

# Definition of value creation ratios

ATP's three ratios:

1. Value creation from guarantees
2. Value creation from bonus potential
3. Total value creation

Re 1. Value creation from guarantees describes the average annual return from the guarantees. This ratio illustrates the connection between the contributions paid and the guaranteed benefits (cash flows). Value creation from guarantees in an individual year is calculated as the return on a 'pension account', PK, corresponding to the value of all interest-bearing contributions to a guaranteed pension.

It has not been possible to recreate the guaranteed cash flows from ATP's start in 1964. The value of the pension account when this calculation started in the beginning of 2008 has therefore been determined at DKK 281bn, corresponding to the value of the guaranteed benefits at the end of 2007. The amount of DKK 281bn is considered an individual contribution to the pension account.

Based on the guaranteed cash flow at the end of 2007, the return on this contribution can be determined as the interest,  $r$ , which satisfies the following equation:

$$\text{Contribution}_{\text{year-end } 2007} = \sum \text{CF}(t) (1+r)^{-(t-2008)}$$

where  $\text{CF}(t)$  is the payout from the guaranteed cash flow until the time,  $t$ . It is assumed that all payouts are made mid-year.

Looking forward, contributions will be made to the pension account in the form of, for example, ordinary contributions from members, update of life expectancy, bonus allowance etc. At the end of a year, the payments,  $B(t)$ , added to the guaranteed benefits over the year can be calculated. At the same time, the acquired guaranteed cash flow can be calculated by deducting the cash flow at the beginning of the year from the cash flow at the end of the year:

$$\Delta \text{CF} = \text{guaranteed cash flow, end of year} - \text{guaranteed cash flow, beginning of year}$$

The interest on year  $i$ 's contributions is the interest,  $r$ , that satisfies the equation:

$$\sum B(t)(1+r)^{(i+1-t)} = \sum \Delta \text{CF}(t)(1+r)^{-(t-(i+1))}$$

For each year, the interest payable on contributions for the future will be calculated to ensure that contributions made in the year correspond to the future guaranteed payouts relating to these contributions. Accordingly, the pension account can be seen as a number of subaccounts that each bears the interest that was determined in the year in which the relevant subaccount was set up. The total value of the pension account at the beginning and end of the year can be determined by adding up all subaccounts at the beginning and end of the year. When adjusting for any payouts,  $U(t)$ , and contributions,  $B(t)$ , over the year, the interest on the pension account can be calculated as the interest,  $r$ , that satisfies the equation:

$$\text{PK}_{\text{year-end}} = \sum B(t)(1+r)^{(i+1-t)} - \sum U(t)(1+r)^{(i+1-t)} + (1+r)\text{PK}_{\text{beginning of year}}$$

Re 2. The value creation from the bonus potential, BP, is calculated on the basis of the bonus potential at the beginning and end of the year, adjusted for the contributions,  $B(t)$  (bonus contributions), and payouts,  $U(t)$  (updating of life expectancy, bonus etc.), made over the year. The interest on the bonus potential is the interest,  $r$ , that satisfies the equation:

$$\text{BP}_{\text{year-end}} = \sum B(t)(1+r)^{(i+1-t)} - \sum U(t)(1+r)^{(i+1-t)} + (1+r)\text{BP}_{\text{beginning of year}}$$

Re 3. The total value creation is calculated on the basis of the sum of the pension account and the bonus potential,  $\text{PK} + \text{BP}$ , at the beginning and end of the year, adjusted for payouts and contributions to the pension account and the bonus potential.

$$(\text{PK} + \text{BP})_{\text{year-end}} = \sum B(t)(1+r)^{(i+1-t)} - \sum U(t)(1+r)^{(i+1-t)} + (1+r)(\text{PK} + \text{BP})_{\text{beginning of year}}$$

As a bonus allowance constitutes a payout from the bonus potential and a contribution to the pension account, the bonus allowance nets out and does not affect the total interest. Updating life expectancy will have the same effect. Consequently, the only contributions and payouts added to the sum of the pension account and the bonus potential are the actual contributions from and payouts to the members.