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WHAT IS THE COST OF PENSION REFORM REVERSAL IN SLOVAKIA AND COULD THE NDC SCHEME SOLVE THE FISCAL IMBALANCE OF PAYG SCHEME?

Ján Šebo
Matej Bel University
e-mail: jan.sebo@umb.sk

Daniela Danková
Matej Bel University
e-mail: dniela.dankova@umb.sk

Ivan Králik
Matej Bel University
e-mail: ivan.kralik@umb.sk

1. Introduction

Slovak pay-as-you-go pension scheme has been organized as a point system where the pension benefits depend partly on the life-long income of an insured person. Since 2005, part of the paid social insurance contributions is redirected into the funded pension scheme, where the savers can choose the pension fund as a vehicle for their pension savings. The financial crisis has forced government to lower the part of social insurance contributions flowing into the funded pillar and introduce balancing mechanism, where the statutory retirement age is tied to the life expectancy of a retiring population. The automatic adjustment to the retirement age was introduced in 2012 as a part of stabilization measures for public finances and came into force in 2017. Rising retirement age on average by two months annually swiftly became a nutrient medium for a political populism that turned out into reform reversal regardless the long-term consequences on pay-as-you-go pillar balance and expected pension benefits. In 2019, Slovakia abandoned the mechanism of automatic adjustment to the retirement age based on the life expectancy of retiring population and Slovak national parliament constitutionally introduced retirement age ceiling at 64 years for men with further bonification of half-year for a raised child up to three children for women. If no correction mechanisms are implemented, this reform reversal would have significant impact on future pension expenditures as well as on the level of pensions received not only from the pay-as-you-go scheme but also from the funded pillar as pointed by CBR (2018b). Seeking for the stabilization measures, introduction of the notional defined contribution (NDC) scheme emerged as a possible solution, which is being investigated by Ministry of Finance of Slovak republic.

In this study, by applying microsimulation pension model supported by statistical and administrative data on Slovak population, we analyze the fiscal and redistributive consequences of retirement age ceiling and impact of NDC scheme introduction on the Slovak pay-as-you-go pillar fiscal balance and expected pension benefits. However, we work with some limitations on the NDC set-up according to the preferences defined by the governmental institutions.

The paper is organized as follows: The second section discusses current knowledge and existing papers dealing with pension reform, reform reversals supported by rising pension populism and existing experience with the introduction of NDC schemes. Third section presents more details on Slovak pension system and elaborates details on the research objective, data, and methodology with the presentation of no-policy change set-up as well as NDC scheme set-up. Fourth section presents the research results of the fiscal and redistribution implications of the policies examined and discusses the findings and potential challenges that need to be further elaborated if the NDC scheme should be implemented, especially the poverty risk for low-income cohorts and minimum retirement income granted to a retiring person regardless the level of paid contributions.

2. Theoretical background

There is a vast amount of literature analyzing the pension reform reversals, either permanent or transitory, after financial crisis with special attention to the central European countries, which introduced multi-pillar pension systems. When inspecting existing research on this topic, two different approaches towards pension reforms reversals emerge. While the typical reduction in contributions flowing into the funded schemes could be connected to the need of financing pay-as-you-go pension deficits and overall problems with the public finances, the second group of reform reversals could be characterized as driven by political populism transformed into the pension system. The first group of pension reversals is analyzed by many studies, where for example Price and Rudolph (2013) examine the impact of the financial crisis on privately funded pensions in the Europe and Central Asia region. Following their report, Chłoń-Domińczak (2018) estimated the reform reversals on the individual pension value and confirmed negative impact of these steps financial balance of PAYG pillars. Especially for Slovakia, reform reversals starting in 2012 gave rise in implicit liability of PAYG pillar. Székely and Ward-Warmedinger (2018) associate reverse steps in pension system reform and populist intervention with the financial crisis and the fact that the transitional period to a multi-pillar system reduced PAYG pillar revenues financed mainly from public debt growth. These conclusions can be found also in the study of Sivák et al. (2011). Other studies covering the impact of pension reform reversals with focus on Slovakia include Beblavý (2011) end especially Drahokoupil and Domonkos (2012), who confirmed that unresolved problems in the implementation of previous reforms are associated with the financing of the transition costs. At the same time, they show that not only fiscal constraints, but also political conditions have shaped the changes in the pension systems. More radical ideas on the reasons and following expected consequences of fiscal crisis

on achieved pension reforms could be found in the paper of Casey (2014), who claim that the need to comply with the EU wide rules on fiscal discipline, the easiest way was to treat the funded pension savings as “piggy banks” and seize the transitional cost reserves. This has opened the door for interventions into the pension systems, which in turn became unstable and unpredictable regarding future development. The need to finance public finance deficits immediately thus motivated shortism and political populism in the pension system in these countries. This new wave of reverse steps can no longer be associated with the need for fiscal consolidation. They are mainly associated with political populism, which increases the spending of the PAYG pillar and the rate of intergenerational redistribution in order to gain political preferences. These interventions can be explained by classical political economics, where focusing on the median voter means a shift in orientation to the older generation due to demographic change in population structure.

Absence of automatic balancing mechanisms that effectively limit political populism in the pension system, the PAYG pillars would face interventions by politicians that tend to increase fiscal imbalances and shift the burden to future generations. Brooks and James (1999) unveil the background of pension system reform from the perspective of political economy and point out that it is precisely the legacy of the past and the fragmentation of political views supported by different interest groups that hinder effective and long-term financially stable pension reform. Later, James (2002) concludes in his study that setting up the interaction of institutions covering different pillars in the pension system is in many cases more political than a professional issue. Both studies indirectly point to the need to perceive the existence of political risk, which is linked to 'politics' and not directly to 'policy' in the pension system. The existence of political populism in the pension system was pointed also by Baroni (2007). At the same time, Galasso (2008) points out that the apparent deviation of the pension system from long – term fiscal equilibrium provides distorted expectations of economic agents during their working career, which in turn increases the political risk and instability of the pension system.

The basic pension scheme in Slovakia takes the form of a pay-as-you-go (PAYG) scheme with a strong intergenerational redistribution of income. The PAYG scheme is based on a point system where for each fully worked calendar year, an individual earns one point and at the same time, its value is determined by a personal wage point representing the ratio of wages to the average wage in the economy for a given year. At time of retirement, the accumulated points are multiplied by the average personal wage point throughout the entire career. The accumulated points are then multiplied by the current pension value, whose value changes according to the change in the average wage in the economy over the last two years. The point system set in this way would be fully merit. Therefore, an element of solidarity is introduced into the system, which increases the pensions granted to low-income individuals and reduces the entitlements for medium and higher income cohorts. By this adjustment, the Slovak PAYG scheme deviates from merit and reduces the relationship between paid contributions and the old-age pension, which leads to intra-generational redistribution.

In terms of financial stability, Slovak pension scheme shows a tendency towards imbalances and increasing deficits due to an increasing dependency factor, despite the fact that an automatic mechanism for increasing the retirement age based on the life expectancy of the retiring population was active since 2017 (CBR 2018a; 2018b; Porubský and Novysedlák 2018; Šebo et al. 2017). On top of this, there came a radical reform reversal in 2019, where the Slovak National Council amended the Constitution by removing automatic stabilization mechanism of flexible retirement age and introduced constitutionally fixed retirement age at 64 years. When inspecting the shift from the flexible retirement age based on the life expectancy of retiring cohort to the fixed retirement age from the political economy, one can see that support for this move was obtained from the older population and labor unions even if these groups would not gain any additional benefits (CBR 2018a). Council for Budgetary Responsibility, as well as researchers, unsuccessfully asked for the calculations of the fiscal impact on PAYG pillar as well on the benefit ratio to be performed and presented to the general public before final voting in the parliament. At the same time, there were no stabilization measures accepted that would limit the negative impact on the PAYG pillar deficits and decreased benefit ratio.

To reduce the financial and political pressure on intergenerational redistribution, NDC schemes were implemented. The model of NDC scheme is a pay-as-you-go system that mimic FDC (financial defined contribution) scheme. This means that the pension depends on the amount of contributions paid and virtual returns (Chłoń-Domińczak et al. 2012; Holzmann et al. 2012). Contributions are evaluated by a fictive return that reflects the financial health of the pension system. The account balance is called notional (non-financial, fictious, virtual) because it is used only for keeping evidence. It means that the system does not invest funds on the financial markets and contributions are immediately redistributed to the pensioners. When an individual reaches retirement age, accumulated virtual capital is recalculated into an annuity, which considers the life expectancy of the concerned cohort, indexation, and technical interest rate. This theoretical return is based on statutory parameters such as the GDP growth, average wages, change in amount of contributions paid or labor costs (Alonso-Garcia a Devolder 2016). NDC schemes were implemented in various countries including Sweden (Holzmann 2017), Italy (Belloni a Maccheroni 2013), Poland (Chłoń-Domińczak and Strzelecki 2013), Russia (Eich et al. 2012) or Latvia (Dundure and Pukis 2015). Generally, the amount of the future pension depends on the duration and amount of paid contributions in every NDC scheme. However, additional factors which reduce this dependency and increase redistribution are also implemented. These additional factors, mostly motivated by political preferences, change internal financial stability of NDC schemes (Holzmann et al. 2012). Implementation of any policy measure and changes in policy parameters will have an impact not only on the balance sheet of the pension schemes but also on redistribution between and within generations. Sivák et al. (2011) show that intergenerational equality cannot be achieved in the long – term without cardinal changes of the parameters in PAYG scheme because of the ageing population. Many authors who examine redistribution

in public policy systems assert that the level of redistribution in pension systems in OECD countries has been decreasing over two last decades (Fenge and Werding 2003). According to Fenge and Werding (2003) and Werding (2003) the ageing process in many countries is a result of imbalances in redistribution between generations. As a result, we can see a significant financial burden of future generations in pension systems.

2. Methodology and data

The aim of the paper is to examine fiscal and redistribution impacts of the pension reform reversals undertaken in 2019 and estimate the impact of NDC scheme introduction on the fiscal sustainability of PAYG scheme. Secondary, using the example of several previous studies oriented on the NDC scheme introduction, we estimate the redistribution impacts of NDC scheme compared to the no-policy change scenario with automatic balancing mechanism of flexible retirement age tied to the life-expectancy of retiring cohort and pension reform reversal policy of fixed retirement age introduced in 2019. Overall, we test the fiscal and redistribution impacts of the following policies:

1) No policy change (NPC) scenario with an automatic adjustment of the retirement age according to change in life expectancy of the retiring population.
2) Pension reform reversal policy of fixing retirement age at 64 years.
3) Implementation of the NDC scheme with a fixed retirement age at 64 years.

For modeling pension policy and examining their impacts, we use a cohort-based dynamic microsimulation model. The model contains four basic modules: (i) macroeconomic module which simulate future economic development (wage growth, unemployment, asset prices, and inflation), (ii) demographic module which simulate future population structure from 2017 to 2080 according to data from Slovak Demographic Centre, (iii) microsimulation module which contains individual attributes (characteristic) of individuals according to a transition matrix for individual conditions, and (iv) pension policy module. In its baseline the model is built on individuals across the population and individual status attributes are determined on models that determine probability distribution of status attribute values within a cohort based on empirical data estimates. The model shifts the population over time and the pension system is exposed to random economic development, using a moving-block bootstrap method to stochastically simulate future economic developments while maintaining the relationship between macroeconomic variables.

We work with the main assumption that the education of an economic agent is a permanent determinant of his/her income and has a significant impact on the course of life-long income function (Šebo et al. 2017; Balco et al. 2018). Our approach is based on the initial study of Šebo et al. (2015), who focused on modeling the age and education specific life-cycle income function for individuals in Slovakia. We modify the model published by Šebo et al. (2017) that estimates the annual changes in the earnings. The dependent variable is the income (y) of an economic agent at the age of x year (x_m when the age is expressed in months) of the given education cohort j. Modeled real age-education specific life-cycle

income function, using longitudinal data from USA (Julian and Kominski 2011) supplemented by data from Statistical Office of Slovakia about income structure of population presented by Fodor and Cenker (2019), has the following form:

$$y_{j;x} = a + b_j x + c_j x^2 + \varepsilon \quad (1)$$

Estimated coefficients are then applied to the cross-sectional average earnings of age-educated cohorts for each year from 2008 to 2016 obtained from the Statistical Office of the Slovak Republic (2018). Thus, the real lifelong income function of an individual has a concave shape that corresponds to the results of Guvenen et al. (2016) and an estimate made by Fodor and Cenker (2019) on data for the Slovak republic.

According to Cooper (2014) and Guvenen et al. (2016), if an economic agent drops out of the labor market for a certain period, his wage departs from a full uninterrupted income function, since the skills, working habits, and experience during the period of unemployment don´t improve. Once the economic agent returns to the labor market, he can expect to have a lower wage than the same-age economic agents who have a full career. However, his pay after taking up employment follows at least the inflation growth, and so we can say that the wage of the economic agent has the same real value as in the period before unemployment. However, accepting the concavity of the life-cycle income function, this does not apply over the whole working career. We have solved the problem of incorporating inflation into the equation (1). Given the existence of unemployment risk and inflation, the nominal wage (*w*) of a given education cohort could be expressed as:

$$y_{j;t} = \begin{Bmatrix} y_{j;t};\ t = 1 \\ y_{j;t-1} \cdot (1 + \tau_t); U_t = 1, t \in < 1, T > \\ y_{j;t-1} \cdot y^*_{j,;x_m;t} \cdot (1 + \tau_t); U_t = 0, t \in < 1, T > \end{Bmatrix} \quad (2)$$

Where τ_t represents the inflation in time *t*, *U* means the employment at time t. $U_t = 1$ means that the economic agent is unemployed at time t, while $U_t = 0$ means that the economic agent is employed at time t. If an economic agent is employed ($U_t = 0$), his income function depends on the development of inflation and the increased labor capital over time. In the case that the economic agent is unemployed ($U_t = 1$), his lifetime income function changes over time only by the impact of inflation and the labor capital remains constant.

In unemployment period ($U_t = 1$), wage development is influenced only by inflation (τ_t). We can say that cohorts with lower education (lower income level) are at higher risk of unemployment (Guvenen 2009). This fact reflects educational and age-specific probability of unemployment based on the data of the Statistical Office of the Slovak Republic and the Ministry of the labor, social affairs and family of the Slovak Republic for the period 2003-2017.

The model shifts population by months while incorporating the impacts of the macroeconomic indicators on the labor market and population to the level of an individual. The output of the model is a population status and status of each individual according to defined age-educational cohorts on a monthly basis. With

this approach it is possible to examine the impacts of selected policies at micro-level (level of individual with specific status parameters).

The amount of paid contributions during an individual's career (C_j^T) can be determined as:

$$C_j^T = \sum_{t=1}^{T} y_{i\ j,t} \cdot c_{j,t} \quad (3)$$

We assume that each individual retires after he/she reaches retirement age. A rational explanation of this assumption can be found in the existence of a policy that allows concurrence of work income and pension benefits. At the same time, the model works with a different life expectancy according to gender and education level of individuals (Holzmann and Palmer 2006; Van Sonsbeek 2010; Hummer and Hernandez 2013; Porubský and Novysedlák 2018; CBR 2018b). Differences in life expectancies according to education are determined according to data of Slovak Demographic Centre of the Slovak Republic.

All individuals are retired at the same year (exception of the NPC scenario), which means that they enter in labor market in a different year depending on their educational attainment. This means that higher education cohorts spend less time on the labor market than cohorts with lower education.

2.1. No policy change scenario (NPC scenario) and scenario with fixed retirement age

For the purposes of examining the impacts of the considered policy measures, we formulate a baseline scenario without policy change (NPC scenario). The NPC scenario is an adjustment of the pay-as-you-go pension system parameters based on the current legal status, with the entitlement to pension is granted according to the currently valid formula with solidarity and the retirement age is linked to a life expectancy. Pensions are valorized according to a level of inflation, but at least 2 percent per year.

If an individual earns an average personal wage point (POMB) at level 1, throughout his/her working career, he/she has been paid at the level of the average in the national economy. During the calculation of the expected pension, the model works with solidarity that effectively increases POMB to those, who have achieved POMBs below 1 during their career. Also, the solidarity decreases POMB for those, who have achieved the POMB higher than 1,25 during career. The effect of solidarity ($uPOMB_T$) can be determined as:

$$uPOMB_T = \begin{cases} POMB_T; & ak\ POMB_T \in \langle 1; 1{,}25 \rangle \\ POMB_T + 0{,}2 \cdot (1 - POMB_T); & ak\ POMB_T \in \langle 0; 1 \rangle \\ 1{,}25 + 0{,}68 \cdot (POMB_T - 1{,}25); & ak\ POMB_T \in \langle 1{,}25; 3 \rangle \end{cases} \quad (4)$$

The calculation of the first granted old-age pension for each individual can be determined as:

$$RI_T = ADH_T \cdot N_T \cdot uPOMB_T \quad (5)$$

where:

RI_T – first granted pension from PAYG scheme;

ADH_T – actual value of pension point for the period, in which agent leaves the labor market for retirement;

N_T – number of years of pension insurance at the time of retirement;

$uPOMB_T$ – personal wage point of an individual modified by solidarity.

When considering the scenario with fixed age, the key indicator explaining potential increase of fiscal burden can be presented using the load factor, which compares the number of retirees and contributors within the PAYG scheme.

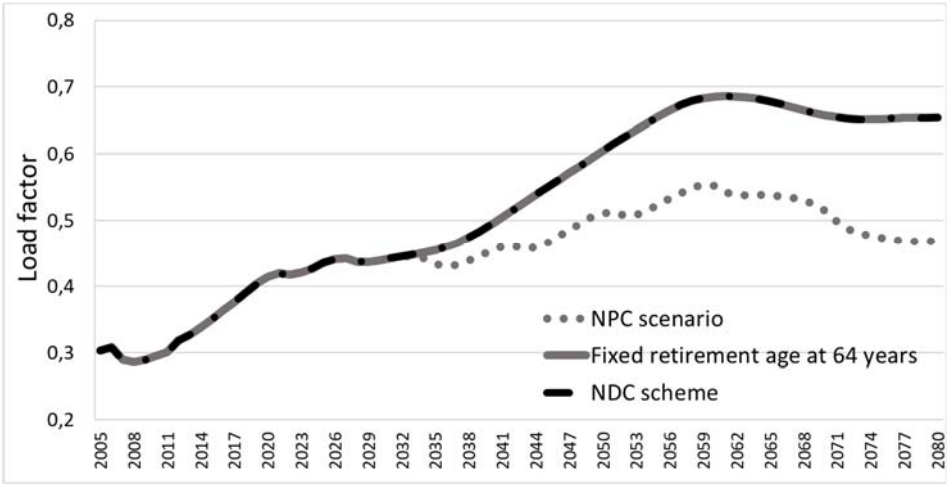

Fig. 1. Load factor for PAYG scheme

Source: Own calculations, 2020.

The load factor is higher in scenario with fixed retirement age and NDC scheme scenario than in NPC scenario due to fixed retirement age at 64 years. For the NPC scenario, we could expect to have approximately 55 retired individuals for 100 contributors in 2060. But for the scenario with fixed retirement age at 64 years we could expect to have 68 retired individuals to 100 contributors in 2060. Earlier retirement age increases the number of retired individuals and reduces number of contributors, as confirmed by Porubský and Novysedlák (2018) respectively CBR (2018b).

2.2. Introducing the NDC scheme

We modify a point system of Slovak pension system to a notional defined contribution scheme (NDC scheme) with a fixed retirement age at 64 years. The aim of the NDC schemes is to imitate structure of funded defined contribution schemes while maintaining fiscal stability. As any pension scheme, in NDC scheme individuals goes through two phases which correspond to the time when he/she is active at labor market and the time when he/she receive his/her pension. During the first phase paid contributions (C_t) are assigned to a virtual account in

NDC scheme, which is often called a net present value of notional pension wealth (NPW). In NDC schemes every individual's account has a value that varies yearly according to the chosen indexation coefficient (appreciation). For the individual, this development can be described as (Auerbach and Lee 2011):

$$NPW_{(t+1)} = NPW_t\left(1 + r_t^i\right) + C_t \tag{6}$$

where:

r_t^i – indexation rate (appreciation of existing positive balances of individual's notional pension wealth generated from paid contributions);
C_t – amount of paid contributions during the period t;
NPW_t – notional pension wealth at time t.

NPW is notional value of assets and the indexation rate is based on internal rate of return of scheme, which is often derived from the labor market performance in the economy. At the time when individual retires, granted pension is based on the value of *NPW*. Thus, indexing of *NPW* should copy performance of the labor market in the economy, not just average wage (*w*) but also number of workers in each economy (*n*). However, the Swedish system uses indexing based on changes in average wage (*g*) instead indexing based on labor market performance expressed as changes in labor force (*Δn*) and changes in average wage (*g*) or alternatively based on individually expressed rate of return (r_t^i). This mechanism of *NPW* indexation in its economic meaning and mathematic modification is equal to mechanism in Slovak PAYG scheme where the mechanism of indexation is based on annual reevaluation of the actual value of pension point (*ADH*) which is linked to the change of average wage in economy (*g*). At the same time individual accounts of living individuals are modified by account balances of death individuals of specific age cohort. This means that the indexation of NPWs of the specific cohorts as a whole (*r*) is equal to *g*, where $r = g < r^i$. The net present value of notional pension wealth (NPW_t) in Swedish NDC scheme is based on the current mortality and predicted indexation rate of *NPW* is set at 1,6 percent, e.g. *g = 0,016*. The superscript t represents age cohort which reaches retirement age at year T. Granted pension (RI_T^t) according to Swedish type of NDC model, for individual who is going to retire at year *T*, we can describe as:

$$RI_T^t = \frac{NPW_T^t}{\sum_{s=t}^{D}(1+g)^{-(s-t+1)}p_{T,s}^t} \tag{7}$$

where:

NPW_T^t – net present value of notional pension wealth at year of retirement,
$P_{T,s}^t$ – survival probability from year T to year s, evaluated in year t for all population which will retire at year T,
D – maximal life expectancy according to mortality tables.

In subsequent years, if the value increase (falls) above (below) the value 0,016, the individual's pension is valorized according to changes in average wage (*g*), and hence $r_t = 1 + g_t$. We can assume that, if the wage growth is at the level of

1,6 percent then the level of granted pension (*RI*) will be constant during the whole life of retired individuals (Auerbach and Lee 2009).

Although the Swedish system is relatively stable system, a balance mechanism was implemented into system. This mechanism slows growth rate of net present value of notional pension wealth in case of threatening financial stability of NDC scheme through smoothing coefficient (*b*):

$$b = \frac{F+C}{NPW^{NDC}+P} \tag{8}$$

where:

F – financial assets of NDC scheme,

C – expected pension contributions which are equal to three-year moving median from pension contributions and three-year moving average of turnover date (average of expected duration of contributions and benefits),

NPW^{NDC} – aggregated net present value of notional pension wealth of current contributors,

P – expected liabilities to current beneficiaries.

This balance mechanism in Swedish NDC scheme is also called "a brake". The aim of the balance mechanism is to prevent excessive accumulation of debt but not of assets. This mechanism is activated only if NDC scheme is under-funded (the value of the coefficient (b) falls below 1). During the period when is this balance mechanism active these two factors are affected:

1) Pension assets of cohort are not accumulated with a rate equal to $(1 + g_t)$ but with rate equal to $(1 + g_t)b_t$, where b_t is smoothing coefficient,
2) The rate of valorization of granted pensions (*RI*) adjust pension benefits which are equal to $(1 + g_t)b_t$, what means bigger probability of declining for each cohort because real income growth equals to $\frac{(1+g_t)b_t}{1{,}016}$.

The balance mechanism stays active until the smoothing coefficient (*b*) reaches a value bigger than 1,0. If balance mechanism falls for the first time below 1,0 in year t, the balance mechanism shall be applied until year s, where $s > t\ ak\ \prod_{v=t}^{s} b_v < 1{,}0$ (Auerbach a Lee 2011). This balance mechanism prevents debt accumulation through the maintenance of lower pension benefits.

2.3. Indicators used for evaluation of redistribution and fiscal stability of PAYG scheme

Redistribution and fiscal impacts of analyzed policies are examined using three indicators:

1) individual replacement ratio *(IRR)* which is an individualized indicator of adequacy expressed as the ratio of the amount granted reduced pension (RI_T) (resp. combined pension (RI_T^*)) pension to the latest known wage, e.g. $\frac{RI_T}{\bar{w}}$, resp. $\frac{RI_T^*}{\bar{w}}$,

2) PAYG scheme deficit. It is a relative indicator that represents financial balance of PAYG scheme on a cash basis. PAYG scheme deficit is expressed as ratio of total amount received contributions ($c_{I\,k} \cdot n_k$) of age-educational cohort k ($\sum_{k \in K_{CON}} c_{I\,k} n_k$) and total amount of paid pensions ($d_{I\,k} \cdot n_k$) of age-educational cohort k ($\sum_{k \in K_D} d_{I\,k} \cdot n_k$) reduced by 1, e.g.: $f_s = \frac{\sum_{k \in K_{CON}} c_{I\,k} \cdot n_k}{\sum_{k \in K_D} d_{I\,k} \cdot n_k} - 1$,
3) The last indicator is designed as a solution to the discussion of number of papers (e.g. Auerbach a Lee 2009; Chłóń-Domińczak et al. 2012; Holzmann et al. 2013; Alonso-Garcia a Devolder 2016; Godínez-Olivares et al. 2016; Holzmann 2017), which are discussing about the optimal setting of contribution rate for PAYG scheme and funded scheme which are linked schemes and they are sharing one common contribution rate. We formulate an indicator of effective contribution rate (c_{ef}), which express required contribution rate to cover deficits of PAYG scheme (f_s) in two-pillar contribution system, e.g.: $c_{ef} = \frac{c}{f_s + 1}$.

For each policy, we ran 3600 simulations. The results of simulations are classified into percentiles according to performance of economic for whole simulated period. This method increases the interpretability of the results as the results can always be interpreted in relation to a specific percentile according to economic performance. In our study results are presented on 50th percentile of all simulations.

3. Results and discussion

The individual replacement ratio (*IRR*) of pension system examines the adequacy of the pension system at individual level, as opposed to aggregate replacement ratio which examines adequacy of benefits compared to average wage in economy. IRR represents the impact of selected policies on individuals with different status characteristics. As the NDC scheme considers the amount of paid contributions to the system, we can assume that pensions will be lower compared to other policies. Figure 1 shows IRR of individuals with different educational cohorts.

Implemented fixed retirement age at 64 years reduces IRR compared to an NPC scenario due to shorter working career. Implementation of NDC scheme with fixed retirement age at 64 years will reduce the expected IRR further. The NDC scheme is suitable for individuals with long working career, where the effect of compound interest has a significant impact. In contrast, pointing system evaluates each paid contribution equally. At the same time, NDC scheme increases equity in pension system in a contrast with current system where the IRR of individuals with lower educational level are increased by solidarity.

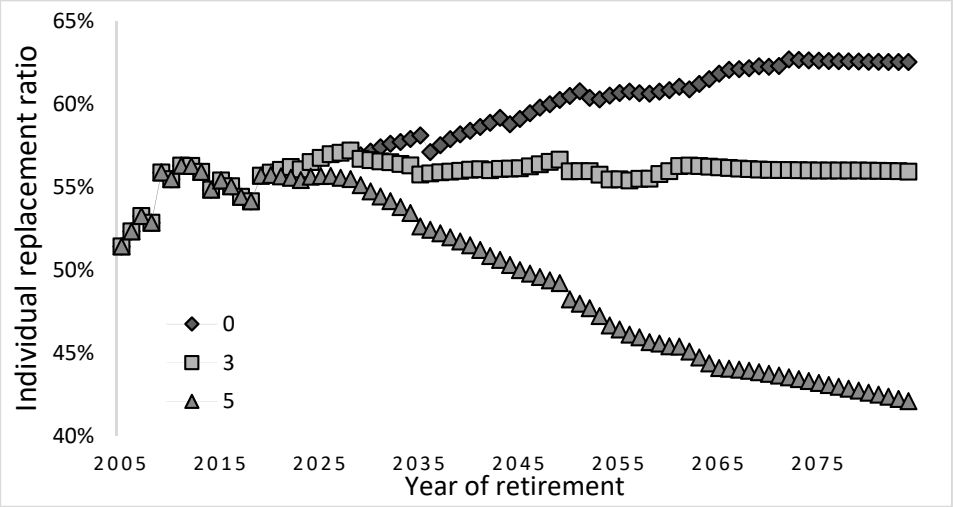

Fig. 2. Individual replacement ratio (IRR) of an average earner
Source: Own calculations, 2019.
Notes: 0 – No-policy change scenario; 3 – Policy with fixed retirement age; 5 – NDC scheme

As presented by Janíčko and Tsharakyan (2013), reduced number of contributors due to the aging population and increased life expectancy causes problems with funding of PAYG scheme. Therefore, the increasing number of retired individuals caused by the policy of fixed retirement age at 64 years should increase the PAYG scheme deficit.

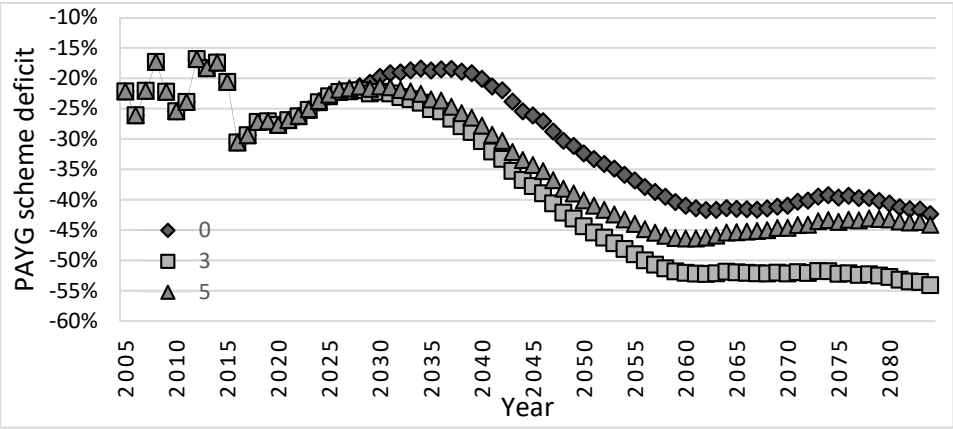

Fig. 3. PAYG scheme deficit
Source: Own calculations, 2020.
Notes: 0 – No-policy change scenario; 3 – Policy with fixed retirement age; 5 – NDC scheme

We confirm that implementation of NDC scheme has significant stabilizing effects on PAYG scheme even if the retirement age is fixed at 64 years, which is consistent with study of Holzmann (2017). However, even the NDC scheme introduction cannot fully neutralize the deficits caused by the policy of retirement age fixation. The policy of flexible retirement age is therefore considered as an effective stabilization mechanism for the PAYG scheme.

The last indicator, effective contribution rate, presents what level of contribution rate should be needed to fully stabilize the PAYG scheme. In other words, the figure below presents the fiscal burden shifted to the working population.

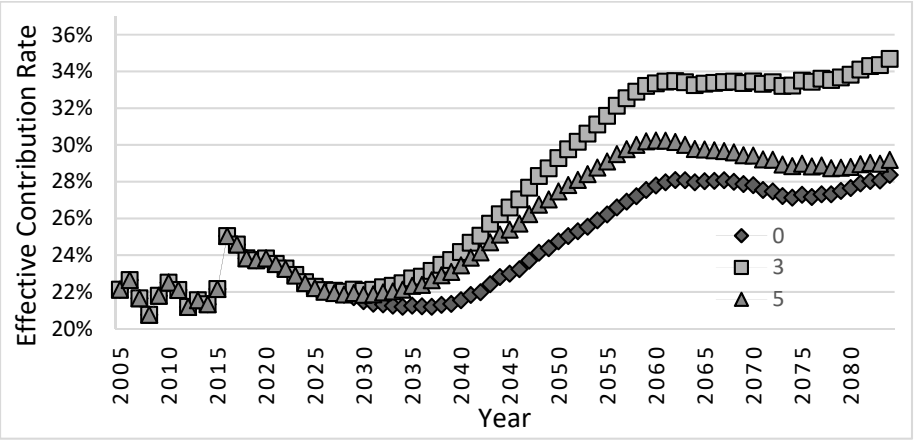

Fig. 4. Effective contribution rate

Source: Own calculations, 2020.

Notes: 0 – No-policy change scenario; 3 – Policy with fixed retirement age; 5 – NDC scheme

The NPC scenario would have a long-term stabilizing effect on the contribution rate, while a fiscal pressure on working population would show up after the year 2050, where a strong population cohorts would start leaving the labor market. However, fixing the retirement age would significantly increase the fiscal burden and the contribution rate would need to increase from 22% in 2015 to almost 34% in 2060. Introduction of the NDC scheme would lower the fiscal burden, however, on the expense of significantly lower replacement ratio.

3. Conclusion

Fixed retirement age enacted by a Constitutional law in the Slovak Republic has proven to have a negative impact on sustainability of the PAYG scheme and public finances that can lead to additional interventions in pension system. We have examined the redistribution and fiscal impacts of possible stabilization interventions in the form of widely discussed NDC scheme according to a Swedish model. Using a stochastic microsimulation model we estimated redistribution and fiscal impacts of three selected policies. Our results are consistent with many

published research outcomes showing that the implementation of NDC scheme has stabilizing effects on PAYG scheme, but on the other hand lowers the individual replacement ratios of retired individuals. Introduction of NDC scheme could promote greater transparency in pension systems and provide better information for individuals about his/her pension entitlements from PAYG scheme. Future research should investigate the further redistributional impacts on various income cohorts.

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