

REVIEWER'S REPORT

Manuscript No.: IJAR-58258

Title: Linear Regression Analysis On The Impact of Defence Expenditure on Human Capital Development in U.S.A. : A Time Series Econometrics Study .

Recommendation:

Accept as it is

Accept after minor revision.....

Accept after major revision

Do not accept (*Reasons below*)

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality			✓	
Clarity		✓		
Significance		✓		

Reviewer's ID: JPR-002

Detailed Reviewer's Report

Manuscript Title: *Linear Regression Analysis on the Impact of Defence Expenditure on Human Capital Development in U.S.A.: A Time Series Econometrics Study*

Overall Evaluation

The manuscript investigates the relationship between defence expenditure and human capital development in the United States using annual time-series data from 1974–2024. Human capital development is proxied by life expectancy at birth, while defence expenditure, federal receipts, population growth, and gross fixed capital formation are used as explanatory variables. The study employs Ordinary Least Squares (OLS) regression along with several diagnostic tests, including tests for heteroskedasticity, autocorrelation, multicollinearity, structural breaks, and model specification. The topic is relevant and timely considering the increasing global attention to defence spending and sustainable development. The manuscript demonstrates the author's effort in conducting an extensive econometric analysis. However, several conceptual, methodological, analytical, and presentation issues require substantial revision before the manuscript can be considered suitable for publication.

The introduction provides adequate background regarding U.S. defence expenditure and its importance in national security. It also explains the motivation for examining defence expenditure in

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relation to human capital development. Nevertheless, the literature review remains relatively limited and descriptive. The manuscript relies heavily on only three base studies, whereas a journal-quality paper should critically review a wider body of international literature published during the last five to ten years. The review should compare different empirical findings, identify research gaps, explain theoretical perspectives, and clearly demonstrate how the present study contributes new knowledge beyond existing research. The theoretical framework linking defence expenditure with life expectancy should also be strengthened by incorporating concepts such as the opportunity cost hypothesis, Keynesian military expenditure theory, endogenous growth theory, and human capital theory.

The research objectives are clearly stated but remain relatively broad. The study would benefit from developing explicit research questions and testable hypotheses grounded in economic theory rather than presenting only statistical hypotheses. Moreover, the justification for selecting life expectancy as the sole proxy for human capital development requires further explanation. Human capital is a multidimensional concept involving education, health, labour productivity, and skill development. Although life expectancy is an accepted indicator, relying exclusively on it may oversimplify the concept. The author should discuss this limitation and explain why other indicators such as education expenditure, Human Capital Index, literacy rate, or school enrolment were not incorporated.

The methodology section explains the basics of regression analysis in considerable detail; however, much of the discussion resembles textbook material rather than research methodology. Instead of describing elementary regression concepts, the methodology should focus more specifically on model specification, data sources, variable transformations, justification for logarithmic transformation, expected signs of coefficients, stationarity issues, and assumptions underlying time-series econometrics. Since the study uses annual data spanning 51 years, it is essential to establish the stationarity properties of the variables before estimating the regression model. Standard econometric practice requires Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), or KPSS unit root tests to determine whether the variables are stationary. These tests are absent from the manuscript, representing a major methodological weakness because OLS estimates based on non-stationary variables may produce spurious regression results.

Similarly, after testing stationarity, the manuscript should investigate whether a long-run equilibrium relationship exists among the variables using Johansen Cointegration or Engle-Granger Cointegration tests. Without establishing cointegration, the validity of interpreting long-run relationships remains questionable. If variables are integrated of different orders, the study may instead consider an

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ARDL Bounds Testing framework, which is particularly appropriate for small samples such as the present dataset.

The econometric analysis is comprehensive in terms of diagnostic testing. The inclusion of heteroskedasticity tests, autocorrelation tests, RESET specification test, Chow structural break tests, and multicollinearity diagnostics demonstrates considerable effort. Nevertheless, the interpretation of several diagnostic results requires improvement. The manuscript reports the presence of heteroskedasticity and autocorrelation but continues to interpret the OLS coefficients without correcting the estimated standard errors. Once heteroskedasticity and autocorrelation are detected, the author should estimate robust standard errors using Newey-West or HAC estimators, or alternatively employ Generalized Least Squares (GLS) or Prais-Winsten estimation. Without these corrections, the reported t-statistics and significance levels may be unreliable.

The interpretation of regression coefficients is generally understandable, but greater caution is necessary when discussing causality. Throughout the manuscript, the author occasionally implies that defence expenditure increases life expectancy. Since the analysis is based on observational time-series data using OLS regression, the findings establish statistical association rather than causal effects. Statements implying causation should therefore be revised to indicate that defence expenditure is positively associated with life expectancy after controlling for other variables. Additionally, the positive relationship between defence expenditure and life expectancy should be interpreted more critically. Higher defence expenditure may simply reflect greater economic prosperity rather than directly improving health outcomes. Endogeneity and reverse causality should therefore be acknowledged.

The manuscript reports an R^2 of approximately 0.916, indicating a high explanatory power. However, such a high value in time-series regression involving trending variables often raises concerns regarding spurious regression. This again highlights the necessity of conducting unit root and cointegration analyses. Furthermore, although correlation analysis is presented, no Variance Inflation Factor values are reported in tabular form. The manuscript merely states that multicollinearity is absent. Presenting the actual VIF statistics would improve transparency.

The structural break analysis using Chow tests for 2001, 2008, and 2020 is one of the strengths of the study because these events correspond to significant geopolitical and economic shocks. However, the author should justify why only these years were selected rather than employing endogenous structural

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break tests such as Bai-Perron multiple breakpoint tests, which identify structural changes objectively rather than imposing predetermined break dates.

The conclusion summarizes the findings effectively but occasionally overstates the implications of the results. The policy recommendations remain relatively general and should be expanded. Since the study concludes that defence expenditure exhibits a positive association with life expectancy, policymakers should be advised to balance defence investment with adequate allocations for healthcare, education, and infrastructure to maximize long-term human capital development. The limitations section is currently insufficient and should explicitly acknowledge limitations relating to sample size, variable selection, omitted variables, potential endogeneity, and the exclusive focus on the United States. Suggestions for future research should include comparative cross-country analyses, panel data approaches, dynamic econometric models, and alternative measures of human capital.

The manuscript also requires careful language editing. Several grammatical errors, repetitive explanations, formatting inconsistencies, spacing issues, and typographical mistakes are present throughout the document. Many sections repeat definitions of statistical concepts that are unnecessary for an academic journal article. The paper would benefit substantially from professional English editing to improve readability and conciseness.

Overall, the manuscript addresses an important research problem and demonstrates commendable effort in applying econometric techniques. However, significant methodological improvements are necessary to ensure the robustness of the empirical findings. Incorporating stationarity and cointegration analysis, addressing heteroskedasticity and autocorrelation through robust estimation methods, expanding the literature review, strengthening the theoretical framework, improving the interpretation of results, and refining the academic writing will substantially enhance the scientific quality and publication potential of the manuscript.