
ESS – Extension of Social Security

**Second-pillar Pension Re-reforms in Bulgaria, Croatia,
Estonia, Latvia, Macedonia, Romania, and Slovakia**

Benefit Payouts amidst Continuing Retrenchment

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Abstract

Most analyses of Central and Eastern Europe's (CEE) second-pension pillars focus on Hungary and Poland, the first CEE governments to establish such pillars (1997-1999) and the first to retrench them (2010-2011). However, as the regional front-runners in second-pillar creation and termination, Hungary and Poland differ in some important ways from other CEE countries that adopted this model. This paper concentrates on the other CEE second pillars, a majority of which have matured and begun to pay benefits, although only to small numbers of workers. For seven CEE countries, it describes these private benefits, compares them with public pensions and presents available evidence concerning their durability, adequacy and financing.

JEL Classification: I3, H53, H55, J14, J26

Keywords: pension privatization, pension reform, social security policy

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Acronyms

CEE	Central and Eastern Europe
DB	Defined benefit
DC	Defined contribution
EU	European Union
NDC	Notional defined contribution
OECD	Organisation for Economic Co-operation and Development
PAYG	Pay-as-you-go
SIA	Social Insurance Agency

1. Introduction

This paper follows the latest developments in the brief but tumultuous existence of mandatory individual retirement accounts in seven CEE countries – Bulgaria, Croatia, Estonia, Latvia, Macedonia, Romania and Slovakia. Often referred to collectively as second pillars, these accounts were established by most CEE governments during 1999-2007, with encouragement and financial support from the World Bank. At the time, the World Bank claimed that second pillars would increase economic growth, ease public pension financing as populations aged and protect worker savings from adverse political actions, rendering the second pillars more stable than public pension systems¹. In subsequent years, these claims were challenged, including from within the Bank itself². However, they resonated at the time in the CEE region where, in the wake of the Soviet Bloc's dissolution, privatization was a popular reform strategy.

The CEE governments funded the new individual savings accounts by diverting a portion of public pension revenues, thus creating or increasing operating deficits in the public systems³. Upon enactment, accounts in most countries were mandatory for younger workers, voluntary for the middle-aged, and unavailable to workers approaching retirement. Thus, over time, participation would become mandatory for everyone. Reflecting the split of each participating worker's contributions between the first- and second-pension pillars, workers would in the future receive two pensions in retirement, one government-managed pension financed on a pay-as-you-go (PAYGO) basis and a second privately-managed pension with advance funding.

However, the second pillars soon encountered difficulties. The commercial firms that managed them charged high fees, eroding account balances⁴. Governments relied primarily on borrowing to fill the gaps in public pension finance caused by diverting revenues to individual accounts. This reliance inflated national deficits and caused some countries to approach the European Union's debt and deficit limits⁵. In 2007, the global economic crisis made credit scarce and expensive. No longer able to borrow to fill the gaps in public pension finance, most of the governments reduced second-pillar funding (Table 1). These cuts continued after economic stability was restored. In some countries, cuts are still being planned and implemented⁶. However, individual accounts continue to exist in some form in all seven countries, and most of them have recently begun to pay benefits. This paper describes these benefits and compares them with the public pensions that most accountholders also receive.

¹ World Bank (1994) and Holzmann (1998).

² For an analysis that challenges the early World Bank claims, see Orsag and Stiglitz (1999), Barr (2000), Holzmann and Palacios (2001) and Fultz (2012).

³ Estonia also required an additional worker contribution, 2 per cent of covered wages.

⁴ Fultz and Ruck (2001) and Price and Rudolph (2013).

⁵ The EU Maastricht Criteria generally require Member States to keep annual deficits under 3 per cent of GDP and accumulated debt under 60 per cent of GDP.

⁶ See section 2.

Table 1. Public pension contributions diverted to second-pillar individual accounts in seven CEE countries (% of covered wages)

Country	At inception of the second pillar	Prior to crisis (2007)	2018
Bulgaria	2%	5%	5%
Croatia	5%	5%	5%
Estonia	6%	6%	6%
Latvia	2%	8%	6%
Macedonia	7.4%	7.4%	6%
Romania	2%	2% ⁷	3.75%
Slovakia	9%	9%	4.25%
Average	4.77%	6.06	5.14%

Source: Appendix A.

In general, this paper shows that second-pillar policies remain unsettled in most countries. In Bulgaria and Romania, government proposals specifying second-pillar benefits are blocked by opponents. In Romania, a new government reduced the second-pillar contribution rate and is considering making participation optional. Three governments have allowed certain workers to exit the second pillars (Bulgaria, Croatia and Slovakia), refund their contributions, and receive a full public pension. In terms of benefit design, most governments require that life-long annuities be paid to most accountholders, thus helping to protect pensioners from outliving their savings. However, in only one country, Croatia, will these annuities be adjusted for inflation in the same manner as public pensions. In some countries, benefit laws and regulations fall short of ensuring equal treatment for women.

Although new second-pillar exit options (Bulgaria, Croatia, and Slovakia) help to diffuse worker dissatisfaction, they also create horizontal inequalities and strain public pension finance. To protect accountholders from second-pillar disadvantages while simultaneously protecting the public pension system from rising costs, CEE governments may consider moving to supplemental pension systems in which worker participation is encouraged but not required and which are funded independently of the public pension system by additional worker, employer, and/or government contributions.

2. A snapshot of CEE pension schemes

Across the seven CEE countries, second pillars operate as components of public pension systems. As such, these systems are the starting point for this analysis. All seven have features that reflect the countries' previous socialist governance and subsequent transitions to a market economy. Contributions are paid mainly by employers. Retirement ages, previously lower than in countries of the Organisation for Economic Co-operation and Development (OECD), are increasing in small increments toward 65-67 for men and 62-67 for women⁸. Redistribution in benefit formulas, widely regarded as excessive during the Soviet period, has been reduced or eliminated⁹. Due to the financing method adopted for second pillars, public pension finance is strained by the diversion of contribution revenues to individual accounts.

⁷ In Romania, the diversion of contributions was subsequently raised to 5.1 per cent, then cut to 3.75 per cent in the Fall of 2017.

⁸ Hirose (2011).

⁹ Fultz and Ruck (2000), p. 12.

In terms of their design, CEE public pensions have three basic characteristics in common – features that are typical of most public pension schemes worldwide. Monthly payments are guaranteed for life for all those who meet eligibility requirements. Thus, pensioners do not face the risk of outliving their benefits. Public pensions are adjusted regularly based on a mix of wage and cost indices. This, too, helps to protect older pensioners from economic hardship. And all public pensions are computed in a manner that gives women and men of the same age with equal years of work and pension contributions equal monthly benefits, a policy that is widely accepted as equitable.

Replacement rates vary widely, as shown in Table 2, falling below the European Union (EU) average in four countries (Bulgaria, Croatia, Estonia and Latvia) and exceeding it in two (Slovakia and Romania)¹⁰. Women’s replacement rates also vary significantly in relation to men’s, with the average exceeding that of men in three countries (Croatia, Estonia and Latvia). With one exception (Croatia), all the systems have aggregate replacement rates of at least 40 per cent. Note that ILO Convention No. 102 (Social Security – Minimum Standards) requires that the old-age benefit level equal at least 40 per cent of the reference wage for a standard beneficiary after 30 years of employment.

Table 2. Aggregate replacement rates for selected CEE pension systems, 2016¹¹

Country	Men and women	Men	Women
Bulgaria	45%	50%	42%
Croatia	37%	39%	40%
Estonia	45%	39%	51%
Latvia	42%	40%	43%
Macedonia	--	--	--
Romania	66%	68%	57%
Slovakia	62%	60%	57%
EU 19	58%	61%	55%

Source: European Commission (2018b), p. 47.

3. Second-pillar benefits – the legal frameworks

Many CEE governments launched individual-account systems before defining the benefit package that workers could expect to receive¹². This situation has since been largely rectified, with laws now in place in five of the seven countries (Croatia, Estonia, Latvia, Macedonia and Slovakia), as shown in Table 3. All five have recently begun to pay benefits to small numbers of accountholders. In two others, the inception of payouts is still on the horizon (Bulgaria, 2022; Romania, 2032) with no benefit law in place.

¹⁰ As it is not an EU Member State, a comparable replacement rate is not available for Macedonia.

¹¹ The ratio of the median individual gross pension of people aged 65-74 to the mean individual gross earnings of people aged 50-59.

¹² Fultz and Ruck (2000), p. 16.

Table 3. Countries, dates of second-pillar laws and dates for benefit payouts

Country	Launch of second pillar	Inception of benefit payouts	Benefit law enacted
Bulgaria	2002	2022	No
Croatia	1999	2012	Yes
Estonia	2002	2009	Yes
Latvia	2001	2014	Yes
Macedonia	2006	2016	Yes
Romania	2007	2032	No
Slovakia	2005	2015	Yes

Source: Appendix A.

In neither of the latter countries is legislative action on the horizon. The main obstacles are:

- In *Bulgaria*, the finance ministry proposed a payout law in 2016 but subsequently withdrew it under criticism led by second-pillar fund administrators. Their main objection focused on a requirement that they pool their assets to ensure solid financing for life annuities¹³. After the ministry withdrew the bill, the government shifted authority for a second-pillar payout law to the Ministry of Labour and Social Policy, which has not yet formulated a proposal. Until a payout law is enacted, retiring workers receive lump-sum payments or refund their account balances to the public system in exchange for a full public pension (Table 2 and Appendix A-1).
- In *Romania*, the previous government's labour ministry proposed a payout law in 2016, but soon thereafter, national elections brought a new government to power. Claiming low public confidence in the second pillar and low investment returns, at various times, the new government proposed to discontinue the second pillar, to make it optional, to cut the public pension contributions diverted to it and to lower the cap on management fees charged by private funds¹⁴. A compromise agreed upon in late 2017 reduced the diversion of contributions from the first pillar to the second from 5.1 per cent to 3.75 per cent of covered wages but retained the requirement that workers participate. The government continues to study eliminating that requirement.

In recent years, some governments have narrowed the group of workers required to save in individual accounts. These revisions were largely responses to worker dissatisfaction with low second-pillar investment returns and/or to the public pension deficits created by diverting revenues to the second pillars. During 2010-2015, three governments relaxed requirements that workers save in individual counts (Bulgaria, Croatia and Slovakia, Table 4 and Appendices), either by making the accounts optional for some workers, allowing workers to refund their contributions to the government in return for a public pension, or both.

¹³ The requirement was aimed at ensuring adequate funding for annuities for the long-lived. However, the fund administrators criticized it as "rendering the concept of personal savings meaningless." (Krzyzak2016).

¹⁴ Ottawa (2018).

Table 4. Second Pillars: Exit options/requirements

Country	Amendment
Bulgaria	<ul style="list-style-type: none">– At the end of 2014, second-pillar members were allowed to return to the first pillar alone, while refunding their account balances to the government ¹⁵. The option is available until five years before retirement.– Those who opt out of the second pillar may also opt back in.– The first pillar alone was made the default for new labour market entrants who do not select a second-pillar fund within one year.
Croatia	Since 2011, retiring workers who had joined the second pillar voluntarily (aged 40-50 at time of implementation of the second pillar) have been allowed to return to a single first pillar if that benefit would be higher than their combined first- and second-pillar benefits.
Slovakia	On four occasions during 2008-2015, the government allowed second-pillar members to refund their account balances and regain the right to a full public pension (and, conversely, first-pillar members were permitted to join the mixed system).

Source: Appendix A.

In two countries, further second-pillar revisions are now being considered. In Macedonia, accountholders who receive lower pensions than others in their age cohorts who did not join the second pillar have sued the government. In June 2017, the Macedonian government created a committee to develop proposals for addressing the problem of low second-pillar pensions (Appendix A-6). In Romania, as noted, the government continues to study the feasibility of making individual accounts optional (Appendix A-8) ¹⁶.

4. Second-pillar benefits – three design issues

4.1. Will payments be guaranteed for life?

Myopia, or short-sightedness, is the main policy rationale for guaranteed lifetime pensions. If workers were left to their own devices, many would save inadequately for retirement and recognize their error only when it was too late. Some would be forced to rely on public assistance, burdening other taxpayers. ILO Convention No. 102 (Social Security – Minimum Standards) helps to prevent these outcomes by requiring that retirement benefits be paid regularly during the pensioner's lifetime ¹⁷. To what extent do CEE second-pillar laws adhere to this basic principle?

Table 5 shows that most laws require lifetime benefits for most workers. Two countries (Croatia and Latvia) require that workers convert their entire individual account to a life annuity, with no «leakage» in the form of phased withdrawals or lump-sum payments. In two others (Estonia and Slovakia), laws also require payment of lifetime benefits but make exceptions for small accounts, which can be paid as lump sums. The

¹⁵ The government has proposed that the funds be credited to the government Silver Fund, a public pension demographic reserve.

¹⁶ *Nineoclock*.

¹⁷ In CEE, Convention No. 102 has been ratified by Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Montenegro, Serbia, Slovakia, Slovenia, Romania and the Ukraine.

governments of Bulgaria and Romania made similar proposals to those of Estonia and Slovakia, but these were not accepted.

One government (Macedonia) leaves the decision between a lifetime pension and phased withdrawals to the accountholder. Here a complex rule requires that account withdrawals be large enough to make the individual's public pension plus the withdrawal equal to at least the minimum pension. This prevents a pensioner from collecting the minimum pension while setting his/her second-pillar account aside for future years. When the exhaustion of an individual account leaves the pensioner's monthly payment below the minimum pension, it is automatically increased to that level ¹⁸.

Table 5. Will retiring workers be guaranteed regular, lifetime payments?

Policy	Countries
Yes No lump sum payments allowed	<ul style="list-style-type: none"> ■ Croatia and Latvia– annuity purchase required or workers can refund savings to public pension system in return for a full public benefit
Mostly Accountholders are generally required to purchase annuities, but with exceptions for small accounts	<ul style="list-style-type: none"> ■ Estonia – lump sum paid for accounts equal to less than one quarter of flat pension rate ■ Slovakia – lump sum paid if no pension provider offers annuity ■ Bulgaria and Romania – previous, unenacted government proposals required annuity purchase for larger accounts
No Life annuity purchase not required	<ul style="list-style-type: none"> ■ Macedonia – worker has choice between annuity or phased withdrawal

Source: Appendix A.

4.2. Will second-pillar pensions retain purchasing power?

Adjusting pensions regularly for inflation and/or changes in average wage levels promotes social cohesion and pensioners' economic security. Such adjustments are of special importance in CEE, where many of the grandparents of today's workers experienced hardship in retirement during an era when inflation was not officially recognized, and pensions declined in value as pensioners aged ¹⁹. More recently, runaway inflation also eroded pensions during the early years of transition, making life difficult for parents of many current workers.

As shown in Table 6, only one country, Croatia, requires regular second-pillar pension adjustments. Croatian second-pillar pensions must be adjusted in the same manner as public pensions, which is currently twice a year. This requirement provides important protection for pensioners but poses risks for the pension provider due to the uncertainty of future inflation rates. Governments can mitigate such risks for private funds by issuing inflation-indexed bonds. Through investing in them, the funds can shift the risk of uncertain inflation rates to taxpayers. So far, Croatia has not issued these bonds (only one CEE country, Poland, has done so and only in small quantities).

¹⁸ Hirose (2017).

¹⁹ Fultz and Ruck (2000), p. 4.

Table 6. Will second-pillar pensions retain their purchasing power?

Status	Country
Adjustment required	<ul style="list-style-type: none">■ <i>Croatia</i> – must follow the public pension adjustment (currently two adjustments per year, using the Swiss method (50% wages, 50% prices) and a variation of it (70:30, 50:50, 30:70), depending on wage and price trends■ <i>Romania</i> – proposed law would have required adjustment at a rate prescribed in the individual's pension contract
Adjustment not required	<ul style="list-style-type: none">■ <i>Bulgaria</i> – no requirement in previous draft law■ <i>Latvia</i>
Adjustment optional for fund, but with conditions	<ul style="list-style-type: none">■ <i>Estonia</i> – cannot exceed 3% per year■ <i>Macedonia</i> – can occur only for two years■ <i>Slovakia</i> - initial benefit amount is reduced to offset adjustment costs

Source: Appendix A.

In addition, some second-pillar accountholders have *indirect* access to regular pension adjustments. In countries that allow some accountholders to refund their balances in return for a full public pension (Bulgaria, Croatia and Slovakia) or that extend this option to everyone (Latvia), an inflation-adjusted pension is available by choosing that option ²⁰.

On the other hand, two CEE countries restrict private funds' latitude to provide adjustments – Estonia, by rate, and Macedonia, by duration. Slovakia requires that the initial pension amount be reduced to finance future adjustments, a procedure akin to self-insurance.

In sum, under the second-pillar benefit laws of today, the great majority of pensions will not maintain their value over time. The main recourse available to accountholders who want inflation protection is to refund their balances to the public system, if they have this option.

4.3. Will second-pillar pension calculations provide gender equality?

The conversion of an individual account to a lifetime pension involves «stretching» the former over the worker's remaining years of life. Since that period is unknown, annuity providers rely on estimates for particular age cohorts. Two quite different estimates are possible: (i) A unisex life table that applies to both sexes, or (ii) distinct life tables for women and men, reflecting the fact that women as a group live longer. The former approach ensures that men and women with the same contributions and investment returns will receive the same monthly pension amounts while, under the second, a woman will receive roughly 15 per cent less ²¹. As discussed earlier, gender-neutral calculation is the norm in public pension schemes, where it helps to prevent poverty, is widely regarded as fair, and is consistent with treatment of life expectancy in other public policies (see Box 1). European Commission Directive 79/7/EEC calls for those Member States whose second pillars are part of the public pension systems to refrain from using gender-specific actuarial factors in calculating benefits.

²⁰ In Latvia, this option was part of the original second-pillar law.

²¹ For the EU 28, male life expectancy at age 65 / female life expectancy at age 65 = 18.2 / 21.6 = 84.3 per cent.

Box 1.
The policy rationale for gender-neutral pension calculations

- *Poverty alleviation* - Paying lower pensions to those who on average live longer would expose that group to greater risk of poverty at every stage of their retirement.
- *Individual fairness* – Calculating pensions based on separate projections of life expectancy for women and men as groups would mask the substantial overlap that exists between them, creating many unjustified winners and losers – in other words, men who outlive the female average but receive higher pensions because other men die earlier (winners) and women whose longevity falls short of the male average but who receive lower pensions because of other women’s longevity (losers).
- *Policy coherence* – Women are not the only group in society with longer life expectancy. Non-smokers on average outlive smokers, the affluent on average outlive the poor, and those with a strong genetic endowment live longer on average than those born with predispositions to disease. If we apply group treatment to women, should we not apply it to other groups? Where should this process of differentiation stop?

Source: Fultz and Steinhilber, 2003.

Table 7 shows that CEE second pillars are nearly evenly divided on this question. Four governments mandate, or have proposed, gender neutrality, while the remainder allow, or propose to allow, private funds to reduce benefits paid to all women to reflect the longer life expectancy of women as a group.

Table 7. Will the calculation of second-pillar pensions be gender-neutral?

Yes	No
Croatia	Latvia, but workers may return to public NDC system, where gender neutral pensions are provided
Estonia	Macedonia
Slovakia	Romania, no requirement in proposed law
Bulgaria, proposed ²²	

Source: Appendix A.

There are also some fine points:

- In Latvia, retiring female workers have an indirect path to gender-neutral benefit computation. By refunding their accounts to the public pension system at retirement, they can receive a full public benefit computed with a single, unified life expectancy estimate. This is an especially beneficial option for women who, all other things being equal, could be expected to use it in larger numbers. If so, this would create disproportionate savings for private pension funds and disproportionate costs for the public system.
- In Macedonia, where accountholders have the option to convert their balances to a lifetime pension, the absence of a requirement for gender fairness will likely discourage women from doing so.

²² This proposal was coupled with a second proposal to create a common pool of assets for paying pensions. Such a fund would presumably have been structured as a single annuity provider for all. If so, this would preclude gender discrimination.

-
- In Romania, the previous labour ministry's proposal required workers to use their accounts to purchase life-long annuities but with neither a requirement for gender fairness nor an exit option (as in Latvia). Had this proposal been enacted, Romanian women would have received lower monthly second-pillar pensions than their male peers with similar account balances and investment returns.

Gender-neutral pension calculation is key to achieving gender equality, but in competitive private-pension markets, this alone is insufficient. When subject to these requirements, providers can lower their overall costs by recruiting fewer female members. Such discrimination may be illegal but nevertheless occurs in subtle ways, for example, through advertising or rewards for joining the fund that target men. There are two ways to eliminate this incentive: a single national annuity provider that converts all account balances to monthly payments, and thus has no leeway to discriminate in choosing members, or a mandatory system of financial transfers among pension providers that offsets any advantage that would accrue from a disproportionate number of men in a fund's membership base.

One government, Croatia, has adopted the former approach; in another, Bulgaria, the finance ministry proposed it but later withdrew the option in response to opposition led by private fund providers.

The second approach does not exist in any CEE country. There are, however, precedents in EU healthcare systems where private funds compete for members, for example, in the Netherlands, Poland, Switzerland, Romania and Slovakia²³. In these countries, equalization funds were created to dissuade private healthcare providers from discriminating against potential members who are likely to be less healthy and thus incur higher medical expenses.

5. Discussion

Drawing on the preceding pages, this section discusses the main impacts of second-pillar pension design on workers' retirement security. Four cross-cutting patterns stand out, related to: (i) the stability of second-pillar laws; (ii) requirements or a lack thereof for regular pension adjustments; (iii) second-pillar implementation strategies; and (iv) the impact of the new refund options on the financing of public pensions.

- A. *Unsettled second-pillar policies.* It is a universal principle that pension systems need to be reformed gradually to enable workers to plan early for their security in old age. The preceding discussion demonstrates that one country, Estonia, has largely observed this principle. While its government suspended the redirection of public-pension contribution revenue to the second pillar after the global financial crisis, it restored it when economic conditions stabilized and even created a catch-up period (Appendix A-3). However, Estonia's situation contrasts sharply with the fluctuating policies in the other six countries.

Three of these countries have permanently reduced the flow of public pension contributions to individual accounts (Latvia, Romania and Slovakia); three have relaxed the requirement to save in individual accounts (Bulgaria, Croatia and Slovakia); and, two lack the political consensus needed to pass a benefit law (Bulgaria

²³ As well as in the US Affordable Care Act (Obamacare).

and Romania)²⁴. One government is the target of lawsuits by second-pillar accountholders who receive lower pensions than non-members (Macedonia) and has established a working group to develop solutions.

Clearly, this high policy flux is not helpful to workers in planning for the future, nor is it conducive to the worker confidence that is essential for the second pillars' success.

- B. *Pensions without inflation protection.* Four of the five countries with payout laws require that all or most account balances be converted to annuities at retirement. This is a positive development for the affected workers, one that will help ensure regular payments throughout their lifetimes. Yet only a single law requires that second-pillar pensions be adjusted regularly for inflation (Croatia), and several laws place limits on the frequency, rate or means of financing such adjustments (Estonia, Macedonia and Slovakia). Thus, for most workers who retain their account balances in the second pillar at retirement – either because they do not have a refund option or because they choose not to exercise it – the goods and services that their pensions can buy will diminish over time.
- C. *Missing support and enforcement mechanisms.* In principle, second-pillar pensions can be designed to protect workers' retirement security in the same way that public pension systems do: guaranteed lifelong benefits, regular inflation adjustments and gender equality in benefit computation. However, competing private funds require both regulation and assistance from governments to implement these worker protections. In several CEE countries, the legal requirements are in place, but the regulation and support needed for their successful implementation are not.

The observation applies, first, to gender-neutral benefit computation. Without either a single annuity provider or an equalization fund, private annuity providers operating in those CEE countries that require gender equality in benefit calculation (Estonia and Slovakia) have the potential to reduce their costs through subtle recruitment of male members and discouragement of female enrolment. Such gender discrimination may not yet have occurred, or the regulatory authorities may not have detected it. The threat, however, is real, as evidenced by the existence of equalization funds in many European systems that rely on competing private firms to deliver health benefits.

Similarly, in the single country with mandatory private pension adjustments (Croatia), this requirement is not supported by a government initiative to make inflation-adjusted bonds available to private funds, thus enabling them to hedge their risks. For Croatia and other governments that might follow its lead in protecting second-pillar pensioners from inflation, ensuring the availability of such bonds will be key to success.

- D. *Refund options that strain public pension finance.* Refund options enable accountholders to avoid second-pillar losses relative to public pensions. Such options are expanding in CEE countries, with three governments in this study having adopted this approach in some form in recent years (Bulgaria, Croatia and Slovakia)²⁵. These options favour the subset of accountholders that are both eligible and aware of their

²⁴ Macedonia also reduced second-pillar revenues, but this was part of an overall reduction in the pension contribution rate (see Appendix A).

²⁵ In addition, Poland now requires refunding, Hungary allows it, and Latvia included a refunding option in its original second-pillar law.

rights. However, they are problematic for accountholders who are less well-informed, as well as for public pension recipients as a group.

As pension literacy is not high in CEE countries, many accountholders may be unaware of their eligibility for a refund option. Furthermore, if options are time-limited, some accountholders may miss deadlines or make mistakes, either by action or inaction that become apparent only after it is too late. Laws that allow workers to make multiple choices, moving in and out of the second pillar, add further complexity to their decisions.

Furthermore, the existence of refund options for some accountholders but not others creates horizontal inequities. As retiring accountholders without refund options find out that they are disadvantaged relative to peers who have them, or those who do not have individual accounts at all, political pressure is likely to mount for more and broader options for exiting second pillars.

Yet expanding such options strains public pension finance to the disadvantage of all pensioners. Strains arise for two reasons: first, because the account balances that are refunded to the public pension system do not make it whole. They are insufficient due to the deduction of private management fees during a worker's career. These fees are high in most CEE countries and, over a worker's career, can erode the account balance by a fifth or more²⁶. A second strain arises from gender differences in life expectancy. In countries without a mandate for gender-neutral pension calculation in the second pillar, women have stronger incentives to refund their account balances at retirement, all things being equal, than do men. Thus, the more «expensive» pensioners will likely return to the public system in larger numbers, providing large savings to private funds but creating disproportionate costs for the government.

For both reasons, the more widely that refund options are made available and exercised, the more likely that they will strain public pension finance and create pressures for future cuts in public pensions.

How can governments protect retiring accountholders from second-pillar losses without weakening the financing of their public pensions? While recognizing that there are no easy answers, some observers have called for a paradigm shift in which the second pillar is no longer financed from the first, and in which governments «nudge» rather than require workers to contribute to supplemental retirement savings plans²⁷. Policy initiatives that nudge pension participation through automatic enrolment, but from which workers can withdraw at will, have been undertaken on a large scale by the United Kingdom, the US State of California, and New Zealand (Kiwi Savings Plan).

Such an initiative is currently being planned in Poland, where second pillars will be fundamentally restructured in 2019. A quarter of existing account balances will be transferred to a demographic reserve in the ZUS, the public pension agency; and the remaining three-quarters will be transferred to new occupational savings accounts to which both employers and workers will contribute, incentivized by government matching funds. Enrolment will be automatic, but workers will have the right to opt out (by signing a

²⁶ An investment management fee of just 1 per cent of the account balance will reduce the value of the account by 20 per cent over a workers' career (Barr, 2011, p. 19). For CEE management fee levels, see Price and Rudolph, 2013.

²⁷ The concept of the “nudge” was elaborated by Thaler and Sunstein (2008). Orenstein (2013), and Cribb and Emmerson (2016), among others, have advocated it as an alternative to mandatory second pillars.

declaration). Because the new accounts will be financed outside the public pension system, they will not strain its financing and so will not pose a threat to workers' public pensions.

The success of such a shift hinges on several factors. First, governments would need to educate workers, raise public awareness and overcome resistance, including opposition from private investment managers that today benefit from mandatory worker participation and public funding of second pillars. Second, with worker participation encouraged by making enrolment automatic, governments must develop the technical capacities and commit the resources needed to monitor private management fees and to regulate them to protect the investments of inattentive accountholders. Third, to promote high levels of worker participation, governments would need to ensure transparency in the operation of voluntary private funds, as well as to raise workers' awareness and pension literacy. Finally, when the second pillar is voluntary, the need for an adequate and soundly-financed public pension system becomes even more important.

Taken together, these prerequisites provide a reminder that there are no shortcuts in addressing the difficulties that currently face CEE second pillars. But it is equally clear that a key source of those difficulties – the funding of the second pillar from the first – is difficult to sustain when private benefits compare unfavourably with public pensions. For those CEE governments that are seeking to protect accountholders from second-pillar disadvantages while simultaneously protecting public pension systems from excessive costs, the option of moving toward a voluntary, independently-financed supplemental system deserves a close look.

Appendix A

Country profiles

A.1. Bulgaria

Enactment of second pillar – 2002

- Contribution rate, 2 per cent of covered wages, subsequently increased to 5 per cent
- Two types of funds, so-called universal funds (for all workers) ¹ and occupational funds (early retirement for those engaged in hazardous work).

Retrenchment – end of 2014

- Second-pillar members (both universal and occupational funds) given the option to return to the first pillar alone, while refunding their account balances (proposal: to the government Silver Fund, a demographic reserve that is conservatively managed). The option is available until five years before retirement. Those who opt out of second pillar may return.
- A single first-pillar system is made the default for new labour market entrants who do not select a second-pillar fund within one year.

The second-pillar benefit package

- *Qualification* – Must be of retirement age.
- *Benefit types* – No law in place. Periodic payments (pensions and annuities) ² planned to start in 2022. Pending enactment of law on payouts, retiring workers receive lump-sum payments or, as described above, refund their account balances to the public system in exchange for a full public pension.

During 2015 and 2016, the finance ministry proposed legislation on conditions of benefit payout. The proposal included:

- Pension funds must offer accountholders lifetime pensions;
- Accountholders may opt to receive a pension from a pension fund or an annuity from a life insurance company, with the goal of encouraging competition in the pensions/annuities market; ³
- Pension funds must create a common pool of assets for paying supplemental pensions to ensure financing for the long-lived;
- Annuity providers (both pension funds and life insurance companies) must use gender-neutral life expectancy tables in computing benefits.

Recent experience – There are nine private pension management companies, each offering two funds, as described above.

In 2016, 24,373 retiring workers refunded their second-pillar account balances, resulting in an average public pension increase of US\$ 42.44. During 2017, 14,586 retiring workers applied for this transfer and 3,797 transfers were completed as of 20 March 2018.

¹ Born in 1960 and thereafter.

² In Bulgaria, the term “lifetime pension” is used for pension funds and the term “lifetime annuity”, for life insurance companies.

³ However, the Ministry of Labour, along with existing pension fund administrators, opposes payment by life insurance companies.

A.2. Croatia

Enactment of second pillar – 1999, implementation, 2002, with benefit payments to start in 2012. Contribution rate, 5 per cent of the 20 per cent pension insurance rate redirected to individual accounts.

Retrenchment – No change in contribution rate. Since 2011, retiring workers who had joined the second pillar voluntarily (ages 40-50 at time of second-pillar implementation) can return to the single first-pillar scheme if that benefit would be higher ¹. As a result, the initiation of second-pillar benefit payments has been pushed forward 10 years, to 2022. In 2014, life-cycle funds were introduced, and workers nearing retirement must move their savings into a conservative fund.

The second-pillar benefit package – Upon retirement, individuals must use the accumulated balance in their accounts to purchase an annuity from an authorized insurance company. Currently, there is only one licensed company, Raiffeisen.

- *Qualification* – entitlement to a public pension.
- *Benefit types* – Single life pension, joint life pension, single life pension with guarantee period ², and joint life pension with guarantee period. Lump-sum payments are not permitted. Annuities are paid by pension insurance companies. As noted, there is currently only one.
- *Benefit computation* – Gender-neutral benefit computation is required, and the law prohibits discrimination based on gender (2014).
- *Pension adjustment* – Mandatory, following the rules of the first pillar, which require two adjustments per year, one according to the Swiss method (50 per cent wages, 50 per cent prices), and a second based on variable ratios (70:30, 50:50, 30:70), depending on wages and price trends (2014).

Recent experience

- In 2017, 249 people were receiving second-pillar annuities.
- Just over half of them (52 per cent) received a joint pension with a guarantee period.
- Croatia's single annuity provider, Raiffeisen, applies both gender-neutral benefit calculation and bi-annual pension indexation but reportedly opposes the latter.

¹ The first pillar is attractive, in part, because workers in the mixed system are not entitled to a public pension supplement (since 2007, between 4 per cent and 27 per cent of the public pension). This created an imbalance between pensioners in the mixed system and those in the first pillar only. The government has deferred the decision on whether to provide this supplement to members of the mixed-pension system. In addition, many early retirees are women in low-paid jobs who had been contributing to the second pillar for a relatively short time and who retired early (resulting in high life expectancy in the second-pillar benefit calculation) (Vukorepa, 2015).

² If the beneficiary dies during the guarantee period, the pension is paid to a designated heir.

A.3. Estonia

Enactment of second pillar – 2002, contribution rate, 6 per cent of the covered wage, of which 4 per cent was redirected from the public pension system to the individual accounts, supplemented by a 2 per cent mandatory contribution from the accountholder's wage.

Retrenchment – During 2009 and the first half of 2010, the 6 per cent contribution rate was temporarily reduced to zero. During 2014-2017, the rate was temporarily increased to 8 per cent to make up for missed contributions ¹.

The second-pillar benefit package

- *Qualification* – Person must have contributed to the individual account for at least five years and be of pensionable age, which is gradually increasing from 63 to 65 ².
- *Benefit types* – Lump sums and programmed withdrawals are paid by pension companies, while annuities are paid by insurance companies.
- Lump sums are permitted only if invested balances are less than 10 times the basic pension. Phased withdrawals are allowed when balances are 10-50 times the basic pension ³.
- *Annuity calculation* – Insurance companies are required to use gender-neutral life expectancy tables.
- *Annuity adjustments* – Not required. Insurance companies may offer interest of up to 3 per cent on annuities ⁴.

Recent experience

- Commencement of benefit payments, 2009.
- Three insurance companies are licensed to pay second-pillar annuities.
- At the close of 2016, 32, 272 people were entitled to receive payments from their second-pillar accounts. Of these:
 - 21 per cent (6,083) had postponed application for payment.
 - 48 per cent (15,949) opted for a programmed withdrawal.
 - 16 per cent (5,225) took the account balance as a lump-sum payment.
 - 15 per cent (5,015) were receiving an annuity.
 - Of these, 56 per cent are men, 44 per cent women.
 - Men's annuities are on average 27 per cent higher.

¹ Individuals could opt to voluntarily pay the 2 per cent rate, starting in 2010 (while the 4 per cent social tax was still not being redirected to the second pillar). Thus, for some individuals, the current rate is 9 per cent rather than 8 per cent.

² The increase is three months per year beginning in 2017, until age 65 is reached in 2026.

³ Rocha, 2012.

⁴ Accountholders may purchase annuities that distribute at least 50 per cent of profits.

A.4. Latvia

Enactment of second pillar – 2001. Contributions equalling 2 per cent of wages were redirected from the public pension system to individual accounts. This gradually increased to 8 per cent (and would have risen to 10 per cent but for retrenchment, as described below). Participation is mandatory for those born after 1971 (or age 30 at the time of enactment), and voluntary for those born during 1951-1971 (ages 30-39 at enactment). Benefit payments are mandated to commence in 2014.

Retrenchment – 2009, second-pillar contribution rate reduced to 2 per cent, subsequently (2016) increased to 6 per cent.

The second-pillar benefit package

- *Qualification* – eligibility for a public pension
- *Benefit types* – At retirement, workers choose between (1) purchase of an annuity, or (2) crediting of the second-pillar account balance to his/her public notional defined-contribution (NDC) account to increase the NDC retirement benefit.
 - For annuity purchase
 - Option to defer annuity for up to 10 years and to set three different benefit amounts over time;
 - Option for insurance companies to offer pensioners joint annuities with a fixed-duration guarantee (during which the monthly payment is inheritable);
 - No requirement for gender-neutral benefit calculation; and
 - No requirement for pension adjustments.
 - For refunding option
 - Pension adjustments as under public NDC system;
 - No option for joint annuity; and
 - Gender-neutral benefit calculation required, as in the public NDC system.

Recent experience – In 2016, 14 per cent of retiring workers (2,028) opted to purchase an annuity with their account balances, which averaged US\$ 5,952. The remaining 86 per cent of retiring workers (10,248) opted to transfer their balances, which averaged US\$ 1,887, to the public NDC system.

The first cohort of mandatory second-pillar participants will reach statutory retirement age in 2035.

A.5. Macedonia

Enactment of the second pillar – 2003, implemented in 2006, with a 7.42 per cent contribution rate diverted from the 21.2 per cent pension contribution rate at the time.

Retrenchment – 2011, 7.42 per cent reduced to 6 per cent in the context of an overall reduction in the pension contribution rate from 21.2 per cent to 18 per cent.

The second-pillar benefit package (enacted in 2012)

- *Qualification* – Generally, accountholders must be eligible for a public pension (requiring prior contributions of 15 years) ¹.
- *Benefit types* – An accountholder may choose a life annuity, a programmed withdrawal, or a combination of the two. Those without a public pension generally receive lump-sum payments.
 - *Payment* – Annuities are paid by insurance companies, while lump sums for those without a public pension are paid by pension funds.
 - *Benefit calculation* – No requirement for gender neutrality. An annuity may include a guaranteed period, during which a designated heir would inherit the income stream.
 - *Pension adjustments* – Not required. Annuities may be indexed by cost of living or share of profits for up to two years. Phased withdrawals must be adjusted annually to reflect market yield.
 - *Interaction with public pension system*
 - For second-pillar accountholders, the maximum public pension is reduced from 80 per cent to 30 per cent of prior wages.
 - Programmed withdrawals must be paid at a rate that pegs the first- and second-pillar benefits to the minimum pension. When the exhaustion of a phased withdrawal leaves the public pension level below the minimum pension, it is increased to the minimum pension level.

Recent experience

- In 2018, 73 accountholders are receiving second-pillar pensions, of which 35 are voluntary members and 38 are mandatory members.
- About 15,600 accountholders will retire over the next decade.
- Complaints are currently being litigated from accountholders who receive lower pensions than peers who did not join the second pillar. In June 2017, the Macedonian government created a committee to develop proposals for addressing the problem of low second-pillar pensions.

¹ An accountholder who is not eligible for a public pension may receive the balance as an annuity only if the annuity amount exceeds 40 per cent of the statutory minimum pension. Otherwise, the account can be drawn down through phased withdrawals (without a guarantee of lifelong benefits).

A.6. Romania

Enactment of second pillar – Legislation passed in 2004 and implemented in 2007, with an initial contribution rate of 2 per cent of wages, set by law to rise by 0.5 per cent per year to reach 6 per cent in 2016. Participation was mandatory for those under age 35. A one-time choice to join the second pillar was available to those then aged 35-45.

Retrenchment – legislated rate of increase was suspended and slowed. In November 2017, it was reduced from 5.1 per cent to 3.75 per cent of wages, effective in 2018. A proposal to make the second pillar voluntary was considered but not adopted.

The second-pillar benefit package

- *Qualification* – Entitlement to a public pension.
- *Benefit types* – Pending enactment of a law on benefit payouts, provisional regulations authorize payment of lump sums.
 - In December 2016, the Ministry of Labour proposed a draft law on annuities according to which:
 - Accountholders with larger balances (sums that would finance an annuity of at least 24 per cent of the first-pillar social pension) would be required to purchase annuities, while those with lesser amounts would receive programmed withdrawals over 5-10 years.
 - Annuities would be paid not by second-pillar funds but by «pension payment providers.»
 - Gender-neutral calculation of annuities would not be required.
 - Annuities would be indexed annually at a rate pre-established in the contract between the individual and the pension payment provider.

However, the new Romanian government has not promoted this proposal.

Large numbers of second-pillar accountholders will begin to retire in 2032.

A.7. Slovakia

Enactment of the second pillar – 2005, initial contribution rate, 9 per cent of wages, redirected to individual accounts from the country's then 18 per cent public-pension contribution rate for retirement.

Retrenchments

- *2008-2015* – On four occasions, the government allowed second-pillar members to refund their account balances and regain the right to a full public pension (and, conversely, first-pillar members to join the mixed system).
- *2012*
 - 9 per cent rate reduced to 4 per cent, with a provision to increase by 0.25 per cent per year, starting in 2017 and reaching 6 per cent in 2024.
 - Accountholders required to choose one of four funds with varying levels of risk from their pension management company ¹.

The second-pillar benefit package

- *Qualification* – 10 years' contributions and reaching retirement age.
- *Benefit types* – Life annuities, temporary annuities ² and phased withdrawals. The first two are paid by private life insurance companies, with the Social Insurance Agency (SIA) mediating the companies' negotiations with the retiring worker ³. Three private insurance companies are currently licensed. If the account balance is so low that none of them offers an annuity, a phased withdrawal (at the current rate of 11 euros per month) is paid by the pension fund until the account is exhausted ⁴.
 - Gender-neutral benefit computation is required. Insurance companies reportedly oppose it and, to hedge their risks, use longer estimates of life expectancy than the SIA ⁵.
 - Cost-of-living increases are optional (in which case, the initial benefit amount is reduced).
 - Spousal benefit is optional but limited to two years (with an actuarial reduction in the benefit amount).

Recent experience – During 2015-2016, 1,816 individuals applied for an offer of annuity and 708 accepted it:

Second-benefit pillar benefit applications and payments, 2015-2016

Type of payment	Number of persons who received offer	Number of persons who accepted offer and made contract
Life annuity	1,281	458
Life annuity coupled with lump sum or phased withdrawal (for large accounts)	187	79
Phased withdrawal (for small accounts)	348	171
Total	1,816	708

In 2016, the average payment was 26.24 euros. About 60 per cent of pensioners received less.

¹ Some companies have four, three or two, but every company has a single guaranteed fund.

² A supplemental pension for those whose life annuity exceeds a threshold (four times the subsistence minimum, 792.30 euros in 2017) paid for 5, 7 or 10 years.

³ For life annuities and temporary pensions, the SIA collects offers of annuity amounts from private insurance companies based on the worker's account balance, conveys these to the worker who chooses among them, and mediates contract negotiations between the chosen company and the worker.

⁴ Lump-sum distributions of small accounts are prohibited by law.

⁵ Nineteen years versus 16 years for the SIA.

Appendix B

Notes on second-pillar replacement levels

We provide a model for second-pillar replacement rates and some related empirical evidence.

1. *Relation between defined-contribution and defined-benefit pensions*

Typical formulas for defined-benefit (DB) and defined-contribution (DC) pensions are:

$$P_{DB} = P_{DB}(a, w) = a \sum_{t=0}^{T-1} W_t(1 + w)^t,$$
$$P_{DC} = P_{DC}(c/g, i) = \frac{c}{g} \sum_{t=0}^{T-1} W_t(1 + i)^t$$

where

T : Number of contribution years

W_t : Contributory wage of the individual in t -year before retirement

w : Rate of growth of the average wage

a : Benefit accrual rate per year of contribution

i : Rate of interest credited to individual accounts

c : Contribution rate

g : Annuity factor at retirement age

Here w and i are assumed to be constant over time for simplicity.

Observe that if $i = w$,

$$P_{DC}(c/g, w) = P_{DB}(c/g, w).$$

This means that a notional defined-contribution (NDC) scheme which provides interest equal to the average wage growth is equivalent to a DB pension with a benefit accrual rate equal to $a = c/g$.

For simplicity, a retired worker who has earned the national average wage throughout his/her career is considered:

$$W_t = \bar{W}_0(1 + w)^{-t}$$

where \bar{W}_0 is the national average wage at the year of retirement.

In this case,

$$P_{DB}(c/g, w) = \frac{c}{g} T \bar{W}_0$$

and

$$P_{DC}(c/g, i) = \frac{c}{g} \sum_{t=0}^{T-1} \bar{W}_0 \left(\frac{1+i}{1+w} \right)^t = \frac{c}{g} D \bar{W}_0$$

where

$$D = \frac{(1+\alpha)^T - 1}{\alpha},$$

and

$$\alpha = \frac{1+i}{1+w} - 1 \approx i - w$$

is the net interest rate, or the difference between interest rate and wage growth.

Therefore,

$$\frac{P_{DC}(c/g, i)}{P_{DB}(c/g, w)} = \frac{D}{T}.$$

Thus, the ratio of the benefit level of a DC pension relative to that of the corresponding DB pension depends on the net rate of interest of wage growth and the contribution period.

2. *Second-pillar pension levels in selected CEE countries*

To estimate the level of the second-pillar pension for an average retired worker, the annuity factor at the retirement age (denoted by g in the previous section) is assumed to be the life expectancy at age 65 for both sexes. Note that the annuity factor is the expected present value of unit pension payments. The assumption is that future interest earned on the remaining balance will be used for the indexation of the pensions in payment ¹.

Private pension funds charge fees on contributions, assets (or returns), or others such as entry, exit and transfer fees. These operating costs and fees have a non-negligible effect on the benefit level through the reduction of balances of individual accounts. It is thus important to consider the operating costs and fees.

¹ In Sweden, the annuity factor for the NDC pension is 16.0 while the current life expectancy at age 65 is 20.0 years. This implies that a discount rate of around 2.5 per cent is assumed.

(a) The NDC case

First, the case where $i = w$ is considered. The table below presents the estimated benefit level of second-pillar pensions for an average retired worker in selected CEE countries.

Country	Life expectancy at 65 for both sexes (1)	Cont. rate for the second pillar (2)	Total cont. rate for old-age pensions (2)	Share of the second pillar cont. rate	Equivalized accrual rate of the second-pillar pensions (3)	Benefit accrual rate of the government pension (4)
	g	C_{PII}	C_{tot}	C_{PII} / C_{tot}	C_{tot} / g	a
Bulgaria	16.2	5.0%	17.8%	28.1%	1.10%	1.10%
Croatia	17.6	5.0%	20.0%	25.0%	1.14%	0.97%
Estonia	18.7	6.0%	20.0%	30.0%	1.07%	-
Latvia	17.0	6.0%	20.0%	30.0%	1.18%	1.18%
Macedonia	15.5	6.0%	18.0%	33.3%	1.16%	1.80% (m) 2.06% (f)
Romania	16.7	3.75%	25.8%	14.5%	1.54%	1.02%
Slovakia	17.5	4.25%	18.0%	23.6%	1.03%	1.03%

Source: Authors' calculation.

Notes:

- (1) Life expectancy at 65 for both sexes are from EUROSTAT (<http://ec.europa.eu/eurostat>).
 - (2) Contribution rates for the second pillar and total contribution rates of the old-age pensions in 2018 (See Annex A).
 - (3) Equivalized accrual rate of second-pillar pensions is calculated by dividing the total contribution rates of the old-age pensions by life expectancy at 65 for both sexes.
 - (4) Benefit accrual rate of the government pension is calculated as follows:
 - Bulgaria: The accrual rate used in the pension formula.
 - Croatia, Macedonia, Romania and Slovakia: These countries adopt the point system. The accrual rate was calculated as the pension value as a percentage of the national average wage of the most recent year where data are available. The rate of Croatia includes the supplementary increase of 27 per cent.
 - Latvia adopted NDC for the government pension scheme. The accrual rate was pegged to the equivalized accrual rate of the second-pillar pensions.
 - Estonia: The pension formula consists of a flat-rate base amount, a length-of-service component, and an earnings-related component.(Source: Country Fiche on public pensions for the Ageing Report 2018 https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en).
-

To compare the generic benefit levels of the first and second pillar on the same basis, the above calculation assumed the full allocation of the contribution rate for old-age pensions. In fact, a part of the total contribution rate is diverted to the second pillar and the pensions are calculated proportionately.

Comparing the results in the last two columns of the table above, note that the equivalized accrual rate of the second pillar pensions is quite close to the benefit accrual rate of the government pension in all countries. In addition to Latvia, which adopted NDC pensions, these two rates coincide in Bulgaria and Slovakia. The second-pillar accrual rate is higher than the government pensions in Croatia and Romania. By contrast, the government pension accrual rate is significantly higher than the second pillar in Macedonia although a gradual reduction in government pensions is planned.

(b) The general case

In the general case where i differs from w , the accrual rate of the second-pillar pensions also depends on their difference as well as the contribution period. One needs to consider the D/T factor defined in the first section. The table below presents D/T values in selected cases.

$T \backslash \alpha$	-3.0%	-2.0%	-1.0%	1.0%	2.0%	3.0%
5	0.94	0.96	0.98	1.02	1.04	1.06
10	0.88	0.91	0.96	1.05	1.09	1.15
20	0.76	0.83	0.91	1.10	1.21	1.34
30	0.67	0.76	0.87	1.16	1.35	1.59
40	0.59	0.69	0.83	1.22	1.51	1.89

The table below compares the average wage growth rates and rates of return on investment as well as fees expressed as a percentage of the total assets for a 10-year period (2006-2016).

Country	Average wage growth (1)	Average return on investment (2)	Operating costs and fees as a % of total assets (3)
Bulgaria	10.2%	2.3%	1.0%
Croatia	3.0%	N.A.	0.7%
Estonia	6.2%	1.1%	1.3%
Latvia	6.6%	2.7%	1.9%
Macedonia	4.3%	5.6%	0.5%
Romania	9.3%	7.6%	0.6%
Slovakia	3.9%	1.3%	0.8%

Notes:

- (1) Average wage growth is the average rate of growth of the national average wage for the period 2005/2006-2016. (Source: OECD.Stat https://stats.oecd.org/Index.aspx?DataSetCode=AV_AN_WAGE for Estonia, Latvia and Slovakia, and National Statistical Offices for Bulgaria, Croatia, Macedonia and Romania).
- (2) Except for Macedonia, the average return on investment concerns both mandatory and voluntary private pensions for the period 2006-2016 (Source: OECD, Pension Markets in Focus, 2017 edition). The average return on investment in Macedonia concerns the second-pillar pensions for the period 2006-2015 (Source: Agency for Supervision of Funded Pension Insurance).
- (3) For Estonia, Latvia and Slovakia, the data on operating costs and fees concern both mandatory and voluntary private pensions for the period 2006-2016 (Source: OECD, Pension Markets in Focus, 2017 edition). For Bulgaria, Croatia, Macedonia and Romania, the data on fees are the current maximum rates of asset management fees of second-pillar pension funds approved by the supervising authorities (which most pension funds apply).

Although caution must be exercised in comparing data with different sources and bases, the table above shows that for a 10-year period (2006-2016), the average wage growth exceeded the average return on investment in all countries except for Macedonia. Moreover, if the operating fees are considered, the discrepancy will further widen. Note that the global financial crisis occurred during that period. A negative net interest rate against wage growth implies that the benefit level of the second-pillar pensions will be less favourable than the NDC case, as indicated above.

3. **Effect of a change in the interest rate on the accumulated balance of individual accounts**

To illustrate the effect of operating costs and fees, the sensitivity of the accumulated balance with respect to a change in interest rate is demonstrated (See footnote 35).

$S = S_T(i)$ denotes the accumulated value of a stream of a unit currency contribution made to an individual account with a compound interest rate i over an T -year period. It is given by

$$S = S_T(i) = \sum_{k=0}^{T-1} (1+i)^k = \frac{(1+i)^T - 1}{i}.$$

Hence,

$$\frac{S'}{S} = \frac{T(1+i)^{T-1}}{(1+i)^T - 1} - \frac{1}{i}.$$

The values of S'/S are tabulated below for selected values of T and i .

$T \backslash i$	1%	5%	10%
5	2.0	2.0	2.0
10	4.5	4.7	4.8
20	9.7	10.6	11.4
30	15.1	17.2	18.9
40	20.6	24.4	27.2

This table shows that for a full career ($T=40$) contributor, 1 percentage point of change in the interest rate will result in a more than 20 per cent change in the final balance in individual accounts.

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