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Study on the dynamics of voluntary private pension fund assets in Romania

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The economic and financial crisis manifested internationally has led to a drop in value of the private pension fund assets in many pension systems in the world, causing a reallocation of the investment of these assets in low risk placements. The consequence of decreasing the value of private pension fund assets on behalf of their influence factors has strong implications for the declining confidence of policyholders in these types of placements, affecting their contribution cut. In the present study, we measured the variation of the net assets of pension funds in Romania under the influence of five variables: exchange rate, loan interest rate, deposit interest rate, benchmark interest rate and stock market value index (BET-C index). We used the multiple linear regression method and we analyzed both the correlation between the dependent variable and the independent variables, and the engendering of the coefficients needed to determine the regression equation. To counter the effects of the decrease of the net asset value of the facultative pension funds, a mix of their placements, dynamic and adaptable to the variation of the influence factors shall be developed for a short time horizon.

Key words: Private pensions, net assets, investments, influence factors, statistical correlations.

INTRODUCTION

For the analysis of the pension systems in the world, numerous studies and analysis have been developed, regarding their organization, the yield of undertaken investments, their guarantee and regulation schemes and other issues.

International pension schemes are, for the most part, a combination of their public and private component. Currently, a popular variant of the pension systems is a minimum pension, guaranteed by the public pension system, known as the PAYG system, supplemented by a private pension, based on the contribution of the insured. The importance of private pension schemes has become increasingly great, states being in various stages of development: the accumulation phase or the benefit payment phase.

Depending on the type of benefits obtained, the pension systems can be i) defined contribution (DC) pension plans where the only element fixed in advance is the size of the contribution, the benefits obtained vary according to the results of investing the participant’s fund assets; ii) defined benefit (DB) plans usually held at a company or an industry level, in which the pension is a defined part of the salary of the beneficiary (usually for the last years of activity), and the risk of investment is supported by the pension fund; iii) hybrid systems, combining DC and DB characteristics.

In 1994, the World Bank suggested a concept of pension system based on three pillars, an approach that has become very common today. The three pillars differ in terms of objectives, principles relating to contributions and benefits, public or private nature, optional or compulsory nature, which allow combining different elements in the most appropriate ways (Cristea et al., 2007).

With respect to the organization of the pension system in Romania, it is structured according to the model proposed by the World Bank, which is the three pillar
The public pension system, which is the 1st pillar, under the supervision of the National House of Public Pension.

The retirement age for women is now 59 years, and for men, 64 years (expected for the retirement period December 2010 to March 2011). The new law on the unitary system of public pensions, with effect from 1 January 2011, provides retirement at 65 years for men and 63 years for women (Law no. 263/2010 on the unitary public pension system), a gradually increase of this age until January 2015 for men, respectively until January 2030 for women, being envisaged;

2) The private pension system, under the monitoring of the Private Pension System Supervisory Commission, with its two components:

i) 2nd pillar - privately managed mandatory component, governed by Law no. 411/2004 on private pension funds, as subsequently amended and supplemented, launched in May 2008;

ii) 3rd pillar - privately managed facultative component, governed by Law no. 204/2006 on facultative pensions, launched in May 2007.

Second-pillar private pension is mandatory for new people entering the labor market and have more than 35 years and is optional for the other categories of persons under the age of 45, who are already insured and contribute to the public pension system.

Participants in the facultative third pillar pension can be all those persons with an income from professional activities, paying contributions individually or together with their employers, provided that the level of contributions does not exceed 15% of the gross salary income of each.

Since 2010, contributions are deductible from paying income tax for each participant within the equivalent of 400 Euros per year, and if the employer contributes too, the same level of deductibility in computing taxable profit applies (before 2010, the deduction limit was 200 per year).

Pension systems around the world face chronic difficulties that inevitably will chronicle in the years ahead. The origin of imbalances of the pension systems are in the development and demographic trends regarding the population aging process while reducing birth rates, increasing the average lifespan, inflation, rising costs need in the post-active period, early retirement, increase in quality of life and last but not least, reducing the dependency ratio (that is, decreasing the number of taxpayers and increasing the number of retiring). In Romania, about 19.2% of Romania’s population is over 60 years and in 2030, studies show that their share will climb to 22% of the total population (Private Pension System Supervisory Commission, 2007).

**THEORETICAL FOUNDATIONS**

The economic and financial crisis manifested internationally "...has reduced the value of assets accumulated to finance retirement by around 20 to 25% on average according to the latest OECD figures" (Antolin and Stewart, 2009). Also, the crisis effects led to a reallocation of investments of pension funds assets towards low risk placements, "a trend which has been noted by pension regulators in OECD countries such as Norway, Slovakia, Spain and Turkey and in other areas (for example Kenya, Bulgaria, and Costa Rica – where domestic investments have increased)" (Antolin and Stewart, 2009).

Reducing the value of private pension fund assets influences on the one hand, their solvency and the level of financing of the defined benefit pension plans (DB); on the other hand, defined contribution private pension plans, DC, are also affected, through the decrease in aggregate amounts in insured accounts.

Clark and Urwin (2007), seeking to discover the best practices for investment management, have shown that a strategic mix of placement assets, while versatile, will create opportunities to obtain value added. "Belief that asset classes can be temporarily expensive, or cheap, suggests a dynamic medium-term approach to asset allocation based on relatively frequent assessment of relative value" (Clark and Urwin, 2007).

Built on the basis of case studies of best practices of placement asset management and pension fund field, Clark and Urwin have demonstrated that they are based on certain principles: “organisational coherence, including an institution’s clarity of mission and its capacities”, people, including who is involved in the investment process, their skills and responsibilities and process, including how investment decision-making is managed and implemented" (Clark and Urwin, 2008).

The efficiency of the investments made by pension fund also depends on the performances of the companies they invest in. In this respect, when analyzing the value of the private pension fund assets, we must take into consideration the performances that these companies provide for there shareholders. This way, “the economical power and the living standard of the population depend on the capacity of the companies to carry on their activity in an efficient way” (Siminica et al., 2008).

In most international pension schemes, various versions of Pension Benefit Guarantee Schemes are set. Arguments for such guarantee schemes consider the prevention of the “market failure” and the diversification of fund assets investments to reduce their risk. "A pension guarantee fund cannot work properly without adequate funding rules" (Stewart, 2007).

Romania is one of the few countries that requires administrators of private pensions to create actuarial reserves and where the law on facultative private pension system provides an absolute guarantee on the amount of
net contributions. “Romania has the widest range of instruments for risk control: separation of assets, actuarial reserves, verification by the depositary, guarantee fund, audit, minimum rate of return” (Zavoianu, 2010).

“European pension fund management has traditionally been strongly based on domestic bond investment” imposed by “portfolio regulations and investor caution resulting from past experiences of equity risk” (Davis, 2002). The Romanian pension system, as part of the financial system, has undergone influences of the current global economic conjuncture, the financial and economic crisis, and recent economic and political developments at national level.

Thus, “the IMF agreement, anti-crisis measures, unemployment, exchange rate developments, monetary policy interest rate, etc., have said the word in a certain extent on the assets and the pension system in its entirety “ (Mot, 2010).

CONCEPTS AND METHODOLOGY

Description of data used for analysis

In Romania, the main indicators of the facultative pension funds, the third pillar, at the end of November 2010, according to the CSSPP reports, were the following (extracted from Monthly Bulletin, Private Pension System Supervisory Commission, year III, no. 11/2010):

i. A total of 13 active pension funds managed by 10 companies, divided into three risk categories depending on the placements made: Low risk funds, medium risk funds and high risk funds.

ii. The number of participants in facultative pension funds, of 216,945, increased by 15.9% compared to the end of 2009 (December), by 18.0% compared to November 2009 and by 1.3% compared to the previous month. The coverage of the total number of participants in the total of employees in Romania was 4.8% of the total number of employees (Monthly Bulletin, Private Pension System Supervisory Commission, p. 14).

iii. The degree of concentration depending on the number of participants was 67.2% for the first three facultative pension funds, belonging to the pension managers ING, BCR and Allianz-Tiriac BCR, for the medium risk funds (ING and Allianz-Tiriac) and low risk (BCR) and 86.6% for the first five pension funds (to the first three, ING and Allianz-Tiriac are added, for the high-risk fund component).

iv. Net assets, worth 73.2 million Euros (314.4 million lei), increased by 54.1% compared to December 2009, by 63.7% compared to November 2009 and by 2.4% compared to the previous month;

v. Of the total net assets of facultative pension funds, 91.2% were placed in the country, and the remaining 8.8% were placed abroad.

Private pension fund assets are invested in compliance with prudential rules imposed by CSSPP. For facultative pension funds, the following prudential rules of investment of their assets are imposed (summarized provisions of art. 84 of Law 204/2006 on facultative pensions):

i. To be conducted in the interest of participants and beneficiaries, in a manner that ensures their safety, quality, liquidity and profitability, in instruments traded on a regulated market;

ii. Placements in derivative financial instruments are allowed only insofar as they contribute to the reduction of investment risks or facilitate efficient management of assets;

iii. Assets are adequately diversified so as to avoid excessive dependence on a particular asset, issuer or group of companies and concentration of risks in the overall assets.

Each facultative pension fund manager establishes its own fund assets investment policy in placements required by law, subject to maximum limits imposed by it (art. 87 of Law 204/2006 on facultative pensions). Thus, investments of facultative pension fund assets, according to law, shall be made in the following types of placements:

i. Money market instruments, including accounts and deposits in domestic currency (RON) at a bank, Romanian legal person, or a branch of a foreign credit institution authorized to operate in Romania, not to exceed a percentage greater than 20% of the total value of the facultative pension fund assets;

ii. Securities issued by the Ministry of Public Finance of Romania, issued by Member States of the European Union or European Economic Area, in a percentage up to 70% of the total value of the facultative pension fund assets;

iii. Bonds and other securities issued by local public authorities in Romania or in the Member States of the European Union or European Economic Area, in a percentage up to 30% of the total value of the facultative pension fund assets;

iv. Stocks and shares traded on regulated and supervised markets in Romania, in Member States of the European Union or the European Economic Area, in a percentage up to 50% of the total value of the facultative pension fund assets;

v. Securities and stocks and shares issued by third countries, representing up to 15% of the total value of the facultative pension fund assets;

vi. Bonds and other stocks and shares traded on regulated and supervised markets, issued by local public administrative authorities in third countries represent, representing up to 10% of the total value of the facultative pension fund assets;

vii. Bonds and other stocks and shares of foreign non-governmental organizations, if these instruments are listed on authorized stock exchange markets and meet the rating imperatives, in a percentage up to 5% of the total value of the facultative pension fund assets;

viii. Securities issued by organizations of collective placement in transferable stocks and shares in Romania and other countries, representing up to 5% of the total value of the facultative pension fund assets;

ix. Other forms of investments approved by law.

In addition, depending on the nature of the issuer of instruments in which the manager can invest, the maximum rates permitted by current legislation in Romania are:

i. 5% of facultative pension fund assets may be invested in one company or its every category of assets;

ii. 10% of facultative pension fund assets may be invested in assets of a group of issuers and their affiliates.

The evolution of the net assets of the facultative pension funds over the entire collection period, from the establishment until now, is presented in Appendix 1. Net asset placements of facultative pension funds in Romania on investment categories allowed by law are presented in Figure 1.

As it can be seen from Figure 1, facultative pension fund investments mainly target government securities and bank deposits, accounting for approximately 75% of their total value.

One can notice a slight decrease in the share of government securities in total assets during the first 11 months of 2010, from 68.9% in December 2009 to 63.6% in November 2010. Government securities, except treasury certificates, have short maturities, ranging from 3 to 5 years, representing 49.49% of total
government bonds.

Bank deposits represent 11.3% of total facultative pension fund assets, following an increasing trend from the end of 2009, by 185.5% compared to December 2009 and by 237.2% compared to November 2009. In relation to deposits, short-term deposits with terms less than one month predominate, accounting for 63.02% of their total value.

The value of investments in shares of facultative pension funds is 12.92% of their total assets, following an increasing trend by 58% compared to December 2009 and by 70.1% compared to November 2009. During 2010, the share of investments in shares had an oscillating evolution, representing 14.58% of total assets at the end of the first quarter, by 11.41% at the end of the second quarter, followed by a slight increase at the end of the third quarter up to 13.88%, then a decline down to 12.98% at the end of November 2010. The shares were purchased mainly from the domestic market, while 12.87% of the total shares from foreign markets. Overall, compared to the end of 2009, the structure of facultative pension fund portfolios at the end of November 2010 incurred some changes, in terms of an almost double increase of exposures on bank deposits and bonds issued by international organizations (European Bank for Reconstruction and Development, World Bank, European Investment Bank). The remaining assets have experienced decreases in the shares of total assets of the facultative pension system.

Given the structure of facultative pension fund investments, we will test the extent to which certain factors influence the evolution of assets managed by the facultative pension funds. Thus, some influence factors of the evolution of facultative pension fund assets are as follows:

1) The level of interests that may affect the trading value of fixed income instruments in the opposite direction of the evolution of interests. Also, “depending on the level of interests, the reinvestment risk can occur (the risk of not being able to reinvest at maturity an amount of money placed in an asset at the same interest), particularly in relation to interests on fixed-income instruments (government securities), in 2009” (Mot, 2010). Facultative pension fund deposits are established in national currency at banking companies in Romania.

2) The exchange rate, which influences the value of assets denominated in foreign currencies at the moment of their evaluation. Thus, depreciation rate of the national currency against the euro determines increases in the value of these assets. For the 3rd Pillar, at the end of September 2010, the exposure of the pension funds on assets denominated in currencies other than the national currency was 4.77% of total assets;

3) The stock market and its evolution also influence the value of assets held by the pension funds. The value of investments in shares, for the third pillar, at the end of November 2010, represented approximately 13% of the total fund assets. Investments in shares listed on stock exchanges in European Union member states accounted for 1.79% of total assets of the facultative pension system.

In the analysis, we use monthly data supplied by the Private Pension System Supervisory Commission, National Bank of Romania and Bucharest Stock Exchange for the period June 2007 to November 2010 (research applies to a number of 42 monthly observations). Based on these influence factors, variables used for testing the statistical correlations are:

i. The net assets of facultative pensions, as a dependent variable (its value during the period under review, June 2007 to November 2010 can be found in Figure 1 of Annex 1);

ii. The RON/EUR exchange rate, interest rates on loans, deposit interest rate, the benchmark interest rate and the BET-C index value as independent variables (values found in Figures 1 to 5 in Annex 2).

Description of the method

The analysis of the correlation between the dependent variable and the five identified independent variables can be done both separately, through the correlation coefficient, analyzing the correlation between the dependent variable and an independent variable chosen from the group of variables studied or globally, within the linear regression.

The intensity of the correlation between the studied variables is assessed using the Pearson correlation coefficient. It takes theoretical values between -1 and 1; the positive values indicating direct correlations, the negative correlation indicating inverse correlations (one variable increases, while the other decreases). The Pearson correlation coefficient indicates a better dependency between data as its value is closer to 1 or -1 (1 implies a perfect correlation that is obtained only when a set of data is correlated with itself). Also, the significance threshold should be
Table 1. Correlation between the dependent variable and the independent variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange rate</th>
<th>Loan interest rate</th>
<th>Deposit interest rate</th>
<th>Benchmark interest rate</th>
<th>BET-C index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson correlation</td>
<td>Net assets</td>
<td>0.832</td>
<td>0.111</td>
<td>-0.075</td>
<td>-0.384</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>Net assets</td>
<td>0.000</td>
<td>0.243</td>
<td>0.320</td>
<td>0.006</td>
</tr>
<tr>
<td>N</td>
<td>Net assets</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 2. Variables entered/removed*.  

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables entered</th>
<th>Variables removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exchange rate</td>
<td></td>
<td>Forward (Criterion: Probability-of-F-to-enter &lt;= 0.050)</td>
</tr>
<tr>
<td>2</td>
<td>Deposit interest rate</td>
<td></td>
<td>Forward (Criterion: Probability-of-F-to-enter &lt;= 0.050)</td>
</tr>
<tr>
<td>3</td>
<td>BET-C index</td>
<td></td>
<td>Forward (Criterion: Probability-of-F-to-enter &lt;= 0.050)</td>
</tr>
<tr>
<td>4</td>
<td>Benchmark interest rate</td>
<td></td>
<td>Forward (Criterion: Probability-of-F-to-enter &lt;= 0.050)</td>
</tr>
</tbody>
</table>

*Dependent variable: Net assets - Third Pillar Pension Funds.

less than 0.05 (which statistically corresponds to the assumption that of 100 measurements only in the case of maximum 5% random results can be obtained, due to chance or hazard).

Linear regression consists of calculating the correlation coefficient for the group of variables, practically analyzing the correlation between a dependent variable and several independent variables. As with the correlation coefficient applied above, the calculated value should be closer to 1 to estimate that there is a strong correlation. Thus, to capture the correlation between the total net asset value of facultative pension funds (Y), on the one hand, and the five dependent variables (X1 ... Xn) on the other hand, we used a multiple linear regression model having the form:

\[ Y = \alpha + \beta_1 \cdot X_1 + \beta_2 \cdot X_2 + \ldots + \beta_n \cdot X_n \]

where: \( \alpha, \beta_1, \ldots, \beta_n \) – regression coefficients.

To identify the best combination of independent variables that explain the variation of the dependent variable, we used the forward option in SPSS, by which independent variables are introduced into the model one by one, in order of their importance, at each step testing whether the corresponding regression coefficient is zero.

RESULTS AND DISCUSSION

In the analysis of the correlation between the dependent variable, the net asset value of facultative pension funds and the independent variables: RON/EUR exchange rate, loan interest rate, deposit interest rate, benchmark interest rate and stock market value index (BET-C index), by processing the data using the SPSS software, we obtain the indicators shown in Table 1.

As shown in Table 2, the first independent variable entered into the model is the "exchange rate", which, as previously shown, has a greater influence on the net asset value of facultative pension funds. In the second phase, a second independent variable was introduced, that is the "deposit interest rate", and then the "BET-C index" and the last variable introduced was the "benchmark interest rate". We note that the fifth independent variable studied, the "loan interest rate" is not entered in the model, since its effect on the net asset value is insignificant.

Table 3 summarizes, for each multiple linear regression model, the value of the correlation coefficient (R), the value of the ratio of determination (R²) and the standard error. The interpretation of the four resulting models of correlation is as follows:

- Model 1 shows the dependence between the net assets and the RON/EUR exchange rate, for which a correlation coefficient of 0.832 and a determination ratio of 0.692 is obtained. These figures show that there is a direct correlation between the two variables, strong enough, because 69.2% of the variation in total net assets is
accounted for by the RON/EUR exchange rate changes; - Model 2 in which the independent variable deposit interest rate is also added, for which a correlation coefficient of 0.939 and a determination ratio of 0.881 are obtained, it means that 88.1% of the variation in total net assets is accounted for by changes in RON/EUR exchange rate and the interest rates on deposits. Furthermore, by introducing the second independent variable into the regression model, the standard error of the estimate decreases significantly from 57351.9 - 36123.5; - Model 3 introduces the third independent variable, namely BET-C index, in the equation of model 2, leading to a value of the correlation coefficient of 0.958 and a determination ratio of 0.917; - Model 4 in which the last independent variable, the benchmark interest rate, is introduced and we obtain the highest value for the correlation coefficient (0.966) and the determination ratio (0.933). This model accounts for 93.3% of the variation in total net assets of facultative pension funds and is considered the most comprehensive.

Regression coefficients calculated for each of the four models are shown in Table 4. T test and significant value are used to test the regression coefficients, namely the assumption that between the dependent variable and the independent variables there is no significant relation. In the study conducted, the t test takes high values for each variable, and Sig. takes very small values (under 0.05), which allows us to reject the hypothesis that between the analyzed variables there is no significant relation, meaning that small errors might occur due to random measurement.

We note that the influence of the four selected variables on the net asset value of facultative pension funds is very good (Significant<0.05), and the tolerance is greater than (1-Adjusted R square) (1-0.925 = 0.075) for each dependent variable, which eliminates the risk of un-collinearity.

VIF (Variance Inflation Factor = 1/Tolerance) also helps in analyzing collinearity, being able to express un-collinearity if it exceeds 10. In our case, for three of the four variables included in the model (the exchange rate, interest rates on deposits and benchmark interest rate), VIF is smaller than 10, implying that certainly there is no un-collinearity for these variables. For BET-C index, VIF exceeds 10, but its significant value (significance degree) and tolerance value fall within acceptable limits so that the parameters necessary to conduct the statistical analysis satisfy the conditions for an optimal analysis. Using the calculated coefficients, which are found in column B of Table 4, the multiple linear regression model identified for the variables studied is given in Equation 1:

\[ Y = 206952.517 + 110178.91 \cdot X_1 - 18987.026 \cdot X_2 - 43.97 \cdot X_3 - 21319.975 \cdot X_4 \]

(1)

where Y- Total Net Assets of Facultative Pension Funds; X1 - exchange rate; X2 - deposit exchange rate; X3 - BET-C index; X4 - benchmark exchange rate.

In order to validate the linear regression equation obtained, the histogram for the dependent variable is generated (Figure 2). The histogram shows the frequency of values taken by the dependent variable, on 10 equal intervals. In addition, we overlap the chart obtained by distributing the number of values on equal intervals and the normal distribution chart. In order to conclude if we can validate the linear regression equation obtained, we will also generate the P-P regression standard residues diagram (Figure 3).

The histogram highlights that the normal distribution law is 80% fulfilled. Generating the histogram given the analyzed data shows that on the second interval (-2.5/-2) and on the 6th interval (-0.5/0), normal distribution law is not achieved. Given the data from within the central intervals (which show the highest frequency), the intervals situated closer to interval no. 6 clearly meet the normal distribution law, so that the error in linear regression model can be attributed to the decreasing frequency of values within interval no. 6.

In Figure 3, residues were represented by comparison with the normal distribution law. Residues are observable and measurable estimators of statistical errors that are difficult to see. Residues mainly comply with normal distribution law (empirical observation, based on
Table 4. Regression coefficients for the dependent variable net assets of facultative pension funds.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized coefficients</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tolerance   VIF</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Toler         VIF</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-780679.325</td>
<td>95935.971</td>
<td>-8.138</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Exchange rate</td>
<td>231179.979</td>
<td>24382.504</td>
<td>0.832</td>
<td>9.481</td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>-810543.920</td>
<td>60545.090</td>
<td>-13.387</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Exchange rate</td>
<td>282503.544</td>
<td>16687.004</td>
<td>1.017</td>
<td>16.930</td>
</tr>
<tr>
<td></td>
<td>Deposit interest rate</td>
<td>-18652.623</td>
<td>2372.194</td>
<td>-0.472</td>
<td>-7.863</td>
</tr>
<tr>
<td>3</td>
<td>(Constant)</td>
<td>-88559.684</td>
<td>184856.505</td>
<td>-0.479</td>
<td>0.635</td>
</tr>
<tr>
<td></td>
<td>Exchange rate</td>
<td>159533.021</td>
<td>33383.229</td>
<td>0.574</td>
<td>4.779</td>
</tr>
<tr>
<td></td>
<td>Deposit interest rate</td>
<td>-29557.972</td>
<td>3350.390</td>
<td>-0.748</td>
<td>-8.823</td>
</tr>
<tr>
<td></td>
<td>BET-C index</td>
<td>-37.844</td>
<td>9.310</td>
<td>-0.635</td>
<td>-4.065</td>
</tr>
<tr>
<td>4</td>
<td>(Constant)</td>
<td>206952.517</td>
<td>196653.556</td>
<td>1.052</td>
<td>0.299</td>
</tr>
<tr>
<td></td>
<td>Exchange rate</td>
<td>110178.910</td>
<td>34830.529</td>
<td>0.396</td>
<td>3.163</td>
</tr>
<tr>
<td></td>
<td>Deposit interest rate</td>
<td>-18987.026</td>
<td>4731.390</td>
<td>-0.481</td>
<td>-4.013</td>
</tr>
<tr>
<td></td>
<td>BET-C index</td>
<td>-43.970</td>
<td>8.755</td>
<td>-0.738</td>
<td>-5.022</td>
</tr>
<tr>
<td></td>
<td>Benchmark interest rate</td>
<td>-21319.975</td>
<td>7279.806</td>
<td>-0.315</td>
<td>-2.929</td>
</tr>
</tbody>
</table>

**Dependent Variable: AN_Filon_III**

- Mean = 2.0E-15
- Std Dev = 0.05
- N = 42

Figure 2. Histogram of the dependent variable, total net assets of facultative pension funds.

Comparing points marked by reporting them to the straight-line drawn according to the evolution of these points, so the regression equation can be applied. We mention that on the 0.7 to 0.8 interval (10%) of the analyzed cumulated probabilities the normal distribution law is not carried out, which increases the error in the linear regression equation. For the rest of the probabilities interval (90%), the normal distribution law is well fulfilled.

**Conclusion**

Multiple linear regression equation allows us to estimate the total net asset value of facultative pension funds.
according to the four variables selected in the model. The interpretation of coefficients from the obtained equation (equation no. 1) reveals that based on the analyzed data for the June 2007 to November 2010 period, on a short time horizon, the following correlations may occur:

i. If the value of the exchange rate increases with one point, the total net asset value increases with 110.178.91 thousand RON;
ii. If the interest rate on deposits increases with 1%, the total net asset value drops with 18,987.026 thousand RON;
iii. If the BET-C index increases with one point, the total net asset value drops with 43.97 thousand RON;
iv. If the benchmark interest rate increases with 1%, the total net asset value drops with 21319.975 thousand RON.

The evolution of the main indicators of the financial market in Romania in 2010 led to the following implications on facultative pension funds:

i. Issues of government bonds were subscribed to a lesser extent, investors seeking higher yields than the level provided by the Ministry of Public Finance, which has limited them to a maximum yield of 7% in late 2010;
ii. The main stock market index, BET-C, determined an oscillating evolution of the quantity of shares in the total investment of net assets of facultative pension funds;
iii. The national currency also had an oscillating evolution of its exchange rate related to the euro and the US dollar. To counter the currency market volatility, pension funds were protected against foreign exchange risks through specific instruments like forward and swap.

Knowing the extent to which the net asset value varies is very important, primarily by increasing or decreasing the invested placements on behalf of the policyholders maintaining therefore their contributions at the same level and thus maintaining the same results for theses placements.

As demonstrated in the works of other specialists, the consequence of reducing the value of private pension fund assets due to their influence factors, generated mainly by the financial and economic crisis at an international level "has severely dented the confidence of investors in many countries in DC systems, with some countries suggesting a decline in contributions to voluntary schemes" (Antolin and Stewart, 2009). Therefore, the evolution of exchange rates, interest rates on deposits and monetary policy rate (benchmark interest rate) and BET-C index greatly influences facultative pension fund assets.

"Structural reforms aimed at further enhancing the economy’s flexibility will be implemented in a timely fashion so as to strengthen domestic adjustment mechanism and to maintain the overall competitiveness of the economy" (Marcu, 2008).

According to the present analysis, we need to bear in mind that on a short time horizon, an increase in deposit interest rates and the benchmark interest rate will cause a decrease in net assets of facultative pension funds, an effect that must be countered by a possible reallocation of pension fund investments towards placements that
provide better returns. The analysis shows that the evolution of the interest rate on loans does not affect the facultative pension fund assets, although its growth will have an indirect effect on these assets by increasing the interest rate on deposits in order to eventually maintain the same interest margin limits. An increase of the stock market index influences to a lesser extent, the net asset value of pension funds, facultative private pension fund managers must also bear in mind this aspect.

In conclusion, in order to counteract the effects of a decrease of the net asset value of facultative pension funds, there should be developed, a mix of their placements on a short term period, dynamic and adaptable to the variations of the influence factors. This will create opportunities for better yields on pension funds and will prevent a decrease of the contributions of the policyholders to these pension funds.

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REFERENCES


Law no. 204 from 2006 on facultative pension. Official J. Romania. Ist Part. no. 470 from 31/05/2006.


Appendix

Annex 1

Figure 1. Net assets evolution of facultative pension funds in Romania (3rd Pillar) during June 2007 to November 2010 (thousands RON).

Annex 2

Figure 1. Exchange rate evolution RON/EUR in Romania, during June 2007 to November 2010.

Figure 2. Interest rates on loans evolution in Romania, during June 2007 to November 2010.
Figure 3. Deposit interest rate evolution in Romania, during June 2007 to November 2010.

Figure 4. Benchmark exchange rate in Romania, during June 2007 to November 2010.

Figure 5. BET-C index evolution in Romania, during June 2007 to November 2010.