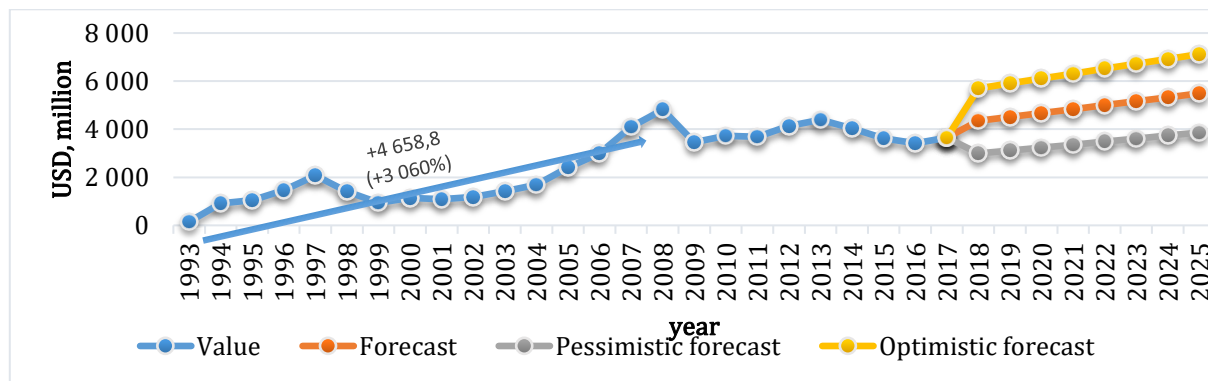


SCENARIO APPROACH TO DEFINING FOR NATIONAL DEFENSE EXPENDITURE

The challenges and risks that arise at the current stage of economic and political activity in Ukraine lead to further transformation processes and become a catalyst for the state reforming or degrading. In other words, it is a significant factor influencing their development trajectory. That is why, with the purpose of researching and identifying the main tendencies of the defense funding, an attempt was made to construct optimistic and pessimistic forecasts of expenditures for defense of Ukraine for the period up to 2025.

For the study purpose, the dynamics of expenditures for defense from the State Budget of Ukraine in 1993-2017 in millions US dollars had taken as the World Bank data.

The largest positive figures the absolute value of growth for 2008 shown at the Figure 1 below. It characterizes an increase in volumes for the entire period of 1993-2008 (by US \$ 4 658.79 million).



Source: developed by the author using the MS Excel program according to the World Bank [1]

FIGURE 1. TREND MODEL OF GROWTH OF EXPENDITURES ON DEFENSE FOR THE PERIOD UP TO 2025

During the investigated period, defense spending increased by 23.96 times to US \$ 3 495.33 million. If we analyze the average figures for the period, then the amount of defense expenditures during the analyzed period on average increases annually by US \$ 139.81 million, or 1.24 times. This means an increase in expenditures by an average of 27.95% and an increase of US \$ 23.71 million per percentage increase.

The growth or deceleration factor is also calculated in three periods: 1993-2001, 2002-2010 and 2011-2017. There is a slowdown in the growth of defense spending today compared with the beginning of the state's existence. (Table 1.)

Table 1

THE RATE OF ACCELERATION / DECELERATION OF DEFENSE FINANCING IN THE PERIOD 1993-2017

Indicator	Unit of measurement	Value
Growth rate 1993-2001	%	150,02
Growth rate 2002-2010	%	116,53
Growth rate 2011-2017	%	99,99
Acceleration / Deceleration Rate (02-10/93-01)		0,78
Acceleration / Deceleration Rate (11-17/02-10)		0,86

Source: compiled and calculated by the author according to the World Bank [1]

To predict the future change in defense financing, a trend model (Figure 1) was constructed and evaluated according to Fischer score criteria, Durbin-Watson criteria, and determination coefficient [3].

To determine the size of the error or the accuracy of the forecast of the amount of defense financing, we will calculate Tayla's mismatch ratio by the formula:

$$K_T = \frac{\sqrt{\sum (y_i - \bar{y})^2}}{\sqrt{\sum y_i^2}} K_T = \frac{11915206.734}{399352497.3812} = 0.0298$$

This indicator varies from 0 to 1. The closer to 0, the better the results of the forecast.

The determination coefficient is 0.85, which is more than 0.7, so the connection between the variable functions is tight, that is, in 85% of cases, the variable t (time) affects the change in the amount of defense expenditures.

$$R^2 = 1 - \frac{\sum (y_i - y_t)^2}{\sum (y_i - \bar{y})^2} R^2 = 1 - \frac{11915206.734}{82436857.145} = 0.855$$

The Darwin-Watson criterion is best known for the invention of autocorrelation. In our study, the criterion is 0.58. By the Durbin-Watson table for n = 33 and k = 1 (level of significance 5%) we find: d₁ = 1.38; d₂ = 1.51. Since 1.38 > 0.58 < 1.51, then the autocorrelation of the residues is present.

$$DW = \frac{\sum (e_i - e_{i-1})^2}{\sum e_i^2} DW = \frac{6940761.31}{11915206.73} = 0.58$$

We will test hypotheses regarding the coefficients of the linear equation of trend according to Fischer score criteria: F_{kp} (1; 31; 0.05) = 4.08

$$F = \frac{R^2}{1-R^2} \frac{n-m-1}{m} = \frac{0.8555}{1-0.8555} \frac{33-1-1}{1} = 183.4774$$

Since F > F_{kp}, then the determination coefficient (and in general the trend equation) is statistically significant.

Thus, the dependence of defense expenditures on time has been studied, which should be taken into account in subsequent budgeting. At the stage of the specification, a linear trend was chosen. The statistical significance of the equation is verified using the determination coefficient and Fisher's criterion. It is established that the model parameters are statistically significant. Possible economic interpretation of the parameters of the model - with each period of time the amount of expenditures on average increases by US \$ 153.53 million.

Thus, the analysis of the forecasting of the financing of the Armed Forces of Ukraine since 1993 makes it possible to conclude that additional funds are being sought for financing defense needs. Economic and political factors have a significant impact on the accuracy of the analysis, in particular the rapid and unpredictable change in the hryvnia exchange rate in relation to other currencies.

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