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Implications of different fee structures for individuals and providers

This chapter analyses the implications of different fee structures on asset-backed pension arrangements for individuals and providers. It models different fee structures at the individual and aggregate levels, and assesses how they affect the assets accumulated by individuals and the revenues collected by providers. A sensitivity analysis shows the impact of various parameters. The chapter also looks at the impact for providers of a transition from a contribution-based fee to an asset-based fee.

A first step to have better comparable indicators on fees across countries is to understand the different implications of different fee structures. Indeed, comparing fees charged to members of asset-backed pension plans across countries is complex. Several factors explain this. Indeed, providers of asset-backed pension arrangements can use different fee structures; fees collected vary according to the size and maturity of the arrangement, as well as the types of services provided by the arrangement; and indirect costs may not be reflected in the fees charged. Better understanding the different implications of various fee structures could be, therefore, a first step in improving indicators for cross-country comparisons.

This chapter analyses the implications of different fee structures on asset-backed pension arrangements for individuals and providers. It models different fee structures and calculates different indicators showing the effects on individuals, through the assets accumulated and the net return achieved, and providers, through fees collected, to assess their implications.

The analysis shows that different fee structures may affect individuals and providers differently. Fees reduce the level of assets accumulated at retirement. For example, a 1% asset-based fee reduces total assets accumulated at retirement by 20.5% relative to a situation without fees, after 40 years of contributions and under certain assumptions described later. There are other fee structures that may have the same impact on individuals as the 1% asset-based fee but may not be neutral for providers. For example, providers may have an incentive to levy fees on assets or on returns rather than on contributions, as they would collect more fees for each individual by the end of the accumulation period. At the aggregate level, a contribution-based fee is more interesting for providers when starting a new asset-backed pension arrangement. They may transition later to an asset-based fee to increase fee collection. Performance fees may help to align the interest of providers and individuals. However, performance fee structures that do not treat positive and negative performance in a symmetrical way may induce providers to boost the volatility of their investment portfolio in order to increase fee collection.

This chapter is structured as follows. Section 3.1 provides the methodology and presents the indicators used to assess the impact of different fee structures on individuals and providers. Section 3.2 then calculates the indicators for different fee structures making the individual neutral in terms of assets accumulated at retirement, assuming a world without uncertainty. Section 3.2 also conducts a sensitivity analysis. Section 3.3 generalises the results in a world of uncertainty by introducing stochastic variables. This provides the opportunity to study different performance fee structures and to assess the impact of return volatility on the indicators. Section 3.4 generalises the results of the Section 3.2 at the aggregate level and Section 3.5 concludes. The annex provides a description of the model used in Section 3.2.

3.1. Methodology and indicators

The analysis considers different fee structures. Han and Stanko (2018^[1]) present the fee structures used by providers of asset-backed pension arrangements in IOPS and OECD countries. Fees can be charged on contributions (or equivalently salaries), assets, or investment returns/performance.¹ Combining different arrangements is also frequent, in particular charging on contributions and assets, or charging on assets and returns/performance. The analysis does not consider fixed fees and one-off fees (e.g. exit fees paid upon changing provider).²

The model first considers the effect of fees on the retirement savings of an individual based on certain deterministic variables (Section 3.2).³ The individual is assumed to join a defined contribution pension plan at age 25 and to contribute 10% of earnings until age 64. Earnings grow in line with a constant productivity growth and inflation. Contributions are invested in a fixed-portfolio strategy⁴ and earn a constant nominal rate of return.⁵ The provider charges fees on an annual basis according to different fee structures.⁶ At the end of the accumulation period, the individual takes a lump sum, so no more fees are due to the provider.

The model is later generalised in two ways. First, the variables are made stochastic, thereby reflecting the uncertainty over their values (Section 3.3). The model generates 10 000 Monte Carlo simulations. Inflation, productivity growth and rates of return are drawn from normal distributions with moments determined by historical data. In each simulation, the individual is randomly assigned to one of three different real earnings growth paths and may suffer spells of unemployment.⁷

Second, the analysis considers several cohorts of individuals instead of just one individual (Section 3.4, aggregate model). It uses the same parameter values as in the deterministic model. Each single-year age cohort has the same size, and all the individuals of a given cohort have the same level of earnings in each year. Contributions represent a constant share of GDP. Fees collected by the provider are aggregated across the different cohorts of savers in each year.

The analysis uses three indicators to measure the implications of different fee structures for individuals and providers:

- **Charge ratio:** It is the reduction in the assets accumulated at retirement because of the fees levied (i.e. one minus the ratio of the accumulated assets net of charges to the accumulated assets without charges).
- **Reduction in yield:** It is the reduction in the rate of return due to the charges levied. For example, if the gross rate of return is 5%, a reduction in yield of 1% means that the fee structure produces the same asset accumulation as a portfolio without fees reaching a rate of return of 4% ($\frac{1+5\%}{1+1\%} - 1$).
- **Fees collected:** It is the total amount of fees collected by the provider on the different flows over the accumulation period, as a percentage of the total contributions made. For the aggregate model, it is the total amount of fees collected by the provider on the different flows across the different cohorts of savers, as a percentage of GDP.

3.2. Implications of different fee structures at the individual level in a world without uncertainty

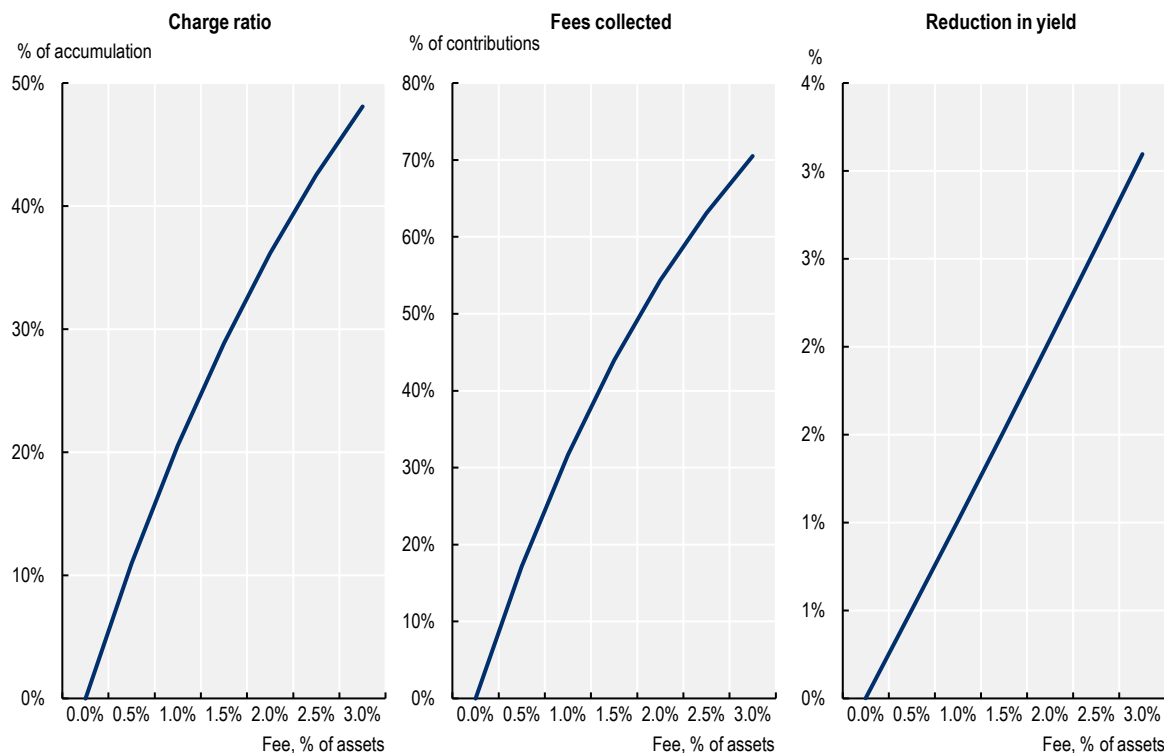
This section considers the implications of different fee structures for individuals and providers, when looking at one saver with deterministic characteristics over the course of the accumulation phase. It provides the value of different indicators (charge ratio, reduction in yield and fees collected) for the asset-based fee structure, and for different fee structures making the individual neutral, i.e. producing the same charge ratio. The section then analyses how the indicators vary when changing different parameters.

3.2.1. Asset-based fees

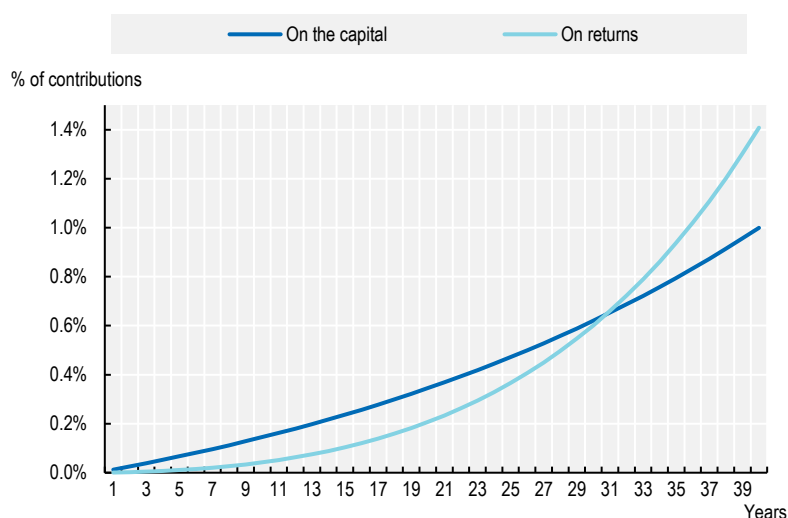
The analysis focuses first on the asset-based fee, which is the most common fee structure across OECD countries (OECD, 2019^[2]). Under this fee structure, the provider of the asset-backed pension arrangement calculates fees in each period as a percentage of the total assets under management.

Increasing the fee rate of the asset-based fee structure increases the cost to the individual, in terms of lower assets accumulated at retirement and average return, and the revenues of the provider. However, the relationship is linear only for the reduction in yield indicator. For example, Figure 3.1 shows that the charge ratio for a 1% asset-based fee is 20.5%, meaning that the individual suffers a reduction of 20.5% in the total assets accumulated at retirement compared to a situation without fees. For an asset-based fee of 2%, the charge ratio is 36.2% (multiplied by a factor 1.76) and for an asset-based fee of 3%, the charge ratio is 48.1% (multiplied by a factor 1.33). For the 1% asset-based fee, the fees collected by the provider correspond to 31.7% of the contributions made and the reduction in yield is 1%.

Figure 3.1. Charge ratio, fees collected and reduction in yield, according to the fee rate of the asset-based fee structure



With an asset-based fee, a significant part of the total fees collected come from charging the capital. The asset-based fee is calculated from the stock of assets at the end of each year. This stock of assets results from the sum of contributions paid up to that point (the capital) and the returns obtained on these contributions. Figure 3.2 shows the yearly fees collected during the accumulation phase for a 1% asset-based fee broken down between the part collected on the capital and the part collected on returns. At the beginning of the accumulation phase, most of the fees are collected on the capital. Over time, the returns grow exponentially due to the compound interest, so that more fees are collected on returns than on the capital after around 30 years. On aggregate, 51.6% of all the fees collected by the end of the accumulation phase have been collected on the capital. It is worth noting that for a 40-year contribution period, the first contribution gets charged 40 times (so 40% with a 1% asset-based fee), while the last one is only charged once.

Figure 3.2. Decomposition of the fees collected for a 1% asset-based fee

3.2.2. Fee structures making the individual neutral

Different fee structures can result in the same charge ratio, making the individual neutral in terms of the total assets accumulated at retirement. Table 3.1 presents different fee structures producing the same charge ratio under the baseline assumptions. The analysis identifies four different fee structures equivalent to the 1% asset-based fee. These are a 20.5% fee on contributions, an 18.6% fee on returns, a mixed fee on contributions (10.7%) and assets (0.5%), and a mixed fee on assets (0.5%) and returns (9.3%).^{8,9} The five fee structures have a charge ratio of 20.5% (i.e. the individual loses 20.5% of total assets accumulated at retirement compared to a situation without fees) and a reduction in yield of 1%. It is noteworthy that a 20.5% fee on contributions produces a charge ratio of the same value, and fees collected obviously also correspond to 20.5% of total contributions.¹⁰

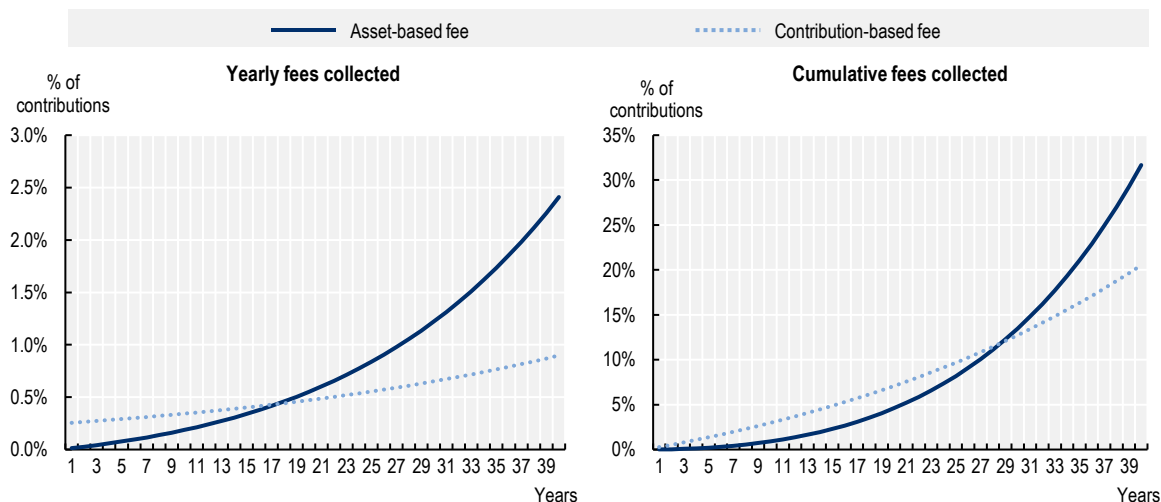
Table 3.1. Fee structures resulting in the same charge ratio as the 1% asset-based fee

Fee structure	Fee	Charge ratio	Reduction in yield	Fees collected
Fee charged on assets	1%	20.5%	1%	31.7%
Fee charged on contributions	20.5%	20.5%	1%	20.5%
Fee charged on returns	18.6%	20.5%	1%	31.7%
Fee charged on contributions and assets	10.7% on contributions and 0.5% on assets	20.5%	1%	26.1%
Fee charged on assets and returns	0.5% on assets and 9.3% on returns	20.5%	1%	31.7%

However, equivalent fee structures for the individual are not necessarily neutral for the provider. The provider collects more fees when these are based on assets or returns (31.7% of total contributions) than when they are based on contributions (20.5%). A mixed fee structure charging on both contributions and assets falls in-between (26.1%). The provider is neutral between charging fees on assets only, on returns only, or mixing fees on assets and fees on returns. Therefore, the provider has an incentive to charge fees on assets or on returns rather than on contributions, for a given charge ratio. The fact that a contribution-based fee takes away part of the contributions for investing explains this. Reversely, if the provider targets a certain level of fee revenues, the individual will be better off with fee structures based on assets or on returns. Indeed, a 31.7% charge on contributions is necessary to produce the same fee collection for the provider as a 1% asset-based fee, but this results in a charge ratio of 31.7%.¹¹

A contribution-based fee is front-loaded, while an asset-based fee is back-loaded. Figure 3.3 shows that a provider collects more fees at the beginning of the accumulation phase with a contribution-based fee, as compared to an asset-based fee producing the same charge ratio.¹² Over time, however, the situation reverses, because assets grow faster than contributions. If the individual contributes during at least 29 years, the provider is better off with an asset-based fee because the cumulative amount of fees collected is larger.

Figure 3.3. Time profile of yearly and cumulative fees collected for two equivalent fee structures



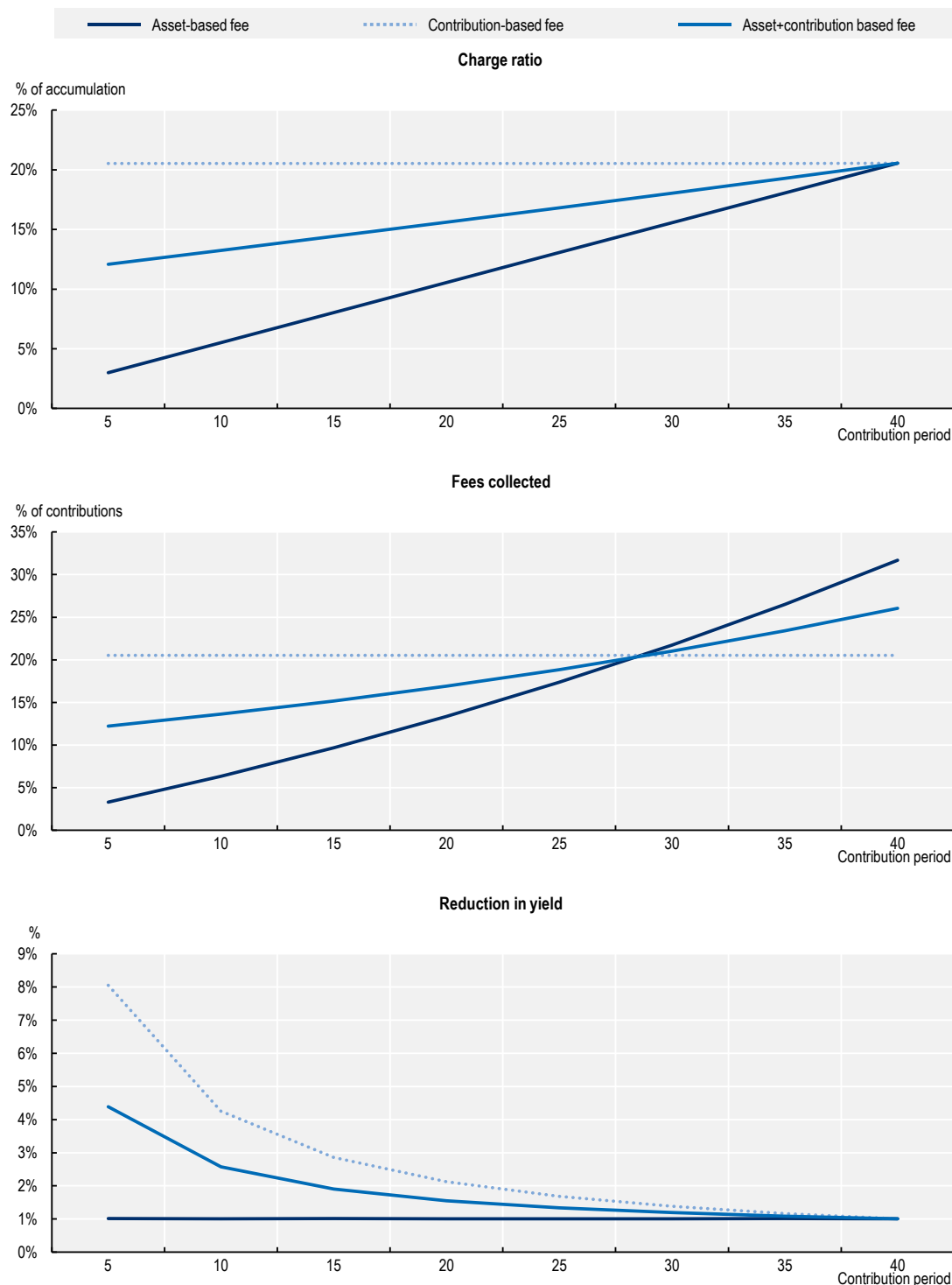
Note: The figure compares the time profile of fees collected for the 1% asset-based fee and the 20.5% contribution-based fee, which are equivalent for the individual.

Changing some of the parameters changes the results. Therefore, the following sub-sections provide a sensitivity analysis, looking at the impact on the different indicators of the number of years of contributions (length of the contribution period and contribution gaps), the amount contributed (contribution rate and wage growth), and the investment returns (level of returns and time profile of returns). The sensitivity analysis considers the fee structures in Table 3.1, which produce the same charge ratio for the baseline scenario.

3.2.3. Impact of the length of the contribution period

The length of the contribution period has a distinct impact on the charge ratio, the fees collected and the reduction in yield, depending on the fee structure. Individuals join an asset-backed pension plan at different stages and not necessarily immediately when starting their career, in particular in voluntary systems. The analysis here looks at the impact of the length of contribution by assuming that the individual joins the plan at different ages, between 25 and 60, thereby reducing the length of the contribution period from 40 years to a minimum of five years. Figure 3.4 shows the impact of the length of the contribution period on the charge ratio, the fees collected and the reduction in yield for the fee structures presented in Table 3.1, which produce the same charge ratio for a 40-year contribution period.

Figure 3.4. Charge ratio, fees collected and reduction in yield for different fee structures according to the length of the contribution period



Note: The figure compares the three indicators for the 1% asset-based fee, the 20.5% contribution-based fee and the mixed fee structure charging on assets (0.5%) and contributions (10.7%), which are equivalent for the individual for a 40-year contribution period. The 18.6% return-based fee and the mixed fee structure charging on assets (0.5%) and returns (9.3%) are not shown as they provide the same results as the asset-based fee.

The length of the contribution period does not affect the charge ratio and the fees collected for the contribution-based fee. Figure 3.4 shows that both indicators remain equal to 20.5% irrespective of the length of the contribution period. In absolute terms, the level of assets accumulated at retirement and the level of fees collected decline for shorter contribution periods, but proportionally to the decline of assets in the absence of fees and to the decline of contributions. The indicators therefore remain constant for all durations of the contribution period for the contribution-based fee.

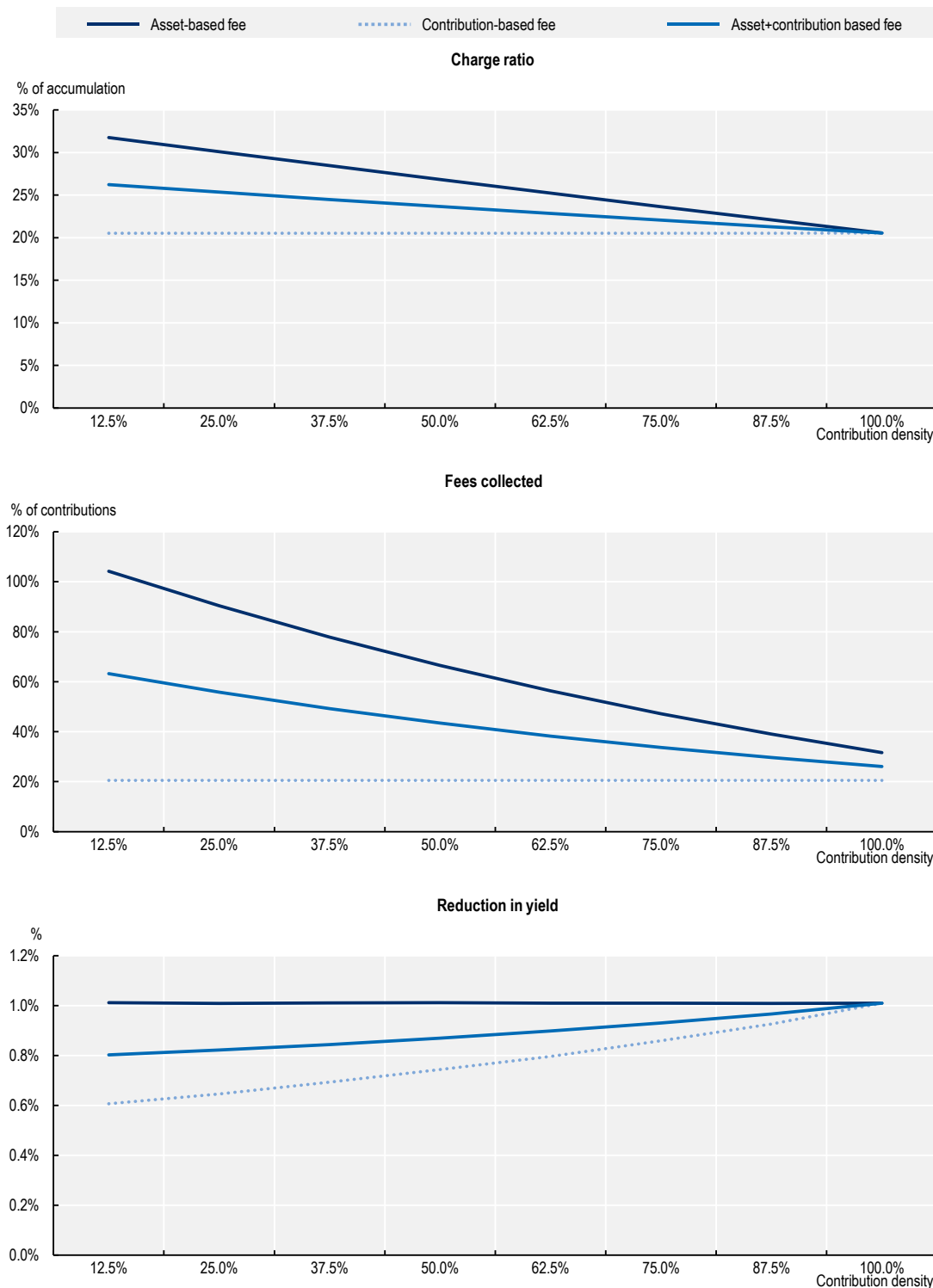
By contrast, longer contribution periods increase linearly the charge ratio and the fees collected for the asset-based fee, the return-based fee and the mixed fee structures. For example, the charge ratio increases by 0.5 percentage point for each additional year of contribution with the 1% asset-based fee. The return-based fee and the mixed fee structure charging on assets and returns produce the same results as the asset-based fee (see the footnote below the figure). Due to the compound interest, the level of assets does not increase linearly during the accumulation phase. The longer is the contribution period, the larger becomes the basis to calculate asset-based fees and return-based fees, and the greater is the impact on the assets accumulated and, on the fees collected. A 1% asset-based fee and a 20.5% contribution-based fee would produce similar revenues for the provider for an individual contributing for 28 years, from 37 to 64 years old (middle panel of Figure 3.4), but that individual would be better off with the asset-based fee (14.6% charge ratio).

Looking at the reduction in yield provides a different picture. The reduction in yield remains constant (at 1%) for the asset-based fee irrespective of the length of the contribution period. It is also the case for the return-based fee and the mixed fee structure charging on assets and returns as they both produce the same results as the asset-based fee. However, the bottom panel of Figure 3.4 shows that when the fee structure includes a charge on contributions, shorter contribution periods increase the reduction in yield. At the extreme, the 20.5% contribution-based fee results in a negative net rate of return for very short contribution periods. For example, for a contribution period of five years, the contribution-based fee produces a reduction in yield of 8.1%, which is larger than the gross rate of return assumed under the baseline assumptions (5.7%). This means that the contribution-based fee results in the same level of assets accumulated at retirement as a portfolio without fees reaching a -2.2% rate of return. The reduction in yield penalises the fact that the charge ratio is still at 20.5% for short contribution periods. It reflects the fact that the individual could get a lower charge ratio with alternative fee structures based on asset charges, as shown in the bottom panel of Figure 3.4.

3.2.4. Impact of contribution gaps

Gaps in the contribution history also affect the charge ratio, the fees collected and the reduction in yield differently according to the fee structure. Once individuals have joined an asset-backed pension plan, sometimes they may stop contributing to it for a while. Gaps in the contribution history may arise from periods of unemployment, inactivity, or informal work. When contributions stop, fees on contributions also stop, while fees on assets and returns continue to be charged. To study the effect of contribution gaps on different fee structures, the analysis assumes here that the individual joins the plan at age 25 but stops contributing before age 64, while leaving the assets invested in the plan until retirement age. The individual is a member of the plan for 40 years, but does not contribute all the years. This provides a range of contribution densities, with 50% meaning that the individual contributed for 20 years (from age 25 to 44) and left the assets in the plan without contributing for another 20 years (from age 45 to 64). Figure 3.5 shows the impact of contribution gaps on the charge ratio, the fees collected and the reduction in yield for the fee structures presented in Table 3.1, which are equivalent for the individual for a 100% contribution density (i.e. no contribution gap).

Figure 3.5. Charge ratio, fees collected and reduction in yield for different fee structures according to the contribution density



Note: The figure compares the three indicators for the 1% asset-based fee, the 20.5% contribution-based fee and the mixed fee structure charging on assets (0.5%) and contributions (10.7%), which are equivalent for the individual for a 100% contribution density. The 18.6% return-based fee and the mixed fee structure charging on assets (0.5%) and returns (9.3%) are not shown as they provide the same results as the asset-based fee.

Shorter contribution gaps reduce the charge ratio and the fees collected for fee structures charging on assets and returns. This is in contrast with the situation where the length of the contribution period is increased by joining the plan earlier. Figure 3.5 shows that the charge ratio declines linearly as the contribution density increases for the asset-based fee and the mixed fee structure charging on assets and contributions. The decline is non-linear for the fees collected. It is also the case for the return-based fee and the mixed fee structure charging on assets and returns, as they produce the same results as the asset-based fee (see the footnote below the figure). With fees based on assets and returns, the provider collects fees even when the individual does not contribute. The longer is the contribution gap (i.e. lower contribution density), the more the level of assets accumulated at retirement declines in proportion, compared to a situation without fees. It also means that the provider collects more fees as a share of contributions. By contrast, the two indicators are not sensitive to the contribution density for the contribution-based fee because fees are not charged when contributions are not paid, so everything adjusts in proportion.

The situation is reversed again when looking at the reduction in yield (bottom panel of Figure 3.5). The reduction in yield is not sensitive to the contribution density for the asset-based fee, the return-based fee and the mixed fee structure charging on assets and returns. It increases as the contribution density improves for fee structures charging on contributions. For lower contribution densities, the impact of the contribution-based fee on the rate of return gets lower, because fees are collected in fewer years in comparison to the years during which contributions earn a return.

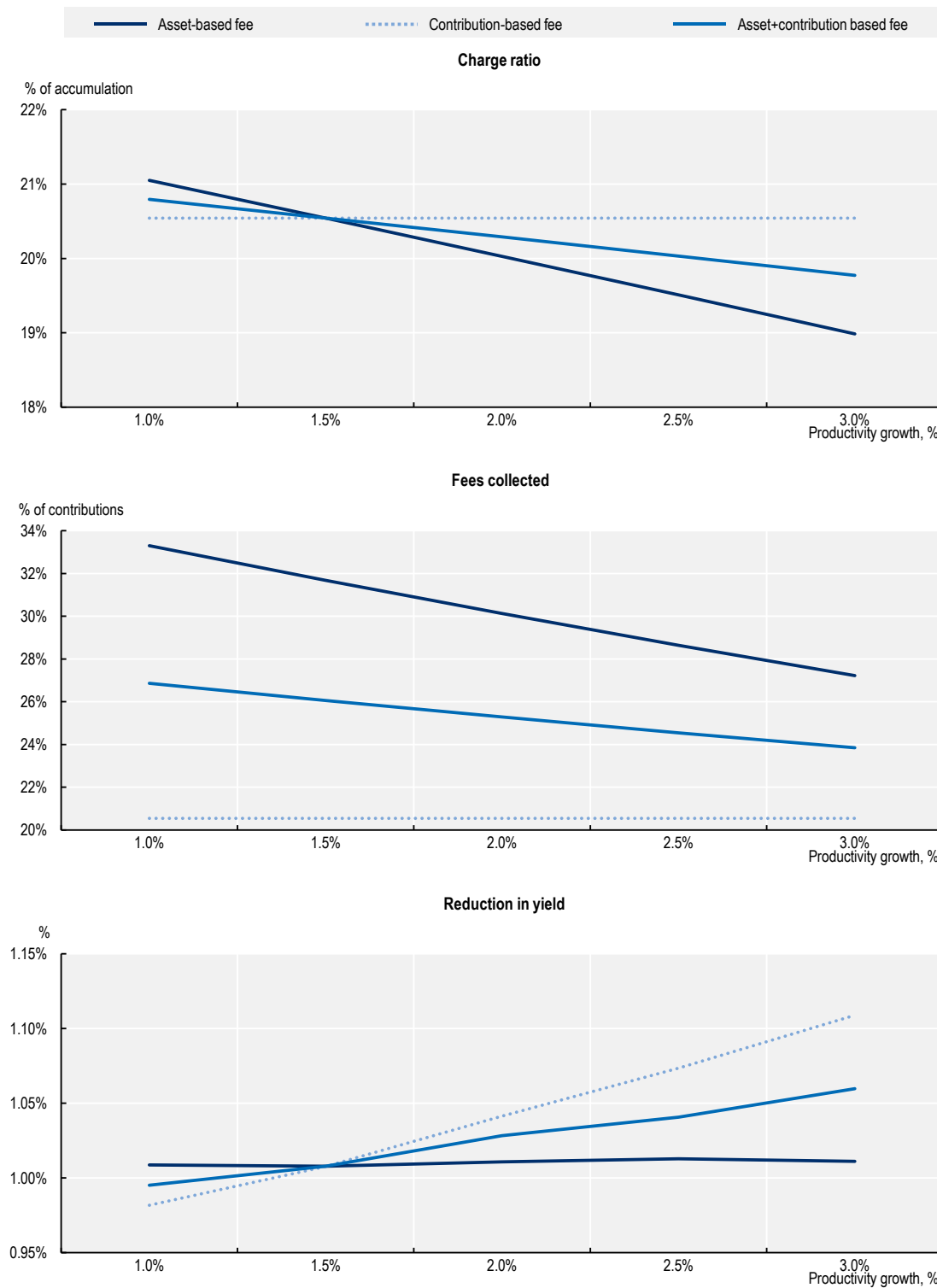
3.2.5. Impact of the contribution rate

The contribution rate has no impact on the three indicators for all the fee structures considered in Table 3.1. This is because all the parameters (contributions, asset accumulated and investment returns) adjust in the same proportions when the contribution rate varies, irrespective of the fee structure. Given that the indicators are relative measures, they keep the same value as in Table 3.1 for different contribution rates.¹³

3.2.6. Impact of the wage growth

Wage growth also influences the level of contributions, as does the contribution rate. Two parameters, productivity growth and inflation, determine wage growth in the model used. This section illustrates the impact of the productivity growth rate, but the impact of inflation is similar. Figure 3.6 shows the impact of the productivity growth rate on the charge ratio, the fees collected and the reduction in yield for the fee structures presented in Table 3.1, which are equivalent for the individual for a 1.5% productivity growth rate.

Figure 3.6. Charge ratio, fees collected and reduction in yield for different fee structures according to the productivity growth rate



Note: The figure compares the three indicators for the 1% asset-based fee, the 20.5% contribution-based fee and the mixed fee structure charging on assets (0.5%) and contributions (10.7%), which are equivalent for the individual for a 1.5% productivity growth rate. The 18.6% return-based fee and the mixed fee structure charging on assets (0.5%) and returns (9.3%) are not shown as they provide the same results as the asset-based fee.

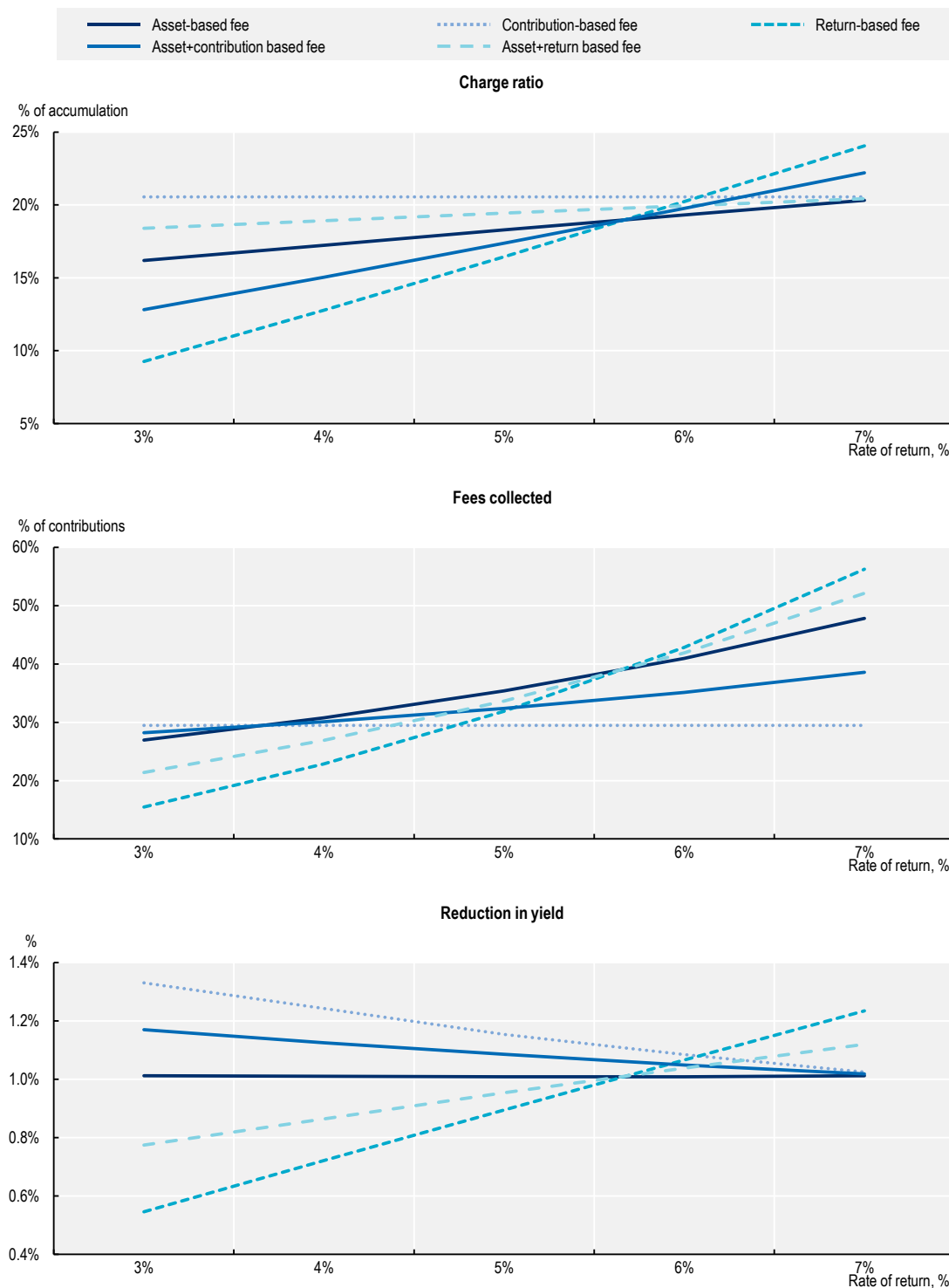
The charge ratio and the fees collected are smaller with fee structures charging on assets or returns for individuals with a higher wage growth, everything else equal. Both indicators are insensitive to the productivity growth rate for the fee structure charging on contributions only (Figure 3.6). For the 1% asset-based fee, a 1% increase in the productivity growth rate reduces the charge ratio by 1 percentage point. Because of the compounding effect of productivity growth on wages, an increase in the productivity growth rate increases contributions non-linearly, with larger impacts towards the end of the accumulation phase. This implies that the effect on assets and on fees on assets/returns is felt more strongly towards the end of the accumulation period too. In relative terms, fees on assets/returns have therefore a lower impact on the assets accumulated at retirement, thereby reducing the charge ratio.

The reversed situation is observed for the reduction in yield. As the productivity growth rate increases, the impact of contribution-based fees on the rate of return gets larger (bottom panel of Figure 3.6).

3.2.7. Impact of the rate of return

The fee structure most sensitive to the rate of return is the one charging on investment returns. Figure 3.7 shows that the charge ratio, the fees collected and the reduction in yield increase for this fee structure when the rate of return is higher. Because of the compound interest, the higher is the rate of return, the larger is the impact on assets and on investment returns. With fee structures charging on assets or on returns, providers of asset-backed pension arrangements therefore have an incentive to reach the highest possible performance because they will collect more fees. The individual is also better off with a higher performance, as the assets accumulated at retirement will be higher, irrespective of the fee structure. However, with fee structures charging on assets or on returns, the charge ratio increases with the rate of return, because the fees collected increase by a larger proportion than the assets.

Figure 3.7. Charge ratio, fees collected and reduction in yield for different fee structures according to the rate of return



Note: The figure compares the three indicators for the 1% asset-based fee, the 20.5% contribution-based fee, the 18.6% return-based fee, the mixed fee structure charging on assets (0.5%) and contributions (10.7%), and the mixed fee structure charging on assets (0.5%) and returns (9.3%), which are equivalent for the individual for a 5.7% rate of return.

3.2.8. Impact of the time profile of the rate of return

Changing the time profile of the rate of return may affect fees. Instead of assuming a fixed portfolio investing 60% of the assets in equities throughout the accumulation phase and reaching a constant rate of return, one can look at other types of investment strategies. For example, with life-cycle investment strategies, the share of assets invested in risky assets, such as equities, is larger at the beginning of the accumulation phase and declines as the individual gets closer to retirement. This implies that the rate of return may decline over time as well.

The time profile of the rate of return has a small impact on the indicators. The analysis considers three life-cycle investment strategies with the same age-weighted average equity exposure as the baseline fixed-portfolio strategy (and therefore the same age-weighted average return). The first one reduces the equity exposure linearly with age; the second one keeps the equity exposure constant during the first 20 years and then reduces it linearly to zero over the next 20 years; and the third one keeps the equity exposure constant during the first 30 years and then reduces it linearly to zero over the next 10 years. The impact on the charge ratio, the fees collected and the reduction in yield is larger with the second life-cycle investment strategy but remains minor. With this investment strategy, the equity exposure (and the rate of return) is larger at the beginning of the accumulation phase. For the 1% asset-based fee, this leads to an increase of the charge ratio to 20.8%, of the fees collected to 32.5% and of the reduction in yield to 1.1% (from 20.5%, 31.7% and 1.0% with the fixed-portfolio strategy, respectively).

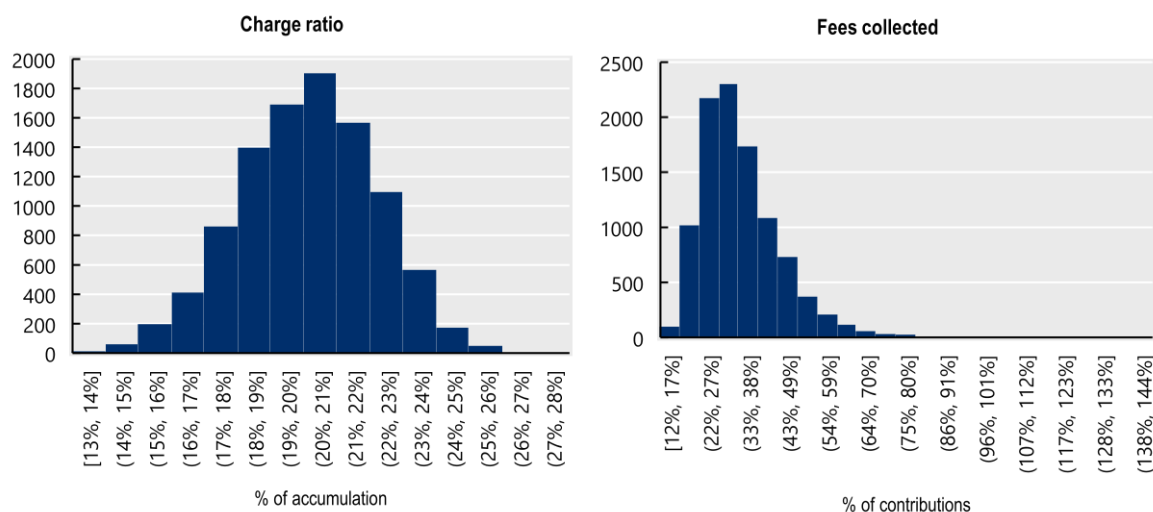
3.3. Implications of different fee structures at the individual level when introducing uncertainty

This section generalises the analysis in the previous section by introducing uncertainty. Producing 10 000 Monte Carlo simulations with stochastic parameters allows to consider uncertainty. This section first analyses the impact of introducing uncertainty for the different fee structures. The analysis focuses on two indicators, the charge ratio and the fees collected, as the gross and net returns are now stochastic, complicating the calculation of the reduction in yield. The introduction of uncertainty also allows to study additional fee structures like performance fees and to assess the impact of return volatility on the indicators.

3.3.1. Impact of introducing uncertainty

For the 1% asset-based fee, the distribution of the charge ratio resembles a normal distribution, while the distribution of the fees collected is skewed to the right (Figure 3.8). The median (20.2%) and the average (20.1%) charge ratios are very close to each other. For the fees collected, the average (33.3%) is greater than the median (31.2%). This means that fees collected can reach, in certain scenarios, extreme values.

Figure 3.8. Distribution of the charge ratio and the fees collected for the 1% asset-based fee



The analysis identifies four different fee structures that produce the same *average* charge ratio as the 1% asset-based fee in a world of uncertainty. The fee structures providing the same average charge ratio of 20.1% are a 20.1% fee on contributions, a 14.6% fee on returns, a mixed fee on contributions (10.5%) and assets (0.5%), and a mixed fee on assets (0.5%) and returns (7.3%).

For fee structures based on charges on contributions, the fee rates are very similar in a world with and without uncertainty. For example, the 1% asset-based fee is equivalent to a 20.1% fee on contribution in a world of uncertainty, and to a 20.5% fee on contribution in a world without uncertainty. Moreover, in line with the results shown in Section 3.2, the contribution-based fee is not sensitive to the stochastic variables (i.e. contribution length and density, wage growth and rates of return). The charge ratio and the fees collected are equal to 20.1% for all the simulations (Table 3.2).

Table 3.2. Distribution of the charge ratio and the fees collected for equivalent fee structures

	5 th percentile	1 st quartile	Median	Mean	3 rd quartile	95 th percentile	Probability > fee on assets
Charge ratio, percentage of accumulation							
Fee charged on assets	16.65%	18.75%	20.20%	20.14%	21.59%	23.38%	
Fee charged on contributions	20.14%	20.14%	20.14%	20.14%	20.14%	20.14%	48.92%
Fee charged on returns	13.01%	17.00%	20.00%	20.14%	23.12%	27.55%	48.45%
Fee charged on contributions and assets	18.41%	19.44%	20.16%	20.14%	20.86%	21.75%	48.69%
Fee charged on assets and returns	15.03%	17.97%	20.07%	20.14%	22.23%	25.27%	47.89%
Fees collected, percentage of contributions							
Fee charged on assets	19.80%	25.70%	31.20%	33.32%	38.63%	53.34%	
Fee charged on contributions	20.14%	20.14%	20.14%	20.14%	20.14%	20.14%	5.68%
Fee charged on returns	15.90%	24.10%	31.92%	35.24%	43.19%	64.70%	53.88%
Fee charged on contributions and assets	19.95%	22.85%	25.59%	26.66%	29.29%	36.64%	5.64%
Fee charged on assets and returns	18.07%	25.01%	31.64%	34.28%	40.75%	58.75%	53.42%

By contrast, the fee rates on returns equivalent to the asset-based fee are lower in a world of uncertainty. For example, the 1% asset-based fee is equivalent to a 14.6% return-based fee in a world of uncertainty, as opposed to a 18.6% return-based fee in a world without uncertainty. As seen in Figure 3.7, fee structures charging on investment returns are very sensitive to the rate of return. In a world of uncertainty, rates of return are volatile. Providers collect more fees when rates of return are higher, while they are not penalised when rates of return are negative (beyond the fact that they do not collect a fee). This implies that the fee rate does not need to be as high in a world of uncertainty to reach the same average charge ratio.¹⁴

The fee structure charging on returns produces the most dispersed distributions for the charge ratio and the fees collected. The standard deviation of the distribution of the charge ratio for example, is null for the contribution-based fee, around 1% for the mixed fee on assets and contributions, 2% for the asset-based fee, 3% for the fee charging on assets and returns, and 4% for the return-based fee. The return-based fee is particularly sensitive to the rate of return, as seen Figure 3.7. It results in skewed distributions with large positive values, especially for the fees collected. In 5% of the simulations, fees collected would reach 64.7% of total contributions or more.

Providers of asset-backed pension arrangements are better off with fee structures charging on assets and/or returns. Indeed, providers have significantly greater chances of larger fee collection with the asset-based fee, the return-based fee and the mixed fee structure charging on assets and returns. In less than 6% of the cases would fee structures charging on contributions produce a larger fee collection than the asset-based fee. When looking at the charge ratio, the analysis shows that individuals tend to be slightly better off with fee structures other than the asset-based fee, even though the five fee structures produce the same average charge ratio. Comparing the charge ratio produced by the different equivalent fee structures in each simulation shows that in less than half of the cases (between 48% and 49%), the 1% asset-based fee will produce a lower charge ratio than the other fee structures.

3.3.2. Performance fees

The stochastic model allows to study different forms of performance fees. Following OECD (2018_[3]), the design of a performance fee depends on the following parameters:

- The fee base (i.e. is the fee calculated on investment income or on assets);
- The fee rate;
- The hurdle rate (i.e. the minimum return the portfolio must reach before a performance fee is levied);
- The measurement period (i.e. the length of time over which performance is calculated); and
- The use of a high-water mark (i.e. the last highest value that the portfolio has reached) to trigger the payment of a performance fee.

The mixed fee structure charging on assets and returns presented previously uses a performance fee with the investment income as the fee base, a fee rate of 7.3%, a hurdle rate of 0%, a measurement period of one year, and no high-water mark. The analysis considers five additional fee structures mixing an asset-based fee and a performance fee. They all use the same fee rates (i.e. 0.5% fee on assets and 7.3% fee on performance), but vary with respect to the other parameters for the performance fee:

- Fix hurdle rate: The performance fee is calculated based on the return in excess of 5%. No performance fees are paid if returns are below 5%.
- Variable hurdle rate: The performance fee is calculated based on the return in excess of a government bond return index. No performance fees are paid if returns are negative or below the index.
- High-water mark: The performance fee is calculated based on the return resulting from the increase in the unit value of the portfolio compared to the last highest unit value. No performance fees are paid if the unit value of the portfolio is smaller than the last highest unit value.
- Carry-over mechanism: The performance fee is calculated based on the difference between the return and a hurdle rate (either 0% or 5%). It can be positive or negative. If it is positive, 45% of the calculated performance fee is paid to the provider, while the rest is put into a reserve. If it is negative, the whole amount is put into the reserve. The following year, the newly calculated performance fee is added to the previous reserve. If that sum is positive, the same split applies to the sum between fee payment (45%) and reserve (55%). If the sum is negative, no performance fee is paid and the whole amount is put into the reserve.¹⁵

The five performance fee structures produce a lower charge ratio and lower fees collected than the performance fee with a 0% hurdle rate. This is simply because the performance fee is paid less often, as the portfolio needs to reach a higher rate of return before a performance fee is due. The average charge ratio varies from 12.7% for the carry-over mechanism combined with a fix hurdle rate, to 17.6% for the high-water mark (Table 3.3), as compared to 20.1% for the 0% hurdle rate (Table 3.2).

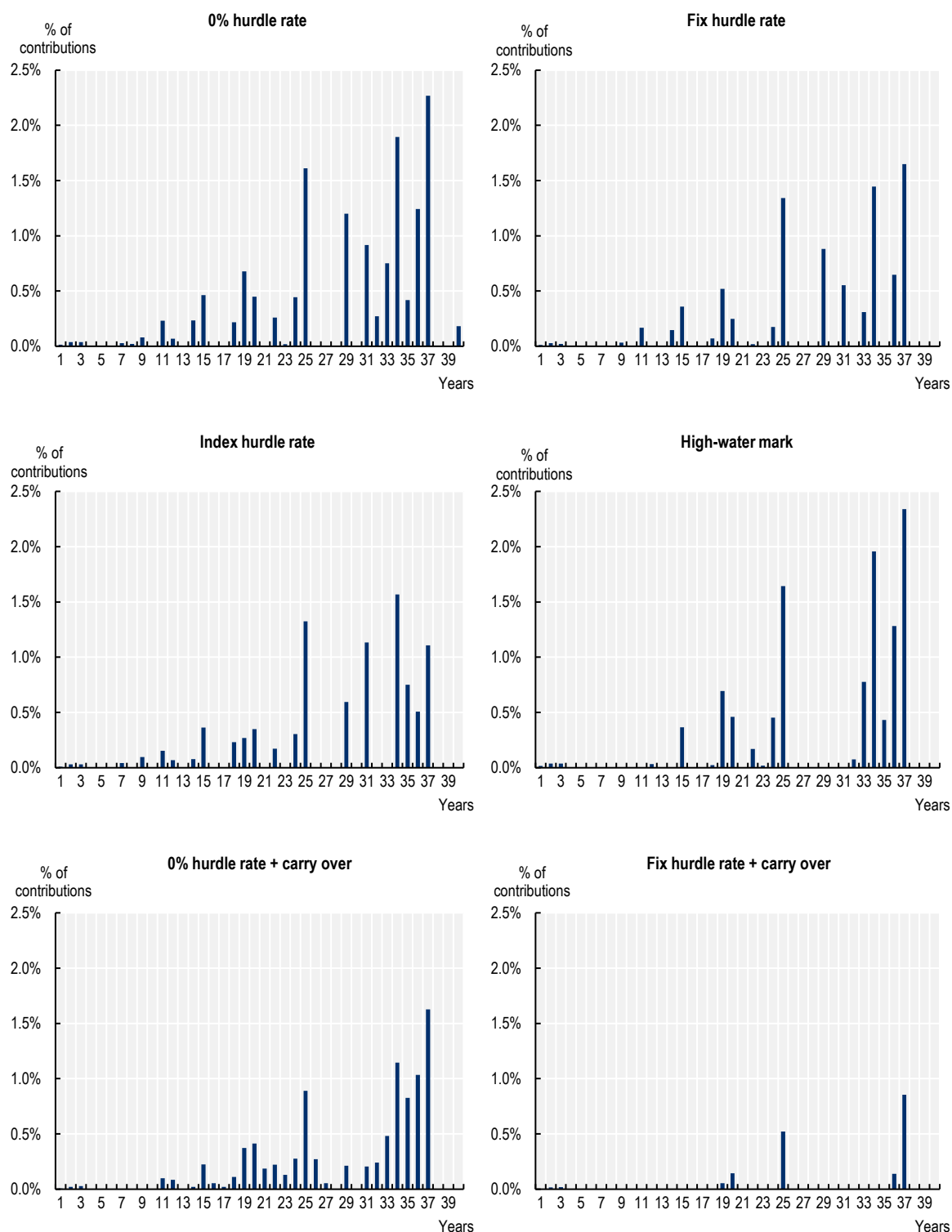
Table 3.3. Distribution of the charge ratio and the fees collected for different performance fee structures

	5 th percentile	1 st quartile	Median	Mean	3 rd quartile	95 th percentile
	Charge ratio, percentage of accumulation					
Fix hurdle rate	12.30%	14.66%	16.35%	16.44%	18.19%	20.71%
Variable hurdle rate	12.52%	14.92%	16.62%	16.70%	18.45%	21.00%
High-water mark	11.67%	15.06%	17.55%	17.57%	20.04%	23.53%
Carry-over	11.99%	15.06%	17.32%	17.36%	19.63%	22.85%

	5 th percentile	1 st quartile	Median	Mean	3 rd quartile	95 th percentile
Carry-over + fix hurdle rate	9.16%	10.88%	12.45%	12.68%	14.24%	16.89%
Fees collected, percentage of contributions						
Fix hurdle rate	14.75%	20.42%	25.84%	28.13%	33.50%	48.35%
Variable hurdle rate	15.07%	20.77%	26.31%	28.52%	33.83%	48.93%
High-water mark	14.11%	21.21%	28.10%	30.64%	37.31%	55.24%
Carry-over	14.49%	21.43%	28.23%	30.88%	37.54%	55.64%
Carry-over + fix hurdle rate	10.80%	14.97%	19.73%	22.22%	26.86%	41.37%

Keeping part of the performance fees in reserves to cushion negative returns, i.e. the carry-over mechanism, reduces the total level of performance fees collected. The carry-over mechanism introduces a symmetrical treatment of performance fees because the provider has to compensate for any negative past performance before collecting a performance fee again. Figure 3.9 provides the time profile of performance fee collection over the 40-year accumulation period for different fee structures, for one simulation. One can assess the effect of the carry-over mechanism by comparing the charts with and without the mechanism for the 0% and the 5% hurdle rates. For a hurdle rate of 5%, the carry-over mechanism brings down the number of years with a performance fee collection from 19 to 8 (comparing the top-right and bottom-right charts). It also reduces the sum of performance fees collected from 8.6% to 1.8% of contributions. For a hurdle rate of 0%, the carry-over mechanism actually increases the number of years with a performance fee collection (from 26 to 28), but still reduces the sum of performance fees collected from 14.0% to 9.3% of contributions (comparing the top-left and bottom-left charts).

Figure 3.9. Illustration of performance fees collected for different fee structures for one simulation



Note: The figure compares the performance fees collected in one simulation for the different performance fee structures sharing the same fee rates (0.5% fee on assets and 7.3% fee on performance).

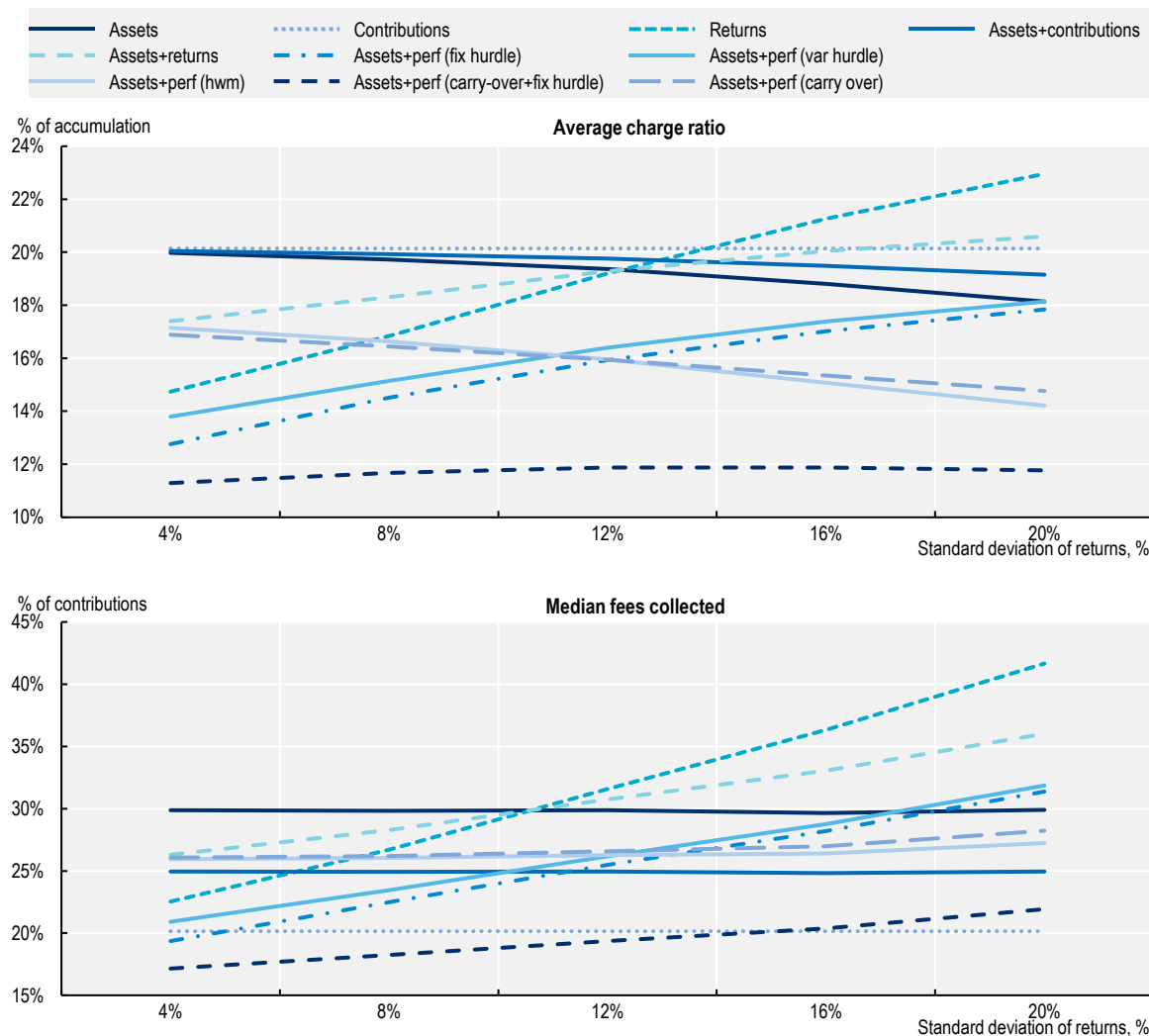
Conditioning the payment of performance fees to increasing the unit value of the portfolio compared to its last maximum, i.e. using a high-water mark, provides similar outcomes to the carry-over mechanism, but the latter allows to smooth performance fee collection. The high-water mark also requires providers to compensate for past losses before collecting performance fees, but the fee collection is more erratic. The two performance fee structures produce similar distributions for the charge ratio and the fees collected (Table 3.3). The main difference lies in the profile of fee collection. Figure 3.9 shows that performance fee collection with the carry-over mechanism (with a 0% hurdle rate) involves smaller amounts but more frequent than with the high-water mark. This is because part of the positive performance fees is put into a reserve, thereby smoothing out fee payments.

3.3.3. Impact of the volatility in the rate of return

Providers may prefer more volatile portfolios as higher volatility in the rate of return may increase fees collected. It is, therefore, interesting to analyse the sensitivity of the indicators to the volatility of the rate of return for different fee structures. For example, Dai, Merton and Rizova (2020^[4]) use option pricing models to value performance fees and show that asset managers charging a performance fee with a fix hurdle rate collect more fees when the annualised return volatility increases. This provides an incentive for managers to boost the volatility of their investment portfolio in order to increase their revenue. To check whether this result holds with the model used herein, the study conducts two different sensitivity analyses. The first one considers that investment rates of return follow a normal distribution with mean 5% and standard deviation varying from 4% to 20%. The second sensitivity analysis makes the mean and standard deviation of the rates of return vary in tandem, as usually, an asset class with more volatile returns also has higher average returns.

Fee structures charging on investment returns indeed produce higher charge ratios and fees collected when the standard deviation of returns is larger. Figure 3.10 show that this is the case for fee structures charging on returns only, or mixing a fee on assets with a performance fee with a fix (0% or 5%) or variable hurdle rate. For these fee structures, a higher volatility of returns increases the upside potential of fee collection, without any consequences when returns go deeper into negative territory beyond the absence of fee collection. Therefore, individuals are worse-off when the volatility of returns is bigger because they have a higher charge ratio, while providers are better-off as they collect more fees.

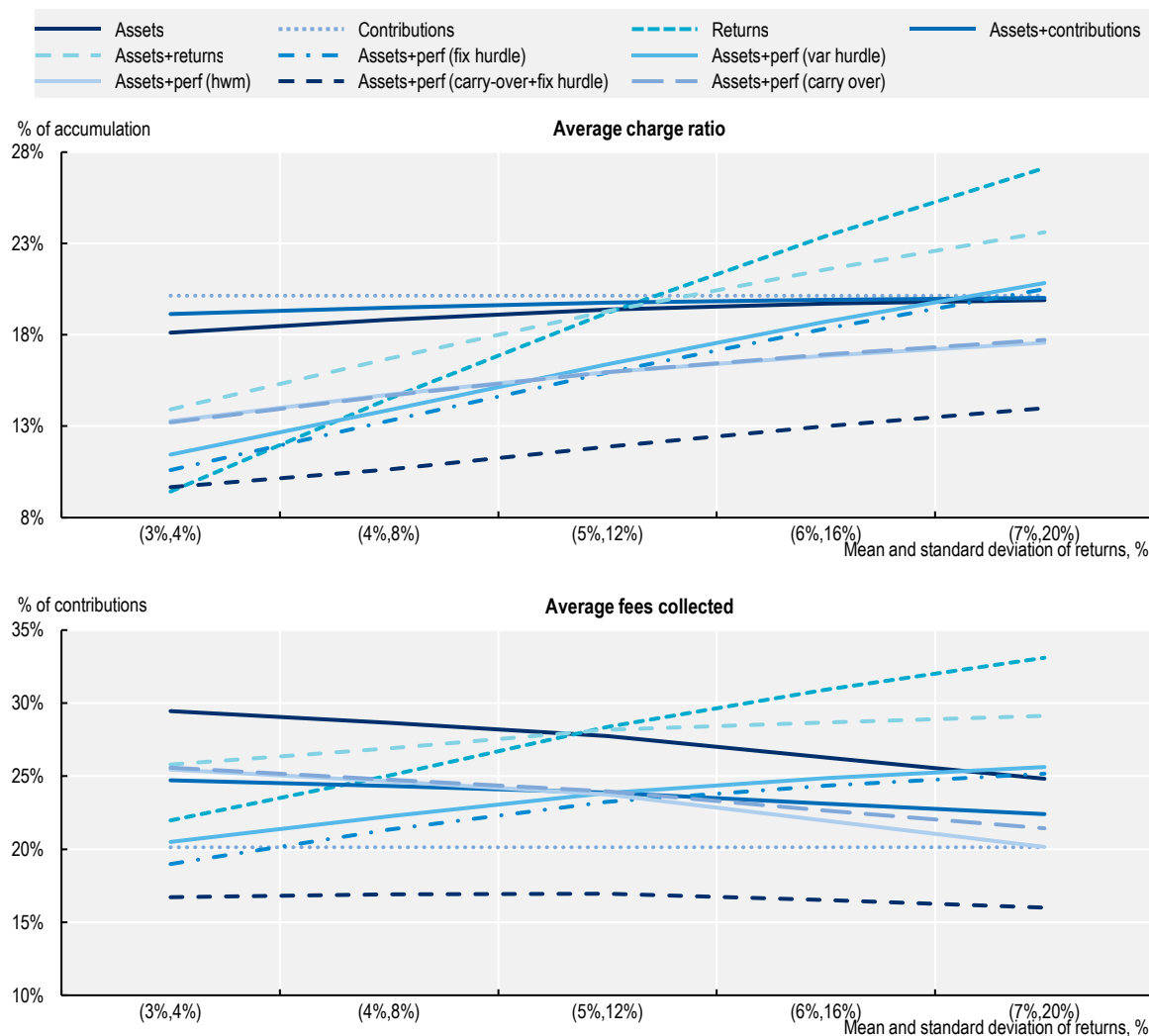
Figure 3.10. Charge ratio and fees collected for different fee structures according to the standard deviation of returns



Note: The figure compares the two indicators for the fee structures in Table 3.2 and Table 3.3, assuming that investment rates of return follow a normal distribution with mean 5%.

Treating negative and positive investment returns in a symmetrical way changes the impact of return volatility. Because of the symmetry implied between positive and negative performance with the carry-over mechanism and the high-water mark, a higher return volatility actually reduces the average charge ratio and the median fees collected (Figure 3.10).¹⁶ This makes individuals better-off, but providers worse-off. This is because it takes time for providers before they can collect fees again after a negative return has occurred. However, when the volatility of returns increases in tandem with the mean (Figure 3.11), both fee structures produce a higher charge ratio and fees collected. This is in line with Figure 3.7, showing that, for fee structures charging on assets or on returns, higher rates of return increase the charge ratio and the fees collected. It remains true when this is coupled with a higher return volatility.

Figure 3.11. Charge ratio and fees collected for different fee structures according to the mean and standard deviation of returns



Note: The figure compares the two indicators for the fee structures in Table 3.2 and Table 3.3, assuming that investment rates of return follow a normal distribution with mean and standard deviation determined in tandem.

3.4. Implications of different fee structures for providers at the aggregate level

This section generalises the deterministic model for one individual of Section 3.2 to several cohorts of individuals. It looks at the fees collected by providers on aggregate over all individuals for the different fee structures presented in Table 3.1 that leave the individual neutral between them as they would have the same charge ratio. As the time profile of fee collection varies according to the fee structure, aggregate fees collected by providers may vary over time as well when combining different cohorts of savers at different stages of their accumulation phase. The analysis first looks at the situation of a maturing asset-backed pension arrangement, and then looks at the transition from a contribution-based fee to an asset-based fee.

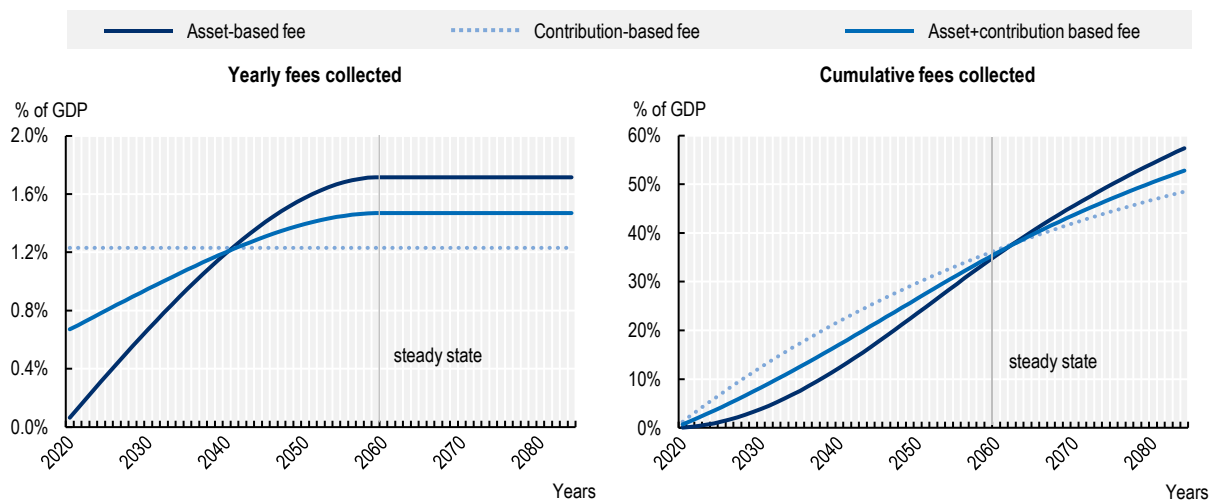
3.4.1. Maturing asset-backed pension arrangement

The model assumes that the asset-backed pension arrangement was introduced in 2020 and that contributions from all age cohorts started in that same year. The number of individuals in each single-year age cohort is assumed to be equal. Each individual saves 10% of wages from age 25 to 64 (except for those who were already older than 25 when the arrangement was introduced).

As the asset-backed pension arrangement matures,¹⁷ providers collect fees that represent a growing share of GDP for fee structures charging on assets or returns. For the contribution-based fee, fees collected always represent a constant share of GDP, simply because contributions are a constant fraction of GDP over time. Figure 3.12 (left panel) shows that it takes 40 years for fees collected to reach a constant share of GDP for the asset-based fee and the mixed fee structure charging on assets and contributions. Forty years are needed for the arrangement to mature, as afterwards each cohort in the arrangement saves for a full career. This is because individuals who were already in the labour market when the new arrangement was introduced can only contribute for part of their career. During the maturing period, total assets therefore represent a growing share of GDP, explaining why fees collected on assets or returns also increase as a share of GDP.

Figure 3.12. Time profile of yearly and cumulative fees collected for different fee structures

As a percentage of GDP



Note: The figure compares the fees collected for the 1% asset-based fee, the 20.5% contribution-based fee and the mixed fee structure charging on assets (0.5%) and contributions (10.7%), which are equivalent for the individual under the baseline assumptions. The 18.6% return-based fee and the mixed fee structure charging on assets (0.5%) and returns (9.3%) are not shown as they provide the same results as the asset-based fee.

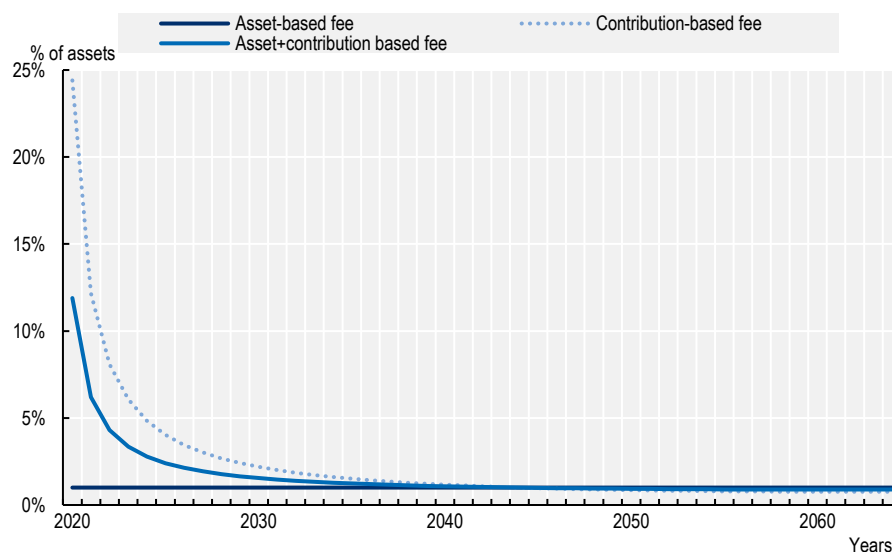
Providers collect more fees with an asset-based fee when the asset-backed pension arrangement is mature, i.e. when it reaches the steady state because all cohorts of members can contribute for a full career. After 40 years, yearly fees collected with the 1% asset-based fee represent 1.7% of GDP, as compared to 1.2% of GDP with the 20.5% contribution-based fee and 1.5% of GDP with the mixed fee structure charging on assets (0.5%) and contributions (10.7%). This is consistent with the results found at the individual level, which showed that providers collect a larger amount of fees by the end of the accumulation period with the asset-based fee than with the contribution-based fee (Table 3.1).

It takes more than 40 years for providers to accumulate the same amount of collected fees with the asset-based fee compared to the contribution-based fee that produces the same charge ratio for individuals. The right panel of Figure 3.12 presents the cumulative fees collected over time for different fee structures. Because the contribution-based fee is front loaded, providers collect more fees with this fee structure at the introduction of the asset-backed pension arrangement. Even though yearly fees collected start to be larger with the asset-based fee after 22 years, it takes another 22 years to compensate for the early years. Therefore, it is only after 44 years of existence of the asset-backed pension arrangement that providers will be better off with the asset-based fee. This is more than the 29 years identified at the individual level in Figure 3.3. This is because the asset-backed pension arrangement covers individuals with less than 40 years of contributions during the maturing phase, thereby reducing the amount of fees collected with the asset-based fee proportionally more than with the contribution-based fee (Figure 3.4, middle panel).

Finally, expressing fees as a percentage of total assets for cross-country comparisons may be misleading. Conducting cross-country comparisons of fees charged is a complex matter. One reason is that providers of asset-backed pension arrangements may use different fee structures in different countries.¹⁸ Reporting the volume of fees collected yearly as a percentage of total assets allows to express all fee structures using the same reference as the asset-based fee, but it may result in misleading conclusions. Figure 3.13 shows that, when using total assets as the reference for fees collected, the contribution-based fee looks more expensive than the asset-based fee during part of the maturing phase, in particular in early years where contributions represent a large fraction of total assets. This is so when both fee structures are neutral for the individual, as they result in the same loss of accumulated assets at retirement compared to a situation without fees (charge ratio).

Figure 3.13. Time profile of yearly fees collected for different fee structures using total assets as the reference value

As a percentage of total assets

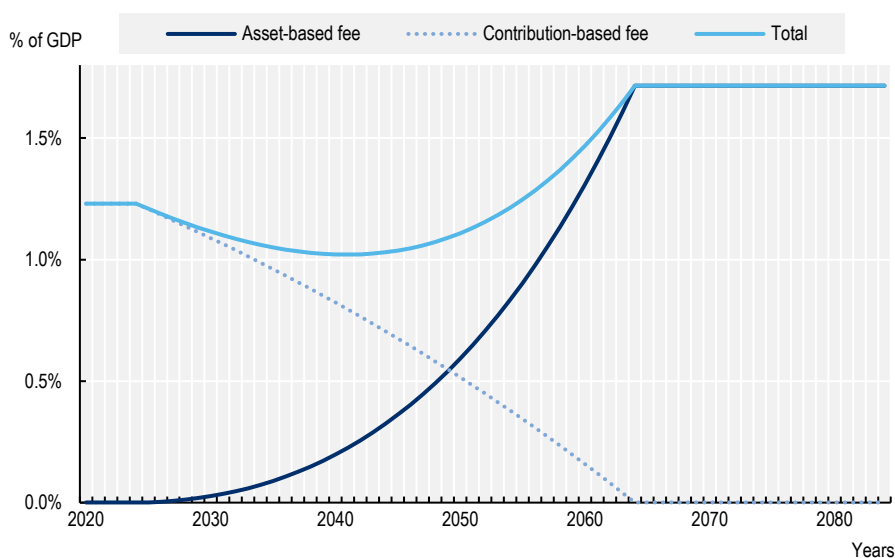


Note: The figure compares the fees collected as a percentage of total assets for the 1% asset-based fee, the 20.5% contribution-based fee and the mixed fee structure charging on assets (0.5%) and contributions (10.7%), which are equivalent for the individual under the baseline assumptions. The 18.6% return-based fee and the mixed fee structure charging on assets (0.5%) and returns (9.3%) are not shown as they provide the same results as the asset-based fee.

3.4.2. Transition from a contribution-based fee to an asset-based fee

Given the time profile of fees collected under the different fee structures, providers of asset-backed pension arrangements may prefer to start with a contribution-based fee and transition later to an asset-based fee. This would allow them to collect sufficient fees at the introduction of the arrangement to be able to run it and then to increase fee collection over time. Figure 3.14 illustrates the transition from a 20.5% contribution-based fee to a 1% asset-based fee. All individuals contributing for a full career are neutral between these two fee structures as they produce the same charge ratio. However, the asset-based fee allows a larger fee collection in steady state. Whether the arrangement is mature or not when making the transition does not matter, as fees collected under a contribution-based fee always represent a constant share of GDP during the maturing and steady-state phases. The analysis assumes that, from 2025, all new savers have fees charged on assets, while those who had joined before remain with the contribution-based fee until the end of their accumulation period. The amount of fees collected under the contribution-based fee therefore declines over time, while it is the opposite for the asset-based fee. On aggregate, providers would collect lower fees during the 30 years following the start of the transition, but would collect more fees afterwards, as individuals under the asset-based fee become prominent in the arrangement.

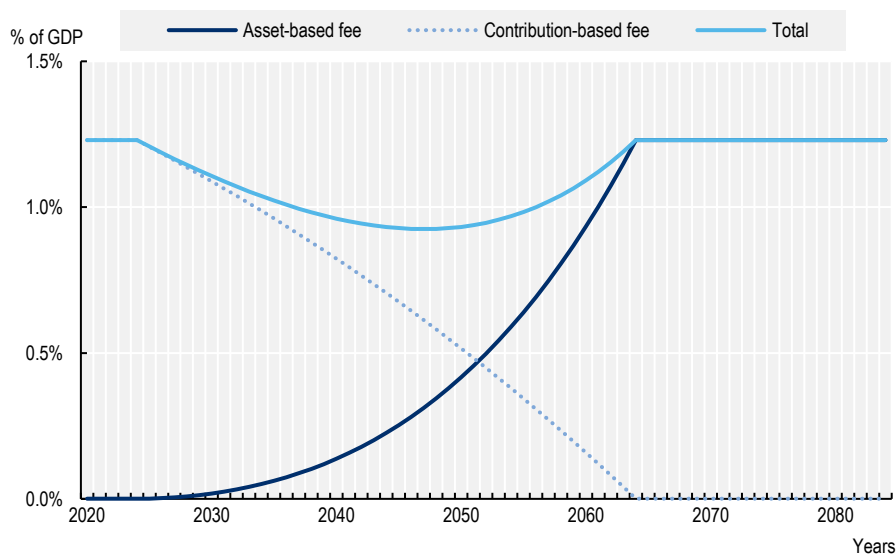
Figure 3.14. Fees collected during the transition from a contribution-based fee to an asset-based fee making individuals neutral



Note: The figure shows the fees collected when transitioning in 2025 from a 20.5% contribution-based fee to a 1% asset-based fee, which are equivalent for the individual under the baseline assumptions.

Providers can achieve the same level of fee collection in the long term than initially when moving from contribution-based to asset-based fees while reducing the charge ratio for individuals, thereby benefiting plan members. Figure 3.15 illustrates the transition from a 20.5% contribution-based fee to a 0.7% asset-based fee. After the transition period is over, providers would collect the same level of fees as before (1.2% of GDP). In between, fee collection would be lower, falling to 0.9% of GDP. Individuals with the asset-based fee would be better off than those who were in the arrangement before the transition, as the charge ratio would fall from 20.5% to 14.6%.

Figure 3.15. Fees collected during the transition from a contribution-based fee to an asset-based fee making the provider neutral in steady state



Note: The figure shows the fees collected when transitioning in 2025 from a 20.5% contribution-based fee to a 0.7% asset-based fee.

3.5. Conclusions

This chapter has analysed the effect of different fee structures on individuals and providers of asset-backed pension arrangements. It used deterministic and stochastic modelling to calculate indicators measuring the cost to individuals in terms of foregone assets accumulated at retirement and average return. It also calculated the level of fees collected by providers at the individual level and at the aggregate level. The analysis provides several main conclusions.

Fees can reduce significantly the level of assets accumulated at retirement. With a 1% asset-based fee, the individual suffers a reduction of 20.5% in the total assets accumulated at retirement compared to a situation without fees (charge ratio). This corresponds to a decline in the rate of return of 1% (reduction in yield). In addition, providers collect an amount of fees equivalent to 31.7% of total contributions (fees collected). By the end of the accumulation period, most of the fees have been collected on the capital, as opposed to the investment income. Moreover, fees collected increase with the length of the contribution period and the rate of return, but decrease with the contribution density and the earnings growth rate.

For a contribution-based fee, the charge ratio, the fees collected, and the fee rate are all equal. This implies that for this fee structure, the charge ratio and the fees collected are insensitive to the number of years of contributions, the amount contributed and the investment rate of return. By contrast, the reduction in yield implied by a contribution-based fee decreases with the length of the contribution period and the rate of return, but increases with the contribution density and the earnings growth rate.

Equivalent fee structures for the individual are not necessarily neutral for the provider. Under certain baseline assumptions, individuals are neutral, i.e. same charge ratio, between the 1% asset-based fee and a 20.5% contribution-based fee, an 18.6% fee on returns, a mixed fee on contributions (10.7%) and assets (0.5%), and a mixed fee on assets (0.5%) and returns (9.3%). Providers, however, have an incentive to levy fees on assets or on returns rather than on contributions, because fee collection will be larger, except when individuals contribute for short periods.

Individuals with contribution periods below 40 years, those experiencing faster earnings growth during their career than the average, and those with lower rates of return than the average would be better off, i.e. they would have a lower charge ratio, with a 1% asset-based fee than with an equivalent 20.5% contribution-based fee. By contrast, individuals with contribution gaps, those experiencing slower earnings growth than the average, and those with higher rates of return than the average would be better off with the contribution-based fee. When introducing uncertainty, individuals are more likely to suffer a larger charge ratio with an asset-based fee than with the other equivalent fee structures.

Linking the payment of performance fees to the achievement of a certain rate of return (hurdle rate) or to the compensation of past negative returns (high-water mark or carry-over mechanism) reduces the charge ratio for the individual because the provider collects fewer performance fees. The carry-over mechanism and the high-water mark treat positive and negative performance in a symmetrical way because the provider has to compensate for any negative past performance before collecting a performance fee again. Moreover, the carry-over mechanism allows the provider to collect performance fees more regularly, because part of the positive performance fees is put into a reserve, thereby smoothing out fee payments.

Providers may be better off with higher volatility on investment returns in their portfolio as they may get higher performance fees, except with the carry-over mechanism and the high-water mark. When higher volatility is associated with higher average returns, providers collect more fees with all fee structures studied except the contribution-based fee.

Providers of asset-backed pension arrangements would prefer to collect fees on contributions rather than on assets over all cohorts of individuals in the early years of an asset-backed pension arrangement. When the arrangement is mature as all cohorts of individuals can contribute for a full career, the 1% asset-based fee allows providers to collect more fees than the 20.5% contribution-based fee. However, during the initial years of the asset-backed pension arrangement, fee collection under the asset-based fee is lower, while the contribution-based fee immediately reaches its full potential and produces constant revenues. Therefore, it may take around 40 years before the asset-based fee starts to pay-off for providers.

Transitioning from a contribution-based fee to an asset-based fee could be positive for providers and individuals. Such a transition could allow providers to increase aggregate fee collection without increasing the charge ratio for individuals. Alternatively, it could allow providers to reduce the charge ratio for individuals while keeping the same level of aggregate fee collection in the long term. Moreover, transitioning to a mixed fee structure including an asset-based fee and a performance fee could help to better align the interests of providers and individuals. However, the conditions under which this may apply need to be further studied. This will be covered in the next edition of the *OECD Pensions Outlook*.

Finally, expressing fees as a percentage of total assets for cross-country comparisons could lead to confusion. Reporting the volume of fees collected yearly as a percentage of total assets in different countries allows to express different fee structures using the same reference as the asset-based fee. However, depending on the maturity of the asset-backed pension arrangements under comparison, it could lead to the conclusion that a country using a contribution-based fee charges higher fees than a country with an asset-based fee, because fees collected represent a larger share of the assets under management. This could hide the fact that both fee structures are neutral for the individual, as they result in the same loss of accumulated assets at retirement compared to a situation without fees (charge ratio).

Annex 3.A. Model description

Individual earnings are assumed to grow in line with productivity growth (p) and inflation (i). Earnings at a given year t (W_t) in discrete time¹⁹ can be written as a multiple of earnings in period 0 (W_0), when the individual is 25 years old:

$$W_t = W_0(1 + p)^{t-1}(1 + i)^{t-1} \quad \text{Equation 1}$$

The contribution rate (c) is a constant fraction of earnings. A fee on contributions (f_C) reduces the net contribution (C_t) into the plan as follows:

$$C_t = c(1 - f_C)W_t = c(1 - f_C)W_0(1 + p)^{t-1}(1 + i)^{t-1} \quad \text{Equation 2}$$

These contributions earn a constant rate of return r . Taking into account a fee on assets (f_A) and a fee on investment returns (f_R), the level of assets accumulated at time $t > 1$ (A_t) equals:

$$A_t = (A_{t-1} + C_t)[(1 + r)(1 - f_A) - \max(r, 0)f_R] \quad \text{Equation 3}$$

Assuming a positive rate of return (i.e. $\max(r, 0) = r$), at the end of the accumulation period ($t = T$), the level of assets equals:

$$A_T = c(1 - f_C)W_0[(1 + r)(1 - f_A) - rf_R] \frac{[(1 + r)(1 - f_A) - rf_R]^T - (1 + p)^T(1 + i)^T}{[(1 + r)(1 - f_A) - rf_R] - (1 + p)(1 + i)} \quad \text{Equation 4}$$

In the absence of fees, the equation simplifies to:

$$A_{T(\text{no fees})} = cW_0(1 + r) \frac{(1 + r)^T - (1 + p)^T(1 + i)^T}{(1 + r) - (1 + p)(1 + i)} \quad \text{Equation 5}$$

The charge ratio is the percent loss in the level of assets at the end of the accumulation period compared to a situation without fees. It is therefore $1 - \frac{A_T}{A_{T(\text{no fees})}}$. Using Equation 4 and Equation 5, one can immediately see that the charge ratio does not depend on the initial level of earnings (W_0) nor on the contribution rate (c). In addition, when there is only a fee on contributions (i.e. $f_A=f_R=0$), the charge ratio simply equals the fee rate (f_C).

Moreover, fees collected by the provider at time $t > 1$ (F_t) can be written as:

$$\begin{aligned} F_t &= cW_t f_C + (A_{t-1} + C_t)(1 + r)f_A + (A_{t-1} + C_t)rf_R \\ &= cW_t f_C + A_t \frac{(1 + r)f_A + rf_R}{(1 + r)(1 - f_A) - rf_R} \end{aligned} \quad \text{Equation 6}$$

For a contribution-based fee (i.e. $f_A=f_R=0$), fees collected in each year are simply equal to the product between the contributions paid (cW_t) and the fee rate (f_C). Therefore, by the end of the accumulation phase, the ratio of fees collected to the sum of contributions (before fees) is the fee rate (f_C).

Finally, for an asset-based fee (i.e. $f_C=f_R=0$) and a return-based fee (i.e. $f_C=f_A=0$), one can derive the reduction in yield directly from Equation 3. The reduction in yield equals $\frac{1+r}{1+r_N} - 1$, with r_N the net (after-fees) rate of return. For an asset-based fee, this gives $\frac{1+r}{(1+r)(1-f_A)} - 1 = \frac{f_A}{1-f_A}$. For a return-based fee, the reduction in yield is equal to $\frac{1+r}{1+r-rf_R} - 1 = \frac{rf_R}{1+r(1-f_R)}$.

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Notes

¹ Fees on salaries are equivalent to fees on contributions. For example, it is equivalent for an individual to contribute 10% of salary and pay on top a fee of 1.5% of salary, or to contribute 11.5% of salary and pay a 15% fee on contributions. The level of fees paid is the same in both cases.

² The model does not consider selected features that may exist in different countries and affect fee levels, such as collective investment, guarantees, risk mitigation techniques, biometric protection and annuities.

³ See Annex 3.A for the model description.

⁴ The analysis assumes a portfolio with 60% in equities (World and EU) and 40% in bonds (government and corporate).

⁵ The productivity growth rate (1.5%), the inflation rate (1.7%) and the nominal rate of return (5.7%) are drawn from historical values and correspond to the average of the respective distributions used for the stochastic model.

⁶ In practice, the provider may collect fees more frequently than annually.

⁷ The first real earnings growth path assumes that earnings grow at the beginning of the career and decline at the end of the career; the second path assumes that earnings grow at the beginning of the career and reach a plateau; the third path assumes that earnings are flat during the whole career.

⁸ For the mixed fee structures, the analysis fixes the asset-based fee at 0.5% and determines the fee on contribution (respectively on returns), so that the resulting charge ratio equals 20.5%.

⁹ Fees on returns are only charged when the performance is positive.

¹⁰ Annex 3.A provides formulas showing why, for a contribution-based fee, the charge ratio and the fees collected as a proportion of contributions are always equal to the fee rate.

¹¹ Alternatively, a 0.6% charge on assets produces the same level of fees collected as the 20.5% contribution-based fee, but a lower charge ratio of 13.0%.

¹² The time profile of fee collection is identical for the 1% asset-based fee and the 18.6% return-based fee.

¹³ Annex 3.A provides formulas showing that the charge ratio does not depend on the contribution rate.

¹⁴ The result holds when identifying fee structures producing the same median charge ratio (instead of the average) as the 1% asset-based fee.

¹⁵ This design is inspired by the one used by the Japanese Government Pension Investment Fund (GPIF) with its asset managers.

¹⁶ The median rather than the average is used here for fees collected, because the median is less sensitive to extreme values.

¹⁷ An asset-backed pension arrangement is mature when all cohorts of members have had the possibility of contributing to it for a full career. When the arrangement is introduced, individuals already in the labour market at that time can only contribute for the final part of their career. Once the arrangement only covers individuals contributing for their full career because the first cohorts of members have retired, assets under management represent a constant share of GDP and a steady state is reached.

¹⁸ Other reasons include the fact that all fees may not always be reported (e.g. indirect costs reducing the investment returns), and that fees charged may cover different types of services.

¹⁹ OECD (2001^[5]) presents a similar model in continuous time.



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