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Pensions in 30 years

Abstract

The paper presents a variant calculations simulation of the shaping of pensions in Poland from the perspective of the next 30 years. The predicted amount of pensions and the range of charging GDP with pension expenditure as well as the future replacement rate.

The run of analyses shows that depending on the dynamics of the future economic growth, and assuming that the range of charging GDP with pension expenditure would remain at least at the same level, it would be possible to systematically increase the real level of pensions at least 1.7 times, or even 2.98% times. Any potential increase in the range of charging the GDP would lead to an appropriate growth of the real value of pensions, even 3.72 times.

However, the relative level of satisfaction with retirement needs, with an increase in average wages would decrease because of demographic processes and in the 2050s it could reach even the level of 31.7%. It means that maintaining the replacement rate at the current level will require an increase in charging GDP from the current 11.2% to over 16% in 2050.

Keywords: forecast, replacement rate, retirement needs, GDP burden rate

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Introduction

In the last few decades, in many countries of the world, processes of reforming traditional (i.e. insurance and solidarity) pension systems, developed in the second half of the 19th and 20th centuries, have been observed. In Poland, such a reform was carried out in 1999. More broadly, these reforms have shifted from defined benefit PAYG schemes to defined contribution-funded schemes. Of course, in the practical solutions used in individual countries, we rarely deal with pure systems based entirely on one of these principles. However, most of the reforms initiated by the 1980 Chilean pension system reform were either to completely abolish or at least severely limit, the role of the pay-as-you-go system in shaping future pensions and introduce the system as an important, and even essential, part of the public (or backed by state) of the capital system[2]. In Poland, in the reform of the pension system carried out in 1999, it was expressed in the transition to the funded mechanism under the public pension system implemented by the Social Insurance Fund (FUS, *Fundusz Ubezpieczeń Społecznych*) and the Social Insurance Institution (ZUS, *Zakład Ubezpieczeń Społecznych*), and in the creation of a compulsory private capital system managed by the Universal Pension Societies (PTE, *Powszechne Towarzystwa Emerytalne*) and Open Pension Funds (OFE, *Otwarte Fundusze Emerytalne*) created by them. The main reasons for the departure of the structure of pension systems from PAYG insurance systems based on the defined benefit scheme indicated difficulties in sustaining these related systems financially, on the one hand, to the change in the demographic situation of modern societies[3] (Iwanicz-Drozdowska & Malinowska-Misiąg, 2014) and, consequently, the increasing burden on public finances, and, on the other hand, to the need and possibility of using funds accumulated on pension funds to finance capital needs of the economy[4].

More than 20 years after the introduction of these reforms, another proposal to change the entire system appears in Poland (after the reduction of the part of the contribution transferred to OFE in 2011 and the transfer of a significant part of the funds accumulated in OFE from OFE to ZUS in 2014), leading to the elimination of the obligatory so-called the second pillar, which includes OFE and its partial replacement by the system of Individual Retirement Accounts (IKE, *Indywidualne Konto Emerytalne*) system[5]. This change seems to be part of the exacerbation, also observed on a larger scale, or a serious limitation of pension reforms consisting in the privatisation of

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[2]   The directions of changes in the pension supply systems are discussed, among others, in OECD reports (OECD, 2015).

[3]   Demographic changes and their economic consequences on a global scale are discussed in: Vollset, et al., (2020) , and with regard to EU countries in: European Commission (2021b). Hence, the impact of the aging of the population on the shape of the pension system in Poland is described by: Iwanicz-Drozdowska & Malinowska-Misiąg (2014).

[4]   Góra pointed out the increase in the burden of retirement expenses resulting from demographic changes (see: Góra, 2005). On the other hand, Oręziak points to the benefits that the capital market, and in particular, the international financial corporations operating on it, gain as a result of the pension system reform (see: Oręziak, 2014).

[5]   About the social consequences and threats to the IKE system see: (Tomidajewicz, 2019).

pensions and their basis on capital systems with defined contribution[6]. The abandonment of pension systems based on capital principles is related primarily to the threats they pose both to public finances and to the possibility of ensuring decent pensions to citizens who are about to end their working age.

At the same time, however, it raises the question of social and economic policy: **on the basis of what principles can and should the existing pension systems be reconstructed?** At the same time, these modern pension systems should ensure the fulfillment of two basic conditions: the first is to enable the basic goal of any pension system, which is to provide retirees with an income to meet their socially legitimate needs. The second principle is that the pension system that meets social needs does not cause threats to the economic balance, and to the balance of public finances[7].

In the previous research on the possibility of shaping future pension benefits, most of the considered scenarios and forecasts are based on the adoption of specific assumptions regarding the shape and nature of the pension system. In particular, these studies assume that the current mechanism for collecting pension contributions will be maintained, as well as the subjective scope and rules for calculating the amount of pension rights[8]. Such assumptions are adopted both in the forecasts of FUS receipts and expenditures[9] as well as in the reports prepared by the European Commission on the consequences of the aging of the EU population[10]. Contrary to this approach, in the further part of this article, when analysing the possibilities of meeting pension needs in the future, the construction of the pension system will be omitted. which we will treat here not as an external data determined by the socio-political system functioning in a given country (in our case in Poland), but as a specific result variable that should be shaped in such a way as to enable it to achieve the goals set for this system[11]. This

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[6]   As Oręziak points out, many countries are currently withdrawing from the previously implemented reforms privatising their pension systems. In particular, see: Chapter 4 *Privatization of pensions in the light of the experiences of various countries* in: (Oręziak, 2021).

[7]   Even in the studies of the World Bank, traditionally in favour of the marketisation of pension systems, there is a growing awareness that „the core objectives of country pension systems (is)-protection against the risk of poverty in old age and smoothing consumption" (Holzmann, et al., 2008, p. 4).

[8]   See also: Lefebvre (2007).

[9]   In the FUS projections, the subject of the projection is limited to a part of the pension system, as they do not include pensions obtained under the agricultural insurance system (KRUS, *Kasa Rolniczego Ubezpieczenia Społecznego*), and the proceeds from payments to OFE are taken into account only in the part in which they are transferred to FUS accounts, under the mechanism of slider pension system. See: *Prognoza wpływów i wydatków Funduszu Emerytalnego do 2060 roku* (2016), and: *Prognoza wpływów i wydatków funduszu emerytalnego do 2080 roku* (2019).

[10]   In these reports (prepared since 2018 by the European Commission's Directorate-General for Economic and Financial Affairs) nationally differentiated systems of collecting contributions and paying out pensions are taken into account for each country, which on the one hand allows for taking into account the specific legal and institutional conditions existing in each country, but on the other hand may lead to the lack of full comparability of the obtained indicators. See: European Commission (2021, p. 92 and next).

[11]   In the study of the World Bank referred to here (Holzmann et al., 2008, p. 3–4), when discussing the goals of reforming pension systems, it is indicated that: *The primary criteria are the*

strategy is close to the methods used in international comparisons, when, in view of the diversified construction of national pension systems, the share of pension expenditure in GDP or in total expenditure on social benefits is used as a comparable measure.

The purpose of this article is to investigate what possibilities of meeting the indicated expectations exist in Poland. The basis for answering this question will be hypothetical accounts of the future capacity of the Polish economy to meet retirement needs. They will be carried out on the basis of available demographic forecasts and forecasts about the future development of the GDP and income of the society. We will take the year 2050 as the horizon of our considerations. This means that we will try to define the possibilities of meeting the retirement needs of the generation currently in the initial period of professional activity.

Methodological assumptions

When examining the future possibilities of meeting the retirement needs, as the basic assumption of our analysis, we will assume that they will be a consequence of how much of the future GDP can and must be allocated to meet them.[12] Thus, our considerations will basically ignore the issues of institutions and mechanisms for acquiring and accumulating funds for retirement purposes, as well as the rules for determining the amount and forms of their payment to people who, due to their age, have ceased professional activity.

Therefore, the following statement regarding the division of GDP available in a given period is the starting point in our considerations:

$$GDP_t = I_t + K_t$$

$$\text{when } K_t = K_b + E$$

in which:

I_t – investment outlays in the economy in the year *t*

K_t – overall consumption in the year *t*

K_b – current consumption of the working-age population, financed by income from labour, capital and social transfers

E – the global amount of pension funds earmarked for consumption by the inactive population due to age.

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ability of the reform to maintain adequacy, affordability, sustainability, and robustness while achieving welfare-improving outcomes in a manner appropriate to the current and expected environment of the individual country: Once a system and/or reform has been assessed in relation to the primary criteria, **secondary** evaluation criteria should be considered to evaluate the system's contribution to output and growth.

[12]   The broader justification for accepting the share of funds earmarked for meeting pension needs in the total GDP as a key factor in determining future pensions is included in: (Tomidajewicz, 2018). The financial and budgetary consequences of an aging population are also discussed in the report of the European Commission on this issue. See: (European Commission, 2018).

The basic component E is income from pensions, regardless of whether it comes from a solidarity or funded system, or directly or indirectly financed from the state budget. The global amount of pension funds may also include institutionalised and non-institutionalised social transfers in the form of public social welfare benefits for people in retirement age and assistance provided to them by charitable institutions and the NGO sector. Due to the difficulties with their statistical determination, they will be omitted in further analyses, as well as informal assistance provided to people in retirement age by their families, which we will treat as a component of their K_b consumption fund. In further considerations, we will also assume that the entirety of the resources that make up the global pension fund is directed to satisfying the consumption needs of pensioners. Thus, we will ignore the fact that also retirees (and more broadly speaking people in post-working age) can save some of their income and spend it either on investments or on supporting consumption of the younger part of society.

The adoption of the above assumptions regarding the structure of GDP means that the basic problems facing us can be reduced to:

1. Determining the desired and feasible in the adopted time horizon the scale of burdening GDP with the global pension fund, expressed in the E / GDP ratio = e, which we define here as the GDP burden rate;
2. Examining what and to what extent will depend the ability of the Polish economy to create a pension system allowing for the provision of income to retirees allowing for satisfying their socially justified needs.

Economic growth forecast

When conducting the economic growth account from the perspective of nearly 30 years, we will use the average GDP growth rate measured in constant prices in previous periods as its basis. In the Polish conditions, we will assume three variants of the average index of GDP growth in constant prices in the long run[13], which is the basis for further forecasts:

GDP_{v1} as the average for the period 1995–2020, which amounted to **103.977**
GDP_{v2} as the average for the period 1990–2020, which amounted to **103.054**[14]
GDP_{v3} = **105.0**, which can be considered as the desired value.

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[13]   The variants of future economic growth adopted here are based on the simplest possible assumption of continuation of the current trends in this respect. Many analyses on this issue use models that also take into account the causal determinants of growth processes. In particular, the consequences of demographic changes, including migration processes, as well as technical and technological changes are taken into account. However, this would require a separate treatment, going beyond the main subject of this study.

[14]   The above average GDP growth rates were calculated as the arithmetic average of GDP growth calculated in constant prices compared to the previous year. This means that using them to predict the future size of GDP allows them to be determined in constant prices by 2020 as the base year.

Variant 1, based on the average growth rate from 1995–2020, seems to be considered realistic, as it covers both periods of good economic conditions in the years 1995–1998, 2004–2007 and 2015–2018 and its slowdown in 2001–2003, 2009–2010 and the Covid-19 collapse in 2020.

Variant 2, based on the average growth rate from the entire post-transformation period (1990–2020), due to the inclusion of the extraordinary transformation crisis of 1990–1992 in it, we will treat as pessimistic, allowing for a deep economic downturn in the future.

Variant 3, is an optimistic option instead, assuming an acceleration of the average growth rate to 5% in the future. The justification for adopting this figure may be the fact that in the last 30 years Poland has recorded an annual growth rate exceeding 5% eight times. This means that in periods of favourable international economic conditions and with the activation of internal development factors, it is possible for the Polish economy to achieve a growth rate even significantly exceeding the value of 5% adopted here. However, considering that from the perspective of 30 years there will be also periods of economic slowdown, we arbitrarily assumed the 5% GDP growth rate as optimistic, but within the scope of the potential possibilities of the Polish economy. Of course, the implementation of this variant is based on the assumption that new development mechanisms will be launched in the Polish economy, based on new technical and organisational solutions, allowing for a high increase in labour productivity and thus increasing its competitiveness based on factors other than low labour costs. This option also assumes that the driving force behind development will be in the future structural changes resulting from the transition to a zero-emission economy and the implementation of the EU climate policy.

However, we will not consider here the most pessimistic variant of future economic growth that could be based on the long-term forecast prepared by the OECD[15] by 2060 also for the Polish economy. The decline in GDP per capita growth rate to 1.3% assumed in this forecast after 2030 is mainly a consequence of the decline in the working-age population and the resulting problems in the labour market. Without disregarding the related threats, one should take into account the potential possibility of mitigating them through an appropriate and properly timed migration policy. This, in turn, would require separate analyzes, going beyond the main subject of this study.

With the above assumptions, the development of future GDP in the three variants considered here is presented in Table 1.

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[15]   According to this forecast, the potential average annual growth of GDP per capita in the years 2030–2060 is expected to amount only to 1.3% in Poland. See: (Lipka, 2018) and (Guillemette & Turner, 2018).

Table 1. GDP forecast in million PLN (constant prices in 2020)

No.	Description	2020	2035	2050
1.	GDP v_1	2 326 656	4 176 356	7 093 974
2.	GDP v_2	2 326 656	3 652 850	5 736 905
3.	GDP v_3	2 326 656	4 839 444	10 055 807

Source: Central Statistical Office of Poland (GUS, Główny Urząd Statystyczny) data and own calculations

Burden of income with retirement expenses

Assuming that the amount of burden on the economy with retirement expenses in a synthetic way determines the share of retirement and disability pensions in GDP, it is tempting to calculate the amount of funds that may be allocated in the future to meet the needs of retirement and disability pensions. The current trends in expenditure on retirement and disability pensions in Poland and the EU[16] countries are presented in Table 2.

Table 2. Burden with pension expenditure in selected EU countries (in% of GDP)

	Countries	2010	2015	2019
1.	European Union – 27 countries (from 2020)	13	13.1	12.6
2.	**Poland**	**11.8**	**11.6**	**10.9**
3.	Denmark	12.6	13.5	12.6
4.	Germany	12.4	11.8	11.9
5.	Italy	15.4	16.4	15.9
6.	France	14.4	15.1	14.7
7.	Czech	8.8	8.6	8.3
8.	Ireland	8.1	5.8	5.0
9.	Hungary	10.6	8.5	7.3
10.	Greece	14.9	17.8	16.1

Source: *Pensions* (2022)

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[16]   The data for Poland and the entire European Union are of fundamental importance for our considerations here. On the other hand, information on the level of the burden rate in other countries has been selected in such a way as to show the scale of its variability, from the lowest amounting to 5% in Ireland to the highest amounting to nearly 19% in Greece.

Based on information from the GUS, we can supplement this data with the amount of expenditure on pension purposes in 2020, amounting to 11.2% of GDP in Poland.

As these data indicates, the rate of burdening the economy with expenditure for retirement purposes in Poland was only slightly lower than the EU average. At the same time, it was clearly lower than in countries such as France and Italy (not to mention Greece, which is the record holder in this respect) and much higher than in Ireland, which spends relatively the least on pensions, or in Hungary. Of course, the degree of burdening the economy with pension expenditure in individual countries depends on the one hand, on the changing demographic structure, and on the other, on the pension systems operating there. However, the data presented here show the acceptable scale of variability of this load. It seems that the burden on the average European level (12–13%), and even as high as 14–15% in France, does not have to pose serious threats to the economic situation and the fiscal balance of the country. As a consequence, in further analyses we will adopt two variants of the rate of burdening GDP with pension expenditure. With the first of them, in the future it will be at the level achieved in 2020, i.e., $e1 = 11.2\%$, while in the second variant it will be increased to (although exceeding the European average, but still seems safe) $e2 = 14\%$. With these assumptions, the funds that Poland will be able to allocate for retirement expenses are presented in Table 3.

The amount of pensions and the replacement rate depending on the burden on income with pension expenditure

By adopting the previously calculated funds that can be allocated in the economy to meet the needs of retirement, it is possible to try to determine how it will affect the average amount of pensions and the future average replacement rate. And the amount of future pensions will depend on the number of people using pension funds, resulting mainly from demographic phenomena, and on the adopted regulations defining the retirement age. In further analysis, we will assume as the basis for calculating the future financial situation of pensioners that the funds the economy can allocate for retirement purposes will serve to satisfy the needs of all people in retirement age. According to the population demographic forecast for 2014–2050 by the GUS, the Polish population in post-working age will amount to **10,193 thousand** in 2035 and **12,404 thousand** in 2050[17]. The amount of pensions that will be possible in this demographic situation depending on the future pace of economic growth and the degree of burdening GDP with pension expenditure is presented in Table 4.

Table 4 shows that even with the pessimistic forecast of economic growth and the maintenance of the current rate of burdening GDP with pension expenditure, despite the growth of the post-working age population resulting from the demographic forecast,

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[17]   In the GUS forecast, in accordance with the earlier legal framework, restored after attempts to raise it, the age of post-producer was assumed to be 60+/65+ years (*Prognoza ludności na lata 2014–2050*, 2014). It should be noted here that in ZUS statistics and analyses the amount of the average old-age pension is calculated as the quotient of the sum of benefits paid and the number of beneficiaries, which slightly differs from the number of people in post-working age.

Table 3. Retirement expenses depending on the GDP growth rate and the burden rate

No.	Description.	2020	2035			2050		
			$v_1 = 3.977$	$v_2 = 3.054$	$v_3 = 5.0$	$v_1 = 3.977$	$v_2 = 3.054$	$v_3 = 5.0$
1.	GDP – in PLN million	2 326 656	4 176 356	3 652 850	4 839444	7 093 974	5 736 905	10 055807
2.	Total pension expenditure in million PLN if $e_1 = 11.2\,\%$	260 558	467 752	409 119	542 018	794 525	642 533	1 126250
3.	if $e_2 = 14.0\,\%$	x	584690	511399	677522	993156	803167	1 407813

Source: GUS data and own calculations

Table 4. The expected average monthly retirement pension per 1 person in post-working age in PLN (at constant prices in 2020)

No.	Description	2020	2035			2050		
			$v_1 = 3.977$	$v_2 = 3.054$	$v_3 = 5.0$	$v_1 = 3.977$	$v_2 = 3.054$	$v_3 = 5.0$
1.	GDP growth index							
2.	Pension in PLN with e1 = 11.2%	2542.56	3 824.1	3 344.8	4431.3	5 337.8	4 316.7	7566.4
3.	Pension Growth index 2020 = 1.0	1.0	1.50	1.32	1.74	2.10	1.70	2.98
4.	Pension in PLN with $e_2 = 14.0\,\%$	x	4780.2	4181.0	5539.1	6672.3	5395.9	9458.1
5.	Pension Growth index 2020 = 1.0	1.0	1.88	1.64	2.18	2.62	2.12	3.72

Source: Own calculations based on GUS data

the Polish economy will be able to ensure a relatively small but constant increase in real value by 2050. the average old-age pension, which, in 2050, in the worst case will amount to 1.7 of its level from 2020. Of course, the real value of future pensions may be significantly higher in the event of accelerating economic growth and/or increasing the burden of pension expenditure on GDP. In the most favourable variant for pensioners, this will allow, compared to the state from 2020, for an almost four-fold (3.72) increase in the average old-age pension in 2050 in real terms. As already emphasised earlier, we assume here that the most important and ultimate goal of the operation of pension systems is to provide retirees with an income that allows them to meet their socially legitimate needs. The degree of achievement of this goal is determined, on the one hand, by the absolute amount of retirement benefits (as shown in Table 4), but on the other hand, for the social feeling that retirement needs are satisfied, the relative level of satisfaction of these needs, which is most often measured by the replacement rate, is no less important. According to its classic definition, the replacement rate determines the ratio of the received old-age pension to the remuneration that the pensioner received before leaving his or her professional activity. However, due to the availability of relevant statistical data, in further analysis we will use a measure that determines the ratio of the average pension to the average remuneration in the national economy in a given year[18]. This means that in order to calculate the possible amounts of the replacement rate in the future, it is also necessary to adopt certain assumptions as to the future level of wages in the national economy. We will assume somewhat arbitrarily that the level of average wages in the future will grow at the same rate as GDP growth. From the point of view of employees, often represented by trade unions in wage negotiations, an alternative postulate is to shape wages proportionally to the increase in social labour productivity. However, despite the importance of social arguments for such wages, in further analyses (due to the difficulties in forecasting an increase in social labour productivity) we will limit ourselves to the hypothesis that wages will increase at a rate corresponding to GDP growth. With such assumptions, the level of wages, depending on the expected rate of economic growth, is presented in Table 5.

Table 5. Forecast of an increase in average wages (PLN/month) in the national economy (at constant prices in 2020)

No.	Description	2020	2035	2050
1.	**Salaries V_1 – GDP 3.977**	5521.02	9910.2	16756.3
2.	**Salaries V_2 – GDP 3.054**	x	8668.0	13614.8
3.	**Salaries V_3 – GDP 5.00**	x	11478.2	23861.8

Source: Own calculations based on GUS data

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[18]   In a similar way, the replacement rate is defined, inter alia, in the study of the Pension Institute experts who write: *In order to be able to calculate the value of this ratio, the average amount of the newly awarded pension should be divided by the amount of the average monthly salary in the enterprise sector without payments from profit in December of a given year* (Kolek & Sobolewski, 2021).

The adoption of these assumptions makes it possible to calculate the replacement rate for the three variants of the ceiling of the burden on the economy with pension expenditure. It should be noted here that in view of the constant dependence between the increase in wages and the increase in GDP and between it and the increase in the pension burden, the adopted GDP growth rate does not affect the amount of the replacement rate and it depends only on the rate of burden and the number of people in post-working age, determining the given contribution to GDP by the amount of the average pension These options are:

e_1 = 11.2%, i.e., the maintenance of the burden rate recorded in 2020 in the future

e_2 = 14.0%, i.e., raising this burden to a rate considered high but not posing a threat to the economic equilibrium

e_3 = 16.2%, i.e., a level that ensures that the replacement rate is kept at the initial level of 46% in 2050.

The respective sizes are presented in Table 6.

Table 6. Variants of the replacement rate formation (in% of the average wage in the economy)

No.	Description	2020*	2035	2050
1.	if e_1 = 11.2 %	46.0%	38.6%	31.7%
2.	if e_2 = 14.0 %	x	48.2%	39.6%
3.	if e_3 = 16.2 %	x	55.3%	46.0%

* – real data from 2020
Source: Own calculations based on the data from the previous tables

As can be seen from the values presented in Table 6, with the assumptions made here regarding the growth rate of average wages, equal to the GDP growth rate, and the amount of pensions being the quotient of funds allocated to retirement and the number of people in retirement age, it decreases with the increase in the population of people in post-working age, and may increase as a result of an increase in the share of pension expenditure in GDP. As a result, with the assumptions adopted here, it will be possible to maintain or even a certain increase (from 46% to over 48%) in the replacement rate until 2035, provided that the rate of burdening GDP with pension expenditure is increased to 14%. Alternatively, even such an increase in the burden rate does not guarantee that the current average replacement rate will be maintained in the 2050 horizon.

If we assume that the desired replacement rate in 2050 should be within the standards suggested by the ILO and not lower than today, i.e., approx. 46%[19], the necessary level of the burden rate on GDP should increase to over 16%.

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[19] We take into account that the current level is 46%, and the minimum replacement rate postulated by the ILO should be at least 40%. See: (*Konwencja Nr 102 Międzynarodowej*

Conclusions

The simulation calculations of the amount of future pensions in the next 30 years, i.e., for 2035 and 2050, carried out here show that depending on the pace of future economic growth, while maintaining at least the current rate of burdening GDP with pension expenditure, it will be possible to systematically increase their real level from 1.7 times (at the rate of GDP growth = 3.05%), to even 2.98 times (at the rate of growth of GDP = 5.0%). Obviously, a possible increase in the GDP burden rate will lead to a corresponding increase in the real value of pensions by up to 3.72 times in the case of an increase in the burden rate to 14% with a GDP growth rate of 5%.

Whereas, the relative level of satisfaction of retirement needs, measured by the replacement rate, with an increase in average wages corresponding to the GDP growth rate, will (regardless of the GDP growth rate), as a result of demographic processes, decrease even to the level of 31.7% in 2050. This means that maintaining the replacement rate at the current level will require an increase in the burden of pension expenditure on GDP from the current 11.2% to over 16% in 2050.

The simulations presented here are based on several assumptions that may change as a result of both independent socio-economic processes and the state taking specific actions in economic and social policy. In particular, the future rate of economic growth will have a significant impact on the real level of retirement benefits. On the other hand, the relative satisfaction of retirement needs expressed by the replacement rate, in addition to the GDP burden rate indicated here, will be significantly influenced by the number of people in post-working age. The size of this group adopted in our simulations is a consequence of the adopted demographic forecast and the assumption of the retirement age amounting to 60/65+. However, while the demographic forecast for this age group can be considered close to certainty, the assumption about the retirement age is a consequence of the principles of social policy adopted in Poland and may change along with changes in this respect. Therefore, it should be indicated that any increase in the retirement age, leading to a decrease in the number of people covered by these benefits, will lead to a corresponding reduction in the rate of burdening GDP with pension expenditure, compared to the options presented in our simulations or at the same level of the GDP burden rate, will result in increasing the replacement rate. Alternatively, contrary to the views sometimes formulated in economic journalism, the reduction of the burden on GDP with pension expenditure will not be affected by the size of possible immigration and the related increase in the working-age population. This is due to the fact that we assumed the pace of economic growth as independent of changes in the size of the labour force derived from the working-age population. Some justification for such an assumption may be the fact that the development of Poland to date does not show a clear relationship between the demographic development (in particular of the working-age population) and the GDP growth rate. If, however, it was assumed that the growth or inhibition of the decline in the working-age population was a condition for maintaining or accelerating the GDP growth

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Organizacji Pracy dotycząca minimalnych norm zabezpieczenia społecznego, 1955) and (Kolek & Sobolewski, 2021, p. 5)

rate, then the possible effects of migration processes could affect the feasibility of the variants of the expected growth rate adopted here[20]. As a consequence, the amount of funds earmarked for meeting pension needs depends directly only on the future size of GDP and the rate of burdening it with pension expenditure. On the other hand, the growth, as a result of migration processes, of the economically active population may lead to an acceleration of economic growth and will also make it possible to reduce the unit burden of working people with the costs of financing pension expenditure.

Compared to most of the forecasts and simulations of the future level of retirement benefits found in the literature, the calculations carried out here show that the demographic processes of population aging do not have to lead to a catastrophic reduction in the level of meeting pension needs and/or an equally catastrophic increase in the burden of the costs of living for retirees on future generations. It seems that the often encountered pessimistic visions of future pensions result mainly from the fact that their formulation is based on the currently existing pension systems, the maintenance of which is threatened by declining contributions and a simultaneous increase in pension needs resulting from the aging of societies. However, if we take into account the possibilities of society growing along with the economic growth, it turns out that ensuring an increase in the absolute level of future pensions becomes fully realistic, and the increase in their relative amount will require increasing the burden of pension expenses on society, but with the increasing level of affluence, the extreme nuisance of these loads should not be excessively severe.

The analyses and simulation accounts presented here completely ignore the problems related to the structure of pension systems, which, on the one hand, would make it possible to obtain funds ensuring an appropriate rate of burden on GDP, and, on the other hand, define the conditions and criteria for distributing these funds among future retirees.

Without going into detailed considerations regarding those issues that require separate consideration, it is worth pointing out, however, that as the main sources of funds to meet retirement needs, they can be used:
- contributions by the economically active to compulsory insurance pension schemes;
- funds from tax burdens earmarked for meeting these needs through the budget;
- or compulsory and voluntary savings accumulated in pension funds by currently professionally active people and directed by these funds to pay pensions to their former participants. At the same time, if the sum of economically active savings turns out to be insufficient to cover pension payments, it may be necessary to liquidate previously accumulated savings at current market prices on the capital market, which, given their greater supply, may cause their prices to fall and the value of their proceeds to be reduced.

When considering the mechanisms of acquiring funds to meet the pension needs and the proportions of their use in the construction of the pension system, it should be emphasised that the least stable and most risky source of these funds will be voluntary

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[20]   The strong dependence of the future growth rate on the demographic situation, and in particular on the share of people in the working age in the population, is shown in: (Guillemette & Turner, 2018, p. 17).

and to a large extent, also obligatory savings accumulated in pension funds. Alternatively, the lowest risk is associated with funds from contributions to the compulsory pension insurance systems. An additional advantage of this method of acquiring funds for retirement purposes is its resistance to possible inflationary threats. Compared to these methods, financing pension needs directly from the budget, on the one hand, is characterised by increased certainty resulting from trust in the state and the obligations it undertakes, but on the other hand, it may be subject to fluctuations resulting from the current political and economic situation, and in particular from the need to maintain a balance public finances.

However, with regard to the issue of the division of funds earmarked for satisfying retirement needs, it should be considered:

1. How to determine the rules and age of obtaining retirement rights? When regulating them, it should be taken into account that any increase in the retirement age, resulting in a decrease in the number of people receiving pensions, will become a way to reduce the level of the necessary rate of burden on GDP or, at the same level of this rate, to increase the replacement rate.
2. To what extent and at what level to ensure a minimum pension provision to all citizens reaching the age that prevents further professional activity (whether, from what age and at what level the minimum is or civic retirement pension)?
3. Whether and to what extent the amount of the old-age pension is to be determined on the basis of the defined benefit, and to what extent its level, based on the principle of the defined contribution, is to be derived from the updated value of the sum of previously made savings? The choice between defined benefit and defined contribution schemes is primarily related to the objectives and assessment criteria of these schemes. If the goal of the pension system is its ability to provide future retirees with a predictable and stable pension, ensuring the satisfaction of their life needs, then defined benefit systems show a definite superiority. If, however, the main goal is to ensure a balance between the revenues and expenses of the pension system itself, treating the amount of pensions as a consequence of its safe (and if it is a private system also profitable and risk-reducing) operation, defined contribution systems are chosen.

From the point of view of the basic goal of creating social security systems, which is to provide retirees with an income that would allow them to meet their socially justified needs, the most advantageous seems to be the pursuit of a socially acceptable increase in the retirement age and, while guaranteeing a universal minimum retirement pension, basing pension systems on the principle of defined benefit.

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