

DEFICITS AND DEFENSE: HOW FISCAL IMBALANCES SHAPE MILITARY SPENDING IN NATO COUNTRIES

Marian DOBRANSCHI, Valentin PÎRVUȚ

“Nicolae Bălcescu” Land Forces Academy, Sibiu, Romania
dobranschi.marian@armyacademy.ro, pirvut_v@yahoo.com

Abstract: *This paper examines the relationship between fiscal deficits and military expenditure in NATO countries over the period 2000–2021. Using fixed-effects panel models, the results show a positive and statistically significant association between fiscal deficits and defense spending. A semi-log specification suggests that increases in fiscal deficits are linked to economically meaningful changes in military expenditure. Tests for non-linearity using quadratic models do not provide evidence of a smooth functional form. However, non-parametric estimates reveal signs of threshold behavior, with the relationship becoming less stable at higher deficit levels. Extending the analysis to the composition of military expenditure, the findings indicate that personnel spending increases at moderate deficit levels but declines under larger fiscal imbalances. Overall, the results suggest that fiscal deficits influence both the level and allocation of defense spending, with important implications for fiscal sustainability and defense policy.*

Keywords: fiscal deficits, military expenditure NATO countries non-linear effects defense budget composition

1. Introduction

Military expenditure remains a central component of public policy in NATO countries, reflecting both security priorities and fiscal capacity. In recent decades, governments have faced increasing pressure to balance defense commitments with macroeconomic stability, particularly in the context of rising fiscal deficits. While a growing body of literature examines the determinants of military spending, relatively limited attention has been paid to the role of fiscal imbalances and their potential non-linear effects on defense budgets.

From a theoretical perspective, fiscal deficits may influence military expenditure in multiple ways. On the one hand, higher deficits can relax short-term budget constraints, enabling governments to sustain or increase defense spending. On the other hand, persistent fiscal imbalances may generate pressure for fiscal consolidation,

potentially constraining military budgets, especially at higher levels of deficit.

This paper investigates the relationship between fiscal deficits and military expenditure across NATO countries over the period 2000–2021. Using panel data techniques, the analysis explores both linear and non-linear relationships and extends the investigation to the composition of defense spending, with a focus on personnel expenditure. The results provide new evidence that fiscal deficits affect not only the level of military spending but also its internal allocation, with important implications for fiscal policy and defense planning.

2. Literature Review

The relationship between fiscal deficits and military expenditure has attracted increasing attention in the context of NATO countries, where governments must balance defense

commitments with fiscal sustainability. The literature combines theoretical insights with empirical evidence, highlighting the complex and often ambiguous links between fiscal imbalances, macroeconomic conditions, and defense spending.

2.1 Theoretical Perspectives

Two main theoretical approaches frame the analysis of fiscal deficits and public expenditure. The Keynesian perspective argues that fiscal deficits can play a stabilizing role by stimulating aggregate demand during economic downturns. In this context, defense spending may act as a countercyclical tool, supporting employment and economic activity, particularly when linked to domestic industries and technological spillovers [8,10]. Empirical studies suggest that under certain conditions, military expenditure can generate positive externalities through innovation, infrastructure, and labor market effects.

In contrast, the neoclassical view emphasizes fiscal discipline and long-term sustainability. Persistent deficits are seen as a source of macroeconomic instability, potentially leading to higher interest rates, increased public debt, and inefficient resource allocation. In the defense sector, this perspective highlights the risk that military expenditure may crowd out productive public investments such as education and infrastructure, thereby constraining long-term growth [7].

A central theme in the literature is the crowding-in versus crowding-out debate. While some studies find that defense spending can stimulate economic activity and complement private investment, others show that it diverts resources away from more productive sectors or increases the fiscal burden through higher debt levels [4]. The direction and magnitude of these effects depend on factors such as institutional quality, fiscal rules, and the level of economic development.

Recent contributions also emphasize the importance of non-linear dynamics. The impact

of fiscal deficits may vary depending on the level of debt, economic conditions, and policy credibility. Threshold effects and regime-dependent relationships have been identified, suggesting that fiscal expansion may have different consequences in periods of stability compared to times of fiscal stress [3,9].

2.2 Military Expenditure and Macroeconomic Dynamics

Military spending in NATO countries is influenced by a combination of economic, political, and strategic factors. Economic capacity, measured by income levels and fiscal space, interacts with security considerations and alliance commitments to determine defense budgets. Empirical studies show that higher income levels and macroeconomic stability are generally associated with more consistent defense spending, while fiscal constraints may limit the ability to maintain or increase military expenditure [4,11].

The relationship between military expenditure and economic growth remains inconclusive. Some studies report positive effects driven by technological spillovers and employment generation, while others highlight negative effects due to resource misallocation and inefficiencies in defense procurement. In many cases, the results are sensitive to model specification, sample selection, and time horizon, reflecting the complexity of the relationship [4,11].

Fiscal sustainability is a key concern in NATO contexts, where defense spending must be financed without undermining broader economic stability. Research indicates that when defense expenditures are financed through borrowing, they can contribute to rising public debt and increased fiscal vulnerability. However, the impact depends on whether spending is part of a long-term strategy or driven by short-term pressures, such as procurement cycles or external threats [3,7].

2.3 Fiscal Deficits and Defense Budgets

Empirical evidence on the relationship between fiscal deficits and military expenditure is mixed. Some studies find that

larger deficits constrain defense spending by tightening overall budgetary limits and increasing debt service obligations. In such cases, defense budgets may be reduced or reallocated in response to fiscal consolidation pressures [7].

Other research suggests that defense expenditure may be relatively insulated from fiscal pressures, particularly in countries with strong institutional frameworks or strategic priorities that prioritize military readiness. In these contexts, fiscal deficits do not necessarily lead to immediate reductions in defense spending, especially in the short run [4,11].

A key mechanism highlighted in the literature is the role of fiscal space. When governments have access to financing or maintain credible fiscal policies, they may sustain or even increase defense spending despite rising deficits. Conversely, when fiscal constraints become binding, defense budgets may face adjustment pressures, particularly in areas that are more flexible or politically negotiable [3,7].

2.4 Research Gap

Despite the growing body of literature, limited attention has been paid to the potential non-linear effects of fiscal deficits on military expenditure and to how fiscal imbalances influence the internal composition of defense budgets. This study contributes to the literature by combining parametric and non-parametric approaches to explore these dimensions, with a particular focus on NATO countries.

3. Methodology

This study examines the relationship between fiscal deficits and military expenditure in NATO countries over the period 2000–2021 using panel data techniques. The empirical strategy combines linear fixed-effects models with non-parametric methods in order to capture both average relationships and potential non-linear dynamics.

3.1 Linear Model

The baseline specification is a country fixed-effects model:

$$MilExp_{it} = \beta_0 + \beta_1 Deficit_{it} + \beta_2 X_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

where $MilExp_{it}$ represents military expenditure as a percentage of GDP in country i at time t , and $Deficit_{it}$ denotes the fiscal deficit (% of GDP, with positive values indicating deficits). X_{it} is a vector of control variables capturing macroeconomic conditions.

Country fixed effects (α_i) control for unobserved, time-invariant heterogeneity across countries, such as institutional characteristics or strategic preferences, while time fixed effects (γ_t) capture common shocks affecting all countries, including global economic cycles or geopolitical developments.

The vector of control variables includes: GDP growth (%), capturing economic dynamics; GDP per capita (PPP, log), reflecting the level of economic development; population (log), accounting for country size effects; unemployment rate (%), capturing labour market conditions; and tax revenue (% of GDP), proxying fiscal capacity.

In addition, a semi-log specification is estimated:

$$\ln(MilExp_{it}) = \beta_0 + \beta_1 Deficit_{it} + \beta_2 X_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

which allows the coefficients to be interpreted in proportional (percentage) terms and provides a robustness check for the baseline results.

3.2 Non-linear Analysis

To explore potential non-linearities, the study employs a non-parametric kernel regression of the form:

$$MilExp_{it} = m(Deficit_{it}, X_{it}) + \varepsilon_{it}$$

Unlike parametric models, this approach does not impose a predefined functional form, allowing the data to determine the shape of the relationship. This is particularly useful for identifying threshold effects or regime changes, where the impact of fiscal deficits may differ depending on their magnitude.

The non-parametric estimates are used both to compute average marginal effects and to visualize the relationship between fiscal deficits and military expenditure across different deficit levels.

3.3 Extension: Composition of Military Expenditure

To provide additional insights, the analysis is extended to the composition of military expenditure, with a particular focus on personnel spending. This allows the assessment of whether fiscal deficits influence not only the overall level of defence expenditure but also its internal allocation.

Personnel expenditure represents a key component of defence budgets and is typically characterized by higher rigidity due to wage commitments and staffing structures. By applying both linear and non-parametric approaches to this component, the study evaluates whether fiscal pressures lead to adjustments in recurrent spending,

thereby offering a more nuanced understanding of defence budget dynamics.

4. Results

Table 1 reports the fixed-effects estimates of the relationship between fiscal deficits and military expenditure. Across all specifications, the coefficient on the fiscal deficit is positive and statistically significant, indicating that higher deficits are associated with increased military spending. In the baseline model, a one percentage point increase in the fiscal deficit raises military expenditure by approximately 0.03 percentage points of GDP, with slightly smaller effects when time fixed effects are included. The log specification confirms this result, suggesting a positive proportional relationship.

Among control variables, GDP growth and tax revenue display consistent positive effects, indicating that both economic expansion and fiscal capacity support higher defence spending. Other controls, including GDP per capita, population, and unemployment, are not robustly significant across models.

The inclusion of time fixed effects improves model fit, with the within R-squared increasing from 0.115 to 0.302, highlighting the importance of common temporal factors.

Table 1 Fiscal Deficits and Military Expenditure

	(1) FE	(3) Log FE
Fiscal deficit	0.0323*** (0.00963)	0.0146** (0.00686)
GDP growth (%)	0.00917** (0.00344)	0.00648** (0.00311)
GDP per capita (PPP, log)	-0.271** (0.101)	-0.0151 (0.183)
Population (log)	-0.611 (0.663)	-0.370 (0.331)
Unemployment rate (%)	-0.0152 (0.00908)	0.00144 (0.00709)

Tax revenue (% of GDP)	0.0354** (0.0141)	0.0211** (0.00983)
Observations	557	557
R ²	0.115	0.302

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, Fiscal deficit (% of GDP), positive values = deficit.

Table 2 presents the non-parametric average effects for both total and personnel military expenditure. The results confirm a positive association between fiscal deficits and defence spending across both dimensions, with an average effect of 0.0358 for total expenditure and a substantially larger effect for personnel spending. This suggests that fiscal

imbalances have a stronger influence on the allocation of resources toward personnel costs. At the same time, the effects of control variables differ across the two specifications, both in magnitude and direction.

Table 2 Non-parametric Average Effects on Total and Personnel Military Expenditure

	Average_Effect on total military expenditures	Average_Effect on personnel military expenditures
Effect		
Fiscal_deficit	0.0358	.5050002
GDP_growth	0.0436	-.5121379
Population_log	0.6093	-.9963912
Unemployment	0.0099	.8983015
Tax_revenue	0.0238	.2914842

*Note: The non-parametric average effects indicate that fiscal deficits have a positive impact on both total and personnel military expenditure.

In particular, variables such as GDP growth and population exhibit contrasting effects, highlighting the presence of heterogeneous and non-linear relationships that are not fully captured by linear models.

Overall, the non-parametric results reinforce the robustness of the positive deficit–defence spending relationship, while also indicating that fiscal deficits influence not only the level but also the composition of military expenditure.

As shown in Figure 1, the non-parametric estimates reveal a clear non-linear relationship between fiscal deficits and military expenditure. For deficit levels

between 0% and approximately 7–9% of GDP, military spending increases gradually, suggesting that moderate fiscal expansions are associated with higher defence allocations. However, beyond this threshold, the relationship reverses.

At deficit levels above 9% of GDP, predicted military expenditure declines sharply, indicating that excessive fiscal imbalances may constrain defence spending. This pattern suggests the existence of a threshold effect, where deficits initially support military expenditure but become unsustainable at higher levels.

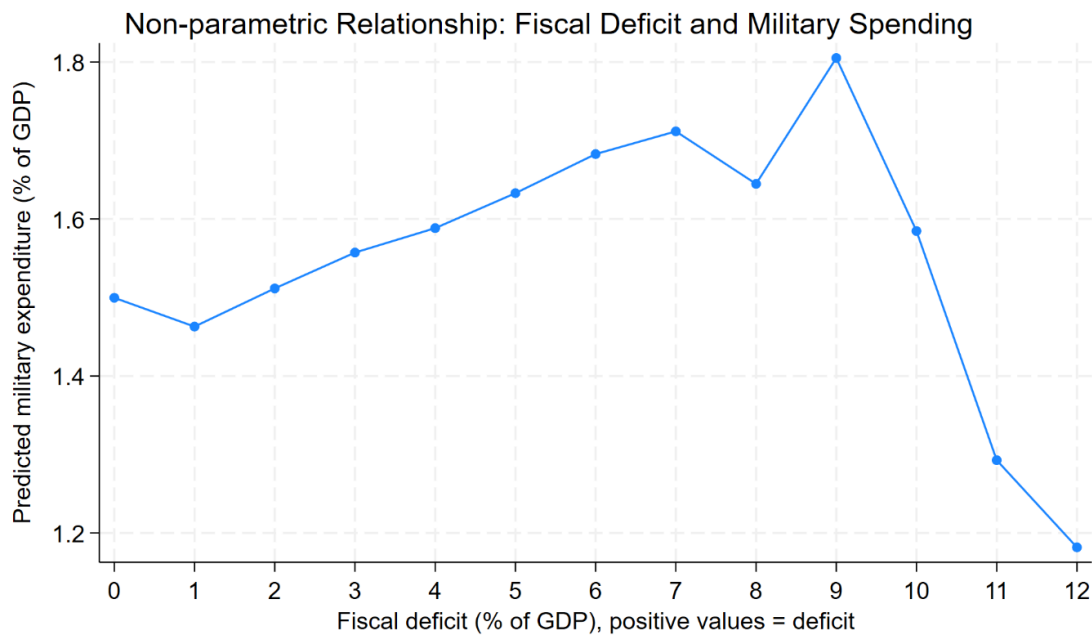


Figure 1: The non-linear relationship between fiscal deficits and military spending
Source: Author's compilation.

A similar non-linear pattern is observed when focusing on personnel expenditure. At moderate deficit levels, personnel spending

tends to increase, reflecting the rigidity of wage and staffing commitments, as shown in Figure 2.

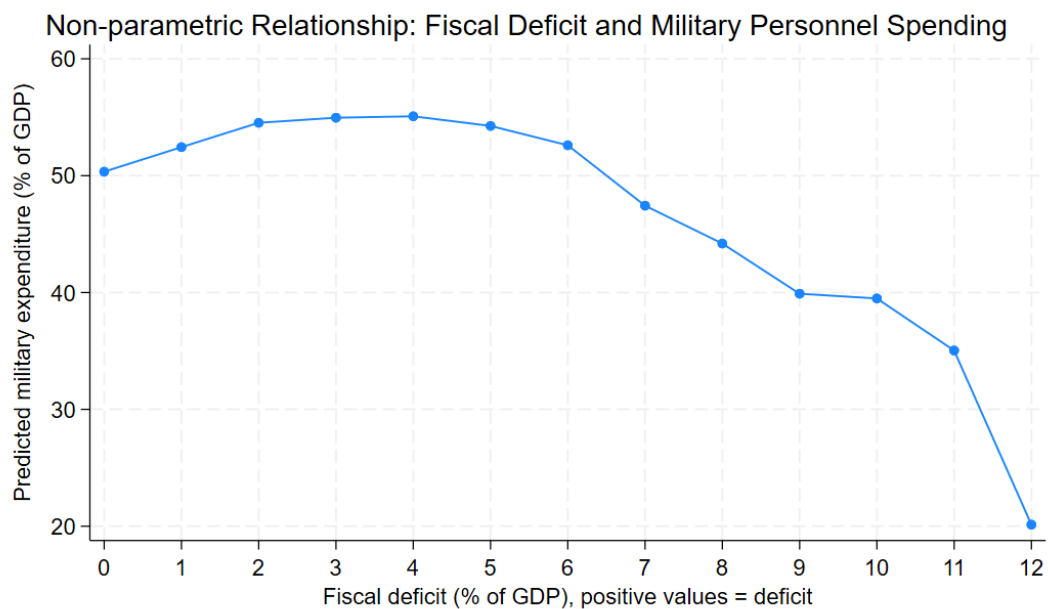


Figure 2: The non-linear relationship between fiscal deficits and military personnel spending
Source: Author's compilation.

However, at higher levels of fiscal imbalance, personnel expenditure declines, suggesting that governments adjust recurrent defence costs when fiscal constraints become binding. The non-parametric estimates reveal a pronounced inverted-U relationship between fiscal deficits and military personnel expenditure. At low to moderate deficit levels (approximately 0–4% of GDP), personnel spending increases gradually, reaching a peak, which reflects the relative rigidity of wage and staffing commitments within defence budgets. Beyond this point, the relationship reverses. As fiscal deficits increase further, personnel expenditure declines steadily, with a sharper contraction at higher deficit levels. This suggests that personnel costs, although initially protected, become a key adjustment margin under significant fiscal pressure. Overall, the results indicate that fiscal deficits have a non-linear impact on the composition of military expenditure, with governments prioritizing personnel spending at moderate deficit levels but reducing it when fiscal constraints become binding.

5. Conclusions

This paper examines the relationship between fiscal deficits and military

expenditure in NATO countries using both linear and non-parametric approaches. The results indicate a robust positive association, suggesting that governments tend to maintain or increase defence spending even in the presence of fiscal imbalances.

However, the analysis also reveals important non-linear dynamics. While moderate fiscal deficits are associated with higher military expenditure, this relationship weakens and eventually reverses at higher deficit levels, indicating the presence of threshold effects. This finding suggests that fiscal expansion may initially support defence budgets, but excessive deficits become unsustainable and lead to adjustment pressures.

Extending the analysis to personnel expenditure provides additional insights. Personnel spending increases at moderate deficit levels, reflecting the rigidity of labour-related costs, but declines when fiscal constraints intensify. This highlights that fiscal deficits influence not only the level but also the composition of defence spending. Overall, the findings emphasize the need for balancing fiscal sustainability with defence commitments, particularly in the context of rising budgetary pressures in NATO countries.

References

- [1] Barro, R. J. (1987). Government spending, interest rates, prices, and budget deficits in the United Kingdom, 1701–1918. *Journal of Monetary Economics*, 20(1), 1–32. [https://doi.org/10.1016/0304-3932\(87\)90015-8](https://doi.org/10.1016/0304-3932(87)90015-8).
- [2] Becker, S. (2019). Accidental rivals? EU fiscal rules, NATO, and transatlantic burden-sharing. *Journal of Peace Research*, 56(2), 161–178. <https://doi.org/10.1177/0022343319829690/>
- [3] Bardakas, N., Karagianni, I., & Pempetzoglou, M. (2022). Defence expenditure and public debt in Greece: A nonlinear relationship. *Security and Defence Quarterly*, 10(3), 1–22.
- [4] Çetin, İ., & Güzel, S. (2019). Military expenditures and economic growth in Middle East and North African countries. *Tesam Akademi Dergisi*, 6(1), 1–14.
- [5] Corsetti, G., Kuang, H., & Schmitz, J. (2009). Fiscal Stimulus with Spending Reversals. Center for Economic Policy Research Working Paper. <https://ssrn.com/abstract=???> (if you have the exact link, insert)
- [6] Dumitrescu, L., & Hurlin, C. (2012). Testing for Granger noncausality in heterogeneous panels. *Econometrics Journal*, 15(2), 339–371. <https://doi.org/10.1111/j.1368-423X.2012.00328.x>.

- [7] Durucan, S., & Yeşil, S. (2022). The impact of defence expenditures on government debt, budget deficit, and current account deficit: Evidence from developed and developing countries. *Eskişehir Osmangazi Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 42(1), 123–146.
- [8] Irandoust, S. (2017). Militarism and globalization: Is there an empirical link? *Quality & Quantity*, 51(4), 1505–1525. <https://doi.org/10.1007/s11135-017-0525-4>.
- [9] Karagianni, I., & Pempetzoglou, M. (2019). A linear and nonlinear causality analysis between military expenditures and external debt in NATO member countries. *European Journal of Economics and Business Studies*, 5(1), 41–58.
- [10] Khalid, S., & Mustapha, R. (2014). Long-run relationships and causality tests between military expenditure and economic growth in India. *Economics and Finance Letters*, 2(1), 1–12. <https://doi.org/10.18004/efl.2014.02.01>.
- [11] Torusdag, M., & Gül, A. (2021). Defense expenditures, current account deficit and economic growth: The case of NATO countries. *Journal of Contemporary Issues in Business and Government*, 27(3), 637–659.
- [12] Waszkiewicz, P. (2016). Drivers of Greek and Turkish defense spending. *International Journal of Management and Economics*, 2(1), 45–62.
- [13] Waszkiewicz, P. (2019). Drivers of Greek and Turkish defense spending. *International Journal of Management and Economics*, 2(3), 210–226.
- [14] Torusdag, M., & Gül, A. (2021). Defense expenditures, current account deficit and economic growth: The case of NATO countries. *Journal of Contemporary Issues in Business and Government*, 27(3), 637–659.