









“Pension assets as an investment in economic growth: The case of post-socialist countries and Ukraine”

AUTHORS	Oleh Kolodiziev   Hanna Telnova   Ihor Krupka  Myroslav Kulchytsky  Iryna Sochynska-Sybirtseva 
ARTICLE INFO	Oleh Kolodiziev, Hanna Telnova, Ihor Krupka, Myroslav Kulchytsky and Iryna Sochynska-Sybirtseva (2021). Pension assets as an investment in economic growth: The case of post-socialist countries and Ukraine. <i>Investment Management and Financial Innovations</i> , 18(3), 166-174. doi: 10.21511/imfi.18(3).2021.15
DOI	http://dx.doi.org/10.21511/imfi.18(3).2021.15
RELEASED ON	Thursday, 26 August 2021
RECEIVED ON	Friday, 25 June 2021
ACCEPTED ON	Monday, 23 August 2021
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

35



NUMBER OF FIGURES

2



NUMBER OF TABLES

3

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BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Received on: 25th of June, 2021
Accepted on: 23rd of August, 2021
Published on: 26th of August, 2021

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Ihor Krupka, Myroslav Kulchytskyi,
Iryna Sochynska-Sybirtseva, 2021

Oleh Kolodiziev, Doctor of Economics,
Professor, Head of the Department of
Banking and Financial Services, Simon
Kuznets Kharkiv National University of
Economics, Ukraine. (Corresponding
author)

Hanna Telnova, Doctor of Economics,
Associate Professor, Senior Researcher,
Department of Organization of
Scientific Work and Gender Issues,
Kremenchuk Flight College of Kharkiv
National University of Internal Affairs,
Ukraine.

Ihor Krupka, Doctor of Economics,
Associate Professor of the Department
of Analytical and International
Economics, Ivan Franko National
University of Lviv, Ukraine.

Myroslav Kulchytskyi, Doctor
of Economics, Professor of the
Department of Finance, Money
Circulation and Credit, Ivan Franko
National University of Lviv, Ukraine.

Iryna Sochynska-Sybirtseva, Ph.D.
in Economics, Associate Professor
at the Department of Economics,
Management and Commercial Activity
Central Ukrainian National Technical
University, Ukraine.



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Conflict of interest statement:
Author(s) reported no conflict of interest

Oleh Kolodiziev (Ukraine), Hanna Telnova (Ukraine), Ihor Krupka (Ukraine),
Myroslav Kulchytskyi (Ukraine), Iryna Sochynska-Sybirtseva (Ukraine)

PENSION ASSETS AS AN INVESTMENT IN ECONOMIC GROWTH: THE CASE OF POST-SOCIALIST COUNTRIES AND UKRAINE

Abstract

Post-socialist governments are looking for the best options to implement a fully funded pension system along with a pay-as-you-earn pension scheme. The paper aims to establish the impact of pension assets on economic growth using the example of post-socialist countries (Hungary, the Slovak Republic, Slovenia, Poland, and the Czech Republic). The use of methods of correlation and regression analysis allows determining the type of dependence (linear, exponential, gradual, and logarithmic) of countries' economic growth indicators on pension assets and patterns for their investment (deposits, securities of public and private sectors). The obtained economic growth indicators of the studied post-socialist countries show a strong logarithmic dependence on the size of pension assets: Gross fixed capital formation depends on changes in the pension asset amount by 76.44% and GDP by 71.01%. The economic growth of the studied post-socialist countries is most significantly influenced by pension assets invested in deposits. Investing pension savings in public and private sector securities is less effective. The proved provisions determine the expediency of moving from the predominant pay-as-you-earn pension scheme to the predominant fully funded pension system for Ukraine. Such a transformation requires a stable and efficient construction of the country's banking system, a developed policy for reforming the pension system while considering the criteria of the internal demographic, social, and financial situation.

Keywords pension savings funds, economic development, GDP,
gross fixed capital formation, deposits, securities

JEL Classification H55, I38, O16

INTRODUCTION

Governments around the world are still facing the challenge of determining the optimal retirement age, ensuring a sufficient amount of pension benefits, and appropriate funding mechanisms and sources. Approaches to solving these problems differ from country to country, namely, taking measures to increase or decrease the retirement age, transforming the architectures of pension systems, and regulating the amounts of contributions and payments of pension funds. Such measures are often based on social, demographic criteria and the financial capacity of states. However, another task is equally important such as increasing the effectiveness of the pension system as a source of investment in the economy. Pension funds in developed countries use assets to invest in government securities, private enterprises' shares, in long-term deposit accounts, which, as a whole, contribute to the growth of the capital market, and this results in economic growth. Post-socialist countries with a pay-as-you-earn pension scheme face some difficulties in this process. Among these, Ukraine is currently in search of optimal options for the introduction of a fully funded state pension sys-

tem, and the share of capital aggregated by private pension funds is too small. Thus, as of the end of 2020, the number of participants in private pension funds (PPFs) in Ukraine was only 883 thousand people (mostly people aged from 25 to 50), the number of concluded pension contracts was 87.8 thousand, and the PPF assets amounted to UAH 3,563.7 million (National Securities and Stock Market Commission, 2021). These indicators reflect the unpopularity of PPFs among the Ukrainian population, in particular, due to distrust in these organizations, and a fully funded state pension system has been developed at the legislative level for more than ten years. This situation must be resolved by proving the feasibility and determining the effectiveness of fully funded pension systems both for the country's economy (opportunities for economic growth) and the population.

1. LITERATURE REVIEW

For a long time, scientific studies on the impact of pension fund assets on macroeconomic indicators have shown an increase in economic growth due to an increase in the aggregate level of savings shaped in pension assets available for investment (Altiparmakov & Nedelkovic, 2018; Apilado, 1972; Bijlsma et al., 2018; Davis & Hu, 2008; Holzner et al., 2021; Iparraguirre, 2020; Keller, 2018; Zandberg & Spierdijk, 2013). In addition, Bayar (2017) denotes a two-way causal link between pension fund assets and economic growth. Hoffmann et al. (2020) emphasize that pension fund assets are important for investments that take into account environmental, social, and governance factors (ESG investments) as they combine financial profitability with public benefits while not losing financial income. Tropina et al. (2021) state that non-state pension funds are a source of significant investment in the economy. Achkasova and Urum (2019) determine that "...effective investment of non-state pension funds' assets provides an increase in the value of assets, which in turn enables participants of non-state pension funds to enhance the quality of life". Oliynyk et al. (2017) investigated investment strategies both for non-state pension funds and life insurance companies.

On the other hand, it is pointed out that such a positive impact is limited by the reduction of savings in other forms, in particular in the form of household deposits (Apilado, 1972). At the same time, Altiparmakov and Nedelkovic (2018) analyze the transition to private pension funds in Latin America and Eastern Europe and identify the limited impact of pension savings on aggregate savings.

Holzner et al. (2021) state that strengthening the role of private pension funds may cause risks to financial stability.

Empirical studies by Sanusi and Kapingura (2021) show that the impact of pension funds on economic growth and investment in South Africa are insignificant. Therefore, the authors provide a recommendation for the development of investment patterns for pension savings in areas that ensure economic growth while maintaining the security of invested funds.

It is noted that investing pension funds in shares contributes to the stock market development (Alda, 2017; Alda & Sanjuan, 2017), and the stock market development, in turn, affects the investment of pension funds in shares (Babalos & Stavroyiannis, 2019).

Bonizzi and Churchill (2017) emphasize that investing pension fund assets acts as a catalyst for their financial performance by meeting the demand for financial innovation.

Many studies focus on the impact of pension savings on the capital market (Bijlsma et al., 2018; Scharfstein, 2018; Staveley-O'Carroll & Staveley-O'Carroll, 2017; Stewart et al., 2017; Sun & Hu, 2014; Thomas & Spataro, 2016).

In particular, the significant impact of pension assets on the growth of economic sectors, which are more dependent on external financing, is highlighted by Bijlsma et al. (2018). The study proves the promotion of economic growth through the development of institutions, such as pension funds, by long-term financing of productive investment activities in countries where the financial activities of the ordinary banking system are limited (Thomas & Spataro, 2016).

Sun and Hu (2014) indicate that the fully funded pension system contributes to a country's financial development and economic growth. Based on an empirical study of 55 countries, the authors find that a 1% increase in pension fund assets can bring about an 0.15%-0.23% increase in the market value of capital. Niggemann and Rocholl (2010) believe that reforming pension funding initiates an increase in stock and corporate bond markets, especially in developing countries. The authors conclude that the degree of pension financing represents an influential determinant of international changes in the capital market development.

Stewart et al. (2017) do not deny the positive impact of pension assets on the capital market, but outline the limitations of its effectiveness due to the tendency to invest in short-term assets (bank deposits and short-term government bonds). According to the authors, this leads to a decrease in investment returns. In addition, the study points out the need to promote the development of innovative investment instruments and optimize the limits of foreign investment.

However, Daradkah and Al-Hamdoun (2020), while studying the relationship between pension funds and capital market development in Jordan for the period 1980–2017, found no statistically significant dependence between pension funds and capital market development in the short term, but proved a statistically significant long-term balance between pension funds and capital market development (both in the market depth and its liquidity).

Scientific papers also widely present methods of empirical research on the impact of pension assets on economic growth. Researchers often use regression models. For instance, Holzmann (1997) finds a positive relationship between pension reform and economic growth using the Solow model. Davis and Hu (2008) offer a modified Cobb-Douglas production function with a pension asset factor.

According to Davis and Hu (2008), pension assets positively affect the per capita output for both OECD and developing countries, with a larger effect on the latter.

Hu (2005) uses Granger causality tests to determine the impact of pension assets on GDP growth, and the inessentiality of evidence related to the impact of GDP growth on pension assets.

Nepp and Dolgodvorov (2016) derive a mathematical formula for the GDP dependence on the pension benefit level, pension savings value and the structure of mandatory contributions to the system of pension distribution and accumulation. The authors established a linear dependence of GDP on the share of pension contributions directed to the fully funded pension system.

Thus, the works of scientists contain a number of results, hypotheses, and conclusions that require further research. Of particular acuteness is the context of pension savings fund investments in post-socialist countries where a pay-as-you-earn pension scheme has been dominating for a long period, and the fully funded pension system has not been introduced in its entirety yet. Just as important is to study the effective investment patterns for pension assets, which, on the one hand, should help preserve pension savings and be less risky (government securities), and on the other hand, ensure investment in financial market development through deposits in reliable banks and stably operating companies' securities.

The purpose of the study is to determine the impact of pension assets on the economic growth of the post-socialist countries of Central and Eastern Europe (Hungary, the Slovak Republic, Slovenia, Poland, and the Czech Republic), which can be taken into account in Ukrainian practice.

2. METHODS

The panel data of the study are a statistical sample of indicators for the post-socialist countries of Central and Eastern Europe, namely Hungary, the Slovak Republic, Slovenia, Poland, and the Czech Republic. Having travelled the path of European integration, for Ukraine, they can illustrate the practice of reforming the pension system not only to fulfill the social security function, but also to promote economic growth.

To prove the dependence between pension fund assets (OECD, 2021a) and economic growth, two resulting indicators were selected such as gross fixed capital formation (GFCF) (OECD, 2021b) and GDP (OECD, 2021c).

A reasonable dependence type (linear, exponential, gradual, and logarithmic) was established by constructing paired correlation and regression equations and determining the strength of the relationship between the resulting indicator and the independent variable (pension fund assets, PI) based on the coefficient of multiple determination, R^2 . The statistical significance of the equations was tested using Fisher's criterion.

To determine the growth rate of the resulting indicators based on the growth of pension assets, the correlation and regression equations were differentiated, which most accurately describe the dependence.

Revealing the impact of investment patterns for pension assets on the resulting indicators included the construction of multiple regression equations as follows:

$$GFCF = b_0 + b_1 \cdot D + b_2 \cdot PuS + b_3 \cdot PrS. \quad (1)$$

$$GDP = b_0 + b_1 \cdot D + b_2 \cdot PuS + b_3 \cdot PrS. \quad (2)$$

where $GFCF$ – gross fixed capital formation, USD mln; GDP – gross domestic product, USD mln; D – pension assets invested in bank deposits, USD mln; PuS – pension assets invested in public sector securities, USD mln; and PrS – pension assets invested in private sector securities, USD mln.

The statistical modeling period covered 11 years (2009–2019).

3. RESULTS

The modeling results made it possible to derive the dependence of gross fixed capital formation on the amount of pension assets (Table 1).

For all models, the actual value of Fisher's criterion is $F > F_{table}$, i.e. the constructed regression equations are statistically reliable.

The dependence of Gross fixed capital formation on pension assets of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia is most accurately described by the logarithmic model ($R^2 = 0.7644$). According to the properties of logarithmic functions, such dependence is increasing and continuous (Figure 1).

To determine the change rate for Gross fixed capital formation influenced by changes in pension assets of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia, the logarithmic function was differentiated as follows:

$$\frac{dGFCF}{dPI} = (53146.6746 \cdot \ln(PI))' - (415363.1826)' = \frac{53146.6746}{PI} \quad (3)$$

The dependence of Gross fixed capital formation on pension assets is constructed as follows:

$$GFCF = 36166.1557 + 32.5821 \cdot D + 0.702 \cdot PuS - 7.9826 \cdot PrS. \quad (4)$$

The actual value of Fisher's criterion is $F > F_{table}$, i.e. the constructed regression equation is statistically reliable. The strength of the relationship $R^2 = 0.4807$, i.e. the distribution of pension assets of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia by main areas, ex-

Table 1. Equation of the dependence of Gross fixed capital formation on pension assets

Dependence type	Correlation and regression equation	Relationship strength (coefficient of multiple determination)
Linear	$GFCF = 2.3091 \cdot PI + 33740.9809$	0.6603
Exponential	$GFCF = 30340.55024e^{2.9E-5 \cdot PI}$	0.5152
Gradual	$GFCF = 38.40455 \cdot PI^{0.7793}$	0.6622
Logarithmic	$GFCF = 53146.6746 \cdot \ln(PI) - 415363.1826$	0.7644

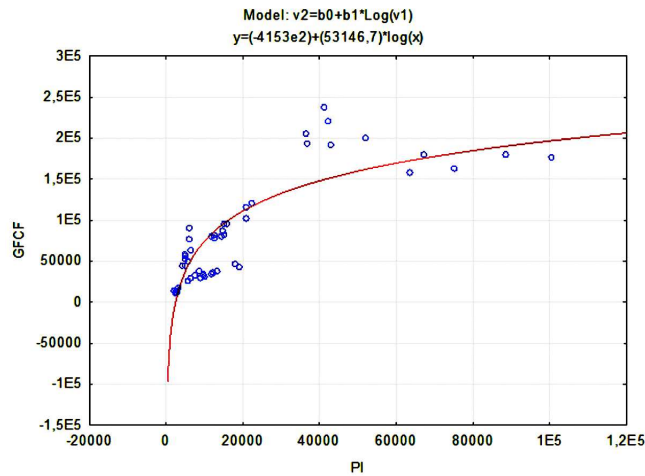


Figure 1. Graph of the logarithmic dependence of Gross fixed capital formation on pension assets ($R^2 = 0.7644$)

Table 2. Equation of the GDP dependence on pension assets

Dependence type	Correlation and regression equation	Relationship strength (coefficient of multiple determination)
Linear	$GDP = 12.2261 \cdot PI + 135072.1034$	0.6647
Exponential	$GDP = 138193.00605e^{3.0E-5 \cdot PI}$	0.5794
Gradual	$GDP = 187.79785 \cdot PI^{0.774}$	0.7011
Logarithmic	$GDP = 270299.6146 \cdot \ln(PI) - 2139917.9584$	0.7101

plains the variability of Gross fixed capital formation by 48.07%.

The modeling results made it possible to derive the dependence of GDP on the amount of pension assets (Table 2).

For all GDP models, the actual value of Fisher’s criterion is $F > F_{table}$, i.e. the constructed regression equations are statistically reliable.

As with Gross fixed capital formation, the greatest relationship strength between GDP and pension assets of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia is described by a logarithmic model ($R^2 = 0.7101$) (Figure 2).

To determine the change rate for GDP influenced by changes in pension assets, the logarithmic function was differentiated as follows:

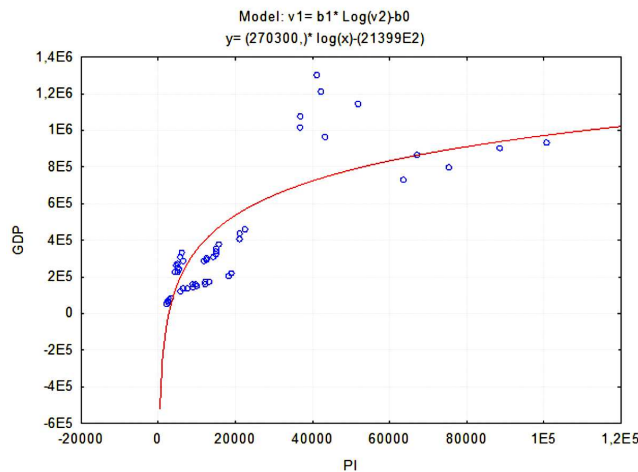


Figure 2. Graph of the GDP logarithmic dependence on pension assets ($R^2 = 0.7101$)

Table 3. Share of investment patterns in pension assets in 2019

Source: Calculated based on OECD data (2021d).

Country	Pension assets invested in bank deposits	Pension assets invested in public sector securities	Pension assets invested in private sector securities	Other pension assets
Czech Republic	23%	64%	9%	5%
Hungary	6%	54%	3%	38%
Poland	7%	3%	5%	84%
Slovak Republic	11%	24%	32%	33%
Slovenia	9%	30%	25%	35%

$$\frac{dGDP}{dPI} = (270299.6146 \cdot \ln(PI))' - (2139917.9584)' = \frac{270299.6146}{PI} \quad (5)$$

Limiting of investment patterns is determined by their predominant share in the countries' pension assets (Table 3).

The dependence of GDP on pension assets of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia is constructed as follows:

$$GDP = 152137.9126 + 161.7295 \cdot D + 1.3952 \cdot PuS - 26.5056 \cdot PrS. \quad (6)$$

The actual value of Fisher's criterion is $F > F_{table}$, i.e. the constructed regression equation is statistically reliable. The strength of the relationship $R^2 = 0.4282$, i.e. the distribution of pension assets of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia by main areas, explains the variability of GDP by 42.82%.

4. DISCUSSION

The study has established the strong influence of pension assets on the Gross fixed capital formation and GDP, which is illustrated by the logarithmic dependence, i.e. it is constantly growing. These findings confirm and develop the existing scientific views on the relationship between pension savings and economic growth (Altiparmakov & Nedelkovic, 2018; Apilado, 1972; Bijlsma et al., 2018; Davis & Hu, 2008; Holzner et al., 2021; Iparraguirre, 2020; Keller, 2018; Zandberg & Spierdijk, 2013) while providing an alternative expression of the type of such dependence compared to studies by Holzmann (1997), Davis and Hu (2008), and Hu (2005).

In addition, dependency equations (1) and (3), when differentiated, prove that pension assets have larger impact on GDP than on Gross fixed capital formation. This may be explained by the distribution areas for pension savings. Thus, equations (2) and (4) show that investments in deposits have the most significant impact on the resulting indicators.

At the same time, less significant impact is observed on the part of pension assets invested in public sector securities. However, due to the lower risk representing a condition for pension savings, public sector bonds, unlike the private ones, account for a significant amount of pension assets. Among the countries covered in the paper, public sector securities account for 54% of pension assets in Hungary and 64% in the Czech Republic.

The impact of pension assets invested in private sector securities is characterized by a feedback with the resulting indicators in the case of simultaneous direct dependence of the latter with other distribution areas for pension assets. This result correlates with Apilado's view (1972) based on limiting the positive impact of pension assets on economic growth by reducing savings in the form of household deposits. On the other hand, such limiting is overcome by an increase in the share of deposits and public sector securities in pension assets. Therefore, studies by Sanusi and Kapingura (2021), which emphasized the insignificant impact of pension assets on economic growth and emphasized the need for effective patterns of their investment, were further developed and substantiated.

At the same time, investing in private sector securities is not only direct, but also indirect, when carried out through mutual investment companies and mutual funds (the share in Table 1 is listed in the category *Other*), but their share is insignificant.

nificant among the countries under consideration. Therefore, the result of the study on the impact of pension assets invested in private sector securities will not be significantly distorted.

Furthermore, Equity in pension assets, which has been included in the category *Other* of Table 1, is worth noting individually. Such funds are concentrated in the Reserve Funds and are long-term. In particular, the vast majority of Equity is peculiar to Poland's pension assets.

Thus, as the fact of the positive impact of pension assets on economic growth in post-socialist countries has been established, it determines the feasibility of expanding the use of the fully funded pension system in Ukraine. These countries have been implementing the system since the 90s of the twentieth century, while the developed countries have some experience in its implementation. A significant spread of this type of pension systems is observed in Belgium, Canada, Germany, Ireland, Japan, Great Britain, and the USA (OECD, 2021e).

CONCLUSION

The purpose of the study was to determine the impact of pension assets on economic growth of European post-socialist countries, which can be taken into account in Ukrainian practice. According to the results of the study, the following was established: (1) the distribution of pension savings by areas should increase fixed capital and contribute to economic growth; (2) the identified effective areas for distributing pension savings (mainly deposits) require a stable and efficient construction of the country's banking system; and (3) there is no single common way of transition to a pension system capable, on the one hand, to perform the social protection function, and on the other, provide investment in the economy.

Currently, scientific discussions are underway and practical measures are being taken to regulate the retirement age and the gender difference in it, the minimum pension, and the size of contribution rates. In setting these standards, governments must be guided by certain country-specific criteria.

The effectiveness of pension assets in ensuring economic growth should be noted, but the introduction of the fully funded pension system poses a problem for the government related to the development of a comprehensive mechanism for applying in the period of its spread, along with a pay-as-you-earn pension scheme, permanent measures to regulate both social and economic policies to ensure the country's financial stability and economic growth.

The prospect for further research should be to substantiate the effective standards of Ukraine's pension system in view of domestic demographic parameters, financial condition, and experience accumulated by the post-socialist countries of Central and Eastern Europe.

AUTHOR CONTRIBUTIONS

Conceptualization: Oleh Kolodiziev, Hanna Telnova, Ihor Krupka.

Data curation: Ihor Krupka.

Formal analysis: Hanna Telnova, Myroslav Kulchytskyy, Iryna Sochynska-Sybirtseva.

Funding acquisition: Myroslav Kulchytskyy, Iryna Sochynska-Sybirtseva.

Investigation: Myroslav Kulchytskyy, Iryna Sochynska-Sybirtseva.

Methodology: Hanna Telnova, Ihor Krupka.

Project administration: Oleh Kolodiziev.

Resources: Oleh Kolodiziev, Myroslav Kulchytskyy, Iryna Sochynska-Sybirtseva.

Software: Myroslav Kulchytskyy.

Supervision: Ihor Krupka.

Validation: Hanna Telnova.

Visualization: Oleh Kolodiziev.

Writing – original draft: Oleh Kolodiziev, Iryna Sochynska-Sybirtseva.

Writing – review & editing: Hanna Telnova, Ihor Krupka.

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