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PAYOUTS FROM DEFINED CONTRIBUTION PLANS: A COLLECTIVE RISK-SHARING FRAMEWORK

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One of the major weaknesses of the current 401(k) defined contribution model is that payouts at retirement are almost always in the form of lump sum distributions. This leaves retirees struggling to manage these assets in a way that efficiently meets their lifetime retirement income needs. This essay outlines an alternative approach, based on a collective risk-sharing model. I argue that this framework is far better when evaluated against the Retirement for the AGES principles developed by the Society of Actuaries and the American Academy of Actuaries.

Alignment: The large majority of retirees do not have the skills or knowledge required to manage a lump sum distribution in a way that provides an income stream for life. Retail annuity products are available, but rarely purchased, and they often seem to be "overpriced" from the typical retiree's point of view. The framework described in this essay could be used as an option for existing 401k plans, or could be an integral part of a collective savings model encompassing both the accumulation and payout phases. The payouts are in the form of a lifetime income, so retirees can be secure that their income needs will be met in the most efficient way possible, with no actions needed on their part.

Governance: After a lump sum distribution is made, the retiree is on her own—support from plan governance structures disappear. The framework discussed here is a not-for-profit entity managed by a Board of Directors for the exclusive benefit of participating retirees.

Efficiency: Managing a lump sum distribution exposes retirees to an almost infinite variety of choices regarding investment vehicles, and spending patterns. In most cases the result is a combination of high cost mutual funds with application of a conservative spending rule (e.g. the "4% rule")—a very inefficient way to provide lifetime income. In the framework described here, mortality risk is pooled and the investments would be professionally managed at low cost, using passive investment vehicles for the most part. Because of the collective risk-sharing feature, the fund could also prudently take on some equity exposure in order to increase the expected future returns of the fund. With a disciplined structure for sharing risk (i.e., smoothing returns), the higher expected returns provide opportunities for a more efficient pricing of the annuity used to provide the base income stream.

Sustainability: An individual retiree cannot absolutely guarantee a sustainable lifetime income stream from a self-managed lump sum distribution. The only reliable source of a sustainable income is from an annuity, where mortality risks are pooled. At this point, the burden of sustainability shifts to the annuity provider. A collective model using inter-generational risk sharing, such as proposed here, must be structured to provide sustainability – and this structure must be rigorously tested and monitored to ensure that sustainability. As described later in this essay, the key feature used in the framework is a carefully designed benefit adjustment structure that allows both increases and decreases to the base income amount, depending on the actual investment (and mortality) experience of the fund. The most important purpose of this essay is to describe the testing I have done on sustainability and the efficiency of benefit results.

Finally, I believe that one of the most important issues in any retirement system is the linkage—and the trade-offs—between efficiency and sustainability. Efficiency includes the affordability of meeting post-retirement income needs, and in any funded

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retirement system the single most important contributor to affordability will be the level of investment returns. In our economic world higher investment returns are available only by taking on an increased level of risk, as measured by the uncertainty of future returns and in particular by the downside risk that actual future returns from a risky asset may well be less than those from a less risky asset, even if the expected level of return might be higher. This means that taking on investment risk may improve the affordability of a retirement system under most conditions, but may also threaten the sustainability of the system if too much risk is taken on.

Investment risk is, arguably, the most difficult issue to deal with in the design of a retirement system, but because of its over-riding importance it must be dealt with in some way. Unlike many other risks, investment risk cannot be pooled—the investment results for all individuals, or funds, are delivered by the same global capital market system as it unfolds one day at a time. One must choose to either avoid risk (by investing only in safe assets, or by transferring the risk to another for some premium), or to accept risk and find ways to manage it. As all actuaries know, avoiding risk means forgoing the opportunity for higher returns, which will sharply decrease the affordability of adequate retirement benefits. The key parameter for setting the level of investment risk is the investment policy of the fund, primarily the allocation between risky assets (such as equities) and safer assets (such as bonds). But managing risk for sustainability also means making decisions about how risk is shared among the stakeholders in the system. Most hybrid designs are built with risk-sharing as a central feature, typically between the employer/sponsor and the current participants of the plan. However, the recent evolution of the U.S. retirement system indicates that most employers are reluctant to take a role in sharing risk. The 401(k) model leaves all the risk with the individual participant.

If employers will not share in the risk, then the only option left is for participants to share risk amongst themselves, but this can only be done across generations, or age cohorts. The framework I describe here is one which uses inter-generational risk sharing as a way to accept, and manage, risk in a way that improves the affordability and efficiency of the system, while still maintaining sustainability through time. In such a collective risk-sharing framework, some cohorts will end up with better results than those from a regular DC plan (with a comparable investment strategy and cost structure), and some cohorts will end up with worse results than a regular DC. But no cohort knows in advance what their outcome will be. Cohort solidarity depends on worker preference for more certain outcomes, and the belief that they will be treated fairly—that giving away upside potential will be a fair price to pay for gaining insurance against downside risk exposure.

KEY FEATURES

Here I describe the key features of a proto-type framework which I have tested. Obviously, this is just one illustration of a fund that fits into the collective risk-sharing family. Alternative choices for the plan design parameters are plausible (subject to testing for sustainability).

1. There is a single investment pool, invested 35% in equities (U.S. and non-U.S.) and 65% in a core-type fixed income fund. For the most part, I would assume index funds are used to minimize expense charges. (I assume an expense charge of 0.25% each year, including administrative and investment expenses.)

2. At retirement the incoming lump sum is used to purchase a base annuity income. Pricing would be based on a conservative estimate of the long-term

expected return on the portfolio. The pricing structure would remain fixed from year-to-year, but the Board would have authority to change it if there are significant changes in future return expectations, using a phase-in over a period of years. (I use a 5% interest rate for the annuity prices. In my stochastic model, this is approximately the 23rd percentile net return expected over a 30 year period).

3. The base annuity benefit would be increased by a fixed 2% COLA factor each year after retirement, subject to the adjustment features described below.

4. The fund would most often be in a surplus position relative to the liability for the base benefit, using a 5% discount rate. (In my stochastic testing, the funded ratio was between 100% and 150% with about a 70% probability, below 100% with about a 25% probability, and above 150% with about a 5% probability.) If the funded ratio exceeds 110%, then "bonus payments" would become payable for the following year, based on a published schedule. The schedule I used is as follows:

Funded	Bonus (% of Regular ratio benefit)
110%	5.0%
120%	15.0%
130%	25.0%
140%	50.0%

5. These bonus payments are for a single year only—they do not become part of the base benefit future income. However, the Board always has full discretion to make special ad hoc decisions. If the funded position of the plan is very strong, the Board could decide to issue some of the bonus in the form of an increase in the base benefit, increasing the liabilities of the plan. (In my stochastic testing, bonus payments are made in about 55% of the years, and when paid the average bonus was just over 20% of the regular benefit.)

6. If the funded ratio falls below 90% for 2 out of the preceding 3 years, then the 2% COLA is suspended. Once the funded ratio has exceeded 100% for 2 out of the preceding 3 years, the COLA is reinstated. (In my stochastic testing, COLA's were suspended in about 16% of the years.)

7. The Board would always reserve the right to reduce annuity benefits in emergency situations, to maintain sustainability. (In my testing, this type of adjustment might be needed in less than 5% of the cases.)

MODEL FOR TESTING

I used a stochastic model to test this benefit payout structure, and compare it with payouts under a group annuity structure. The economic scenario generator is the same I have used for many years performing AL studies for large public and private pension funds. I set the parameters for expected values to reflect estimates for an economy in an equilibrium condition:

- Price inflation: the distribution of inflation results over long periods has a median value of about 2.45%, and a mean value of about 2.55%.

- Bond yields: the distribution for 10-year Treasury yields has a median value of 4.25%. Credit spreads and yield curve shapes are stochastically modeled.

- Bond returns: the return distribution for a core fixed income portfolio (e.g., Barclay's Aggregate) has a median value of about 4.5%.

- Equity returns: assuming a portfolio of

75% US equities and 25% non-U.S. equities, the return distribution for equity returns over long periods is about 8.0% (i.e., a 3.5% equity risk premium is being used). Fat-tailed distributions are used for the equity model.

The model simulates individuals saving 12% of pay from age 30 to age 67, and investing these contributions in a fund that is 65% equity and 35% fixed income. These accumulated balances at age 67 (expressed as a multiple of final pay) are then used as inputs to the payout model. For the collective risk-sharing framework, I use a multi-cohort approach that develops, and tracks, the results of the fund over 60 years as new cohorts retire each year and commence benefit payments. For the group annuity framework I assume that life annuities with a fixed 2% COLA are purchased at retirement based on the 10-year Treasury yield at that time, plus 50 basis points. For both frameworks I use mortality from a generational unisex RP-2000 table projected to 2048 using Scale BB. The results presented here are based on overlapping cohorts of equal size. Although not shown in this paper, I have also done some analysis that reflects the impact of changes in the size of the cohorts.

BENEFIT RESULTS

The key metric used for benefit analysis is a replacement ratio: annuity benefits divided by pay at retirement. For the collective risk-sharing model, annuity benefits reflect post-retirement bonus payouts and COLA suspensions, based on the performance of the fund. I selected my accumulation period assumptions (12% of pay from age 30 to age 67) with the intent that balances at retirement would have a strong probability of creating replacement ratios of at least 40%. This 40% target, when combined with Social Security benefits (projected age 67 benefits at 2048), provides a total income replacement target of about 75%.

On average, the collective risk-sharing framework resulted in benefits about 15% higher than from a group annuity, with a median replacement ratio of 56% (versus 48% for group annuity) and a mean replacement ratio of 66% (versus 58% for group annuity). The upside opportunity was also improved, with a 95th percentile value of 147% (versus 125% for group annuity). (Note that my group annuity pricing estimate does not include any margins for profits, expenses or contingency reserves – so real-world benefit amounts under the group annuity option would likely be lower than my calculations.)

Of more significance, however, is that downside risk is also more controlled. The probability of failing to reach the 40% target replacement ratio is only 30% (versus 35% for group annuity). The probability of failing to reach a 30% replacement ratio (a significant shortfall to the target) is 17% (versus 19% for group annuity). In the bottom quintile of the result distribution, the average replacement ratio was 31% (versus only 23% for group annuity).

These results are summarized in the following table:

	Collective Plan	Group Annuity
Median replacement ratio	56%	48%
Mean replacement ratio	66%	58%
95th percentile replacement ratio	147%	125%
Shortfall probabilities:		
Replacement ratio below 40%	30%	35%
Replacement ratio below 30%	17%	19%
Average replacement ratio in bottom quintile	31%	23%

SUSTAINABILITY

For a collective risk-sharing framework,

nothing is more critical than sustainability. In my testing I tracked the funded ratio of the fund (assets divided by liability, using a 5% discount rate) over the 60 year multi-cohort test period for each scenario from the simulation engine. Although a funded ratio below 100% occurs with a probability of about 25%, in most cases the fund recovers to a fully funded position relatively quickly (due to fund performance, plus the effect of COLA suspensions). In about 75% of the cases full funding is restored within 5 years, and in about 90% of the cases full funding is restored within 10 years.

When underfunding persists for a long period, the board would presumably exercise its right to reduce benefits in order to maintain sustainability. I have not yet tried to incorporate such adjustments into my testing process, so this is an area for further work. Also, if an ad hoc benefit reduction is made and the fund then returns to a surplus position, it seems likely that the board would then use any available "bonus credits" to first restore any previous cuts. This complicates the modeling process to some degree.

AREAS FOR FURTHER RESEARCH

Some of the further work on this framework is fairly routine: test some alternative parameters for benefit adjustments, annuity pricing and investment strategies, and develop some sensitivity factors; test alternative parameters for the underlying economic simulation engine, to ensure that the test results are robust; explore demographic assumptions that deviate from a stable population model.

There are also some new areas to explore. One that seems very interesting to me is whether this basic framework can also be applied to support a modified payout structure—in particular, one that uses late-age deferred annuities (deferred to age 85) coupled with a structured payout discipline prior to commencement of the deferred annuity. Presumably both of these components would have participating features that adjust benefit payouts depending on fund performance.

Finally, practical issues relating to implementation, governance and administration need to be more fully addressed. The Senate HELP Committee, under Senator Harkin's leadership, is currently exploring the possible use of collective savings arrangements, so the timing is opportune to develop the ideas more completely. ■