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MODELING BRAZIL'S DEFENSE EXPENDITURE AS A FUNCTION OF TRANSFORMATIONS IN THE INTERNATIONAL SECURITY ARCHITECTURE

Brazil, as the largest economy in Latin America and a key actor in global politics, demonstrates a distinctive approach to defense expenditure, which in recent years has increasingly reflected its dependence on transformational processes within the global security architecture. For Brazil, which has traditionally avoided direct military conflicts, defense spending serves as an instrument for safeguarding national sovereignty, ensuring regional stability, and enhancing global positioning rather than pursuing aggressive objectives. According to data from the Stockholm International Peace Research Institute (SIPRI), Brazil's defense expenditure has fluctuated within the range of 1,1–1,5% of GDP over several decades, which is significantly lower than the global average level of military spending (2,2%). Nevertheless, in absolute terms, these expenditures have exhibited steady annual growth as a result of the country's economic development.

For Brazil, the transformation of the security environment implies a shift from regional isolation toward global integration, in which defense expenditure (~1,3% of GDP in 2023) balances between deterrence and development. As evidenced by empirical research [1], in relatively stable regions – such as Latin America – military expenditure exhibits a nonlinear effect: low levels of perceived threat reduce defense needs, while the influence of global factors necessitates the adoption of adaptive strategies.

Among the external sources of turbulence in the international security architecture that have simultaneously become internal determinants prompting a reassessment of Brazil's defense policy financing, the following factors should be highlighted:

- the growing presence of the Chinese Navy and increased Russian activity are perceived in Brazil as challenges to the country's de facto control over the "Blue Amazon," directly affecting naval funding priorities;

• the weakening of the regime for controlling weapons of mass destruction has stimulated Brazil's interest in developing nuclear-powered submarine technologies as a symbol of strategic deterrence;

• finally, the crisis in Venezuela, along with the rise of transnational organized crime and drug trafficking, has generated new requirements for enhancing army mobility and strengthening border control, which should also be reflected in the state budget.

At the same time, the financing of military expenditures remains significantly constrained due to the strict prioritization of social spending enshrined in legislation, whereby (more than 40% of the federal budget must be allocated to education, healthcare, and social programs).

Model Specification:

$$DE_t = \beta_0 + \beta_1 GDP_t + \beta_2 ER_t + \beta_3 INF_t + \beta_4 GPR_t + \epsilon_t \qquad (1),$$

where: DE_t – defense spending (USD billion);

GDP_t – Brazil's GDP, which serves as an indicator of the state's overall fiscal capacity;

ER_t – Brazilian real to US dollar exchange rate (BRL/USD);

INF_t – inflation rate;

GPR_t – Geopolitical Risk Index.

The initial statistical data for building the model were obtained from official sources [2–5].

Next, we use Statsmodels for OLS [6], implementing them in the Python environment (Table 1, Figure 1).

The estimated econometric model reveals a strong correlation between defense expenditure and the Geopolitical Risk (GPR) index. This finding indicates that the Brazilian government has become increasingly sensitive to global security challenges. At the same time, dependence on exchange rate fluctuations remains a significant negative factor constraining the implementation of defense industrial modernization programs, thereby underscoring the need to develop a stronger domestic industrial base.

A key obstacle to effective defense financing continues to be the structural rigidity of the budget. The high share of mandatory personnel expenditures (exceeding 75%) generates a "crowding-out effect" on investment spending. Transitioning to a program-based budgeting framework and exempting strategic projects from general fiscal constraints constitute necessary steps to sustain the country's defense capability.

Table 1

Implementation of a multiple regression model for defense spending formation depending on changes in the international security architecture

Summary of Econometric Model OLS Regression Results			
Dep. Variable:	Def_Spend	R-squared:	0.995
Model:	OLS	Adj. R-squared:	0.979
Method:	Least Squares	F-statistic:	64.10
Date:	Thu, 22 Jan 2026	Prob (F-statistic):	0.0915
Time:	15:41:03	Log-Likelihood:	2.728
No. Observations:	5	AIC:	2.543
Df Residuals:	1	BIC:	0.9805
Df Model:	3		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975
const	24.4249	8.423	2.900	0.211	-82.596	131.446
GDP_ Growth	11.0537	1.663	6.646	0.095	10.080	32.188
FX_Rate	1.5395	1.548	-0.994	0.502	-21.210	18.131
GPR_ Index	-0.1271	0.030	-4.297	0.146	-0.503	0.249

Omnibus:	nan	Durbin-Watson:	2.781
Prob(Omnibus):	nan	Jarque-Bera (JB):	0.395
Skew:	-0.419	Prob(JB):	0.821
Kurtosis:	1.908	Cond. No	7.85e+03

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, 7.85e+03. This might indicate that there are strong multicollinearity or other numerical problems.

Variance Inflation Factor (VIF)

Feature	VIF
const	3609.015832
GDP_Growth	14.025642
FX_Rate	2.274614
GPR_Index	10.522016

Source: constructed by the author based on data from [2–5] based on [6]

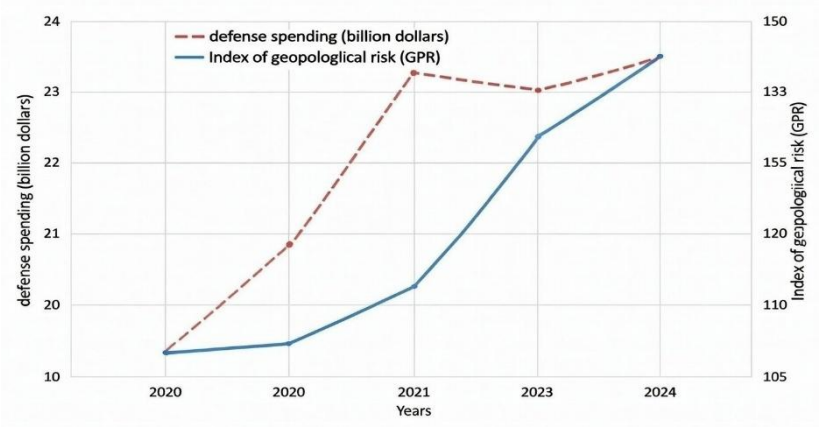

Fig. 1. Dynamics of Brazil's military spending and geopolitical risks (2020–2024)

Source: constructed by the author based on data from [2–5]

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