ECONOMICS
& Sociology

Mykhaylo Malyovanyi
PhD, Assoc. Prof.
Department of Finances and Credit
Uman National University of Horticulture
Uman, Ukraine
E-mail: mihaiiiil@mail.ru

Kateryna Melnyk
PhD, Assoc. Prof.
Department of Finance and Credit
Uman National University of Horticulture
Uman, Ukraine
E-mail: melnyk@ukr.net

ECONOMIC AND STATISTICAL ANALYSIS OF DEVELOPMENT OF NON-STATE RETIREMENT INSURANCE SYSTEM IN UKRAINE

ABSTRACT. The analysis of the development of non-state retirement insurance system for the period 2005-2012 is done in the article. Performed computations indicate a significant decrease in the development pace of the NSPF after 2008, which manifests both in absolute and relative indices. It is found that one of the important causes of development pace retardation is reduction of rate of return of NSPF. Close correlation between the net value of pension assets unit (NVU – index that reflects NSPF returns) and their size using an analytical grouping was proved. Correlation and regression analysis of the impact of selected factors on NVU of non-state pension funds (NSPF) of Ukraine was conducted. The author made a comparative analysis of quantitative and qualitative indices of NSPFs included in Top 10 and other market participants, which showed the superiority of NSPFs over all analyzed parameters. The main variation indices of investment activity of NSPF of Ukraine during 2008-2012 are determined. The main problems of further development of non-state retirement insurance system in Ukraine are outlined.

Introduction

In post-industrial society based on developed market economy, the non-state (private) retirement insurance is an integral part of universal social safety net. In world practice the place and role of non-state retirement insurance have been quite ambiguous for a long time – from its great value in social safety net in the USA, UK, Netherlands, etc., to the almost complete disregard in many countries, including developed (Greece, France, Luxembourg, etc.). However, strong economic crisis along with the negative demographic situation forced the majority of developed countries to change their views on this sphere of social safety, turning it gradually into important part of universal social safety net. In recent years, non-state retirement insurance has been developing rapidly in the world countries. Only during 2001-2012 the total worldwide assets of non-state pension funds increased from 10,76 trillion USD

in 2001 to 22,53 trillion USD in 2012[1]. World trends of the development of non-state retirement insurance did not pass over Ukraine. However, we have to state that non-state social insurance system in Ukraine is still at the stage of formation and plays rather weak role both in the social safety net and at the financial market as a source of investment resources.

So today, an objective evaluation of the development indices of retirement insurance system is quite urgent, which can be achieved, particularly, using economic-mathematical research methods.

The main objective of our research is the analysis of the activities of non-state retirement insurance (NSRI) system in Ukraine, in order to identify the trends of further development and outlining of the main problems of its functioning. This study is carried out within the scientific and research work 'Financial support of social safety net in Ukraine' (state registration number 0111U001929). The authors of this study made the deep economic and statistical analysis of NSPF in Ukraine for the first time using absolute and relative indices for the whole period of their operation. Obtained research results are important for determination of the future development trends of the NSRI system, which are especially important in the context of crisis of public finance in Ukraine, which has a negative impact on the level of social safety net and social and economic development of the country.

1. Literature Review

1.1. The role of non-state pension funds as social and financial institutions

Timely and complete financial support of all social benefits and programs is a necessary condition for the successful implementation by the social safety net of its functions. In Ukraine from the early 90th of the XX century a constant crisis of public finances is observed, which affects the level of social safety net negatively. One of the main reasons for it– is demographic crisis, which is manifested through the increase of the number of pensioners and decrease of the number of payers of insurance premiums. This problem is typical for many countries of the world. The consequences and impact of demographic changes on the level of funding of the social safety net in general and retirement insurance, in particular, were studied quite deeply by M. Cichon, W. Scholz, A. van de Meerendonk, K. Hagemejer, F. Bertranou, P. Plamondon (2004).

In order to minimize the consequences of demographic and economic crisis in Ukraine, pension reform was launched. One of its important constituent is non-state retirement insurance system (NSRI) based on the accumulative principle. If in PAYG system (Pay-As-You-Go) current income is used for paying current indebtedness, the NSRI provides placing of funds of each participant in the special funds for the purpose of its storage and financing. These funds under certain conditions, which are determined by agreement or by statute, are used for the social benefits only for the person to whom such payments were made. The benefits of NSRI system by Antipov O. (2012) include: high resistance to demographic changes, as the size of non-state pension, the frequency of its payment don't depend on the demographic situation in the country, and on the ratio of workers and pensioners; direct dependence of pension benefits from the efficiency of investment, not from public finances status. Nicholas Barr (2012) analyzed in his study the role of public and private sectors in retirement insurance in details. He points out the need for complex integration of all the pension system levels (public and private) to ensure the effective functioning of the national pension system. Thus, the NSPF is an alternative to public funds

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[1] Pension Markets in Focus. OECD. 2013. available at:
http://www.oecd.org/pensions/PensionMarketsInFocus2013.pdf

of retirement insurance, and the need of their participants in money to pay pensions doesn't put pressure on public finances.

Domestic and foreign researches testify the increasing role of the NSPFs in the social safety net both in Ukraine and in many developed countries. In particular, according to the research team Pablo Antolin & Stéphanie Payet & Juan Yermo: «Private or more generally, funded pensions play an important role in the retirement income systems of many OECD countries. This role is expected to grow as recent pension reforms in many OECD countries will lead to a reduction in pay-as-you-go (PAYG) public pension benefits» (2013, p. 6).

However, the NSPFs are powerful institutional investors in the economy of the country. In their research, Raffaele Della Croce & Juan Yermo point out: «Pension funds and insurers are major investors in a large number of developed economies, with assets representing over 60% of GDP in countries such as Canada, the Netherlands, the United Kingdom and the United States» (2013, p. 9). Herewith, investments are directed not only to the development of the business, but also to various social projects and financing of infrastructure that enhances the social role of NSPF (Raffaele Della Croce, 2012).

1.2. Status and problems of development of NSPF in Ukraine

The development of non-state retirement insurance is essential in Ukraine, taking into account the difficult demographic situation in Ukraine and substantial deficit of public finances. The analysis showed that during 2005-2012 non-state retirement insurance system in Ukraine had quite positive but mixed development indices. Therefore, despite the growth of NSPF assets and increase of the participants number, the majority of researchers (Brahin S., Makarenko O., 2011; Pryimak I., Koptyuk O., 2012; Telichko N., Kuzmenko G., 2010; Shakh I., Yastrubskyi M., 2011; Bachynska O., Kravchuk O., 2010) agree with the idea that the rate of NSRI development is far from perfect and predictable. For example, experts predicted that at the end of 2009 the NSPF will save about 30 billion UAH (Lanovska G., 2008, p. 159), but actually the total assets of the NSPF at the end of 2012 amounted only 1,66 billion UAH[2].

Researches of domestic scientists (Krykliy V., 2013; Levchenko V., 2006; Pryimak I., Koptyuk O., 2012; Telichko N., Kuzmenko G., 2010; Shakh I., Yastrubskyi M., 2011; Bachynska O., Kravchuk O., 2010; Tkachenko E., 2013) found a number of external factors that affect negatively both the present and the future development of non-state retirement insurance system in Ukraine:

- low awareness of citizens on pension reform;
- low public confidence in financial institutions;
- low stock market development;
- lack of financial support from the state;
- very low interest of most entrepreneurs in creating corporate pension funds through large payments to NSPF;
- low income of citizens.

Also the barriers to the effective development of NSPF in Ukraine are internal factors. In particular, Aleksyienko L., Alekseyenko M. (2013) note that the current systems of investment activity management of NSPF in Ukraine are imperfect. The question of the role of financial resources of pension funds, insurance companies and collective investment institutions in the development of business processes. Therefore, the investment activity of pension funds in Ukraine is low, and pension assets don't exceed 1% of GDP. For example, in

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[2] Development results of non-state pensions protection system for 2012. National Commission conducting the state regulation in the sphere of financial services markets, available at: http://nfp.gov.ua/files/OgliadRinkiv/NPF/npz-2012r.pdf.

the U.S.A. and Austria pension funds concentrate more than 90% of GDP, the Netherlands – 120%, Switzerland – 113%. However, as Pavliv V. (2013, p. 133) points out, the activities and functioning of NSPF and the specifics of their work in subsequent years will be primarily determined by the state of the domestic financial environment. Therefore, further research of the development of NSRI system of Ukraine, in our opinion, should be implemented taking into account the trends of the financial market development and the economy of Ukraine.

2. The results of economic and statistical analysis of NSPF development in Ukraine

During the research, development of NSRI system in Ukraine conditionally was divided by the authors into two periods: before the financial crisis of 2008 and after. The conducted computations showed a significant pace decline of the NSPF after 2008, which manifests both in absolute and relative indices. Reduction of the average profitableness of NSPF assets is of particular concern (in 2012 the average profitableness was 3,71% compared to 9,4% in 2011)[3], which negatively affects not only on existing retirement savings of participants, but also on expansion of their number due to involvement of new policyholders. Therefore, despite the fact that the total amount of NSPF assets increases every year (*Figure 1*), they amounted less than 0,5% of the financial resources that were accumulated in social safety net.
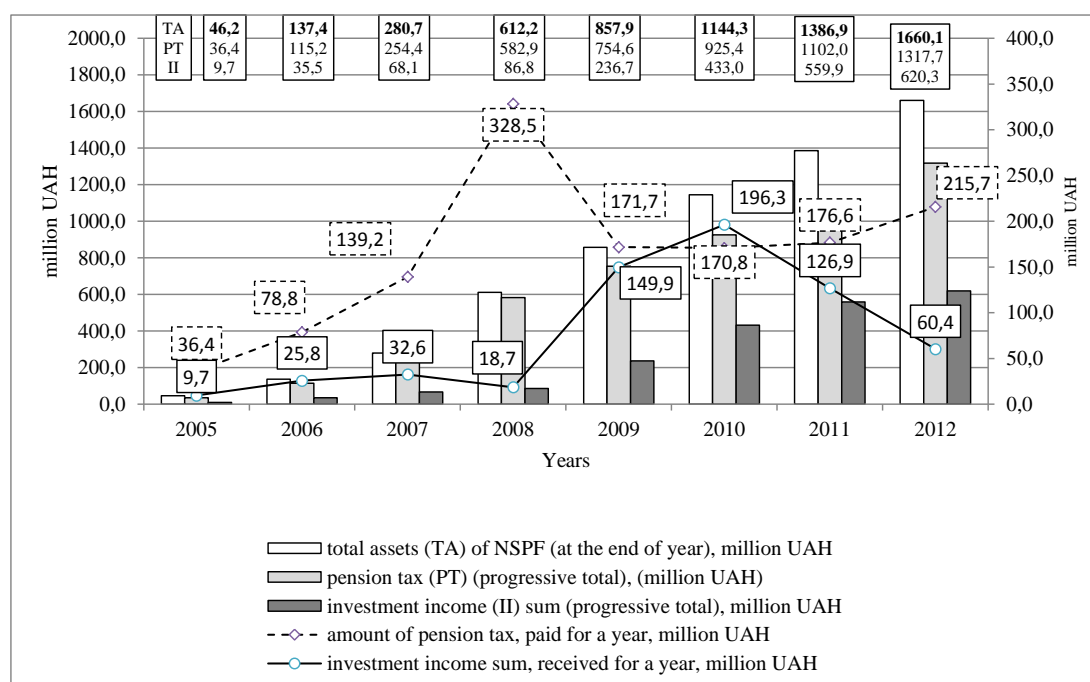

Fig. 1. Dynamics of basic indices of financial condition of non-state retirement insurance system of Ukraine for 2005-2012
Source: Calculated by the author on the bases of data of the National Commission conducting the state regulation in the sphere of financial services markets.

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[3] Development results of non-state pensions protection system for 2012. National Commission conducting the state regulation in the sphere of financial services markets) available at: http://nfp.gov.ua/files/OgliadRinkiv/NPF/npz-2012r.pdf.

During 2005-2012 the total amount of assets increased from 46,2 million USD to 1660,1 million USD. Such increase was occurred due to both pension tax and received investment income. One of the trends in recent years is the increase in the share of investment income in total assets of NSPF. In 2005 investment income amounted 20,99% of total assets of NSPF, and in 2010 – 37,84%, 2011 – 40,37, and in 2012 – 37,37%. This is due to the decrease in the amount of pension tax, which is paid to the NPF after 2008. During 2005-2008 the annual amount of pension tax increased from 36,4 million UAH in 2005 to 328,5 million UAH in 2008, which made it possible to ensure the annual increase in pension tax (progressive total) during this period at the level:

$$T = \sqrt[3]{\frac{582,9}{36,4}} = 2,5206 = 152,06\%$$

. At the same time, in the period of 2008-2012 their average annual amount decreased from 325,5 million UAH in 2008 to 215,7 million UAH in 2012, while the average expansion rates decreased to

$$T = \sqrt[4]{\frac{1317,7}{582,9}} = 1,2558 = 25,58\%$$

.

However, despite positive growth dynamics of the total amount of investment income (progressive total), a decrease in its annual amount is observed. In 2012 in the non-state retirement insurance system was obtained 60,4 million UAH of investment income, which is the lowest index in the last four years. These trends indicate the increase of non-state retirement insurance system retardation and the accumulation of problems connected both with the organizational constituent of its functioning and financial. One of such problems is the low efficiency of functioning of most NSPF. It is characterized by such indicators as the level of investment income, the average profitableness of assets, net value of pension assets (NVPA) and net value of pension assets unit (NVPAU). As the research shows, in recent years a positive dynamics of development of the NSRI system was ensured by 10 biggest NSPF, in which a considerable proportion of the participants and pension assets are focused (*Table 1* in Annex). According to the research results we have found that during 2008-2012 the first 10 NSPFs by the amount of net value of pension assets are almost unchanged (9 NSPFs during the studied period entered the Top 10 by the net assets value). The share of Top 10 by the value of net assets during 2008-2012 increased from 85,44% to 88,7%. In general, NSPF indices of Top 10, which characterize the development of NSRI during the analyzed period, show a positive dynamics compared to the rest of the market participants (*Table 1* in Annex). Especially it concerns indices, that characterize the efficiency of NSPF activity: total value of net assets, the amount of investment income and rate of return. During the analyzed period the total result of the investment activity in the NSPF, which are in the Top 10, was always positive. At the same time other NSPFs in 2008, 2011 and 2012 bore losses as a result of investment activity. Also, the rate of return of Top 10 increased from 6,24% in 2008 to 11,46% in 2012, indicating recovery of their investment activity after the financial-economic crisis. The total rate of return of other NSPFs in 2012 amounted -2,49% (27 NSPFs of 62 in 2012 bore losses as a result of investment activity) indicating significant problems in their investment activity. Obtained indices reflect the low level of the NPFs development that work directly with the public, who is simultaneously both a contributor and a participant. Outrunning development of large NPFs is stimulated primarily by their efficiency, which manifests itself in steady increase in the net value of pension assets unit (NVU), which is a major factor that affects the choice of NSPF contributor. One of the major factors that has a positive effect on increase of NVU and increases the profitableness of NSPF is increase of the amount of total assets.

During the analysis we have found the dependence of NVU amount from total assets amount (*Fig. 2*).
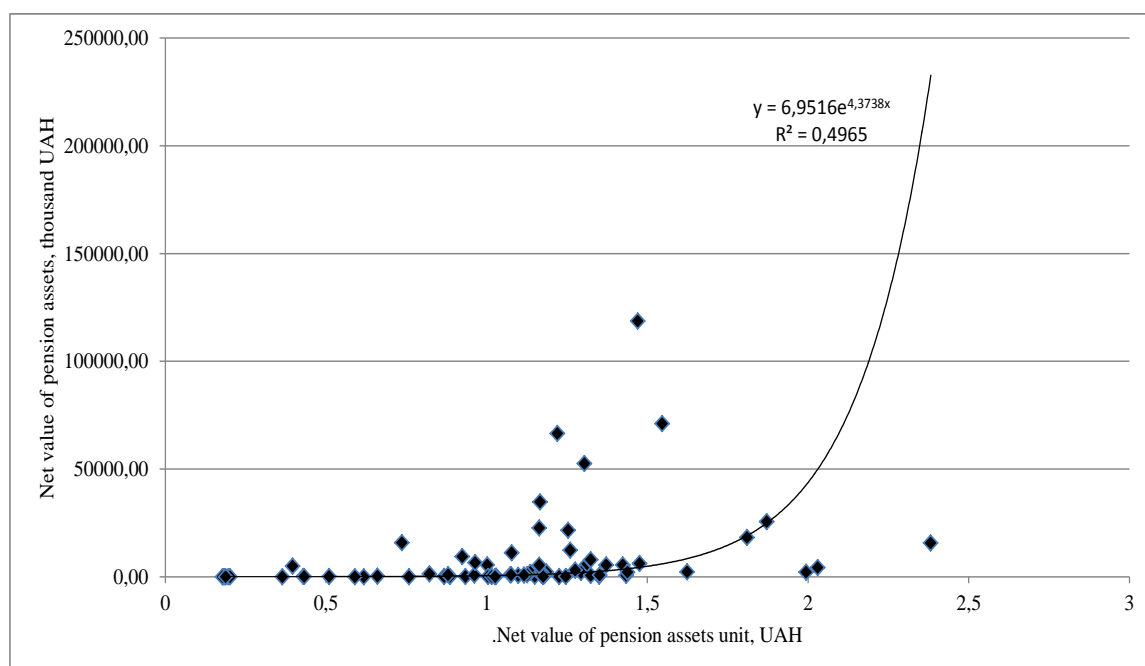
Fig. 2. The dependence of NVU from net value of pension assets on the average for 2008-2012
Source: Calculated by the author on the bases of data of the National Commission conducting the state regulation in the sphere of financial services markets.

As we can see in *Fig. 2* NVU increase is traced with the increase in the net value of the NPF assets. To affirm this conclusion we have additionally conducted analytical grouping (*Table 2*).

Table 2. Results of analytical grouping

№	NSPF groups by NVU amount, UAH	Amount of NSPF in a group	Average value of NVU, UAH	Average amount of net value of NSPF pension assets, thousand UAH
1	0.18 - 0.49	10	0.28	520.27
2	0.49 - 0.81	6	0.65	2714.66
3	0.81 - 1.12	18	0.99	2192.37
4	1.12 - 1.44	28	1.26	9187.21
5	1.44 - 1.76	4	1.53	49506.18
6	1.76 - 2.07	5	1.93	115264.18
7	2.07 - 2.39	1	2.38	15666.66
	Total	72		

Source: Calculated by the author on the bases of data of the National Commission conducting the state regulation in the sphere of financial services markets (http://npf.dfp.gov.ua).

As a result of conducted calculations, empirical correlation ratio is obtained:

$\eta = \sqrt{\dfrac{859965990.09}{4035918475.47}} = 0.46$, which indicates that the connection between NVU and net value of NPF pension assets exists, but it is moderate. The coefficient of determination

$\eta^2 = \dfrac{859965990.09}{4035918475.47} = 0.21$ shows that by 21.31% the variation of NVU is forced by differences between the features, and by 78.69% – by other factors.

Thus, conducted economic and mathematical calculations are indicative of the existing connection between the amount of pension assets of NSPF and NVU which characterizes the efficiency of its activity. Simultaneously, the analysis shows the presence of other factors that also affect NVU. In order to determine their influence we conducted the correlation and regression analysis. Calculations were conducted using the indices for the period 2008-2012 on 72 NSPFs (all factual NSPFs of Ukraine). So the results have sufficiently high confidence level and can be used for the objective analysis of the impact of specified below factors on resultative factor: Y – net value of pension assets unit, UAH; X_1 – the number of NPF participants, thousand persons; X_2 – NSPF rate of return, %; X_3 – the total compensation for subjects which provide services for the fund, to net asset value at the end of year, %; X_4 – the net value of pension assets, million UAH; X_5 – pension payments, million UAH. The results of the data processing on electronic computer are presented in *Table 3*.

Table 3. The result of correlation and regression analysis of the impact of specified factors on net value of pension assets unit in the non-state retirement insurance system of Ukraine

Parameter:	Model characteristic:
coefficient of correlation – 0,5921	correlation ratio – moderate
coefficient of determination – 0,3506	variability of the function by 35,06% is determined by variability of specified factors
F-ratio test: $F_f = 8,31$; $F_\kappa = 2,29$	$F_f > F_\kappa$, null-hypothesis about the absence of connection between indices is discarded – the model is adequate to reality
Student's t-test**:** $t_f = 1,984$; $t_\kappa = 0,22$	$t_f > t_\kappa$, null-hypothesis about the insignificance of coefficient of regression is discarded – it is statistically significant
Durbin-Watson test: DW = 1,9744	Autocorrelation is absent, if $1.5 < DW < 2.5$. In our case: $1.5 < 1,9744 < 2.5$
Regression equation: $Y = 1.69 - 7.6E\text{-}5X_1 + 0.00398X_2 - 0.085X_3 + 0.000686X_4 - 0.0139X_5$	

Source: Calculated by the author on the bases of data of the National Commission conducting the state regulation in the sphere of financial services markets.

Before proceeding to the analysis of the obtained results, a number of prerequisites of OLS (Ordinary Least Squares) should be checked:
1. Homoskedasticity (constancy of dispersions deviations). The variance of the random deviations ε_i is constant: $D(\varepsilon_i) = D(\varepsilon_j) = S^2$ for every i and j.
2. Absence of multicollinearity. Between the explanatory variables strict (strong) linear dependency is absent.
3. Absence of residues autocorrelation, i.e. values of residues ε_i are distributed independently of each other.

1. Firstly – dispersion should be homoscedastic. It means that for each value of the factor x_i residues ε_i have the same variance. If this condition of the OLS usage is not met, then heteroskedasticity takes place. Thus heteroskedasticity (absence of homoskedasticity) is manifested by the fact that the spread of residues varies depending on a variable X_i. Let's verify the presence of heteroskedasticity using the Spearman rank correlation test:

1) For x_1: Number of degrees of freedom v1 = v2 = n - m - 1 = 83 - 1 - 1 = 81 Fkp (1,81) = 3.92 Building F-statistics: F = 7.03/2.99 = 2.35 Whereas F < F_{kp} = 3.92, the hypothesis of heteroskedasticity absence is accepted;

2) For x_2: Number of degrees of freedom v1 = v2 = n - m - 1 = 83 - 1 - 1 = 81 Fkp (1,81) = 3.92 Building F-statistics: F = 5.45/3.6 = 1.51 Whereas F < F_{kp} = 3.92, the hypothesis of heteroskedasticity absence is accepted;

3) For x_3: Number of degrees of freedom v1 = v2 = n - m - 1 = 83 - 1 - 1 = 81 Fkp (1,81) = 3.92 Building inverse F-statistics: F = 6.99/2.39 = 2.92

Since F > F_{kp} = 3.92, then the hypothesis of heteroskedasticity absence is accepted;

4) For x_4: Number of degrees of freedom v1 = v2 = n - m - 1 = 83 - 1 - 1 = 81 Fkp (1,81) = 3.92 Building of inverse F-statistics: F = 3.14/2.1 = 1.49

Since F < F_{kp} = 3.92, then the hypothesis of heteroskedasticity absence is accepted;

5) For x_5: The Number of degrees of freedom v1 = v2 = n - m - 1 = 83 - 1 - 1 = 81 Fkp (1,81) = 3.92 Building inverse F-statistics: F = 5.56/2.7 = 2.05 Since F < F_{kp} = 3.92, the hypothesis of heteroskedasticity absence is accepted.

2. Let's test obtained results on multicollinearity. As a criterion of multicollinearity the following inequalities could be accepted: r (xjy) > r (xkxj); r (xky) > r (xkxj). If one of the inequalities is not fulfilled, is excluded the parameter of x_k or x_j, connection of which, with the effective index of Y, is less cramped.

For the selection of the most significant factors x_i the following conditions are taken into account:

- connection between effective index and factor should be higher than interfactorial connection;
- connection between factors should be not more than 0.7. If the matrix has interfactorial correlation coefficient $r_{xjxi} > 0.7$, then in the multiple regression model occurs multicollinearity;
- during high interfactorial connection of index, factors with a lower coefficient of correlation between them are selected.

In our case, all coefficients are paired correlation coefficients |r| < 0.7, indicating the absence of multicollinearity of factors (*Table 4*).

Table 4. Matrix of paired correlation coefficients

	y	x_1	x_2	x_3	x_4	x_5
y	1	0.0165	0.31	-0.55	0.4	-0.14
x_1	0.0165	1	0.0603	-0.0371	0.00019	0.0104
x_2	0.31	0.0603	1	-0.35	0.18	-0.0222
x_3	-0.55	-0.0371	-0.35	1	-0.41	0.26
x_4	0.4	0.00019	0.18	-0.41	1	-0.0132
x_5	-0.14	0.0104	-0.0222	0.26	-0.0132	1

3. To analyze the correlation of deviations Durbin-Watson statistics is used:

$$DW = \frac{\sum(e_i - e_{i-1})^2}{\sum e_i^2} = 1,9744$$

Critical values d_1 and d_2 are determined on the basis of special tables for the required significance level α, on the bases of the number of observations n = 83 and the number of explanatory variables m = 5.

Autocorrelation is absent, if the following condition is carried out:

$$d_1 < DW \ и \ d_2 < DW < 4 - d_2.$$

Without referring to the tables, you can use a rough rule and assume that residues autocorrelation is absent, if $1.5 < DW < 2.5$. Whereas $1.5 < 1.69 < 2.5$, the autocorrelation of residues is absent. For a more reliable conclusion you should refer to the table values.

By Durbin-Watson table for $n = 83$ and $k = 5$ (significance level is 5 %) we find: $d_1 = 1.52$; $d_2 = 1.77$.

Whereas $1.52 < 1.77$ and $1.9744 < 1.9744 < 4 - 1.77$, the autocorrelation of residues is absent.

The results of correlation and regression analysis are indicative of the fact that connection between NVU and analyzed factors are moderate, and therefore the resultative factor is influenced by other factors not included in the model. Variability of resultative factor by 35,06% is determined by the variability of specified factors. Simultaneously, the test of significance of obtained paired correlation coefficients using the Student's t-test showed that the most significant connection exists between (y and x_{x2}), (y and x_{x3}), (y and x_{x4}). And the greatest impact on the resultative factor has the factor x_3 ($r = -0.55$). The amount of NSPF participants and amounts of pension tax although have influence on the resultative factor, but not essential.

Let's test overall quality of multiple regression equation. To test it, Fisher's exact test is used. The actual (observed) value of Fisher's exact test is calculated through the coefficient of determination R^2, calculated according to data of specific observation. According to Fischer-Snedecor distribution tables, Fisher's exact test value is calculated (Fkp). The significance level α (usually it is equal to 0.05) and two numbers of degrees of freedom $k_1=m$ и $k_2=n-m-1$ are specified for it.

F-statistics. Fisher's exact test

$$R^2 = 1 - \frac{s^2_e}{\sum(y_i - \overline{y})^2} = 1 - \frac{11.1}{17.09} = 0.35$$

The closer this coefficient to one, the greater regression equation explains the behavior of Y.

More objective assessment is adjusted coefficient of determination:

$$\overline{R}^2 = 1 - (1 - R^2)\frac{n-1}{n-m-1}$$

Adding to the model of new explanatory variables is carried out as long as the adjusted coefficient of determination increases.

Let's verify the hypothesis of overall importance – the hypothesis of simultaneous equality to zero of all regression coefficients of explanatory variables:

$$H_0: \beta_1 = \beta_2 = ... = \beta_m = 0.$$

Verification of this hypothesis by using the Fisher F-statistic of distribution is carried out.

If $F < F_{kp} = F_{\alpha \, ; \, n-m-1}$, then there is no reason to reject the hypothesis H_0.

$$F = \frac{R^2}{1 - R^2} \frac{(n - m - 1)}{m} = \frac{0.35}{1 - 0.35} \frac{83 - 5 - 1}{5} = 8.31$$

Table value with degrees of freedom $k_1 = 5$, $k_2 = n-m-1 = 83 - 5 - 1 = 77$, $F_{kp}(5;77) = 2.29$.

As the actual value $F > F_{kp}$, the coefficient of determination is statistically significant and the regression equation is statistically reliable.

An equally important factor affecting the efficiency of the NSPF functioning is their investment activity. The amount of accumulations of NSPF participants and consequently their future pension tax depends directly on level of investment income.

During 2005-2012 in Ukraine, the system of NSRI shows the positive level of results obtained from the investment activity but rate of return not always covers the inflation rate (*Fig. 3*).

Despite the relatively positive indices, we note that the bulk of investment income was received by the Top 10 of NSPFs. For example, of 72 NSPFs that actively carried out their activity in 2012, only 43 had a positive result from investment activity (*Table 1* in Annex). The efficiency of investment activity, primarily is determined by the return on financial assets that are included in the investment portfolio of the NSPF. In Ukraine for 2005-2012 a change of the structure of the investment portfolio of the NSPF was always carried out, which is caused by the change of the return on various financial assets (Development results of non-state pension protection system for 2012, http://nfp.gov.ua/files/OgliadRinkiv/NPF/npz-2012r.pdf).
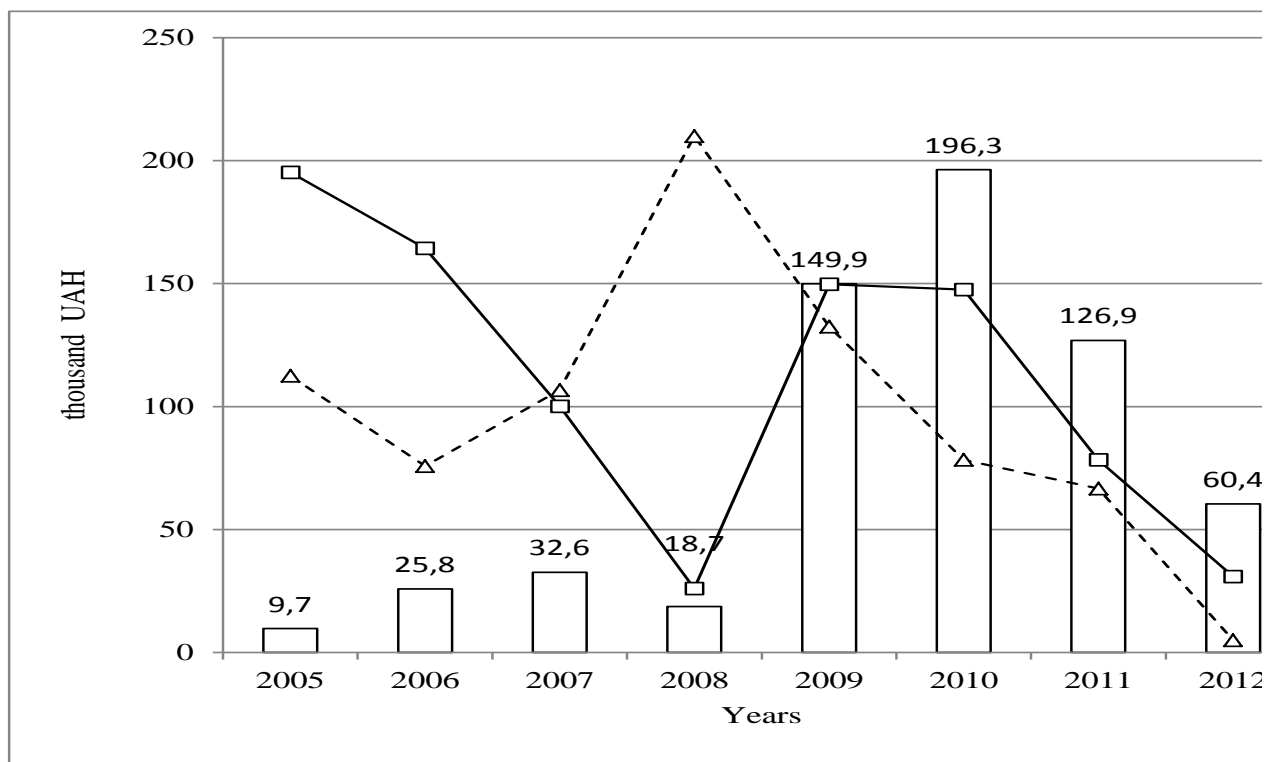

Fig. 3. Dynamics of absolute and relative indices that characterize the investment activity of NSPF of Ukraine for 2005-2012
Source: Calculated by the author on the bases of data of the National Commission conducting the state regulation in the sphere of financial services markets.

The bulk of financial assets of domestic NSPFs concentrated in financial instruments

with clear level of return (deposits, government securities, corporate bonds, etc.) which significantly differs from world practice of investing pension assets. For example, in the OECD countries in 2012, 80% of pension assets were invested in bonds and stocks (Pension Markets in Focus, OECD, 2013, available at: http://www.oecd.org/pensions/PensionMarketsInFocus2013.pdf). Such structure of the investment portfolio of NSPF Ukraine is more conservative and less dangerous, taking into account strong volatility of financial markets.

High rate of return of financial instruments in Ukraine (compared to OECD countries) had a positive impact on the nominal rate of return of investment activity of NSPF Ukraine during 2008-2012. But during the researched period it was less than the total rate of inflation. So by the real index Ukraine is on the penultimate place. However, the nominal rate of return of investment activity of NSPF is quite variable and is not constant, which is confirmed by our analysis of variation of return of investment activity of all NSPF of Ukraine for 2008-2012 (*Table 5*).

Table 5. Analytical indices of profitableness volatility of investment activity of NSPF in Ukraine for 2008-2012

№	Indices	2008	2009	2010	2011	2012	2008-2012	Top10 2008-2012	Other NSPFs 2008-2012
1.	Simple arithmetical mean	0,84	15,03	12,9	-0,58	-4,03	8,78	8,43	6,53
2.	Mid-point	1,59	15,45	13,51	3,08	1,64	9,97	10,16	8,42
	Variation indices								
	Absolute indices of variation								
3.	Range of variation	109,65	36,85	48,47	194,03	211,07	109,64	44,75	227,29
4.	Mean deviation	10,33	6,7	6,61	11,16	13,36	9,21	8,07	10,45
5.	Dispersion	245,11	75,44	74,75	520,3	746,27	161,81	106,62	314,31
6.	Mean-square deviation	15,66	8,69	8,65	22,81	27,32	12,72	10,33	17,73
	Relative indices of variation								
7.	Coefficient of variation	1869,23	57,77	67,08	3914,87	677,82	144,81	122,56	271,69
8.	Relative linear deviation	1233,35	44,57	51,28	-1915,38	-331,49	104,85	95,78	160,15

Source: Calculated by the author on the bases of data of the National Commission conducting the state regulation in the sphere of financial services markets (http://nfp.gov.ua/content/stan-i-rozvitok-npz.html).

The coefficient of profitableness variation of NSPF Ukraine for 2008-2012 was 144,81. Whereas v > 70%, the sum-total is close to the limit of no uniformity and variation is strong. The coefficient of variation is much more than 33%. Thus, the considered sum-total is not uniform, average is insufficient typical for it, indicating instability of the dynamics of the studied index. However, it should be noted that the profitableness variation in NSPFs which

are included in the Top 10 less than in other NSPFs, which indicates their more stable and predictable investment activity.

Conclusion

Conducted economic and statistical analysis showed that the development of NSRI system in Ukraine today is characterized by considerable variability and volatility that makes it difficult to objectively predict the key indices of NSPF activity for the future. Obtained results entitle us to believe that at this stage of development of the NSRI system in Ukraine the most effective are large NSPFs, which mostly form their assets due to contributions of legal entities and individuals that pay them in favor of members of NSPFs. There is a number of subjective and objective reasons for it. Taking into account the socio-economic importance of the NSRI system, in our opinion, advanced avenues for further research on this subject is, first of all, analysis of the investment activity of NSPF in order to improve the overall efficiency of the NSPF and ensuring positive dynamics of increase of all basic indices: NSPF members, total assets amount, pension tax, investment income, rate of investment income, etc. Further researches on this subject will be aimed at identifying regularities of non-state pension funds development, depending on the major social, demographic and economic indices in the country. The objective of these researches will be to identify the main tools of stimulation of the NSPF development in Ukraine.

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