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BSc
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The impact of economic indicators on active military personnel in NATO countries

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Statement of originality

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Abstract

This thesis examines how key economic indicators correlate with the number of active military personnel across NATO countries. As many NATO member states are faced with difficulties in military recruitment and retention, understanding the socioeconomic drivers behind these issues is critical for defence planning. The study focuses on four indicators: unemployment rate, GDP, defense spending, and educational attainment to assess their relationships with military labor supply.

A panel dataset covering multiple years across NATO countries was compiled using data from The Military Balance and the World Bank. The analysis includes a correlation study and a fixed-effects regression model to control for country-specific heterogeneity.

The results show ...

The thesis contributes to a better understanding of military labor dynamics and highlights the need for further cross-country, multi-variable research in this field.

Introduction

Reqruitment and retention of military personnel has is becoming an increasingly important issue for many NATO countries due to demographic changes, socioeconomic conditions and geopolotical tensions (NATO Research and Technology Organization 2007; NATO 2022). Understanding the factors that influence military labor supply is crucial for providing advice to NATO policy makers in order to improve defence planning (NATO Research and Technology Organization 2007). This thesis investigates the relationships of unemployment rate, GDP, defense spending and educational attainment with the number of active military personnel in NATO countries. It aims to provide empirical results on how broader economic conditions may affect military labor supply and thus support defense policy formulation.

Previous studies have shown, that higher unemployment rates are often linked to increased enlistment, for example in Sweden and the United States, while findings from the Czech Republic have suggested more complex relationships (Bäckström 2019; Asch et al. 2010; Holcner et al. 2021). GDP and defense spending have been studied as signals of a country's civilian and military economy, which influences the choice of military employment, though results remain mixed (Warner and Asch 1995; Holcner et al. 2021). Furthermore, educational attainment is seen as both a requirement for modern armed forces seeking highly skilled personnel and a challenge for personnel retention (CNA's Resources and Force Readiness division 2025; Hof, Zuidema, and Pennings 2023). While existing research often focuses on individual countries or isolated variables, this thesis takes a broader approach by analyzing data across multiple NATO countries and over several years, aiming to fill a notable gap in the literature and find generalizable results.

Literature Review

This literature review explores the research on the influence of socioeconomic factors on military labor supply. Recruitment and retention in the military has been studied using a wide range of different factors. According to a report by the NATO Research and Technology Organization (2007), the recruitment and retention issues in NATO countries are caused by factors such as low unemployment rates, military operational and personnel tempo, higher civilian salaries and the shrinking pool of 18-24 year old indiciduals - among other challenges. External competition for labor supply pool, recruit quality and compensation have also been reported as some of the reasons individuals have expressed for not choosing a career in the military (NATO Research and Technology Organization 2007). This review aims to investigate how factors such as GDP, unemployment, education and defence spending impact the attractiveness of the military as an employer. It focuses on quantitative studies in NATO countries in order to identify current knowledge of military reqruitment and retention, while also determining gaps in the literature that this thesis aims to address. First the effect of unemployment rates will be discussed, then GDP and defence spending and finally educational attainment.

The assertion that low unemployment rates cause recruitment and retention issues is supported by several authors such as Bäckström (2019) who found a positive and statistically significant correlation between unemployment and military application rates in Sweden and Asch et al. (2010), who similarly found unemployment rate to be positively and significantly related to high-quality enlistment contracts in the United States. These findings align with research by Balcaen and Du Bois (2025) who found a one percent point increase in unemployment rate to result in a 0.0137 percentage point increase in military application rates. However, some evidence also suggests the opposite, for example Holcner et al. (2021) found an inverse relationship between unemployment and military recruitment in the Czech Armed Forces.

Warner and Asch (1995) describe the decision to enlist and to remain in the military as a choice between employment in the military or the civilian sector. The study mentions that a perfectly rational individual join the military sector if the pay differential between the sectors exceeds the preference for civilian life. Warner and Asch (1995) also note that the USA and its allies spend a significant amount of their defence budgets on military personnel. This means that GDP and defence spending along with their dynamics could reflect employment opportunities in the civilian and military sector and in turn be correlated with choices to enlist and stay in the military. Although Bäckström (2019) researched mostly unemployment rates, he highlights the fact that a stronger civilian economy increases the difficulty of recruiting new military labor force. On the other hand Holcner et al. (2021) found that the annual increase in GDP, indicating a growing economy, had a positive impact on the recruitment to the Czech Armed Forces. The annual increase in defence expenditure was also found to be correlated with a higher number of military recruits (Holcner et al. 2021).

The U.S Department of Defence has a benchmark of at least 90% of new military recruits having secondary education or higher (CNA's Resources and Force Readiness division 2025). This emphasizes the fact that the military is looking for educated recruits. Asoni and Sanandaji (2013) also argue that the transition to a smaller and technologically advanced military has made the recruitment process more selective and less likely for an individual to be allowed in the military without a high-school degree. Elster and Flyer (1982) found that the the four-year retention rates were higher amongst U.S military recruits with a high-school degree, compared to those with lower educational attainment, however this study was conducted with data from the 1970s, which may not reflect the current socioeconomic or military environment. In contrast, a more recent study by Hof, Zuidema, and Pennings (2023) found that in the Dutch Armed Forces, recruits training to become officers, who have a higher level of secondary education prior to enlistment, show higher intentions to quit basic training, than those training to become noncommissioned officers, who have a lower level of secondary education. The study hypothesizes that recruits with a better educational background could believe that they have better opportunities in the civilian labor market.

This literature review has shown that socioeconomic factors such as unemployment rates, GDP, defence spending and educational attainment can have a notable impact on military recruitment and retention. Unemployment rates are often found to be positively correlated with enlistment, however some evidence suggests more complex or even the opposite relationship. It is often assumed that a stronger civilian economy increases the difficulty of obtaining and maintaining military personnel and that a stonger military economy should attract recruits as better pay is offered, although these aspects have not been extensively studied. The literature also suggests that the military is actively recruiting individuals with a higher educational attainment, but the research reflects mixed results on the impact of educational attainment on personnel retention. The varied results and the fact that most studies focus on a single country highlights the need for further research across multiple NATO countries.

Case Background

NATO (North Atlantic Treaty Organization) is a security alliance established in 1949 (U.S. Mission to NATO n.d.). As of 2025, NATO consists of 32 member countries from North America and Europe (NATO n.d.). Its primary mission is to ensure collective freedom and security of its members through political and military means (U.S. Mission to NATO n.d.). Among others, NATO currenyly faces threats such as Russia's invasion of Ukraine, China's growing ambitions and conflicts in the Middle East and Africa, highlighting the need to further strengthen its deterrence and defence capabilities (NATO 2022).

It has become increasingly difficult in many NATO countries to recruit new and retain existing qualified military personnel. This can be attributed to a variety of factors, including socioeconomic conditions. (NATO Research and Technology Organization 2007) In light of this, this thesis explores how a selection of economic indicators influence the number of active military personnel in NATO countries.

The indicators unemployment rate, GDP and defence spending dynamics and educational attainment were selected for this thesis. The data for unemployment, GDP and educational attainment were obtained from the *World Bank Open Data* (2025) and the data for defence spending and active military personnel were sourced from *The Military Balance* (2025). The data was collected for the years 2015-2023 across all NATO countries and Russia. Data was then harmonized to create a dataset suitable for analysis.

Methodology

6.1 Data Preparation

Table 6.1: Variable Descriptions

Variable	**Description**	**Source**	**Unit**	**Transformation**
Active armed forces per capita	Number of active military personnel per capita	Military Balance, World Bank	per capita	log()
Unemployment rate	National unemployment rate	World Bank	% (0-100)	none
Secondary education rate	Proportion of population (25+) with secondary education	World Bank	% (0-100)	none
GDP per capita	Gross Domestic Product per capita	World Bank	2015 USD	log()
Defence spending per capita	A country's defence expenditure divided by population	Military Balance	2015 USD	log()
Defence spending % of GDP	Defence expenditure as a share of GDP	Military Balance	%	none
GDP per capita % change	Annual percentage change in GDP per capita	World Bank (own calculation)	%	none
Defence spending per capita % change	Annual percentage change in defence spending per capita	Military Balance (own calculation)	%	none
Defence spending % GDP % change	Annual percentage change in defence spending as % of GDP	Military Balance (own calculation)	%	none

The data preparation process involved several steps to create a clean and structured dataset that could be used for analysis. The study combines military and socioeconomic data for NATO countries across multiple years. Data was collected from various sources, transformed into a consistent format and merged into a single dataset.

First, the military personnel and defence spending data were aquired from different issues of *The Military Balance* (2025) as each issue contained data for a specific year. Data for active armed forces numbers, defence spending per capita and defence spending's share of GDP was selected for NATO member countries from each table. Data types were then adjusted so that numerical values were presented in a consistent format. (neccessary???) In order to ensure that the data is comparable, the effect of inflation was removed from defence spending per capita data by adjusting the values to 2015 USD using the Consumer Price Index (CPI) of different years. The CPI data was sourced from Federal Reserve Bank of Minneapolis (2025). The tables from different years were then merged into a single long-format table, where each row represented observations for a specific country in a specific year as this format is suitable for panel data analysis.

Next, the unemployment rate, GDP per capita in constant 2015 USD, population and secondary educational attainment data were collected from *World Bank Open Data* (2025). Data was again filtered to include only NATO countries from 2015 to 2023. The educational attainment data had missing values that were handled using linear interpolation, to estimate missing values based on neighboring data, and backward/forward filling for data points at the start or end of the series, which could not be interpolated. The tables were then also transformed into a long format, so that they could be merged with the military personnel and defence spending data.

A logarithmic transformation was applied to variables active armed forces per capita, GDP per capita and defence spending per capita. These variables can have skewed, due to disproportionate influence from larger countries, which can have substancially higher values for the variables in question. Logging can mitigate this skewness, stabilize variance and allow for interpretation of the regression coefficients in terms of elasticities. Other variables were not logarithmically transformed as they were expressed as percentages, therefore logging would make interpretation difficult and distort the scales.

Finally, the military and economic data tables were merged into a complete dataset. The active armed forces per capita column was created using military and population data and additional columns for annual changes in GDP per capita, defence spending per capita and defence spending's share of GDP were calculated by finding their percentage changes from the previous year's value.

6.2 Data understanding

Table 6.2 reports the descriptive statistics for the variables used. The logged dependent variable armed forces per capita showed relatively low variation with a standard deviation of 0.44 and a range of values between -6.55 and -4.30 which could limit the explanatory power of the regression model, however the regression model might still provide insights into smaller changes in active military size per capita.

Table 6.2: Descriptive statistics of variables

	Armed Forces per cap.	GDP per cap.	Def. budget per cap.	Unemploy- ment rate	Secondary ed- ucation rate	Def. budget % GDP	GDP per cap. % change	Def. budget per cap. % change	Def. bud- get % GDP % change
mean	-5.71	7.86	74.50	10.03	5.71	1.61	2.18	4.82	4.57
std	0.44	4.58	14.64	0.76	0.81	0.66	3.67	18.73	16.39
min	-6.55	2.02	33.60	8.28	3.44	0.35	-15.21	-41.71	-41.03
25%	-5.96	4.83	69.07	9.52	5.26	1.14	0.76	-5.61	-3.59
50%	-5.79	6.54	77.78	9.93	5.81	1.44	2.27	1.89	1.48
75%	-5.46	9.41	86.00	10.70	6.29	1.98	4.37	10.16	10.67
max	-4.30	26.40	95.29	11.59	7.60	3.82	13.65	100.83	109.23

Defence spending per capita, its annual change and the annual change in defence spending's share of GDP however showed higher volatility, with standard deviations of 14.64, 18.73 and 16.39 respectively. These higher standard deviations could suggest heteroskedacity. In addition to that, in panel data settings, standard errors are ofter correlated within entities (in this case countries), which means assuming independent standard errors could inflate t-statistics and potentially overstate statistical significance in regressions. To account for this, a fixed-effects regression could be estimated using standard errors clustered at the country level.

The use of imputed educational attainment values was also investigated. There were a total of 23 interpolated or filled values across a total of 285 observations. No country had more than 2 imputed values in the timeframe. Given the small scale of imputed values, it was unlikely that a strong bias would be introduced. Nevertheless, a sensitivty analysis should be conducted to analyze the effect of imputation more in depth.

Outliers were detected using both Z-score (with a threshold of ± 3) and IQR methods. Outliers were found, however comparing them to the complete dataset revealed no unrealistic values. Since the outliers were most likely due to high variance in some variables, not data quality issues, they were not excluded from the dataset.

6.3 Analysis

This section describes the analytical approach used to investigate the relationships between socioeconomic variables and active military personnel size. It describes how correlations and multicollinearity of the data was evaluated, how a sensitivity analysis for imputed values and a robutness check for multicollinear variables were conducted. Finally, is is explained how the regression model was estimated.

The correlation and multicollinearity analysis were performed on demeaned data, consistent with the fixed effects regression. The fixed effects model relies on within-country variation over time by subtracting country-specific means, so the data was transformed similarly. For each observation, the mean of the variable across all year of the corresponding country was subtracted from the original value. This demeaning process makes the data comparable across countries as the variables only reflect deviations from each country's average.

The correlation analysis involved calculating the Pearson correlation coefficient for each of variables, resulting in a correlation matrix. The correlation matrix was used to assess the direction and strength of bivariate relationships. Variance Inflation Factors (VIF) were calculated for the independent variables to assess the potential presence of multicollinearity. VIF values indicate how much variance of a coefficient estimate is inflated due to relationships with other predictors.

The regression analysis used a fixed-effects panel regression model to control for time-invariant heterogeneity across countries (Bäckström 2019). This meant that it was not neccessary to use the demeaned data, because the model already took differences between entities into account. A fixed effects regression isolates the within-country variation over time, enabling more accurate estimation of the conditional effects of economic factors on military personnel levels. In other words, by introducing country fixed effects, the model was estimated on changes within countries, rather than between countries. (possibly reference backstrom) The following equation was used to estimate the base model:

$$
\begin{aligned}
log(ArmedForces_{it}) = {} & \beta_1 \cdot Unemployment_{it} + \beta_2 \cdot Education_{it} \\
& + \beta_3 \cdot log(GDPPerCap_{it}) + \beta_4 \cdot log(DefSpendingPerCap_{it}) \\
& + \beta_5 \cdot DefSpending\%GDP_{it} + \beta_6 \cdot \Delta GDPPerCap_{it} \\
& + \beta_7 \cdot \Delta DefSpendingPerCap_{it} + \beta_8 \cdot \Delta DefSpending\%GDP_{it} \\
& + \alpha_i + \varepsilon_{it}
\end{aligned}
$$

where i denotes the country, t the time, Δ the annual change and a_i is the country-specific fixed effect.

A sensitivity analsis was also conducted to determine whether to include interpolated and filled educational attainment data in the regression model. Three regression models were created: Model A with complete data, including observations with interpolated educational attainment values, Model B that excluded rows with interpolated and filled values and Model C with complete data and an additional dummy variable indicating whether the education data was interpolated or not.

The final fixed-effect regression model used clustered country-level standard errors to account for portential within-country correlation of error terms and heteroskedacity across countries. In panel data, observations from the same entity are often not independent, which violates classical OLS assumptions. Clustering allows for arbitrary correlation within countries, ensuring a more robust and conservative model.

Results

7.1 Correlation Analysis

Table 7.1: Correlation matrix

	Armed Forces per cap.	GDP per cap.	Def. budget per cap.	Unemployment rate	Secondary education rate	Def. budget % GDP	GDP per cap. % change	Def. budget per cap. % change	Def. budget % GDP % change
Armed Forces per cap.	1.00	0.17	0.29	-0.08	-0.12	0.14	0.04	-0.06	-0.11
GDP per cap.	0.17	1.00	0.64	-0.61	0.25	0.44	0.30	0.26	0.02
Def. budget per cap.	0.29	0.64	1.00	-0.49	0.17	0.85	0.07	0.51	0.41
Unemployment rate	-0.08	-0.61	-0.49	1.00	-0.40	-0.42	-0.08	-0.30	-0.15
Secondary education rate	-0.12	0.25	0.17	-0.40	1.00	0.23	-0.06	-0.01	-0.00
Def. budget % GDP	0.14	0.44	0.85	-0.42	0.23	1.00	-0.07	0.45	0.51
GDP per cap. % change	0.04	0.30	0.07	-0.08	-0.06	-0.07	1.00	0.13	-0.16
Def. budget per cap. % change	-0.06	0.26	0.51	-0.30	-0.01	0.45	0.13	1.00	0.80
Def. budget % GDP % change	-0.11	0.02	0.41	-0.15	-0.00	0.51	-0.16	0.80	1.00

The correlation analysis revealed no single factor with a strong correlation to active military personnel numbers. Active armed forces per capita was found to have weak to moderate positive correlations with GDP per capita (0.17), defence spending proportion of GDP (0.14) and defence spending per capita (0.29). Weak negative correlations were observed with unemployment rate (-0.08), secondary education attainment rate (-0.12) and defence spending proportion of GDP annual change (-0.11). These findings suggest that military size may grow as a country's economy improves and defence spending rises, while higher unemployment and education attainment rates may be related to reductions in military personnel.

Notable strong correlations of independent variables were found to be between defence expenditure per capita and defence expenditure as a proportion of GDP (0.85), and between their annual changes (0.80). This was unsurprising given that these variables are derived from defence spending. However, such large correlations may indicate multicollinearity, which could bias regression estimates and inflate standard errors. multicollinearity should be assessed before running the regression.

While the correlation analysis provides useful preliminary insight into the relationships between the variables, it does not isolate the direct effect of each variable. Therefore, a fixed effects regression is used to estimate the conditional effects of the economic variables on active armed forces per capita, controlling for unobserved time-invariant heterogeneity across countries.

7.1.1 Multicollinearity

Table 7.2: Variance Inflation Factors (all variables)

Variable	**VIF**
Unemployment rate	1.95
Secondary education rate	1.27
GDP per capita	2.73
Defence spending per capita	6.00
Defence spending % of GDP	4.93
GDP per capita % change	1.35
Defence spending per capita % change	4.28
Defence spending % GDP % change	4.43

The initial results showed moderate to high VIF values for defence spending per capita (6.00), defence spending as percentage of GDP (4.93) and their respective annual percentage changes (4.28 and 4.43) indicating the presence of multicollinearity. This is expected as these variables were highly correlated and capture similar underlying dynamics. Generally VIF values from 1 to 5 are considered moderate and mostly acceptable, while values over 5 can be potentially problematic. To mitigate this, variables defence spending per capita and its annual change were removed and VIF values were calculated again.

Table 7.3: Variance Inflation Factors (reduced variables)

Variable	**VIF**
Unemployment rate	1.89
Secondary education rate	1.23
GDP per capita	2.10
Defence spending % of GDP	1.93
GDP per capita % change	1.19
Defence spending % GDP % change	1.50

The results showed significantly reduced VIF values, with defence spending percentage of GDP now having 1.93 and its annual change having 1.50. The observed reduction in multicollinearity motivated the esitmation of two regression models: a full model including all variables and a reduced model excluding the highly collinear variables. This motivates a robustness check to ensure, whether the findings of the models are stable or influenced by multicollinearity.

7.2 Regression Analysis

7.2.1 Robustness Check

Two fixed effects regression models were estimated to assess the robustness of the model. The first was a base model, which included all variables and the second was a reduced model with defence budget per capita and its annual change excluded, as these variables had exhibited multicollineary with defence budget as proportion of GDP and its annual change.

The full model explained a larger proportion of the within-country variance ($R^2 = 0.2066 vs 0.1200$) and included a statistically significant variable defence spending per capita, which had a positive relationship with the dependent variable. However the multicollinearity between defence spending per capita and defence spending as percentage of GDP could undermine the stability and interpretability of the model. This was evidenced by the change in the sign of defence budget as percentage of GDP coefficient from negative to positive. Defence budget as percentage of GDP was expected to exhibit effects in the same direction as defence budget per captia as they are derived from the same underlying measure of defence budgets. The opposing signs in the full model and the change of direction in the reduced model raised concers of multicollinearity distorting the individual coefficient estimates. These concerns were further supported by the change in statistical significance of defence budget as percentage of GDP annual change, which was not significant in the full model, but became significant in the reduced one. These inconsistencies supported the decision to remove the collinear variables and favour the reduced one, which could be more stable and interpretable.

Table 7.4: Robustness check

Term	**Base model**	**Reduced model**
Coefficient estimates		
Unemployment rate	$-0.0041, p = 0.3719$	$-0.0013, p = 0.7758$
Secondary education attainment rate	$-0.0075, p = 0.0001$	$-0.0083, p = 0.0001$
GDP per capita	$-0.1653, p = 0.2939$	$0.2376, p = 0.0867$
Def. budget per capita	$0.3829, p = 0.0000$	-
Def. budget % GDP	$-0.1110, p = 0.0202$	$0.0846, p = 0.0053$
GDP per capita % change	$0.0008, p = 0.6900$	$-0.0009, p = 0.6437$
Def. budget per capita % change	$-0.0014, p = 0.0517$	-
Def. budget % GDP % change	$-0.0001, p = 0.8607$	$-0.0013, p = 0.0082$
Model statistics		
R^2 (within)	0.2066	0.1200
F-statistic (robust)	$F(8, 245) = 7.97, p < 0.001$	$F(6, 247) = 5.61, p < 0.001$

7.2.2 Sensitivity Analysis

Three models were estimates to analize the effect of interpolated and filled educational attainment values. The secondary educational attainment rate coefficients stayed consistently negative and statistically significant across models. Additionally, other coefficients also remained with similar magnitudes. This means that using interpolated values does not meaningfully distort the relationship with the target variable. This is suppoerted by the fact that the dummy variable for interpolated values in Model C is not statistically significant, suggesting no systematic differences in observations, where the education rate was interpolated or filled in.

Table 7.5: Sensitivity analysis models

Term	**Model A (full)**	**Model B (excl. filled)**	**Model C (full + dummy)**
Coefficient estimates			
Unemployment rate	$-0.0013, p = 0.7758$	$-0.0024, p = 0.6276$	$-0.0011, p = 0.8205$
Secondary education attainment rate	$-0.0083, p = 0.0001$	$-0.0069, p = 0.0013$	$-0.0084, p < 0.0001$
GDP per capita	$0.2376, p = 0.0867$	$0.1537, p = 0.3107$	$0.2878, p = 0.0480$
Def. budget % GDP	$0.0846, p = 0.0053$	$0.1003, p = 0.0021$	$0.0882, p = 0.0038$
GDP per capita % change	$-0.0009, p = 0.6437$	$-0.0009, p = 0.6462$	$-0.0014, p = 0.4804$
Def. budget % GDP % change	$-0.0013, p = 0.0082$	$-0.0017, p = 0.0008$	$-0.0013, p = 0.0073$
Interpolation dummy	-	-	$-0.0299, p = 0.2529$
Model statistics			
Number of observations	285	262	285
R^2 (within)	0.1200	0.1135	0.1247
F-statistic (robust)	$F(6, 247) = 5.6143, p < 0.001$	$F(6, 224) = 4.7800, p < 0.001$	$F(7, 246) = 5.0059, p < 0.001$

Based on these results, Model C with full data including interpolated and filled values and a dummy variable flagging imputed values was chosen as the prefferred regression model. While imputed data could introduce noise or subtle bias into regression estimates, this did not appear to be the case this time as the interpolation dummy variable was found to be statistically insignificant. Nevertheless, Model C was adopted as it retains full sample size while explicitly controlling for data quality variation, thereby increasing the robustness of the model. Additionally, Model C had a marginally larger within country R^2, than Model A (0.1247 vs 0.1200), meaning it explained the variation within countries slightly better, which again supported the decision to choose Model C.

7.2.3 Final model

!NB maybe mention not clustered model in appendix!

The final fixed effects regression model had a 0.1247 within-entity R^2, meaning it explained approximately 12.47% of within-country variation in the logarithm of active armed forces per capita. The robust/clustered F-statistic for the model was $F(7, 246) = 2.3521, p = 0.0242$, showing joint significance of the independent variables. In other words, the model better explains the variation in the dependent variable than a model with only country-specific intersepts and no independent variables.

Table 7.2.3 reports the parameter estimates for the final model. Unemployment rate proved to be statistically insignificant ($-0.0011, p = 0.9039$), indicating that it may not substancially affect military labour supply in the sampled country and year subset. Secondary education attainment rate exhibited a significant modest negative relationship ($-0.0084, p = 0.0424$) with the dependent variable, meaning for every 1 percentage point increase in secondary education attainment rate, the active military size per capita decreased by approximately 0.84%. This negative relationship could be caused my multiple factors, for example more educated individuals may consider their opportunities better in the civilian sector, while it could also be that countries with higher educational attainment rates have more technologically advanced armed forces, which require less manpower.

The logarithm of GDP per capita had a positive, but insignificant relationship ($0.2878, p = 0.2519$) with armed forces per capita. This could suggest that the state of

Table 7.6: PanelOLS Estimation Summary

Dep. Variable	`Active Armed Forces per capita`
Estimator	PanelOLS
No. Observations	285
Entities	32
Time Periods	9
Cov. Estimator	Clustered
R-squared (Within)	0.1247
Log-likelihood	259.79
F-statistic (robust)	2.3521
P-value (F-stat)	0.0242
Distribution	F(7, 246)
F-test for Poolability	70.146
P-value	0.0000
Distribution	F(31, 246)
Included effects	Entity

the economy alone does not systematically influence the size of a county's active military. Wealthier countries may also prioritize technology over manpower. The annual change in GDP per capita also found to be statistically insignificant ($-0.0014, p = 0.3695$), indicating that short term economic changes might not influence active military personnel size.

Defence spending's share of GDP however exhibited a significant and positive relationship ($0.0882, p = 0.0209$), meaning for each percentage point increase in defence spending's proportion of GDP, active military size per capita increased approximately 8.82%. The annual changes in defence spending's proportion of GDP proved to be an insignificant predictor on active armed forces numbers ($-0.0013, p = 0.0791$). These findings could indicate that a higher baseline proportion of defence spending in GDP may signal long-term commitments to maintaining a large military, while short term changes in the proportion may not directly predict a change in active military personnel. It could also be that short term investments in defence spending were used for assets other than manpower.

It is important to note for the interpretation of these coefficients that the dependent variable was active military size per capita, meaning the coefficients reflect relative changes in active military personnel with respect to population size. Assuming a stable population, the reported percentage changes in active military size per capita can also be interpreted as approximate percentage changes in total active military size. However in cases where population can vary notably, the per capita measure provides a more consistent comparison.

Table 7.7: Parameter Estimates

Variable	**Coef.**	**Std. Err.**	**t-stat**	**p-value**	**CI Lower**	**CI Upper**
Unemployment rate	-0.0011	0.0088	-0.1208	0.9039	-0.0185	0.0163
Secondary education attainment rate	-0.0084	0.0041	-2.0404	0.0424	-0.0165	-0.0003
GDP per capita	0.2878	0.2506	1.1484	0.2519	-0.2058	0.7813
Def. budget % GDP	0.0882	0.0379	2.3250	0.0209	0.0135	0.1629
GDP per capita % change	-0.0014	0.0016	-0.8991	0.3695	-0.0045	0.0017
Def. budget % GDP % change	-0.0013	0.0007	-1.7632	0.0791	-0.0027	0.0001
Education Dummy	-0.0299	0.0223	-1.3412	0.1811	-0.0739	0.0140

Statement of work

This thesis contains only work done by the author. No sections are based predominantly on group work. I, Joosep Roots, take full responsibility for the content of this thesis.

Conclusion

Write!!!

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