

TECHNICAL ANALYSIS OF
THE SPECIAL COMMISSION TO STUDY THE
MASSACHUSETTS CONTRIBUTORY RETIREMENT SYSTEMS

SUBMITTED
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Technical Analysis

I. Introduction

While the central elements affecting the level of retirement benefits are straightforward to describe – three-year salary average, 2.5 percent accrual rate for each year of service, 80 percent cap on the replacement rate, and annual cost-of-living adjustments on a base limited to \$12,000 – their implications are not transparent. This appendix examines the implications of current retirement provisions for workers with different career characteristics. It also explores some workings of termination allowances and Retirement Plus. While a complete analysis of these issues should be based on a sample of earnings histories representative of the actual members of the system (and projections of likely future histories), such a sample was not available for this Commission. Thus, the following analysis uses hypothetical earnings histories.⁵⁸

II. Distribution of Benefits and Contributions

The distribution of benefits and contributions among workers depends on promotions and pay freezes near the end of a career, differing rates of wage growth throughout a career, varying ages for the start of a career, varying timings of a public sector career within a longer working career, and the rate of inflation.

In order to compare the lifetime experiences of different workers, this analysis presents the ratio of the value of lifetime pension benefits to accumulated contributions. Aggregating annual benefits and contributions requires the choice of a discount rate. The bulk of the presentations use a 4-percent discount rate, while some use an 8-percent discount rate. The 8-percent rate represents the expected return on pension fund assets and therefore the *expected* cost to the Commonwealth to provide benefits. Since this assumption ignores the fluctuations in the rate of return on the actual portfolio from year to year, it ignores the cost to taxpayers of bearing the risk associated with providing benefits that are supported by the portfolio. While the state is much better able to bear risk than the typical individual worker, these fluctuations can be substantial and do impose a real cost on taxpayers, as 2008 made painfully clear.

Workers do not have access to assets that pay a safe return of 8 percent. Instead, their available return on a safe asset would be closer to 4 percent. Thus, the calculations use both 4 percent and 8 percent, which represent the value to the worker from paying contributions and receiving benefits, on the one hand, and the expected cost to the Commonwealth of providing the benefits, on the other. Both are relevant for interpreting the pattern of benefits and contributions across different earnings paths for different questions. The 4-percent case is appropriate for evaluating the fairness of the treatment of different workers and the incentive for a worker to retire. The 8-percent calculations are relevant for calculating the expected cost to the Commonwealth of hiring

⁵⁸ This “Technical Analysis” presents refinements and extensions of the material in the “Background Document,” which was submitted on September 1, 2009. As a result, the figures in the “Background Analysis” (formerly the “Background Document”) and the “Technical Analysis” may differ slightly. Technical analyses of teacher pension plans have been done for a number of states, including Massachusetts. See Robert M. Costrell and Michael Podgursky, “Peaks, Cliffs and Valleys: Incentives in Teacher Retirement Systems and their Consequences for School Staffing,” *Education Finance and Policy*, Spring 2009 Vol 4, No. 2, Pages 175-211.

people with different earnings expectations. Additional calculations and the computer code will be made available upon request.

A. Late-career Promotions, Pay Freezes, and General Earnings Growth

A critical part of the benefit formula is the averaging of earnings over three years. For a given age and number of years of service, the initial benefit is proportional to this earnings average. Thus, the earnings path during those three years is important. If two workers with identical histories are candidates for a promotion in the last years of work, with one getting it while the other does not, their pension benefits will differ. If the promotion raises the average salary over the three years by 10 percent beyond normal increases, the initial pension benefit will be 10 percent higher. For a long-career worker with an 80 percent replacement rate, this 10 percent increase in the initial pension benefit is 8 percent *of average earnings*. In present discounted value, each additional \$1.00 of an initial pension benefit starting at age 65 is worth \$12.51.⁵⁹ Thus the value of the lifetime pension increases by roughly 100 percent of the annual earnings prior to the promotion. The increase in total compensation, salary plus pension benefits, is approximately 4.3 times the value of the promotion over the three years.⁶⁰

While some difference in pension value is appropriate as a consequence of a promotion, the size of the increase in the current pension system raises a question of fairness between a worker who receives a promotion and one with a similar earlier career who does not. This large payoff to a late promotion might affect who applies for promotions and who gets them and so may affect the efficient provision of public services.

Reliance on the last three years of earnings creates not only opportunities for employees but also risks. A worker with a 50-percent chance of getting a promotion faces a large risk as to pension level. If pensions were less sensitive to late-career effects, and were of the same average size, retirees would face less risk in benefit level from the uncertainty over who will get a promotion. Risk to benefit levels also arises from general fiscal circumstances. For example, if fiscal circumstances result in a one-year pay freeze between the last two years, then, relative to a projected 4.5 percent raise, the initial benefit is reduced by 1.5 percent, affecting all later benefits as well. A two-year pay freeze nearly triples this reduction to 4.4 percent. Recognizing the large present discounted value of benefits, the risk to total receipts, earnings plus pension, is much larger than the risk to earnings alone.

B. Distribution Over Varying Rates of Earnings Growth

Different occupations within government may offer different rates of earnings growth over the course of a career. With benefits calculated on the basis of final three-year averages, workers who experience faster rates of wage growth will receive higher returns on their pension contributions than those with relatively flat earnings profiles. This result occurs because the

⁵⁹ This calculation assumes that the pension is larger than the limit on benefits receiving a COLA, so that there is no additional COLA as a consequence of the pension being larger.

⁶⁰ The increased pension value is 12.51 times the 80 percent replacement rate times the 10 percent increase in average earnings, where 12.51 is the present value factor for an additional dollar of pension benefit beginning at age 65, assuming that the pension already exceeds the COLA base.

benefit depends only on the late-career earnings, while the contributions depend on earnings throughout the career.

To demonstrate the quantitative importance of different earnings patterns on benefits, Figure 1 shows the ratio of lifetime pension value to accumulated contributions for employees with different rates of earnings growth. Someone with earnings growth of 3 percent will receive benefits equal to 2.29 times contributions, compared to 2.95 for someone with earnings growth of 5 percent – nearly 30 percent larger. While some variation in the expected rate of return on contributions is appropriate in a defined benefit plan, these differences seem large and difficult to justify. With an 8-percent discount rate, someone with earnings growth of 3 percent will receive benefits equal to 0.68 times contributions, compared to 0.98 for someone with earnings growth of 5 percent – 44 percent larger.

C. Distribution Over Varying Starting Ages

The current workforce started public employment at a wide range of different ages. The starting age affects how well one does under the pension system. Calculations of this starting-age effect require making some assumption about the initial salary of individuals who begin public employment at later ages. For simplicity, the assumption used here is that earnings depend solely on age and not tenure with the state, which is reasonable for individuals who begin state employment after working in other capacities. It would not be representative of a worker who enters the labor force for the first time at a later age.

Figure 2 shows the ratio of lifetime benefits to accumulated contributions for workers starting at different ages, all of whom retire at age 65. With a 4-percent discount rate, a worker starting at age 35 receives 18 percent ($3.26/2.77$) more in benefits relative to contributions compared with a worker starting at age 25. And a worker starting at age 45 receives 17 percent more ($3.24/2.77$). Thus, those starting younger get less in lifetime pension benefits for each dollar of accumulated contributions. These differences arise for several reasons. The most important is that the longest-serving individuals in this example will have hit the 80 percent cap on the replacement rate. Figure 3 shows the relative sizes of the ratios under the assumption that a worker retires on reaching the 80-percent cap, if that is before age 65. While a worker starting at age 35 gets an 18-percent higher return on contributions than one starting at 25 if they both work to age 65, they get roughly the same return on contributions if the earlier starter retires on hitting the 80-percent cap on benefits. This comparison shows the disincentive to continued work once the 80-percent cap is reached, a topic that will be addressed in more detail below.

Another perspective comes from comparing the ratio of benefits to contributions for workers with 20 years of service but different starting and ending dates. In each case, the assumption is that benefits are not claimed before age 55. Those starting earlier get lower lifetime benefits relative to accumulated contributions than those starting later – workers starting at age 35 receive 30 percent ($3.16/2.47$) more in benefits relative to contributions compared with workers starting at age 25 (see Figure 4).⁶¹ Depending on the nature of retirement savings opportunities with

⁶¹ Note that this ignores the complications of allowing a refund of contributions, but in the current case the value of the pensions exceeds that of a refund of the contributions.

other employment, this difference may be compounded by the differences in these other opportunities.

D. Distribution Due to Varying Levels of Inflation

The future of inflation is uncertain. With initial benefits proportional to the three-year final earnings average, the ratio of the three-year final average to the earnings in the final year is a measure of the impact of inflation within this three-year period. The full impact of inflation on the purchasing power of benefits depends on how the inflation affects earnings. A baseline case to consider is where earnings keep up with inflation. For this case, Figure 5 shows the ratio of the three-year average earnings to final earnings for different inflation rates, measured relative to the ratio with 3-percent inflation, which is a rate that seems appropriate with 4.5 percent earnings growth toward the end of a career. The variation is significant, going from a 3-percent higher ratio with zero inflation to 8-percent lower with 13-percent inflation, a level reached in the late 1970s. This calculation shows the risk associated with not having earnings indexed for inflation when calculating the three-year average of earnings.⁶²

Another way that inflation affects the purchasing power of benefits is from the limits on the COLA. The COLA is restricted to 3 percent, so if inflation exceeds 3 percent the COLA will not maintain the purchasing power of the pension. In addition, the COLA is restricted to the first \$12,000. Thus even when the COLA percentage increase matches the inflation rate, the purchasing power of the benefit is not maintained when it exceeds \$12,000. In this case, the higher the inflation rate the more rapidly the pension grows and so the less successful the COLA is in maintaining the purchasing power of the pension over time. These two elements are brought together in Figure 6, which shows the present value of benefits at different inflation rates after retirement relative to that at 3-percent inflation for our standardized full-career worker, calculated for a given initial benefit equal to approximately 3.9 times the COLA base limit, and assuming that inflation-adjusted discount rates are not affected by the level of inflation. The lifetime value of inflation-adjusted benefits is 38 percent higher at 1 percent inflation than at 5 percent.⁶³

⁶² At the other extreme, if inflation has no effect on nominal earnings levels, the ratio of the current three-year average to final pay does not vary with inflation. However, in this case, final earnings are not a good measure of the purchasing power of initial benefits. Focusing just on the inflation within the averaging period, we look at the ratio of the three-year average benefits to the purchasing power of the earliest earnings in the averaging period. Again using 4.5 percent earnings growth, the ratio of the three-year average benefits to the earliest of the averaged earnings, adjusted for purchasing power, can be compared to that with 3-percent inflation. The ratio is 6 percent higher with zero inflation and 17 percent lower with 13 percent inflation than with 3 percent. At a national level, the very high inflation rates of the late 1970s were associated with real wage declines.

⁶³As in other figures, we use a \$40,000 COLA base here since the calculation is for workers retiring 40 years from now. The effects are identical to those that would occur with a \$12,000 COLA base, just at a higher level. The assumption made here is that inflation is constant throughout retirement; however, the impact on the results is driven by inflation in the first years after retirement, so the scenarios are not as extreme as they might appear.

III. Incentives for Continued Work

The pension system matters for retaining workers in public service due to the incentives it creates to keep working or to retire. One way to measure these incentives is the accrual of pension value relative to earnings net of the pension contribution. Since the pension applies to a large set of workers with widely varying circumstances, economic theory supports a relatively smooth incentive from the pension system rather than one that varies between large incentives to continue work and large disincentives, sometimes over short intervals

A. Pension Accrual as Part of the Incentive to Work for the Current Year

Figure 7 reports the year-by-year pension contribution to the incentive for an additional year of work (as a percent of net earnings) for workers 55 and over who started at ages 25, 35, and 45.⁶⁴ If a worker who started at age 25 is 55 and delays retirement for one year, the increase in the lifetime value of the pension from another year of work is equal to 46 percent of the salary net of contributions. For the workers who started at 35 and 45, the increases in lifetime pension value are 36 percent and 48 percent of net earnings, respectively. One striking finding shown in the figures is the role of the 80-percent maximum benefit in sharply decreasing the incentive to continued work. After reaching the 80-percent cap, the lifetime value of the pension decreases significantly with each year of further work. Workers starting at 25 reach the 80-percent cap prior to reaching 65 and experience one sharp drop in the incentive to continue work, while workers starting at 35 experience a stepwise decrease in which they first hit the highest benefit accrual rate at age 65 and then, a few years later, the 80-percent cap. Workers starting at 45 do not reach the 80 percent cap until after age 69. Thus the pension system adds a great deal to the incentive to continue employment for a while, but then subtracts a great deal from that incentive once the 80-percent cap binds.

Figure 8 shows the same calculation for a worker starting at age 25 extended to include vested terminations before age 55. This figure illustrates the backloading of the pension, as the accrued pension relative to net earnings is much lower at earlier ages.

B. Pension Accrual as Part of the Incentive to Return to Work After a Gap

Basing benefits on the last three years of earnings and not indexing the average earnings for inflation over the period from a termination until a deferred pension claim creates a strong incentive for a worker who left public service after vesting to return to work for three years. Figure 9A shows the increase in lifetime pension value from returning to work relative to the net earnings during the three-year return period for different periods of time outside public

⁶⁴ Consider a 55 year old. Stopping work would result in a pension, which we assume is begun immediately. Working for an additional year, the pension would be based on the 3-year average earnings that included the next year's salary and the benefit factor for being a year older, although the latter would not apply if the 80 percent maximum benefit rule applied. This results in a higher monthly pension that would start a year later. We discount the higher pension back to the decision point at age 55, allowing for the possibility of dying during the year on the value of the pension. The evaluation of the incentive to continue work ignores survivor benefits for workers who die before claiming retirement benefits. The calculations for this figure assume that the COLA base is constant throughout the career. If the base changes from time to time, the calculations show the incentive assuming an accurate forecast of the level actually present at the time of retirement, and assumed unchanged thereafter.

employment.⁶⁵ The numbers are very high, much higher than those in the incentive to simply continue working, as reported above. Figure 9B repeats this calculation using the 8-percent discount rate, reflecting the expected cost of pension benefits. With an 8-percent discount rate, a return to work delays the start of benefits and so allows further accumulation of earlier contributions, reducing the measured ratio compared with a 4-percent discount rate. The ratios remain high for early departures, but turn negative for one close to retirement.

One can also relate the increase in pension value to the contributions during a return to work. As an example, consider a worker who starts with the state at age 25 and works until age 50. This worker's pension upon leaving at 50 would be worth \$662,000, claimed at 55 (the evaluation discounted to age 50). Now suppose instead that the worker returns to work at age 62 and works until 64. The three-year average earnings increase 4.5 percent per year over the gap years from \$100,000 to \$193,000 and the pension value increases to \$940,000 (the evaluation discounted to age 50). However, the added contributions paid over these three years are only \$37,000 (evaluated at age 50). Thus, the increase in the pension value is 7.5 times the added contributions. If earnings on the return to work only reflected 3 percent inflation, rather than 4.5 percent wage growth, the earnings growth and so the pension growth would not be so large. In this case, the increase in pension value is still 4.5 times the added contributions. Since the increase in pension value exceeds the additional contributions so dramatically, the pension system generates a strong incentive to return to work for these three years beyond that provided by the salary.

C. Pension Accrual Incentives Under Retirement Plus

Since July 2001, all newly-hired teachers have been enrolled in an alternative pension system known as Retirement Plus.⁶⁶ This alternative system has a contribution rate of 11 percent (rather than the 9 percent plus 2 percent of salary in excess of \$30,000 present earlier) and provides members who have at least 30 years of service an extra 2 percent of final average salary for each full year of creditable service in excess of 24 years, up to the same statutory maximum of 80 percent. This new system changes the incentive to continue working. Figure 10 shows the role of the pension in the incentive to work another year with and without Retirement Plus for teachers starting at age 25. Retirement Plus greatly encourages continued work when close to 30 years of service. Conversely, as a result of interaction with the 80-percent cap, Retirement Plus greatly discourages the longest teaching careers.

IV. Termination Allowances

Workers with at least 20 years of service at the time of an involuntary termination (not for cause) are entitled to a termination allowance in place of their superannuation benefit. The termination allowance is calculated as one-third of the member's 3-year average salary plus the annuitized

⁶⁵ These calculations continue to assume that wages are solely a function of age and thus there is no reduction in wages after the return due to departure. Also, the accumulated contributions are left with the state, not withdrawn followed by repurchase of the years of service.

⁶⁶ Teachers hired before July 2001 were eligible to opt-in upon payment of an additional contribution amount.

balance of the employee's accumulated contributions, determined using a 7-percent return.⁶⁷ For a typical worker, the 1/3 rule determines the bulk of the benefit. A typical value of the 1/3 allowance plus annuitized balance is a bit more than 40 percent of the final average salary in a sample of termination allowances recently claimed in the state retirement system.⁶⁸ The benefit starts immediately, with no increase available for deferring its start.

A rationale for the termination allowance is that benefits are backloaded (as shown in Figure 8) in part to encourage continued work. But the incentive to continue work at the same job is not relevant for someone who was terminated, although there is concern about the incentive to seek another job in public employment. Possible termination with a small pension subjects employees to a risk, which is of particular concern since the public employees are not covered by Social Security. A typical employee starting at 25, who voluntarily terminates at 45, would be eligible for a superannuation benefit of \$7,979 if claimed immediately. This amount equals 10 percent of final average earnings. However, if the termination was involuntary, the initial termination benefit would be \$37,562, or 47 percent of the final average salary. The termination allowance provides a substantial add-on to the pension available via the superannuation allowance.

Figure 11 shows the relative sizes of termination and superannuation pensions. The dashed line is the present discounted value of lifetime termination benefits for a worker with a typical earnings trajectory who began employment at age 25 and was terminated at different ages. The solid line shows the lifetime superannuation benefits for the same worker if the departure were voluntary and the benefit is claimed at the age of separation or age 55, whichever is later. Two patterns are evident. First, the lifetime values of termination benefits are high relative to those of superannuation benefits, particularly at younger ages. Second, the lifetime values of termination benefits are lower for people who are terminated later, despite the fact that they have worked longer. For example, under the rules for superannuation benefits, a Group 1 employee entering at age 25 who voluntarily terminates at 49 would be entitled to a superannuation pension worth roughly \$500,000.⁶⁸ However, if the termination were involuntary, the termination pension has a lifetime value of \$960,000, almost twice as much. Similarly, an employee voluntarily terminating employment at 55 would receive a superannuation pension worth \$740,000 while a termination allowance at the age is worth \$880,000. Thus, while the value of the superannuation pension is increasing sharply with each additional year of service (until the 80 percent cap binds), the value of the termination pension is actually falling. Moreover, Figure 11 shows that the lifetime value of the pension if terminated at age 45 is worth more than the superannuation pension with continued work no matter what the retirement age. This design element strongly discourages former employees from returning to work for the Commonwealth.

Also, from the perspective of providing adequate income at ages when most people fully retire, the early start in termination benefits is probably not as valuable as a sufficiently larger benefit

⁶⁷ In computing termination pensions and accumulated balances, interest is credited to the annuity savings fund at the 3.5 percent rate consistent with the actuarial assumptions in the valuations of the state retirement system and teachers' retirement system. Interest is credited monthly.

⁶⁸ This calculation assumes that the employee waits until age 55 to claim the pension.

starting later, but the one-third portion of the termination benefit does not include an increased monthly amount for a delayed start.⁶⁹

V. Conclusion

This appendix has examined some implications of the current design of the retirement pension and select ancillary benefits with a focus on the distribution of benefits and on the incentives to work. The analysis has identified a number of features of the current system.

In present discounted value, each additional \$1.00 of an initial pension benefit starting at age 65 is worth \$12.51. Thus a great deal is riding on each dollar of additional earnings in the three-year averaging period. As a consequence, two workers with similar careers that diverge at the end can get benefits of very different lifetime values. Also, there is considerable pension risk for workers related to what happens to earnings within the averaging period – risks coming from getting or not getting a promotion, from the general level of pay increases, and from inflation. Moreover, this reliance on only three years of earnings is an invitation to manipulate earnings.

With contributions paid throughout a career and benefits based on earnings levels in just three years, there are wide differences in the value of lifetime pension benefits relative to the accumulated value of contributions. Those with more rapidly rising earnings trajectories throughout their careers get more in benefits relative to contributions than those with slowly rising earnings trajectories. Workers who complete 20-year careers starting at earlier ages get less in benefits relative to contributions than those starting later. Evaluations across different length careers ending at retirement ages depend on which retirement ages are chosen – a reflection of the considerable importance of the 80-percent cap on benefits of those with the longest careers.

The 80-percent cap strongly discourages continued work once the cap is reached. The interaction of the cap with Retirement Plus strongly encourages retirement at a younger age than without Retirement Plus. More generally, the pension system is backloaded so that those in their fifties are receiving far more in accrued pension value (relative to earnings) than those in their thirties. This structure offers a large incentive to vested terminated workers to return to work toward the end of their careers.

Termination benefits are large relative to superannuation benefits available at the same ages. They decrease in lifetime value when they occur at a later age with more years of service. They strongly discourage looking for alternative work covered by the pension system.

⁶⁹ An examination of the member handbooks of the 107 largest state retirement systems outside of Massachusetts revealed only two other major plans that provide widely applicable involuntary termination benefits – Montana and the District of Columbia Teachers Retirement Plan. The DC Teachers Plan gives workers over age 55 the same benefit as if they were 60 and eligible for the retirement benefit and workers under age 55 receive a .167 percent reduction in their retirement benefit for every month prior to age 55. The Montana Public Employees' Retirement System allows terminated workers to buy up to three additional years of service with the employer paying part of the cost. Some workers in Virginia have a termination benefit that removes the early retirement reduction for involuntarily terminated workers claiming prior to the normal retirement age.

Some of this analysis lends support to some of the recommendations considered by the Commission. However, the Commission has not given consideration to more fundamental changes. To pursue the potential value of more fundamental changes, one would want a sample of individual earnings histories to see the extent that the points made with hypothetical earnings paths apply to actual ones. Having noted some shortcomings inherent in a benefit design based on earnings in a short period toward the end of a career, we note that private plans have not only moved away from defined benefit plans but that companies that have preserved defined benefit plans have been shifting away from final average plans.⁷⁰ And we note that the United Kingdom has moved away from a final average plan for civil servants to a career CPI-indexed plan.⁷¹

⁷⁰ Among defined benefit plans, according to a 2006 Watson Wyatt survey of defined benefit plans with at least 1000 active participants, 56 percent are final average pay, while 27 percent are career average. In the largest plans (25,000 or more participants) there were 47 final average pay plans and 31 career average plans in 2006, while the numbers were 62 and 22 a year earlier. 2006 Survey of Actuarial Assumptions and Funding, available at <http://www.watsonwyatt.com/research/resrender.asp?id=2007-US-0083>.

⁷¹ See http://www.civilservice.gov.uk/Assets/nps_tcm6-1866.pdf.

Figure 1. *Lifetime Pension Benefit Relative to Accumulated Contribution, By Rate of Earnings Growth, 4-Percent Discount Rate*

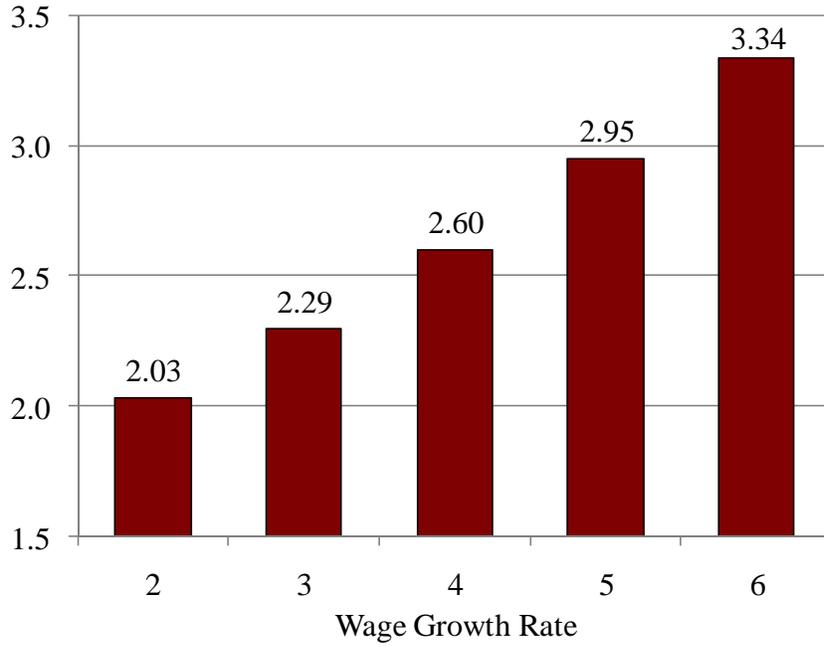


Figure 2. *Lifetime Pension Benefit Relative to Accumulated Contribution for an Employee Departing At Age 65, By Starting Age, 4-Percent Discount Rate*

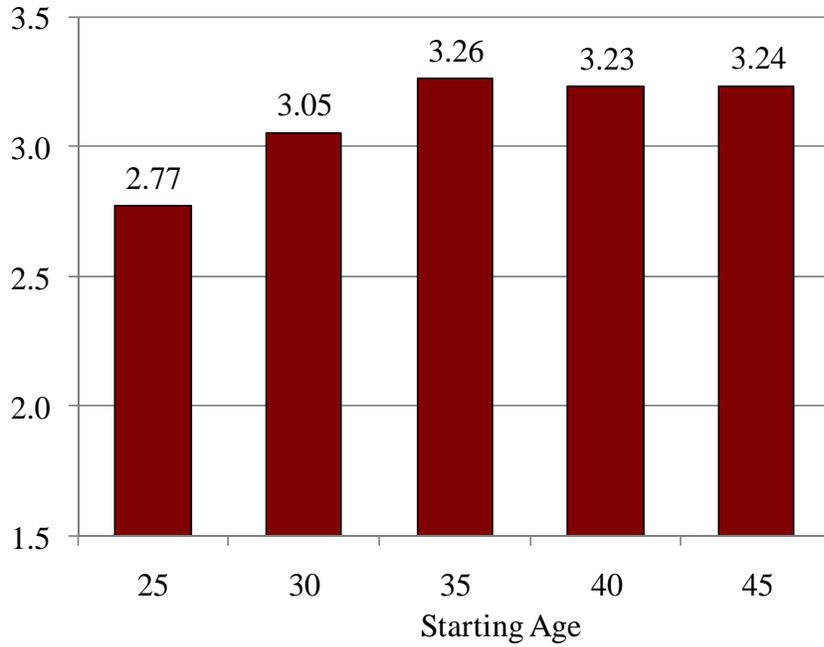


Figure 3. *Lifetime Pension Benefit Relative to Accumulated Contribution for an Employee Departing at the 80-Percent Cap If Before Age 65, 4-Percent Discount Rate*

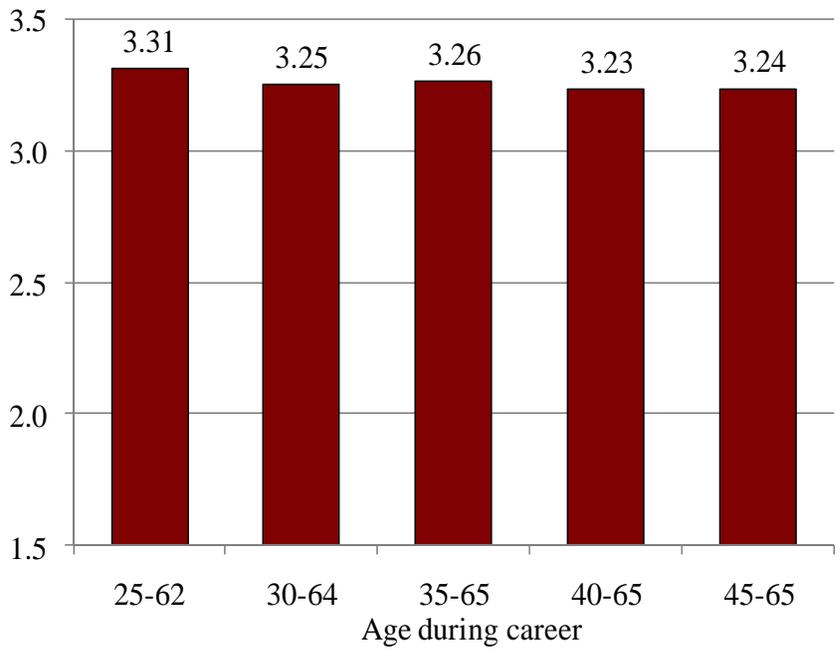


Figure 4. *Lifetime Pension Benefit Relative to Accumulated Contribution for an Employee with 20 Years of Service, By Starting Age, 4-Percent Discount Rate*

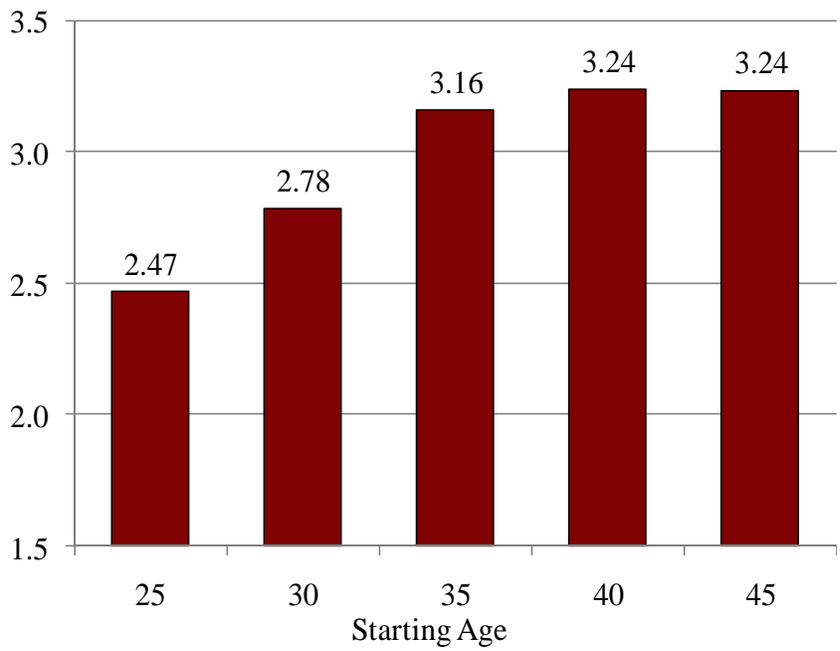


Figure 5. *Ratio of Final Average Earnings to Final Year Earnings Relative to That at 3-Percent Inflation Rate, By Inflation Rate, 4-Percent Discount Rate*

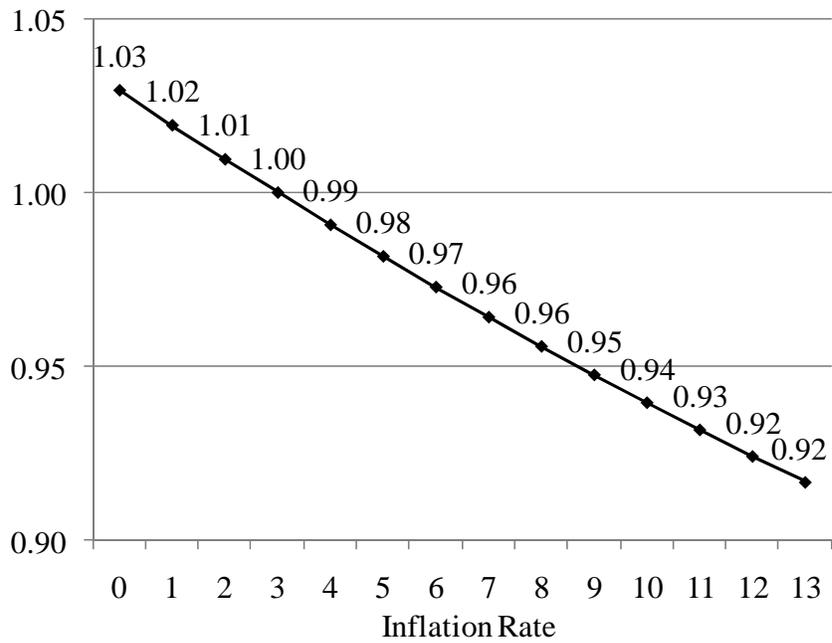


Figure 6. *Lifetime Inflation-Adjusted Pension Benefit Relative to That at 3-Percent Inflation Rate, By Post-Retirement Inflation Rate, 4-Percent Discount Rate*

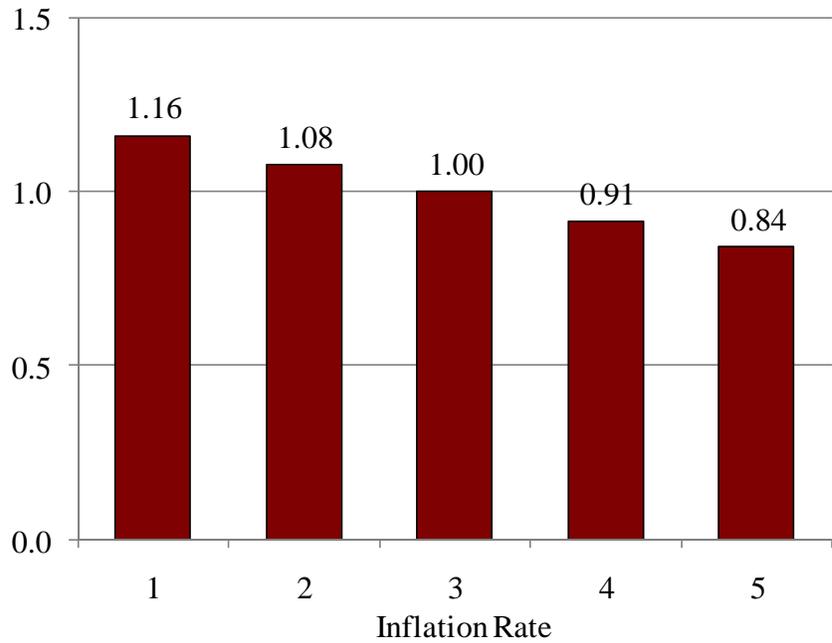


Figure 7. Increase in Lifetime Pension Benefit for Another Year of Work as a Percentage of Net Earnings, 4-Percent Discount Rate

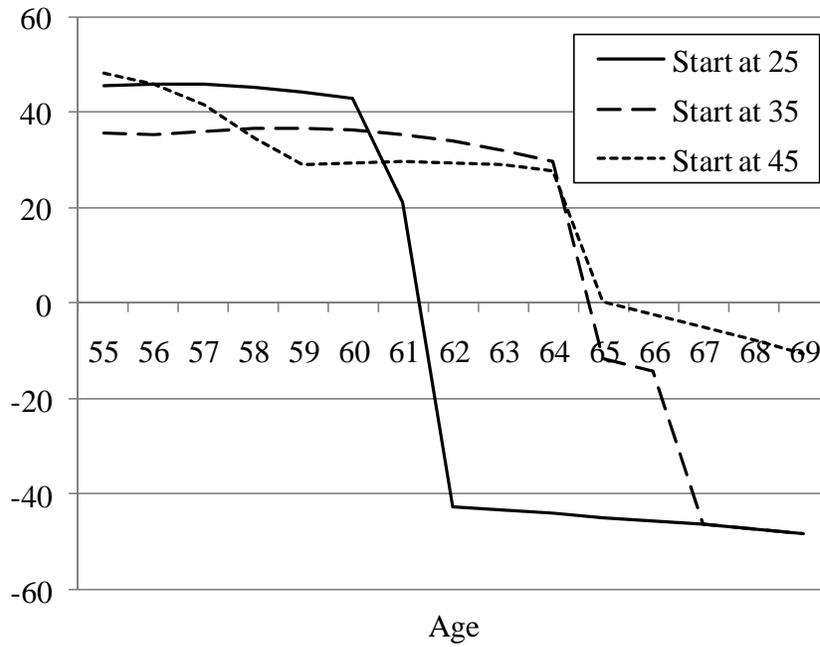
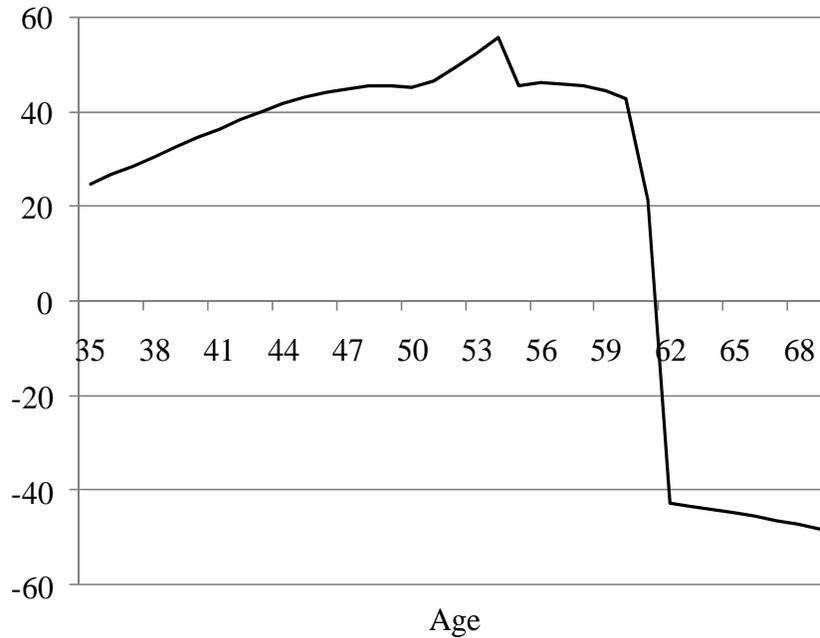


Figure 8. Increase in Lifetime Pension Benefit for Another Year of Work as a Percentage of Net Earnings, for Employee Starting Service at Age 25, 4-Percent Discount Rate



Note: Calculations include vested terminations prior to age 55.

Figure 9A. Pension Incentive to Return for Three Years After a Gap, By Age of Departure and Age of Return, 4-Percent Discount Rate

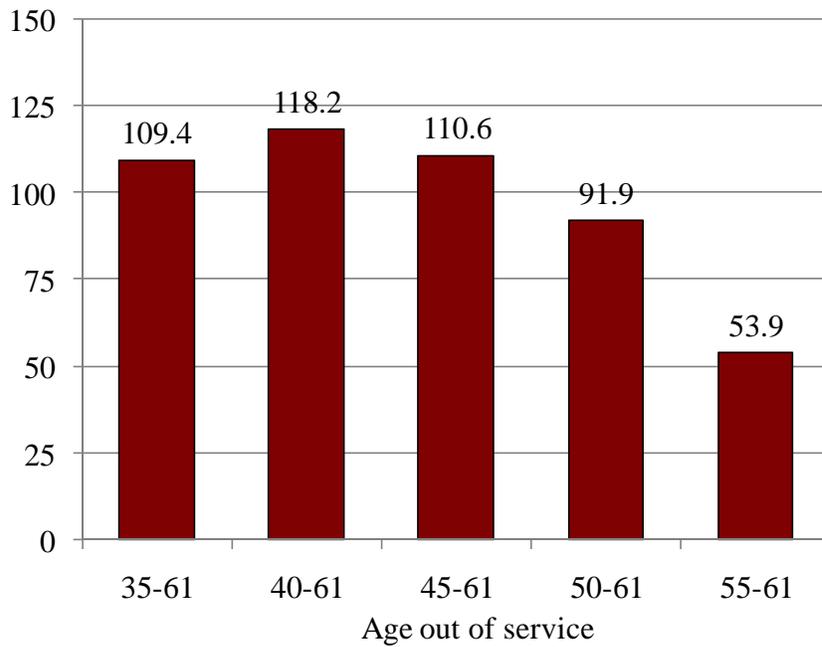


Figure 9B. Pension Incentive to Return for Three Years After a Gap, By Age of Departure and Age of Return, 8-Percent Discount Rate

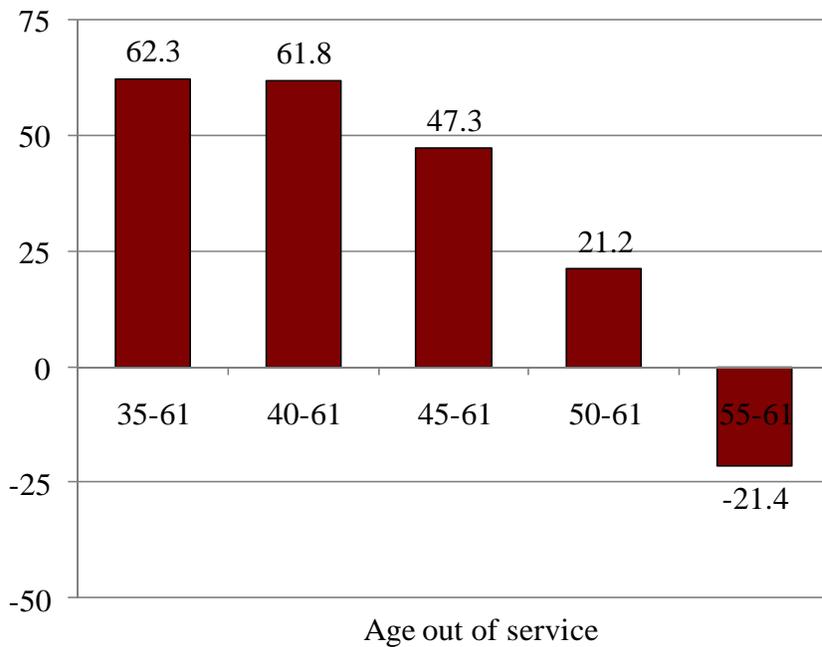


Figure 10. Increase in Lifetime Pension Benefit for Another Year of Work as a Percentage of Net Earnings, with and without Retirement Plus, 4-Percent Discount Rate

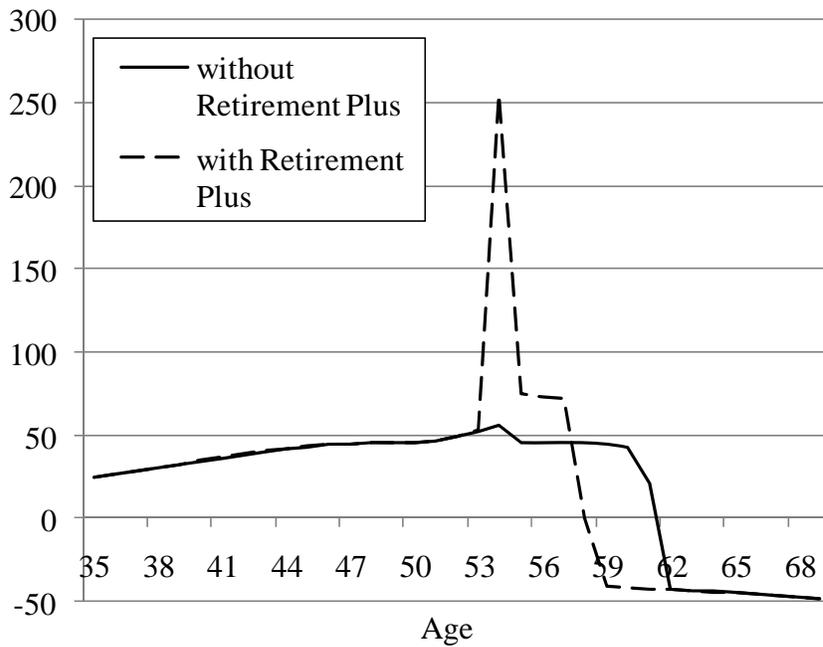


Figure 11. Present Value of Termination and Superannuation Allowances By Age at Separation, in Thousands of Dollars, 4-Percent Discount Rate

