	0.28	0.66	0.69	0.25	0.28	0.66	0.69
56	0.15	0.15	0.14	0.14	0.26	0.26	0.27	0.27	0.26	0.26	0.27	0.27
57	0.16	0.14	0.14	0.12	0.25	0.23	0.25	0.23	0.25	0.23	0.25	0.23
58	0.17	0.14	0.15	0.12	0.24	0.21	0.22	0.19	0.24	0.21	0.22	0.19
59	0.18	0.15	0.15	0.12	0.22	0.19	0.20	0.17	0.22	0.19	0.20	0.17
60	0.19	0.15	0.15	0.11	0.20	0.16	0.17	0.13	1.82	1.78	1.92	1.88
61	0.21	0.17	0.16	0.12	0.19	0.15	0.13	0.09	-0.18	-0.22	-0.28	-0.32
62	0.23	0.19	0.16	0.12	0.17	0.13	0.10	0.06	-0.20	-0.24	-0.30	-0.34
63	0.25	0.2	0.17	0.12	0.14	0.09	0.06	0.01	-0.21	-0.26	-0.33	-0.38
64	0.27	0.16	0.17	0.06	0.12	0.01	0.02	-0.09	-0.22	-0.33	-0.35	-0.46
65	0.30	0.11	0.17	-0.02	0.10	-0.09	-0.03	-0.22	-0.23	-0.42	-0.37	-0.56
66	0.00	-0.22	0.00	-0.22	0.00	-0.22	0.00	-0.22	0.00	-0.22	0.00	-0.22
67	0.00	-0.17	0.00	-0.17	0.00	-0.17	0.00	-0.17	0.00	-0.17	0.00	-0.17
68	0.00	-0.14	0.00	-0.14	0.00	-0.14	0.00	-0.14	0.00	-0.14	0.00	-0.14
69	0.00	-0.15	0.00	-0.15	0.00	-0.15	0.00	-0.15	0.00	-0.15	0.00	-0.15

TABLE D

Private and Total (Private Plus SS) Pension Wealth Accruals as Proportion of Wages, By Plan Type With and Without Bridging Supplements 200% of Base-Case Wage

Age	Basic Plan				Subsidised Early Retirement				Subsidised Early and Special Ret.			
	No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement		No Bridging Supplement		With Bridging Supplement	
	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS	Pension Accrual	Pension Accrual Plus SS
55	0.15	0.17	0.48	0.5	0.27	0.29	0.57	0.59	0.27	0.29	0.57	0.59
56	0.16	0.16	0.15	0.15	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
57	0.17	0.15	0.16	0.14	0.27	0.25	0.26	0.24	0.27	0.25	0.26	0.24
58	0.18	0.16	0.16	0.14	0.25	0.23	0.24	0.22	0.25	0.23	0.24	0.22
59	0.19	0.17	0.17	0.15	0.24	0.22	0.22	0.2	0.24	0.22	0.22	0.2
60	0.21	0.18	0.18	0.15	0.22	0.19	0.19	0.16	1.94	1.91	2.01	1.98
61	0.22	0.19	0.18	0.15	0.20	0.17	0.16	0.13	-0.20	-0.23	-0.27	-0.3
62	0.24	0.21	0.19	0.16	0.18	0.15	0.13	0.1	-0.21	-0.24	-0.29	-0.32
63	0.26	0.22	0.20	0.16	0.15	0.11	0.09	0.05	-0.22	-0.26	-0.31	-0.35
64	0.29	0.21	0.21	0.13	0.13	0.05	0.05	-0.03	-0.24	-0.32	-0.33	-0.41
65	0.32	0.18	0.22	0.08	0.10	-0.04	0.01	-0.03	-0.25	-0.39	-0.35	-0.49
66	0.00	-0.16	0.00	-0.16	0.00	-0.16	0.00	-0.16	0.00	-0.16	0.00	-0.16
67	0.00	-0.13	0.00	-0.13	0.00	-0.13	0.00	-0.13	0.00	-0.13	0.00	-0.13
68	0.00	-0.1	0.00	-0.1	0.00	-0.026	0.00	-0.1	0.00	-0.1	0.00	-0.1
69	0.00	-0.11	0.00	-0.11	0.00	-0.11	0.00	-0.11	0.00	-0.11	0.00	-0.11

FIGURE A
Basic Plan

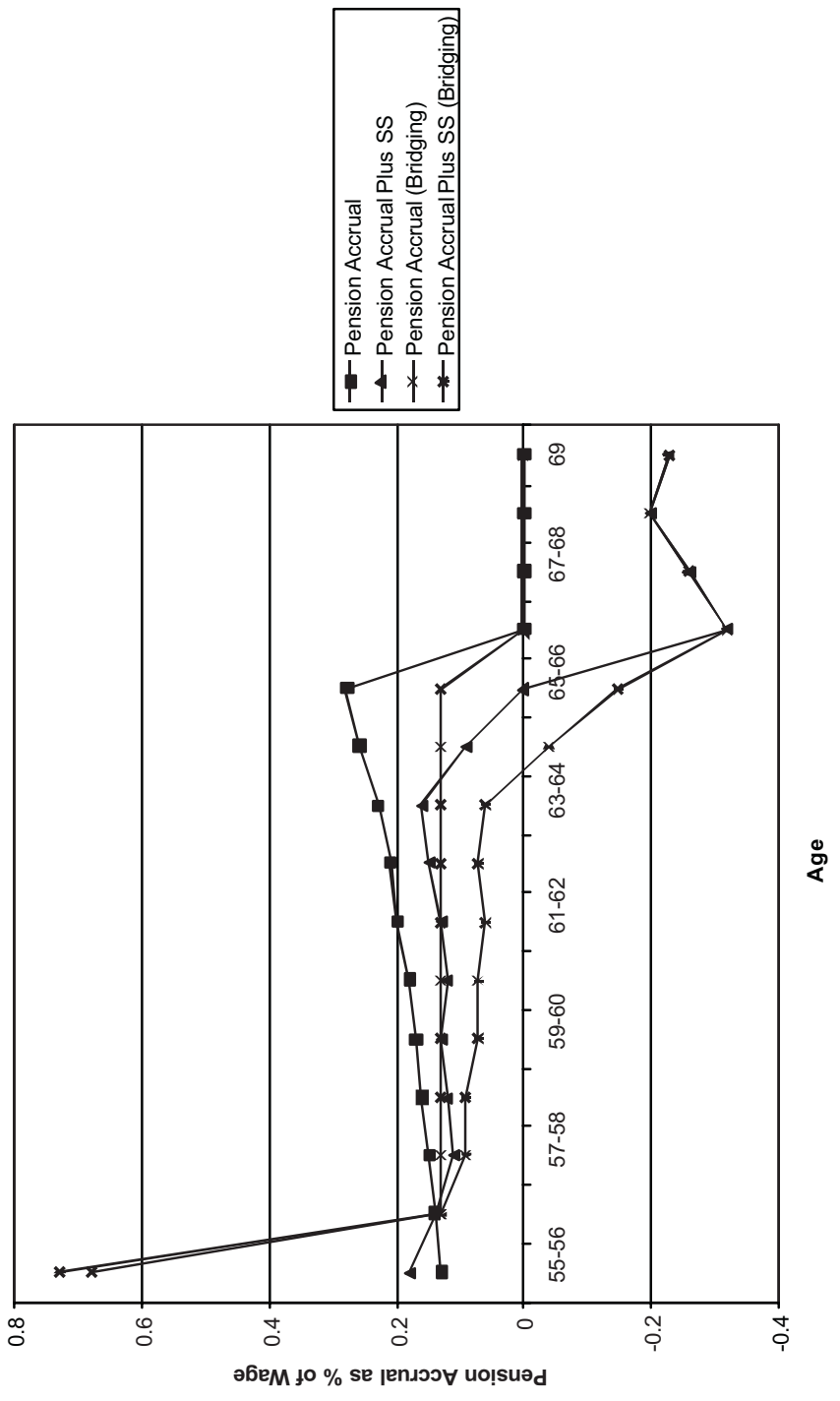

FIGURE B
Subsidized Early Retirement

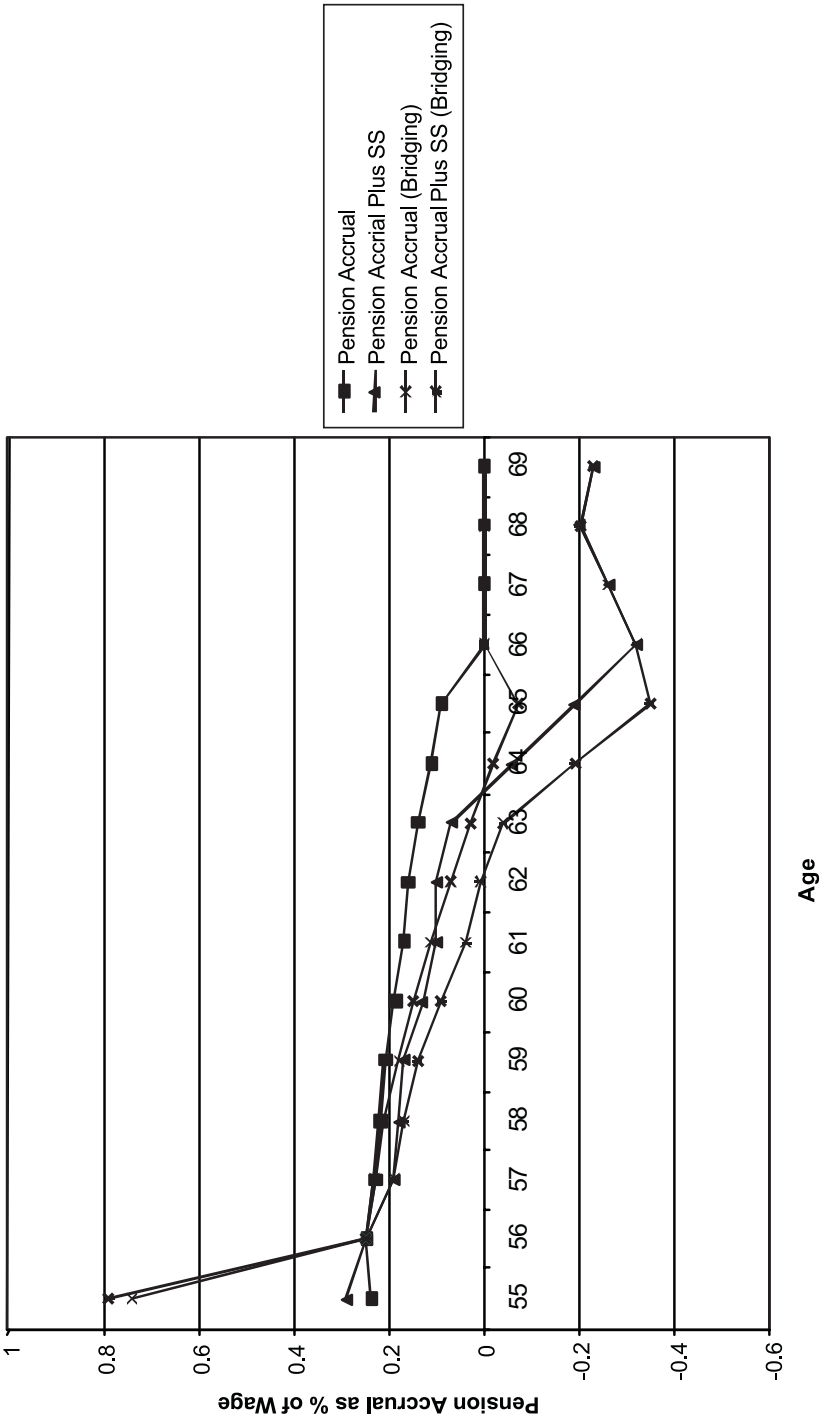

FIGURE C
Subsidized Early and Special Retirement

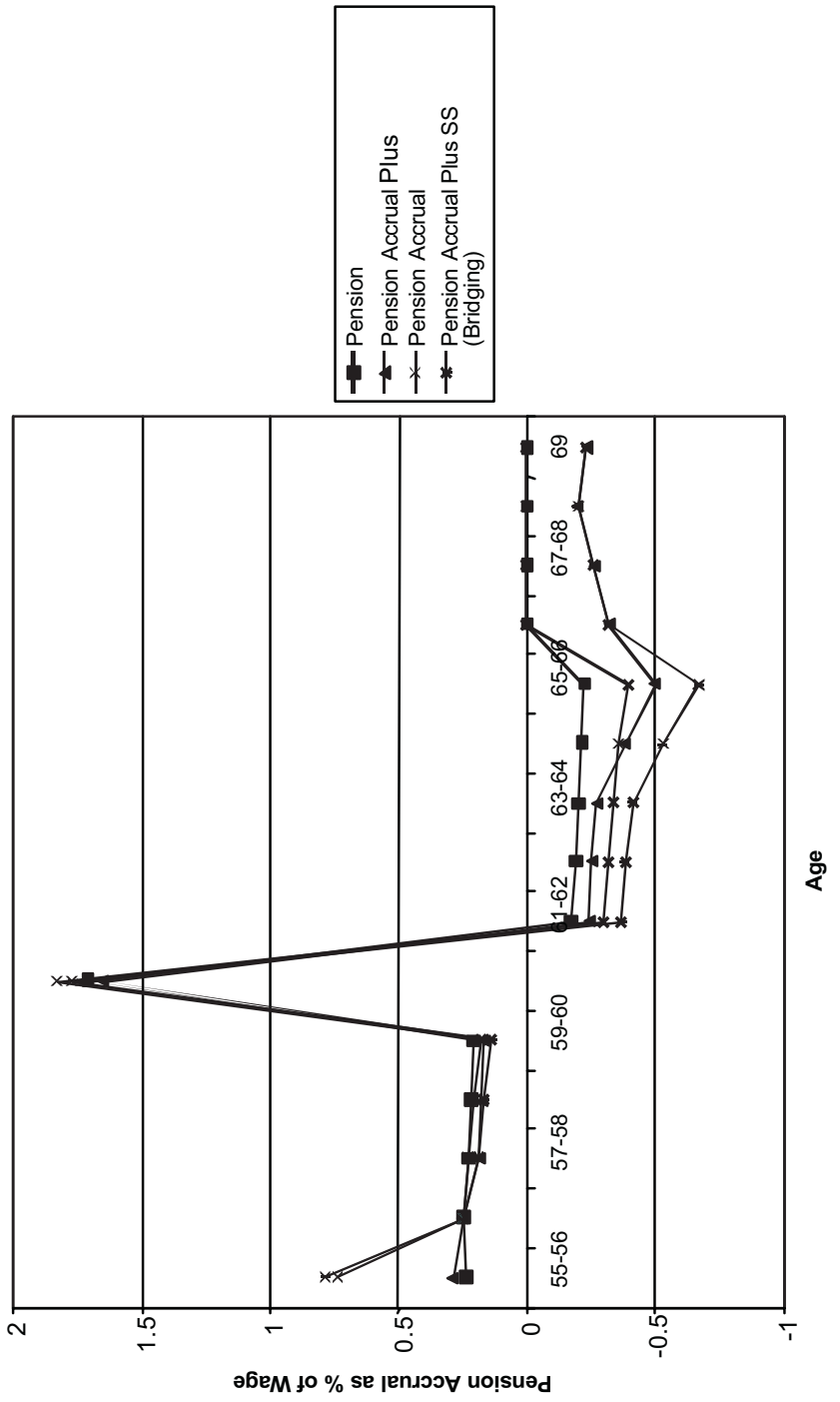

FIGURE D
Pension Accrual — No Bridging

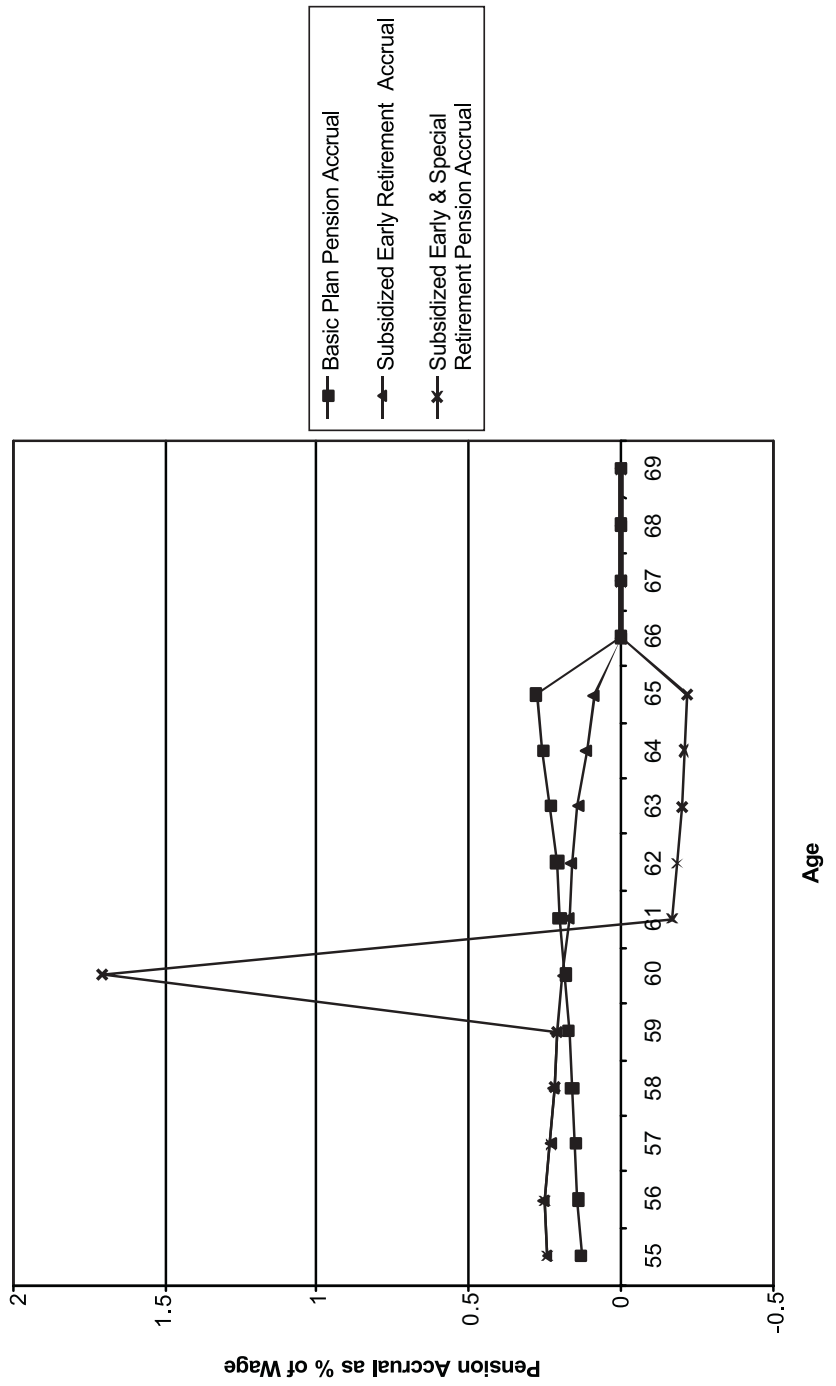

FIGURE E
Pension Accrual Plus SS — No Bridging

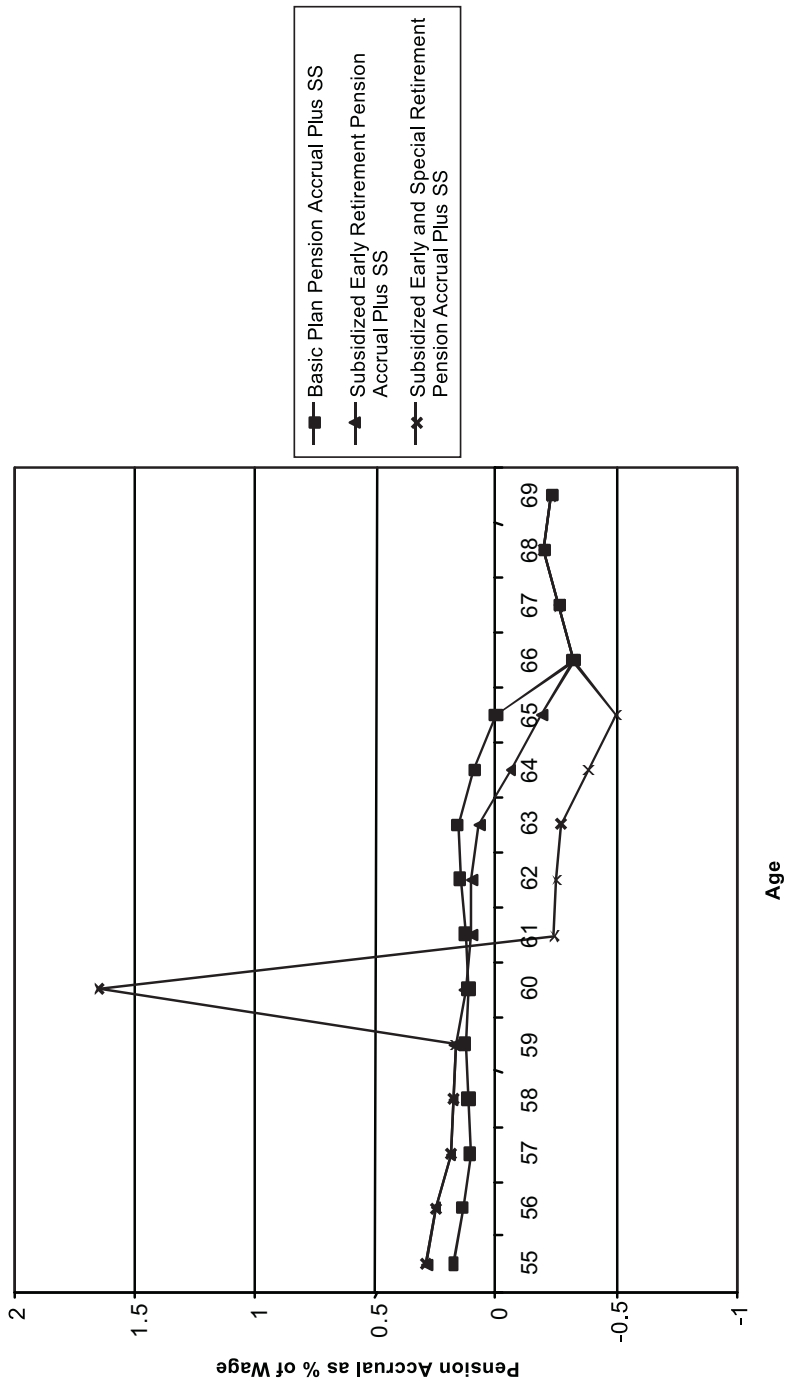

FIGURE F
Pension Accrual with Bridging

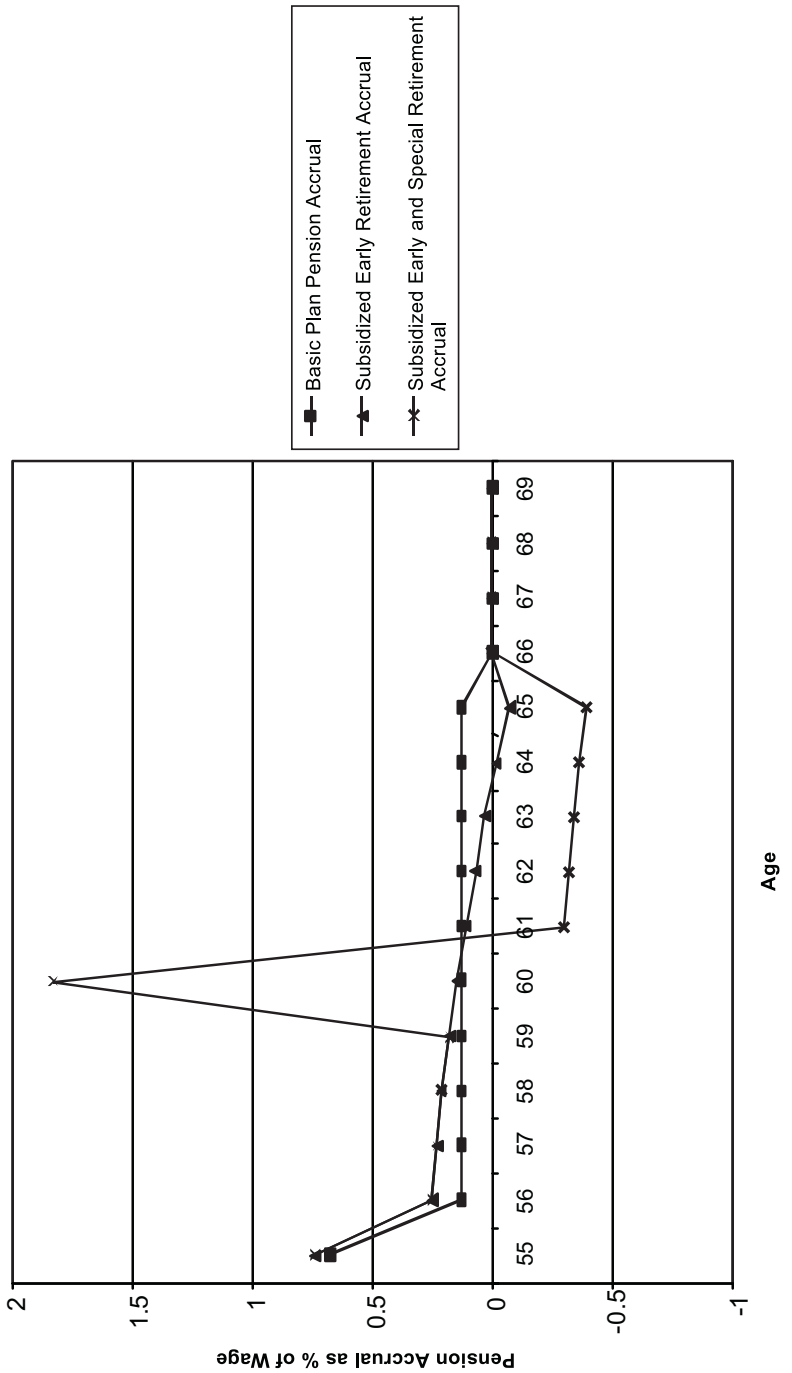

FIGURE G
Pension Accrual Plus SS with Bridging