

## THE EXTENSION OF PAY-AS-YOU-GO PENSION INSURANCE SYSTEM – INCOME AND EXPENDITURE ASPECT

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### Abstract

*The greatest deficit in increasing the dynamics and stability of the economic system is to create incentive and other conditions for extending the time of labour productivity and its utilization in job market. This requires, amongst other things, a fundamental reform of the pension system, based on the precise definition of what an insured event is: not reaching a certain age -but the loss of the ability to engage in gainful activity to provide a means of living a dignified life. We propose a general model of gradual reform of the pension system based on voluntary entry into the fully closed and with full merit extension of the current system of pay-as-you-go pension insurance, which exists in the Czech Republic and other countries. Anyone entering this extension after reaching the retirement age gets the payment in the form of life annuities according to what they paid into the system based on the insurance mathematics of the life expectancy. In the paper we present the appropriate economic model. Contrary to previously published outcomes, we also deal with the expenditure side (by drawing resources from this system by older people contrary to the-changing needs of living).*

**Keywords:** Human Capital, Pension System, Pay-as-you-go Pension Insurance, Mathematical Model of Postgraduate Extension of the Pay-as-you-go Pension Insurance System, Productive Services

### 1. INTRODUCTION

Discussions focusing on the topic of stability and reform of the pension system going on at the non-specialist, political and professional levels take place in every country that has achieved a certain degree of social development. In the Czech Republic and equally in the neighbouring countries, they flare up, as experience of many years shows, at least three times a year as a result of various impulses. This is a proof of social importance and sensitivity, complexity and multilateral social links of this topic. As basic parameters of the post-reform target situation we regard sustainability from the perspective of demographic development, stability from the perspective of expected turbulences in financial markets (Zhang, 2007) and sufficiency of the pension system (from the social perspective).

In our approach, having applications broader than just the solution of the pension system reform, we proceed from the fact that our global society as a whole is experiencing a substantial transition which is comparable to the industrial revolution; however, from the historical point of view, it is a change of greater importance, being a certain landmark in the historical development. The essence of this transition is that the sector which becomes dominant is the sector of productive services, productive in the sense that these services directly contribute to acquisition and retention of human capital. Through that they become the most significant factor of the economic growth and determine both its quantitative and qualitative characteristics. Most problems our global civilisation faces are, more or less, related to the fact that we do not manage to overcome the trends of inertial development and carry out comprehensive reforms which would reorient the economy to use of productive services. One of the key components of these reforms is a pension system reform in relation to reforms of other systems of social insurance and social investment (financing of education, healthcare, family policy, housing, etc.). The sector of productive services enables:

- a faster professional growth.
- attaining a higher quality of employment.
- extending the zenith and term of employment.

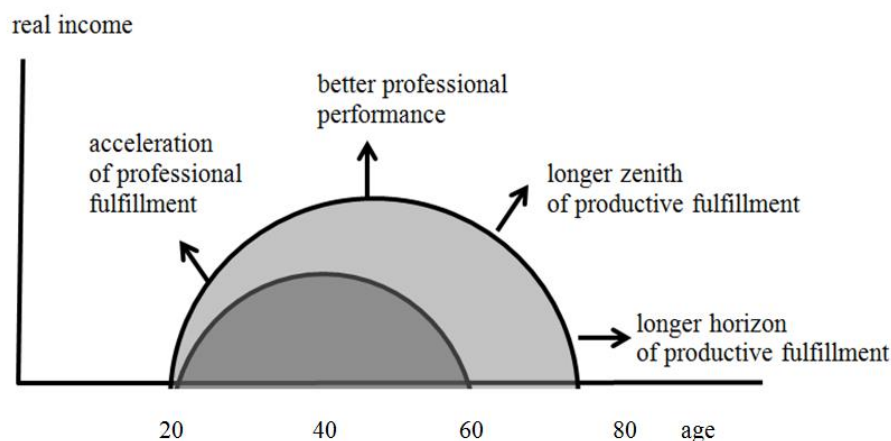


**Figure 1.** The Economic Effects of Productive Services

Source: Own creation

The area of extending the productive age contains considerable reserves of economic growth. Especially in those areas where a complementary relation exists between employment and employability of persons of different generations, such as in creative teams in various occupations connected with scientific and technical progress. A lengthening of productive age using incentives integrated in the pension system is viewed as a solution especially by these authors: Bayar, (2013), Cadena, Kays (2015), Vavrejšnová et al. (2004).

We will show that the key to a reform of the pension insurance system is answering the question against what kind of risk this system is insured and what an insured event is in this system. Right in connection with this question it holds true what the great German thinker Goethe warned against when he said that if you do not do the first button up well, you cannot dress yourself well anymore. In such countries where pension systems are governed by legislation, such as in the Czech Republic, it is already the very legal regulation of the term “pension insurance” which is usually oriented incorrectly and reflected in many structural faults of the pension system. The situation is similar in the neighbouring countries as well (Germany, Austria, Poland, Slovakia, and Hungary).

Following identification of weaknesses of the existing pension system we will propose a method applicable in general (i.e. not only in the conditions of the Czech Republic) of how to reform the pension system gradually and on a voluntary basis, so that its permanent sustainability could be ensured and its motivational and solidarity functions reinforced. For that purpose we will use a model of fully merit-based and fully closed postgraduate extension of a pay-as-you-go system of pension insurance. It is our original model. Alternatives of this extension with different parameters can be tested in relation to any public pension system as an input, i.e. the model designed by us can be used in any country where a pension system exists. If we define early retirement parameters appropriately, the whole pension system can be transformed gradually and safely, as a result of implementation and gradual expansion of the postgraduate extension, into a fully merit-based and fully closed system with a single basic pension benefit. The model, which we will present, can be also used for testing various options of changes of pension system parameters and based on that many practical conclusions can be formulated. From the perspective of practical implementation of the pension system reform, it is possible to assume that the model testing phase can last quite long, especially because of minimising various risks as well as reaching a necessary social consensus.

Then we will point out prerequisites and a broader context of a pension system reform. Particularly, we will focus on various scenarios of drawing funds from the postgraduate extension of the pension insurance system.

## 2. SUBJECT AND METHODS

The subject of our research is a pension system reform carried out in accordance with development trends of the contemporary society and with real risks against which the system of pension insurance (as insurance against a certain insured event) insures. The first step that needs to be taken is to overcome the basic prejudice related to a wrong definition of insured event in terms of the legislative regulation of the pension insurance system.

If we understand an insured event as attaining a certain age, it is as if in case of compulsory car insurance we considered an insured event to be a certain number of kilometers covered. Therefore, we will work with the assumption that an insured event cannot be anything else than that as a result of ageing (impact of the course of time on personal performance) a person partially or fully loses his or her ability to earn money for decent living by means of his or her own gainful employment.

The first method that we apply in our approach is thus an accurate definition of the basic terminology and a warning against some mistakes that are contained even in the current legislation.

This is also connected with specification of some other terms. In most discussions concerning the pension insurance system, a distinction is drawn between horizontal solidarity and vertical solidarity. Horizontal solidarity is often interpreted as income-based, i.e. solidarity among persons with different income, while vertical solidarity as inter-generational (people in the legally defined productive age contribute from their income via the system of pension security or insurance to cover living costs of retired people, because one day they will also be dependent on such a support).

If we give an exact and factually correct definition of insured event meaning that as a result of ageing (impact of the course of time on personal performance) a person partially or fully loses his or her ability to earn money for decent living by means of his or her own gainful employment, we have to necessarily change our view of what “vertical solidarity” is. It is not solidarity among generations, but within a generation. Solidarity among those for whom the insured event has already occurred and those for whom this event has not occurred yet. We will integrate this idea into the system of pension insurance. Based on that we will design such a pension insurance system which will motivate participants in this system to opt for such a strategy of employment and such a life style which will enable them to lengthen the term of their employment.

Most pension systems in different countries were established and developed in different historical contexts and often contain confusing elements; moreover, they also include elements brought in as a consequence of misunderstanding of the kind of risk against which the pension system insures. Such a system also exists in the Czech Republic and the neighbouring countries. Therefore, a reform of these systems is highly complicated and discussions during its preparation could be controversial to such an extent to actually prevent any substantial reform. Following this practical experience of discussions about a pension system reform, an idea has emerged first to make a model of how a fully merit-based and fully closed voluntary postgraduate extension of the current system of pension insurance would work. The system in the Czech Republic is pay-as-you-go, but the proposed extension can be tested and later implemented, as we have already mentioned, in many other systems of pension insurance.

The fully merit-based and fully closed postgraduate extension of a pension insurance system can be defined this way:

- Participation in it is possible (but not necessary, i.e. participation is not compulsory) for everyone who is entitled to old-age pension.
- The person pays a statutory contribution to it based on his or her earnings or the pension not drawn or a part of the undrawn pension, as the case may be.
- On that basis, he or she becomes entitled to a life annuity which is determined according to regularly updated tables of life expectancy.
- Payments from the postgraduate extension are slightly taxed, so that funds from them could be used for administration of the system and reinforcement of stability of the pension system within the basic type of solidarity.

There are multiple models that can be formed based on these assumptions. Their testing in various situations is the main quantitative method we use following identification and conceptualisation of the most important phenomena.

We proceed from the essential theoretical pieces of work by J. Vostatek (2016) who is the main specialist in reforms of the pension system in the Czech Republic. One of the papers available in the English language is *Extending Pension Coverage: Tax Versus Non-Tax Incentives* by an international team of three authors from three countries – J. Rutecka-Góra, Poland, J. Vostatek, Czech Republic and J. A. Turner, United States (Rutecka-Góra 2018).

Last but not least, we employ the method of interpretation of results achieved as part of the concept of the historic turning point connected with transition to economy based on productive services. In this sense, we mainly consider the relationships of the pension system and reforms of other systems of social investing and social insurance (Valenčík et al. 2017, 2018).

### **3. POSTGRADUATE EXTENSION MODEL**

When simulating how the postgraduate extension of the pension insurance system would work in different concrete modifications and with different parameters, we must differentiate between two, relatively separate aspects:

- Income aspect, i.e. how money increases on the given person's account.
- Expense aspect, i.e. how and on what money of the given person will be spent from the perspective of various scenarios of ageing.

In previous papers on the given theme we mostly dealt with simulation of the income aspect and characterised the expense aspect only generally. In this paper we will deal even with the expense aspect in detail, in addition to specification and interpretation of the model.

#### *3.1. Basic model*

Firstly, we will define the basic concept of the fully-closed and fully merit based postgraduate extension of the current ongoing pension insurance system:

- The fully-closed nature of the system means that all the resources that will come to this system will be distributed by this system (there will be no money revenues from outside investments, and no money will leave the system).
- The fully merit-based nature of the system means that pension benefits are based equivalently on what a person has paid into the system according to the rules we specify.
- We call the system a postgraduate extension because it is only for those who have reached the statutory retirement age.
- This is a voluntary extension of the primary pay-as-you-go pension insurance system. As such, this extension does not utilize capital or fully-funded approach.
- A certain taxation of pension benefits is expected, from which a single basic benefit can be paid to all participants in the whole pension insurance system.
- It is also assumed that the system will be voluntary (everyone can enter or not enter the system voluntarily) and that the system is individually adjustable in the sense that it can be used by a participant of the system at any given time and by any percentage he may draw the relevant pension benefit, whereas the undrawn amount enters back into system as its deposit.

#### *3.2. Model taking into consideration changes in the income and the expense component*

Regarding the income component, we must differentiate two types of potential influences on it:

1. A decrease in earned income which can be:

- voluntary, i.e. when the person himself or herself feels the need to ease professional activities, for example, by working part-time or switching to less demanding work or changing job.
- forced, i.e. when the employer reduces working hours of the employee radically or transfers him or her to less demanding work or when the person is forced to change occupation.

2. A change in costs of living at advanced age, in both directions:

- A decrease in costs of living at advanced age when as a result of ageing the person reduces some of his or her needs (for example: travelling, trying to win status by participating in various forms of prestigious consumption).
- An increase in costs of services connected with procurement and care, compensating limitation of activities of a person at advanced age.
- An increase in costs of healthcare and related services, such as spa treatment.

In this regard we will formulate several comments:

1. At simulation of these influences it is helpful to divide the period of time which starts with entrance to the postgraduate extension into two parts:

- The period of time when the above-mentioned influences do not play any role (which could last for several months or even years).
- The period of time when some of the above-mentioned influences start playing their role.

2. A decrease in income: a decrease in earned income can be considered one-time or gradual, for example, from three quarters to one quarter of the original income.

3. A decrease in earned income has an impact on the income and the expense component of the postgraduate extension, because it is fully or partially compensated by drawing funds from the basic pension insurance (being an impact on the income component that is thus reduced), or even by drawing funds from the postgraduate extension (which can be partial, but it already concerns payments from the system). By the logic of the matter it makes sense first to examine a situation when the decrease in income is compensated for only by the basic pension insurance, relating thus only to the income component of the system and only then, as a follow-up, to simulate impacts of compensating for the income component or increasing costs of living by starting drawing funds from the postgraduate extension.

4. The Czech Republic has a working robust system of public health insurance which does not necessarily require a substantial increase in payer's individual expenses on health care at advanced age, but this can be different in other countries. It is also possible to consider consumption of care beyond objectively necessary treatment and prevention in order to improve quality of life and lifestyle of retired people, via pre-paid care programmes priced independently of an initial state of the client's health (Mertl, 2017).

5. It makes a certain methodological sense to simulate a situation of a constant income from confluence of earned income and payments from the basic and later also the postgraduate system in the event that the earned income is gradually decreasing. It means to present a model of a constant total earned income, an income from the basic pension system and the postgraduate extension of the basic pension system against which other situations can be tested.

We reckon with an old-age pension of CZK 15,000 per month. According to the methodology of old-age pension calculation in the Czech Republic, this corresponds to a salary of approximately 40,000 CZK in the last five years of employment for people at the age of 65, employed or preparing for employment since 18 years of age.

In general, the interval of 38–42 thousand can be taken into consideration, because it depends on the development of the given person's income, the number of children and some other factors. For the

purpose of illustration of how our simulated postgraduate extension of the existing system of the pay-as-you-go pension insurance in the Czech Republic, it suffice to reckon with the estimate of 40,000 CZK.

The following picture shows at how many years of full-time employment 100% and 75% of the replacement ratio to net earnings will be achieved in the situation and initial parameters selected by us.

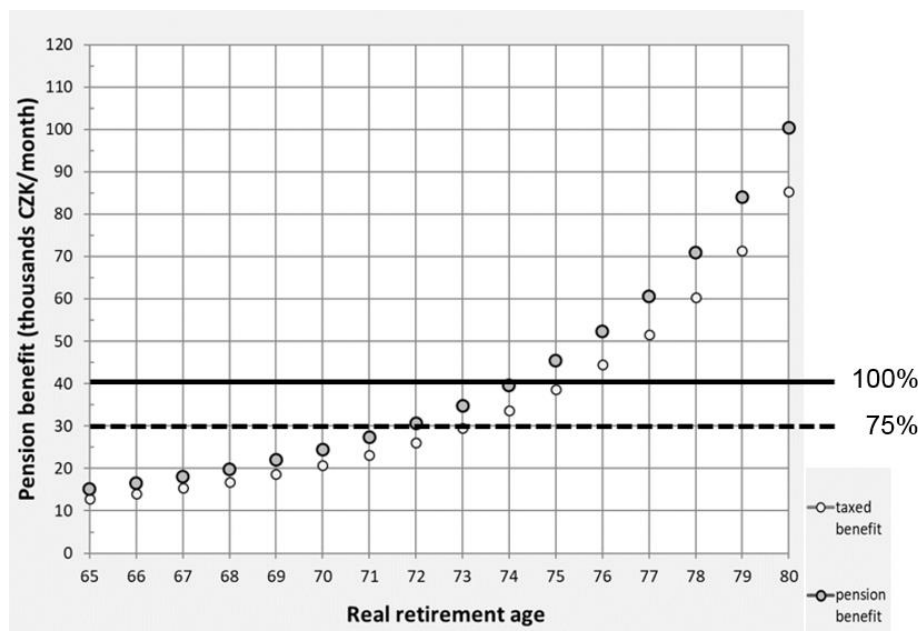


**Figure 2.** Achieving 100% and 75% of the replacement ratio to net earnings

Source: Own creation

The full line shows that 100% replacement ratio to the last net earnings can be achieved already at the age of 75 years in the event that the postgraduate extension proposed by us is implemented, specifically at 15% tax rate of old-age pensions to strengthen income solidarity and to secure stability of the basic pension insurance system. If someone got along on the 75% replacement ratio to the last net earnings, he or she would achieve it already at the age of 73.

We get similar results even with another amount of earnings in the last five years of employment. In case of the Czech pension system it is generally true that at lower earnings it is achieved a bit earlier, whereas at higher earnings a bit later. It is caused by the element of income solidarity which is integrated in the Czech pay-as-you-go system; however, the differences are neither substantial nor significant.

### Interaction between the system of pay-as-you-go pension insurance and postgraduate extension of this system

To understand the role of the proposed fully merit and fully closed postgraduate extension of the current pension insurance pension scheme, the following graphical representation can be used:

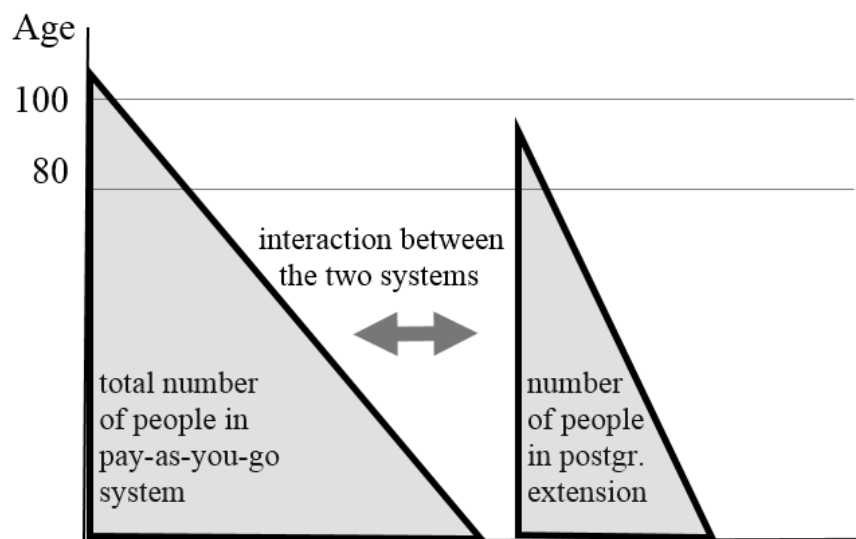


**Figure 3.** Graphical representation of relationships between pension schemes

Source: own creation

As time goes by, the number of people is decreasing both in the system of pay-as-you-go pension insurance, and in postgraduate insurance system (linear approximation is chosen for simplicity).

Total number of people in individual systems is given by the sum of persons in age categories.

Number of people in the postgraduate system is smaller (here is a case around 1/4), considering the maximum horizon of productive activity approximately 80 years (older are exceptions).

Both systems can interact in several different ways.

The postgraduate system can have the following effects:

**1. Effect of postponed payment of pensions:** The more people will enter the postgraduate extension, the more significant will be the postponement of their pensions, resulting in the effect of the deferred payment of pensions (5 to 10 years). However, according to the rules proposed by us, their pension benefits will be higher. This is a less significant effect that could, if necessary, temporarily relieve pressure on the pension system.

**2. Tax effect:** The tax effect is much more important, that is, the fact that those who remain productive pay taxes. This effect is very significant because it is a net income in public budgets. We can consider dual use of such "extra" means:

- The use of taxes to stabilize the basic pay-as-you-go system (this effect would already be sufficient based on the importance of postgraduate extension).
- Use of health insurance contributions to further prolongation of the productive employment period as strengthening incentives for health insurers to lead healthcare providers to higher performance services. This implies a certain reform of the current system from the full redistribution of selected resources (current status) to make deductions from people who are in postgraduate system of certain parts (say 50%), compared to the state of full redistribution, remain the relevant health insurer where the person is insured. Also the Czech Republic needs a certain adjustment of the payroll taxation of persons actively working in retirement age into the health insurance system.

**3. Effect of Income Taxation:** In addition to existing taxes, income tax may be introduced in postgraduate extension with rate, for example, 15%, which would fulfil the principle of the basic meaning of pension insurance, namely that the insured event is the loss of the ability to earn money by gainful employment due to aging. It would be about solidarity between those who can and want to be

gainful, and those who cannot or do not want to work. The tax would substantially stabilize the pay-as-you-go pension system. (However, the introduction of this tax is not necessary because the same can be ensured on the basis of what is stated in the point 1).

**4. Pro-growth effect:** Higher income group of persons in the postgraduate system also means higher consumption expenditure and hence greater growth, which is a relatively significant effect.

**5. Effect of a change in quality of growth:** The creation and expansion of postgraduate extension would become an important source of funding for productive services to extend the horizons of productive employment, and as such would contribute to a significant change in the quality of economic growth, which is important for the future.

The above is just an initial analysis of the different aspects of the interaction between the two systems and the effects arising therefrom.

#### 4. DISCUSSION AND SUMMARY OF RESULTS

Based on the presented model, we have prepared a calculator by means of which everyone can calculate the income and the expense component of their participation in our proposed fully closed and fully merit-based postgraduate extension of the existing pay-as-you-go system of pension insurance in the Czech Republic. Similar calculators can be made for pay-as-you-go pension systems in any country.

The model of calculator of payments from the postgraduate extension proposed by us can be used for resolving various issues. For example, what will happen when someone decides to ease his or her earning activities or is forced to do so. It turns out that even in this case achievement of a high life annuity is realistic, because a highly significant role is played by calculation based on shortening life expectancy, having a greater percentage effect than any optimistic yield of saving activities. This can also be interpreted in such a way that the most efficient way to secure oneself at advanced age is to invest in lengthening the term of productive age.

We are currently preparing an on-line calculator that will be freely accessible, where everyone can calculate his or her optimum as well as expected post-productive-age trajectory according to income, opportunities and hobbies and “take a look” at various options of his or her future. One only needs to enter the following data:

- For how many years after you reach the age of 65 will you be achieving your full income?
- What is the percentage decrease in your income you reckon with from a certain period of time?
- What replacement income do you want to achieve in addition to your net income?
- What is your gross or net wage?
- What old-age pension will you be receiving from the basic pension system?

There is still another important reason for using the model in the above-mentioned way. Any reform of a pension system in any country is a highly sensitive issue from the political, social and macroeconomic point of view. Experience from Sweden and some other countries shows that it can be carried out only based on a wide-ranging consensus. The process proposed by us enables:

- to carry out a gradual and smooth reform of the whole pension system, using the principle of allowing people to retire earlier and enter the postgraduate extension designed by us, on a voluntary basis;
- everyone who will consider whether to enter the postgraduate extension and with what parameters to calculate the income and the expense component, i.e. what a specific degree of participation will cost him or her and what it will bring him or her (for example, what part of the basic old-age pension and from when he or she will be receiving; when and how much of the pensions he or she will start drawing from the postgraduate extension);

- from the beginning to create a “surplus” environment in the whole pension insurance system; i.e. to carry out the reform without financial claims; on the contrary, to generate funds in the system as a result of lengthened time of voluntary productive employment for which the system provides an effective motivation;
- to create a real economic basis for fulfilling the purpose of pension insurance, i.e. for solidarity from those for whom the insured event will occur (they will fully or partially lose their ability of productive employment because of ageing) and has not occurred yet at their age.

A separate question is employment of persons at older age in professional markets. These opportunities are mainly offered in creative teams which are by definition based on intergeneration transfer of knowledge and experience. The role of such teams in a direct link to technological progress is growing and will be growing in the long run, generating thus a natural demand for human resources on the basis of connection of expert knowledge and professional and social experience.

## 5. CONCLUSION

In the world of emerging and expected turbulences in financial markets, stability of pension systems in each country becomes more important. At the same time, the demographic aspect also calls for answering the question of long-term sustainability of pension systems, the pay-as-you-go component in particular. As costs of retired people's consumption are a considerable part of the total costs of households, the stability of a pension system is linked to the stability of national macro-economic development.

In our approach we incorporated the topic of a crucial pension reform into a wider context of very deep changes which all the countries will gradually undergo and the common denominator of which is a marked growth of the role of the productive service sector, meaning the sector which influences recruiting, retaining and full use of human capital. These reforms ought to be carried out in all systems of social investments and social insurance that have both the public and the private component.

From experience of the barriers to efforts to reform the system of social investments and social insurance (especially financing of education, healthcare or old-age pensions), we propose to carry out a major part of these reforms in the conditions of the Czech Republic by means of a voluntary, fully merit-based and fully closed postgraduate extension of the existing pay-as-you-go system of pension insurance. The model, proposed by us for testing various options, shows that to reform the pension system and subsequently also other areas of productive services is realistic and connected with minimum risks.

We have been preparing our model and calculations and considering related aspects in a direct link to the particular conditions of the Czech Republic. However, the model is general enough to be easily customised according to conditions of any country that has a developed pension insurance system. In this sense its potential offers promising research and policy implementation cooperation at the international level.

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