Guaranteeing More: Investment-Driven Liabilities in Practice

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Introduction

Financial guarantees in pension plans are currently a hot topic. Defined-benefit (DB) pension plans have proven very expensive to sponsors and are beging discontinued around the world typically by conversion into defined-contribution (DC) plans or by closure to entrants. DB plans are financially expensive, say average or final salary plans, since benefit cashflows are hard to predict both with respect to the career and the general increase in wages. Designing investment strategies to support DB plans therefore is extremely difficult.

Moving to DC plans does not necessarily solve the problems of DB, though, at least not moving to traditional DC products like, say, whole-life annuities. Such products also contain various embedded guarantees like interest guarantees on future contributions, conversion and/or surrender options that make benefit cash flows almost as hard to predict as in DB plans.

These challenges have sparked a movement within the pension industry that argues that guarantees are expensive, they are inhibiting investment opportunities and therefore should be abandoned whatsoever *in the best interest of clients*.

We believe this is wrong: The diagnosis is flawed and therefore the wrong cure is prescribed.

It is true that traditional guarantees are expensive but this is not an inherrent characteristic. The problem with ”traditional” guarantees is that they are not easily transferred to financial markets. Think about a final-salary DB plan: Here neither career nor wage inflation are tradable in financial markets leaving the plan sponsor with substantial risk.

The dividing line for guarantees in pension plans therefore is accessibility to financial markets. We call this *investment-driven liabilities* to underline the importance of designing guarantees from market opportunities. Guarantees that are designed with respect to investment opportunities are not expensive to neither the plan sponsor nor the company since the guarantee is easily transferrable to financial markets. Neither are they an unreasonable cost to those clients who seek the security of a guarantee because financial instruments are efficiently priced.

ATP’s new pension model

It is in this light ATP has fundamentally changed the guarantee. The thinking is that if the present market rate is 5 per cent, then ATP can guarantee 5 per cent in interest to new contributions; if the market rate is 6 per cent next year, ATP will guarantee 6 per cent interest to next years’ contributions (this also implies that liabilities are appreciated at market rates, ie. by fair-value accounting.)

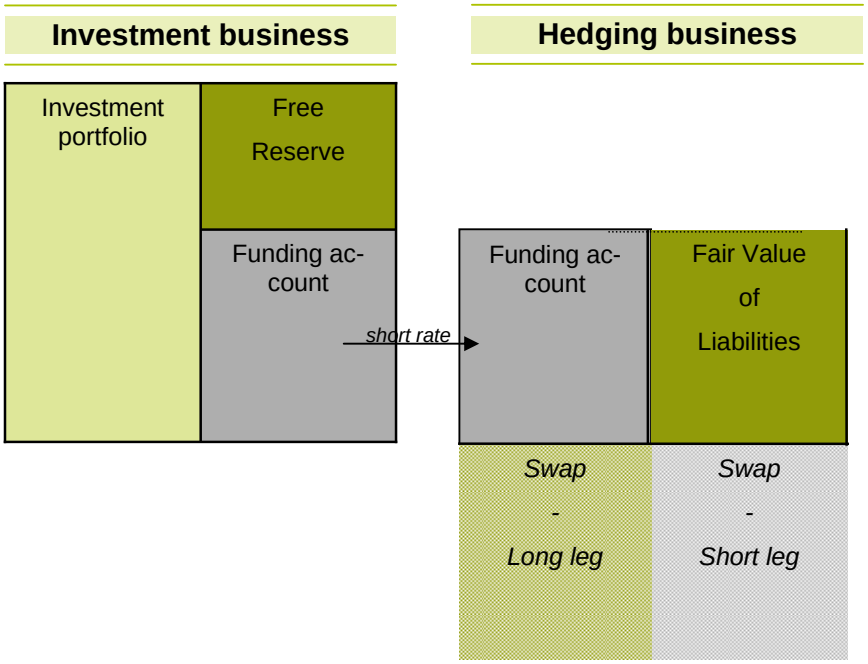
Furthermore, ATP wishes to retain the possibility of subsequently indexing pensions in the new pension model. This aim is achieved by splitting new contributions into a “guarantee contribution” and a “bonus contribution”. The split is 80/20 with 80 per cent to be guaranteed and the remaining 20 per cent to pay for the right to receive bonus (ie. right to indexation).

The guarantee contribution will be used for the “purchase” of a pension right with a guaranteed rate of interest corresponding to the current market rate. The bonus contribution will be added to the free reserves thereby serving as an investment buffer for ATP’s investment policy. The bonus contribution thus becomes a direct payment for the bonus option that existing rights have already earned.

Capital structure and business model

The core of ATP's business model is the splitting of its investment activities into 'investment' and 'hedging'. The key to understanding this split is the so-called *funding account*, which consists of two opposing interest-bearing accounts, one in the investment portfolio and one in the hedging portfolio, with zero net value. Interest is the short money-market rate.

Figure 1: Splitting the balance into sub-balances of investment business and hedging business. If the two sub-balances are collapsed the funding accounts net out and the original balance emerges.



The principle is illustrated in Figure 1, where it is shown how the funding account is used to create separate balance sheets for the investment business and hedging business, respectively. In the hedging business a swap portfolio is constructed in such a way that the interest-rate sensitivity of the swaps exactly match the interest-rate sensitivity of the guaranteed benefits.

The value of the long leg of the swap contracts is then equal to the fair-value reserve. Since the net value of swaps is zero at issue, the value of the short leg also equals the reserve and, consequently, the funding account must equal the reserve to balance matters. The interpretation of the funding account is, therefore, that it expresses the historic sum of the guaranteed benefits, as they are hedged.

New contributions

For each DKK 100 in new contributions, DKK 80 is used for the "purchase" of guaranteed pension. In the hedging business, the guaranteed benefits accordingly grow by DKK 80, because the guarantee contribution is equal to the market value of the guaranteed pension. The anticipated cash flow is now hedged with a swap, where the present value will be the same DKK 80 because liabilities are discounted by the market (swap) rate. The fixed leg therefore now matches the new obligation, so the floating leg has to be matched by the funding account. The funding account therefore also increases by DKK 80. Accordingly, the hedging portfolio balance sheet show a net increase of DKK 160, but essentially remains a "zero sum game".

In the investment business, the assets side (investment portfolio) increases by DKK 100, which exactly corresponds to the increase in the funding account of DKK 80 plus an increase of DKK 20 in the free reserve from the bonus contribution.

The point is that because it is precisely the *market* rate that is guaranteed, it is possible to exactly hedge the new obligation (guarantee contribution = market value of guaranteed pension). The high interest-rate guarantee is therefore – from a financial point of view – risk free.

Better pensions

In the following we use the former ATP model as a reference, and by "higher expected pension" we mean a higher pension when the same investment principles are applied in both models. Accordingly, in the calculations below it is only the *accrual principle* that is changed, while the investment and bonus (indexation) policies remain unchanged.

Our first point is, that the generally higher guaranteed rate does not impede investments. This is directly observable from Figure 1 where it can be seen that bonus is to be distributed out of the excess return generated by the *investment* business (over the funding cost) which is completely indifferent to the (fixed) interest guarantee.

The slope of the yield curve

There is, however, a particular component of the overall investment return that is of special interest. This is the so-called *term premium*, which is the surplus return typically generated by long bonds compared to short bonds. It originates from investors demanding a risk premium for choosing long bonds to short bonds.

However, it is not in the investment business that this is of interest, but in the hedging business.

As can be seen from Figure 1, the new pension model means that ATP will be systematically issuing pension rights at long rates (the guaranteed benefits), while the net obligation will be at short-term rates (via the funding account).

ATP is thus continuously exposed to the slope of the yield curve, which is essentially positive, and thereby to the term premium. In addition to the extra return (risk premium) that the investment business produces, ATP's business model thus entails that the hedging business will realise an additional risk premium, which will contribute to higher pensions.

Moreover, as the hedging business is a zero sum game, the improvement is achieved *structurally*, i.e., without increasing the investment risk in the ATP scheme. The new pension model is thus an example of *investment-driven liabilities*, where the overall pension result is improved exclusively by adapting the pension *product* to investment realities.

Three scenarios

To illustrate these effects we have devised three scenarios, cf. Table 1. Each (static) scenario defines an equity return and a short- and long-term interest rate, which are used for hedging and calculation of the return on bonds. In each scenario, the ATP pension plan is projected 150 years into the future (2005 to 2155) for both the former and the new pension model, with the assumption that the ATP contribution is ongoingly increased with inflation.

We follow a person born in 2005 who is assumed to pay the full ATP contribution from the age of 20 until pension age at 67. In this way, the transition effects of the change to the new model are largely eliminated.

Table 1 *Three static financial scenarios*

Scenario	Equity return	Short-term interest rate	Long-term interest rate	Price inflation
#1	5%	5%	5%	2.5%
#2	5%	3%	5%	2.5%
#3	8%	3%	5%	2.5%

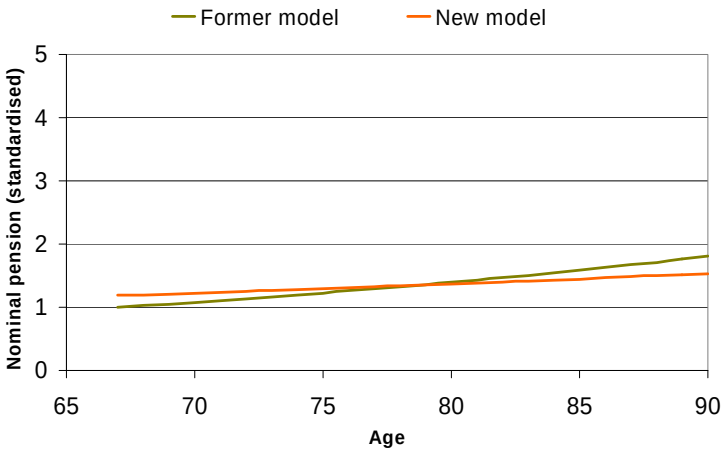
Scenario #1

The pension profile according to the first scenario for a person born in 2005 and retiring in 2072 is shown in Figure 2. We have used the starting pension payment of the former model to establish the scale for the graph. The new model can be seen to pay out approximately 15 per cent more as starting pension than the former model, which subsequently catches up after about 12 years.

In scenario #1, the effects of investments and hedging are kept out of the picture, as all returns are set at 5 per cent. The result in Figure 2 is therefore that the higher guarantee results in a higher starting pension in the new model, but that the former model catches up over a period of approximately 12 years thanks to higher subsequent indexation (bonus). From then on, the former model gives a higher pension than the proposed model.

The steeper payment curve of the former pension model should be seen in the light of the fact that the expected pension in Figure 2 is dependent on *survival*. Thus, there are many more recipients of the starting pension, which is higher under the new model, and relatively fewer who survive to the age of 87, when the former model overall pays out more than the new model.

Figure 2: Expected pension payments in scenario #1 for a person born in 2005 under the former pension model and under the new model



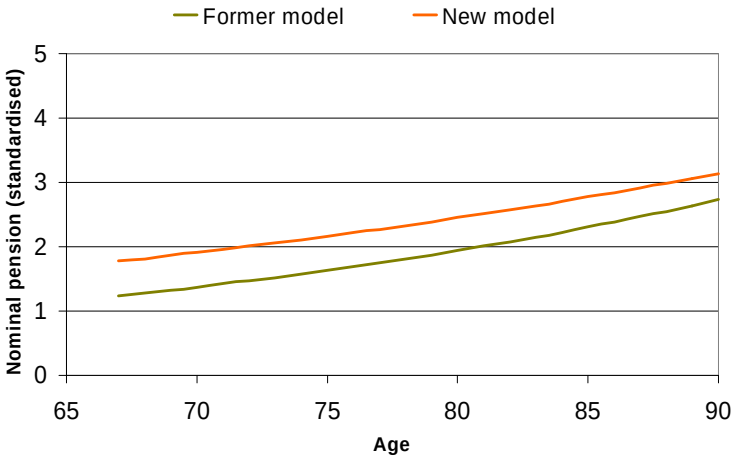
Note: The pension profiles are normalised to the first pension payment under the former pension model.

Scenario #2

In the second scenario we have introduced a 2 per cent yield-curve slope. In this way it is possible to study the net effect of guaranteeing the market interest rate and then hedging it. The result is shown in Figure 3. Here it can be seen that the starting pension is improved in both models in relation to the first scenario (Figure 3), but also that the new model gives a generally higher pension expectation than the former model.

The new model thus achieves far better realisation of the risk premium offered by the yield curve than does the former model.

Figure 3: Expected pension payments in scenario #2 for a person born in 2005 under the former pension model and under the new model

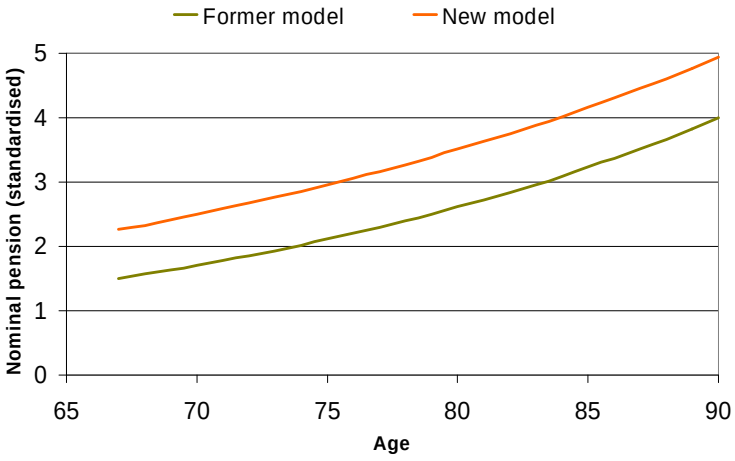


Note: The pension profiles are normalised to the first pension payment under the former pension model in scenario #1.

Scenario #3

In scenario #3 we introduce an equity risk premium of 3 per cent in addition to the term premium of 2 per cent. The expected pension profiles are shown in Figure 4. On comparison with Figure 4 it can be seen that the starting pension in both pension models is further improved, as the "investment engine" is now properly engaged. Investment freedom is thus *not* reduced by the higher guarantee in the new model.

Figure 4: Expected pension payments in scenario #3 for a person born in 2005 under the former pension model and under the new model



Note: The pension profiles are normalised to the first pension payment under the former pension model in scenario #1.

Conclusion

We believe pension plans can be improved simply by designing guarantees to market opportunity. We call this principle investment-driven liabilities.

Using this principle, ATP has adapted its guarantee to investment reality, so that (financial) risk can be efficiently transferred to capital market. This generally eases the burden on risk capital which has allowed a higher guarantee. The conclusion therefore is that higher pensions can be expected by guaranteering more – not less!