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Methodological Principles of Assessing the Volume of Investment Influx from Non-State Pension Funds into the Economy of Ukraine[*]

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ABSTRACT. This article addresses the processes of forming investment resources from non-state pension funds under current conditions in Ukraine and the laws and regulations that define the principles of the formation of investment institutions. Based on factors that in the nearest future will affect the decision-making process by which different kinds of investors make payments to non-state pension funds, we develop a procedure for assessing the volume of investment influx from non-state pension funds into the economy and propose a procedure for long- and short-term prognosis of the volume of investment influx from non-state pension funds into the Ukrainian economy.

KEY WORDS. Pension fund, non-state pension fund, pension insurance fee, investment potential, financial investments, investment portfolio return, methods of estimating volume of investment inflow from non-state pension funds into Ukrainian economy.

In most countries with a well-developed market economy, non-state pension insurance funds make up

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an essential segment of the financial services markets.

Improvements of the non-state pension system allow, on the one hand, to reduce the load on the state pension system with regard to payment of pensions, and, on the other, to create an internal source for long-term investments in a country's economy.[1] It seems significant that most of the post-socialist countries that are halfway towards a market economy have used the experience of fully-fledged market economies to implement projects oriented towards the provision of non-state pension.

Among financial institutions rendering the service of non-state pension insurance, non-state pension funds are high on the list. They are sharply distinguished from others whereby they conduct business exclusively in the area of non-state pension insurance, in contrast to other financial institutions (banks, insurance companies, etc.) that provide additional services beyond pensions.

Pension insurance services provided by non-state pension funds are increasingly popular in countries with well-developed financial services markets. This can be illustrated with the values of assets of US-based non-state pension funds' that nearly quadrupled from 1985 to 2000, having reached a total of US$4,588.2 billion.[2] By the beginning of 2002, among Western European countries, Great Britain and the Netherlands held the largest value of financial assets in non-state pension funds, US$1,658.4[3] and US$624.2[4] billion, respectively.

Among Central and Eastern European countries, Hungary and Poland have the most dynamically growing systems of voluntary non-state pension funds, with the former's financial assets of 358 billion forints

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[1] In the US, for example, pension funds are main participants on the capital market, owning approximately 27 per cent of all financial assets issued in the US by the end of 2004 (including over 23 per cent of US-issued shares and 12 per cent of corporate bonds), with the total asset value of all accumulative pension funds (including public [state and municipal] and private) of US$8.2 billion. Glen Hubbard, *Money, the Financial System, and the Economy,* 5th ed., Addison Wesley, 2005

[2] *Fund Industry: conception, distribution, administration*, Financial Technology Transfer Agency (ATTF), Luxembourg, 2003, p. 12.

[3] Ibid.

[4] Ibid, p.14.

(equal approximately to 1,348 billion EUR)[5] in 2002, reaching 434,4 billion forints (or 1,633 billion EUR)[6] by the end of 2003, and the latter's financial assets exceeding 29 billion zloty (approximately US$9 billion)[7] in 2002. Among the CIS countries, Russia and Kazakhstan figure prominently in this business.

In some countries, Chile for example, the system of non-state pension funds is used for accumulating personified mandatory pension insurance fees, with no personified accumulative state pension fund in place.

Reform of the pension insurance system in Ukraine began with the Verkhovna Rada's passage on 9 July 2003 of the Law «On non-state pension provision,» which also gave impetus to institutional changes in the financial services market.

Since 1 January 2004, non-state pension funds (NSPFs), banks, and insurance companies may operate on the non-state pension insurance market. Prior to this date, while banks and insurance companies had been running substitution services (such as special deposits, supplemental pensions' insurance, etc.) for the specific non-state pension insurance services, the NSPFs were working in the financial services market with virtually no legal support and protection. As a result, the statistical data of the State Commission on regulating the financial services market show that, by the beginning of 2004, the financial assets of active NSPFs did not exceed 23 million UAH. It should also be taken into consideration that after passing laws related to non-state pension insurance, large companies have shown a keen interest in creating NSPFs.

At the same time, an assessment of Ukrainian academic books and articles on the subject shows that only a few researchers, A. Fedorenko, D. Leonov, E. Libanova, N. Kovaleva, A. Yakymiv, have carried out

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[5] Zoltan Vaida, «Perspectives of the Pension Reform in Hungary,» materials from an international conference, *Pension Reform in Ukraine: Chances and Perspectives*, 3-5 December 2002, Kyiv.
[6] Czaba Nagy, «Experience of the Pension Reform in Eastern Europe: Hungary,» materials from an international conference, *Pension Reform in Eastern Europe: Chances and Perspectives*, 27—28 May 2004, Kyiv.
[7] Petr Kurovsky, «Experience of the Pension Reform in Poland in 1999—2002,» materials from an international conference, *Pension Reform in Ukraine: Chances and Perspectives*, 3-5 December 2002, Kyiv.

quantitative analyses of economic aspects of the provision of non-state pension.

Even these publications in scientific periodicals, however, are either fragmentary, incomplete, and do not complement the picture of an overall quantitative estimate of NSPFs' effect on investment processes in the economy (A.Fedorenko, D. Leonov, N. Kovaleva), or mostly based on the obsolete draft laws and regulations of Ukraine related to the subject (E. Libanova, A. Yakymiv). Therefore, there is a vital necessity to implement a scientific approach to formation of the NSPF system in the Ukrainian financial services market and to analysis of the effects of NSPFs on economic processes development.

Notwithstanding the fact that the State has no direct involvement in financial resources management of the non-state pension insurance system, the State's critical position is to attract long-term investments for the economic development of Ukraine and to gradually shift the focal point of attention from the state-provided pension sector to the non-state sector as the latter expands.

Therefore, the State, on the one hand, with the purpose of protecting participants of the non-state pension system, strictly regulates the investment activities of NSPFs and enforces stringent rules as to the structure and investment allocation of pension assets. On the other hand, the State may use the NSPFs' investment potential for increasing the financial market's activity and providing inter-industrial redistribution of long-term financial resources in the market. The main objective of this research study, therefore, is a research-based argumentation for evaluating NSPFs' investment potential and an analysis of the principles, developed by the authors, for long- and short-term forecasting of the influx of investment from the non-state pension funds into the Ukrainian economy.

Procedure for defining the volume of pension insurance fees paid by the expected number of non-state pension funds' participants

Basic characteristics of calculating the volume of pension insurance fees paid by potential participants in the NPSFs

Because the NSPF payment system is based on the principle of voluntary participation of persons and legal entities, the authors believe that calculating the volume of pension fees paid by the expected number of NSPFs' potential participants will be of a non-exact, predictive nature. However, there are also mandatory fees (payments to corporate NSPFs on behalf of employees carrying out hazardous and difficult work who receive a pension under privileged conditions).

Moreover, the Law of Ukraine «On non-state pension provision» envisages the right of an employer, as well as a person, to suspend payments, temporarily or permanently, to an NPSF. When payments are suspended, the risk factor will also be subject to evaluation.

In our opinion, the basic characteristics for estimating the volume of pension insurance fees paid by potential participants to NPSFs shall be divided into the following groups:

1) Demographic figures (sex, age), job market figures (number of employees by industrial sector);

2) Characteristics of sources of fee payments for voluntary pension accounts:

• employer's income, employers are potential NPSFs' payers (founders) in general and by industrial sector;

• average wages, in general and by industrial sector;

• specific weight of arrears of wages (including by industrial sector);

• subsistence wages;

• a person's monetary savings.

3)   Limitations, imposed by the Laws on Taxation[8] with regard to fee payments to privileged NSPFs:

 • a number of pension fee payers (persons and legal entities) who have the right to make privileged payments;
 • a maximum amount of payments on behalf of one person per month on which basis the person shall be granted a tax benefit;
 • a maximum amount of payments by the employer that can be carried out under privileged conditions in favor of one person;

4) Characteristics of fee payments to NSPFs under general conditions:

 • a contingent of NSPFs' participants by type of fund;
 • an average amount of the employer's payment to one participant (by type of funds);
 • an average amount of fee payment made by a person (on his/her own or his/her relatives' behalf);

5) Characteristics of fee payments to NSPFs under special conditions:

a)   an estimate of the volume of mandatory payments to corporate NSPFs at the expense of transferring privileged pensions to the third level of the Pension System:

 • a contingent of persons, who are provided with additional payments to secure their privileged pensions;
 • an index for the basis of extra charges to privileged pensions;
 • the rate of extra charges for privileged pensions;

b)   Evaluation of payments to NSPFs on behalf of employees of state-owned companies

 • an index of budgetary financing of payments on their behalf.

The mechanism of fee payments to different kinds of NSPFs, defined in the Law of Ukraine «On non-state pension provision,» is different in cases of:

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[8] Law of Ukraine, «On Taxation of Corporate Profit,» Law of Ukraine, «On Individual Income Tax.» official web-site of the Parliament of Ukraine www.rada.kiev.ua

1) employers, who pay fees to corporate NPSFs on behalf of their employees, have to make payments for all their employees;

2) there are no restrictions to open and professional NSPFs, i.e. investors (employers and persons) decide independently on the group of participants on whose behalf the payments will be made.

The authors believe the calculation of voluntary payments to NSPFs will depend on the following factors:

1) the average amount of a company's income by industrial
sector;

2) the average amount of a company's circulating assets in an industrial sector that are conditionally available;

3) the number of employed people who are capable of work (by industrial sector);

4) average monthly wages (income) by industrial sector;

5) the number of self-employed people;

6) the average monthly wages of self-employed persons by profession;

7) for companies in an industrial sector, the availability of corporate NSPFs, to which payments are made for the purpose of voluntary provision of pensions;

8) the volume of average monthly fees paid by businesses to open NSPFs;

9) the volume of average monthly fees paid by businesses to insurance companies according to the terms of pension insurance or long-term life insurance;

10) the financial share in the payroll fund of businesses that are founders (payers) to corporate NSPFs;

11) the financial share in the payroll fund of businesses that are founders (payers) to open NSPFs;

12) the average percentage of volume of money transferred to the non-state pension provision system by companies in an industrial sector.

Analysis of factors that affect the calculation of the volume of pension payments to NSPFs

In a formally logical approach, the following tendencies and links among the above-mentioned factors that affect the basic calculation figures can be predicted:

1) Since the companies of different industry sectors have a different weighted average structure of the basic characteristics necessary for calculating payments to NSPFs and depend differently on the external factors for a calculation pattern, the calculation shall be done in relation to an industry sector in order to precisely account for changes in the current economic situation and for changes in governmental control of the current situation.

Calculating the amount of payments at the expense of companies' obligations to NSPFs, some corrections should be made in connection with:

• a declining coefficient for wages payment by industrial sector (that takes into account the part of wages accounted for, but not yet paid);

• a declining coefficient of the availability of conditionally available circulating assets of companies in an industrial sector (that takes into account the existence of a source for pension fee payments).

2) Since transferring funds for employees' non-state pension reduces the net profit of a company-investor by the amount of fees paid to the NSPF (with a corrected tax factor of 1.0 if the fees deducted from the net profit are paid after taxation, or 0.75 if the fees are deducted from the total costs of a company-investor), this factor limits the financial capabilities of a company to make payments to an NSPF, balancing between the company's social and business development programs (whereby profits are used to finance the programs) and the interests of the owners who are in favor of paying out a certain part of profits as dividends.

3) With the purpose of securing a company's profit as a subject to taxation, the Tax Code limits the total sum of pension payment (to NSPFs, banks, or insurance companies) that a company may pay under

privileged conditions on behalf of an employee (i.e., the payments may be included in total costs), to fifteen per cent of the employee's calculated salary for a financial month, during which the payment is made, on the condition that the total sum may not exceed the amount of subsistence wages for a capable-of-work person (fixed on 1 January of a financial year) multiplied by 1.4 and then rounded off to the nearest integer divisible by 10. This way, the expected top amount of the employer's payments to an NSPF will not exceed the prescribed limit which, in turn, depends on the contingent of participants in an NSPF from this employer and the figure of average wages in a related industrial sector[9].

It is advisable to subdivide and consider the figures of average wages in two groups to obtain a more precise prediction:

First group — related to employees with fifteen per cent of average wages, not exceeding the amount of subsistence wages for a capable-of-work person (fixed on 1 January of a financial year) multiplied by 1.4 and then rounded off to the nearest integer divisible by 10.

Second group — related to employees with fifteen percent of average wages, exceeding the amount of subsistence wages for a capable-of-work person (fixed on 1 January of a financial year) multiplied by 1.4 and then rounded off to the nearest integer divisible by 10.

Therefore, the corrected wages fund in a related industrial sector will be used for final calculations, the fund holding no more money than the amount that allows employers to pay the highest volume of fees on privileged conditions.

4) It should also be considered that the maximum limit for a person with regard to pension payments on his/her behalf collected from all sources (employers, the person him/herself, his/her immediate relatives), may not exceed the amount of monthly subsistence wages for a capable-of-work person (fixed on 1 January of a financial year) multiplied

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[9] D. Leonov, «Pension Reform: Tax Bumps,» *Financial Services* No. 3 (2004): pp. 38-42.

by 1.4 and then rounded off to the nearest integer divisible by 10. If an employer pays out the employee's fees, then the employer's payments are to be immediately included in the calculation of tax benefits.

Therefore, it can be inferred from this factor that, on the one hand, a company's payments on behalf of its employees are limited to the sum of monthly fees that are within the bounds of tax benefit regulations applicable both to the company (investor) and to the employee, who is a beneficiary in this respect. On the other hand, it can be inferred that payments for the employee from other sources (such as from his/her immediate relatives, or from the person him/herself) under privileged conditions are limited only to the sum of the remaining balance of fees that can be paid under privileged conditions, as prescribed by the Law of Ukraine «On the Taxation of Natural Persons», after deducting the employer's amount of fees.

5) In calculating the volume of employees' fees that are paid out of their own pockets, the standard average value of people's monetary savings should be considered, seeing that the fees paid for immediate relatives and for his/herself follow the standard ratio of income by consumption/accumulation.

In addition to that, calculating the sum of employees' influx into an NSPF should be corrected for the decreasing factor of wages by industrial sector (counting the part of wages accounted for but not yet paid).

6) Methodological approaches to the calculation of the volume of future payments to NSPFs from self-employed and hired employees are virtually the same, with the correction in the latter case for the volume of an employer's fees within the bounds of the current tax benefits, as prescribed by the Law of Ukraine «On Taxation of Natural Persons.»

Therefore, the volume of fees paid by self-employed people can be calculated based upon the number of such people in an industrial sector, his/her monthly average wages, the average amount of savings in the population income pattern, and also upon the limit to payments under privileged condi-

tions to the non-state pension provision system, defined, with regard to a person, by the Law of Ukraine «On Taxation of Natural Persons» (the limit is a figure of monthly subsistence wages for a capable-of-work person [fixed on 1 January of a financial year] multiplied by 1.4 and then rounded off to the nearest integer divisible by 10).

7) In view of the initial stage of development in the Ukrainian non-state pension provision system and the underdevelopment of the corresponding institutional infrastructure (in particular, the system of NSPFs), figures that indicate the growth of the system of NSPFs should be calculated, with the purpose of predicting future payments to NSPFs based on the idea of «the level achieved for the previous period.»

Since pension contracts are usually a long-term agreement (established for seven to ten years) and the size of pension fees, defined in such a contract, is approved at the time of entering into a contract, we assume that the total initially-agreed sum of payment will be preserved in the future, as long as the contract is in force. The growth rate of the volume of pension fees can be calculated based upon the analysis of the growth rate of the number of participants in NSPFs by type of fund, the average amount of the employer's payment on behalf of a participant (by type of fund), and the average amount of payment made by a person him/herself (on his/her own or a relatives' account).

In this case, the limiting factors are:

For corporate payments,

• the negative trends of a company's conditionally available circulating assets in an industrial sector;

• decline in a company's profit;

• For personal payments,

• arrears of wages;

• subsistence wages' growth rate exceeding over the rate of wages.

These limiting factors may force payers to NSPFs (persons and employers) to temporarily suspend payments on already concluded contracts in the events defined by the Law of Ukraine «On non-state pension provision».

8)Calculating the volume of payments to NSPFs, competition on the market of NSPF services should be taken into account (besides NSPFs, insurance companies and banks may compete on the market), as well as the fact that some above-mentioned financial institutions may have had a head start (particularly, in the case of insurance companies in the long-term life insurance market having at least a year's lead in forming clients).

As previously mentioned, there are general restrictions as to tax benefits (calculated according to the combined amount paid to an NSPF, insurance company, and bank) that payers (employer, a person or his/her immediate relatives) to the non-state pension provision system may be granted. Also, with the purpose of correcting a potential amount of payments to NSPFs, a deduction of fees paid by employers and persons to other financial institutions shall be made from the calculated amount that allows for a probable maximum of tax benefits within the legal bounds.

Since some employers and persons may already have had long-term life insurance policies before the NSPFs activities started, average monthly fees on those insurance policies shall be deducted from the calculated potential volume of payments to NSPFs.

9)A possible funds transfer (mostly with regard to employers) from one kind of fund to another (for instance, corporate, trade, open) within the legal limitations prescribed by the Law of Ukraine «On non-state pension provision».

In certain cases, that can in general affect the volume of pension payments to NSPFs.

The most common case can be a funds transfer by an employer from a corporate to an open NSPF for the purpose of curtailing expenses for non-state pension provision (due to a reduction in the number of people who are beneficiaries of pension payments).

10)The estimate of volume of mandatory fees' to be paid to corporate NSPFs at the expense of moving pensions under privileged conditions to the non-

state level of pension provision[10] can be calculated by an approach similar to the one already in use for prognostic values of mandatory fees paid to the Pension Fund of Ukraine. It is logical because it is the direction of transfer that changes, not the principles of calculation.

11) Different methods can be used for calculating the estimate of payments to NSPFs in favor of state-owned companies' employees, depending on the laws regulating this subject.

The characteristics of budget financing of annual payments on behalf of these people, defined by the Law «On the State Budget» can be used directly while performing the first stage of NSPF payments estimate.

Procedure for estimating the volume of investment influx
from non-state pension funds into the economy

Basic characteristics of calculating the volume of investment influx from non-state pension funds into the Ukrainian economy

Basic input characteristics:
We believe that calculating the volume of investment influx from non-state pension funds into the Ukrainian economy should be based on the following basic figures:

1) Demographic figures of the number of potential participants in NSPFs, including:

1.1 Figures of the social-and-demographic structure of the employed population in terms of the population's age and sex, in order to subdivide persons who have reached the retirement age (defined by the Law of Ukraine «On non-state pension provision»), into these categories by participation in NSPFs:

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[10] The Law of Ukraine «On Mandatory State Pension Insurance» envisages this possibility in the future — official web-site of the Parliament of Ukraine www.rada.kiev.ua.

a) In favor of persons who, on the day of computation, have not reached the age of 70 (60+10) for men, or 65 (55+10) for women, pension payments may be made to NSPFs[11];

b) Pension payments may not be made to NSPFs in favor of men and women who have reached the age of 70 and 65, respectively, on the day of computation;

1.2 Prognostic employment factors of persons of retirement age;

1.3 Prognostic factors of percentage of disability retirement before the retirement age prescribed by law.

1.4 Prognostic factor of death rate.

2) Rates of average wages, including:

2.2 The average level of taxed income (profit), based on which pension fees are calculated, in general, and also, for the future analysis, as seen by:

2.2.1 population by age and sex,

2.2.2 the aggregate payroll fund by industrial sector,

2.3 Prognostic annual growth rate of actual earnings;

2.4 level of expected unemployment in the first age group.

3) Rate of pension fees paid by employers to NSPFs under privileged conditions on behalf of their employees may not exceed fifteen percent of the sum of wages of every NSPF's participant;[12]

4) Size of the maximum tax benefit on the tax on profits from fees per one natural person, which is equal to 1.4 of subsistence wages, fixed at the beginning of the current year, for a capable-of-work person;[13]

5) Prognostic factors of financial discipline of companies in an industrial sector and among corporate payers in general, that shall be used for calculating actual payments to NSPFs, compared to corresponding calculated payments;

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[11] According to the Law of Ukraine «On non-state pension provision,» a participant of an NSPF may decide himself on the age of retirement with regard to the NSPF, though the age must be within a ten-year range from the retirement age set by law for state pension provision.

[12] According to the Law of Ukraine «On Taxation of Corporate Profit» — official web-site of the Parliament of Ukraine www.rada.kiev.ua.

[13] According to the Law of Ukraine «On Individual Income Tax» — official web-site of the Parliament of Ukraine www.rada.kiev.ua.

6) Prognostic figures of corporate revenue performance in an industrial sector and among corporate payers in general, that shall be used for correcting the computation of actual sources of payments to NSPFs, compared to the calculated maximum amount of payments on privileged conditions made by those companies to NSPFs.

7) Prognostic factors of investment income, returned on investments of NSPFs' financial funds, in the order prescribed by law. We believe these calculations can be based on the projected level of investment profits from pension assets deposited in a bank on cash-based deposit accounts, with some deviations from this level;

8) Prognostic figures of administration costs due to pension assets management, including:

8.2 in accordance with the boundary tariffs defined by the State Securities and Stock Market Commission (SSSMC), an asset management company's annual fee may not be in excess of a 4.2 percent of the net value of pension assets.[14] Since the net value of pension assets increases, the annual fee payment will be on the rise, too. The increase of service fees of an asset management company can be defined as a function of net value of NSPFs' pension assets;

8.3 service fees of the manager of an NSPF, in accordance with the limited tariffs defined by the State Financial Services, may not be in excess of six percent of every fee payment in the case of an open fund, and five percent — in the case of a corporate or professional fund;[15]

8.4 service fees of the custodian (according to the boundary tariffs defined by the SSSMC, the custodian's maximum fee may not be in excess of 0.5 percent of the net value of pension assets);[16]

8.5 service fees for auditing.

Intermediate characteristics:

With the purpose of a further prognostic calculation, the authors propose the following intermediate

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[14] The State Securities and Stock Market Commission — official web-site http://www.ssmsc.gov.ua/
[15] The State Commission on Regulation of Financial Services Markets of Ukraine — official web-site http://www.ssmsc.gov.ua/
[16] The State Securities and Stock Market Commission — official web-site http://www.ssmsc.gov.ua/

characteristics for formalizing the statutes and regulations of the Ukrainian legislation on non-state pension provision:

1. n_t — value of payments paid to NSPFs in the year t;

2. o_t — value of one-off payment from NSPFs in favor of participants or their legal heirs in the year t;

3. v_t — amount of financial transfers from NSPFs in the year t; to banks and insurance companies for the purpose of insuring life annuities of the insured persons who are of the retirement age but do not want to receive their pension benefits for a certain time.

4. m_t — number of participants who receive a one-off payment[17] (the disabled participants under the 1st or 2nd category of disability who decided to receive the accumulated money before they reach the retirement age, and also legal heirs of deceased participants) in the year t;

5. x — year when insured persons of the same age started making payments;

6. g_t — number of persons whose accumulated money shall be transferred for the purpose of insuring life annuities;

7. h — coefficient of retirement among the employed persons who have reached the retirement age;

8. v_t — amount of money that is transferred in the year t by an NSPF to banks or insurance companies to insure life annuities of the persons who have reached the retirement age but do not want to receive pension from the Pension Fund.

9. $g(x)_t$ — number of persons who became participants in NSPFs in the year x, and whose accumulated money is transferred for the purpose of insuring life annuities in the year t.

10. $m(x)_t$ — number of the insured persons in the year t who became participants in NSPFs in the year x and are disabled in the 1st or 2nd category of disability. They decided to receive the accumulated money before they reach the retirement age. This

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[17] According to the Law of Ukraine «On non-state pension provision» — official web-site of the Parliament of Ukraine www.rada.kiev.ua.

money is also paid to the legal heirs of deceased participants.

11. y — sum of payments actually paid by persons out of their own pocket in the previous period.

Output characteristics

The output characteristics of our proposed procedure for calculating the volume of investment influx from non-state pension funds into the economy are: size of pension assets of NSPFs in every time period of a different year and, hence, its growth dynamics.

Procedure for calculating the volume of investment influx from non-state pension funds into the economy

The procedure for a long-term prognosis of the volume of investment influx from non-state pension funds into the economy of Ukraine

According to the procedure developed by the authors, the volume of investment influx from non-state pension funds into the economy of Ukraine is based on a sum of pension assets accumulated over the previous years and payments on behalf of participants in the current year. To obtain the final result, this sum will be at first increased by the investment profit from investing NPSFs' assets accumulated over the previous years and by the investment profit from payments in the current year, then decreased by the volume of expenditures for asset management of NSPFs accumulated over the previous years, by the administrative costs counted as a percentage of the payments in the current year, by the volume of one-off payments from NSPFs in favor of participants or their legal heirs, and, finally, by the amount of money transferred from a pension

fund to insurance companies in order to insure life annuities of the insured persons.

If N_T — volume of NPSFs' assets in a certain time period T (t = 1…T), then

$$N_T = \sum_{t-1}^{T}(n_t + y_{t-1} - I_t - A_t - o_t - v_t) \qquad (1)$$

where n_t — volume of employers' payments in the year t;

y_{t-1} — actual amount of payments paid by persons out of their own pocket in the previous year;

I_t — investment profit from investing NPSFs' assets;

fs_t — prognostic value of financial penalty (as one of the sources of NSPFs' financial capital formation) applied to legal entities and physical persons for violation of legislation as for calculation and payment of insurance payments, plus amount of administrative penalties;

A_t — administrative expenses on NSPFs management in the year t;

o_t — volume of one-off payments from NSPFs in favor of insured persons or their legal heirs in the year t;

v_t — amount of the money transferred from an NSPF in the year t to insurance companies in order to insure life annuities of the insured persons who have reached the retirement age and do not want to work and, therefore, will not start receiving pension by old age on a later date.

The value of n_t, the volume of employers' payments to NSPFs in the year t, depends on the number of employees P_t (adjusted for the projected death rate and the number of persons retiring on a disability pension at an earlier age than prescribed by law), the rate of pension fees paid to NSPFs, S, and the

value of average wages Z_t.[18] Moreover, we propose, while computing payments to NSPFs, to take into account the adjustment coefficients for financial discipline and profits of the companies in an industrial sector, as well as among corporate payers in general. The adjustment shall be used for calculating the actual payments to NSPFs, compared to the related computed payments[19].

$$n_t = P_t \times S \times Z_t \times 12 \times Kp_t \times Ki_t .$$ (2)

The investment profit from investing the NSPFs' assets in the year t is defined as an increment of 1) the investment profit level from investing the NSPFs' assets and 2) the sum of pension assets, accumulated over the previous years and in the year t:

$$I_t = i_t \times (N_{t-1} + n_t + y_{t-1}) ,$$ (3)

where i_t — rate of investment profit in the year t;

N_{t-1} — value of NSPFs' assets at the end of previous year.

The figure of administrative expenses on NSPFs management in the year t, A_t, is calculated as a total of the administrative expenses, which include asset management, fund management and safekeeping of pension assets, and service fees of NSPFs' consultants and auditors:

$$A_t = 0{,}042(N_{t-1} + n_t + y_{t-1})(1 + i_t) + 0{,}06(n_t + y_{t-1}) + \\ + 0{,}005(N_{t-1} + n_t + y_{t-1}) + ar + aa ,$$ (4)

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[18] Formula (2) can be simplified by calculating an individual average prognostic value of the rate of pension fees paid to NSPFs, S, or by using its factual value of the previous period. For example, the rate has a maximum value of fifteen per cent of wages, permitted by the Law of Ukraine «On Taxation of Corporate Profit». Then Formula (2) would be: $n_t = P_t \times S \times Z_t \times 12 \times Kp_t \times Ki_t = 1{,}8P_t \times Z_t \times Kp_t \times Ki_t$.

[19] We believe that these adjustment coefficients have to be computed based on the official statistics data for the previous accounting period.

where   *ar* — prognostic value of investment consult-
ants' fees;

    aa — prognostic value of audit fees.

It should be noted that Formula (4) assumes the
highest value, allowed by law, of service fees for
asset management and safekeeping. This formula will
be valid for all transition periods to non-state
provision, which is described below.[20]

We believe, the future non-state pension provi-
sion system in Ukraine will comprise the three fol-
lowing periods:

First: presumably will last the first year during
which persons paying out-of-pocket are not likely to
participate in the NSPF system. Payments are more
likely to come from companies on behalf of their em-
ployees. Making any prognostic assumptions seems
pointless until the end of this period because it is
virtually impossible to predict the initial condi-
tions from the very beginning in a voluntary system.

During the first period, NSPFs are only accumu-
lating payments, but are not paying out pensions,
with the exception of a one-off compensation in fa-
vor of participants who fall legally under the 1st
or 2nd category of disability, or in favor of de-
ceased participants. Variable o_1 denotes the total
of these one-off payments.

Second: presumably will last the next three
years. Similarly to the previous period, funds are
only accumulating payments, but are not making pay-
ments to insurance companies for insuring life an-
nuities. Nevertheless, one-off compensation is
granted to the legal heirs of participants. More-
over, persons who have the legal right to receive a
disability pension (under the 1st or 2nd category of
disability) and who decided instead to receive all
the money due in a lump-sum, may obtain this money
that has been accumulated on personal accounts of
NSPFs.

For the second period, we propose the following
formalistic approach to compute the value of invest-

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[20] We believe the rates of service fees for managing NSPFs, which are constant in Formula (4), can be in practice computed based on the official statistics data of the average value of the fees.

ment influx from non-state pension funds into the economy of Ukraine:

$$N_{T=2.4} = N_1 + \sum_{t-2}^{T} (n_t + y_{t-1} + I_t - A_t - o_t) \qquad (5)$$

where:

$$n_t = P_t \times S \times Z_t \times 12 \times Kp_t \times Ki_t . \qquad (6)$$

One-off payment to the participants of an NSPF who are legally disabled in the 1st or 2nd category of disability and decided to receive all the accumulated money due before the retirement age, and also to legal heirs to the deceased participants (the total number of beneficiaries = m_t in the year t) is expressed by the formula:

$$o_t = m_t \times \sum_{b=1}^{t} S \times Z_b \times 12 \times (1 - \frac{A_b}{N_b})(1 + i_b)^{t-b} \qquad (7),$$

The terms are:

S — Rate of pension fees paid by employers to NSPFs[21];

Z_b — average wages in the year b;

A_b — administrative expenses on NSPFs management in the year b;

N_b — volume of NSPFs' assets in the year b;

i_b — investment profit from investing NPSFs' assets in the year b;

b — number of years a participant has made payments to NSPFs.

$$m_t = w_t \times P_t + e_t \times P_t , \qquad (8)$$

where w_t — prognostic death rate in the year t;

e_t — prognostic rate of retirement on a disability pension (covering persons in the 1st and 2nd category of disability).

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[21] This can also be a maximum, or statistical average (see Footnotes 18-19)

It is significant that we do not precisely calcu-
late the volume of pension benefits that are paid in
one lump-sum in connection with a person's death or
disability. We have to consider people who will join
the system not from its first year of implementa-
tion, but in future years (i.e., they will not have
reached the employment age by the time the new sys-
tem comes into effect). For more accurate calcula-
tion of benefits payable in favor of this age group,
it is necessary to precisely calculate figures in
terms of sex and age. The initial value of Index *b*
= *x*, where *x* is the first year when a same-age
group of insured individuals starts making payments.

Third: We believe this period will begin four
years after the system of NSPFs is effectively im-
plemented in Ukraine.[22]

For this period, we propose the following formal-
istic approach to compute the value of investment
influx from non-state pension funds into the economy
of Ukraine:

$$N_{T>4} = N_{20} + \sum_{t-21}^{T}(n_t + y_{t-1} + I_t - A_t - o_t - v_t) \qquad (9)$$

However, to more precisely calculate values for
the third period, additional characteristics regard-
ing fees paid by people who will start their employ-
ment after some years the new system of calculation
by sex-age group is in place.

$$v_t = \sum_{x=1}^{t}\left\{g(x)_t \times \sum_{b=x}^{t}(S \times Z_b \times 12)(1 - \frac{A_b}{N_b})(1 + i_b)^{t-b}\right\}, \qquad (10)$$

where *x* — is the first year when a same-age group
of insured individuals starts making payments;

$g(x)_t$ -number of persons who became participants
in NSPFs in the year *x*, and whose accumulated money

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[22] At the beginning of the third period, computations may be corrected based on the factual results of
NSPFs' activity achieved by the end of their fourth year of existence (i.e., by the end of 2008).

is transferred for the purpose of insuring life annuities in the year t.
Note, that:

$$g(x)_t = g1(x)_t \times (1 - f) + g2(x)_t \times h \; . \qquad (11)$$

The terms are:

$g1(x)_t$ — number of persons who became participants in the non-state pension provision system in the year x and will reach the retirement age in the year t;

f — prognostic rate of employment among persons of the retirement age;

$g2(x)_t$ — number of persons of the retirement age, who became participants in the non-state pension provision system in the year x and continue to work;

h — rate of retirement among working persons of the retirement age.

Similarly, one-off payments in the year t to legal heirs of deceased insured persons and insured persons who became participants in the year x and are disabled in the 1st or 2nd category, and who decided to obtain their accumulated money before their retirement age, can be calculated more precisely:

$$o_t = \sum_{x=1}^{t} \left\{ m(x)_t \times \sum_{b=x}^{t} (S \times Z_b \times 12)(1 - \frac{A_b}{N_b})(1 + i_b)^{t-b} \right\} \qquad (12)$$

where $m(x)_t$ — number of persons, in the year t, who became participants in the year x and are disabled in the 1st or 2nd category, and who decided to obtain their accumulated money before their retirement age, and also legal heirs of deceased insured people.

During *the fourth period*, we believe that personal savings will be drawn into the system of NSPFs[23]. Taking into consideration, on the one hand,

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[23] According to the Law of Ukraine «On Non-State Pension Provision,» persons may, but do not have to pay out-of-pocket to NSPFs. Their participation as payers to NSPFs is absolutely voluntary. Therefore, a natural

the human factor in making voluntary decisions to
make payments out-of-pocket, and, on the other, the
long-term liabilities of persons with pension agree-
ment on their own or their immediate relatives' be-
half, it seems reasonable to simplify the prognostic
procedure of estimating the volume of these pay-
ments. This can be done by each-year statistical
evaluation of growth rate of pension payments com-
pared to the previous time period.

The procedure for a short-term prognosis of the volume of investment influx from non-state pension funds into the economy of Ukraine

The calculation of the volume of investment in-
flux from non-state pension funds into the economy
of Ukraine in the short-term was developed by the
authors and based upon the necessity for monthly
computations with a correction of input character-
istics at the beginning of each year. The charac-
teristics to be clarified are:

- N_{t-1} — volume of NPSFs' assets at the end of the
previous year;

- Z_t — average wages (projected from the previous
year's average wages);

- K_t — adjustment coefficient for rate of finan-
cial discipline of companies in an industrial sector
and corporate payers in general, that shall be used
for calculating actual payments to NSPFs, compared
to corresponding computed payments (assuming that
the adjustment coefficient is the same during the
year and equal to its previous year's value);

- i_t — rate of investment profit in the current
year (based on the investment profit in the previous
year);

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person has no obligation to pay his own money, whether or not he has an NSPF account in his name opened by
an employer, his relatives, or the union.

- *ar*, *aa* — values of investment consultants' fees and audit fees, adjustment based upon the previous year's payments;
- m_{t-1} — number of persons who are disabled in the 1st or 2nd category, and who decided to obtain their accumulated money in one lump-sum payment before their retirement age, and also legal heirs of deceased persons (adjustment based upon the factual number of people in the previous year).
- O_{t-1} — average value of one-off payments in the previous year;
- g_{t-1} — number of persons whose accumulated money was transferred for the purpose of insuring life annuities or transferred to banks in the previous year (adjustment based upon the factual number of people in the previous year);
- V_{t-1} — average value of money transferred to insurance companies to insure life annuities, or transferred to banks.

Therefore, if N_{t-1} — value of NSPFs' assets in the previous year, let us assume that $N_{m-1} = N_{t-1}$, and this value is factual, then in order to compute the value of NSPFs' assets at the end of each month in the current year t we use the following formula:

$$N_M = N_{m-1} + \sum_{m=1}^{M} (n_m + I_m - A_m - o_m - v_m) \qquad (13)$$

where:

N_M — total value of NSPFs' assets at the end of month $M, M \leq 12$;

n_m — total value of fees paid in the month m;

I_m — investment profit from NSPFs' asset investment in the month m;

A_m — administrative costs on NSPF management in the month m;

o_m — total value of one-off payments in favor of insured persons or their legal heirs in the month m;

v_m — total value of money that an NSPF transfers in the month m to insurance companies to insure life annuities of the persons who have reached their retirement age, and who do not want to work and receive pension from an NSPF.

Value of fees paid to NSPFs in the month m depends on the number of employees P_t (assuming this number is stable during the year t), the rate of mandatory payments to NSPFs S, and the average wages Z_m (corrected based on the factual average wages in the previous year). Besides, to calculate payments to NSPFs, we propose to consider the adjustment coefficients for the financial discipline rate and profit rate of companies in an industrial sector and corporate payers in general, that shall be used for calculating actual payments to NSPFs, compared to corresponding computed payments (assuming that the adjustment coefficients are stable during the year).

$$n_m = P_t \times S \times Z_m \times Kp_t \times Ki. \tag{14}$$

The investment profit from investing the NSPFs' assets in the month m is defined as an increment of 1) the investment profit level from investing the NSPFs' assets (to simplify calculations, no adjustment for the number of days in a month is made), and 2) the sum of pension assets, accumulated over the previous periods and in the month m:

$$I_m = \frac{i_t}{12} \times (N_{m-1} + n_m + y_m), \tag{15}$$

where i_t — rate of investment profit in the year t (adjusted based on the previous year's actual figure);

N_{m-1} — value of NSPFs' assets at the end of the previous month.

The figure of administrative expenses on NSPFs management in the month m, A_m, is calculated as a total of the administrative expenses, which include asset management, fund management and safekeeping of pension assets, and service fees of NSPFs' consultants and auditors:

$$A_m = \frac{\dfrac{0{,}042(N_{m-1} + n_{m-1} + y_{m-1})(1 + i_m)}{12} + 0{,}06(n_t + y_{t-1}) + 0{,}005(N_{t-1} + n_t + y_{t-1}) + ar + a}{12}, \qquad (16)$$

where ad, ar, aa — service fees of chief executives of an NSPF for administration, investment consultants' fees, and audit fees; all the expenses are corrected based on the previous year's total expenses.

Let us assume there is only a slight value deviation in the current year's short-term calculation of one-off payments from the previous year's one, and we may just neglect the difference to simplify our computation. Then, the value of one-off payments to persons who are disabled in the 1st or 2nd category and who decided to obtain their accumulated money in one lump-sum before their retirement age, and also to legal heirs to deceased persons (we assume the actual number of such persons equals to that in the previous year, m_{t-1}, and that O_{t-1} is the average amount of one-off payments in the previous year) is expressed by the formula:

$$o_m = \frac{m_{t-1} \times O_{t-1}}{12}, \qquad (17)$$

where v_m — amount of money transferred by a pension fund in the month m to insurance companies to in-

sure life annuities of the persons who have reached
their retirement age and 1) do not want to work and,
therefore, will not receive their old age pension on
a later date, or 2) postpone their retirement, after
reaching the retirement age, to some point in the
future.

This amount for the short-term prognostic purpose
is expressed by the formula:

$$v_t = \frac{g_{t-1} \times V_{t-1}}{12}.$$

(18)

We also assume that the number of persons in the
year t, whose accumulated money is transferred to
insure life annuities g_{t-1}, approximately equals to
the number of such persons in the previous year.
V_{t-1} is the average amount of the accumulated money
transferred to insurance companies to insure life
annuities in the previous year.

Summary

Based upon the above analysis of our procedure
for calculating the volume of investment influx from
non-state pension funds into the economy of Ukraine,
we have come to the following conclusions as to per-
spectives of the future practical use of the proce-
dure:

1.   A prognostic calculation of the volume of
investment influx from non-state pension funds into
the economy of Ukraine can be done with a certain
level of probability based on the current statisti-
cal data within the legal bounds defined by existing
legislation.

2.   The calculation accuracy of the volume of
investment influx from non-state pension funds into
the economy of Ukraine can be affected by both ob-
jective and human factors.

3.   The objective factors that affect calcula-
tion accuracy of the volume of investment influx

from non-state pension funds into the economy of Ukraine are:

✓Forecast errors in the figures of social-demographic structure in relation to the population by age-sex group. Taking into consideration the low level of trust of financial institutions in people, there is a slim possibility of investing the money voluntarily out-of-pocket into the pension provision system.

✓Terms of beginning the payment process by persons who became insured in the middle of a year and terms of money transfer to insurance companies for covering life annuities, and also lump sum payments in favor of such people or their legal heirs.

✓Prognostic coefficients of employment rate among persons of the retirement age are closely correlated to the age of retirement itself. If we assume that in the future this age will be raised (as has been done in other countries), then these coefficients will go down for some time, but later on they will bounce back.

✓Wage levels, based on which the insurance fees are paid, and levels of subsistence wages for an employed person. These levels, in turn, depend on the dynamics of the GNP and can be only loosely predicted in the long-term because economic changes are tightly connected to political processes in a country.

✓Prognostic coefficients of financial discipline and profitability of companies in an industrial sector and among corporate payers in general, that shall be used for calculating actual payments to NSPFs, compared to corresponding computed payments.

✓Accuracy of prognosis for the rate of investment profit that will be obtained as a result of investing the money of NSPFs. The accuracy depends on the economic situation and inflation dynamics in the country.

4. The human factors that affect the accuracy of calculating the volume of investment influx from non-state pension funds into the economy of Ukraine are:

✓Voluntary participation of persons, paying out-of-pocket, in NSPFs.

✓Voluntary participation of companies-employers in NSPFs and arbitrary fixing of the value of fees in favor of their employees.

✓Changes in the main directions of investment policy and standards of NSPFs' asset investment that by law can be made by Councils of NSPFs during the year, which will result in the changes of investment income rates in the current year and the years that follow. This makes any long-term prediction inaccurate.

The authors intend to put this methodological model to a test based on the characteristics of NSPFs activity in Ukraine in 2005. The authors would greatly appreciate suggestions and feedback from the readers.

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