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Pension Fund Clients Trapped by Low Returns and High Fees

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IDEA CERGE EI
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Study 1/2026

Pension Fund Clients Trapped by Low Returns and High Fees[1]

JANUARY 2026

LUKÁŠ NÁDVORNÍK*, FILIP PERTOLD*

Summary

The current Czech third-pillar capital-based pension savings system **fails to deliver on its purpose**. It requires citizens to make **unrealistically high contributions** due to **extremely low effective returns** and a **high fee burden**. A fundamental revision is necessary, as maintaining the status quo risks fees depriving fund clients of up to **half of their returns**.

- **10x Higher contributions for the same benefit:** Due to low returns and high costs, the average client in the Czech Republic must contribute up to **10 times more** funds than a client of Slovak index funds to achieve the same capital rent.
- **Dynamic funds lag significantly:** Even the most profitable part of the pillar—Dynamic Funds—lagged behind market returns by **more than 5% annually** and delivered less than half the appreciation compared to foreign low-cost index funds (e.g., Slovakia, Sweden).
- **Fees absorb up to half of wealth:** High fees in dynamic funds can deprive a client of up to **50%** of their future wealth over a 40-year horizon; in the last decade, they **erased 37–49%** of the funds' total returns.
- **Solution - reduce costs, introduce life-cycle funds, and better target state support:** Key improvements involve revising fee caps to incentivize pension companies to create low-cost index funds and introducing a mandatory life-cycle strategy that automatically increases yield potential. State support should be directed only towards clients investing in funds that make the most sense from a pension perspective—specifically, life-cycle funds and more dynamic funds.

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* CERGE-EI, a joint workplace of Charles University and the Economics Institute of the Czech Academy of Sciences.

The Czech capital pillar in trouble and how to repair it?

With population aging in most European countries, there is growing pressure on pay-as-you-go pension pillars. According to current projections, this pressure will peak in the 2040s (Czech National Budget Council), with increases in fiscal expenditures on pensions and reductions in the replacement rate expected, particularly for high-income groups.

One effective way to increase individual pensions is through a functional funded pension pillar. The funded pillar invests citizens' capital in the global economy, so its effectiveness does not depend on domestic demographics and economy, and it supports the pay-as-you-go pillar in times of pressure.

A functional capital pillar is therefore required not only to protect deposits from inflation, but above all, to increase individual's security in retirement.

Following the abolition of the second pension pillar in 2016, the Czech Republic has only one capital pillar remaining – the so-called third pillar. It consists of two main parts: (1) *Transformed funds (TF)*. These were created by transforming the original supplementary pension insurance, which had existed since 1993 and was terminated by the 2013 reform, and (2) *Supplementary pension savings (SPS)*, which have been in operation from 2013 to the present.

TF funds that are no longer open to new clients typically offer a guaranteed non-negative annual return, highly conservative assets, and the option of a lifetime pension in the form of an annuity, based on mortality tables. SPS, in contrast, is open to new clients. It allows them to choose an investment strategy by entering the Conservative, Balanced, and Dynamic Participation Fund (PF), offers the possibility of *early retirement*, and any lifetime pension is settled with a one-time payment and a transfer of funds to a life insurance company. As of the third quarter of 2025, 45% of participants and 55% of the capital of the third pillar were enrolled in TF [1]. Other state-supported pension products include *Investment life insurance* and *Long-term investment products (LIP)*[2].

[2] LIP is more of a trading account regime and an "envelope" than an actual product. Its nature, yield, and fee structure are heavily dependent on the products that fill the "envelope." It is therefore a very diverse tool that is suitable for clients with knowledge in the field of investments.

This study focuses on the standard fund pension pillar (SPS+TF) as a solution for the general public.

Czech capital pillar: dysfunctional, not thriving, but with potential

A functional capital pillar delivers a sufficiently high capital return for as many citizens as possible. In these two respects, the Czech third pillar is only halfway there:

Number of participating citizens: Very high, but declining since 2012. As of the third quarter of 2025, there were 3.9 million participants[3] in the entire pillar, representing 42% of the population over the age of 15 [1, 2]. This is a high penetration rate even compared to OECD countries [3]. However, this number has been declining since its peak in 2012, when it reached 5.1 million participants and 57% of the population over the age of 15, at an average rate of 94,000 participants per year (~ 2.5% per year). There has been a sharp decline in the number of participants in TF (~ 258,000 participants per year), which is not offset by a sufficient increase in participants in SPS (~ 164,000 participants per year).

Capital annuity: Low and collected as a lump sum. As in previous years, the vast majority of capital from the pillar was collected at once, i.e., as a lump sum settlement (82% of capital), representing an average of CZK 139,000 per person [4]. This amount is small in view of the requirements for increased old-age security, as itrepresents an annuity of only CZK 580 per month for 20 years. This is less than 3% of the current average old-age pension [5]. If we limit the data to SPS participation funds, one-off settlements (66% of capital) amounted to only CZK 116,000 per person. [4].

Clearly, in the more than 30 years since its launch in 1994, the Czech voluntary capital pillar has failed to find a sufficiently meaningful function in the Czech pension system. Citizens who leave it today after reaching the age of at least 60 take away an amount that cannot in help any relevant way to supplement the state pay-as-you-go pension.

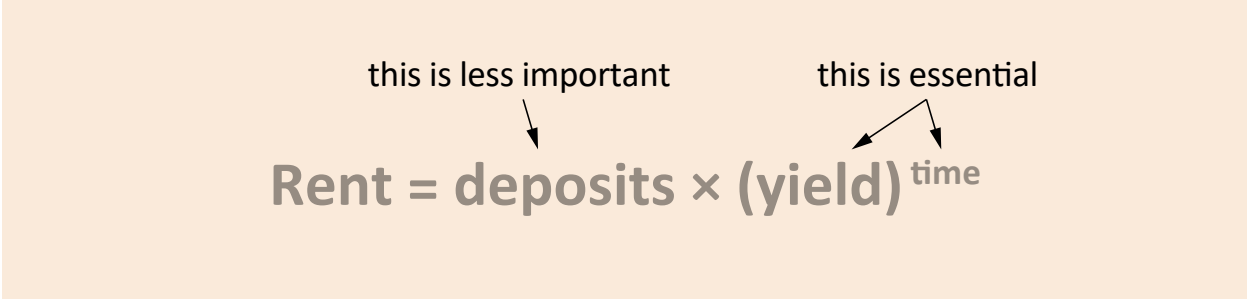
We do not expect that the situation will improve in the future without more fundamental changes to the pillar. Although one-off settlements per person have grown slightly over

[3] For comparison, as of September 30, 2025, 184,000 contracts (participants) were registered in the LIP. Source: Press release AKAT (20. 10. 2025)

the last 10 years, the average rate of less than CZK 9,000 per year represents real growth of 4-5% per year after taking inflation into account. For the pillar to function meaningfully, individual pension accounts need to be in the order of millions of crowns, not low hundreds of thousands.

What matters is the return and time, not the size of deposits or contributions

Although it may seem – for example, from current parametric adjustments to the pillar[4] – that the reason for the low balance of participants' pension accounts and their ineffective functioning is small deposits made by citizens (these currently average CZK 1,100 per month) and/or low employer contributions (CZK 1,200 per month for 35% of participants), the key to a richer capital pillar lies in **sufficiently high returns** and **sufficiently long savings periods** for participants.



The reason for this is the compound interest on invested funds in the capital pillar and its exponential nature. In long-term investing, of which lifelong contributions to the pension capital pillar are a textbook example, it is necessary to focus on return and time.

It should be noted that state contributions alone represent a 20% increase in participants' contributions and motivate them to participate in the pillar and to make higher contributions. However, the principle of compound interest in the capital pillar shows that focusing reform efforts on increasing contributions is ineffective in the long term. Relatively significant state expenditures on the third pillar (contributions and the cost of tax relief), which, according to the Fair Pensions Commission, amounted to CZK 19 billion in 2019 and 13% of personal income tax collected [6], should be directed towards optimizing more effective parameters of the problem: extending the savings period, i.e., getting young people into the pillar as early as possible, and paying out annuities instead of a lump

[4] The 2024 reform increases the minimum contribution required to receive a state subsidy from CZK 300 to CZK 500, increases the absolute amount of the state subsidy for higher contributions, and reduces it for lower contributions. It also increases the tax deduction from CZK 24,000 per year to CZK 48,000 and the required participant contribution to obtain it from CZK 1,100 to CZK 1,700.

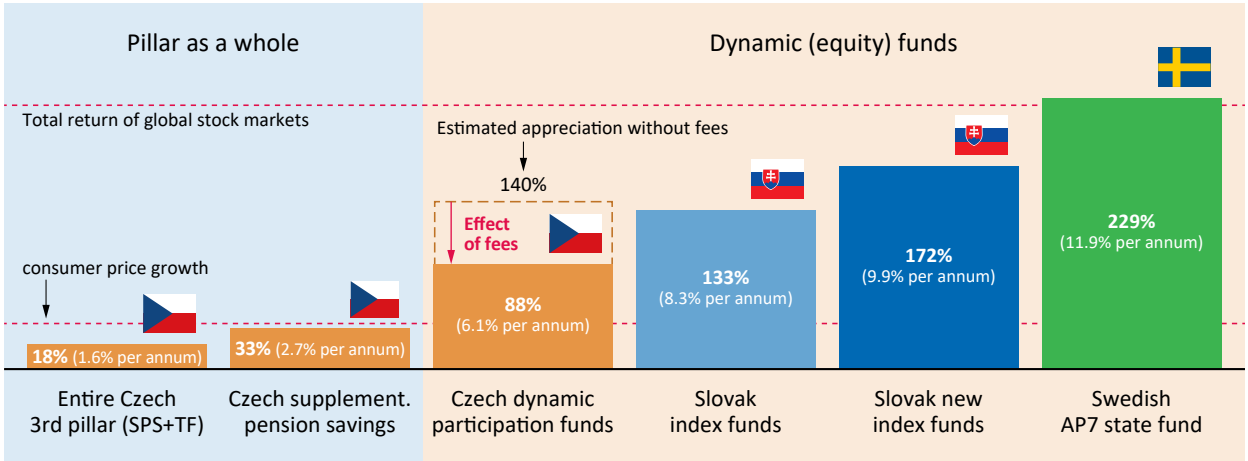
sum upon citizens reaching a specified age, and increasing the pillar's returns rather than motivating higher contributions. This analysis further elaborates on returns.

Returns on the third pillar are insufficient and returns on dynamic funds are too low

The returns on the Czech capital pillar have been extremely low for a long time. This has been criticized by many expert and international organizations, including the OECD [3], the Fair Pensions Commission [6], and the National Budget Council of the Czech Government [7].

The situation is illustrated in **Fig. 1**. Over the past decade (June 2014 – January 2025), the entire 3rd pillar (SPS + TF) brought clients a total return of 18%, without taking into account state contributions and tax relief. During the same period, inflation reduced the real value of these savings by more than 35% [8]. TF performed even worse, yielding only 14%. The entire SPS, i.e., the part of the pillar that is still open to new entrants, achieved a return of 33% during this period and also resulted in a loss of capital.

Fig. 1: Overall assessment of the Czech third pillar and its components vs. more successful pillars abroad
over the last 10 years (6/2014–1/2025), including fees, converted to CZK



Note.: All returns are for the period from June 2014 to January 2025, after internal fund fees have been taken into account and converted into Czech korunas. The "Entire 3rd pillar" represents the capital-weighted return on all 3rd pillar funds (transformed funds and all SPS funds), "Supplementary pension savings" represents the capital-weighted return on all funds in the SPS, "SPS – dynamic funds only" represents all dynamic funds from the SPS, "Slovak index funds" represent the capital-weighted return of all funds from the non-guaranteed Slovak 2nd pillar that follow an index strategy, "Slovak new index funds" are index funds established after 2012, "Swedish AP7 State Fund" is the return on the equity/dynamic portion of the AP7 supplementary fund. The upper dotted line represents appreciation of the ETF on global equities (iShares Core MSCI World), while the lower dotted line shows the effect of inflation through consumer price growth. The dotted rectangle shows the effect of fees charged: this is an estimate of the appreciation of Czech dynamic funds if a fee of 1% + 15% of the average return were not charged.

The reason for the exceptionally poor returns for the entire pillar and for SPS is the historical dominance of TF in the pillar and more conservative funds in SPS, where low returns are part of the investment strategy. Clearly, this strategy is completely unsuitable not only for the function of the pillar, but also because it fails to meet the simple requirement of maintaining the purchasing power of its clients.

However, the structure within the SPS is gradually changing, and capital is increasingly shifting to dynamic funds (as of January 2025, dynamic funds outnumber other types). This is a positive trend, as these funds are the most profitable within the current pillar. **However, even these predominantly equity funds, which aim for the highest returns, achieve unsatisfactory returns relative to examples of good practice from abroad.** While Czech dynamic funds have achieved an appreciation of 88% over the last decade, index pension funds from the Slovak mandatory second capital pillar increased in value by 133% [9]. These funds are very popular[5], and have a very low-cost structure and a passive, index-based strategy. Slovak index funds established after 2012 achieved even higher returns and delivered almost double the appreciation (172%) compared to Czech dynamic funds after conversion to Czech koruna. The significant[6] Swedish AP7 Safa low-cost state fund [10] has also been exceptionally successful in the long term, delivering a return of 229% in its dynamic class and outperforming global equity markets, represented by the MSCI World ETF fund, which returned 220% (i.e. 11.6% per annum). Czech dynamic funds thus lagged behind the performance of global stock markets by approximately 5.5% per annum[7].

With higher returns, smaller amounts can be saved with the same result

The very significant impact of long-term returns on the function of the pillar can be demonstrated using a model that compares how much must be saved monthly during a citizen's working life into hypothetical funds with different expected returns to obtain the same benefits in retirement. We find that 40 years of deposits would be necessary for a citizen to withdraw CZK 10,000 per month from the fund for 20 years, taking into account price growth (more detail appears in the description of **Figure 2**). For each

[5] Slovak index pension funds hold 73% of capital in the non-guaranteed part of the second pillar, making them a relevant representative of that pillar.

[6] According to the Swedish Pension Agency's report for 2024, almost 70% of Swedes were employed or self-employed in AP7.

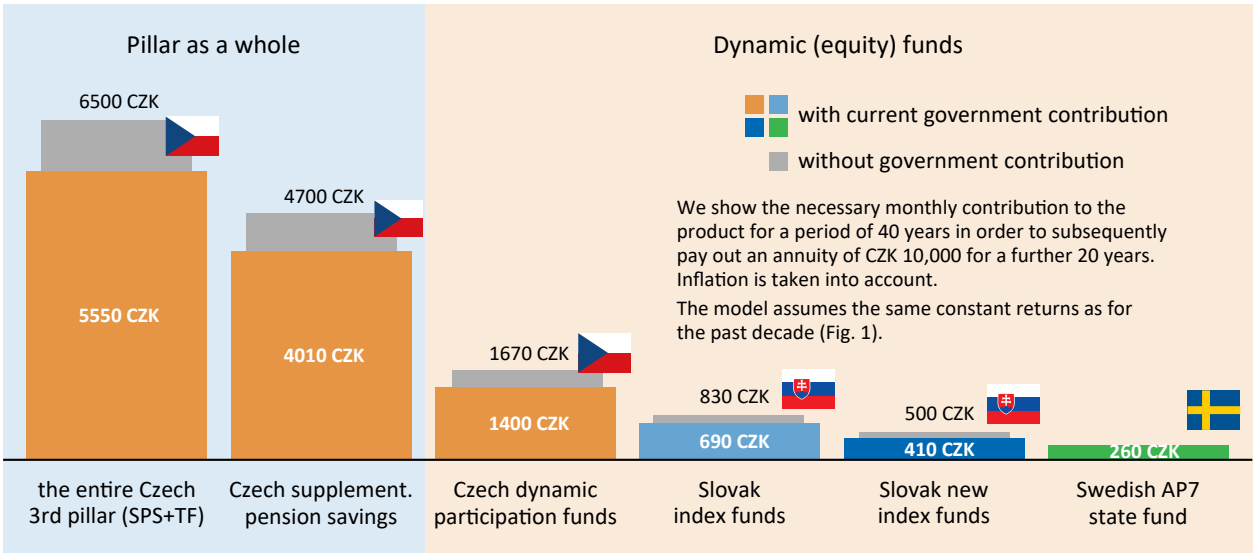
[7] After accounting for fund fees. Global equity funds are approximated by ETFs (ticker EUNL) on the MSCI World Index with an internal TER fee of 0.2% per annum. All have been converted to CZK for this study.

case, we set a long-term return equal to the returns over the last 10 years, as shown in **Figure 1**. It should be noted that this simulation aims to show the dramatic impact of returns on the effectiveness of the capital pillar, not to predict the future returns of various investment strategies.

This model shows that, to achieve exactly the same retirement benefit, it is necessary to set aside over 10 times more with conservative strategies than with effective dynamic funds. Specifically, the entire Czech SPS with its current distribution of capital between conservative, balanced, and dynamic funds would require a monthly deposit of over CZK 4,000, while the new Slovak index funds require deposits of only CZK 410 to achieve the same benefit for its clients. Given the current average deposit of CZK 1,100, the problem with the Czech pillar is not insufficient deposits by participants, but rather the pillar's excessively low returns, which are extremely inefficient in this regard. Similarly, it is clear that state subsidies do not have a significant effect under the current system and their purpose is primarily motivational rather than financial.

Fig. 2: Monthly savings required for a monthly pension of CZK 10,000 in retirement

The simulation demonstrates the dramatic impact of returns on the function of the pillar; it is not a prediction of future returns.



Note: Simulation of necessary monthly deposits into hypothetical funds with long-term returns identical to the current returns from Fig. 1 to obtain the same retirement benefit. A savings period of 40 years is considered, with monthly deposits at the amount shown, which are increased by inflation at a constant rate of 2.5% per annum. 40 years of deposits are followed by 20 years of withdrawals of CZK 10,000 per month (in today's prices), increased by inflation. After 20 years of withdrawals, the portfolio is completely depleted. Details of the model are described in the Methodology section.

In other words, if the current average contributions to the Czech third pillar were invested in a fund with the performance of the new Slovak index funds to date, the hypothetical

pension would amount to CZK 27,000 per month for 20 years (at today's prices), and in the case of the Swedish AP7 state fund, it would reach CZK 52,000 per month.

Once again, we see that the current pillar would not be effective even if most participants invested in dynamic funds within the SPS. Here, too, the low return relative to the comparisons has a dramatic effect on the ability to generate a worthwhile pension for low deposits.

Fees reduced fund returns by as much as 50%

To understand the basic reasons for the low returns from Czech dynamic funds, it is useful to estimate the effect of their fee structure. **Figure 1** shows the hypothetical return of these dynamic funds without fees, indicated by a gray dotted rectangle with a simulated appreciation of ~140%, which is more than half as much again as with fees. It is clear that fees play a significant role in long-term appreciation, and we next focus on them in more detail.

Table 1 provides an overview of the current fee structure and its simulated impact on the returns of all funds considered. The fee structure of Czech funds is based on the statutory fee limits applied by almost all 50 funds, excepting only two[8]. Two pension companies return a small portion of the fee from the volume in the form of a bonus if certain conditions are met[9].

The modeled impact of fees on returns is also significant over a ten-year horizon (6/2014–1/2025; we simulate a longer horizon in the following section of the analysis). Over this horizon, fees on transformed funds wiped out almost half of their total appreciation, and SPS funds wiped out around 40% of their returns. Although the fee structure of Slovak index funds has changed significantly over time, for comparison and illustration purposes, we can calculate that today's fee of 0.4% per annum would deprive these funds of 7% of their appreciation. Similarly, a Swedish low-cost AP7 fund with a fee of 0.07% per annum would hypothetically eliminate only 1% of returns over this period.

[8] These are Czech Etic PF, where the performance fee has been reduced from 15% to 10%, and KB Peněžní PF, which applies the fee schedule for mandatory conservative funds.

[9] This is Rentea, which, in the form of a public promise, returns 1% of the volume every 5 years (effectively a 0.2% p.a. lower ongoing fee on the volume) on condition that the statutory fee limit is not reduced. Conseq returns 10–25% of the fee from the volume to a special fund for savings periods of 10–25 years, from which bonuses are transferred to clients.

Table 1: Typical fund fees and their impact on historical returns

Fund type	Annual ongoing charge	Portion of returns lost due to fees
Transformed funds	~1,0%* (0.8% of volume + 10% of return)	49%
Conservative funds (SPS)	~0,6%* (0,4% of volume + 10% of return)	37%
Balanced funds (SPS)	~1,8%* (1,0% of volume + 15% of return)	42%
Dynamic funds (SPS)	~2,3%* (1,0% of volume + 15% of return)	37%
Slovak index pension funds	0,4% of volume [11]	7%**
Swedish AP7	0,07% of volume [10]	1%**

*Table 2: Overview of the current maximum statutory fees for funds in the study, which the vast majority of funds apply. For Czech funds, we also estimate the effective fee based on historical average returns for the period 6/2014–1/2025. The right-hand column contains an estimate of the portion of fund returns lost during this period due to the existence of the fee, based on an estimate of the effective fee. * These are estimated values, and are close to the actual values. ** Funds have historically reduced fees; this calculation assumes the current fee for the entire period to illustrate the impact of a low-cost fee structure; it is not a quantification of the actual historical value.*

Current fees could can cost participants up to half of their future assets in the long term

Ongoing fees play an even more significant role in long-term lifetime retirement savings. This effect of fees is illustrated by the simulation in **Fig. 3**.

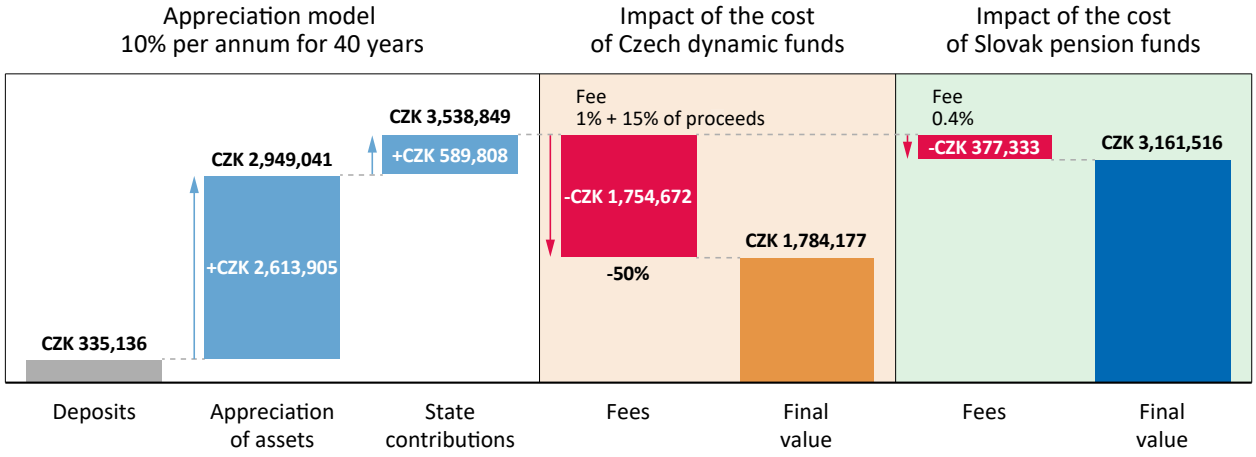
Here, we consider an accumulation phase of 40 years of monthly deposits equal to the current average 1,100 CZK monthly deposit into the SPS, instead deposited into a hypothetical dynamic fund with an internal rate of return of 10% per annum, similar to that of new index funds in Slovakia over the past decade – **Fig. 1**. At the end of the accumulation phase, during which slightly over CZK 300,000 is deposited at today's prices[10], the assets will appreciate to almost CZK 3 million. After taking into account state contributions under the current framework, the appreciation will increase again by almost CZK 600,000. This demonstrates that the effect of contributions is not particularly decisive – it is the return on the participant's deposits that matters most.

If we next apply the effect of ongoing fees retrospectively, the final capital will be reduced. Applying the fee structure currently used for Czech dynamic funds will result in a reduction of more than CZK 1.7 million, i.e., almost half of the final assets. If the ongoing fee that is typical for Slovak pension funds, 0.4% per annum, were applied, there would be only an 11% decrease in final assets, less than CZK 400,000. If we applied the fee

[10] All amounts stated in CZK are adjusted for expected inflation of 2.5% per annum. The amounts can therefore be compared with today's prices and their current purchasing power.

structure of the Swedish AP7 state fund, there would be a decrease of only CZK 70,000, or 2% of assets.

Fig. 3: High fees can cost clients up to half of their assets
The simulation assumes monthly deposits of CZK 1,100 over a period of 40 years with an annual return of 10%.



Note: Demonstration of the long-term effect of ongoing fees. Please note that this is not a prediction of future returns, but an illustration of the principle. The accumulation phase consists of 40 years of monthly deposits of CZK 1,100, increased by inflation, into a hypothetical fund with a constant internal rate of return on assets of 10% per annum. State contributions (20% of deposits) plus their appreciation are added to the appreciation of these deposits. The final hypothetical assets (CZK 3.5 million in this case) are then reduced by the long-term impact of fees (red columns). We consider two variants: the fee structure currently applied in dynamic SPS funds in the Czech Republic (1% of volume and 15% of yield per annum), and the structure of today's Slovak pension funds (0.4% per annum of volume). It is clear that the fee structure is a significant factor.

A key question is whether the current fee structure applied in the Czech SPS is justified, in view of the lower long-term returns compared to Slovak index funds or the Swedish state fund.

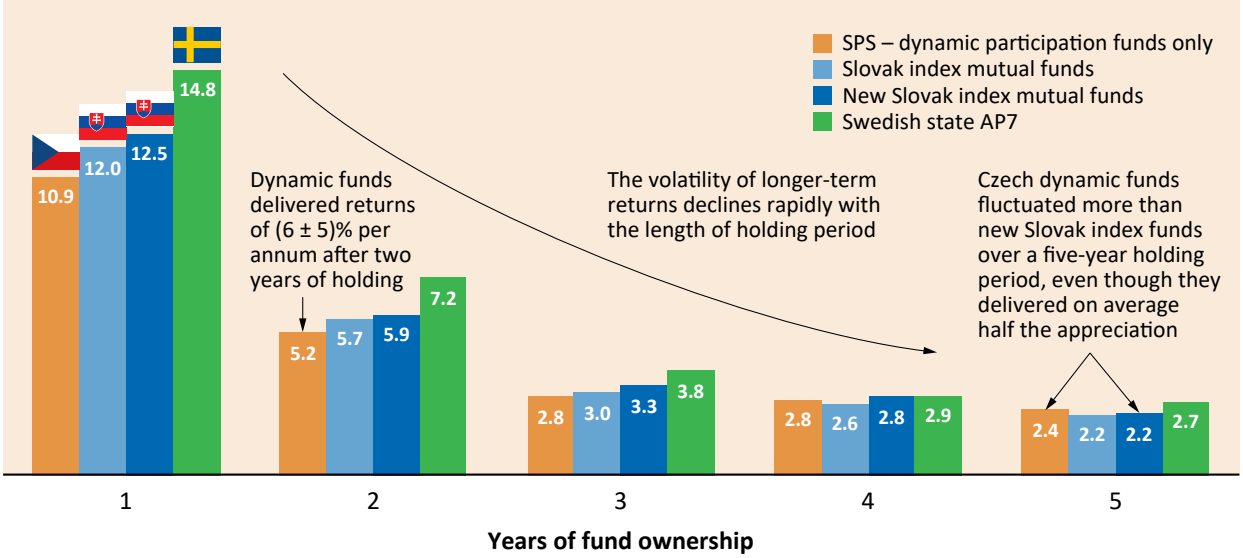
The composition of assets in dynamic funds resulted not only in lower returns but also in higher volatility over the longer term than funds abroad

The fact that Czech dynamic funds lag behind global equity funds by ~5.5% per year cannot be explained solely by the fee structure, which accounts for less than half of this underperformance. The remaining reason is therefore the composition of the assets themselves, their long-term setting, and the specifics of any active management strategies. **Figure 4** shows that, on average, the composition of these funds was chosen to achieve lower volatility over a very short investment period of 1 to 2 years, in contrast to comparable Slovak and Swedish funds. However, volatility declined very rapidly with the length of time the funds were held. For example, over a 5-year savings period, Czech dynamic funds yielded higher volatility of 5-year returns with significantly lower appreciation than did Slovak index funds. Because a decrease in volatility with extension of the investment horizon is a generally valid mechanism and the recommended savings period in the SPS

set by the legislature is 10 years, a more dynamic asset composition, which is clearly achievable[11], would likely benefit the effectiveness of the pillar.

Fig. 4: Volatility of returns on dynamic (equity) funds in the Czech pillar vs. funds abroad

Standard deviation of returns for a given holding period over the last ten years (6/2014–1/2025) in percent, converted to CZK



Note: Fund volatility decreases significantly as the length of savings increases. The columns represent the standard deviation of the distribution of returns over a given period for Czech and foreign dynamic funds. The data covers the period from June 2014 to January 2025 and is converted into CZK. It is clear that a mere five years of holding is sufficient to dramatically reduce the uncertainty of expected returns – although Czech dynamic funds, with their more conservative composition, achieved lower volatility after one year of holding in exchange for lower returns, they lost this advantage after five years. The mean value of the return distribution does not change significantly between 1 and 5 years.

The higher volatility of dynamic funds can generally create unfavorable situations if there is significant turbulence on the stock markets when the participant reaches retirement age. It is good practice to eliminate these eventualities using life cycle strategies[12] with a variable mix of dynamic and more conservative funds depending on the participant's age. These mechanisms are used in both foreign examples, Slovak pension funds[13] and the Swedish AP7 state fund[14]. This functionality is not mandatory in the Czech third pillar, although some pension companies offer it.

[11] Act No. 427/2011 Coll., Sections 99 to 108, regulates the composition of dynamic funds in a manner that allows 100% exposure to global stock markets through collective investment funds, including ETFs, up to 80% of their assets, as well as shares of individual companies or derivatives on stock indices (e.g., futures).

[12] Clients typically invest exclusively in the most dynamic funds up to a certain age, e.g., 50, to increase the long-term returns on their strategy. Bond funds are gradually added to the portfolio mix, which reduces the volatility of assets during retirement and annuity selection.

[13] This is a default investment strategy in which clients are automatically enrolled unless they explicitly choose otherwise: up to the age of 50, they have 100% exposure to equity funds, then until the age of 75, their exposure to equities is gradually reduced to zero and 100% of their assets shift to bond funds.

[14] The life cycle strategy in the Swedish state fund includes 100% exposure to equities until the age of 55, then gradually decreases until 75, at which point 75% of assets are in a conservative bond fund and 35% remain in equities. This mix remains unchanged beyond 75.

Conclusion

This analysis is a reminder that for the capital pillar in Czechia to function properly and to provide participants with meaningful long-term pensions, it is necessary to focus not only on the savings period but also on the overall return of the pillar. The study draws the following conclusions:

- The returns from the pillar as a whole are extremely low and require unrealistically high contributions from citizens in order to function. The reason for this is the dominant representation of conservative and transformed funds in the overall mix of the pillar.
- However, even its most profitable segment, dynamic funds, which aim to achieve higher returns through investments in stock markets, have lagged behind market returns by more than 5% per year over the last decade and have delivered less than half the returns of new index funds in Slovakia's second pension pillar or Sweden's low-cost state fund.
- The yield has a dramatic effect on the pension function of the pillar. In order to obtain exactly the same pension[15], the average client of a Czech pension savings plan must make deposits up to 10 times larger during their lifetime. Clients of Czech dynamic funds must make deposits more than three times larger than Slovak new index pension fund clients.
- The reason for this, apart from the composition of the funds' assets, is also a significantly higher fee structure compared to these examples from abroad. Over the last decade, this alone has wiped out 37–49% of the returns of funds in the Czech third pillar.
- Modeling the impact of the current fee structure of dynamic funds over a 40-year lifetime horizon estimates that client fees could deprive them of up to half of their future assets.

The study's conclusions also include proposals for revising the current pillar:

- Increase the overall return of the pillar by motivating clients to participate in dynamic funds, ideally through a mandatory life cycle strategy that automatically adjusts the risk level of the client's pension portfolio over the course of their lifetime.
- Revise the fee structure of all funds, including dynamic funds, and reduce the fee cap to encourage pension companies to create low-cost index pension funds, following the example of countries such as Slovakia.

[15] The model assumes the same returns as in the previous decade. This model does not aim to predict future capital market behavior, but shows an example to demonstrate the dramatic effect of returns on the functioning of the pillar.

- Adjust the scheme of state contributions, which primarily play a motivational role in the system, to increase the participation of young people in the pillar and increase the savings period for all participants, including motivation to withdraw funds in the form of a gradual annuity and limit their payment only to life cycle funds and more dynamic funds that are best able to deliver the intended function of the pillar – sufficient capital anuity.

Methodology

Data sources

We drew data series for all Czech participating funds within the SPS from the mandatory published data of individual pension companies. We obtained data series for Czech transformed funds through personal communication with representatives of the Association of Pension Companies of the Czech Republic. We obtained data series for Slovak pension funds from data published on the website of the National Bank of Slovakia [9]. We drew data series for the Swedish AP7 state fund from sources [10,12,13]. The data series for the evaluation of global stock markets reflect the development of iShares Core MSCI World ETF values, obtained from [14]. We considered the data series for the consumer price index HICP [8].

We processed the following data: the development of the value of the pension unit $C(t)$ at time t and the development of the value of capital $NAV(t)$. We aggregated the time series *C(t)* and *NAV(t)* of individual investment funds on a weekly basis to harmonize data structures. We performed this aggregation using *resampling,* with the selection of the last observation in a given interval (i.e., the end of the week), thus ensuring consistent representation of the portfolio status at the end of each week. In the case of *NAV(t)* for Rentea, which is the only company that does not report this variable on a weekly or higher frequency, we applied a linear interpolation. For values in currencies other than CZK, we performed a conversion to CZK by multiplying by the exchange rate on the given day.

Overall evaluation, average annual return, deposits

We obtained the evaluation $R(t_f, t_i)$ of the data series between moments t_i and t_f using

$$R(t_f, t_i) = C(t_f)/C(t_i) - 1,$$

where t_i and t_f represent the time values of the beginning and end of the horizon under consideration and i and f represent their serial indices in the series t. Unless explicitly stated otherwise, we chose $t_i = 2014 - 06 - 01$ and $t_f = 2025 - 01 - 05$ for the calculations of the *overall evaluation*. This period was not chosen arbitrarily, but is the longest usable horizon at the time of the study: the dynamic UF of the most significant pension companies were created during 2013, but they did not always have a dynamic asset composition during this period (this was created during its first year of existence) and the returns from 2013 and early 2014 were significantly lower. To eliminate this, we chose the start at time t_i. We quantify transformed funds by APS at a one-year frequency; the most recent data was available as of January 1, 2025, which is why we chose t_f for this date.

We consider the average annual return $\bar{R}$ to be the standard geometric mean

$$\bar{R} = \left[R(t_f, t_i) + 1\right]^{1/\Delta t} - 1,$$

where Δt is the annualization period expressed in years.

We define net contributions $V(t)$ to the fund as the difference between contributions and withdrawals from the fund and calculate them as

$$V(t_n) = [PJ(t_n) - PJ(t_{n-1})]C(t_n),$$

where $PJ(t_n)$ is the number of pension units at time t_n, obtained as

$$PJ(t_n) = NAV(t_n)/C(t_n).$$

Aggregation of data series and creation of indices

We aggregated the data series for individual funds into larger units using the capital-weighted average return $R_{ind}(t_n)$. The aggregated data series (index) for values between moments t_i and t_f consist of values $C_{ind}(t_n)$, which we obtained using

$$C_{ind}(t_n) = \prod_{j=i}^{f} \left[R_{ind}(t_j) + 1\right]$$

using

$$R_{ind}(t_n) = \frac{\sum_m [R_m(t_n, t_{n-1}) NAV_m(t_{n-1})]}{\sum_m [NAV_m(t_{n-1})]}$$

in which m denotes the specific data series (fund) of which the index consists, n is an arbitrary index of the time series, and $n-1$ is the immediately preceding index (in this case, one week).

The specific indices have the following composition, based on actual composition of the funds:

- "Czech dynamic mutual funds": Allianz Dynamic Mutual Fund, UNIQA Dynamic Mutual Fund, Conseq Global Equity Mutual Fund, ČS Dynamic Mutual Fund, ČSOB Dynamic Mutual Fund, ČSOB Dynamic Responsible Mutual Fund, NN Growth Mutual Fund, KB Equity Mutual Fund, Generali Dynamic Mutual Fund, Rentea Dynamic Mutual Fund
- "Czech balanced mutual funds": Allianz Balanced Mutual Fund, UNIQA Balanced Mutual Fund, UNIQA Bond Fund, Conseq Bond Fund, Conseq Target Bond 35, ČS Balanced Fund, ČSOB Balanced Fund, ČSOB Pension Fund, NN Balanced Fund, KB Balanced Fund, KB Bond Fund, Generali Balanced Fund, Rentea Bond Fund
- "Czech conservative participation funds": Allianz Mandatory Conservative Fund (PKF), UNIQA PKF, Conseq PKF, ČS PKF, ČS Ethical PF, ČSOB PKF, ČSOB Guaranteed PF, NN PKF, KB PKF, KB Cash PF, Generali PKF, Generali Savings PF, Rentea PKF
- "Czech supplementary pension savings," or "SPS": all of the funds mentioned above
- "Czech transformed funds" or "TF": transformed funds of Allianz, UNIQA, Conseq, ČS, ČSOB, NN, KB, and Generali
- "Czech 3rd pillar": all funds mentioned above
- "Slovak new index funds": NN Index Global – Index non-guaranteed mutual fund, UNIQA Index non-guaranteed mutual fund, VÚB Generali INDEX, index non-guaranteed mutual fund
- "Slovak index funds": Funds in the "Slovak new index funds" index and Allianz PROGRES index non-guaranteed DF
- "Slovak equity funds": NN Dynamika – Non-guaranteed equity fund, NN Rešpekt – Non-guaranteed ESG equity fund, UNIQA Non-guaranteed equity fund, VÚB Generali SMART, Innovative non-guaranteed fund, VÚB Generali PROFIT, Non-guaranteed equity fund
- "Slovak non-guaranteed funds": funds in the "Slovak index funds" and "Slovak equity funds" indices and Kooperativa ESG index non-guaranteed DF, NN Harmónia – Mixed non-guaranteed DF
- "Slovak guaranteed funds": Allianz GARANT bond guaranteed fund, KOOPERATIVA bond guaranteed fund, NN Solid – bond guaranteed fund, UNIQA bond guaranteed fund, VÚB Generali KLASIK, bond guaranteed fund
- "Swedish State Fund AP7" Safa Equity.

If the fund did not exist between the given moments t_i a t_f, we remove it from the list.

Estimating the effect of fees

We estimate the effect of fees on the dynamic IRR in Fig. 1 using the known average return $\bar{R}$ including fees for the given period and the approximate average return $\bar{R}'$ excluding fees, which we obtain by solving the equation

$$\bar{R} = (\bar{R}' + 1)(1 - P_1 - P_2\bar{R}') - 1,$$

where $P_1 = 1 \times 10^{-2}$ and $P_2 = 0{,}15$. We chose this procedure as an approximation of the method of accounting for fees derived from returns using the High Water Mark (i.e., 15% of the difference between the average value of the pension unit in the given period and the maximum average unit of previous periods). The reason for this is that rigorous application of the HWM methodology is technically very demanding in the case of an index of more dynamic funds and is fraught with practical uncertainties (how exactly

the "period" is calculated in each individual fund, how HWM is handled at the beginning/end of the horizon studied, and the birth of the fund itself during the "period" could be the value of the pension unit before or after the application of the fee from the volumeP_1, and etc.).

The total return for the period Δt between moments t_i and t_f is then

$$R(t_f, t_i) = (\bar{R}' + 1)^{\Delta t} - 1.$$

The portion of return lost due to the fee for the period Δt is expressed as $1 - [(\bar{R} + 1)^{\Delta t} - 1]/[(\bar{R}' + 1)]^{\Delta t} - 1]$; used in **Table 1**.

Yield volatility

We consider the statistical volatility of yields (Fig. 4) for the period Δt in a data series longer than Δt and bounded by moments t_i a t_f to be the standard deviation of the distribution of *rolling* yields $R(\mathrm{t_n}, \Delta t)$ for all possible t_n, defined as

$$R(\mathrm{t_n}, \Delta t) = C(t_n)/C(t_n - \Delta t) - 1.$$

Simulation of monthly deposits required for annuity and final capital values

We perform the simulation numerically and analytically; here we present the analytical description. The nominal capital $K_{tot}(m)$ after m months in a fund with internal monthly asset yield (before fees) R_i and ongoing monthly fee P, with monthly deposits K_0 increased by inflation described by monthly consumer price growth F, with zero initial capital, can be expressed as the sum of the sequence of future nominal capitals K_n after the appreciation of individual deposits after n months, $0 \leq n \leq m$, expressed as

$$K_n = K_0(1 + F)^m \left[\frac{(1 + R_i)(1 - P)}{1 + F}\right]^n = K_0(1 + F)^m q^n$$

and

$$K_{tot}(m) = \sum_{n=0}^{m} K_n = K_0(1 + F)^m \frac{q^{m+1} - 1}{q - 1}$$

where m is the total number of months of the accumulation phase ($K_0 > 0$). The model assumes zero initial capital.

The model also considers the withdrawal phase ($K_0' < 0$), following the accumulation phase. In this phase, we consider the initial capital of $K_{tot}(m)$ and analogous relationships as above. We require that this capital not be depleted after m' additional months of withdrawal, again increased by inflation. For given m, m', R_i, P, F and K_0' we therefore seek K_0 such that the portfolio is depleted after m' months.

$m = 40 \times 12$, $m' = 20 \times 12$, $R_i = (1 + 0{,}1)^{1/12} - 1$, $P = (0{,}01 + 0{,}15 \times R_i + 1)^{1/12} - 1$ or $(4 \times 10^{-3} + 1)^{1/12} - 1$, $F = (1 + 0{,}025)^{1/12} - 1$ and $K_0' = 10^4 \times (1 + F)^m$.

We model the final capital value for Fig. 3 based on the above expressions for different values of K_0 (with or without government contributions), R_i (with or without capital appreciation) and P (without a fee or with a given fee option), with the difference that we always adjust $K_{tot}(m)$ to current prices at the end, i.e., we use the expression $K_{tot}(m)/(1 + F)^m$.

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Study by the Institute for Democracy and Economic Analysis (IDEA)

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