THEORIES OF
DYNAMIC ACTUARIAL OPTIMIZATION

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THEORIES OF
DYNAMIC ACTUARIAL OPTIMIZATION
(PART 1)

POST-RETIREMENT INCOME FINANCING:
A GAME THEORY MODEL

Definition: “Dynamic” refers to the economic gaming, that is, the interplay between government and other regulatory action and the private sector reaction and, subsequently, vice versa. The pension industry does not function in a vacuum. Post-retirement income provision is a factor of demographic and financial market trends, overall industry competitiveness and health (the same for individual companies with an industry), as well as the regulatory environment. The same can be said as we examine the post-WWII baby boomers’ expected strain on Medicare, Social Security, and other entitlements.

SOCIAL SECURITY, MEDICARE,
AND OTHER ENTITLEMENT PROGRAMS

It is widely understood that Social Security, with its current tax and benefit structure, will not survive the baby boomers’ retirement years. Left unaddressed, either benefits will be cut by 30% or taxes will be increased by 50% over the next forty years. Both “solutions” are irresponsible, given that alternatives are available now.

Partial privatization with a floor, guaranteed monthly benefit, is such a responsible solution. This form of partnership already exists between the government and the private sector pursuant to the Deficit Reduction Act of 2005. Signed into law by President Bush, this DRA allows State Medicaid programs to cooperate with individuals who purchase long-term care insurance (LTCI) policies for themselves. Such individuals can increase their “spend-down” limits by the amount of benefits provided by the policies. By encouraging the purchase of LTCI, government and the private sector (individuals and the underwriters of such policies) are re-insuring one another. Government is still the provider of last resort, but the cost of a dignified elder or infirm period is guaranteed through individual initiative.

The whole point of the government’s role in individual income transfer is to ensure dignity in the individual’s elder or infirm years. Dignity carries a price tag. To the extent that government can cooperate with the private sector, life-long dignity can be ensured.

GOVERNMENT ACTION –
PRIVATE SECTOR REACTION

The federal government, particularly through tax policy, is in a position to make or break private sector retirement programs. Take the private employer-sponsored defined benefit market, for example. The tax code has been utterly unstable and
schizophrenic since 1981 in its (first) encouragement of and (followed by) discouragement of funding of private employer defined benefit pension plans. The 1981 tax cuts of the Reagan Administration dramatically increased maximum fundable pensions of IRC Section 415, as well as corresponding maximum contributions for defined contribution plans. A year later, the axe fell with the Tax Equity and Fiscal Responsibility Act of 1982. Here IRC Section 415 maximum benefits and contributions – which had been conceded only the year before – were sharply cut. Cutting benefits cuts maximum tax-deductible contributions under IRC Section 404. Cutting ongoing contributions and deductions discourages certain types of employers, particularly profitable and smaller employers, from having retirement plans at all.

Nonetheless, even more discouragement of tax-deductible contributions and maximum benefit limits were to follow in the Tax Reform Act of 1986 and the Omnibus Budget Reconciliation Act of 1987 (OBRA ‘87). Note that all of this punishment of the formation, continuance, and ongoing funding of retirement plans took place during the Reagan Administration.

The Clinton years nearly sounded the death knell for private employer defined benefit plans, however. The various tax increases during the Clinton years tightened the noose even further on IRC Section 404, which governs maximum tax deductible contributions to defined benefit plans in particular. Clinton tax policy even imposed fines and other tax levies for funding retirement plans at higher levels than the IRC Section 404(a) limits. Here, then, even larger employers were discouraged from funding their defined benefit plans covering their rank-and-file employees. Therefore, even though the Clinton years were touted as gangbuster years for the economy as a whole, much of that success was prevented into flowing into the corporate funding of employees’ retirement plans.

Next came the first George W. Bush Administration, with its Economic Growth and Tax Relief and Recovery Act of 2001 (EGTRRA). And, we should not forget September 11, 2001, which brought about a short-term collapse of the stock market. EGTRRA dramatically increased once again Code Section 415 benefit and contributions limits, on a phased basis, that currently remains in effect. However, EGTRRA is scheduled to sunset in 2011, which means that the old law limits would take effect once again. Also, EGTRRA dramatically redefined maximum tax-deductible contribution limits to defined benefit plans. And this Bush Administration repealed (at least until 2011 without further legislation to make the 2001 tax cuts permanent) the earlier OBRA’87 limits, which had been so destructive of retirement plan funding.

Add to this, changes in pension accounting disclosure standards for publicly held plan sponsors, which are due to be finalized and effective sometime in 2007, and it is no wonder that corporate boards and other decision makers within private employers are rethinking their commitment to these retirement plans.

Many, particularly larger, plan sponsors thought that cost containment of defined benefit plans covering an aging group, could be found with the innovative cash balance
pension plans. However, those plans have been under legal and regulatory challenge almost from the beginning as being age discriminatory. (In my personal opinion as an actuary, most cash balance pension plans DO discriminate against older workers. Some do not discriminate – that is, they contain complicated and ameliorating benefit credit formulas to make their older workers whole. However, if a worker has a choice between job security with a lesser defined benefit pension commitment, and no job at all – which means no future benefit accruals, I think most workers who need to work would choose the former.)

Given the unstable financial markets, long-term schizophrenic federal income tax policy, the uncertain of certain companies and their industries, and legal and regulatory challenges to defined benefit plan innovation, is it any wonder that corporate plan sponsors are bailing out of their defined benefit plans in record numbers? Even financially stable employers are taking preventive measures to bail out of their pension plans, thereby defending their balance sheets. And government suspicion of defined benefit plans as being tax-avoidance mechanisms does not help the equation.

All of this, of course, feeds into the financial crisis facing the Pension Benefit Guaranty Corporation, the federal agency that is the insurer of last resort for certain private-employer defined benefit plans. A taxpayer bailout of the PBGC, as it is currently constituted, may be inevitable. And then there is the question of fairness: Why should employees covered under certain defined benefit plans enjoy a federal guarantee, while defined contribution plan participants and members of other defined benefit plans do not? All are potentially taxpayers who would pay into the PBGC bailout, after all.

And, another solution to the PBGC’s own financial crisis would seem to suggest itself. Why can’t government work with in partnership with private firms to solve the problems of their under funded retirement plans? The mandatory future benefit accrual freeze for dramatically under funded plans is already in the works, and should be enacted. A moratorium on future benefit accruals may not be very palatable to employees, particularly those nearing retirement. However, company default with only limited PBGC guaranty – the current practice – should be perceived as even worse to those employees.

Perhaps even refundable (by the receiving plan sponsor to the federal government) tax credits, or negotiated federal loan guarantees, for funding under funded defined benefit plans could be a solution. That is, the federal government could, through tax credits, advance pension contributions to plan sponsors that either are solvent but desirous of limiting their short-term exposure, or are in bankruptcy but desirous of salvaging their companies and their defined benefit plans. This is another example of federal-private partnership that could work to amortize, for lack of a better term, the payoff of defined benefit pension commitments, as opposed to dumping private employer liabilities on an increasingly beleaguered PBGC.
Therefore, it is clear that government action, private reaction, and vice versa, constitutes a dynamic economic system that needs to be understood as such before responsible long-term financial policy can be made.

ELDER LAW AND ESTATE PLANNING: A GAME THEORY MODEL

I know enough about this subject to be dangerous, so I will keep it brief. It is currently widespread practice that an individual who wants to do estate planning gifts all or some portion of his/her assets to his/her intended heirs and beneficiaries. Under the current law, there is a three-year look back period before going onto Medicaid, during which time State Medicaid authorities can attach the individual’s assets. Therefore, individuals contemplating going into nursing homes, for example, need to anticipate this move at least three years in advance in order to “protect” their assets from being drained by the nursing homes.

The complexities of federal and state Medicaid statutes, as well as elder law and estate planning, are beyond the scope of this paper. However, it should be clear that they can be understood and cast in the context of a game theory model to better understand and more fairly optimize (both politically, as well as economically and politically) distribution of the financial burden of financing elderly and dependent years.
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(PART 2)

APPLICATION OF OPTIMIZATION THEORY
TO POST-RETIREMENT INCOME PLANNING

Optimization Theory is a process from Applied Mathematics. It encapsulates into one word, the quest to maximize or minimize a given function, subject to certain constraints that are known in the real world. The function is called the Objective Function. The constraints may be the budgetary considerations for the plan sponsor, or the desire to spend a certain amount on certain Highly Compensated Employees, as well as the other employees to be covered by the retirement plan. The constraints also could be top-heavy minimum contributions/benefits or other requirements of the Internal Revenue Code or other federal or state statute.

Optimization Theory can be broken down into two broad categories: linear “programming” and “dynamic” programming. With a linear programming mathematical model, the Objective Function and the constraints are linear functions. With a dynamic programming mathematical model, the Objective Function and associated constraints are non-linear (for example, quadratic or exponential).

NOTE: I have chosen to define a dynamic programming model here because much of basic actuarial mathematics is exponential (that is, it considers (1+I)^n in much of its modeling).

The basic constraint is the census of the group for which you are being asked to design a retirement program. The census, as well as budgetary concerns, rather quickly narrow the field of acceptable programs to either a traditional defined benefit plan, a cash balance pension plan, a so-called 412(i) fully insured plan, or a “carve-out” or other hybrid arrangement, or alternatively, a 401(k) – safe harbor or non-safe harbor – plan, a new comparability profit sharing plan, an integrated plan design of some sort, or another defined benefit or defined contribution plan. All of these plans are in the range of the plan designer’s options for developing a plan design that most favors the group of plan participants selected for favor by the plan sponsor, while observing the legal, regulatory, and budgetary constraints stated in this discussion.

Much of optimization is done instinctively. However, if one takes the time to formalize it, the actuarial designer can save much time and transmit much hard-fought-for experience as a plan designer to less experienced personnel. Therefore, formalizing optimization can be seen as a training tool for new actuaries.
A DYNAMIC PROGRAMMING MODEL FOR PENSION PLAN DESIGN

1. Objective: Maximize benefits for a favored group of workers or for as many workers as possible.

2. Constraints:
   a. IRS and other legal and regulatory limitations. Including, but not limited to the requirements of IRC Sections 410(b), 401(l), 401(a)(4), 415, 416, and 401(a)(26) for defined benefit plans, and IRC Sections 401(a)(4), 401(l), 410(b), 415, 416, and 401(k)/(m) for defined contribution plans.
   b. Budgetary constraints: How much on an ongoing annual basis does the employer for the total group, or for given classifications of workers, want to (or how much must the employer) contribute to benefits (retirement and other)?
   c. Labor market: Whether through formal union negotiations or competition for workers, or for the globally competitive employment marketplace.
   d. Emotional or business constraints: The non-numeric, or behavioral, budgetary aspects mentioned above as they apply to future years – which are unknown. For example, what will the future hold for the business, or the industry, or for the stability of the employee population?
   e. Financial disclosure constraints of the Financial Accounting Standards Board pronouncements on pension and other post-retirement cost accounting on publicly traded employers’ financial statements.

Nonetheless, although this is a dynamic and seemingly highly constrained model, employers who are even relatively profitable are under great expectations for themselves and from their employees and management to provide retirement savings vehicles for the management and workers. The role of “salesmanship,” if you will, is to identify those employers who are potential retirement plan sponsors and to quantify the items in 1, 2b, 2c, 2d, and 2e above. Also, one of the great incentives for an employer to provide a retirement program for workers and management is the significant tax incentives built into the Internal Revenue Code to encourage pre-tax savings for retirement.

The role of the actuarial optimizer is to take 1, 2b, 2c, 2d, and 2e - as well as the age, service, and compensation composition of the employee group (called a “census”) - and to develop a plan or system of plans that satisfies the requirements of 2a and all other constraints to the satisfaction of the prospective plan sponsor, there helping to seal a plan “sale.” In future years, the actuarial optimizer helps to keep a retirement plan sponsor committed – after the initial sale – to having a retirement program for its workers.
A DYNAMIC MODEL OF
INDIVIDUAL RETIREMENT SECURITY

It is a fact of the post-9/11 world that many employers are seeking to shed their pension plans, thereby limiting their commitment for post-retirement income security for their employees. Even Social Security is seeking to re-define its role to workers for future generations of workers.

Therefore, it is imperative that individuals and families do their utmost to accumulate retirement savings throughout their working lifetimes – 401(k)’s and IRA’s for most working-class individuals. Likewise, it is imperative that workers utilize the rollover IRA when they who change jobs or when their employers’ retirement plans go out of existence.

It is a fact of life that most employees do not have the opportunity to pick-and-choose the exact provisions of the retirement program that their union or their employer presents to them. Therefore, the retirement plan under which they are covered can be viewed as an externally imposed constraint when an individual seeks to maximize his/her retirement savings. This is why – although it may sound like “let them eat cake” – Social Security and IRA’s are so important.

Finally, the retirement system for most workers may be evolving in a revolutionary way into 401(k)’s (or IRA’s), Social Security, and long-term care insurance for old age, with Medicaid and other welfare entitlement programs as the safety net of last resort. It may stay this way, at least until the Baby Boomer generation has retired and passed away - and perhaps beyond that.

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Since that time she has worked in the group department of a life insurance company and, beginning in 1977, she has been a consulting pension actuary. She took a hiatus, during which time she did freelance writing for two newspapers on the subjects of Social Security, Medicare, Medicaid, and long-term care insurance. She returned to full-time pension consulting – at Firmani – in November, 1999.

She is a Member of the American Society of Pension Professionals and Actuaries, and an Enrolled Actuary.