NEW DATA ON INDIVIDUAL PENSION WEALTH GROWTH

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EXTERNAL NOTE

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This note outlines the methodology utilised to estimate the yearly gains and losses of an individual's pension wealth by Danmarks Nationalbank (DN) in collaboration with Danmarks Statistik (DST). The note will document the method used to estimate the annual growth in pension wealth and will also show some descriptive results. The estimated measure of individual pension growth rates will be available for researchers in a new dataset (PENSFLOW) through Danmarks Statistik.

Introduction
The growth rates estimated in this exercise are, more specifically, the annual change in an individual's pension wealth, considering contributions and pension payouts.

As a starting point, we utilise the PENSFORM dataset to quantify an individual's pension wealth comprising four key components:

- Pension deposits.
- The share of accumulated value adjustments.
- The share of collective bonus potential.
- The allocation of special bonus provisions.

The interplay between these individualised pension wealth components is illustrated in Figure 1. The pension wealth data is merged with information on contributions and pension payouts.[1]

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[1] Contributions are from the register PENSINDB, INHP and IND. Payouts are from PENSUBL, PENSUDBE, and the experimental dataset on payouts from "Aldersopsparing" products estimated in collaboration with Danmarks Statistik – Read more in the paper *Estimering af udbetalinger fra aldersopsparing*, that is available under documents at https://www.dst.dk/da/Statistik/dokumentation/statistikdokumentation/formue-og-gaeld.

Figure 1

Relationship between individual-level and accounting-level pension wealth terms
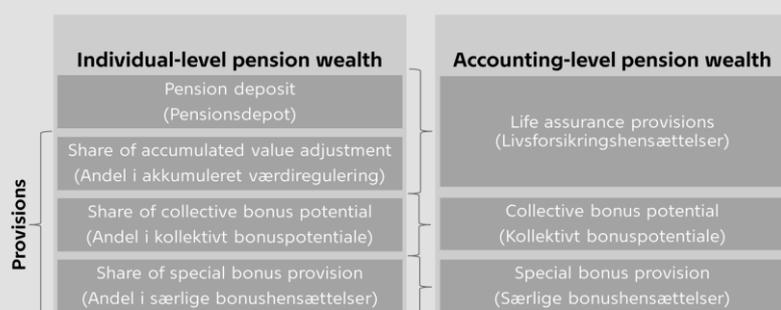
Note: The figure depicts the relationship between the accounting level measures, and the individual level data that is available in the dataset PENSFORM

Source: https://www.dst.dk/Site/Dst/SingleFiles/GetArchiveFile.aspx?fi=8964241959&fo=0&ext=finans and own adjustments.

When estimating pension wealth growth rates, it is crucial to differentiate between market-rate and average-rate products. Market-rate products have no guaranteed specific return for the pension holder. Instead, the return mirrors general market fluctuations more closely. An individual's pension wealth in a market-rate product consists of pension deposits and, in some cases, special bonus provisions.

Conversely, average-rate products consist of pension deposits, special bonus provisions, and additional provision elements: collective bonus potential and accumulated value adjustment. Holders of average-rate products are guaranteed a minimum return on their pension deposit. Thus, provisions are accumulated within pension funds in years of high returns to mitigate potential years of lower returns.

PENSION WEALTH GROWTH RATES

We identify two key metrics of growth rate: a gross growth rate and a net growth rate. The first takes contributions as given and does not remove expenses linked to administrative and risk coverage costs. This is necessary for a comparable measure across all types of institutes, as commercial banks and "firmapensionskasser" do not report administrative fees and risk coverage costs. The net growth rate, only available for pension funds, discounts contributions using the data on administrative fees and risk coverage costs available.

When estimating the growth of an individual's pension, we further dissect the gross and net growth rate metrics into four different metrics:

- A "**broad**" **gross** growth rate: considers all components of **pension** wealth (including the various reserves) and does not discount contributions with administrative fees and risk coverage costs.
- A "**narrow**" **gross** growth rate: considers only pension deposits and special bonus provisions and does not discount contributions with administrative fees and risk coverage costs.
- A "**broad**" **net** growth rate: considers all components of **pension** wealth (including the various reserves) and does discount contributions with administrative fees and risk coverage costs.
- A "**narrow**" **net** growth rate: considers only pension deposits and special bonus provisions and does discount contributions with administrative fees and risk coverage costs.

The broad gross growth rate is the only measure available for all institutions, including Arbejdsmarkedets Tillægspension (ATP), a statutory Danish lifelong supplementary pension that by law includes everyone active in the Danish labour market, and Lønmodtagernes Dyrtidsmidler (LD).

The narrower definition of net growth rate is formulated to represent the optimal gauge of pension wealth growth from the perspective of the individual, ignoring the provisions kept in a pension fund.

MAIN RESULTS

Figure 2, panel (a) dissects the gross growth rate held in the different types of institutions. Here, the grey line corresponds to market rate products, the red and pink lines depict the narrow and broad growth rate of average rate deposits, respectively, the light grey line denotes "firmapensionskasser", the dark gold line LD, the light blue line ATP, and the beige line commercial banks. Panel (b) reports the net growth rate (both broad and narrow for average-rate products) of pension products in pension companies. The different availabilities between gross and net measures are due to a reporting asymmetry: We can correct individual contributions for risk and administrative cost deduction within pension companies, while we cannot for commercial banks, "firmapensionskasser" and ATP.
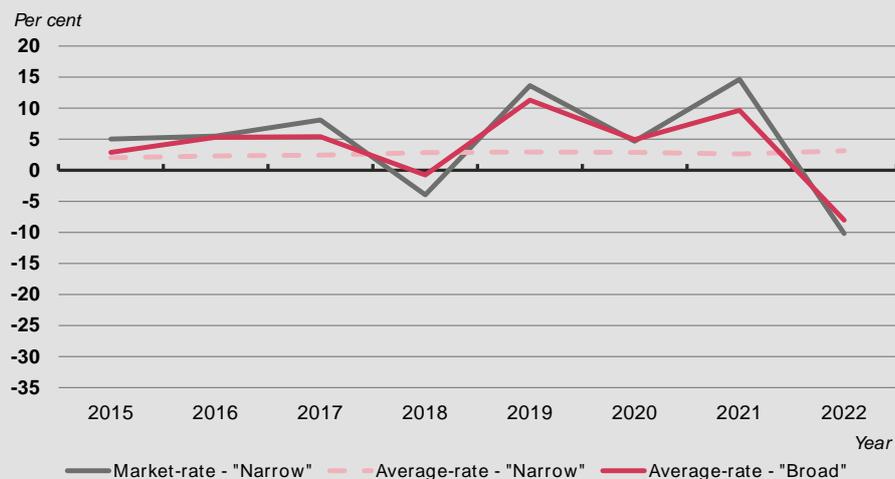
Figure 2

Evolution of pension wealth growth rates over time - median

Gross growth rates
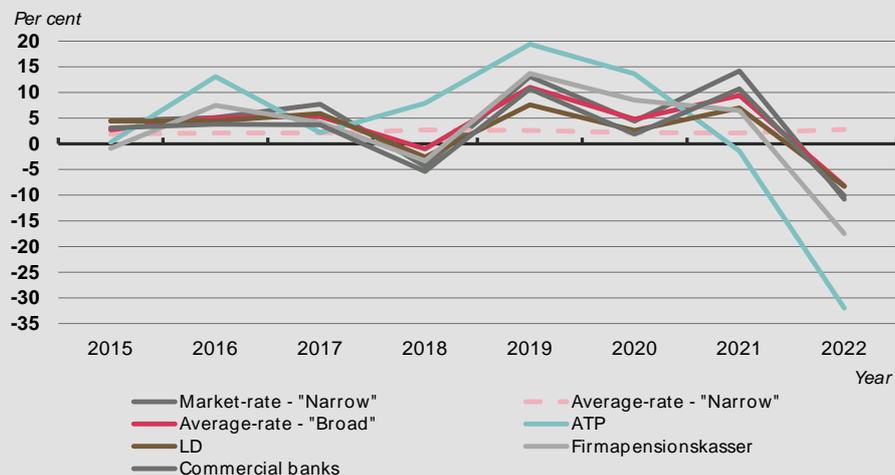
Net growth rates

Note: The figures show the median return over time. For net measures, the growth rates are net of administration costs and risk premia, whereas the gross growth rates are not corrected for costs.

Source: PENSFLOW and own calculation.

Interestingly, the median growth rates for both market rate and average rate products, including all collective reserves, exhibit an almost identical trend. This pattern holds for commercial banks as well. However, the median rate is slightly lower as it is influenced by a concentration of deposits with no growth, possibly in the form of cash deposits and by a significant mass of deposits with a relatively small size (less than kr. 50,000).

Table 1

Distribution of gross growth rates excluding collective reserves

Year	Perc. 25	Perc. 50	Perc. 75	N
		Market-rate products		
2015	2,6	4,5	5,9	2.963.046
2016	3,6	5,1	6,4	3.433.937
2017	5,8	7,7	8,9	3.700.671
2018	-6,4	-4,4	-2,7	3.693.232
2019	10,4	13,1	15,3	3.916.801
2020	2,5	4,4	5,7	4.221.301
2021	10,5	14,2	16,3	4.279.400
2022	-14,7	-10,8	-8,5	4.290.015
		Average-rate products		
2015	0,2	1,9	4,8	1.695.958
2016	0,4	2,1	3,9	1.733.661
2017	0,7	2,1	3,6	1.666.254
2018	1,2	2,7	4,6	1.549.567
2019	1,1	2,6	3,5	1.387.974
2020	0,3	2,2	4,1	1.442.360
2021	0,8	2,1	3	1.411.498
2022	0,7	2,8	4,9	1.316.128
		Firmapensionskasser		
2015	-1,9	-0,9	1,2	2.403
2016	5,3	7,5	10,7	2.659
2017	-0,55	4,1	7,3	2.648
2018	-6,2	-3,3	-3	2.222
2019	8,5	13,7	15,4	2.077
2020	7,4	8,5	10,7	1.609
2021	-1,3	6,5	9	1.603
2022	-18,1	-17,5	-13,2	1.219
		Banks		
2015	0	3,1	7,7	774.929
2016	0,1	3,8	6,1	850.257
2017	0,3	3,7	5,3	868.686
2018	-8,6	-5,4	0	765.628
2019	0	10,7	16,8	791.247
2020	0	1,9	6,7	766.051
2021	2,4	10,7	16,5	730.345
2022	-14,6	-10,1	5	742.648

Note: The tables show the 25th, 50th, 75th percentile of the pension net growth rate split by years and by product type.
Source: PENSFLOW and own calculations.

Table 1 presents annual growth rate quartiles by product type. To construct both tables and graphs, we excluded deposits of less than kr. 10,000. This criterion is

due to the inherently highly volatile growth rate of small deposits and the often-negative returns due to fixed administrative costs.

SAMPLE SELECTION

The new dataset called PENSFLOW includes individuals in their contribution phase, excluding those under 20 years of age and anyone receiving either a lump-sum or recurring payouts (i.e. payments registered in PENSUDBE, PEN-SUDBL, INHP, imputed payments from *aldersopsparing* savings scheme, or payments from ATP). The decision to omit retirees stems from the absence of contract-level microdata on payouts and the intricate challenges of pricing annuities and instalment pensions during the payout phase. These intricacies, combined with guarantees offering annuities even when actual deposits are depleted, complicate the process of accurately calculating returns for retirees, making their data noisy.

The datasets used for this analysis are as follows:

- The production version of PENSFORM – data collected and compiled by DN in collaboration with DST and the Danish Tax Agency.
- PENSINDB – tax data on pension contributions.
- IND – ATP contributions and payouts.

These datasets are the cornerstones of our estimation, encompassing exhaustive stock and flow data for pension accounts.

To determine individual growth rates at the level of individual-fund-pension type-tax code, we match the data on annual contributions to the dataset containing pension deposits. We perform this matching at the individual-fund-tax code level. However, since the contract IDs may not always match across datasets, an alternative matching strategy is needed. Some cases have multiple contracts for a given individual-fund-tax code combination, making it necessary to rank actual contributions and annualised contributions in PENSFORM within that combination and then use the individual-fund-tax code-rank variables for the match.[2] A final note concerns products with tax code 81, which denotes pension schemes without the right of tax deduction. Here, data on contributions from CPS is missing.[3] We therefore blank all returns in this category.

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[2] In instances where two or more contributions for a particular individual-fund-tax code are almost identical, and their order may vary between the contributions and PENSFORM data, a slight risk of incorrect matching arises. However, this discrepancy is negligible, as such cases only happen for contributions of extraordinarily similar values.

[3] For reference: https://www.dst.dk/da/Statistik/dokumentation/Times/moduldata-for-formue-og-gaeld/pensionsformue/cpsskatkod

Consolidation and movements across funds

During certain life events - such as changing employment, firm-level negotiation adjustments, or personal financial decisions - individuals may transfer their pension wealth from one company to another. This can be part of an effort to consolidate pension wealth, thereby reducing administrative expenses and managing investments more proficiently. Moreover, people may switch to different products within the same fund, which is going to have a bearing on their future pension payouts.

To precisely calculate the net growth of pension wealth and preclude any hidden administrative fees resulting from the disinvestment and reinvestment of products, we closely monitor all wealth movements that are not matched by corresponding contributions or payouts. We categorise several types of "shifters":

- Shifter across pension companies (PFL_shifter = 1): the destination of a transfer is a pension fund.
- Shifter across commercial banks (PFL_shifter = 2): the destination of a transfer is a bank.
- Shifter across *"firmapensionskasser"* (PFL_shifter = 3): the destination of a transfer is a "firmapensionskasse".
- Shifter within pension fund (PFL_shifter = 4): change in pension product within the same pension fund.
- Shifter within commercial banks (PFL_shifter = 5): change in pension product within the same bank.
- Shifter within *"firmapensionskasser"* (PFL_shifter = 6): change in pension product within the same "firmapensionskasse.
- Residual shifter (PFL_shifter = 7): any other transfer not included in the above categories. If observations have an estimated growth higher than 75 per cent in absolute value, we also flag them as shifters.
- Closing contracts (PFL_shifter = 8)– we include observations in year *t* for all contracts closing in year *t*, hence having pension wealth at the end of year *t* equal to 0. We denote these as closing contracts.
- 0-wealth contracts (PFL_shifter = 88) – observations that report zero wealth in both year *t* and *t-1*.

Figure 3 delineates the proportion and total number of 'shifters' among individuals actively contributing between the ages of 20 and 65 in 2021. These wealth transitions are more prevalent among individuals in their twenties and diminish gradually with age, with an average rate of about 7 per cent across all age groups (excluding 0-wealth contracts). Wealth transfers across institutions represent around 2 per cent of all observations across age groups, while within-fund transfers around 1 per cent. Residual shifters consist of approximately 4 per cent of all observations.
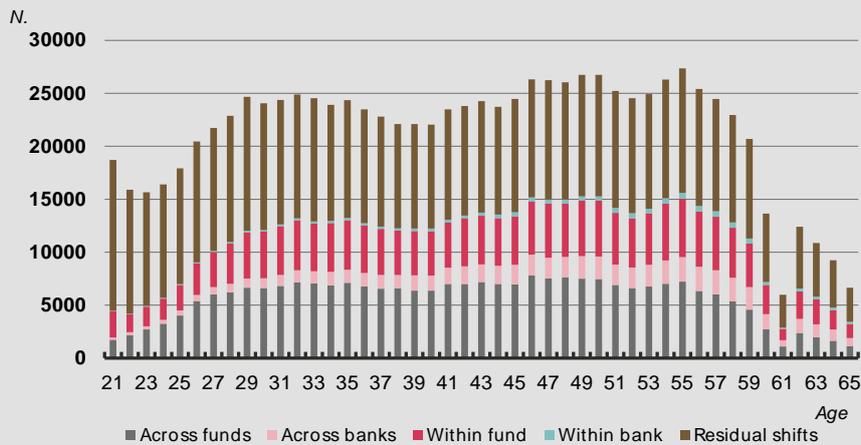
Figure 3

'Shifters' across the life cycle

Share of shifters across age
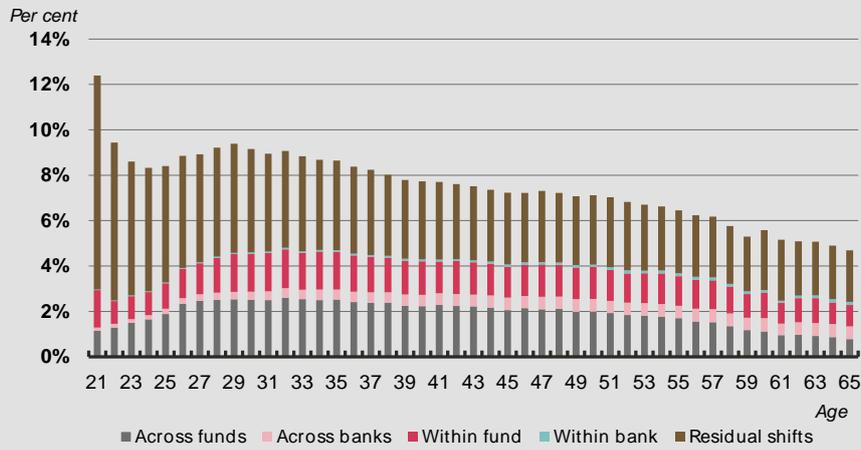
Number of shifters across age

Anm.: The figures show the count and share of people shifting wealth across funds or products within fund in 2021. Any other transfer not included in the above categories is categorised as residual shifter.

Kilde: PENSFLOW and own calculations.

METHODOLOGY

To estimate the growth rate of individual i for product p and tax code s in year t, we employ the Dietz (1968) method:

$$r_{ipt} = \frac{d_{ipst} - d_{ips(t-1)} - f_{ipst}}{d_{ips(t-1)} + \frac{1}{2} f_{ipst}},$$

where d_{it} denotes the total stock of pension wealth for individual i measured at the end of year t, while f_{it} denotes the total pension contribution by individual i during year t. d_{it} and f_{it} differ across the four metrics of growth rates we estimate. In the "broad" measures, the stock d_{it} includes all deposits and reserves. These measures mirror not only the growth rate of wealth but also the wealth buffers accumulated during times of high returns. Pension companies leverage these buffers to assure guaranteed returns for average rate product holders during difficult economic cycles. However, these metrics may not accurately depict the wealth an individual can withdraw from the company. In the "narrow" measure the stock d_{it} includes only deposits and special bonus provisions.

Additionally, our gross measures take contributions f_{it} as given, while our net measures removes from contributions administrative fees and risk coverage costs. Both the broad and narrow gross measures are available and comparable across all types of institutions.[4] Net measures are only available for pension companies as data on administrative fees and risk coverage is not reported by commercial banks, "firmapensionskasser", ATP and LD.

HETEROGENEITY

Fund-level growth

As a robustness check, we construct yearly fund-level growth rates throughout the period. Figure 4 illustrates the return distribution by year and fund type for pension funds and commercial banks.

Figure 4

Distribution of fund-level growth by year and fund-type

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[4] Except ATP whose wealth only consists of reserves – hence our "narrow" definition of growth rate does not apply.
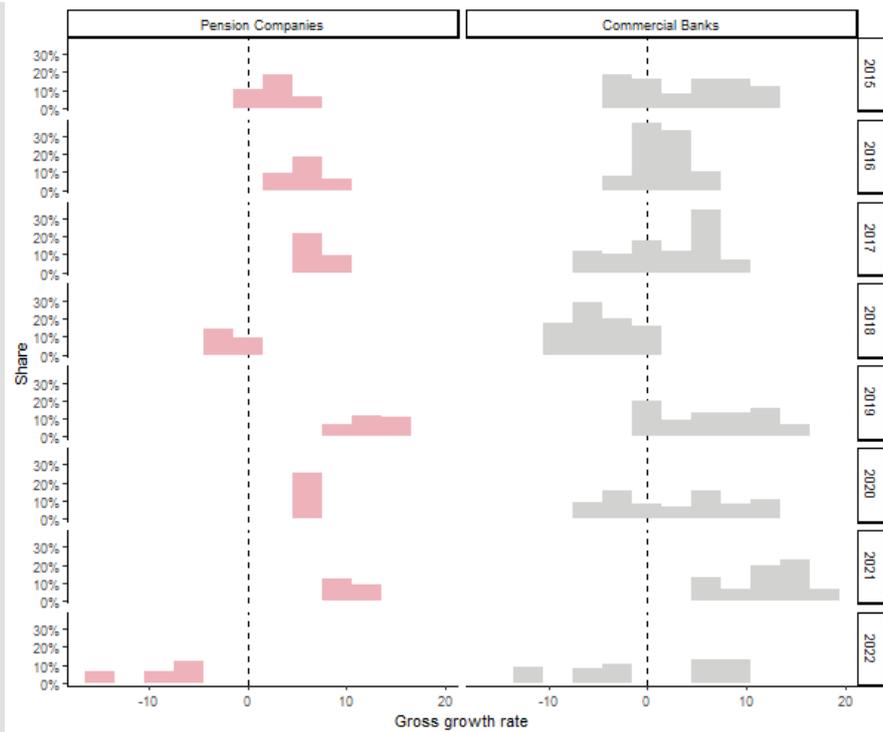
Note: Growth rates for pension companies are net of risk coverage and administration costs whereas growth rates for banks are gross rates. Columns with fewer than three funds have been blanked for confidentiality reasons.
Source: PENSFLOW and own calculations.

Distribution of gross growth rates across the life cycle

Funds typically reduce the investment risk to protect pension savings as individuals age, even within the risk category selected by the pension saver. Figure 5 presents the 2021 median of the narrow definition of gross growth rates by age for various product types. The light pink bands denote the first and third quartiles of the gross growth distribution within a given age bin.

- **Market-rate products**: The top-left graph depicts the growth rate of market-rate products. The distribution is relatively narrow, with the first and third quartiles not far apart, signaling similar investment portfolios and risk management choices across the different companies. The figure also shows the life-cycle component as the gross growth rate has a higher standard deviation for young individuals and gets more stable and conservative as people approach retirement age. This could come both from fund-level investment decisions and individual choices as young people might also be less risk-averse given the long-time horizon and might self-select into higher-risk portfolios.
- **Average-rate products:** The top-right graph shows the growth rate of average-rate deposits, excluding all reserves. As expected, the distribution is very stable across the different age groups and varies a lot less across years. Moreover, the distribution is highly compressed, with the

first and third quartiles being extremely close to the median. For completeness, the mid-right graph depicts the gross growth rate of average-rate products, including all reserves. Notably, the distribution is much more volatile than that of market-rate products.

- **Products in commercial banks:** On the mid-left, the graph depicts the gross growth rate of products in commercial banks. The notably higher dispersion signals less uniform investment behavior and product compositions. Gross growth rates increase and peak around 50 years of age. After that, as people near retirement, we see the usual decline in both levels of gross growth and in standard deviation signaling more conservative investment choices. The large dispersion for people aged under 30 is also due to the smaller set of individuals having private pensions in commercial banks at a young age.

- **Products in firmapensionskasser:** On the bottom-left, the graph depicts the growth rate of products in firmapensionskasser. As firmapensionskasser are company-level funds that constitute a part of the old Danish pension system, only few older individuals still have residual funds left.

- **ATP:** Finally, the bottom-right graph shows the growth rate in Arbejdsmarkedets Tillægspension (ATP). As a fully guaranteed, and highly regulated pension, ATP assigns returns to individual level deposits according to specific actuarial rules[5].

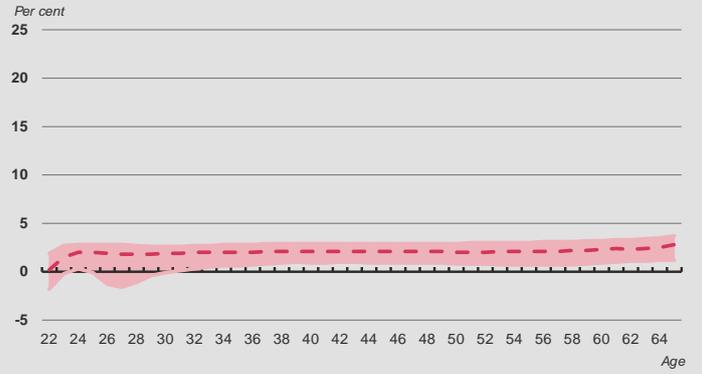[5] Read more at https://www.atp.dk/dokument/garanteret-pension

Figure 5

Gross growth-rates across life cycle by product type in 2021

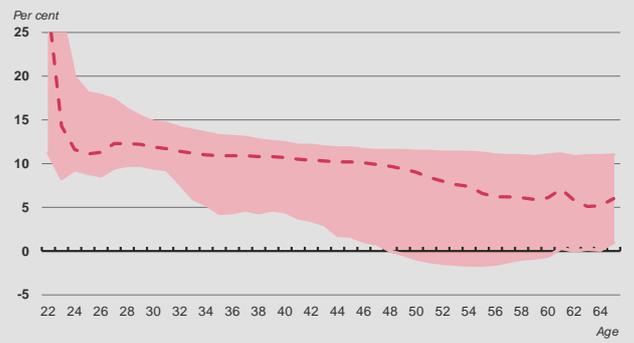Market-rate products – "Narrow"
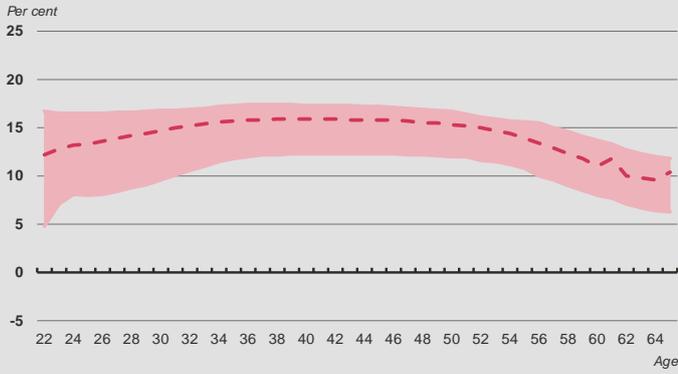
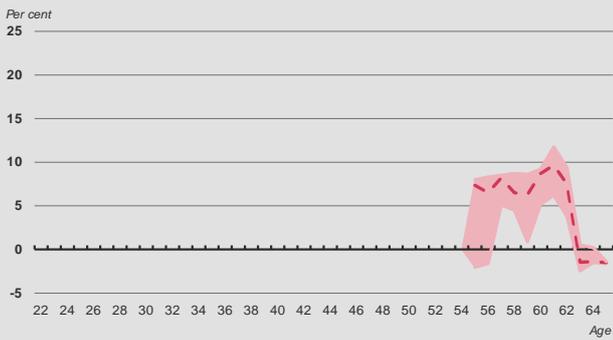Average-rate products – "Narrow"
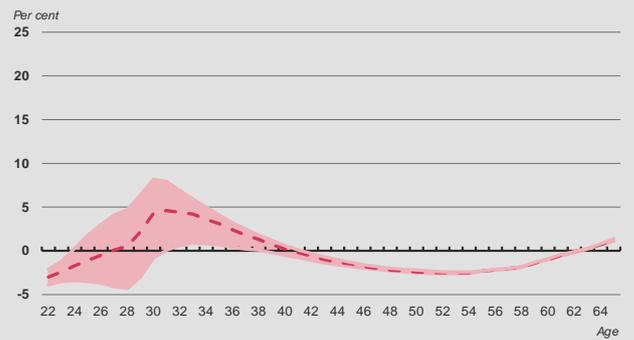

Banks

Average-rate products – "Broad"

Firmapensionskasser

ATP

Source: The figures depict 2021 median of the narrow definition of gross growth rates by age for various product types. The light pink bands denoting the first and third quartiles of the gross growth distribution within a given age bin.
Note: PENSFLOW and own calculations.