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## CONCEPTUAL APPROACHES TO IMPROVING THE FUNCTIONING OF NON- STATE SOCIAL INSURANCE INSTITUTIONS IN UKRAINE

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**ABSTRACT.** The influence of social expenditures and their structure on economic growth in the OECD countries for the years 1980-2015 was estimated. It was established that higher rates of economic growth are observed in the countries with the accumulative principle of financing of social expenditures (on average, for the investigated period 2.94% as compared to 1,87% in countries with distribution systems). It was determined that low level of profitability of investment activity (for the analyzed period – 2008-2015) was the main reason for slow development of the system of non-state social insurance in Ukraine. 75.94% of private pension funds had positive mid-year nominal income, 26.3% of which had nominal income at the level of 10-20% and only 10.6% – more than 20%. Analysis of the formation of investment portfolios of non-state social insurance institutions in Ukraine was conducted so that to determine the influence of socioeconomic factors on income and risk profile of certain financial assets included in portfolio. The authors calculated the structure of two investment portfolios – in a favorable economic situation with low inflation and during an economic downturn, accompanied by high level of inflation. Calculations were carried out using the Markowitz method of investment portfolio optimization. The algorithm of investment activity management for non-state social insurance on the basis of the Prudent Investor strategy was developed.

**Keywords:** non-state retirement insurance, private pension fund, investment income, correlation analysis, regression analysis, Prudent Investor.

### Introduction

Social protection of population is the cornerstone in the functioning of contemporary states, while realization of social priorities is one of the first steps in it. Its active development during the XXth century, accompanied by the expansion of types and forms of social protection, increasing number and size of social services and assistance along with the formation of social

responsibility of business, provided protection from various social risks and threats for the majority of population.

Contemporary welfare state concept takes on the responsibility to provide every citizen with a sufficient level of social protection, to create free access to accredited education and healthcare, to reduce inequality and poverty. Achievement of these tasks requires a steady increase in financial resources, which in the vast majority of countries that have formed integral systems of social protection, are accumulated by the state at the central or local levels. Since the 1990s the most developed countries have begun to review and reform their social protection systems, being driven by economic and demographic changes that have taken place in the world. Therefore, despite the fact that scientists have different points of view on the state of social protection systems of population, they are unanimous in one – at this stage there is a transition from the model of welfare state (accompanied by a decrease in state funding of social programs and their gradual reduction) to a new state social policy, which aims to eliminate the contradiction between market laws and social objectives. Swiss political expert Giuliano Bonoli believes that "dismantling of the welfare state is the main theme of contemporary social policy across Europe" (Giuliano *et al.*, 2000). Swedish economist G. Esping-Andersen points out two main reasons for this process: "The first is that the current status quo is difficult to maintain, taking into account demographic or financial conditions. The second is that this particular status quo looks outdated and does not meet the future's great challenges" (Esping-Andersen *et al.*, 2002, p. 4). Today's factors shaping the foundations of social policies worldwide are new to the world economic thought. Taking this into consideration, a new scientific concept on the development of social protection for the population has emerged. This concept should be aimed at solving the dilemma of the "quadrature of the circle" of the social protection system, taking into account the globalized state of the economy, the overall popular tendency to reduce taxes and the spread of neoliberal economic policy. At the same time, the role and the place of the social welfare system has been widely discussed in academic circles, indicating the urgency and the still unresolved nature of this problem. In recent years, special attention has been also paid to the problem of financing social protection systems and the related interaction between private and public sectors.

The main objective of this study is to analyze the activities of institutes of non-state social insurance in Ukraine in order to identify trends in its further development and the main problems of its functioning.

## 1. Literature review

### *1.1. Assessment of the impact of social expenditures and their structure on economic growth*

Social protection of population has always been closely related to economy and its main determinants (labor market, wages (income), labor productivity, investment level, economic growth, etc.). In this connection more and more frequently scientists consider the system of social protection not only from a social point of view, but also as a mechanism to stimulate the country's economic development. This requires a deeper analysis of the interconnection of socio-economic factors and social protection of population, especially in the context of the formation and use of financial resources. According to studies, this interconnection has a bilateral reciprocal character. That is, not only socio-economic factors affect social protection, but also its tools (various social services and benefits) exert pressure on the dynamics of certain factors. The consequences of such influence can be both positive and negative.

There is no consensus within the world scientific community regarding a positive impact

of rising social protection expenditures on the country's economy. So, one group of scholars (Korpi, 1985; Furceri & Zdzienicka, 2011; Furceri, 2010) generally notes positive effect of rising social expenditure (or state budget social spending on economic growth); however, some researchers have interpreted the results of their studies rather cautiously. R. Arjona *et al.* (Arjona, R. *et al.*, 2003) note that countries with high level of economic development have developed systems of social protection of population, where significant financial resources are directed on its funding. However, the fact whether this rise in social spending causes faster economic growth remains unproved. The authors calculated empirically that the growth of social expenditures on active measures leads to increase in GDP by 1% in the long run, while a similar increase in expenditures on passive measures leads to its reduction by 0.2% (Arjona *et al.*, 2003, pp. 130-139). Other researchers (Connolly & Li, 2016; Pereira & Andraz, 2015; Weede, 1991; Hansson & Henrekson, 1994; Commander *et al.*, 1997; Gwartney *et al.*, 1998) prove that increase in social spending negatively affects economic growth in general.

To assess the hypothesis as to positive impact of social expenditures on economic development in the OECD countries for over the period of 1980-2015, a correlation-regression analysis was carried out (Y – GDP per capita, US \$ in Purchasing Power Parity PPP (dependent variable), X – general social expenditures per capita, USD in PPP (independent variable) (Table 1).

Table 1. The results of the correlation-regression analysis

1. Regression statistics								
Multiple R	0,92029108							
R-squared	0,846935672							
Standard R-squared	0,846781529							
Standard error	4756,362272							
Experimental observation	995							
2. Analysis of variance								
	df	SS	MS	F	Significance F			
Regression	1	1,24E+11	1,24E+11	5494,468479	1			
Excess	993	22464621192	22622982		993			
Total	994	1,47E+11			994			
3. Estimated parameters of the regression equation								
	Coefficients	Standard error	t-statistics	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Y-intersection	6071,46	270,71	22,42	1,86531E-90	5540,22	6602,69	5540,23	6602,69
Variable X1	3,55	0,0479	74,12	0	3,46	3,65	3,46	3,66

Source: own compilation.

The results of correlation-regression analysis show that the correlation between GDP per capita and social protection expenditures in the OECD countries for the analyzed period is close. However, the dependent variety is influenced by other factors that are not included in the model. The variability of the dependent variety in this regression model by 84.7% is determined by the variability of the chosen factor.

The value of the regression coefficients were calculated according to the sample data. It

is necessary make sure that calculated coefficients will be statistically significant (i.e. non-zero for a large part of the samples from the considered aggregate) and will be included into the model. To estimate the statistical significance of the regression coefficient, a null hypothesis is suggested when regression coefficients are equal to zero. For the coefficient  $b_i$ , the mathematical formulas for null hypothesis and the alternative hypothesis are as follows:

H0:  $b_i = 0$  – the coefficient is insignificant;

H1:  $b_i \neq 0$  – the coefficient is significant;

P-value is the probability that null zero hypothesis is true for the corresponding coefficient:

✓ If the P-value is  $< 5\%$ , then the coefficient is statistically significant with a reliability of 95%, and is included in the model;

✓ If P-value is  $> 5\%$ , then the coefficient is statistically insignificant with a reliability of 95%.

According to calculation  $P(3,551294475) = 0\%$  (coefficient is statistically significant).

Confidential interval for coefficients of regression.

("Lower 95%" and "Upper 95%").  $3.457279 \leq b_1 \leq 3.64531$

The analysis showed that the growth of social expenditures per capita in the OECD countries for \$ 1 in PPP leads to the growth GDP per capita of \$ 3.55 in PPP. In other words, there is a positive connection.

For a more in-depth analysis, a similar analysis of the impact of social spending on GDP in all OECD countries has been conducted for the same period. The lowest of regression indicator is observed in France – 2.751326, and the largest is in Chile – 9.29460. Analysis of regression result in OECD countries over the period of 1980-2015 revealed correlation between obtained regression coefficients and funding model for social protection practiced in the studied countries (distributive and cumulative). To assess this correlation, the OECD countries were classified according to the value of the regression coefficients and analytically grouped according to the interdependence of two groups of indicators – obtained regression coefficients (US \$ in PPP) and the size of investment accumulation in the analyzed countries (% of GDP); the obtained regression coefficients (USD in PPP) and the average annual growth rates of real GDP in the investigated countries (%) (*Table 2*). The obtained results of the grouping show that the countries of the first group (with systems of social protection, based on the distribution principle) have lower regression coefficients. This is explained by the fact that significant amounts of financial resources of social protection are directed towards financing passive social protection measures, which indirectly influence economic development, and sometimes have a negative impact (the negative impact of passive social protection measures is empirically proven by the group of authors headed by R. Arjona *et al.* (Arjona *et al.*, 2003)). The second group of countries has higher regression coefficients. The countries from this group have a developed accumulative financing principle (and use of more active social protection instruments), which implies accumulation and investment of a significant proportion of financial resources of social protection in their economies.

The conducted analytical grouping revealed the relationship between investment accumulation in the country and the coefficients of regression.

Table 2. The results of the analytical grouping of OECD countries according to the relationship between investment accumulation and average annual growth rates of real GDP (average for 1980-2015)

Groups	Countries	The number of countries in the group	Mean value, USD US PPP	Investment accumulation as % of GDP	Average annual growth rate of real GDP, %
2.75 - 3.84	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Spain, Portugal, Sweden, Japan	12	3.28	14.86	1.87
3.84 - 4.92	Australia, Czech Republic, Estonia, Hungary, Iceland, Ireland, Luxembourg, Netherlands, Norway, Poland, Slovenia, Switzerland, United Kingdom, USA	14	4.36	62.98	2.94
4.92 and more	Canada, Slovakia, Israel, Turkey, Korea, Chile, Mexico	7	7,16	25,51	4,51
	Total	33			

Source: own compilation.

The obtained empirical correlation between these factors wade up  $\eta = 532.852702.29$  that conforms to 0.44 t-criterion value. This indicates a moderate connection between the outcome Y and the factor predictor X. To confirm the received connection, statistical significance of the relation strength indicator was checked. In order to check the null hypothesis when general correlation coefficient of a normal two-dimensional random variable equals to zero (empirical correlation relation) under the rival alternative hypothesis  $H1 \neq 0$  at the significance level  $\alpha$ , it is necessary to calculate the observable value of the criterion  $t_{fact.} = \eta \sqrt{n-2}$  and according to Student's t-distribution table, to find the critical point  $t_{crit.}$  Of bilateral critical area at the given level of significance  $\alpha$  and the number of degrees of freedom  $k = n-2$ . If  $t_{fact.} < t_{crit.}$  there are no reasons to reject the null hypothesis.

If  $t_{fact.} > t_{crit.}$  – the null hypothesis is rejected.

In our case  $t_{fact.} = 0.44 \cdot 31 = 13.72$  and  $t_{crit.} = 2.021$ .

According to Student's t-distribution table with a significance level  $\alpha = 0.05$  and degrees of freedom  $k = 31$  we find  $t_{crit.} = t_{crit.}(n-m-1; \alpha / 2) = (31; 0.025) = 2.021$  where  $m = 1$  is the number of independent variables.

Since  $t_{fact.} > t_{crit.}$ , we reject the hypothesis, when correlation coefficient equals to zero. In other words, the correlation coefficient is statistically significant. At the same time, the determination coefficient is only  $\eta^2 = 532.852702.29$  that conforms to 0.20 t-criterion value. That is, variation of the dependent indicator (coefficient of regression) is by 19.72% due to the differences between the variables, and by 80.28% due to other factors. That is, in the countries with systems of social protection based on accumulative principles, the growth of social expenditures has a stronger effect on the country's economic development than in the countries with distributive (or solidarity) social protection systems.

At the same time, another analytical grouping showed that countries with higher regression coefficients had higher average annual growth rates of real GDP. Annual growth rates of real GDP in the first group of countries makes up on the average 1.87% for the period under study with the mean value of regression coefficient 3.28, in the second group – 2.94%

with mean value 4.36 and the third one – 4.51% with mean value 7.16.

The results of the study statistically confirm this relationship, which gives greater validity to the obtained results.

Thus, the empirical correlation ratio is  $\eta = 0.971.61$  that conforms to 0.78 t-criterion value, indicating that there is a strong connection between the outcome variable Y (average annual growth rate of real GDP) and predictor variable X (obtained regression coefficients).

Critical values of Student's distribution were calculated:

$t_{\text{fact.}} = 0.78 \cdot 311 - 0.782 = 6.89$ ; according to Student's t-distribution with a significance level  $\alpha = 0.05$  and degrees of freedom  $k = 31$  we find  $t_{\text{crit.}}$ :  $t_{\text{crit.}}(n-m-1; \alpha / 2) = (31; 0.025) = 2.021$  this enables us to state that the correlation coefficient is statistically significant.

Obtained determination coefficient was  $\eta^2 = 0.971.61$  that conforms to 0.60 t-criterion value. Thus, the variation is 60.47% due to the differences between the variables, and 39.53% due to other factors.

The conducted empirical analysis supports the hypothesis about positive effect of social expenditures on economic growth and scientific conclusions of R. Arjona *et al.* (Arjona *et al.*, 2003) concerning the fact that the use of different models of social protection and its tools (active and passive) has different effects on the country's economic development. At the same time, the results showed that in general, social expenditures positively affect economic development, but they should be harmoniously related to economic indicators of the country, which directly influence the formation of the funding sources of social protection of population. That is, economic resources should create a fundamental basis and be a form of economic content of social protection. In addition, growth of social spending should not outpace the growth rates of economic indicators. In most developed countries there has been a violation of this principle over the past 30 years, which has led to the current crisis of funding national social security systems.

This situation forced most OECD countries to take a number of measures to reform their own social protection systems, which were primarily aimed at increasing the share of accumulative systems and optimizing public spending on social objectives. It should be noted that countries that initially favored a cumulative principle in national social protection systems have less problems with their financing of economic and demographic nature.

## ***1.2. Performance of non-state social insurance institutions in Ukraine***

Nowadays, non-state social insurance in Ukraine is implemented through two interrelated systems: non-state social voluntary insurance, carried out by insurance companies in accordance with the Law of Ukraine "On Insurance" within the scope of personal insurance (by concluding insurance contracts), and non-state pension insurance, which is carried out in accordance with the Law of Ukraine "On non-state pension provision" through: non-state pension funds (by concluding pension contracts); insurance companies (by concluding contracts on pension insurance, risk insurance of disability or death of a member of the fund); and banks (by concluding agreements on opening pension deposit accounts for the accumulation of pension savings). There are numerous organizational and financial interrelations within these systems.

Formation of a new concept of the implementation of a social protection system in Ukraine implies a gradual transition from distribution system of social protection to the mixed one, where accumulative principle of financing welfare payments and benefits becomes more crucial. An essential prerequisite for sustainable and financially balanced development of this multilevel system is mandatory functioning of a developed system of non-state social insurance. Analysis of financing social protection in Ukraine (Malyovanyi *et al.*, 2015) revealed that the

state/government is not unable to guarantee citizens stable financing of all welfare payments and benefits in the long run (especially in the area of pension insurance), which leads to the search of new funding sources. In today's world practice, institutes of non-state social insurance are the most effective mechanism for creating additional financial sources. On the one hand, such system strengthens social protection in the country, and, on the other hand, it can be a powerful source of investment resources. Investment activity of non-state social insurance institutions promotes efficient development of the financial market, distribution of capital between sectors of economy, ensuring stable of stock market, a partial unloading of public finances and is a powerful driver of economic development.

Nowadays, third level of social protection system is only at the beginning of its formation in Ukraine and is represented by such financial institutions as private pension funds and insurance companies, which carry out their activities in the field of life insurance and personal insurance. This level may also include all social activities of business, which manifests itself both through the payment of employers in the favor of their employees insurance premiums in the private pension fund and insurance companies, as well as direct social activities at enterprises (through the creation of social funds, provision of free medical care, various types of social payments and benefits, etc.).

The size of the financial assets of non-state social insurance system does not reach 0.5% of all financial expenditures of the social protection system in Ukraine, which indicates insignificant role of this level in the social protection system (Malyovanyi & Melnyk, 2014).

Development of the system of non-state social insurance is influenced by external factors (they do not depend on the activities of institutes of non-state social insurance, but can be minimized at the state level) and internal factors (directly related to the activities of institutes of non-state social insurance) factors. These factors directly affect the profitability (loss-making) of non-state social insurance institutions, which in its turn reduces or increases the demand for accumulative insurance programs.

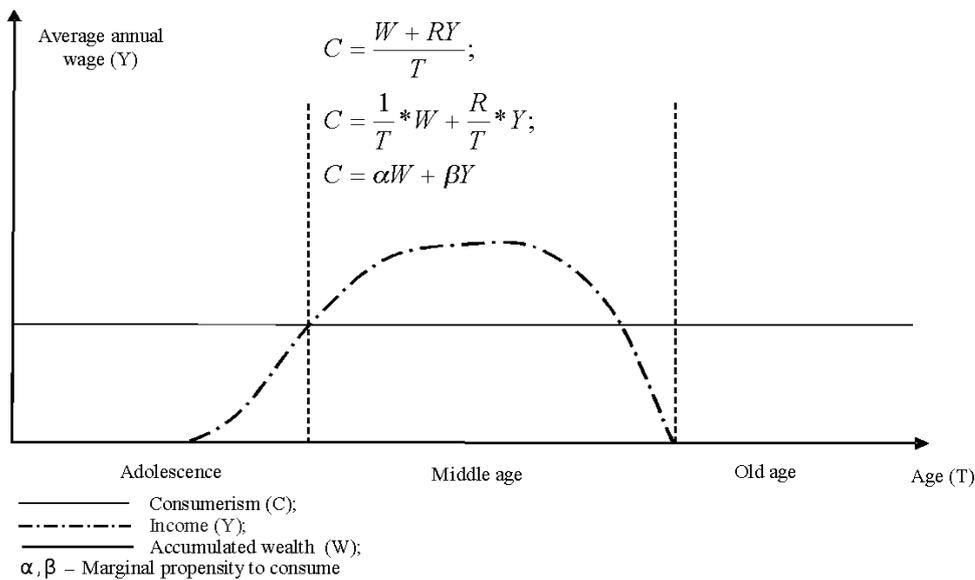
Formation of the demand for accumulative insurance programs can be analyzed using the life cycle income model developed by Franco Modigliani (Modigliani, 1966). This model explains the peculiarities of demand generation for programs of non-state social insurance institutions in Ukraine.

The essence of this model is that households decide on the amount of consumption in the current period, based not on current income, but on the income that they can receive during their lives. Modigliani explains this behavior by the principle of the marginal utility of declining consumption, from which it follows that the benefit derived from the adjustment of consumption in different periods will continue to exist as long as there are differences in consumption between periods (*Graph 1.*) (Modigliani, 1966).

Households are seeking to adjust their current consumption so that it should be uniform constant throughout their lifetime. Therefore, during the working life, employees seek to ensure the accumulation of wealth ( $W$ ), trying not to reduce their average consumption after retirement.

One of the methods to create this accumulation is a variety of non-state social insurance programs.

The amount of accumulated wealth in the system of non-state social insurance will depend on two main factors: the amount of insurance premiums paid in favor of the insured person and the average level of return on investment.



Graph 1. Life cycle income model

Source: Authors' idea based on Modigliani, Franco (Modigliani, 1966)

The formula for the size of pension savings (PN) will be exponential in nature and will include the following components: wages (income) (W); average annual growth of wages (income) (q); the rate of insurance premiums on wages (income) in the accumulation system (in the voluntary system, the interest deduction) (s); retirement age (RA), average age of entering employment (T) and average return on investment ( $\alpha$ ):

$$PN = \sum_{i=1}^{RA-T} (W * s * (1+q)^{i-1} * (1+\alpha)^{RA-T-i}) \quad (1)$$

Whereas, the size of the pension payments (PV), and hence, the amount of current consumption (C) of a retired person will be determined by the size of pension savings (PN):

$$PV = \frac{PN}{d * 12} \quad (2)$$

where: d – the duration of pension payments, years (this formula can be used when calculating the pension for a specified period. When establishing the size of the life pension, other actuarial calculations are used, but they are also based on the amount of pension savings).

Thus, the size of pension payments (PV), which mainly form the current consumption (C) of aged persons, will be as follows:

$$PV = \frac{\sum_{i=1}^{PA-T} W * (1+q)^{i-1} * (1+\alpha)^{PA-T-i}}{d * 12} \quad (3)$$

At the same time, the subject is trying to ensure the maximum possible replacement rate (KZ), which characterizes the ratio of pension payments (PV) and wages (income) received by

a person before retirement.

From the above mentioned mathematical formulas it is possible to conclude that under all equal conditions (wage (income), retirement age, duration of the labor period) the size of return on investment is exponentially critical for the size of pension savings (PN), and, consequently, the size of pension payments (PV), forming the current consumption of pensioners.

For the analyzed period (2008-2015), only 40% of all Ukrainian private pension funds, executing vigorous activity, were profitable. If in 2009, when the inflation rate was 15.9%, the proportion of funds with positive average annual real profitability was made up 50%. Then in 2014, when inflation was lower and amounted to 12.1%, such this proportion share was 32.84%.

Thus, the real profitability of private pension funds is influenced not only by objective factors (inflation rate), but also by subjective factors, including low efficiency of pension asset management. This is proved by the unstable indexes of investment activity of Ukrainian private pension funds in comparison with average world indexes (*Table 3*).

Table 3. Analytical variability factors of investment activity of private pension fund in 2015

№	Variables	Private pension funds ( <i>Large Pension Funds, World</i> )	Private pension fund (Ukraine)*
1.	Arithmetical average	7,63	-31,89
2.	Median	7,4	-24,86
3.	Modal value	4,7	-15,9
Variation indicators			
Absolute variation indicators			
4.	Range of variability	30,7	183,67
5.	Average linear deviation	4,03	16,56
6.	Dispersion	28,05	620,01
7.	Average square deviation	5,3	24,9
Relative variation indicators			
8.	Coefficient of variation	69,41	78,08
9.	Relative linear deviation	52,82	-51,93

\* Indicators of 2013-2015 without taking into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and parts of the zone of anti-terrorist operation. *Source:* own compilation. Authors' calculation based on data: World – Annual Survey of Large Pension Funds and Public Pension Reserve Funds. Report on pension funds' long-term investments. OECD, 2016. <http://www.oecd.org/daf/fin/private-pensions/2015-Large-Pension-Funds-Survey.pdf>; Ukraine – National Commission for the Regulation of Financial Services Markets of Ukraine. – [Electronic resource]: Access mode: <http://nfp.gov.ua/content/oglyad-rinkiv.html> (application date 21.10.2017).

If variation coefficient of real average annual income of the world's private pension funds makes up 69.41 and the average square deviation is 5.3, then in Ukraine these indicators account for 78.08 and 24.9 respectively for the analyzed period. This confirms the fact about the variability of private pension funds' income in Ukraine, which negatively affects confidence in their programs, since it makes impossible any real planning of financial indicators of their activities.

Low level of real income in Ukraine is due to the high level of inflation. However, if we analyze the nominal income of pension assets in Ukraine, it is low compared to alternative financial investment-tools (placement of funds on fixed deposit accounts).

For the analyzed period (2008-2015), 75.94% of private pension funds had positive

average annual nominal income, of which 26.3% had nominal income at the level of 10-20% and only 10.6% – more than 20%. This negatively affects the demand for products of private pension fund, since it is more profitable for potential clients to place their funds on fixed deposits or to buy foreign currency (for example, US dollars).

The calculations show that both nominal and real income of pension assets in Ukraine are far less than the income of other financial instruments, which ultimately affects the formation of demand for non-state pension insurance schemes.

Indices of investment portfolios of Ukrainian private pension funds are volatile. Consequently, the current development level of pension assets management of private pension funds along with high inflation rates does not allow to achieve stability of the indicators of the world's private pension funds, as well as to be permanently in the area of positive real income.

According to the authors, the main reason for the low profitability of private pension funds is low efficiency of pension asset management, which manifests itself through poorly thought-out investment strategy (in particular, the purchase of highly risky securities), as well as low quality of investment portfolio.

## 2. Methodological approach

Statistical and analytical data were the informational background for the study: OECD (<https://data.oecd.org/>); National Commission for the Regulation of Financial Services Markets of Ukraine (<https://nfp.gov.ua>). Studies are based on system data from all OECD countries for the years 1980-2015 (Recent Available Data). The analysis of the activity of non-state pension funds in Ukraine was carried out in 2008-2015 (despite the fact that the system of non-state pension insurance in Ukraine has been operating since 2004, statistical reporting covering all aspects of its functioning (including investment activity) has been carried out since 2008).

During the study, the following research methods were used:

1) correlation-regression analysis was used to determine the impact of social expenditures on the economic development of OECD countries (*Table 1*). The study was extended due to the analysis of influence of social expenditures on GDP in OECD countries for the same period (2008-2015). Obtained regression coefficients were used in analytical grouping to confirm the hypothesis about a positive impact of non-state social insurance institutions development on economic growth in OECD countries (*Table 2*);

2) for the estimation of investment activity of non-state pension funds in Ukraine and comparison with the indicators of the largest private pension funds in the world, the indicators of variation were calculated (*Table 3*);

3) for the optimization of investment portfolio of the private pension fund of Ukraine H. Markowitz method of investment portfolio optimization was used (Markowitz, 1952);

4) the development of proposals to improve the management of investment activities of non-state social insurance institutions in Ukraine is based on the use of the Smart Investor rule («Prudent Investor»).

## 3. Conducting research and results

Several classic investment strategies are used in the management of pension assets of the private pension funds of Ukraine: conservative, balanced and aggressive strategy. Conservative strategy involves placement of assets exclusively in financial market instruments with low risk and regular income – government bonds, bonds of large enterprises, deposits of leading banks, etc. The main objective of this strategy is to save investments and ensure a

positive real return. Balanced strategy implies assets allocation in a wider range of instruments of the financial market – government bonds, bonds of large enterprises, deposits of leading banks, shares of large enterprises. Balanced approach to the ratio of risk and income is a distinctive feature. Aggressive strategy suggests assets allocation in high-risk financial instruments that have a high potential for growth under positive stock market trends. The main objective is to ensure a high return on investment assets.

The structure of investment pension assets in Ukraine shows that the vast majority of private pension funds pursues a conservative or balanced investment policy, when the main part of pension funds is invested in low-income but low-risk financial assets (although after a series of bankruptcies of commercial banks in Ukraine placement of retirement assets term deposits is difficult to attribute to low-risk ones).

According to the opinion of the authors, which coincides with point of view of many scholars on this issue (Abramov & Chernova, 2015; Kaminsky & Lomovatskaya, 2011; Nebaba, 2015; Postnaya, 2014; Cherkasova, 2014), this is not because private pension funds tend to reduce their risks, but because there are no high-quality financial instruments in Ukraine that would guarantee a sufficient level of profitability with relative safety of investment.

The yield of the main stock market instruments that are allowed for investment of retirement assets has a rather high volatility, which prevents private pension funds from providing regular investment returns. Since the investment strategies in place do not imply rapid reaction or adaptation to changes in the stock market. Only the yield of deposits government securities during the period under study has low volatility, while other financial instruments in which retirement assets are allocated show a high degree of variability of their yield. High volatility of financial instruments is the evidence of low level of the stock market development in Ukraine, that unables to really assess the value of a particular security (for example, share value of a share of Ukrainian enterprises in a rather short period of time varies by tens percent), and does not provide investors with financial instruments of high quality that would show a positive real return over a relatively long period of time.

The analysis of the investment of pension funds in bonds and shares of Ukrainian emitters has shown a low level of management of the investment strategy of private pension funds, which respectively affects the investment return. Thus, private pension funds invest in retirement assets mainly in shares of the second and third levels of listing, which is quite risky. Thus, 27.5% of shares acquired by non-state pension funds are securities of the first level of listing, 52.4% – of the second and 20.1% – of the third level. A similar situation is observed with corporate bonds in the structure of investment portfolios of private pension funds. Only 2% of bonds purchased by non-state pension funds belong to the first level of listing, 29% – to the second level and 69% – to the third level of listing (Tumanova, 2011, p. 10).

One of the main ways of solving this problem, together with simultaneously efficiency improvement of pension assets management and ensuring their regular returns is to improve investment strategies of private pension funds of Ukraine taking into account advanced foreign experience. Special mention should be made of improving the allocation of pension assets among financial instruments.

In worldwide practice various investment strategies are used. One of the most effective investment strategies providing a regular return on retirement funds is the use of the Smart Investor rule. Researchers have shown that in the countries with Smart Investor rule in place, income of investment portfolios of private pension funds is higher and risks are lower (Davis & Yu-Wei, 2009).

Smart Investor rule in developed countries of the worldwide is enshrined in normative and regulatory documents: in the Directive 2003/41 / EU of the European Parliament and of the Council of 3 June 2003 "On the activities of institutions for labor pension provision and

supervision", the recommendations of the OECD Council on "The Basic Principles of the OECD on Asset Management of the Pension Fund" of June 5, 2009 and the United States Uniform Prudent Investor Act.

One of the most effective ways of improving pension assets management in Ukraine is gradual abandonment of quantitative methods of regulating composition and structure of investment portfolio of non-state social insurance institutions to the principles and rules of a Smart investor strategy that allows them to respond more adequately to changes in the economy and the stock market while maintaining transparency and reliability of investments.

The essence of the Smart investor strategy lies in the fact that the management system of non-state social insurance (or asset management company) is a fiduciary responsibility, according to which it is necessary to diversify investment portfolio in order to obtain the best returns at an acceptable level of risk.

One of the key aspects of managing retirement assets based on Smart investor strategy is their distribution by type of financial assets. 90% of investment results depend on the accuracy of choosing the structure of an investment portfolio (Davis, 2002).

To optimize the structure of the investment portfolio, the following objectives are to be observed: maximization of income obtained from pension assets allocation in a certain type of financial asset; reducing the riskiness of financial assets included in the investment portfolio; increase in the total amount of pension assets.

In order to optimize the investment portfolio, Markowitz method of investment portfolio optimization was used (Markowitz, 1952).

The optimal investment portfolio is the one that provides minimum risk for a given value of profitability  $E$  and maximum profitability at a given level of risk ( $r$ ). The degree of correlation of financial assets included in the portfolio exerts the main influence on the risk of the whole investment portfolio: the lower the level of correlation, the lower the portfolio risk.

If investment portfolio consists of 2 or more financial assets, then for any given level of profitability, there is an infinite number of combinations of investment portfolio structures with the same level of return. Thus, the main task is to find a combination with the expected rate of return  $E$  ( $r_n$ ) providing a minimum risk. Namely, it is necessary to find the minimum value of portfolio variances:

$$\sigma_n^2 = \sum_{i=1}^n W_i^2 \sigma_i^2 + \sum_i \sum_j W_i W_j \rho_{i,j} \sigma_i \sigma_j \quad (4)$$

under given initial conditions:

$$E(r_{portfolio}) = \sum_{i=1}^n W_j E(r_j) \quad (5)$$

$$\sum_{i=1}^n W_i = 1$$

To find optimal investment portfolio consisting of  $n$ -number of financial assets the following calculations were made::

- 1)  $n$  the value of expected return  $E$  ( $r_i$ ), where  $i = 1, 2, \dots, n$  – each financial asset in the investment portfolio;

- 2)  $n$  value of dispersions  $\sigma^2_i$  of each financial asset;
- 3)  $n(n-1)/2$  value of co-variance  $\sigma_{i,j}$ , where  $j = 1, 2, \dots, n$ .

As a result of substitution of the obtained values of  $E(r_i)$ ,  $\sigma^2_i$ ,  $\sigma_{i,j}$ , we defined  $W_i$  – specific share of each financial asset in the investment portfolio with a given level of return.

As one and the same portfolio with the same structure under various social and economic conditions gives different return due to the change of a current state of the market, the structure of two investment portfolios was calculated: under favorable economic conditions with low inflation rate and under economic downturn with high inflation level (*Table 4*).

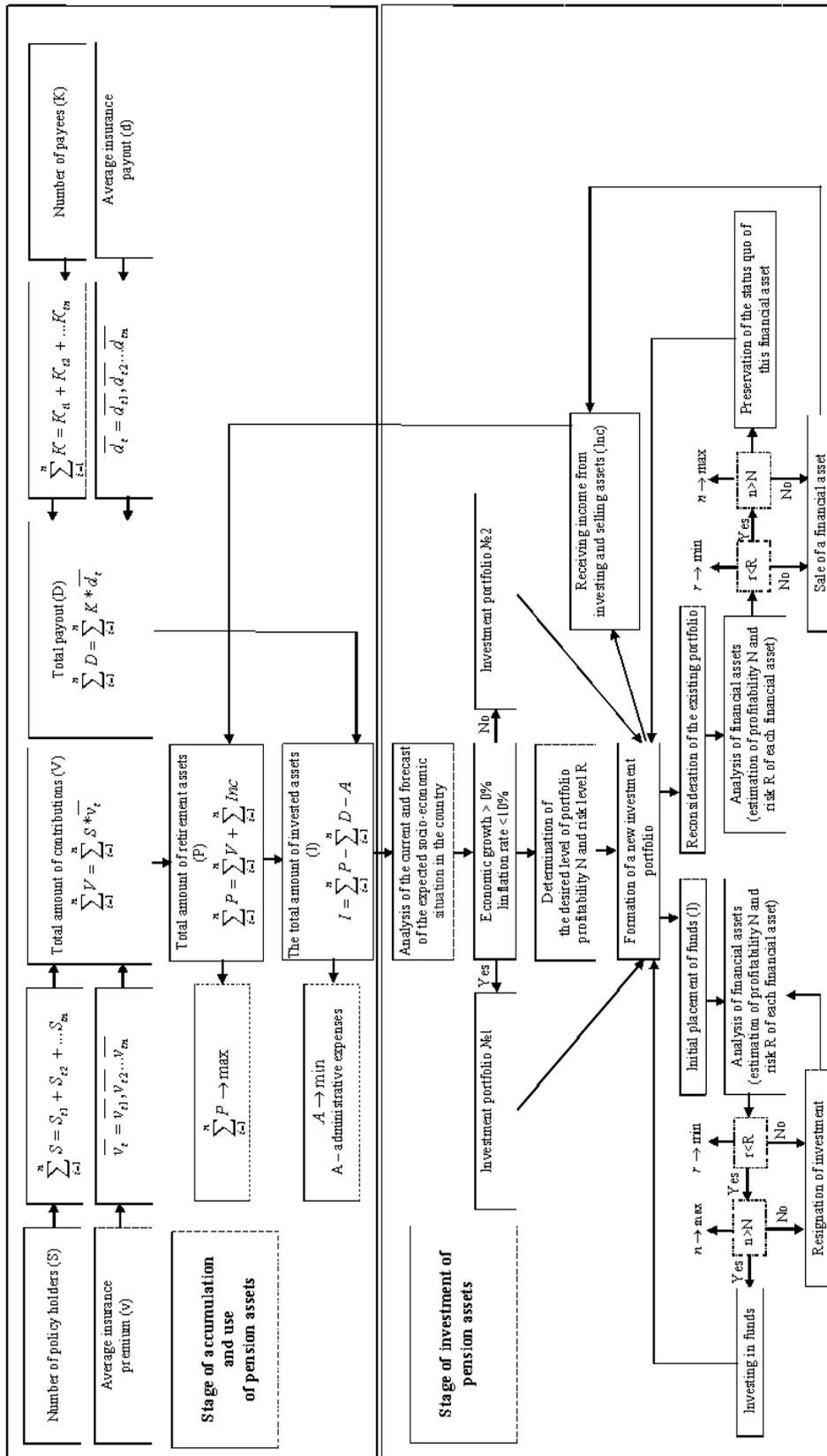
Table 4. Suggested investment portfolios for non-state social insurance institutions in Ukraine

Financial assets	Investment portfolio №1 (economic growth is over 0%, inflation rate is less than 10%)	Investment portfolio №2 (economic growth is less than 0%, inflation rate is more than 10%)
Funds on bank deposits	33,9	45,7
securities guaranteed by the Council of Ministers of the Autonomous Republic of Crimea, local councils	0	0
securities guaranteed by the Cabinet of Ministers of Ukraine	8,6	15,2
bonds certificates of Ukrainian emitters	32,6	24,9
shares of Ukrainian emitters	18,9	6,5
mortgage securities	0	0
property	4,0	3,5
banking metals	1,8	4,1
legal assets	0	0
other assets	0,2	0,1
Calculated real return of a portfolio %*	13,9	0,8

*Source:* own compilation.

Investment portfolio No. 1 is characterized by a larger proportion of specific share fractions and bonds of Ukrainian issuers that are more profitable but more risky than other financial assets. In a favorable economic situation and under low inflation rates, the increase in the share of financial assets data makes it possible to increase the overall return on investment portfolio without significantly increasing its risk profile. At the same time, under unfavorable economic situation and high inflation rates, it is recommended to increase the share of low-risk financial assets (cash in bank deposits and government bonds). It should be noted that the suggested investment portfolios are calculated exclusively for those financial assets that are currently used by non-state social insurance institutions in Ukraine in their investment activity.

Taking into account the estimated optimal investment portfolios, the following conceptual algorithm for managing investment activities of the non-state social insurance institution is suggested upon condition that prudent investor strategy is used (*Graph 2*).



Graph 2. The algorithm of investment activity management of the non-state social insurance institute on the basis of the of Prudent Investor strategy  
Source: own compilation.

Given model of investment resources management of non-state social insurance institutes is the most appropriate way for improving the existing policy of pension assets allocation in Ukraine. Pursuing this policy will contribute to the development of a more flexible investment assets management, which will allow non-state social insurance system to respond adequately to market changes while maintaining the transparency and reliability of investments and sustained growth in retirement assets in the long run.

## Conclusion

At the present development stage of social protection systems, a gradual transition from the solidarity principle of financing to the accumulative concept is taking place under the influence of demographic and economic changes. The findings of this study present evidence that increasing the share of non-state social insurance institutions positively affects economic growth. At the same time, a number of socio-economic factors affect the development of non-state social insurance system in different countries, which may slow down the processes of financial structure rearrangement of social protection systems. According to our research, slow development of non-state social insurance system in Ukraine is caused, in particular, by a low level of profitability of investment activity, which reduces the potential demand for insurance products across the population.

Along with inflationary processes and underdeveloped financial market, it can be explained by low efficiency of investment activity management. To solve this problem, the authors calculated optimal investment portfolios depending on the existing socio-economic conditions and developed an algorithm for managing the investment activity of the non-state social insurance institution based on the Prudent investor strategy. This will increase the profitability of investment activities of non-state social insurance institutions, which will positively affect the increase in demand for insurance products across the population of the country. The increase in the share of non-state social insurance in the long-term will positively affect not only the financing of social protection of the population (in particular, because of the reduction of the burden on public finances), but will also contribute to economic growth through the intensification of investment activity at the expense of accumulated financial resources of non-state social insurance institutions.

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