Analysis of the Influence of the Annualized Rate of Rentability on the Unit Value of the Net Assets of the Private Administered Pension Fund NN

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Abstract. *Starting from the idea that the profitability of a private pension fund has repercussions on the unit value of the net asset, which is able to directly influence the level of the sums accumulated on the members' account, I consider it useful to know the relation of dependence between the annualized return and unit value of the net asset. To conduct the research, I chose the NN Private Administered Pension Fund, which is part of Romania's Pension Pillar II. With the help of the EViews 9.5 Student / Lite Version software, I aim to obtain a valid econometric model with which I can predict the unit asset value of the net asset according to the evolution of the annualized rate of return. After obtaining a valid model, I will predict the unit asset value of the net asset for two hypothetical levels of the annualized rate of return*

Keywords: Pillar II; net asset value, annualized rate of return, econometric model, unifactorial linear regression.

JEL Classification: G23, G28, G29

1. Introduction

The level of pensions to be paid to participants in privately managed pension funds depends on the level of the amounts accrued to the participants' accounts. These are in turn influenced by the amounts with which the participants contribute to the fund, and on the other hand by the return on investments made by the pension funds. If the level of the contribution is closely linked to the gross income of each participant, being specific to each participant in the fund, the return on investment of funds is specific to the fund and influences the level of pensions of all members of the fund. Under these circumstances, I believe it is of interest to analyze the evolution of the unit value of the asset under the influence of the annualized rate of return for a pension fund.

2. Methodology of research

In view of the research conducted in the field of privately managed private pension funds in Romania, we decided to build an econometric model in which to include the actual values of the annualized rates of return for the NN Private Administered Pension Fund and the unit value of the net asset for this fund.

The shape of the model is:

$$VUAN = \beta_0 + \beta_1 * RRA$$

where: VUAN – the dependent variable, ie the unit value of the net assets of the NN Private Administered Pension Fund recorded on 31 December 2010-2017;

β_0 – is the free term of the regression line (value for RRA = 0);

β_1 is the regression coefficient (the amount with which the VUAN changes when the RRA changes with a unit);

RRA – the explanatory variable, represented by the annualized rate of return of the NN Private Administered Pension Fund recorded on 31 December 2010-2017.

For the analysis of the correlations between the two variables of the model, I will use the one-factor linear regression and the annual frequency obtained from the website of the Financial Supervisory Authority (ASF) in Romania.

Using the EViews 9.5 Student / Lite Version software, I will estimate the model using the least squares method and test the validity of the model, the degree of model reliability, the unifactorial regression model assumptions, and the statistical significance of the parameters included in the model.

3. Data used. Defining model variables

Unit Net Asset Value (VUAN) is the pointer used to calculate the amount of money actually available in each participant's personal account.

The annualized rate of return of a privately managed pension fund "is determined by dividing the profitability rate of that fund by 2, measured for the last 24 months preceding the calculation"

In Fig. 1 are the values recorded on December 31 by the two variables (VUAN and RRA) that are the subject of the analysis. The analyzed period begins with 2010 (one year of which privately managed private pension funds computes and publishes annualized profitability rates) and ends with 2017.

	VUAN	RRA
2010	15.13536	0.160363
2011	15.43008	0.081481
2012	17.01465	0.059391
2013	18.93632	0.102432
2014	20.68960	0.098115
2015	21.53651	0.064416
2016	22.39795	0.040992
2017	23.34290	0.040681

Fig. 1 Evolution of VUAN and RRA during 2010-2017.
Source: Author's work based on data available on www.asfromania.ro accessed on 23.06.2018
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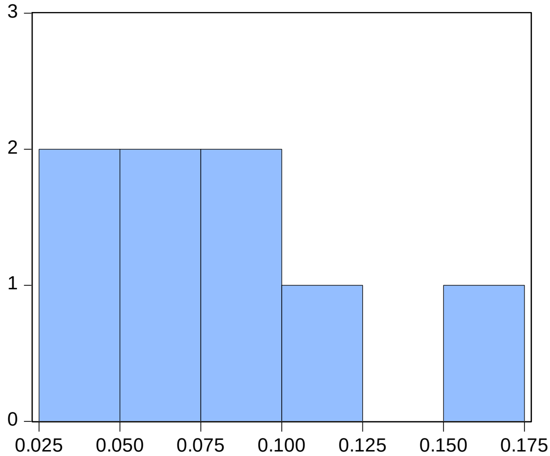
From the statistical data provided by EViews and presented in Fig. 2 it appears that for the NN Private Administered Pension Fund, the average annualized rate of return for the period between 2010 and 2017 was 8.0984%, with a standard deviation of 0.039676.

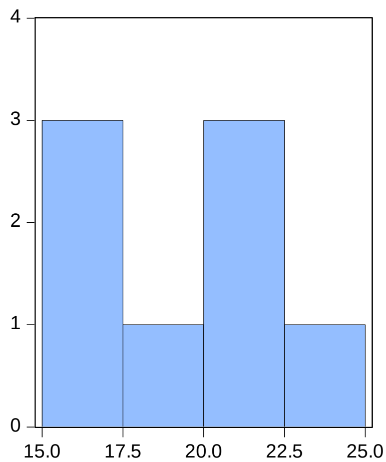
The distribution shows positive asymmetry, the higher values being present on the left by the Skewness asymmetry coefficient which has the value of 0.907239 and the coefficient of flattening Kurtosis is 2.997127, very close to 3, which means a normal distribution. Annualized rate of return has evolved between a minimum of 4.0681% recorded in 2017 and a maximum of 16.0363% achieved in 2010, the trend being one of decreasing.



Series: RRA	
Sample 2010 2017	
Observations 8	
Mean	0.080984
Median	0.072949
Maximum	0.160363
Minimum	0.040681
Std. Dev.	0.039676
Skewness	0.907239
Kurtosis	2.997127
Jarque-Bera	1.097447
Probability	0.577687

Fig. 2 Descriptive statistics of the annualized rate of return of the NN Private Administered Pension Fund.
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

Unit Net Asset Value (VUAN) is the pointer on the basis of which the amount of money accumulated up to a certain point in the individual account of each participant is determined. The profitability of each pension fund is reflected in the value of the VUAN. The annualized rate of return of a pension fund is the main performance indicator of a privately managed pension fund, whose calculation formulas are set by the rules issued by the Romanian Financial Supervisory Authority.



Series: VUAN	
Sample 2010 2017	
Observations 8	
Mean	19.31042
Median	19.81296
Maximum	23.34290
Minimum	15.13536
Std. Dev.	3.174678
Skewness	-0.165605
Kurtosis	1.513788
Jarque-Bera	0.772842
Probability	0.679484

Fig. 3 Descriptive statistics of VUAN for NN Private Administered Pension Fund.
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

Analyzing the statistical data obtained with EViews and presented in Fig. 3 shows that the average VUAN level of the NN Private Administered Pension Fund for the period between 2010 and 2017 was 19.31042 lei, with a standard deviation of 3.174678. The distribution shows a slight negative asymmetry, the higher values being present on the right side, which is evidenced by the coefficient of asymmetry

(Skewness) which has the value of -0.165605 and the coefficient of flattening (Kurtosis) is 1.513788, less than 3, indicating the existence of a platictic distribution. VUAN has increased from a minimum of 15.13536 in 2010 to a maximum of 23.34290 lei reached on December 31, 2017.

The annualized rate of return (RRO) had an annual downward trend except for 2013. This started from the maximum of 16.0363% achieved in 2010 and reached the minimum on 31 December 2017, ie 4.0681%. The average value of the indicator was 8.0984%, which is a rate of return that I consider to be quite good. The annual evolution (reported on 31 December) of the annualized rate of return of the NN Private administered Pension Fund in Pillar II is presented in Fig. 4.

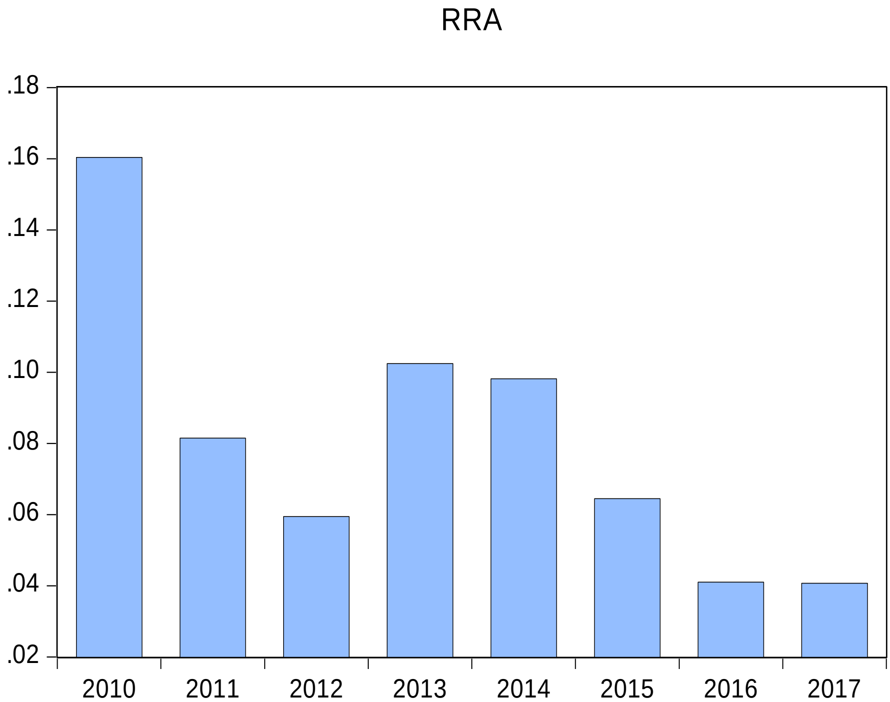


Fig. 4 Dynamics of the annualized rate of return (RRA) of the NN Private Administered Pension Fund.
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The VUAN Dynamics of the NN Private Administered Pension Fund, as can be seen in Fig. 5, had an upward trend over the period 2010-2017, with years of stronger growth (2011, 2012, 2013 and 2014) and years of moderate growth (2010, 2015, 2016 and 2017)..

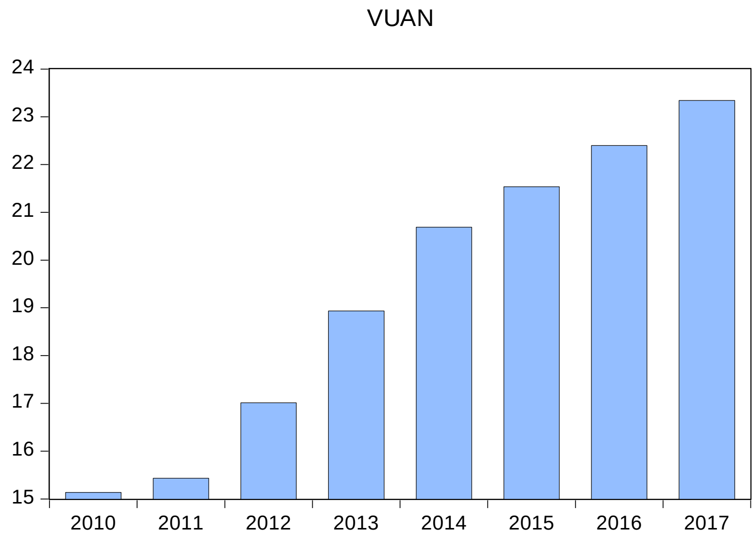


Fig. 5 VUAN Evolution for NN Private Administered Pension Fund.
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

4. Empirical research results

To determine the intensity of the link between the annualized rate of return (RRA) and the unit value of the net asset of the NN Private Administered Pension Fund (VUAN), I will determine the level of correlation between the two variables. The correlation indicates the intensity of the existing link between the two variables included in the econometric model by measuring the degree of scattering of data recorded around the regression line. For this, I will calculate the Pearson correlation coefficient:

$$r_{RRA,VUAN} = \sqrt{R^2} = R = -0{,}670342,$$

Value obtained from the correlation matrix generated by EViews in Fig. 6

	VUAN	RRA
VUAN	1.000000	-0.670342
RRA	-0.670342	1.000000

Fig. 6 The matrix of correlation of the two variables
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

Next, I will estimate the model parameters. Using the EViews software I will analyze the data series and estimate the regression model parameters by applying the least squares method that generated the results presented in Fig. 7.

Dependent Variable: VUAN
Method: Least Squares
Date: 06/17/18 Time: 08:33
Sample: 2010 2017
Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.65421	2.159373	10.95420	0.0000
RRA	-53.63764	24.24000	-2.212774	0.0689

R-squared	0.449358	Mean dependent var	19.31042
Adjusted R-squared	0.357584	S.D. dependent var	3.174678
S.E. of regression	2.544531	Akaike info criterion	4.918088
Sum squared resid	38.84783	Schwarz criterion	4.937948
Log likelihood	-17.67235	Hannan-Quinn criter.	4.784137
F-statistic	4.896370	Durbin-Watson stat	0.973180
Prob(F-statistic)	0.068880		

Fig. 7 Parameter estimation via MCMMP (Least squares)
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The model equation is the following:

$$VUAN = \beta_0 + \beta_1 * RRA$$
$$VUAN = 23{,}65421 - 53{,}63764 * RRA$$

The regression coefficient β_1 complements the Pearson correlation coefficient and indicates an indirect link between the variables of the econometric model. At the same time, we can say that an increase with a percentage of the annualized rate of return will attract a VUAN 53.63764 lei decrease. This contradicts the economic theory which indicates that an increase in the annualized rate of return entails an increase in the unit value of the net asset for a privately managed pension fund. Considering this contradiction, we can suspect that the estimated model is not the correct one and we continue the analysis.

The high value of the free term β_0 shows that the influence of factors not specified in the model on VUAN evolution is significant, which leads to the conclusion that the model used can be further deepened to ensure better results.

For the estimated model the link between VUAN and RRA is an indirect and medium intensity. The determination coefficient (R^2 = R-squared = 0,449358) shows that 44.9358% of the VUAN variation is explained by the evolution of the annualized rate of return (RRA), the remainder of the variation can be explained by factors not included in the econometric model. The adjusted determination coefficient (Adjusted R-squared = 0.357584) also takes into account the number of observations included (i = Included observations) and the explanatory variables.

The correlation ratio ($R = 0{,}670342$) tends to 1 and shows that the estimated regression model approximates the observation data well, averaging, suggesting that the model can be improved in the future to get better results. The mean square error of estimated errors (S.E. of regression) is 2.544531.

I will continue the analysis by checking the significance of the parameters with t:

-H_0: $\beta_0 = 0$; $\beta_1 = 0$ (the parameters are not statistically significant, the model is not valid),

-H_1: $\beta_0 \neq 0$; $\beta_1 \neq 0$ (the parameters are statistically significant, the model is valid).

As for the parameter: β_0: $|t_{calc}|$= 10,95420> 2,4468899 = t_{tab}, and for the parameter β_1: $|t_{calc}|$ = 2,212774 <2,4468899 = t_{tab} the econometric model is retained and the analysis continues. In practice, for a 5% significance threshold, if the statistical t values are greater than or equal to 2, the alternative assumption is accepted, which implies that the parameters are statistically significant and the model is valid. This is not supported by the probability associated with the parameter β_1 (6.89%) which is higher than the materiality threshold (5%).

To test the validity of the model we have the following assumptions:

-H_0: the model is not statistically valid (MSR=MSE)

-H_1: the model is statistically valid (MSR>MSE)

We can assert that the model is not statistically significant following the F (F = 4.96370 <F_{critic}= 6.60789097) test, so I will accept the null hypothesis (H_0) and reject the alternative hypothesis (H_1), the model not being valid for a significance level prob. (F-statistic) = 0.0688080, greater than 5%.

The functional form is linear:

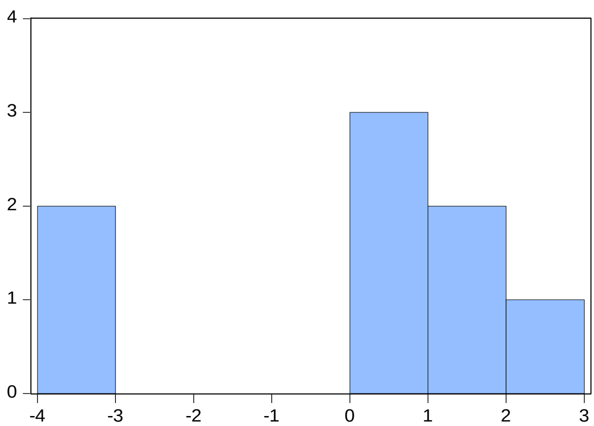
$$VUAN = 23{,}65421 - 53{,}63764 * RRA$$

5. The normality of distribution of random errors and their average

To test the normality hypothesis of random errors I will use the Jarque-Bera test with the following assumptions:

-H_0: random errors have normal distribution;

-H_1: random errors do not have normal distribution.



Series: Residuals
Sample 2010 2017
Observations 8

Mean	1.13e-14
Median	0.859393
Maximum	2.298053
Minimum	-3.853678
Std. Dev.	2.355778
Skewness	-0.888427
Kurtosis	2.159396
Jarque-Bera	1.287942
Probability	0.525203

Fig.8 The Jarche-Bera Test

Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The probability associated with this test is 0.525203 that tends to 1, so I will accept the null hypothesis (H_0), random errors with normal distribution. It can be seen from Fig. 8 that the average random error is 1.13e-14 = 1.13/100000000000000, being very close to zero.

To observe whether the random errors are homoscedastic or not, I will apply the White test with assumptions:

-H_0: there is homoscedasticity;

-H_1: there is heteroscedasticity.

Heteroskedasticity Test: White

F-statistic	0.760375	Prob. F(2,5)	0.5149
Obs*R-squared	1.865735	Prob. Chi-Square(2)	0.3934
Scaled explained SS	0.608379	Prob. Chi-Square(2)	0.7377

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/17/18 Time: 08:35
Sample: 2010 2017
Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.361618	11.91048	-0.366200	0.7292
RRA^2	-1493.227	1371.960	-1.088390	0.3261
RRA	260.1448	274.0197	0.949365	0.3860

R-squared	0.233217	Mean dependent var	4.855979
Adjusted R-squared	-0.073496	S.D. dependent var	5.589702
S.E. of regression	5.791472	Akaike info criterion	6.630646
Sum squared resid	167.7057	Schwarz criterion	6.660437
Log likelihood	-23.52259	Hannan-Quinn criter.	6.429721
F-statistic	0.760375	Durbin-Watson stat	1.405370
Prob(F-statistic)	0.514851		

Fig. 9 The White Test

Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

After applying the test, we obtain that Prob. (F-statistic) for calculated statistics is greater than 5% and 0.5149 respectively, so there is a high probability of error by rejecting the null hypothesis, so we accept the null hypothesis (H_0) that random errors are homoscedastic.

Critical values of the Durbin-Watson statistic for a significance threshold of 5% obtained from the statistical tables are dL = 1.08 and dU = 1.36.

Since the Durbin-Watson statistic = 0.973180, provided by EViews in Fig. 7, is in the range 0 <0.973180 <1.08, it indicates the existence of positive first order autocorrelation.

I will correct the first order autocorrelation by differentiating the regressors, and the result provided by EViews is shown in Fig. 10.

Dependent Variable: D(VUAN)
Method: Least Squares
Date: 06/18/18 Time: 00:21
Sample (adjusted): 2011 2017
Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RRA)	13.16434	4.034468	3.262967	0.0224
C	1.397582	0.154503	9.045682	0.0003

R-squared	0.680449	Mean dependent var	1.172505
Adjusted R-squared	0.616539	S.D. dependent var	0.590680
S.E. of regression	0.365774	Akaike info criterion	1.061355
Sum squared resid	0.668954	Schwarz criterion	1.045901
Log likelihood	-1.714742	Hannan-Quinn criter.	0.870343
F-statistic	10.64695	Durbin-Watson stat	1.651934
Prob(F-statistic)	0.022372		

Fig. 10 Unifactorial regression after correcting self-correction of errors.
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The equation of the adjusted pattern is the following:

$$D(VUAN) = \beta_0 + \beta_1 * D(RRA),$$

where: D(VUAN)=VUAN - VUAN(-1) and D(RRA)=RRA – RRA(-1)

$$D(VUAN) = 1{,}397582 + 13{,}16434 * D(RRA)$$

The regression coefficient β_1 indicates a direct link between the econometric model variables. At the same time, we can say that an increase with a percentage of D (RRA) will attract an increase of 13.16434 lei for D (VUAN).

The low value of the free term β_0 indicates that the influence of factors not specified in the model on the D (VUAN) evolution is not significant, which leads to the conclusion that the model is correctly specified.

The relationship between D (UAN) and D (RRA) is a direct one and a medium intensity.

The determination coefficient (R^2= R-squared = 0.680449) shows that 68.0449% of the variance D(VUAN) is explained by D(RRA) evolution, the remainder being explained by factors which are not included in the econometric model. The adjusted determination coefficient (Adjusted R Squared = 0.616539) also takes into account the number of observations included (i = Included observations) and the explanatory variables.

I will continue the analysis by checking the significance of the parameters with t:

-$H_0: \beta_0 = 0$; $\beta_1 = 0$ (the parameters are not statistically significant, the model is not valid)

-$H_1: \beta_0 \neq 0$; $\beta_1 \neq 0$ (the parameters are statistically significant, the model is valid)

-β_0: $|t_{calc}|$ = 9.045682 > 2.4468899 = t_{tab},

-β_1: $|t_{calc}|$ = 3.262967 > 2.4468899 = t_{tab}

We note that both parameters are larger than the tabulated value, which allows us to reject the null hypothesis and accept the alternative hypothesis that the parameters are statistically significant, the model is valid.

This is also confirmed by the probabilities associated with the two parameters (2.24% and 0.03%) that are greater than the significance threshold of 5%.

To test the validity of the model we have the assumptions

-H_0: the model is not statistically valid (MSR=MSE)

-H_1: the model is statistically valid (MSR>MSE)

We can say that the model is statistically significant following the F test (F-statistic = 10.64695> F_{critic}= 6,60789097), so I will reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1), the model being valid for a probability significance level Prob. (F-statistic) = 0.022372, less than the significance threshold of 5%.

The functional form is linear:

$$D(VUAN) = 1{,}397582 + 13{,}16434 * D(RRA)$$

To test the normality hypothesis of random errors I will use the Jarque-Bera test with the following assumptions:

-H_0: random errors have normal distribution;

-H_1: random errors do not have normal distribution.

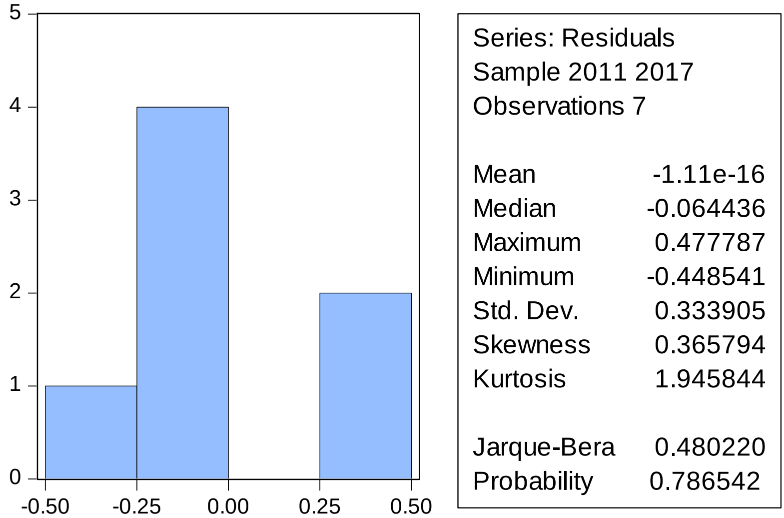


Fig. 11 The Jarche-Bera Test

Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The probability associated with this test is 0.786542 which tends to 1, so I will accept the null hypothesis (H_0), random errors with normal distribution. It can be seen from Fig. 11 that the average random error is -1,11e-16 = -1.11/10000000000000000, being very close to zero.

To see if random errors are homoscedastic or not, I will apply the White test with the following assumptions::

-H_0: there is homoscedasticity;

-H_1: there is heteroscedasticity.

Heteroskedasticity Test: White

F-statistic	1.480397	Prob. F(2,4)	0.3302
Obs*R-squared	2.977470	Prob. Chi-Square(2)	0.2257
Scaled explained SS	0.718424	Prob. Chi-Square(2)	0.6982

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/21/18 Time: 21:43
Sample: 2011 2017
Included observations: 7

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.134186	0.043517	3.083544	0.0368
D(RRA)^2	-36.37138	21.87620	-1.662600	0.1717
D(RRA)	-0.860912	1.297686	-0.663421	0.5433

R-squared	0.425353	Mean dependent var	0.095565
Adjusted R-squared	0.138029	S.D. dependent var	0.100388
S.E. of regression	0.093202	Akaike info criterion	-1.610558
Sum squared resid	0.034747	Schwarz criterion	-1.633740
Log likelihood	8.636954	Hannan-Quinn criter.	-1.897076
F-statistic	1.480397	Durbin-Watson stat	1.901348
Prob(F-statistic)	0.330219		

Fig. 12 The White Test
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

Let's get that Prob. F statistics calculated is greater than 5% respectively 0.3302 = 33.02%, so there is a high probability of rejecting the null hypothesis wrong, so we accept the null hypothesis (H_0) that are homoscedastic random errors.

Critical values of the Durbin-Watson statistic for a significance threshold of 5% obtained from the statistical tables are dL = 1.08 and dU = 1.36.

The Durbin-Watson statistic = 1.651934, provided by EViews in Fig.10, is in the range 1.36> 1.651934> 2.72, which indicate us the inexistence of an autocorrelation.

After elimination of the autocorrelation of the residues, the obtained model is statistically significant, with an average credit, the exogenous variable is statistically significant as the constant.

It fulfills all the assumptions of the classic simple regression model, and still has an average credit rating (R^2= R-squared = 0.680449), approximating the observation data well. All parameters of the final model are statistically significant with Prob. associated less than 5%.

The determinant coefficient (R-squared = 0.680449) shows that 68.0449% of the variance of the dependent variable is explained by the RRA variation.

In order to assess whether the linear regression model is satisfactory and is good for predicting, I will represent in Fig. 13 both the projected values of the unit value of the net asset (VUANF) and the real values of the VUAN.

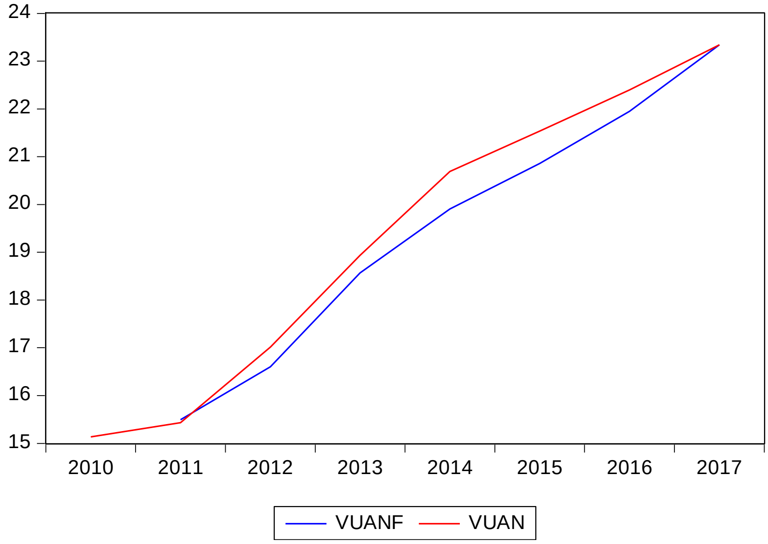


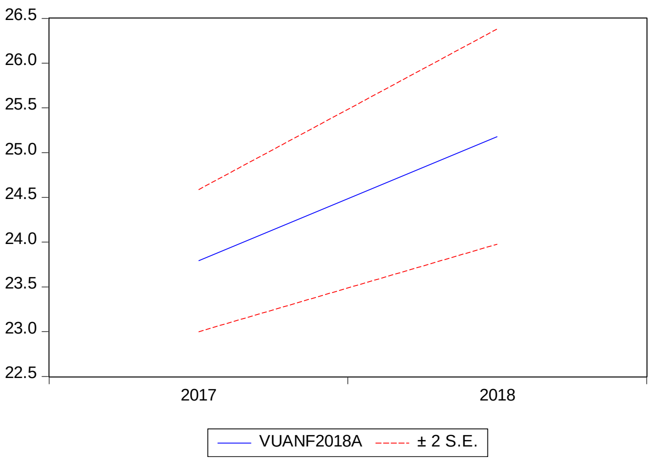
Fig. 13 The graphical representation of the unit value of the forecasted asset (VUANF) and for VUAN

Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The chart shows that the predicted value does not deviate significantly from the real value, indicating an econometric model that can be used successfully to make forecasts.

I will then predict the VUAN level for the end of 2018, given that the RRA will be: 4% and 5%, respectively.

At this stage of econometric modeling, I will predict VUAN of the privately managed pension fund for December 31, 2018, given that the RRA will have the value of A: 4% and B: 5%. The two forecasts are represented in Fig.14 and Fig. 15.



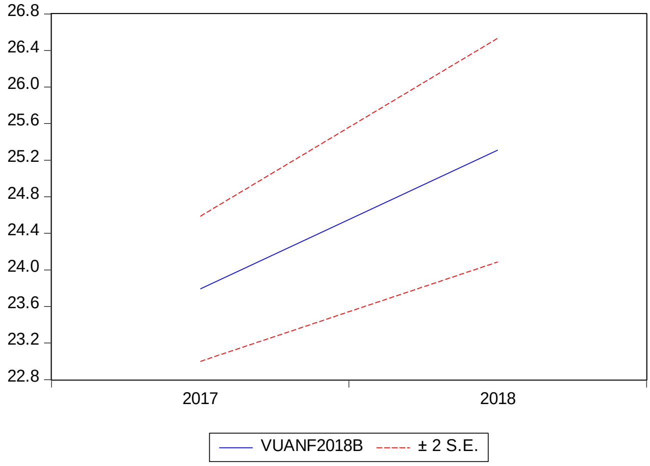
Forecast: VUANF2018A
Actual: VUAN
Forecast sample: 2017 2018
Included observations: 2

Root Mean Squared Error	0.448541
Mean Absolute Error	0.448541
Mean Abs. Percent Error	1.921529
Theil Inequality Coefficient	0.009516
Bias Proportion	1.000000
Variance Proportion	NA
Covariance Proportion	NA
Theil U2 Coefficient	NA
Symmetric MAPE	1.903243

Fig. 14 VUAN prognosis when RRA is 4%.

Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The EViews forecast shows that VUAN will have the level of 25.18 lei at 31 December 2018. At the same time it can be guaranteed with a 95% probability that the VUAN level at 31 December 2018 will be in the range of [23.98; 26.38].



Forecast: VUANF2018B	
Actual: VUAN	
Forecast sample: 2017 2018	
Included observations: 2	
Root Mean Squared Error	0.448541
Mean Absolute Error	0.448541
Mean Abs. Percent Error	1.921529
Theil Inequality Coefficient	0.009516
Bias Proportion	1.000000
Variance Proportion	NA
Covariance Proportion	NA
Theil U2 Coefficient	NA
Symmetric MAPE	1.903243

Fig. 15 VUAN prognosis when RRA is 5%.
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The forecast with EViews shows that VUAN will have the level of 25.31 lei at 31 December 2018. At the same time it can be guaranteed with a 95% probability that the VUAN level at 31 December 2018 will fall within the range of [24.09; 26.54].

To illustrate the results obtained in the two cases I will represent graphically alongside the real evolution of VUAN and the two forecasts in Fig. 16.

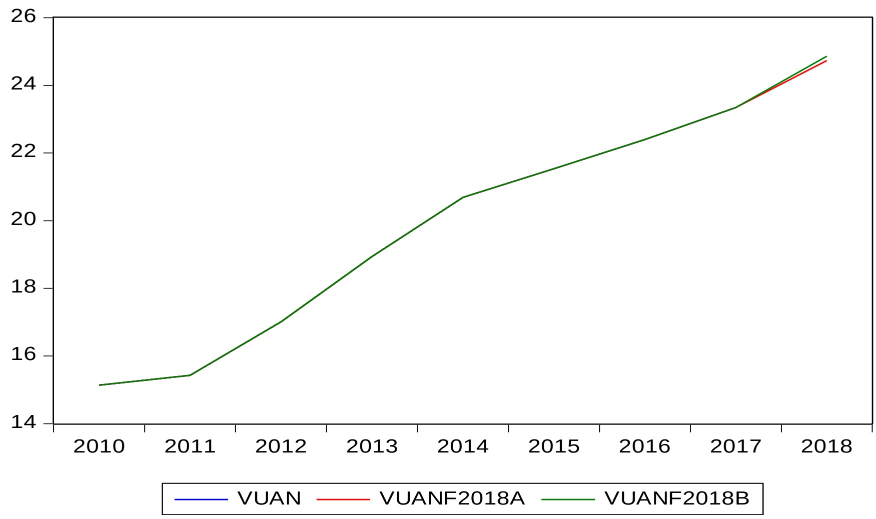


Fig.16 The graphical representation of the unit value of the forecasted asset (VUANF2018A), (VUANF2018B) and of the real values of VUAN
Source: Author's work based on data available on www.asfromania.ro accessed on June 23, 2018 using EViews 9.5 Student / Lite Version.

The results obtained in the two forecasts highlight the growth trends of the VUAN indicator in the two annualized rate of increase of the annualized rate of return to 4% and 5%. This is in line with the theory that increasing the annualized rate of return leads to an increase in the net asset value of the net asset if the other factors of influence remain unchanged.

If we report the VUAN projected for December 31, 2018, in the conditions of increasing the rate of return to 4% (VUANF2018A), at the VUAN forecast for the same date, given at the 5% annualized rate of return (VUANF2018B), will note that between the two levels we have a difference of 0.13 lei, which means that a 1% increase in the annualized rate of return entails an increase of approximately 13 bani of the unit value of the net asset.

6. Conclusions

As a result of the data processing using the one-factor linear regression, we obtained an econometric model with an average creditworthiness that captures the way in which the annualized rate of return dynamics influences the evolution of the unit value of the net assets of the NN Private Administered Pension Fund.

The unifactorial model obtained by estimation is:

$$D(VUAN) = 1{,}397582 + 13{,}16434 * D(RRA)$$

The EViews program estimated the above model and obtained the following final results:

-the determination coefficient confirms that the annualized rate of return rate influences the increase of the unit value of the net asset in the case of the NN Private Administered Pension Fund in the amount of 68.0449%.

- there is a significant direct relationship between the net asset value and the annualized rate of return. It can be said that an increase by one percent of the annualized rate of return will result in an increase of 0.13 monetary units of the VUAN.

I appreciate that the model is good to make predictions with it, but can be improved by adding other explanatory variables and converting it into a multifactorial regression model with a higher level of determination coefficient (R-squared = 0.680449).

References

Durac C, ”Influence of Contribution Rate Dynamics on the Pension Pillar II on the Evolution of the Unit Value of the Net Assets of the NN Pension Fund”, Annals of University of Craiova, 2017, http://feaa.ucv.ro/annals/v1_2017/0045v1-012.pdf.

https://asfromania.ro/informatii-publice/statistici/statistici-pensii/evolutie-indicatori accesat la 23.06.2018.

Norma nr. 7/2010 privind ratele de rentabilitate ale fondurilor de pensii administrate privat; publicată în Monitorul Oficial al României, Partea I, Nr. 369 din 4 iunie 2010.

http://www.eviews.com accesat la 23.06.2018.