

DOI: [10.20472/ES.2016.5.4.002](https://doi.org/10.20472/ES.2016.5.4.002)

THE EFFECT OF SECOND PILLAR PENSION TO OLD AGE PENSION: LITHUANIAN CASE

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Abstract:

This paper evaluates the Lithuanian second pillar pension system from the point of view of individual participant. The goal of the paper is to evaluate whether the participants who joined second pillar pension system in 2004 and retire at the beginning of the year 2019 made the beneficial decision and increase their retirement income. Three different methods are used by comparing the accumulated values of a second pillar pension based on the fully funded principle with the reduced values in the first pillar pension based on the pay-as-you-go principle. The analysis is based on the historical results and data of pension accumulation of an 12 years period from 2004 until the end of 2015 with forecasted continuation of participation for the 2016-2018 period based on the methodology prepared by the authors. The results demonstrate that participation in the fully funded second pillar pension system, compared with non-participation, may in general be assessed as positive and effective. However, the benefits of participation directly depend not only on investment returns and life expectancy, but also on the long-run indexation of the first pillar old-age pension, which is a highly politically reliant variable. Various presumptions concerning this issue are also discussed in the paper.

Keywords:

Pension reform, retirement policies, old-age pay-as-you-go public pension, fully funded private pension, pension funds

JEL Classification: H55, J26, J32

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Citation:

TEODORAS MEDAIKIS, TADAS GUDAITIS, JAROSLAV MEČKOVSKI (2016). The Effect of Second Pillar Pension to Old Age Pension: Lithuanian Case. International Journal of Economic Sciences, Vol. V(4), pp. 20-31., [10.20472/ES.2016.5.4.002](https://doi.org/10.20472/ES.2016.5.4.002)

This research was funded by a grant (No. MIP-15204) from the Research Council of Lithuania. This research was performed in cooperation with Vilnius University.

Introduction

Briefly about the pillars of Lithuanian pensions system. The fully funded second pillar pension was introduced in Lithuania from 1 January 2004, by reforming pension system, which previously was based only on pay-as-you-go principle.

The introduced second pension pillar is based on the individual fully funded accounts of participants who are allowed to pay a part of their obligatory pension insurance contribution into their personal account, instead of paying the full contribution into state social insurance fund. Due to this acquired old-age pension rights of the participants are proportionally reduced.

The second pillar is administrated by pension accumulation companies, which manage several pension funds with different investment strategies. Participation in the second pension pillar – not like in many other countries with similar system – is completely voluntary in Lithuania. By the end of 2015, more than 1.2 million participants – 96 percent of those insured for a full pension – are accumulating capital in second pillar pension funds. The main principles of the pension reform in Lithuania are similar to that of many other post-communist countries (Latvia, Estonia, Poland etc.), where pension systems were reformed earlier (see Égert, 2012; Volskis, 2012).

Lithuanian pension system has faced number of challenges. Some of them are common to other countries as decreasing of birth rates and aging, which is resulting in increased old-age pension expenditures. As specific challenges it should be mentioned the emigration, resulting in declining number of contributors or shadow economy resulting in collected lower social insurance contributions.

In 2008-2009 global financial crisis significantly affected second pillar pension too. From one side, accumulated capital has lost values due to turbulence in financial markets, from another side due to fiscal deficit contributions to second pillar pension funds were decreased from 5.5% to 2% in 2009. Later Government has decide to change participation level (rules) and in 2013 participants of second pillar pension funds had to choose their participation level (contributions level) by selecting one of the following options: to stop further participation in the second pillar, to increase participation in the second pillar (by paying additional 2 per cent contribution supplemented with state contribution of 2 percent of average wage) or to stay with previous participation level (see Maccioni, Gudaitis, 2014).

The goal of present research is to evaluate whether it was beneficial or not for the average monthly wage recipients to join the second pillar in Lithuania and accumulate in it for 15 years from 2004 till 2018. This question looks important enough in the current context of national and international discussion about role and values of second pillar pension systems as they were designed in many post-communist countries.

Previous research on this topic. There are different opinions on pension reforms towards funding varying from approval to scepticism in the scientific literature on pensions. We fully agree with conclusion expressed by N. Barr and P. Diamond (2006): "A move from

pay-as you-go towards funding may or may not be welfare-improving, depending on a series of country specifics".

The pillars of Lithuanian pension system was analysed mostly from the point of view of financial sustainability, effects on public finances, problems of current design of the system (Lazutka, 2008; Lazutka 2013; Jankauskienė & Medaiskis 2010-2012, Bitinas & Maccioni 2014, Gudaitis 2009-2013). Nevertheless, in some papers the problem of individual income of participants of the second pillar is also addressed. Lazutka (2013) express the opinion that "probably income of retirees who had participated both in second pillar pension funds and the first pillar will be lower than income of those who had participated only in the first pillar". Medaiskis & Gudaitis (2013) have conducted study, where they have also assessed the results of pension reform in Lithuania from the personal point of view of participant. Although the conclusion about the usefulness of participation in the second pillar is positive, authors warn that commercial annuity paid from second pillar in certain cases may not compensate the reduction of the first pillar pension. Both mentioned sources do not take into account the essential change in Lithuanian pension system, which were made in 2013, as described above. In this paper the authors intend to extend the previous research and adapt it to the new rules of participation in the second pillar.

The paper consists of three parts. At the beginning, it is described how the amount of the old-age pension is reduced when a participant transfers a part of his/her insurance contributions into second pillar pension funds. Secondly, calculation principles of the accumulated amount in second pillar pension funds and assumptions used in the historical calculations and prognosis are presented. Finally, the results are compared by three different methods, which allow to comprehensively assess the results of participation in second pension pillar in Lithuania.

Methodology

In the following estimations authors consider a person, who started to participate in the second pillar in 2004, during the entire working life received an income equal to average wage in Lithuania and will retire at the beginning of 2019 with the remaining life expectancy of 222 months (based on the data by Statistics Lithuania). The retirement age in 2019 will be 63 years and 3 months (authors use the unisex approach and take the averaged retirement age).

The evaluation whether it was beneficial or not for the average monthly wage recipients to join the second pillar in Lithuania and accumulate in it for 15 years from 2004 till 2018 will be done in three different ways.

Firstly, cash flow analysis will be performed. If the level of second pillar pension participant's annuity payments during retirement period will be higher compared with the size of reductions in old-age pension due to participation in the second pillar, the decision to join second pillar pension funds will be treated as beneficial.

Secondly, net present value of reductions in social insurance old-age pension during retirement period will be calculated. It is considered as costs of participation in second pension pillar. If net present value of mentioned reductions in old age pension is smaller than accumulated wealth in the second pension pillar, then the decision to join the second pillar is treated as beneficial.

Thirdly, net present value of annuity, obtained from accumulated capital in the second pension pillar, will be calculated. It is considered as benefit of participation in second pension pillar. If net present value of annuity payments' will be higher than the net present value of reductions in old age pension during retirement period (based on life expectancy), then the decision to join second pillar pension funds will be treated as beneficial.

In order to perform the comparisons mentioned above it is necessary to evaluate (i) size of the reduction of participant's first pillar pension and (ii) accumulated amount in participant's second pillar pension account.

Evaluation of first pillar pension reduction. As it was mentioned above, in Lithuania participation in fully funded second pillar is influencing the value of old-age pension paid from the first (pay-as-you-go) pillar. The old-age pension calculation in the first pillar is based on three components: the main, supplement, and earnings-related parts¹. The participation in the second pillar affects only the earnings-related part which is decreased proportionally to social insurance contributions paid to the personal second pillar pension account and by the participation period. The specific rule to analyse this phenomenon was proposed and analysed for the first time by Medaiskis & Morkūnienė (2004).

The earnings-related part (hereinafter, ERP) of the old-age pension of a second pillar participant is calculated with reduced coefficients as follows:

$$ERP_T = 0.005 \cdot (k_1 + k_2 + \dots + k_{m-1} + d_m k_m + d_{m+1} k_{m+1} + \dots + d_n k_n) \cdot D_T \quad (1)$$

ERP is equal to the sum of collected coefficients (or "pension points") $k_1 + k_2 + \dots + k_n$ (where n is year of retirement) multiplied by 0.5 percent of the current insured income D_T of the month T of pension payment. If a person joined the fully funded second pillar system from year m with contribution rate r_m (see Table 1 for details), and the pension insurance contribution rate for the supplementary part of old-age pension was R_m , then the earnings-related component for this year of participation is proportionally reduced by $d_m = (R_m - r_m) / R_m$. For example, in 2015, a 9.3 percent contribution rate for the supplementary part of old-age pension was legally adopted. The participant of the second pillar transfers 2 percent into his/her personal pension account, hence his/her coefficient of k_{2015} is reduced by $d_{2015} = (9.3 - 2) / 9.3 = 0.785$, i.e., by 21.5 percent.

¹ In July 2016 the new Pension law was approved. New old-age pension calculation formula was approved, but the key calculation principles stay similar and calculations, which are done in the paper, are corresponding to it.

Table 1. Contribution rates to second pillar pension funds (% of income taxable by social insurance contribution)

Contribution type	2004	2005	2006	2007-2008	2009	2010 - 2012	2013	2014 - 2015	2016 - 2019	From 2020
Employee's (Participant's) part	2.5	2.5	2.5	2.5	3.0 (2.0)	2.0	2.5	2	2	3.5
Employer's part		1.0	2.0	3.0	0	0	0	0	0	0
Additional Participant's contribution								1	2	2
Additional contribution from state budget from country average wage								1	2	2
Total	2.5	3.5	4.5	5.5	3.0 (2.0)	2.0	2.5	4	6	7.5

Source: Social Insurance Fund data.

As it is clear from the rule (1) of calculation of earnings-related part of old-age pension, the monthly reduction of participant's pension is equal to

$$0.005 \cdot ((1 - d_m) k_m + (1 - d_{m+1}) k_{m+1} + \dots + (1 - d_n) k_n) \cdot D_T. \quad (2)$$

The reduction rates d_t are presented in Table 2. It is presumed that the value of the years 2014 -2016 will not be changed till the end of the year 2018. It is important to add, that additional participant's contribution into the second pillar and additional contribution from state budget calculated as a part of country average wage, as it was established from the year 2013, are not influencing the old-age social insurance pension including ERP.

Table 2. Social insurance contribution and reduction rates

Year	Full social insurance contribution rate into old-age earnings-related part (%) R_m	Transfer into second pillar rate (%) r_m	Reduction rate d_m
2004	10.5	2.5	0.762
2005	10.6	3.5	0.670
2006	10.5	4.5	0.571
2007	9.9	5.5	0.444
2008	9.3	5.5	0.409
2009	9.3	2.5	0.731
2010	9.3	2.0	0.785
2011	9.3	2.0	0.785
2012	9.3	1.5	0.839
2013	9.3	2.5	0.731
2014 -2016 2017 -2018	9.3	2.0	0.785

Source: authors' calculations based on Social Insurance Fund data.

Coefficients from k_{2004} to k_{2015} are known from historical statistical data. Short period estimation of these coefficients till the year 2018 is achieved by vector autoregression (VAR) model based on historical data from 2000 till 2015. This multivariate model also includes unemployment rate and labour productivity. Performed unit root tests showed that changes in unemployment rate and growth rates of wage and labour productivity are stationary variables. Analysis confirmed that estimated fourth-order VAR model is sufficient from statistical point of view, because residuals are normally distributed and not autocorrelated. Also performed F-test revealed that between these variables exists Granger causality, thus in this case they can be modelled together.

As values of k_t and d_t are needed in this analysis only until the year 2018, the value of D_T should be evaluated for much longer period – during 222 months of expected life of average retiree because our aim is to compare accumulated amount in second pillar pension account (or annuity based on this account) with reduction of the first pillar pension during the whole future. Formula (2) shows that the key variable becomes insured income D_T . If the essential growth of D_T is expected, then the reduction of first pillar pension becomes more and more valuable and may exceed the annuity paid from the second pillar.

For 2004-2016 period in this research historical and actual size of D_T is used. In 2016 the actual size of D_T is 445 Eur.

The forecast of D_T is difficult due to the fact, that it is highly politically depended variable: till 2016 D_T was discretionary determined every year by the Government of Lithuania. Assessing from economical point of view, D_T has tight link with changes of country average wage (in order to assure stable replacement rate for retirees) and income to social insurance budget. Historical data witness that D_T grows more slowly than country average wage (Lietuvos bankas, 2013). On the other hand, according to formed judicial practice old age pension from first pillar might not be decreased due to the deterioration of the economic situation in the country. Recently in the frame of so-called "New social model" the formal rules of pension point value indexation were approved by Parliament, but still there are no experience how these rules would work in practise. In these circumstances it is assumed in this research that in the year: 2017 value of D_T will be 450 Eur, in 2018 – 455 Eur and in 2019 – 460 Eur. Later it will be increased by 2 percent yearly.

Evaluation of accumulated amount in participant's second pillar pension account. By analysing pension accumulation results in fully funded second pillar in Lithuania, it is important to mention, that second pillar pension funds are divided into several groups depending on the investment strategy. Classification principles are based on the part of investments into equities:

- Conservative pension funds (assets under management (hereinafter, AUM) are not invested into equities).

- Mixed pension funds. (up to 70 percent of AUM are invested into equities²).
- Pure equity pension funds (up to 100 percent of AUM are invested into equities).

The investment results for second pillar pension funds have been monitored continuously since the start of the pension reform in Lithuania. The unit price change of a pension fund is the main indicator used for investment performance evaluation. The unit price change of a pension fund shows how much a pension fund participant's assets increased or decreased during a specific period. However, the indicator of the unit price change of a pension fund takes into account the assets management fee of a pension fund, but does not take into fee from contributions', which is applied by pension fund when new contributions are transferred to pension fund. Therefore, the unit price change of a pension fund does not fully disclose the real change of investment value over the time. The importance of charges applied by the fully funded pension funds was extensively analysed by different authors (e.g. see Barr & Diamond, 2010 and Hinz R, Rudolph P. H., et al., 2010). Comparing the costs of individual accounts in the fully funded system is complex. Moreover, the compounding nature of charges requires a detailed analysis of pension systems in order to evaluate their effectiveness. Because of the effects of compounding, it is easy to underestimate the importance of charges. Due to these reasons, it is necessary to calculate the net investment return of second pillar pension funds by comparing the sum of social insurance contributions transferred to the second-pillar pension funds with the assets accumulated in the pension funds. All applicable fees (contribution fees and asset management fees) are taken into account by calculating net investment returns. In the paper, the accumulated amount in participant's second pillar pension account is calculated by the formula:

$$A_t = \left((W_t \cdot r_t + W_t \cdot r_t^{per} + W_{t-2}^* \cdot r_t^{gov}) (1 - c_t) + A_{t-1} \right) \cdot (1 + \Delta P_t) \quad (3)$$

Where: A_t – accumulated amount in participant's second pillar pension account on year t .

W_t – participant's yearly wage before taxes on year t .

W_{t-2}^* – average country wage before taxes on year $t-2$

r_t – social insurance contribution rate transferred to participant's second pillar pension account on year t .

r_t^{per} – additional participant's contribution (from personal income) to second pillar pension account on year t .

r_t^{gov} – additional contribution from country average wage to second pillar pension account on year t .

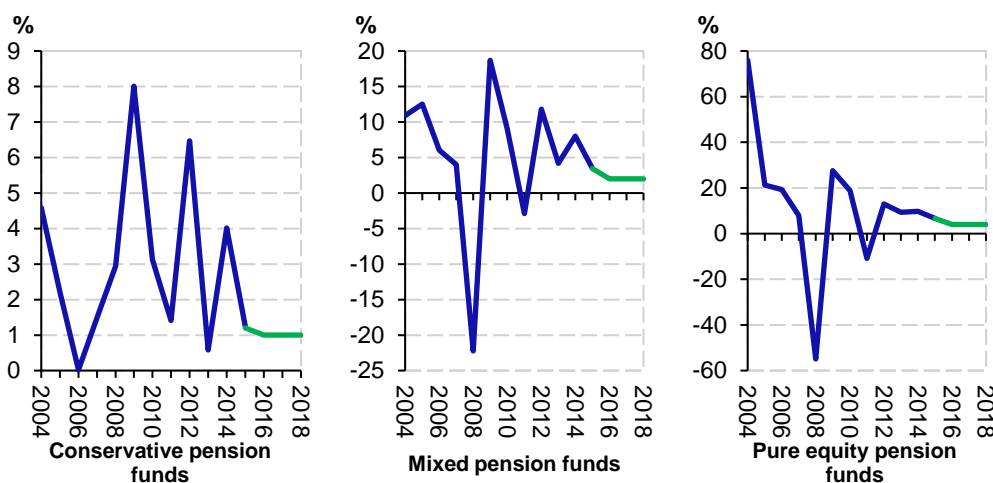
c_t – second pillar pension fund's fee from contributions' on year t .

ΔP_t – second pillar pension fund's investment unit price annual change during year t .

² Traditionally, mixed pension funds in Lithuania are separated in two different categories – those who invest in equities up to 30 percent, and up to 70 percent. Authors use the simplified case and treat the mentioned two groups as one.

Historical values of ΔP_t and its prognosis for 2016-2018 period, which are used in calculations for different pension fund groups are provided in Figure 1. For prognosis reasons authors have selected respective annual investment returns: 1% for conservatives pension funds, 2% for mixed pension funds and 4% for pure equity pension funds. Conservative scenario of investment returns was presumed taking into account low interest environment and fluctuations in the financial markets. The presumed investment returns are lower comparing to long term investment returns from respective asset classes.

Figure 1. Second pillar pension fund's investment unit price annual change during analysing period.



Source: Lithuanian Central Bank and authors calculations

Results

Three different comparisons, selected by the authors and described above allows to comprehensively assess the results of participation in second pension pillar.

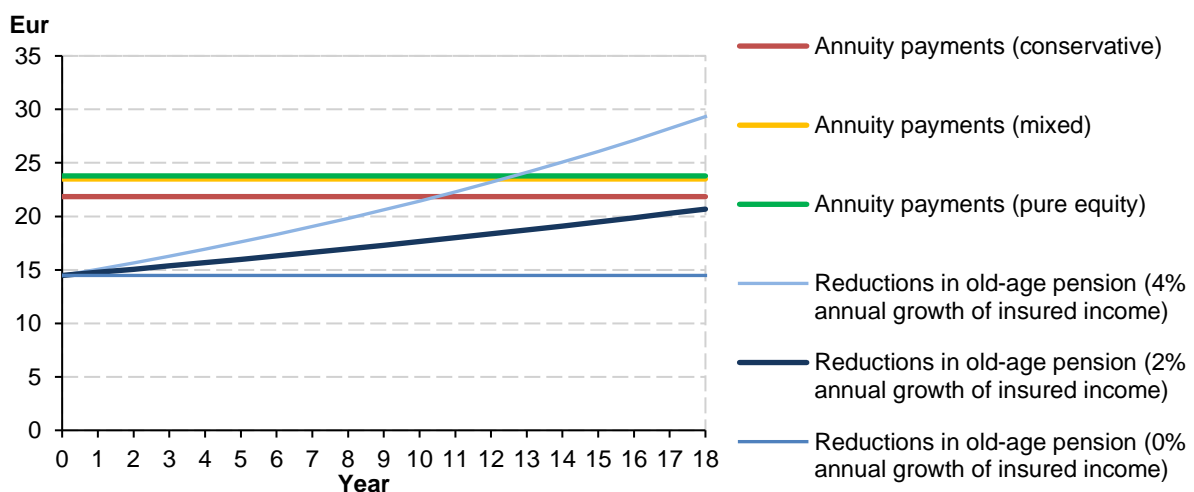
Firstly, cash flow analysis shows that decision to join the second pillar pension funds can be treated as beneficial for participant, who receives average country wage. During retirement period the sum of received annuity payments will be higher than the sum of reductions in old-age pension pay-outs' from the first pension pillar in case of non-participation, even in case where insured income is increased by 2 per cent every year in retirement period (see Table 3 for details).

Table 3. Comparison of future annuity payments from the second pension pillar versus reductions in pay-outs from the first pension pillar, Eur

Pension funds' group	Second pillar pension's annuity payments' sum	Sum of reductions in old-age pension pay-outs from the first pension pillar, due to participation in second pension pillar	Difference
Conservative	4850	3844	1006
Mixed	5216	3844	1372
Pure equity	5279	3844	1435

Source: authors' calculations

In this paper the annuity payments from the second pillar are calculated based on NDC principle, where the accumulated wealth is divided by the number of months in expected remaining lifetime in retirement. Analysis on a monthly pay-outs basis show that in the first half of retirement period, received monthly annuity payments are much higher compared with the received pay-out from the first pension pillar in case of non-participation. However, situation is meaningfully changing in the later retirement period, because the first pillar pay-outs are indexed quite intensive every year while annuity payments are stable during the whole retirement period. The effect of different indexation values is presented in the Figure 2. It should be noted that such a high indexation of insured income as 4 percent per year is rather too optimistic looking at the forecasted long-term income growth in the country.

Figure 2. Comparison of future annuity payments from second pillar versus reductions in pay-outs from first pension pillar due to participation in the second pillar.

Source: authors' calculations.

Secondly, authors compare the net present value of decreases (due to participation in the second pension pillar) in social insurance old age pension during retirement period with the accumulated sum in the second pillar. Results show, that the NPV of reductions in social insurance old-age pension is smaller than the accumulated sum in the second pension pillar. Authors are using 3 per cent annual discount rate in calculations. It

means, decision to join second pillar pension funds is treated as beneficial (see Table 4 for details). This method more precisely reflects the case, when second pillar participant get all accumulated amount at once after reaching the retirement. According to Lithuanian legislation, the participant of the second pillar is obliged to buy annuity if its "basic" amount exceeds 50 percent of the basic pension. In order to apply this rule, the Bank of Lithuania at least once per year approves the values of "basic" annuities. Thus, in order to assess the case, when participant is receiving annuity payments, net present value of annuity payments' sum shall be compared with pay-outs sum received from first pension pillar in case of non-participation. The basic annuity calculation rule approved by the Bank of Lithuania is only a "criterial" rule. It just states the threshold of accumulated pension capital when participant is required to buy annuity (instead of taking the lump sum).

Table 4. Comparison of accumulated sum in the second pension pillar versus net present value of decreases in old age pension during retirement period from the first pension pillar, Eur

Pension funds' group	Second pillar pension's annuity payments' sum	NPV of reductions in old-age pension pay-outs from the first pension pillar, due to participation in the second pension pillar	Difference
Conservative	4850	2955	1895
Mixed	5216	2955	2261
Pure equity	5279	2955	2324

Source: authors' calculations

Thirdly, authors compared the net present value of an annuity, obtained from accumulated capital in the second pension pillar, with net present value of reductions in pay-outs received from the first pension pillar in case of non-participation. Results showed, that in the analysed cases NPV of second pillar annuity is higher than net present value of the pay-outs sum received from the first pension pillar in case of non-participation. It means decision to join second pillar pension funds is treated as beneficial as well (see Table 5 for details).

Table 5. Comparison of NPV of annuity, obtained from accumulated capital in the second pension pillar versus NPV of reductions in old age pension during retirement period from first pension pillar, Eur

Pension funds' group	NPV of the second pillar pension's annuity payments	NPV of reductions in old-age pension pay-outs from the first pension pillar, due to participation in the second pension pillar	Difference
Conservative	3791	2955	836
Mixed	4077	2955	1122
Pure equity	4126	2955	1171

Source: authors' calculations

By concluding, the results demonstrate that under certain assumptions used in this paper participation in the fully funded second pillar pension, compared with non-participation, can in general be assessed as positive and effective. Thus far, the largest share of retirement income is still financed through public pensions, and mandatory social contributions comprise a large part of labour costs, by leaving less scope for additional pensions. However, the more funded pensions are growing, the more importance they gain in financial markets, including their benefits and drawbacks for pensions and old age income (Ebbinghaus, 2011). Lietuvos bankas (2013) revealed that the future pension level will largely depend on increased participation in second pillar and could mean 15-34 per cent higher old-age pension.

Conclusions

The comparison of gain (additionally accumulated pension capital in the fully funded second pension pillar) and loss (reductions in the pay-as-you-go first pension pillar) might serve as a criterion to determine whether participation in the second pillar was successful or not. During the analysed 2004-2018 period a comparison of accumulated pension capital amounts in the fully funded second pillar versus decreased amount in the pay-as-you-go first pillar demonstrated, that an average wage earner's accumulated amount in all fully funded second pillar pension fund groups exceeds the reductions in old-age pension in the first pillar. The evaluations presented in the article allow to state that participation in second pillar pension funds during the years 2004-2018 is seen as successful from the point of view of the retirement income of participants. The differences of the income of participants and non-participants are significant to draw a conclusion.

However, it shall be noted, that the results of participation in second pillar pension will be depending not only on investment performance of pension funds, but also on the expected old-age pension indexation policy in the first pension pillar. It is also highly dependent on the assumptions used in estimations.

Since the second pension pillar in Lithuania is quite young so far (active for 12.5 years), authors naturally could consider only a specific historical period and (specifically for this paper) the case of a person who started to participate in this system at its beginning and will retire in 2019 and receive country average wage. It is important to note, that pension systems are long-term-oriented schemes and especially relevant for younger population members.

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