

Evaluation of pension sustainability and its application

Jan Pokorný¹

Abstract: Sustainability is a very important topic for the pension system with regard to population ageing and changes in labor market as digitalization and Industry 4.0. These causes are the reason for reforms of pension systems, which will lead to systems that are more robust with the ability to withstand without political interference. The aim of this article is to evaluate the proposed pension reform of the Czech pension system by pension commission. In this article, the evaluation of pension sustainability is submitted in the theoretical part and empirical part. First, the general concept of sustainability is defined. Subsequently, the process of adopting public policy (pension reform) is presented with the process of evaluation, which is important for the content of the article. Next, three perspectives are presented, which are used in this article for the initial evaluation of pension systems. The article omits the issue of political decision-making and political sustainability. Fiscal, financial and social sustainability are introduced with tools for measurement of effects. The empirical part of the thesis relates to the proposal of the reform of the pension system in Czechia. First, the history of the pension system is briefly described, followed by the application of sustainability perspectives, which were defined in Theoretical Background. The article uses the method of literature review, it is also a method of analysis with respect to the empirical part of the work. At the end of the work, the method of synthesis is used to summarize the conclusion of this article.

Keywords: evaluation of pension sustainability, fiscal sustainability, financial sustainability, social sustainability, Czech pension system.

JEL Classification: H55, I38, J18

Introduction

The topic of the pension system is very crucial this time. The beginning of the pension systems is connected with the chancellor Bismarck and Germany. Generally, the genesis of the pension systems can be associated with technology and socio-economic changes in society. The consequence of the changes was the worker's movement. The first industrial revolution brought industrialization, urbanization, changes in the structure of the economy, and the changes in the applied concept of solidarity from family to the state (Baldwin, 1990; Wilensky & Lebeaux, 1958).

This time, society is affected by technology, and socio-economic changes all the time. The challenges of the present are digitalization, robotization, the changes in the structure of the economy, population ageing, and so on. These changes have an impact on pension systems. With regard to these changes, the sustainability of pension systems is very important because it has an impact on public finance and social conditions.

Based on this text, the evaluation of the sustainability of pension systems is very important for the measurement of impacts on economy and society.

The text of the article is divided into five chapters. The chapter Research Methodology follows the Introduction with the aims of the article and used methods. Next, Theoretical Background describes the basic concept of sustainability of pension systems.

The chapter four Results and Discussion analysis the proposal of pension reform in Czechia. This analysis is focused on the evaluation of defined perspectives of sustainability. The last chapter is Conclusion, it is a summary of the text of the article.

1. Research Methodology

This article is aiming on the evaluation of the proposed pension reform of the Czech pension system by pension commission. This aim is decomposed to sub-aims. Firstly, the description of the general concept the sustainability of the pension system. Next sub-aim is the description of the proposal of pension reform and then its analysis and evaluation.

For the first part of this article Theoretical Background is used the literature review for introduction to the issue the sustainability of generally and with focus on pension systems. This article extends the previous work of the author (Pokorný & Hejduková, 2019; Pokorný, 2019; Pokorný, 2020), who dealt with the issue of sustainability and specific tools for measurement. Thus, introductory knowledge of the issue serves as a basis for subsequent analysis of the pension system design.

The empiric part of this article is presented by the Czech pension system and the actual proposal of pension reform by pension commission. First, there is a brief introduction of the current form of the

¹ University of West Bohemia, Faculty of Economics, Department of Finance and Accounting, Czech Republic, ORCID code: 0000-0002-3288-5080, pokorny@kfu.zcu.cz

Czech pension system and a basic introduction to the issue of pension reform in Czechia. Subsequently, proposals from the Pension Commission (Komise pro spravedlivé důchody, 2020), which were presented on 11 December 2020. The proposal contains seven changes in the Czech pension system. A literature review is also used in this part of the article.

The next part of this chapter focuses on performing the analysis with respect to the presented changes and data that were presented in the background material (Komise pro spravedlivé důchody, 2020). These are mainly financial fiscal impacts, as well as the social impact, which focuses on reducing poverty among pensioners. Data from the background material (Komise pro spravedlivé důchody, 2020) are placed in the context of measurable data, so the author uses his own research or other research (European Commission, 2019). Unfortunately, it is not possible to perform your own calculations due to the availability of data.

The aim of this part of the article is to analyze the impacts of pension reform on the sustainability of pension systems, from the perspective of financial, fiscal and social sustainability with measurable outputs (IPD, S2 and poverty rate). The method of deduction is used in the evaluation with regard to the comparison of the zero variant and the pension reform.

Last part of this article is the Conclusion where is used the method of synthesis and the results of the research are summarized here.

2. Theoretical Background

The term sustainability is commonly used in various perspectives. We can read or hear about sustainable development, sustainability reporting and the term sustainability can be connected with education, management, accounting and so on (Rao, 2000; Kolk, 2005; McFarlane & Ogazon, 2011; Bieker, 2003; Lamberton, 2005). The principle of sustainability is that something is capable of continuation in the current form (without changes). Sustainability is often used with the environment (Procter et al., 1995).

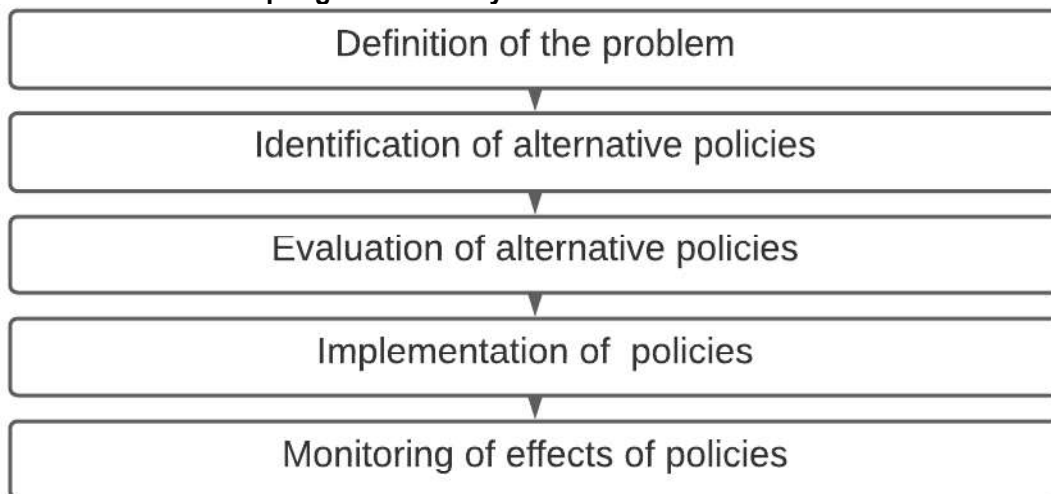
The perspectives of sustainability can be different from an application on an issue. The definition of sustainability of the issue is very important for the definition of problem and identification of alternatives. Based on conditions of sustainability can be defined as the tools and criteria of public policy.

Generally, Fig. 1 shows the process of adopting public policy with 5 steps. Firstly, the definition of the problem is important for identification of alternative policies. Based on the identification, we can evaluate of alternative policies and choose the best variant from alternative policies. Next step is the implementation of policies and its monitoring. This is the Simple Model of the Political Cycle (Potůček et al., 2016).

The model contains the evaluation and it is the issue of this article. In the first step, the definition of the problem is important for the conditions and tools of policies. And evaluation and monitoring are connected with conditions and tolls too. It means that sustainability interweaves the whole model on Fig. 1.

Sustainability is the term associated with pension systems and their designs and impacts in this article. Sustainability of pension systems ant its evaluation is topic with high importance for adopting a public policy or, in the context of this article, pension reforms. The aim of the sustainable pension system is the ability to continue without changes. It means without the need for intervention.

Fig. 1: The Process of Adopting Public Policy



Source: own processing based on Potůček et al. (2016), 2020.

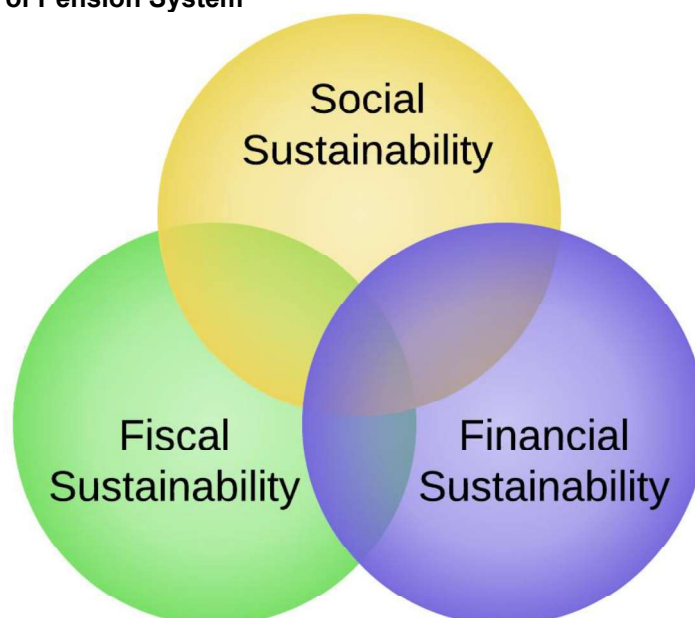
In this article is used the level of three perspectives connected with sustainability. Political sustainability can be used (Schoyen & Starmati, 2013), but this perspective is not in this article. The author uses the Model of a Political System by Easton (1957) where inputs are demands and support. These inputs are transformed by the political system to outputs (decisions, public policies). For this article, it means that the author focuses on inputs and political sustainability in part of the political system. Also, political decisions are dependent on the political business cycle.

Spangenberg (2005) defines the institutional perspective of sustainability, this aspect is not analyzed in this article. The reason is an attempt to generalize this article and the institutional sustainability depends on the institutional system of the country.

On the other hand, the perspectives used in this article are fiscal, financial and social sustainability. These perspectives are possible to adjust to tools and parameters. The political and institutional sustainability is affected by the difference of a state-building arrangement.

However, Glennerster (2010) writes about the moral aspect. This aspect is very normative against the fiscal or financial aspect of sustainability. Moral aspect is not used in this article too, but the author uses fiscal, financial, and social aspects because the author thinks that it can be replaced by the aspect of sustainability. Ismailov (2017) defines social politics based on social and economic needs, the impacts are internal stability and sustainable growth. One of the requirements for implementation is achieving sufficient revenues. Based on the idea of Ismailov (2017), this article uses fiscal, financial and social sustainability. These perspectives are connected due to relationship between the perspectives sustainability from measurements and impacts. In the last part of financial sustainability is indicated this issue. Fig. 4 shows connection of sustainability of the pension system.

Fig. 4: Sustainability of Pension System



Source: own processing, 2020.

In general, the demand for a high level of justice for pensioners (perspective of social sustainability) means a higher expenditure requirement. The impact is on financial and fiscal sustainability. It is either possible to secure higher revenues for the pension scheme and thus maintain a balance of revenues and expenditures, or this may have an impact on public finances.

Different levels of the welfare state have impacts on financial and fiscal sustainability too. Esping-Andersen (1990) expects that the social-democratic regime of the welfare state is more expensive than the conservative regime or liberal regime of the welfare state. This premise is confirmed by data about public social expenditure (Pokorný, 2018). On the other hand, Kangas & Palme (2007) agree with the possibility of the division of states in terms of expenditure but with limitation of this idea. When we use parameters as aspects of social rights and analysis on occupational welfare then we can have a different conclusion. This change of conclusion is affected by the idea about the expensive social-democratic regime of the welfare state and liberal regime with low spending. However, for fiscal and financial sustainability is very important the actual amount of expenditure.

Fiscal Sustainability

The terms fiscal and financial sustainability can be perceived similarly but there is a significant difference. The fiscal sustainability is used for the sustainability of public finance – it means state finance,

Evaluation of pension sustainability and its application

municipal finance and finance of other public institutions in the public sector. On the other hand, financial sustainability is focused on the sustainability of public policy, in this context the sustainability of public pension schemes.

Generally, fiscal sustainability can be understood as a long-time balance of revenue and expenditure in the budget. In this approach, we use time preference (discounting) when 100 EUR has a higher value for me than 100 EUR in 5 years. This rule is called an intertemporal budget constraint.

Burnside (2005) do not agree with this approach because public finances are not a natural resource. He prefers the approach connected with the term solvency. In this context, it means that fiscal policy is sustainability when a government is able to pay its liabilities on time and in full.

Short-time fiscal unsustainability can be solved by a bond issue, externalization of the debt, debt monetarization or privatization. Long-time fiscal unsustainability can be solved in similar ways but it is associated with deeper problems for the public sector and public finance (Maaytová et al., 2015). Next way is a higher tax rate but it can have a negative impact on the economy by reducing the expenditure rate and so on (Balassone & Franco, 2000).

The levels of (un)sustainability can be the measurement by the different tools. Spěvák et al. (2016) describe measurement options of public finance and fiscal sustainability. Firstly, we can use the ratio debt and gross domestic product, the results of this calculation are easy and we can compare the results in time and internationally. For measuring a long-time sustainability could be used another method – statistic and econometric indicator, gap analysis, borderline analysis, and stochastic methods.

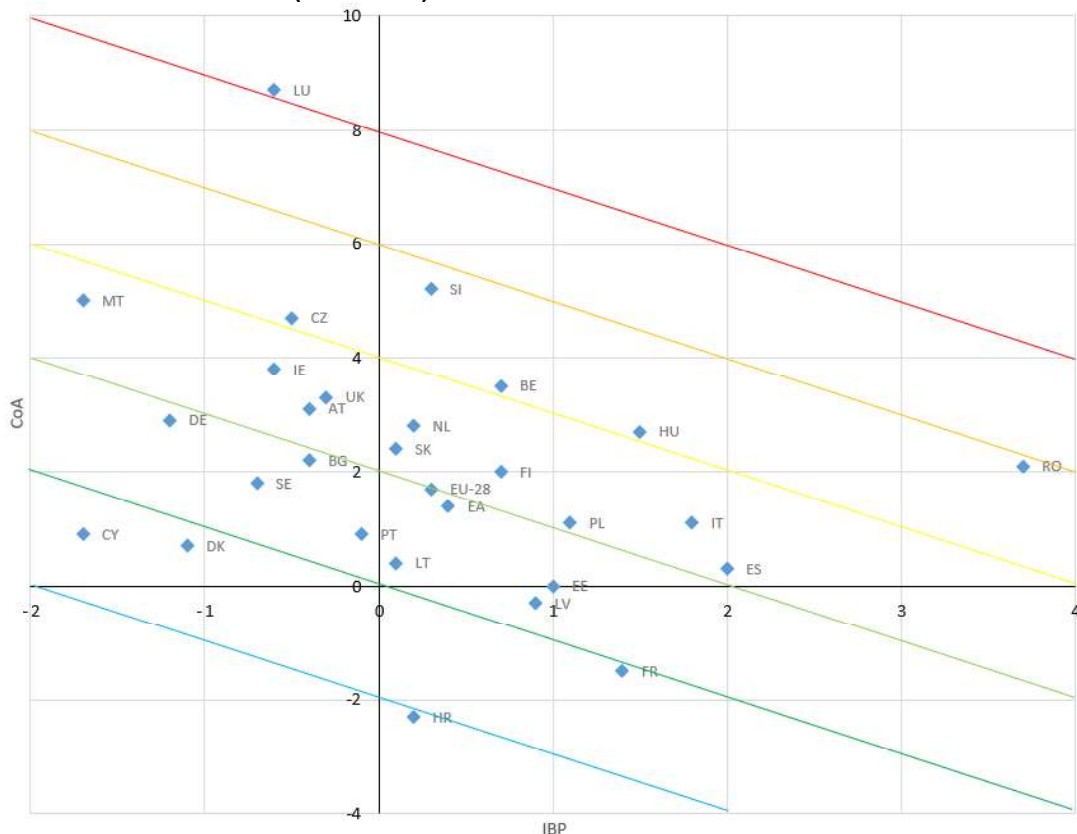
In this article is used gap analysis which is used by the European Commission (2019). This analysis uses three levels based on time. For short time sustainability is used indicator S0. This indicator draws attention to the risk over a period of one year, it is used for detection of the fiscal stress situation.

Indicator S1 conditional on debts and criterion. European Commission (2019) uses as the criterion debt of 60 % gross domestic product under the Maastricht rules. For long-time fiscal sustainability is used indicator S2 for fiscal risks including population ageing. The formula of indicator S2 has two components. Firstly, total initial budgetary position are used for the analysis of the current situation compared with rules (debt of 60 % GDP again). The second component depends on population ageing – it is called Cost of Ageing), this component contains pension benefits, health and social care and so on. The equation of indicator S2 is:

$$S2 = r D_{t_0} - SPB_{t_0} - r \sum_{i=t_0+1}^{\infty} \left(\frac{\Delta PI_i + CC_i}{\alpha_{t_0;i}} \right) + r \sum_{i=t_0+1}^{\infty} \left(\frac{\Delta A_i}{\alpha_{t_0;i}} \right) \quad (1)$$

Equation (1) has four parts, but just the last parts are the second components (Cost of Ageing). In the equation (1) r is differential between the nominal interest rate and nominal growth rate of GDP, D_{t_0} is the ratio between debt and gross domestic product at time 0 (last year before the projection). SPB_{t_0} is structural balance budget, ΔPI_i is the change of property income, CC_i cyclical component, ΔA_i is changing in age-related cost (cost of population ageing) and $\alpha_{t_0;i}$ is differential between the interest-growth rate for the year i and time 0.

Fig. 2: Indicator S2 in 2019 (in % GDP)



Source: Pokorný (2020) based on European Commission (2019), 2020.

Based on equation (1), we can construct a graph with both components. The x-axis represents the total initial budgetary position (IBP) and the y-axis is Cost of Ageing (CoA). Based on this, favorable periods for both components are in negative numbers of the graph because values are in percentages of gross domestic product.

The result of indicator S2 (sum of IBP and CoA) indicates the degree of risk. A higher value means higher risk for fiscal sustainability. The value up to 2 is low risk. The value from 2 to 6 is medium risk and the value over 6 is high risk. Fig. 2 shows the situation in 2019. Better position in current time (IBP) has Malta, Czechia, Denmark etc. Better position in future (CoA) has France, Latvia and Croatia. However, a better position for both times is without countries. Other states have worse positions for both times (Belgium, Hungary, Italy, Poland etc.).

However, states can use one position for improvement of indicator S2. For example, Bulgaria has better current position but its position is not so good. The result S2 for Bulgaria is low risk (up to 2) because the current position is in the better part. The indicator S2 can change from year to year – it depends on fiscal policy and public policy of the state.

Financial Sustainability

As mentioned above, financial sustainability is focused on public policy, in this article, pension systems. The aim of financial sustainability is the balance of revenue and expenditure. With higher expenditure than revenue is necessary to search for a new resource. For financial sustainability is very important definition of resource of revenue and expenditure. Between revenue can be social insurance, tax revenue and so on. On the other hand, expenditure is represented by pension benefits.

With this in mind, implicit pension debt (IPD) can be used. This tool uses expenditure for calculation of gross implicit pension debt or difference between revenue and expenditure, it means net implicit pension debt. IPD is established by the idea of Social Security Wealth by Feldstein (1974) and generational accounting by Auerbach, Gokhale & Kotlikoff (1991). This tool is described in the author's previous work (Pokorný, 2019).

Equation (2) described the process of calculation net IPD:

$$net\ IPD_j = \sum_{t=1}^n (NPV_{jt} ACB_{jt}) = \sum_{t=1}^n (NPV_{jt} TR_{jt}) - \sum_{t=1}^n (NPV_{jt} TE_{jt}) \quad (2)$$

NPV_{jt} is net present value for the state j in time t . ACB_{jt} means accrual balance of TR_{jt} total revenue of pension scheme and TE_{jt} total expenditure of pension scheme. These components can be further

Evaluation of pension sustainability and its application

defined. Total revenue depends on wage and the rate of social contribution a number of workers. And the total expenditure depends on total pensioners and pension benefits.

Next, financial sustainability can be the measurement with other tools, but tools can be used for social sustainability too. For example, implicit pension debt can be managed for the generation when we use generational accounting for one generation (determination of generation, for example at 5-year intervals) and intragenerational solidarity.

Social Sustainability

The term social sustainability is not that easy for definition as fiscal or financial sustainability. Social sustainability is partly question for the term equity. McKenzie (2004) defines social sustainability as a formal and informal process but systems, structures too. Harris (2000) uses seeking distributional justice and adequate provision of social services. It is very normative questions and that is the reason why social sustainability is not so easy for definition and tools.

In distributional justice, we can use the principle of meritocracy, equality, equal opportunities, social needs etc. (Krebs et al., 2015). Next, we can discuss solidarity and its types: mechanical and organic solidarity. Mechanical solidarity is connected with solidarity between people at the same level of social status and this type of solidarity is used in less developed countries.

Organic solidarity is used in more developed countries, the principle of this type of solidarity is associated with a developed division of labour market, and the conscience of the population is weakened within the framework of solidarity, that is, the involvement of the state in this issue (Crow, 2002; Schoenfeld & Meštrović, 1989).

Next, solidarity can be observed about intergenerational relations solidarity. McDaniel (1997) defines giving and receiving generation (grandparent, parent, and child). The author with respect to the topic of this article limits this typology on the public issue of solidarity.

Tab. 1 shows the main parameters for this article – public debt, and pension benefits. In this type of sustainability, we can discuss intergenerational and intragenerational solidarity. This topic is connected with financial and fiscal sustainability too. However, the link between these types of sustainability is discussed in this part of this chapter.

Intergenerational solidarity can be the measurement by approaches of Devolder & de Valeriola (2019) and Musgrave & Musgrave (1994). The aim of Musgrave & Musgrave (1994) approach is respect to demographic changes (change of fertility rate, old-age dependency ratio etc.). For this aim is introduced Musgrave ratio and Defined Musgrave pension plan.

Classic pension plan as defined benefit and defined contribution pension plan respects just one parameter. In defined benefit (contribution) pension plan: pension benefit (contribution rate) is constant and the second variable depends on demographic changes.

Tab.1: The typology of intergenerational solidarity

Giving generation	Receiving generation		
	Child	Parent	Grandparent
Child	x	public debt, potential of future support and transfers	potential of future support and transfers
Parent	education, health care, benefits, social assistance	benefits in unemployment, social care etc.	pension benefits, health care, public debt
Grandparent	public infrastructure, social wealth	public infrastructure, social wealth	transfers from well-off to bad-off

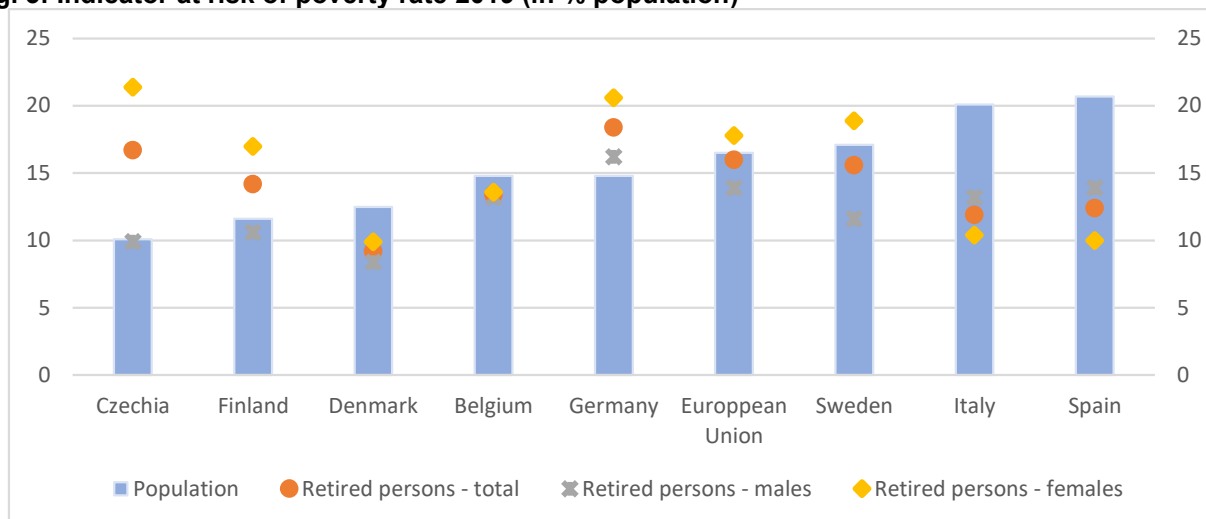
Source: own processing based on McDaniel (1997), 2020.

Musgrave ratio is the ratio between pension benefit and net wage. It means a compromise between defined benefit and contribution pension plan when it efforts to reduce problems is intergenerational solidarity as one of the aspects of social sustainability.

The second approach can be intragenerational solidarity, it means between pensioners as one group. This type of solidarity depends on the type of justice. Equality means the same low pension benefits for everyone, its typically for welfare state with the liberal regime. On the other hand, meritocracy is used in a welfare state with the conservative regime. And for welfare state with the social-democratic regimes is typical a higher pension benefit than in liberal regime. It follows that intragenerational solidarity is a very normative question based on the institutional form and state-building of the countries.

However, for measurement of intragenerational and intergenerational solidarity, we can use at the risk of the poverty rate. This data can be used but there is the same problem with the application of justice in individual states. Fig. 3 shows indicator at risk of poverty rate (60 % of median equivalised income after social transfers) where we can see intergenerational solidarity between the rate for population and retired persons. Czechia, Finland and Germany have a higher rate for retired persons. Nevertheless, we can see the differences based on sex. Italy and Spain have a higher risk of poverty for males, other states have a higher risk for females. These differences can be called as intragenerational solidarity-based on sex. Next differences are connected with income.

Fig. 3: Indicator at risk of poverty rate 2019 (in % population)



Source: own processing based on Eurostat (2020), 2020.

3. Research Results

The first pension system on the territory of today's Czech Republic was established during the Austria-Hungarian Empire and this effect was noticeable during the First Republic. During the period of socialism, the pensions system was affected by efforts to reduce disparities.

Since 1993, there is a separate Czech pension system. Negatives of post-communist pension system affected this pension system. Standing (1996) analysis these negatives:

- low retirement age (up to 60 years),
- relatively low pension benefits as a percentage of average wage against Western Europe,
- unfunded financing.

In the 1990s, the pension systems were affected by the design of Chilean pension reform in the 1980s, the liberals as Milton Friedman with his ideas had an effect on the reform in Chile (Pokorný, 2019). The pension systems in Hungary and Poland were affected by this idea (established the 2nd pillar and the 1st pillar as basic protection in a modified version). The Czech pension system was affected by a liberal idea but without these changes (Vostatek, 2016).

The formula of pension benefit in the Czech pension system has two parts. Firstly, the flat-rate is 10 % of the average wage when the insurance period is met. The second part of pension benefit depends on wage during active participation in the labor market.

In Czechia, Commissions for pension reforms were established at the level of government - Bezděk's Commission I (2004), Bezděk's Commission II (2010), National Economic Council of the Government (2011-12), Expert Commission for pension reform (2013-2017) and Commission for Fair Pensions (2019+). There is also other commissions and committees of political parties (Potůček, 2017; Důchodová komise, 2020).

The results were the "small" pension reform (2011) when retirement age is gradually increased to 65 years for males and females too (previously the number of children was taken into account). The second pension reform is called as the "big" pension reform (2013). The 2nd pillar was established and destroyed in 2016 based on the proposal of another pension commission and political discussion. The principle of this reform was the introduction of the 2nd pillar with funding financing and the contribution was 3 % from social insurance but with addition 2 % of wages. Next reforms were carried out but these two changes had an effect on the form and design of the Czech pension system (Vostatek, 2016; MF ČR, 2020).

In 11th December 2020, the proposal of pension reform was introduced by the minister of Labor and Social Affairs Maláčová and the head of Commission for Fair Pensions Nerudová. They introduced the conclusion of the Commission for Fair Pensions with seven changes for fair pensions. The aim of the

Evaluation of pension sustainability and its application

Commission is the proposal for the pension system, which has three attributes – sustainability, justice and intelligibility (CT24, 2020).

Starting position with respect to unsustainability is depended on depending on revenue from social insurance (77 % expenditure on pensions is by social insurance) and social insurance will endanger with respect to population ageing and changes on the labor market (digitalization and industry 4.0). The result of the Commission is: “The pension system needs to be stabilized with additional income!!!” (Komise pro spravedlivé důchody, 2020, p. 4).

The first phase of pension reform is given by seven changes:

- 1) Taking into account the upbringing of children.
- 2) Lowering the retirement age in demanding occupations.
- 3) Basic pension for each pensioner – basic pension in the 0th pillar for a pensioner with worked 25 years.
- 4) Shorter insurance period from 35 years to 25 years (connected with the 0th pillar).
- 5) Multi-source financing - the 0th pillar of tax revenue financing.
- 6) Lower taxes for working pensioners.
- 7) Retirement calculator for every citizen.

For this article is important changes 1, 3, 4, 5 and 6.

The author (Pokorný & Hejduková, 2019) in the previous article calculated financial sustainability of the Czech pension system and the tool IPD was used for this calculation. The result of the calculation is in Tab. 2. Gross IPD means future liabilities and net IPD means future liabilities with predicted revenue from social insurance.

Tab.2: IPD of Czechia (in % of GDP)

IPD	RA before reform	RA after reform
Gross IPD	314	225
Net IPD	98	-32

Source: own processing based Pokorný & Hejduková (2019), 2020.

However, the pension reform by the Commission for Fair Pensions the changes with impacts on IPD, it means with impacts on financial sustainability. It has three reasons – upbringing of children (changes 1), lowering the retirement age in demanding occupations (2) and introduction of the 0th and the 1st pillar (3, 4, 5). The introduction of the 0th and 1st pillar has the greatest impact on fiscal sustainability. Tab. 3 shows the changes in revenue and expenditure for the introduction of the 0th and 1st pillar and total changes.

Tab.3: Cost of Pension Reform

Category	Yearly cost (in billion CZK)					S2 (in % GDP)
	2022	2023	2024	2025	2026	Long-time
Introduction of the 0 th and 1 st pillar: Additional revenue	0,0	10,4	10,8	11,1	11,4	0,9
Additional expenditure	2,8	3,4	4,6	6,7	8,8	
Difference	2,8	-7,0	-6,2	-4,4	-2,6	
Total: Additional revenue	0,0	10,4	19,8	20,4	21,1	1,2
Additional expenditure	2,8	20,4	22,0	24,5	27,0	
Difference	2,8	10,0	2,2	4,1	5,9	

Source: own processing based Komise pro spravedlivé důchody (2020), 2020.

The aim of the 0th pillar is the basic income (10 000 CZK) for every pensioner with 25 years of active participation in the labor market. The flat rate is contained in the current construction of pension benefit but with 10 % of the average wage. This change means a higher expenditure for the pension system and the second impact is (in)justice (social sustainability): equality against merit is strengthened. A higher basic income is against the development of the pension system. However, the tendency of flat-rate liberalization was in the pension system in the 1990s.

Financial sustainability and fiscal sustainability are closely connected. Tab. 3 shows this impact on indicator S2. The increase of value S2 means moving closer to threshold 6, which is the intermediate stage between medium and high risk to the sustainability of public finances. The largest impact has the

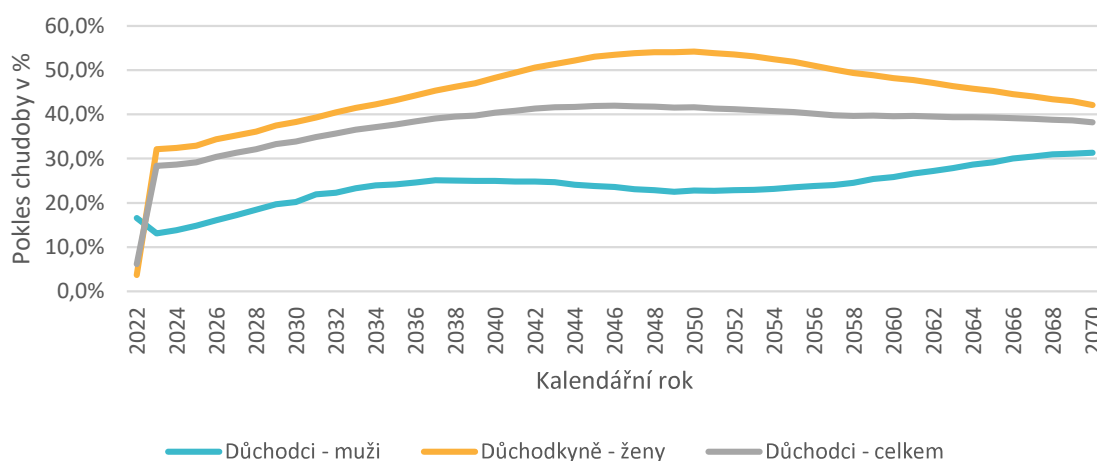
introduction of the 0th and 1st pillar with 75 % of the increasing of S2 due to the proposal of pension reform.

In the context of the proposal of the pension reform, since 2023 additional revenue is included in Tab. 3. This revenue represents as part of the taxation. It means the allocation of taxation on the financing of the 0th pillar. On the other hand, the calculation shows just additional revenue and additional expenditure without assuming a budget for the 0th and the 1st pillar of the Czech pension system. We can assume reallocation of expenditures from the 1st pillar to the 0th pillar (expenditures on basic pension), coverage of expenditures in the 0th pillar from tax revenue and preservation of fictitious income in the 1st pillar. Fiction arises from the fact that in the Czech context there was no actual separation of the pension account, currently, revenues and expenditures on pensions are included in the state budget.

In real terms, this will change expenditures (increase) and use tax revenue to finance the 0th pillar (expenditures are already real tax-financed in the event of a deficit in the fictitious pension account).

The change can be achieved in the context of social sustainability. Fig. 5 shows poverty decline for retired persons. Retired persons – females have a lower average pension benefit against retired persons – males. The reasons for this disparity are a lower average wage against males and more frequent going on parental leave against males. The second reason is solved (change 1) by flat-rate for a raised child with limitation on three children. The impacts of this solution are a higher expenditure (financial sustainability) and reducing differences between pension benefits males and females (social sustainability), it means higher intragenerational solidarity.

Fig. 5: Poverty decline (in %)



Note: Pokles chudoby v % - decrease of poverty, kalendářní rok – a year, Retired persons – males (blue), Retired persons – females (orange), Retired persons – total (grey).

Source: Komise pro spravedlivé důchody (2020), 2020.

However, intergenerational solidarity is very important too for complex sustainability. The question for it can be changed 6: “Lower taxes for working pensioners.” The point is unlikely to be justified for the working generation, as it is a question of using positive incentives within the tax system. The question, therefore, arises as to why the aim should be to motivate the participation of retired people in active participation in the labor market. This may be accompanied by the context of the impending economic crisis, changes in the labor market, which is mentioned in the material (digitization and industry 4.0, where it is emphasized that 51% of jobs will be affected by automation). It can be a problem for intergenerational solidarity in the context “their generation versus our generation.” Consequently, this issue may be related to the willingness to increase pensions.

The results of this proposal of the pension reform in Czechia are impacts on the three perspectives of sustainability of the pension system in a negative connotation. The summary of these results is in Tab. 4.

Based on the material by Komise pro spravedlivé důchody (2020), we can show the definition of the problem for the solution and improving the current position of the pension system. Population ageing and changes in labor market affect the Czech pension system. The high degree of dependence on the public pension scheme is a negative of this system, as is the disadvantage of women and the like.

Tab.4: Results of the Proposal of Pension Reform

Changes	Sustainability		
	Financial	Fiscal	Social
Upbringing of children	Increase of total expenditure	S2: + 0,2 % GDP	Poverty reduction, especially for women
Basic pension from the 0 th pillar	Reallocation of expenditure from the 1 st pillar to the 0 th pillar (in fact, there will be no change from the current situation) and increase of total expenditure	S2: + 0,9 % GDP	Equality is strengthened and the possible negative impact on intergenerational relations. Improving income poverty among pensioners
Shorter insurance period			
Tax revenue financing			
Lower taxes for working pensioners	Probably without a significant impact on the pension system	Lower tax revenue, but without significant changes	Advantages of the older generation, a possible problem in intergenerational relations

Source: own research, 2020.

Based on these problems is created the alternative policy for the pension system (pension reform). Then we can evaluate this pension reform against zero version (pension system without change). For evaluation, we use three perspectives of sustainability with tools describing in Theoretical Background.

The proposal has a negative impact on the pension system because it adds an additional expenditure and additional revenue are used already now because the deficit of the fictitious pension accounting is solved through the state budget.

These changes have negative impacts on fiscal sustainability because indicator S2 can increase to value 6 where high risk begins for the sustainability of public finance. At the same time, the current calculation does not include other effects of the current period, which relate to budget deficits for 2020 and 2021, which imply a deterioration of the starting position for public finances.

The impacts on social sustainability can be positive for intragenerational solidarity with respect to poverty decline. However, intergenerational solidarity can be reduced with respect to financial and fiscal impacts and labor market tax benefits for retired persons. In addition, the merit is reduced in this proposal, which goes against the development of the pension system.

With regard to this, there is subsequently the question of whether the proposed reform of the pension system is appropriate with regard to the essence of sustainability.

Conclusion

Sustainability is important to view problems. The aim of sustainability is the ability to continue without changes. This view can be used for pension systems too. Pension systems face challenges related to population ageing, changes in the labor market etc. This is the reason why it is necessary to evaluate the pension system, and the aspect of sustainability can be used for evaluation.

Perspectives on assessing pension systems from a sustainability perspective may include political, institutional, moral, fiscal, financial, and political sustainability. Political, institutional, and moral sustainability are not described in this article. Political sustainability is perceived as "secondary sustainability," as it is primarily necessary to determine the socio-economic consequences of setting up pension systems or their reform. Institutional sustainability depends on the state-building of the country and it is the problem for generalization of the issue of the pension system. Moreover, social, institutional and moral sustainability depends on the regime of the welfare state, which is used in the country. Moral sustainability is a very normative problem. This article is aiming on effort to evaluate regardless of the author's position of thought.

As part of the adoption of public policy - pension reform in this article - it is necessary to firstly define the problems (reasons for change), then to find alternatives and evaluate them. The policy can then be adopted and monitored.

For evaluation of the pension system and pension reform is used financial, fiscal and social sustainability. Financial sustainability is connected with the balance of the pension scheme and its sustainability. It means revenue is greater than or equal to long-term expenditure. If not, then the funds will be reallocated to the given pension scheme (tax revenue in public schemes), which has an impact on fiscal sustainability. In the context of the Czech pension system, financial sustainability has improved with regard to the increase in the retirement age. However, there is a great dependence on economic indicators (unemployment rate). For measurement of financial sustainability can use implicit pension debt.

Fiscal sustainability is evaluation of public finance and its condition and possibility of future liabilities based population ageing. For the measurement of fiscal sustainability in a long-time, we can use

indicator S2. The fiscal sustainability of Czechia is currently at medium risk, as measured by the European Commission in 2019. However, given the current situation, a worsening of the situation can be expected. Fiscal sustainability is very important in the Czech Republic due to the dependence of the pension system on public finances.

Social sustainability can be described between generations or in one generation in this context. For measurement of social sustainability can be use indicator at risk of the poverty rate. In social sustainability, we can use the next non-quantitative methods because the aim of social sustainability is social peace in society. Next, social sustainability depends on the form of welfare state and justice in society.

The important change of the Czech pension system is connected with the change of political system. Then, the Czech pension system was affected by liberalization and the aim was universal pension benefit. However, the development was subsequently influenced by the deviation from the liberalization of the pension benefit and the construction of the benefit is focused primarily on meritocracy.

During the development of the pension system, various reforms were sought, which were associated with the creation of several pension reform commissions. However, the success of the system design change was unsuccessful. The biggest successful change in the system was the increase in the retirement age.

The Commission for Fair Pensions has been established in 2019. The proposal of pension reform by this commission was introduced in 11th December 2020 with 7 changes in the Czech pension system. These changes have impacts on the sustainability of the pension system. The aim of this proposal is sustainability, justice and intelligibility. This article is focused on the perspectives of sustainability.

The financial sustainability of the Czech pension system will be reduced. It means the implicit pension debt will increase. The impact of the reform will also be reflected in the level of fiscal sustainability when the S2 indicator will increase (the comparison does not include the impact of the economic crisis associated with COVID-19). The S2 indicator will move towards a high risk to the sustainability of public finances. The impact on social sustainability can be viewed positively with regard to poverty reduction. However, the advantage of retired people in the labor market with regard to reducing the tax burden (positive stimulation) may seem to be a problem.

A limitation of the research is limited ability to calculate own indicators (especially to update the IPD), which results from the limited data available. Therefore, the Commission's calculations are taken over in this article. Another problem is the set of rules between the 0th and 1st pillar of the pension system. The current results are not sufficient, as additional revenue and expenditure are presented, but the division between the pillars is missing. The author's initial idea is that the division of pillars will reduce expenditures in the 1st pillar. However, it is currently unclear what the next procedure will be with possible surpluses of the 1st pillar (coverage of previous debts of a fictitious pension account, investments and the possibility of separating the 1st pillar, the establishment of an insurance company dedicated to investing). In addition, the proposed reform weakens the current position of justice in society.

Further research may be focused on the calculations and predictions with respect to a given reform. Furthermore, it can be a relationship between fiscal and financial justice with regard to debt and its relationship to both types of sustainability. The 2nd pillars of the pension system and investment could be a topic for research and their connections with responsibility.

References

- Auerbach, A., Gokhale, J., & Kotlikoff, L. (1991). Generational Accounts: A Meaningful Alternative to Deficit Accounting. *Tax Policy and the Economy*, 5(1), 55-110. <https://www.jstor.org/stable/20061801>
- Balassone, F., & Franco, D. (2000). Assessing Fiscal Sustainability: a Review of Methods with a View to EMU. In D. Franco et al. (Eds.), *Fiscal Sustainability* (pp. 21-60). Roma: Banca d'Italia.
- Baldwin, P. (1990). *The Politics of Social Solidarity. Class Bases of the European Welfare State 1875-1975*. Cambridge: Cambridge University Press.
- Bieker, T. (2003). Sustainability management with the Balanced Scorecard. *International Summer Academy on Technology Studies-Corporate Sustainability*, 1-17. <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.200.9541&rep=rep1&type=pdf>
- Burnside, C. (2005). Theoretical Prerequisites for Fiscal Sustainability Analysis. In C. Burnside (Ed.), *Fiscal Sustainability in Theory and Practice* (pp. 11-34). Washington, DC: World Bank.
- Crow, G. (2002). *Social Solidarities: Theories, Identities and Social Change*. Buckingham: Open University.
- CT24 (2020). *Maláčová navrhuje reformu penzí. Základní důchod by byl deset tisíc korun*. Retrieved December 20, 2020, from <https://ct24.ceskatelevize.cz/ekonomika/3239296-malacova-navrhuje-reformu-penzi-zakladni-duchod-byl-deset-tisic-korun>
- Devolder, P., & de Valeriola, S. (2019). Between DB and DC: optimal hybrid PAYG pension schemes. *European Actuarial Journal*, 9(2), pp.463-482. <https://doi.org/10.1007/s13385-019-00216-y>

Evaluation of pension sustainability and its application

- Důchodová komise (2020). *Důchodová komise*. Retrieved December, 20, 2020, from http://www.duchodova-komise.cz/?page_id=10
- Easton, D. (1957). An Approach to the Analysis of Political Systems. *World Politics*, 9, 383-400. <https://doi.org/10.2307/2008920>
- Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Princeton: Princeton University Press.
- European Commission (2019). *Fiscal Sustainability Report 2018. Volume 1* (Institutional Paper, 094). Brussels: European Union. Retrieved December 20, 2020, from <https://doi.org/10.2765/435292>
- Eurostat (2020). *Eurostat Database*. Retrieved December 21, 2020, from <https://ec.europa.eu/eurostat/data/database>
- Feldstein, M. (1974). Social Security, Induced Retirement, and Aggregate Capital Accumulation. *The Journal of Political Economy*, 82(5), 905-926. <https://www.jstor.org/stable/1829174>
- Glennister, H. (2010). The Sustainability of Western Welfare States. In F. G. Castles et al. (Eds.), *The Oxford Handbook of the Welfare State* (pp. 689-702). Oxford: Oxford University Press.
- Harris, J. M. (2000). *Basic Principles of Sustainable Development* (Global Development And Environment Institute Working Paper 00-04) Medford: Tufts University. Retrieved December 19, 2020, from <https://ageconsearch.umn.edu/record/15600/files/wp000004.pdf>
- Ismailov, T. (2017). Financial aspects of implementation of social policy in the Republic of Bulgaria during the period 2000-2015. *Economic archive*, 20 (1), 57-69. <https://www2.uni-svistov.bg/NSArhiv/title.asp?title=627>
- Kangas, O., & Palme, J. (2007). Social Rights, Structural Needs and Social Expenditure: A Comparative Study of 18 OECD Countries 1960–2000. In J. Clasen & N. A. Siegel (Eds.), *Investigating Welfare State Change* (pp. 106-129). Cheltenham: Edward Elgar.
- Kolk, A. (2005). Sustainability reporting. *VBA Journal*, 21(3), 34-42. [https://dare.uva.nl/personal/pure/cs/publications/sustainability-reporting\(fe0a3f48-dde4-4d2d-80eb-d993d29e6541\).html](https://dare.uva.nl/personal/pure/cs/publications/sustainability-reporting(fe0a3f48-dde4-4d2d-80eb-d993d29e6541).html)
- Komise pro spravedlivé důchody (2020). *Komise pro spravedlivé důchody*. Retrieved December 20, 2020, from <http://duchodovakomise.cz/>
- Krebs, V., et al. (2015). *Sociální politika*. Praha: Wolters Kluwer.
- Lamberton, G. (2005). Sustainability accounting—a brief history and conceptual framework. *Accounting Forum*, 29(1), 7-26. <https://doi.org/10.1016/j.accfor.2004.11.001>
- Maaytová, A., & et al. (2015). *Veřejné finance v teorii a praxi*. Praha: Grada Publishing.
- McDaniel, S. A. (1997). Intergenerational Transfers, Social Solidarity, and Social Policy: Unanswered Questions and Policy Challenges. *Canadian Public Policy/Analyse de Politiques*, 23(Special Joint Issue: Aging), 1-21. <https://doi.org/10.2307/3551538>
- McFarlane, D. A., & Ogazon, A. G. (2011). The Challenges of Sustainability Education. *Journal of Multidisciplinary Research*, 3(3), 81-107. <http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=c69bce65-6841-4810-8a37-2ddf5ed5df9c%40sessionmgr101>
- McKenzie, S. (2004). *Social Sustainability: Towards Some Definitions*. Working Paper Series No 27. Magill: Hawke Research Institute. Retrieved December 19, 2020, from <https://www.unisa.edu.au/siteassets/epi/server-6-files/documents/eass/hri/working-papers/wp27.pdf>
- MF ČR (2020). *Ministerstvo financí ČR*. Retrieved December 20, 2020, from <https://www.mfcr.cz/>
- Musgrave, R. A., & Musgrave, P. (1994). *Veřejné finance: teorie a praxe*. Praha: Management Press.
- Pokorný, J. (2018). *Fungování konkrétního sociálního státu a dopady na ekonomiku* (Bachelor thesis). University of West Bohemia, Pilsen.
- Pokorný, J. (2019). Geneze implicitního penzijního dluhu a jeho využití. *Ekonomické spektrum*, 14(1). Retrieved December 19, 2020, from <http://economic-spectrum.eu/geneze-implicitniho-penzijnio-dluhu-a-jeho-vyuziti-genesis-of-implicit-pension-debt-and-its-use/>
- Pokorný, J. (2020). *Ekonomický pohled na udržitelnost penzijních systémů* (Master's Thesis). University of West Bohemia, Pilsen.
- Pokorný, J., & Hejduková, P. (2019). Pension Debt of the Future and Its Depends on Retirement Age: Comparison between Czechia and Denmark. In P. Ondra (Ed.), *DOKBAT 2019 – 15th Annual International Bata Conference for Ph.D. Students and Young Researchers (vol. 15)* (pp. 891-901). Zlín: Tomas Bata University in Zlín, Faculty of Management and Economics. Retrieved December 20, 2020, from http://dokbat.utb.cz/wp-content/uploads/2020/01/DOKBAT_2019_Conference_Proceedings.pdf
- Potůček, M., et al. (2016). *Veřejná politika*. Praha: C. H. Beck.
- Potůček, M. (2017). *Bariéry a příležitosti institucionálních změn: český systém sociálního zabezpečení* (Politiky péče o dítě a seniory v měnící se společnosti: zkušenosti z České republiky a Norska). Retrieved December 19, 2020, from <http://inncare.fss.muni.cz/wp-content/uploads/2017/04/Pot%C5%AF%C4%8Dek.pdf>
- Procter, P., et al. (Eds., 1995). *Cambridge International Dictionary of English: Guide You to the Meaning*. Cambridge: Cambridge University Press.

- Rao, P. K. (2000). *Sustainable development: economics and policy*. Oxford: Blackwell Publishers.
- Schoenfeld, E., & Meštrović, S. G. (1989). Durkheim's Concept of Justice and its Relationship to Social Solidarity. *Sociological Analysis*, 50(2), 111-127. <https://doi.org/10.2307/3710982>
- Schoyen, M. A., & Stamati, F. (2013). The Political Sustainability of the NDC Pension Model: The Cases of Sweden and Italy. *European Journal of Social Security*, 15(1), 79-101. <https://doi.org/10.1177/138826271301500106>
- Spangenberg, J. H. (2005). Economic sustainability of the economy: concepts and indicators. *International Journal of Sustainable Development*, 8(1-2), 47-64. <https://base.socioeco.org/docs/sustainabilityindicators.pdf>
- Spěváček, V., et al. (2016). *Makroekonomická analýza – teorie a praxe*. Praha: Grada.
- Standing, G. (1996). Social Protection in Central and Eastern Europe: a Tale of Slipping Anchors and Torn Safety Nets. In G. Esping-Andersen (Ed.), *Welfare States in Transition* (pp. 225-255). London: SAGE.
- Vostatek, J. (2016). *Penzijní teorie a politika*. Praha: C. H. Beck.
- Wilensky, H. L., & Lebeaux, C. N. (1958). *Industrial Society and Social Welfare. The Impact of Industrialization on the Supply and Organization of Social Welfare Services in the United States*. New York: The Free Press.