EXPECTATIONS REGARDING PAYMENTS TO BENEFICIARIES OF THE ADMINISTRATIVE CAPACITY OPERATIONAL PROGRAM (ACOP)

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Abstract
Through this study, we aimed to make a forecast of the payments made by the European Union (EU) through the Administrative Capacity Operational Program (ACOP) to the beneficiaries of this operational program (OP), with the aim of determining the absorption trend of European funds over the accessing period 2014 - 2020. The EViews program was used to determine the desired forecast and to analyze the necessary indices. The main index analyzed was the *EU payments to ACOP index*. The results revealed that a prediction can be made on the analyzed data set.

Keywords
ACOP, EU payments, forecasting; absorption of European funds

JEL Classification
G18, O18; O22

Introduction

The main objective of this paper is to determine the possibility of making a forecast of payments made by the European Union to ACOP. Why would this have any relevance? If we manage to achieve this forecast, we will be able to see what is the future of this type of operational program and we will see what is the trend of absorption of European funds on this OP. We are also trying to determine if there is a possibility of achieving the desired 100% absorption of funds on this OP. It is important to establish these things because depending on Romania's degree of absorption of European funds we can figure out how quickly we will achieve the objectives proposed and undertook at the European level.

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1. Review of the scientific literature

The purpose of ACOP was to create a modern public administration, capable of facilitating socio-economic development, through competitive public services, investments and quality regulations, with the idea of contributing to the achievement of the objectives regarding the Europe 2020 Strategy. Such an administration is needed to be able in providing political decision-makers with the necessary tools for the foundation and implementation of public policies in the interest of citizens. Optimizing governance is an important condition for implementing any structural change towards smart, sustainable and inclusive growth.

ACOP 2014-2020 was addressed to all 8 regions of Romania. Within this OP, the following types of beneficiaries were able to acquire funding: central public authorities and institutions, autonomous administrative authorities, NGOs, social partners, accredited higher education and research institutions, the Romanian Academy, local public authorities and institutions at the level counties and municipalities, authorities and local public institutions ITI beneficiaries, the institutions of the judicial system.

According to the data published on the official ACOP website, for the 2014-2020 period, with the related extension until the end of the implementation period, respectively December 2023, ACOP was allocated the sum of 553.19 million euros from the European Social Fund (ESF). Together with the national contribution, the program has reached the value of 671.29 million euros, according to official data.

The ACOP 2014 - 2020 budget (version 3.1), mentioned on the official website, was divided into 3 priority axes, as follows:

- Efficient public administration and judicial system, with a total financial allocation (ESF + national contribution) of 415.03 million euros (61.75%);
- Accessible and transparent public administration and judicial system, with a financial allocation (ESF + national contribution) of 210.08 million euros (31.29%);
- Technical assistance, with a financial allocation (ESF + national contribution) of 46.17 million euros (6.87%).

ACOP is an OP with an absorption rate of over 50%, respectively for projects submitted until 01.10.2022 the absorption rate is 62.89%, according to official data on the website of the Ministry of Investments and European Projects.

The smooth running of the activities and projects on ACOP is supervised, monitored and controlled by the Management Authority for the Administrative Capacity Operational Program (MA ACOP) in order to achieve the indicators and program results proposed through this operational program by Romania.

2. Research methodology

This research is based on the modeling of data series, namely the EU payments to ACOP index, with the help of the EViews program. We will first verify the stationarity of the time series previously mentioned through two techniques:

- Using the estimated autocorrelation function (estimated ACF);
- Unit root tests - Dicky Fuller tests.

Afterwards, we will use ARMA techniques on the mentioned index. Also we will try to check the possibility of making forecasts, based on the historical information regarding EU payments related to ACOP through Box Jenkins model. In the end we will try to make a forecast regarding EU payments related to ACOP, for the period quarter II 2022 - quarter IV 2023 through Box Jenkins model.

3. Results and discussion

3.1 Verification of the stationarity of the time series regarding the EU payments indicator related to ACOP

We will check the stationarity using the series of simple annual returns taking into account the data series on EU payments related to ACOP, carried out in the following period: quarter III 2016 - quarter I 2022. There were identified 23 observations, with values above 0, related to the indicator EU payments related to ACOP, from the time interval: quarter III 2016 - quarter I 2022.

In the following we will work with 22 observations. Regarding the EU payments related to ACOP in the period quarter III 2016 - quarter I 2022, the graph of simple annual returns is represented in figure no. 1.

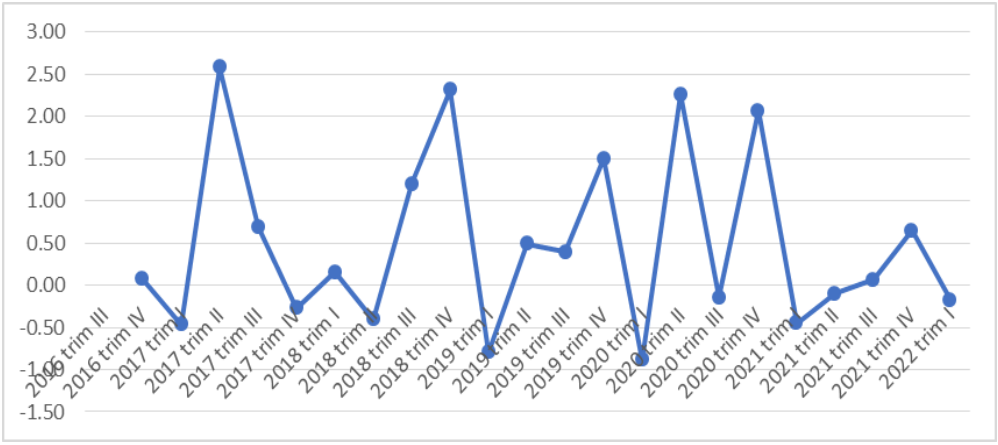

Figure no. 1: Simple annual returns

Source: made by the authors

Using the Eviews system, we generated the correlogram (to help us check for stationarity) for the series of simple returns on EU ACOP payments for the 22 observations (Figure no. 2).

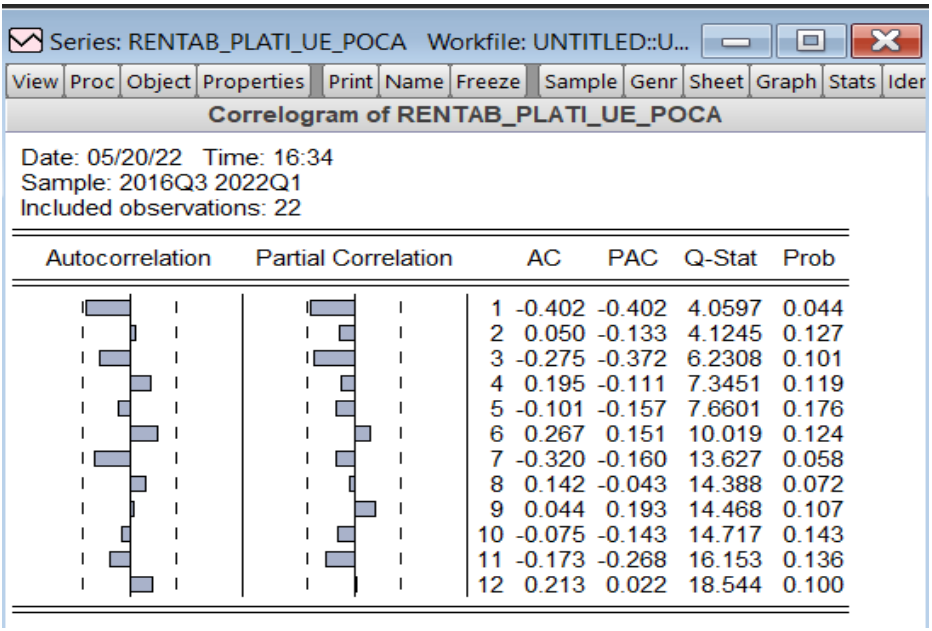

Figure no. 2 – Correlogram for the series of simple returns on EU payments related to ACOP

Source: made by the authors with the help of the EViews program

Correlogram analysis: It is observed that all the autocorrelation coefficients are within the 95% confidence interval [(-1.96*1/√T; 1.96*1/√T); for T=22 the confidence interval is (-0.417873; 0.417873)]. In this case we do not accept the null hypothesis, so the series, from the point of autocorrelation coefficients, is not stationary. Thus, we continue the checks.

The test decision is made based on the Q statistic that is present in the Eviews output, using the p-value. It is observed that from lag 2 the p-value has high values, so the risk assumed in rejecting the null hypothesis is too high, thus, the null hypothesis is accepted: the series comes from a white noise process, so it is stationary.

The second step is to apply unit root tests.

The Dickey Fuller test results generated by Eviews are shown in table no. 1.

Tabel no. 1: Dickey Fuller test results

Series: RENTAB_PLATI_UE_POCA Workfile: UNTITLED::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on RENTAB_PLATI_UE_

Null Hypothesis: RENTAB_PLATI_UE_POCA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.693315	0.0000
Test critical values:	1% level	-3.788030	
	5% level	-3.012363	
	10% level	-2.646119	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RENTAB_PLATI_UE_POCA)
Method: Least Squares
Date: 05/20/22 Time: 18:36
Sample (adjusted): 2017Q1 2022Q1
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RENTAB_PLATI_UE_POCA(...	-1.410551	0.210740	-6.693315	0.0000
C	0.722680	0.245640	2.942030	0.0084

R-squared	0.702197	Mean dependent var	-0.011887
Adjusted R-squared	0.686523	S.D. dependent var	1.798692
S.E. of regression	1.007070	Akaike info criterion	2.942361
Sum squared resid	19.26962	Schwarz criterion	3.041839
Log likelihood	-28.89479	Hannan-Quinn criter.	2.963950
F-statistic	44.80047	Durbin-Watson stat	2.076940
Prob(F-statistic)	0.000002		

Source: made by the authors with the help of the EViews program

Thus, $\hat{\tau}$ has the value -6.693315 and is smaller than the critical values corresponding to the confidence thresholds of 5% (-3,012363) or 10% (-2,646119). This means that the series is not a random walk process (because the null hypothesis can be rejected), being stationary. The model can be written as:

rentab_plati_UE_ACOP = 0.722680 – 1.410551 * rentab_plati_UE_ACOP(-1) + wn (1)

3.2 Time series modeling of the EU payments indicator related to ACOP using ARMA techniques

In order to identify the best model, we generated all models of the type AR(1), AR(2), MA(1), MA(2), ARMA(1,1), ARMA(1,2), ARMA(2 ,1) and ARMA(2,2) for the series of quarterly, stationary simple returns. After modeling, it could be observed that the inverse of the root of all processes is less than 1, being inside the unit circle. Thus, the processes AR(1), AR(2) are stationary, the processes MA(1), MA(2) are invertible and the processes ARMA(1,1), ARMA(1,2), ARMA(2,1), ARMA(2,2) are stationary and invertible. Also, from the analysis of the graphs of the partial autocorrelation functions (PACF) and autocorrelation functions (ACF) of all processes, it could be observed that

there are no significant fluctuations, the coefficients of autocorrelation / partial autocorrelation can be assimilated to the zero value. This means that the errors of these ARMA processors are white noise.

Following the modeling of the series of simple returns regarding EU payments related to ACO it resulted the information from table no. 2.

Table no. 2: Centralized information on the modeling of the quarterly simple return series on EU ACOP payments

Model	Akaike information criterion	Schwarz information criterion	SE of regression	Adjusted R squared
AR(1)	2.994300	3.143079	1.011349	0.078113
AR(2)	3.062845	3.261217	1.026299	0.050659
MA(1)	**2.749673**	**2.898451**	**0.836587**	**0.369192**
MA(2)	2.825230	3.023601	0.857023	0.337997
ARMA(1,1)	2.825147	3.023519	0.857817	0.336771
ARMA(1,2)	2.893526	3.141490	0.846337	0.354403
ARMA(2,1)	2.914469	3.162433	0.880184	0.301732
ARMA(2,2)	2.930838	3.228395	0.850483	0.348062

Source: made by the authors with the help of the EViews program

The criteria for choosing the best model are as follows:

- SBIC as small as possible;
- AIK as low as possible;
- Relatively small standard error of regression;
- Adjusted R squared high;
- Residuals are white noise;

Thus, taking into account all the above criteria (Akaike criterion, Schwarz criterion, Standard error of regression criterion, Adjusted R squared) the MA(1) model can be chosen for forecasting because it respects all the informational criteria.

3.3 Checking the possibility of making forecasts, based on historical information regarding EU payments related to ACOP – Box Jenkins model

For ACOP related EU payments, the forecast will be made using the MA(1) model as it was indicated by all the information criteria. An important step for forecasting using ARMA models is model validation. We therefore proceed to test the residuals for the MA(1) model.

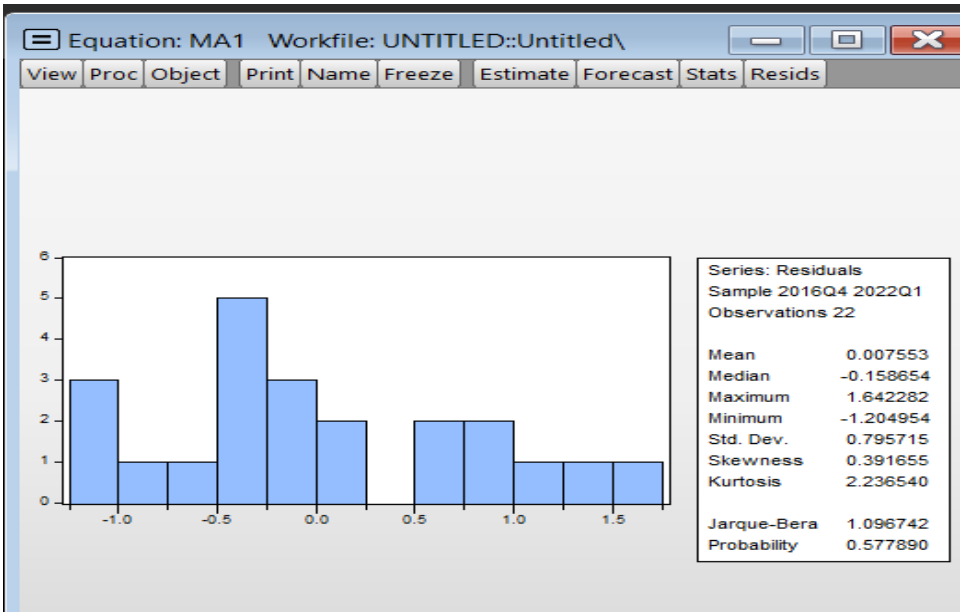

Figure no. 3 – Graph of residuals for the MA(1) model

Source: made by the authors with the help of the EViews program

Although, from figure no. 3, it is observed that the errors are not quite normally distributed as a result of the normality test, it can be stated that the hypothesis of no correlation of the errors is fulfilled considering the value of the Durbin Watson statistic, namely 1.709847.

An ex-post forecast will be made on the MA(1) model and the soundness of the forecast can be checked (for a certain number of observations there will be both observed values and predicted values). There are a total of 22 observations. The forecast horizon is represented by the first 16 observations (Q4 2016 – Q3 2020) and a forecast will be made for values from time 17 (Q4 2020) to time 22 (Q1 2022), i.e. for 6 values.

Given that a forecast is performed on the MA(1) model, non-null forecasts can only be made for 3 forecast steps:
- dynamic forecast is represented in figure no. 4.

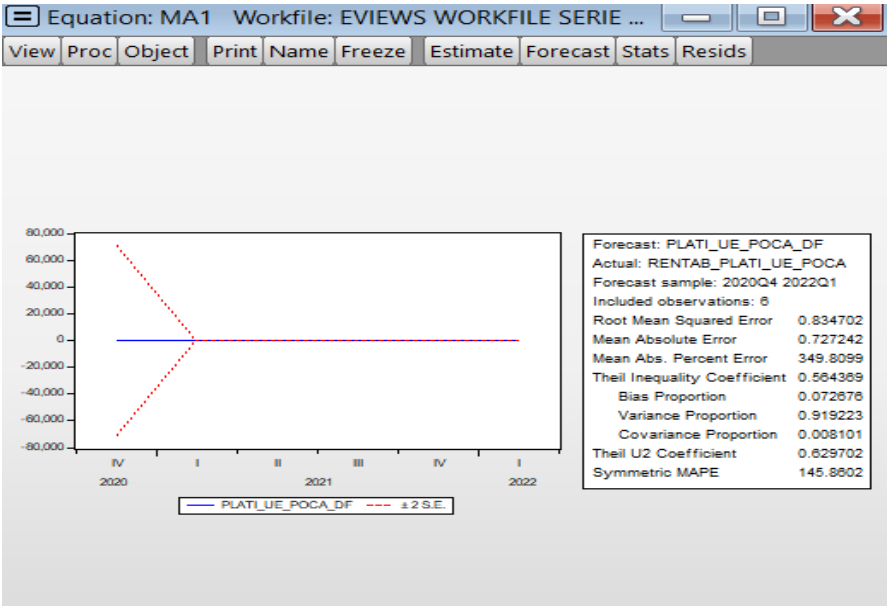

Figure no. 4 – Dynamic forecasting for the MA(1) model

Source: made by the authors with the help of the EViews program

The forecast is quite good because 0.564369 is the value of Theil's indicator, meaning a relatively strong adjustment. Another favorable fact is the value of Bias, which is very close to zero. The variance is 0.919223 (it is relatively large, although it should be small), and the covariance is 0.008101 (it is relatively small, although it should be large).

The RMSE indicator is 0.834702, and the MAE value is 0.727242. The MAPE is equal to 349.8099% (over 100%), which is not very good, indicating a not very accurate forecast.

In figure no. 5 it is graphically represented the predicted series and the series of observed values in the case of dynamic forecasting. It is observed that the forecast line sometimes deviates from reality, but that it has a relatively similar trend to the series of observed values.

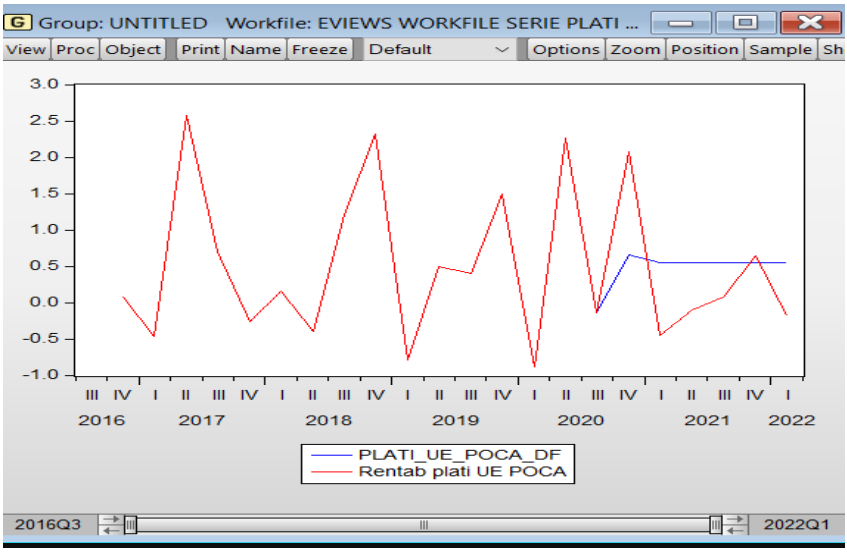

Figure no. 5 – Dynamic forecast graph: observed and predicted data
Source: made by the authors with the help of the EViews program

The static forecast is represented in figure no. 6.

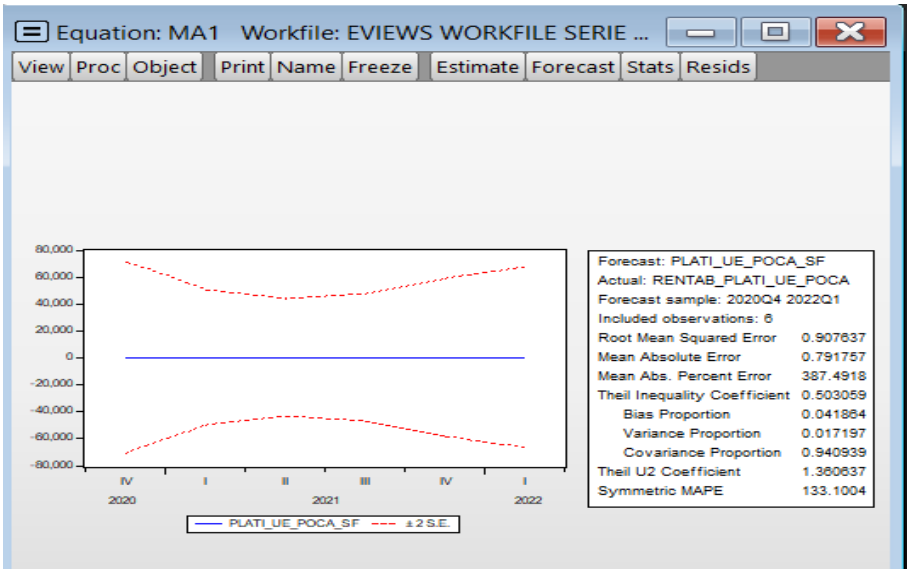

Figure no. 6 – The static forecast related to the MA(1) model
Source: made by the authors with the help of the EViews program

The forecast is quite good because 0.564369 is the value of Theil's indicator, meaning a relatively strong adjustment. Another favorable fact is the value of Bias, which is very close to zero.

The static forecast is better than the dynamic forecast because of Theil's indicator (0.503059), meaning a relatively strong adjustment. Also a favorable fact is Bias (close to zero), the relatively small variance (0.017197) and the relatively large covariance (0.940939).

The RMSE indicator is 0.907637, and the MAE value is 0.791757. MAPE is equal to 397.4918% (over 100%), which is not very good, indicating a not very accurate forecast.

In figure no. 7 plotted the predicted series and the observed series of values for both static and dynamic forecasting. It can be seen that both forecast lines sometimes deviate from reality, but in the case of the static forecast the line is much closer to reality.

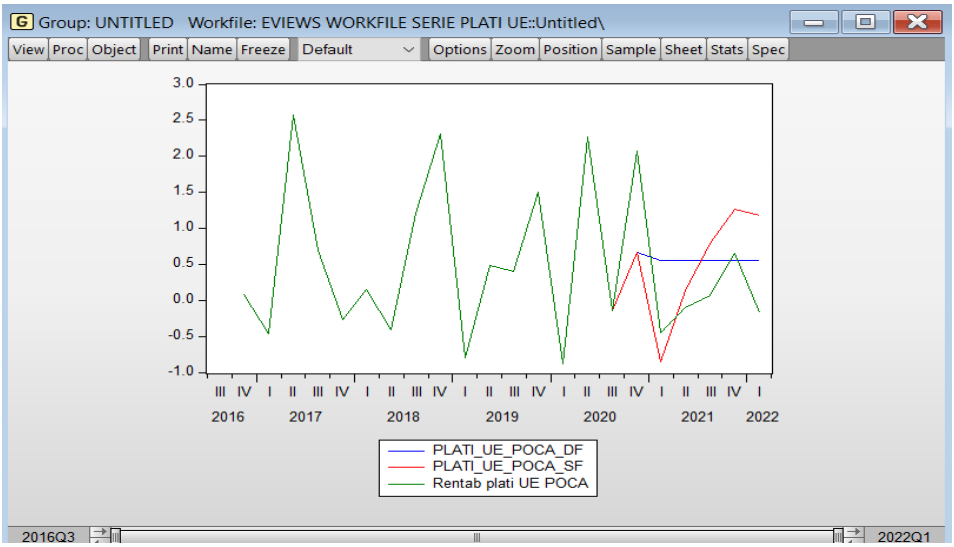

Figure no. 7 – The graph of the static and dynamic forecast related to the observed and forecast series

Source: made by the authors with the help of the EViews program

Following the analysis carried out on the series of simple quarterly returns regarding the EU payments related to ACOP, in the period 2016-2022 (on the historical data), it revealed that a forecast close to reality can be made.

Compared to the dynamic forecast which analyzes the existing data at a certain moment in time (in the present case, quarter III 2020), the static forecast is closer to reality, the

data being analyzed at each moment in time (quarter III 2020, quarter IV 2020, quarter I 2021, etc.), and the forecast is made for the remaining time interval.

3.4 Making a forecast regarding EU payments related to ACOP, for the period quarter II 2022 - quarter IV 2023 – Box Jenkins model

Given the previous sub-chapter where we were able to demonstrate that, based on historical information on EU payments related to ACOP, with the help of the EViews tool, forecasts close to reality could be made, in this sub-chapter we propose, using the same tool of forecasting, to make a forecast of the EU payments indicator related to ACOP, for the period quarter II 2022 - quarter IV 2023. Thus, for EU payments related to ACOP, the forecast will be made with the help of the same MA(1) model, because it was indicated to be the best one for the mentioned informational criteria.

There will be a total of 29 observations. The forecast horizon is represented by the first 22 observations (Q4 2016 – Q1 2022) and a forecast will be made for values from time 23 (Q2 2022) to time 29 (Q4 2023), i.e. for 7 values.

With the help of the MA(1) model, we made the dynamic and static forecasts, represented in figure no. 8.

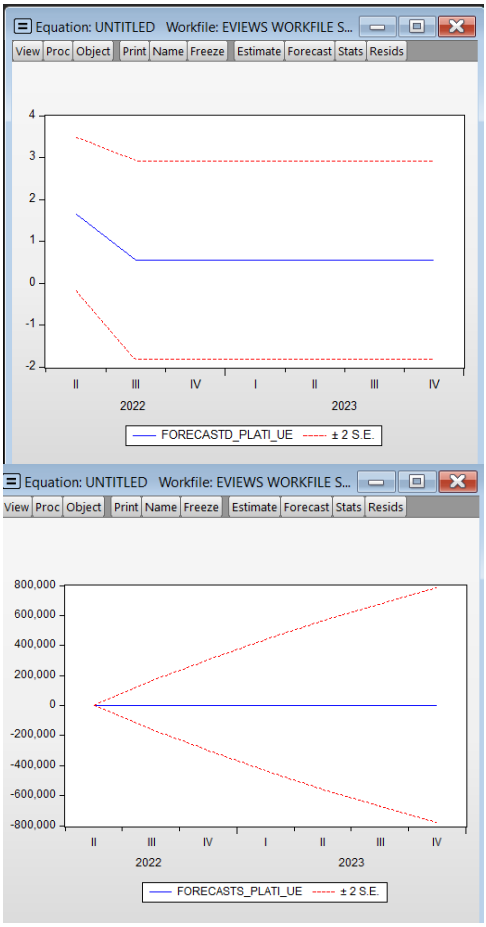

Figure no. 8 – The dynamic and static forecasts related to the MA(1) model for the period quarter II 2022 - quarter IV 2023

Source: made by the authors with the help of the EViews program

In figure no. 9 were plotted the observed values and the predicted series (dynamic forecast). The continuation of the observed values with the moments 23-29 (the period quarter II 2022 - quarter IV 2023) is the forecasted series.

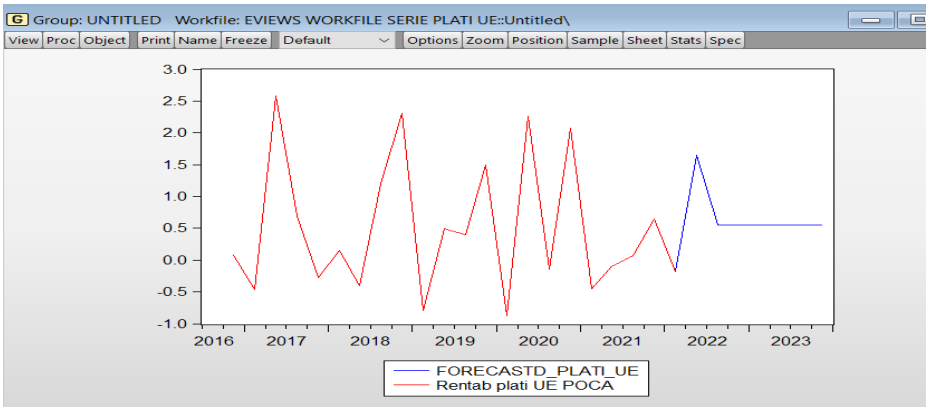

Figure no. 9 – Graph of the dynamic forecast related to the observed (Q4 2016 - Q1 2022) and forecasted (Q2 2022 - Q4 2023) series

Source: made by the authors with the help of the EViews program

In figure no. 10 were plotted the observed values and the predicted series (static forecast). The continuation of the observed values with the moments 23-29 (the period quarter II 2022 - quarter IV 2023) is the forecasted series.

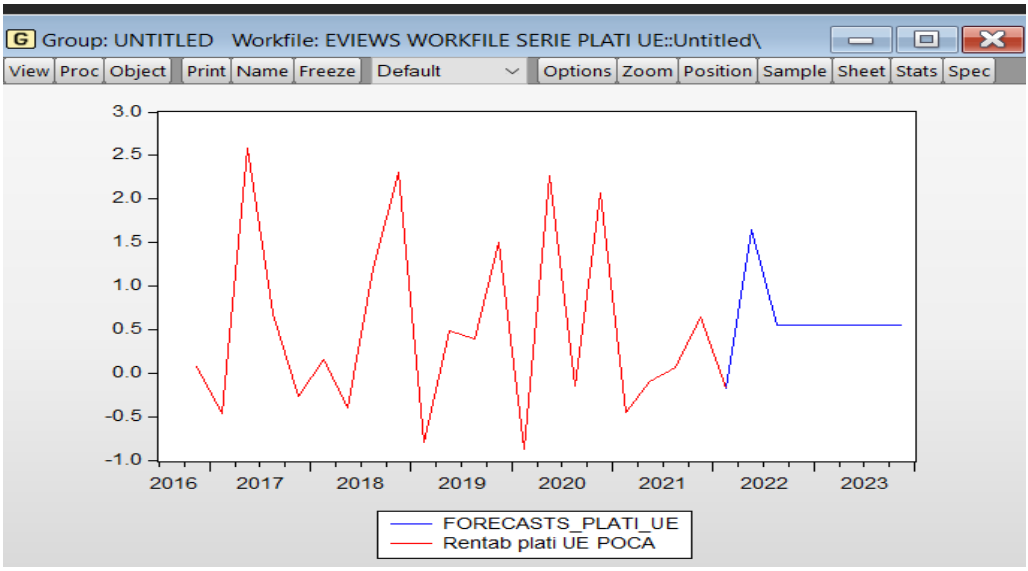

Figure no. 10 – Graph of the static forecast related to the observed (Q4 2016 - Q1 2022) and predicted (Q2 2022 - Q4 2023) series

Source: made by the authors with the help of the EViews program

Thus, with the help of the MA model (1), using the Eviews tool, under ideal conditions (without other influences and without depending on a maximum allocation of funds and without a time restriction), we made the forecast of the EU payments indicator related to ACOP, represented in the figures no. 9 and no. 10, for the period quarter II 2022 - quarter IV 2023.

Conclusions

In conclusion, through this study we managed to create a forecast of the EU payments indicator related to ACOP. As we said throughout this article, the main objective is to achieve a 100% absorption of European funds on ACOP. After the research, we came to the conclusion that yes, it is possible to absorb 100% of the funds with one condition, namely that there is no time restriction for this absorption.

Given that payments to beneficiaries will cease with January 2024, this research is useful to apply to the new OPs, for the new programming period 2021-2027, with a view to achieving 100% absorption on these programs by adjusting the mode of operation of accessing European funds.

The study proves its usefulness, in the sense that observing the forecasts made, the Management Authorities can help the beneficiaries in finding solutions, until the end of 2023, in order to increase the absorption rate as much as possible.

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