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First and second pillar pensions: costs and benefits for contributors in the Baltics

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ABSTRACT

Early in the twenty-first century, the Baltic states reformed their retirement pension systems by introducing funded pensions (second and third pillars) alongside the existing pay-as-you-go (PAYG) system. These reforms aimed to diversify and potentially increase retirees' income and reduce the fiscal strain on public finances. This study evaluates the impact of the second pension pillar on individual incomes at retirement in the Baltic states, comparing benefits (additional retirement income) and costs (reductions in PAYG pensions and deferred consumption). The analysis considers low, medium and high-risk investment scenarios, finding positive outcomes for most participants in Lithuania and Estonia, but unprofitable ones in Latvia.

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Retirement pension systems; funded pension scheme; costs and benefits; state participation; Baltic states

1. Introduction

The main aim of old age pension systems is to ensure adequate income for retirees while being financially sustainable. This has increasingly become a challenge for public old age pension systems based on a single pay-as-you-go (PAYG) principle, which in effect means that the current working population (contributors) are financing current retirees (beneficiaries). Due to increasing longevity and declining fertility rates, maintaining the financial sustainability of such old age pension systems based on only one financing method has become challenging. A combination of two potential financing methods – PAYG and individually funded – is likely to increase income security for the individuals as well as providing financial sustainability for the system. Consequently, old-age pension systems have been subject to reforms in many countries over recent decades. The rationale for these reforms has typically been to strengthen the sustainability and adequacy of retirement income provision by diversifying income sources and spreading risks between PAYG and funded schemes. Alongside the public pension (first pillar), many countries have

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introduced mandatory or quasi-mandatory funded pensions (second pillar) and voluntary funded pensions (third pillar).

The introduction of funded pension pillars in the Baltics and other Eastern European countries was largely driven by the World Bank's policy framework (Averting the Old Age Crisis, 1994), with its consultants actively advising regional governments at the time on transforming their old-age pension systems into multi-pillar schemes.[1] Lithuania pioneered first-pillar pension reform among the Baltic states and broader transition economies, whereas Latvia was first to implement a funded ('second pillar') component. Estonia, conversely, adopted a notably cautious approach to reform (Pension Reform in the Baltic Countries, 2004). In advocating a mandatory multi-pillar retirement pension system, the World Bank put forward several arguments (Averting the Old Age Crisis, 1994). First, it was argued that such a pension structure would clarify the role of redistributional policies and labour market distortions aimed at poverty reduction. Second, long-term savings, the capital market and the ability to invest in a wide variety of securities would be increased and strengthened. Third, the relationship between paid contributions and benefits received would be strengthened, thereby reducing tax evasion.

While the three-pillar pension structure is not unique, what is unique in the Baltics, as well as in some other Central and Eastern European countries, is that second pension pillars are financed at least partially (in some stages even fully) at the expense of public social insurance schemes (first pension pillar). The financing of second pension pillar with transfers from first pension pillar in the Baltics has created tensions between the two schemes. Such financing mechanisms have required politicians to decide either to increase pensions for current retirees faster, by increasing the indexation of pensions, or to transfer additional contributions to the future retirees' pension accounts.

Although reforms to the old-age pension systems in the various Baltic states took place around the same time, under similar economic and social developments, the conditions set for participation in the second pillar funded pension schemes differed. Funded pension schemes had not previously existed in these countries and were created 'from zero', with all the features of the funded schemes to be determined. Since each country designed its own scheme, key features of the second-pillar schemes such as the conditions of participation (voluntary or mandatory), additional participant contributions (whether they were required, what proportion, and whether the state would additionally support the contributors), what investment strategies were offered to participants and the asset management and administrative costs. In addition to the variety in the newly introduced second-pillar pensions, there were also possibilities to save for one's future retirement in third-pillar voluntary pension funds in all the countries. The main features of current pension systems in the Baltics are presented below in Table 1.

In the scientific literature, the results of such multiple pension-pillar approaches and funded pension schemes have been evaluated from the state (macro-) perspective and the conclusions have been ambiguous (Bielawska et al., n.d.; Altiparmakov, 2017). However, the financing of funded pensions with transfers from public social insurance schemes, and other participation conditions and their outcomes, have not been analysed in detail in the scientific literature from the participant's (micro-) perspective. Seeking to fill this research gap, this article aims to evaluate the benefits and costs for contributors to second-pillar pensions in the Baltics. The evaluation of the costs and benefits considers the reduction in the contributor's first-pillar pension (due to lower contributions) and

Table 1. Main features of pension systems in the Baltics in 2025.

	Estonia	Latvia	Lithuania
First pillar mandatory PAYG pensions			
Organising principle	Defined benefit (DB)	Notional defined contributions (NDC)	Defined benefit (DB)
Contribution rate, % of gross salary	20	20	8.72 for individual part
Second pillar funded pensions			
Principle	Defined contribution (DC)	Defined contribution (DC)	Defined contribution (DC)
Year of introduction	2002	2001	2004
Participation principle	Mandatory (voluntary from 2021 but automatic enrolment for new labour market entrants)	Mandatory for new entrants and employees aged under 30, voluntary for those aged 30–50	Voluntary for all employees and new entrants. From 2019 auto-enrolment for workers under 40 years of age with the right to withdraw within six- month period
Third pillar funded pensions (voluntary)			

Sources: national laws.

the acquired additional retirement income from the contributor's accumulated assets in their second-pillar pension account. This involved analysing scenarios with different risk categories of investment fund plans, namely low, medium and high-risk pension funds.

The paper is organised as follows: Section 2 provides an analysis of the scientific literature and evaluates the current context of pension systems that is relevant to the current research. Section 3 describes the estimation method employed and modelling assumptions. Section 4 presents the calculation results. Finally, Section 5 offers concluding remarks, interprets the findings considering previous studies, offers policy implications and highlights directions for future research.

2. Literature review and contextual analysis

As outlined above, the retirement pension systems in all three Baltic states – Estonia, Latvia and Lithuania – consist of a compulsory social insurance scheme, based on PAYG financing principles plus two funded options (the second and third pillars). This three-pillar structure is not unique and can be found in many countries with developed retirement pension systems (Holzmann, 2013). The structure is intended to enhance income security for future retirees through diversified financing sources (Hinz & Holzmann, 2007). The increasing demographic burden, the need for a long-term sustainable pension system, and the necessity to make individual initiatives much stronger (a link between contributions and benefits) were among the main reasons for the multi-pillar pension reforms. After regaining independence, the Baltic countries had to make rapid changes to the social protection systems they had inherited. The Baltic countries faced the same problem as most Western societies – a changing demographic structure. Additionally, the low (and almost flat) level of pension benefits accruing from the first pension pillar signalled the need for reform (Pension Reform in the Baltic Countries, 2004). The weak link between contributions and benefits within the first pension pillar was also seen as a limitation of the PAYG systems at the time (Wagner, 2005). Another very important argument was that such a multi-pillar structure would insulate the

system from political pressures. In addition, it was argued that the financial situation of previous public PAYG schemes impacted the perceived urgency of radical pension reform (Müller, 2001). Finally, it was argued that, in general, a stronger orientation towards funded pension and private pension systems would help to relieve these countries from the financial pressures brought about by demographic changes. In this regard, pension fund assets were seen as an important source for economic development (Börsch-Supan et al., 2006).

The two newly introduced funded pension pillars were envisaged as having different roles. The second pillar was introduced with the intention that all or at least most of the working population would contribute and that, on retirement, they would therefore have significant additional income from these funds. However, in Central and Eastern Europe, including the Baltic countries, the existing public expectations, the priority given to poverty alleviation and the fiscal costs associated with the transition limited the extent to which contributions could be shifted from the first pillar, based on PAYG, to a funded second pillar. Furthermore, since the introduction of the second pillar, the need to maintain the first pillar's basic benefit – aimed at preventing poverty – has constrained the financial resources available for funding the second pillar (Pension Reform in the Baltic Countries, 2004).

To achieve high participation rates in the second pension pillar, the state's engagement in the scheme's design and operation rules was highly visible. For example, at times, participation was not only encouraged but also mandatory, either by matching state contributions or redirecting part of the obligatory PAYG contributions from the first to the second pillar. Such active state engagement in the second pension pillar resulted in most potential voluntary contributors in all three Baltic countries exercising their right to join the second pension pillar (Rajevska, 2021). Nevertheless, the voluntary nature of participation in Lithuania's second pension pillar is a key factor contributing to the lower enrolment rate here compared to Estonia and Latvia, where mandatory or quasi-mandatory participation models have led to broader coverage. Participation in the second pillar was voluntary from the start in Lithuania, including for new entrants to the labour market. This opt-in model required individuals to make an active choice to participate, and this contributed to lower participation rates. Automatic enrolment for new labour market participants, albeit with the option to opt out, was only introduced in 2019. However, following intense debates, the decision to abolish automatic enrolment and revert to a fully voluntary system was legislated in 2025. By contrast, Estonia implemented a mandatory second pillar for new labour market entrants, coupled with a strong incentive-based voluntary option for existing workers, however from 2021 the second pillar changed to voluntary as well. In Latvia, the second pillar was mandatory from its introduction.

The third pension pillar was introduced as an additional possibility for saving towards retirement for those willing to do so voluntarily. However, despite the introduction of tax incentives for both individuals and employers, additional contributions to the third pillar in the Baltics remain relatively small. A range of factors may explain the low voluntary contribution rates to the third pension pillar, including lack of financial literacy and awareness (Dundure & Sloka, 2021; Gedvilaitė et al., 2022; Piirits et al., 2025), perceived adequacy of state pensions (Rajevska, 2015), gender, age, family situation, amount of income, and subjective assessment of one's financial situation (Bednarczyk et al., 2021). Due to these low participation rates (see Table 2 on the number of contributors to the third pillar) and

Table 2. Coverage (percentage) of the working age population by different pension pillars in the Baltic states as of 2021.

Country	Social Insurance Scheme (PAYG)	Second Pension Pillar	Third Pension Pillar
Estonia	100	90.6[6]	19.8
Latvia	100	100	22.1
Lithuania	100	75.7[7]	4.2

Sources: (Pension Markets in Focus - OECD, 2021).

because contributions to third pillar pension funds do not affect public social insurance pensions, this article only analyses contributions to the second pension pillar in assessing the costs and benefits for participants to the funds.

The establishment of second-pillar pension systems in Estonia, Latvia and Lithuania coincided with their EU accession. After joining the EU, these countries saw rapid economic growth, including a notable rise in wages, which contributed to the accelerated indexation of first-pillar old-age pensions. This sharp increase in wages over the past two decades was driven by several factors: EU integration boosted economic growth and foreign investment, labour migration reduced the workforce, pushing wages up, and EU structural funds facilitated infrastructure and business modernisation. In contrast, older EU member states experienced more modest wage growth due to their more stable and developed economies (see Table 3 for details). However, as wages in Estonia, Latvia and Lithuania are approaching the EU average, continued rapid growth seems unlikely. Coupled with changing demographics, maintaining the same pace of first-pillar pension indexation may become challenging.

Attempts to evaluate the outcomes of second pension pillar reforms in Central and Eastern Europe have produced mixed results. In many cases, the investment returns of private pension funds were assessed relative to the indexation of old-age pensions in pay-as-you-go systems. Following the accession of the Baltic states to the European Union, rapid wage growth, high employment levels, and economic convergence with Western European countries contributed to faster indexation of first-pillar pensions compared to the returns generated by second-pillar pensions, which are inherently more volatile and dependent on developments in global financial markets. Altiparmakov and

Table 3. Average full-time adjusted salary per employee in 2023 compared with 2004 in the Baltic states and selected established EU member states.

Country	2004	2023	Increase (2023 vs 2004)
Estonia	6 161 €	24 899 €	304%
Latvia	4 601 €	22 293 €	385%
Lithuania*	6 716 €	27 178 €	305%
Czechia	7 442 €	23 454 €	215%
Hungary	8 180 €	16 895 €	107%
Slovakia	5 499 €	19 001 €	246%
Germany	30 904 €	50 998 €	65%
Spain	20 673 €	32 587 €	58%
France	28 260 €	42 662 €	51%
Italy	24 123 €	32 749 €	36%

*For the 2004 data of Lithuania, a coefficient of 1.289 was applied in order to achieve comparability with the data of other countries. From 1 January 2019, the rates of the state social insurance contributions paid by the employer and the employee were changed.

Source: Eurostat.

Nedeljković (2022) argued that private pension funds have often proven to be dynamically inefficient and inferior to the PAYG systems they were intended to complement or replace. They further contended that the main cost of reversing pension reforms after the 2008–2009 global financial crisis in Central and Eastern Europe will ultimately be borne by individuals in the form of lower retirement benefits (Altiparmakov & Nedeljković, 2022). Contrasting conclusions were drawn by Whitehouse (2012), who found that funded pension schemes significantly contribute to improving the retirement replacement rate. Other evaluations of pension reforms and their reversals in Central and Eastern Europe have primarily focused on macro-level outcomes, offering limited insight into the long-term implications for individual retirement income adequacy (Adascalitei & Domonkos, 2018; Baksa et al., 2020; Bielawska et al., n.d.; Fouejieu et al., n.d.; Naczyk & Domonkos, 2016; OECD Pensions Outlook, 2012, 2012; Ortiz et al., 2018).

2.1. Financing the second pillar: implications and challenges in balancing long-term and short-term goals

The primary rationale behind contribution transfers from PAYG to the funded pillar was to facilitate the transition to a multi-pillar system without imposing additional financial burdens on employees or employers. By reallocating a portion of existing social security contributions, the Baltic states aimed to accumulate additional funds to supplement future pay-as-you-go first-pillar pensions (Fultz, 2006). Policymakers and pension experts extensively debated the financial implications and sustainability of various funding strategies. The costs of the reforms were a major concern when establishing the funded schemes. Many options for splitting the state pillar contribution or raising the overall contribution level were discussed in a quest to find the optimum balance between costs and benefits (Schiff et al., 2000).

The introduction of second-pillar pension schemes explicitly aimed to enhance pension capital accumulation and ultimately increase pension benefits through market-based investments without raising total social insurance contribution rates for state old-age pensions. This approach was based on the perception that second-pillar contributions represented a deferred income for employees, essentially shifting part of their mandatory contributions from immediate state redistribution to individual retirement savings.

It was expected that the scope of the pension reforms would heavily depend on the state's ability to finance the transition costs and the priorities set for state financing. Critics of such an approach argued that funding the second pillar by contribution transfers from the first pillar might undermine the financial stability of the first pillar. Moreover, such financing approach blurred the distinction between the redistributive and savings functions of the pension system, potentially complicating policy objectives and public understanding (Pension Reform in the Baltic Countries, 2004).

As PAYG systems are sensitive politically, it was argued that any surplus left in the PAYG pillar might be not used to ensure the sustainability of the system due to populistic political decisions. Thus, under the proposed arrangement, the system would be better equipped to deal with the challenges faced when the ratio of contributors to beneficiaries worsened due to ageing populations. It was expected that the investment returns from financial markets would ensure higher (or at least not smaller) levels of retirement

benefits to retirees from the diverted contributions, compared to those from the traditional PAYG pillar (Barr & Diamond, 2009). The second argument for diverting some of the PAYG contributions to a funded pillar was the expectation that the accumulation of income in the funds would increase contributors' trust in retirement pension systems in general, in turn positively affecting contributions to the first pillar (Sinn, 2000). The third argument in favour of this transfer was that, given the average income of the working population in the Baltics, it would be difficult to divert additional amounts from earnings to the funds once the pension systems were reformed and funded pillars introduced. 'Stability' in terms of contribution rates (with no change for contributors compared with the pre-reform period) was also mentioned as an important factor: newly introduced funds would not look like an additional cost to the contributors (Schiff et al., 2001).

Debates concerning the financing of the second pension pillar at the expense of the first have been particularly intense during periods of economic recession. Political attitudes during such periods tend to be overwhelmingly negative towards the second pillar, often resulting in reduced or halted contributions to it. This tension became especially acute during the global financial crisis of 2008. When faced with difficulties in fulfilling their obligations to pay the promised rate of old-age pensions to current retirees, all three Baltic governments, like their counterparts in other Central and Eastern European countries, reduced transfers to the funded pension pillars. This measure was taken to maintain the financial viability of the PAYG systems during periods of fiscal stress (Altiparmakov, 2017; Bielawska et al., n.d.). Reducing transfers to the funded pension pillars allowed the immediate pension payments to current retirees to be prioritised. However, these actions often came at the cost of long-term sustainability and the potential growth of pension assets within the funded systems. From 2009 to 2011, transfers from PAYG to funded pensions were cut to 0% in Estonia (later restored to 3% in 2011 and later to 6% in 2012). Latvia's decision was to reduce contributions to funded pensions from 8% to 2% in 2009 (the rate was increased to 4% in 2013). Lithuania also reduced transfers, from 5% to 2% in 2009. The rate was further lowered to 1.5% in 2012, later increased to 2.5% (2013), then changed to 2% (personal) + 2% (social insurance) + 2% (state budget) during 2014–2018 and from 2019 changed to 3% personal contributions and 1.5% matching contributions from average salary from state budget. In the long-term, such decisions potentially have a double negative effect on the accumulation of supplementary pensions in the second pension pillar. First, participants in the second pillar funds are transferring smaller amounts from PAYG to the funded pillar than planned. Second, during economic downturns, the value of assets in the financial markets declines significantly, presenting a good opportunity to invest new contributions. Therefore, non-investment during such periods (as contributions were not transferred) or smaller investments than usual (because the contribution rate decreases) are likely to negatively affect the accumulated amount in second pension pillar in the long-term. Current contribution rates to the second pension pillar in the Baltics are presented in Table 4.

*From January 1st 2025, contributions from 1st pillar to 2nd pillar decreased from 6% to 5%.

The manoeuvring of decision-makers (politicians) is another factor that needs to be considered in this context. They manoeuvre between (a) the commitment to the long-term obligations to finance the second pension pillar and maintaining the legitimate

Table 4. Contribution rates to second pension pillar in the Baltics as a percentage of gross income in 2024.

Estonia	Latvia	Lithuania
2% personal contributions 4% transfers from 1st pillar	6% transfers from 1st pillar*	3% personal contributions 1.5% from average salary in Lithuania (matching contributions from state budget)

*From January 1st 2025, contributions from 1st pillar to 2nd pillar decreased from 6% to 5%.

expectations of its participants and (b) short-term decisions to temporarily reduce or suspend financing the second pension pillar without compensating for such decisions. As such, the conditions for participation in the second pension pillar have significantly changed several times (e.g. in Lithuania in 2013 and 2018, in Estonia in 2020) such that participants have had to choose between proposed alternatives (e.g. whether they want to continue to accumulate funds at a lower rate for a longer time period), return to the accumulation system with new/lower contribution rates, transfer their accumulated assets from the second pension pillar to the first pension pillar or, in the Estonian case, withdraw the accumulated amount earlier than the statutory retirement age from 2021 (Guardiancich & Guidi, 2022). Recent discussions on further pension system reforms in Lithuania have centred on proposals to permit withdrawals from the second pension pillar before retirement, prompting concerns about its potential weakening (Bielskis et al., 2025). Nevertheless, despite these concerns, in 2025 the government legislated to allow pre-retirement withdrawals, marking a significant policy shift with potentially far-reaching implications for the long-term sustainability of the funded pillar.

Lastly, the 2013 reform of the funded pension system in Lithuania marked the first attempt to introduce participant-funded contributions to the second pillar. An analysis of this reform (Medaiskis et al., 2016) revealed that over half of the contributors opted to maintain the minimum contribution level rather than contribute more. Changes in 2018 required participants to fully fund their second pillar contributions, and allowed them to stop making new contributions, with approximately 30% choosing this option. This is likely to result in significantly lower accumulated retirement funds.

Frequent changes in contribution levels and participation rules have undermined the credibility of the funded pension schemes. Despite promises of higher retirement incomes from private pensions, many retirees during this period have received lower public social insurance pensions than those not contributing to the funded scheme. This is because the funded pension schemes had not yet accumulated significant amounts to be able to compensate for lower PAYG pensions, leading to public and political debates about the feasibility and fairness of the pension systems in the Baltics. Ongoing questions about the costs and benefits for contributors persist. As a contribution, this article evaluates different scenarios for contributors with varying income levels opting for low, medium or high-risk pension funds.

2.2. The impact of investment strategies and contributor attitudes on second-pillar pension funds

In our opinion, the key indicators determining the potential benefits to contributors in the investment strategies offered in a funded (second pillar) scheme are the investment

performance of pension funds and the choices made by participants over the entire accumulation period.

Typically, second-pillar pension funds in Central and Eastern European countries are administered by pension accumulation companies that manage several pension funds with different investment strategies. A pension accumulation company will offer several pension funds (usually up to five) with various investment strategies. Pension funds are often divided into groups based on their investment strategy. Most second-pillar pension funds are 'mixed': their assets are invested in both risky asset classes (e.g. equities) and less risky asset classes such as government bonds (Medaiskis & Gudaitis, 2017). This was the situation in the Baltic countries prior to 2018. However, in 2019, Lithuania introduced a lifecycle investment strategy[2] as the default principle in the second pension pillar. This became the only option for contributors wanting to accumulate assets for their retirement. In recent years, some pension savings companies in Latvia and Estonia have also begun to voluntarily offer lifecycle pension funds to contributors.

There is a fundamental difference between Baltic countries with regard to the pension funds' investment strategies and the proportion of pension funds that can be invested in risky asset classes. Since the establishment of the second pillar, pension accumulation companies in Lithuania provide a wider scope of pension funds (investment strategies) than those in Latvia and Estonia. Some Lithuanian pension accumulation companies were offering pension funds with up to 100 per cent of assets invested in risky assets (equities) whereas, in Estonia, up to mid-2019, pension funds were not allowed to invest more than 75 per cent of total fund assets in risky assets (equities) although that limit has since been removed. The limit was even lower in Latvia where initially no more than 50 per cent of total assets could be invested in risky assets up to 2018 although this limit was then increased to 75 per cent and removed altogether in September 2021 (see Table 5 for details). Thus, the historic lower limits for risky asset investments (equities) in Latvia and Estonia might, in the long term, have negatively affected accumulated amounts in the second pension pillar.

The lifecycle investment strategy has been widely explored in the academic literature. Bodie et al. (1992) showed that labour and investment choices are closely related: a person simultaneously selects their optimal levels of current consumption, labour effort and investment portfolio at each period in their lifecycle. Additionally, at any age, greater labour flexibility will include greater risk given the individual's financial investment (Bagliano et al., 2009; Blake et al., 2008; Cocco et al., 2005). The motive for reducing the proportion of equities in a portfolio as a person approaches retirement age can be explained through the ratio of human capital (i.e. discounted expected future labour income) and financial wealth. This ratio changes over an individual's lifecycle such that it increases in the early part of their working life to reach a peak and then starts to decline. Applying a lifecycle investment strategy in a funded pension scheme could minimise the risks related to the behaviour of the participants. The adoption within the funded pension pillars of lifecycle investment strategies has been endorsed by international expert organisations (OECD Legal Instruments, 2022) and by financial consumer advocacy bodies (BETTER FINANCE, 2024).

The investment returns of the pension funds in Central and Eastern European countries have not yet been systematically analysed in the scholarly literature. While nominal and real investment returns have been summarised and presented by international expert

Table 5. Pension fund classification by risk level in the Baltic states.

Fund risk	Estonia	Latvia	Lithuania
Low (dedicated to pre-retirement and retirement pay-out stage)	Assets under management (hereinafter – AUM) are not invested in equities.	AUM are not invested in equities.	Up to 2018: AUM are not invested in equities From 2019: Asset preservation pension funds (up to 20 per cent of AUM can be invested in equities) and lifecycle pension funds for those born between 1954 and 1960 (where part of the AUM could be invested in equities; in current practice, up to 20 per cent of AUM is invested in equities).
Medium (dedicated to mid-age working population)	Up to 50 per cent of AUM can be invested in equities.	Up to 25 per cent of AUM can be invested in equities.	Up to 2018: Up to 70 per cent of AUM can be invested inequities; From 2019: Lifecycle pension funds for cohorts born between 1961 and 1974 (part of AUM can be invested in equities; in current practice, over a seven-year period, the equities part is gradually reduced from approximately 60 per cent to 25 per cent).
High (dedicated to new labour market entrants and younger generation)	Up to mid-2019: Up to 75 per cent of AUM could be invested in equities. From mid-2019: 100 per cent of AUM could be invested in equities.	Up to 2017: Up to 50 per cent of AUM can be invested in equities. From 2018: Up to 75 per cent of AUM can be invested in equities. From September 2021: 100 per cent of AUM can be invested in equities.	Up to 2018: 100 per cent of AUM can be invested in equities. From 2019: Lifecycle pension funds for cohorts born between 1975 and 2002. 100 per cent of AUM can be invested in equities.

Sources: Estonian Funded Pension Registry, 2022; AS 'Latvijas Centrālais depozitārijs' (2022); Bank of Lithuania, 2022; Annual Survey of Investment Regulation of Pension Funds and Other Pension Providers - OECD, 2021.

organisations (Pension Markets in Focus, 2024, 2024) and financial consumer advocacy groups (BETTER FINANCE, 2024), these sources do not examine the underlying reasons for the substantial differences in the pension fund returns among the economically comparable Baltic states. In seeking to reveal the underlying reasons, our research sought to identify and analyse the factors that have contributed to the variations in pension fund investment performance in Estonia, Latvia and Lithuania from the inception of their respective pension systems up to the end of 2023.

Quarterly returns on pension fund investments (in low, medium and high-risk funds) are presented in Figure 1 and cumulative returns are presented in Table 6. As can be seen from the data, regulations that determine the proportion of AUM that can be invested in equities have a significant impact on the returns on pension fund investments. Significant differences can be observed in the high-risk category, which includes pension funds targeted at new labour market entrants and the younger generation. Previously imposed restrictions (Table 5) on the maximum share of AUM that can be invested in equities have limited the opportunities for pension funds to earn higher returns for participants, namely for new labour market entrants and the younger generation. Such restrictions have resulted in a lower investment return at the start of the accumulation stage and may have long-term negative impacts on the amount accumulated by pension fund participants.

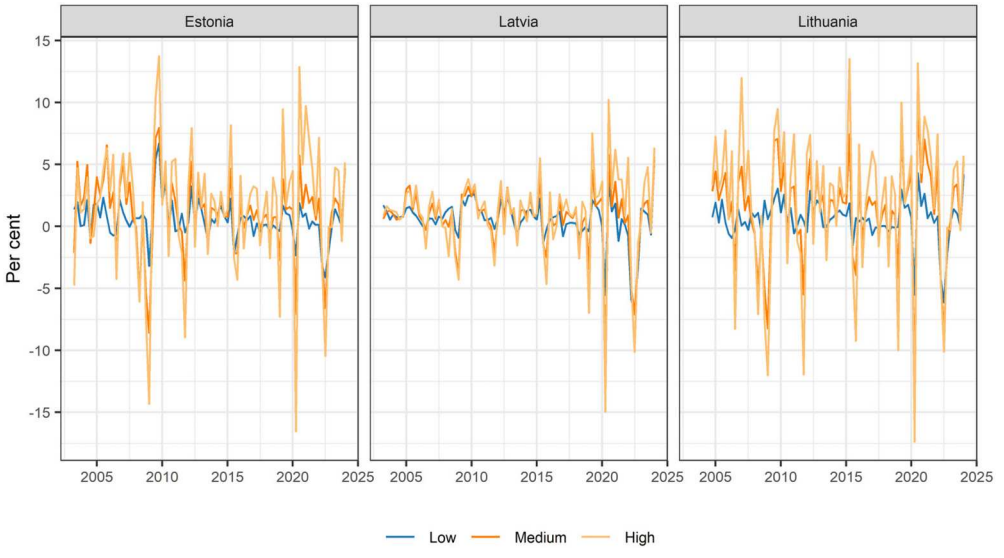

Figure 1. Average annual investment performance of pension funds in Latvia, Lithuania and Estonia. Sources: Authors' calculations, based on Estonian Funded Pension Registry (2024); AS 'Latvijas Centrālais depozitārijs', (2022); Bank of Lithuania (2022) data.

The primary goal of low-risk funds is to preserve participants' accumulated assets as they approach retirement age. To this end, a significant proportion of these funds is invested in government and corporate bonds. Despite this, low-risk funds were impacted by the sharp decline in bond prices in 2022, and their values had not recovered by the end of 2023 (Pension Markets in Focus - OECD, n.d.).

By selecting and changing pension plans (thus the investment strategy and investment risk), contributors' behaviour and choices throughout the accumulation period can also significantly influence the outcome (the accumulated amount in an individual's pension account). Thus, it is important to have sufficient options for selecting appropriate investment strategies throughout the entire accumulation period in a funded pension scheme. Empirical studies (Bodie et al., 1992; Viceira, 2001) suggest that the ideal scenario is for individuals to initially hold proportionally more equities in their portfolios and to shift their investments towards less risky assets as they approach retirement age. This is supported by the findings of Cocco et al. (2005) who modelled a dynamically calibrated lifecycle framework of consumption and portfolio choice under borrowing constraints.

In funded schemes, where pension accumulation companies offer investment strategies with a fixed proportion of investments in risky asset classes such as equities, the

Table 6. Cumulative return of pension funds by risk level in the Baltic states, per cent.

	Low	Medium	High
Estonia	61.7	134.7	252.7
Latvia	57.3	86.6	127.8
Lithuania	55.6	161.6	295.3

Note: Data from 2003Q1 to 2023Q4 are used for Estonia and Latvia, while data for Lithuania cover 2004Q2 to 2023Q4. Sources: Authors calculations, based on Estonian Funded Pension Registry, (2024); AS 'Latvijas Centrālais depozitārijs', (2024); Bank of Lithuania (2022) data.

contributors are expected to be active over a long period of time. In this scenario, they would change from one pension fund (with a high-risk investment strategy) to another with a medium or low risk over the accumulation period. However, some analyses show that participant behaviour is not as rational as anticipated. For example, an analysis of contributors to Lithuanian pension funds showed that (a) contributors are inactive and do not change their investment strategy over the accumulation period and (b) the majority selected an inappropriate pension fund (based on investment strategy and risk) given the accumulation period left until their retirement. The results of this study show that young participants selected overly conservative investment strategies such that, at the beginning of their participation in the second pension pillar, they did not take full advantage of the higher returns in equity markets. Meanwhile, the older participants tended to opt for a larger investment risk in the years approaching retirement by choosing pension funds that invested a large part of their managed assets in equities. Furthermore, even those participants who did change their pension fund made irrational decisions and chose an inappropriate pension fund (in terms of investment strategy and risk) during various stages of the development of financial markets. When there was a peak in stock market values, participants chose to switch to a fund with a higher proportion of equities. Conversely, when the stock markets were bottoming out, participants switched away from equity-heavy funds (Medaiskis et al., 2018).

3. Methodology

To evaluate the outcomes of participating in the second pension pillar from the perspective of an individual in the Baltic states, the study analysed the trajectory of a person who started to accumulate assets in the second pension pillar from its introduction and then retired at the age of 65 in early 2024. Life expectancy at the age of 65 years was set using a unisex approach based on the Eurostat data of 2023. The life expectancy is as in 2019, before the COVID pandemic. It was assumed that life expectancy after retirement would be 18 years in Lithuania, 17 years in Latvia and 19 years in Estonia for the analysed period.

It was first assumed that the individual received an income equal to the average monthly gross wage in their country over the entire accumulation period. To evaluate the effects of a person's income on the outcome of participation in the second pension pillar, two additional cases were analysed: a low-income earner who received the minimum monthly gross wage and a high-income earner whose income equalled three times the average monthly gross wage.

Several reforms to the funded schemes were implemented during the analysed period in the Baltic states, which allowed contributors to make decisions and alter their participation principles several times. It was assumed that all the contributors participated to the maximum in the second pillar, i.e. when having a choice of different contribution scenarios, they chose to continue their contributions to the second pillar or to contribute at the highest possible contribution rate (in the cases of Lithuania and Estonia).

The article evaluates the benefits and costs for contributors to the second pension pillar. In doing so, the present value of annuity payments, obtained from accumulated capital in the second pension pillar, is considered as a benefit of participation in the second pension pillar. The decision to contribute to the second pension pillar affects

the value of the first-pillar retirement pension since, in the Baltic states, the PAYG pension element is reduced. Therefore, the costs of participation are seen as the present value of the reductions in the first-pillar old age pension during the retirement period. If the benefits are higher than the costs described above, the accumulation in the second pension pillar from its introduction up to the end of 2023 is considered beneficial for the individual. Participants in the second-pillar pensions contribute themselves (in addition to the transfers from the first pillar) to the funded schemes in Lithuania and Estonia. In paying additional contributions to pension funds, participants are reducing their current consumption to potentially increase their consumption on retirement. Consequently, a separate scenario was analysed to reflect the incurred costs when incorporating the present value of participants' own contributions.

To analyse the benefits and costs, it is necessary to evaluate (i) the reduction in the contributor's first-pillar pension and (ii) the accumulated assets in the contributor's second-pillar pension account.

3.1. Evaluation of reduced first-pillar pensions in the three Baltic states

3.1.1. Estonia

In Estonia, the monthly old-age pension from the first (PAYG) pillar is based on four components reflecting: (i) a basic amount, (ii) length-of-service, (iii) insurance (up to year 2020) and (iv) a compound insurance and solidarity part (from 2021). Participation in the second pension pillar affects only the insurance and joint components of the monthly old-age pension, which are calculated as follows[3]:

$$\textit{Insurance and joint parts} = V* \sum\left(A + \frac{A + s_2}{2}\right) \tag{1}$$

Where A are the annual pension insurance coefficients, s_2 the length of service with a minimum contribution requirement, V is the cash value of the pension insurance coefficient and the solidarity component. To calculate the annual pension insurance coefficient (A) for a given individual, the public pension element of social tax paid in the specific calendar year is divided by the annual average pension element of the social tax. Hence, the annual pension insurance coefficient (A) reflects the ratio of social tax calculated based on the earnings of the person to that based on average earnings. The solidarity component (s_2) is 1.0 provided the social tax has been paid by a person on at least twelve times the minimum monthly wage during the year. If the social tax paid for the person is based on less than the minimum annual wage, the solidary component is calculated proportionally (Rajevska, 2015). The insurance part was not collected after 2020 and replaced by the joint component from 2021, and this is calculated as the average of the insurance and solidarity components.

If a person has joined a second-pillar pension scheme, their coefficient A for each year of accumulation in the pension fund is reduced proportionally in equation (1) due to the lower public pension component in the social tax paid. The reduction in old-age pension benefit during retirement increases due to the indexation rule applied in Estonia to this benefit. Twenty per cent of this index is based on the annual increase in the consumer price index, and the other 80 per cent on the annual increase of the pension insurance component of the collected social tax.

3.1.2. Latvia

The first pillar in Latvia is a compulsory social insurance scheme, operating according to the redistribution principle (PAYG) and constructed as a Notional Defined Contribution (NDC) scheme. Contributions earmarked for old-age pensions are recorded in notional individual accounts, with a rate of return (i.e. annual capital growth index) applied until retirement such that a (notional) pension capital is accumulated. The capital index[4] is updated each year in line with changes in the wages subject to insurance contributions. The monthly old-age pension is calculated according to the general NDC scheme formula:

$$P = \frac{K}{G*12} \tag{2}$$

Where P is the monthly pension, K is the individual pension capital of an insured person, and G is the life expectancy at the age when an individual pension is granted. If a person has joined a second-pillar pension scheme, their notional pension capital (K) is automatically reduced in Latvia (Rajevska, 2013). This is due to the transfer of contributions from the first pillar to the funded second pillar. The reduction in the first-pillar old-age pension benefit during retirement increases due to the indexation applied to this benefit based on CPI inflation and the growth of real wages. Here, part of those pensions and benefits that are above the threshold (i.e. 50% of the average insurance contribution salary in the previous calendar year) is subject to indexation in Latvia.

3.1.3. Lithuania

Monthly old-age pensions from the first (PAYG) pillar consist of a general and an individual component in Lithuania. Participation in the second pension pillar only affects the individual component, which is calculated as follows:

$$Individual\ part = V*p \tag{3}$$

Where V is the number of pension points accumulated by the person and p is the pension point value (in Euros). Pension points, V, are calculated as the ratio of a person's past social insurance contributions and the average contributions paid across the economy for the individual component. The number of pension points is reduced if one is accumulating assets in the second pension pillar as they are then calculated based on lower first-pillar contributions due to transfers to the private pension funds (European Commission. Directorate-General for Economic and Financial Affairs., 2021.).

The tax system in Lithuania was reorganised such that, as of 2019, the taxes paid by the employer and employee are consolidated. This means that the State Social Insurance Fund (Sodra) will no longer transfer contributions to pension funds. Consequently, the reduction in the individual component of the old-age pension for second-pillar contributors only applies up to the beginning of 2019.

The reduction in the first-pillar pension due to participation in the second pension pillar is increasing due to the application of indexation rules in Lithuania. The pension point value (p) for the individual component of the PAYG pension is indexed by a coefficient which is calculated based on actual changes in the wage fund over the previous three years, the year for which the coefficient is being calculated, and forecast for three years ahead starting from January 1st each year. From 2024, the individual element of the pension is indexed by adding an additional index to the coefficient, calculated in

accordance with the procedure established, such that the additional funds to be used in indexing the individual element of the pension do not exceed 75 per cent of the planned positive cash flow from the State Social Insurance Fund (Sodra).

It is assumed that retirement pensions paid from the first pillar will be indexed at 4 per cent annually from 2024 in the Baltic states. This indexation rate was estimated by considering the inflation and labour force productivity, calculated from long-term baseline scenario forecasts (Long-Term Baseline Projections, No. 109 (Edition 2021) | OECD Economic Outlook: Statistics and Projections | OECD Library, 2021) for the Baltic states. The methodology of The National Audit Office of Lithuania (2017) was used. It is assumed that, from 2024, over the next five years, the output gap will gradually close to zero and the economy remain at its full potential over the remaining long-term period considered in the calculations. Inflation is assumed to return gradually (using cubic spline interpolation) to the ECB's target of 2 per cent from 2024. Labour force productivity is calculated as real GDP divided by the potential number of employed persons.

3.2. Evaluation of accumulated assets in contributor's second-pillar pension account

The analysis of the costs and benefits for the participants used different scenarios regarding the risk category of the investment fund plan, namely low, medium or high-risk pension funds. The risk category reflects the historical volatility of an investment plan's unit value: the higher the category, the higher the historical volatility of the unit's value. The selected investment strategy was assumed to remain the same throughout the entire accumulation period, reflecting the typical behaviour of contributors. The principles for classifying pension funds by risk level in the Baltic states are described in Table 5.

The accumulated assets in the contributor's second-pillar pension account at the end of each quarter were calculated using the following general formula:

$$A_t = [C_t*(1 - f_t) + A_{t-1}]*(1 + R_t) \tag{4}$$

Where A_t are the accumulated assets in the contributor's second-pillar pension account at the end of a quarter t, f_t is a pension fund's fee taken from contributions for quarter t (only applied for the period 2004–2016 in Lithuania) and R_t denotes the quarter-by-quarter return of the second-pillar pension fund. C_t stands for the total contributions made to the second pension pillar during quarter t, calculated using country-specific contribution rates after deducting transfer fees (where applicable). The return of pension funds is calculated from the data available in each country: Lithuania (2004–2023), Latvia and Estonia (2003–2023). The calculated returns are presented in Figure 1.

Standard annuities are calculated based on accumulated assets in the contributor's second-pillar pension account prior to retirement and life expectancy at 65 as presented above. It is assumed that these annuities are not indexed over time. A one-off pension annuity administration tax is applied in each countryanalysed, set at 2.5 per cent for the Baltic states in accordance with the State Social Insurance Fund Board (Sodra).[5]

Benefits from the first and second pension pillars are tax exempt in Lithuania while in Latvia and Estonia they are taxed in line with personal income tax. In the analysis, the net amount of these benefits is used. Therefore, in Estonia and Latvia, benefits were recalculated as the net amount using legislated personal income tax percentages. Non-taxable

income allowances were not taken into consideration in the calculations. In calculating the present value of cash flows during the analysed period, a discount rate of 2 per cent was used reflecting the ECB's inflation target.

4. Results

The results are presented separately for contributors with different income levels in the three countries (see Figures 2–4) below.

For a contributor in Lithuania or Estonia with an average income (see Figure 2), the benefits derived from the second pillar in general significantly exceed the associated costs when considering only the losses from the PAYG system across all scenarios and types of funds. However, there are two notable exceptions to this broadly applicable finding. In the medium-income scenario, the benefits and costs are nearly equal when investing in low-risk funds. Further, in the high-income scenario, investing in low-risk funds in Lithuania has a negative outcome in terms of overall pension.

These exceptions were primarily driven by adverse conditions in financial markets, particularly the negative bond returns experienced during the exceptionally challenging year of 2022. Such market fluctuations have a pronounced impact on investment returns, especially for participants in low-risk funds. Furthermore, those participating co-contribute, alongside transfers from the first pillar to the schemes in both countries. When these contributions are classed as costs of participation, the results become more nuanced. Lithuanian participants have only been making these contributions relatively recently, whereas in Estonia they have been compulsory from the beginning. In Estonia, 4 per cent of social insurance contributions are transferred to the second pillar and contributors pay an additional 2 per cent of their personal income (see Table 4). On the assumption that

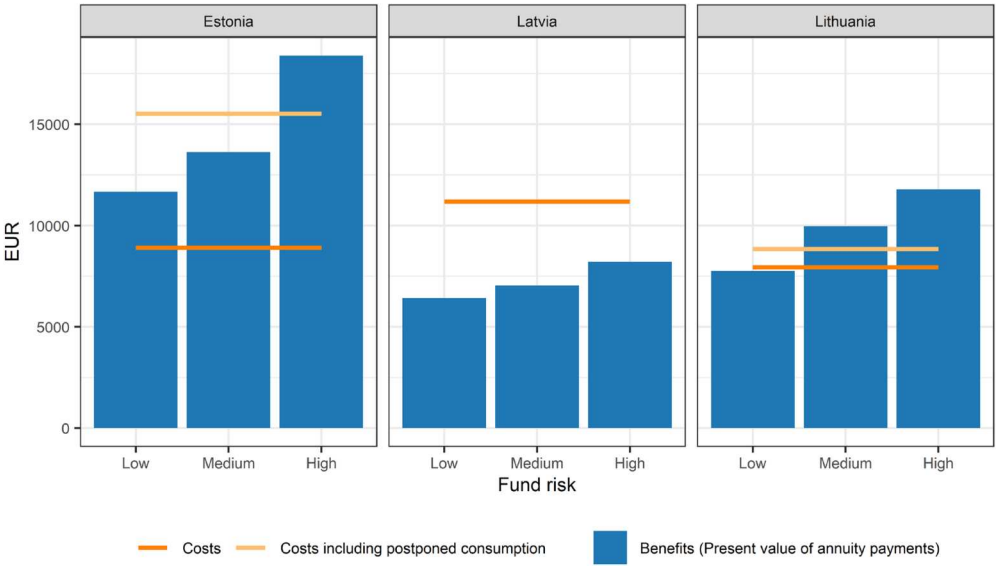

Figure 2. Benefits and costs for contributors with average incomes to second-pillar pension funds in Estonia, Latvia and Lithuania.

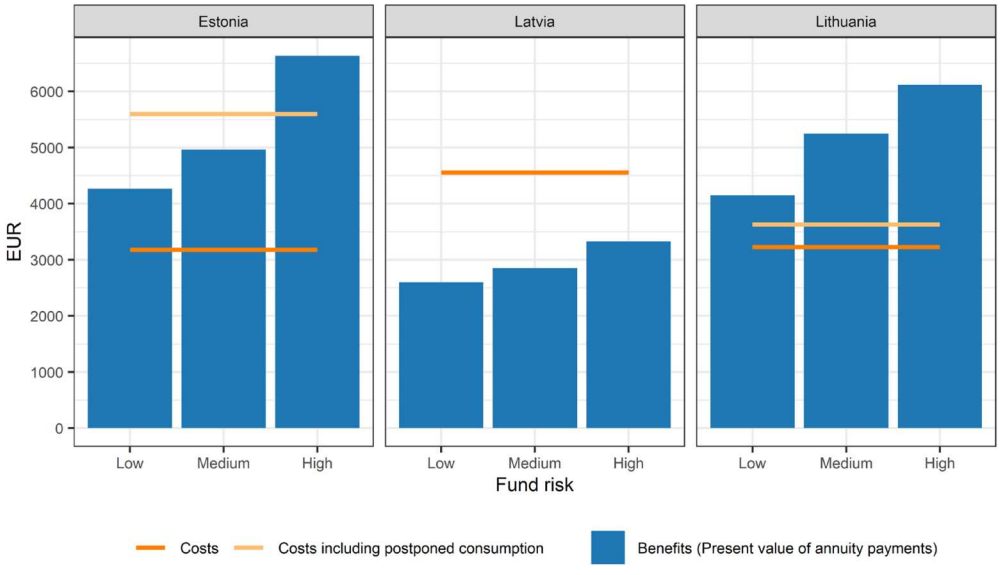

Figure 3. Benefits and costs for a low-income contributor to second-pillar pension funds in Estonia, Latvia and Lithuania.

co-contributors value present consumption more than future consumption, such personal contributions should be added to the contributors' costs due to the postponed consumption. In this scenario, the analysis leads to several possible outcomes for the contributors:

- In Lithuania, contributors with an average income participating in medium- or high-risk funds gain from contributing to the second pillar. Benefits for those who contribute to low-risk funds are slightly lower than the costs;

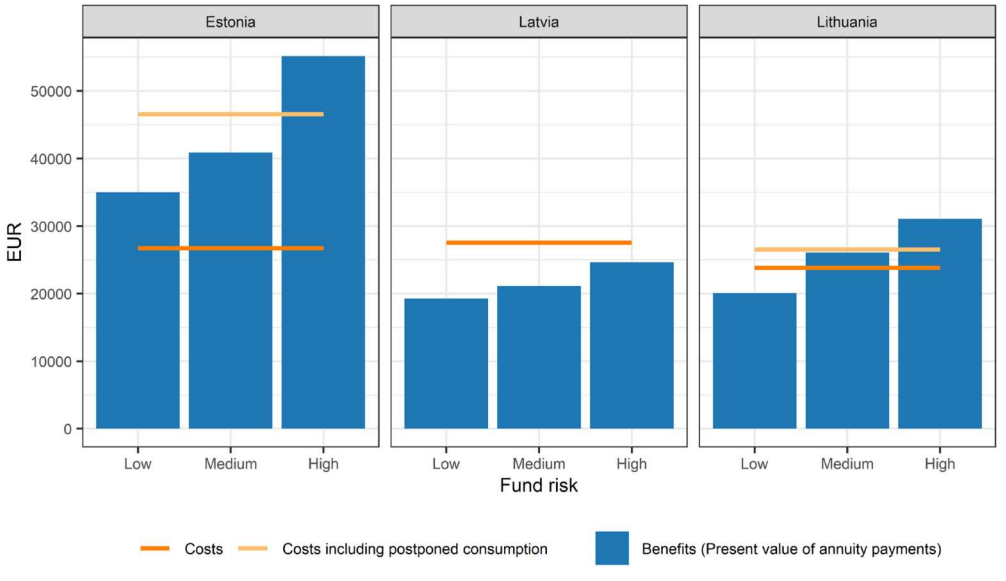

Figure 4. Benefits and costs for a high-income contributor to second-pillar pension funds in Estonia, Latvia and Lithuania.

- In Estonia, only average-income contributors participating in high-risk funds clearly benefit. Conversely, those accumulating funds in medium- and low-risk funds experience losses in terms of postponed consumption when compared to the benefits received;
- In Latvia, average-income contributors experience losses under all scenarios. Further, the notional defined contribution (NDC) system enables assets accumulated in the second pillar to be directly compared with capital losses (due to lower contributions) in the first pillar. First-pillar losses for average-income contributors are higher than the assets accumulated in the second pension pillar.

The results for Latvia can be viewed from two perspectives. Concerning the benefits, the relatively poor outcomes compared to Lithuania and Estonia may be attributed to historically conservative regulatory frameworks, which restricted the proportion of second-pillar assets that could be invested in equities since this has significantly impacted pension funds' historical investment returns. Furthermore, unlike in Lithuania and Estonia, participants in Latvia do not individually contribute to the second pillar. Turning to costs, the rapid and comparatively substantial indexation of first-pillar pension payments – occasionally subjected to populist political influences – has also contributed to the outcomes.

The results also show that low-income contributors to the second pillar in Lithuania benefit in all the analysed cases, regardless of the type of fund chosen. These benefits can be explained by the 'matching' state contributions which are related to the average salary in the country. High income contributors only benefit if they opt for high- or medium-risk funds. High income participants would experience losses from participation in low-risk funds, and while their contributions to medium-risk funds produce benefits these are slightly lower than the costs if one includes postponed consumption.

All contributors to the second pillar in Latvia will experience losses under all scenarios, regardless of the fund, with the benefits coming closest to the costs for high income contributors. This can be explained by the indexation policy for first-pillar pension benefits: part of those pensions and benefits that are above the threshold (i.e. 50% of the average insurance contribution salary in the previous calendar year) will be indexed. The outcomes for contributors with low or high incomes in Estonia are broadly similar to the outcomes for those with average income.

5. Conclusions and policy implications

This article has examined the benefits and costs of participation in second-pillar pensions in the Baltic states from an individual's perspective. The findings show that outcomes are strongly influenced by both shared country-specific features, such as contribution rates, default investment strategies and available investment risk profiles, and pension fund performance.

In Lithuania and Estonia, participation in the second pillar was seen as generally beneficial when accounting only for foregone PAYG benefits, the exceptions being for medium- and high-income contributors to low-risk Lithuanian pension funds. In Latvia, by contrast, contributions proved unprofitable, reflecting the lack of participant co-contributions and the historically limited range of investment opportunities.

When postponed consumption is considered as another cost, the picture remains broadly positive but more nuanced. In Lithuania, contributors to medium- and high-risk funds continue to benefit, although benefits for high-income participants in medium-risk funds is close to zero. Notably, low-income contributors in Lithuania profited more than higher earning contributors, largely due to the relatively high matching state contributions. In Estonia, the second pillar was clearly only beneficial for those contributing to high-risk funds.

These results have important policy implications. The comparative performances of the Baltic pension systems demonstrate that institutional design strongly shapes distributional outcomes. Basing the state's contributions on the country's average salary, as in Lithuania, creates favourable conditions for attracting additional funds from participants themselves and accumulating higher resources for future pensions, particularly for low-income groups. In contrast, the absence of such policy measures, as in Latvia, significantly limits the effectiveness of self-funded pensions.

The rapid wage growth observed in the Baltic states since EU accession is unlikely to persist as the incomes converge toward the EU average. Slower growth will reduce fiscal space for generous PAYG indexation, thereby reinforcing the importance of efficient funded schemes. The future balance between the benefits and costs of second-pillar pension accumulation may differ from the patterns observed in the period analysed. Second-pillar reforms should therefore be considered not only in terms of immediate distributional effects, but also in their capacity to buffer future demographic and fiscal pressures.

Another lesson from the analysis concerns behavioural responses. Evidence from this analysis and from previous studies (Lusardi & Mitchell, 2014; Medaiskis & Gudaitis, 2017) suggests that individuals frequently make suboptimal choices – such as switching into conservative funds during market downturns – driven by limited financial literacy and short-term bias. These tendencies may significantly erode long-term investment returns. Default lifecycle strategies, regulatory safeguards and expanded financial education could mitigate such risks by guiding participants towards more appropriate, risk-adjusted, portfolios.

This is not to deny that the study has its limitations. The analysis relied on historical investment returns over a 20-year period, and although these may not accurately predict future performance they do represent realistic risk–return profiles within the Baltic context. Furthermore, the country-specific institutional arrangements limit comparability and generalisability. Extending the observation period to 25–30 years and broadening the scope to include other Central and Eastern European countries would allow more robust conclusions.

To summarise, the Baltic experience with experiments in second pension pillar reforms highlights both the potential benefits and pitfalls of such schemes. Well-designed systems that combine co-contributions, diverse investment options and behavioural safeguards can enhance retirement outcomes and complement PAYG pensions. However, poorly structured systems risk imposing costs without commensurate benefits. As the region's economies mature, the balancing between PAYG and funded pensions will remain central to ensuring sustainable and adequate pension systems.

Notes

1. Old-age pension systems in the Baltic states were transformed into multi-pillar schemes, with reforms implemented in 2001 in Latvia, in 2002 in Estonia and in 2004 in Lithuania.
2. A lifecycle investment strategy in a pension fund refers to an approach in which the investment portfolio is automatically adjusted according to the participant's age or the remaining years until retirement. This strategy typically entails a gradual transition from high-risk assets, such as equities, to more conservative investments, such as bonds and cash, as retirement nears.
3. In equation (1), the insurance part is calculated as $V \cdot \sum A$ and the joint part as $V \cdot \sum\left(\frac{A+s_2}{2}\right)$.
4. For the calculations, annual capital indexes were obtained from Latvia's State Social Insurance Agency. The G coefficient, as well as the minimum and average monthly gross wages, were taken from the Latvia's Official Statistics Portal.
5. https://www.sodra.lt/uploads/documents/files/ataskaita(7).pdf.
6. In 2021, Estonia implemented a significant reform to its second pillar pension system, allowing individuals to withdraw their accumulated funds before reaching retirement age. By the end of 2025 Q1, approximately 36% of those who had previously joined the second pillar had opted out. It is important to note that the article does not account for these significant changes and their potential implications for the pension system and the broader economy.
7. At the beginning of 2025, political discussions began in Lithuania regarding the possibility of allowing individuals to withdraw from the second pension pillar before reaching retirement age. The potential consequences of such a decision are viewed negatively (Bielskis et al., 2025).

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