P-ISSN: 2709-6254	Journal of Development and Social Sciences	Jul-Sep 2023, Vol.4, No.3
O-ISSN:2709-6262	http://dx.doi.org/10.47205/jdss.2023(4-III)87	[956-966]

JDSS Journal of Development and Social Sciences
www.jdss.org.pk

RESEARCH PAPER

Exploring the Nexus of Defense Expenditure, Governance Strategies, and Ecological Impact: An Evidence from Developed Countries

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ABSTRACT

This research aims to conduct a comparative study of developed countries to examine the relationship between defense spending, governance, and ecological footprints. The study employs Panel Data to analyze the data from a range of developed countries from 1996-2022, including their defense spending patterns, governance structures, and ecological footprints. The study identified certain governance practices that contribute to reducing ecological footprints in developed countries. The findings highlight the environmental impacts of economic expansion and military activities, emphasizing the need to consider both factors when assessing their environmental effects. The study reveals that the military and economy have distinct ecological consequences independently driven by resource-dependent dynamics. It underscores the significance of incorporating the military into theoretical frameworks and empirical investigations within environmental sociology. The analysis also highlights the presence of ecologically unequal exchange relationships, whereby economically and militarily powerful nations disproportionately exploit global environmental resources, leading to unsustainable consumption levels in less developed countries.

KEYWORDS Comparative Study, Defense Spending, Developed Countries, Ecological Footprints, Environmental Policies, Governance, Military Investments, Resource Allocation

Introduction

The military, a crucial institution for a nation, interacts with the environment in various ways. Radicalism and militarization are identified as hazardous activities for a country's territory. While a strong defense is essential for national sovereignty, it incurs significant costs, including an ecological footprint. Defense industries contribute to waste and emissions, negatively affecting the environment. Environmental deterioration can be mitigated by promoting the use of renewable energy in the industrial sector and enhancing state (S. Ahmed et al., 2020).

Governance (Z. Ahmed et al., 2020) The ecological footprint quantifies nature's total demand and supply, encompassing productive land and natural resources consumed by the population. It includes natural products, waste absorption (e.g., CO_2), and fertile lands such as grazing land, forests, crops, and fishing ground (Roychoudhury et al., 2019). The principles of sustainable development consist of economic, societal, and environmental considerations. Economic systems and social structures shape social impacts on health, which are embedded in the broader environment and affect the distribution of energy resources worldwide. Under the consideration of natural resources, population growth, and industrial development (Jie et al., 2023). The global ecological footprint has risen to 21 billion global hectares in the past three decades, reflecting increased utilization of environmentally unfriendly practices for economic production. It quantifies the impact of human activity on land, water, and waste generation resulting from the production of commodities necessary for sustaining a specific lifestyle (Nihal et al., 2023a). The ecological footprint is influenced by defense spending, governance quality, economic growth, energy consumption, and population increase (Nihal et al., 2023b).

To investigate the impact of defense spending on ecological footprints in developing countries, considering variations in governance structures. By achieving this objective, the research aims to provide a comprehensive analysis encompassing the interconnectedness of defense spending, governance, and ecological footprints in developing countries. The findings will contribute to a better understanding of how these factors interact and inform policy decisions regarding defense spending and environmental sustainability.

Literature review

Natural resources were utilized and moved from one area to another long before the modern age(Nihal et al., 2023a). Localized ecological degradation, such as the decline of civilizations like the Mayans, accompanied the global integration of regions under the economic system of global capitalism. This integration resulted in diverse and unequal positions of nation-states within the international division of labor(Z. Ahmed et al., 2020). Changes in economic values often align with ecological and material movements. The global economy, influenced by the tiered interstate system, relies on controlling economic and environmental flows. International political economy examines how the structure of states and relationships affects environmental effects and human well-being. We focus on environmental modernization (Z. Ahmed et al., 2020), the treadmill of production, the treadmill of destruction and ecologically unequal exchange. To emphasize these viewpoints' notions of interactions between society and nature, we try to elaborate on the differences and parallels between them in terms of the economy, military, and environment.

Modernization and the Treadmill: Ecological Contradictions and the Economy

To meet their social needs, humans have significantly altered the environment, which was unimaginable in the past. The economy, as a major social institution, plays a crucial role in shaping how civilizations interact with the environment through resource acquisition, labor organization, commerce, production, and waste management within the global economic system(Jorgenson & Clark, 2009a). Environmental sociology focuses on the ecological impacts of socioeconomic interactions. Theoretical traditions like ecological modernization and treadmill of production differ in their views on environmental circumstances and economic growth. Modernization advocates believe that "traditional" countries should develop socially and economically along the lines of Western nations with time, investment, commerce, and large-scale production, following the framework and zeal of (Jorgenson, 2016a) Environmental economics have reacted to social and ecological concerns throughout time by recognizing that economic expansion has a negative impact on the environment(Muhammad et al., 2021). Environmental issues are seen as a byproduct of continuous social development rather than as a means of altering, the course of economic development ("Investigating the environmental Kuznets curve (EKC) hypothesis: does government effectiveness matter? Evidence from 170 countries.," 2020) growing consumer demand for "green products" indicates increasing public concerns for a healthy environment and encourages sustainable practices in economic progress. The "third way" for preserving the existing economic system, according to proponents of ecological modernization who embrace the idea of "rational capitalism," involves governmental control and continued economic progress(Pels, 2023). Ecological reasoning integrates natural processes into economic thinking, leading to dematerialization and reduced energy consumption in a growing economy(Kaltenbach, 2020). Ecological modernization argues that economic growth, industrialization, and technology can mitigate ecological degradation and promote environmental sustainability.

This study examines ecological modernization and treadmill of production perspectives, analyzing the impact of ecological rationality and economic growth on environmental consequences. Panel models using GDP per capita and quadratic terms evaluate the opposing viewpoints on economic growth and the environment, considering society/nature links.

Militarism and the Treadmill: Ecological Degradation and the Military

The interplay between the economics, military, and state is complicated. The growth of armies inside countries is influenced by both internal politics and states' positions in the international system(Waheed, 2017). Economic supremacy precedes military supremacy for hegemonic states, as surplus funds from the former finance the latter. The 20th century witnessed significant changes in military size, capabilities, and social standing, particularly post-World War II. The United States' military firmly entrenched itself in the power elite through the growing influence of the Pentagon(Knowles, 2020). The military's focus on technical needs led to the intertwining of "big science" with military objectives, directing resources towards advanced vehicles, aircraft, and weapons for national security and potential future conflicts (Luong et al., 2021). More expensive and resource-intensive than older equipment, newer equipment was manufactured of specific materials. Advanced technology has expedited military operations but also increased spending due to equipment maintenance costs. The military's evolving nature generates independent development dynamics requiring substantial funding. Some comparative sociological research focuses on how the military affects levels of domestic income inequality (Kick and Kentor, 2006), economic development (Yang & Wang, 2022), and other social outcomes (Jenkins and Scanlan 2021). Despite the potential environmental impact, there is limited sociological research on the environmental effects of militarism in contemporary contexts. The two most significant outliers, (Gregory & Smith, 2005) are maybe. Drawing on the treadmill of production theory, researchers explore the military-environment relationship, highlighting the military's independent expansionary dynamics and negative environmental impact. Militarism undermines conservation efforts due to its rationale and emphasis on national security.

Division of Nations: Ecologically Unequal Exchange and Nature

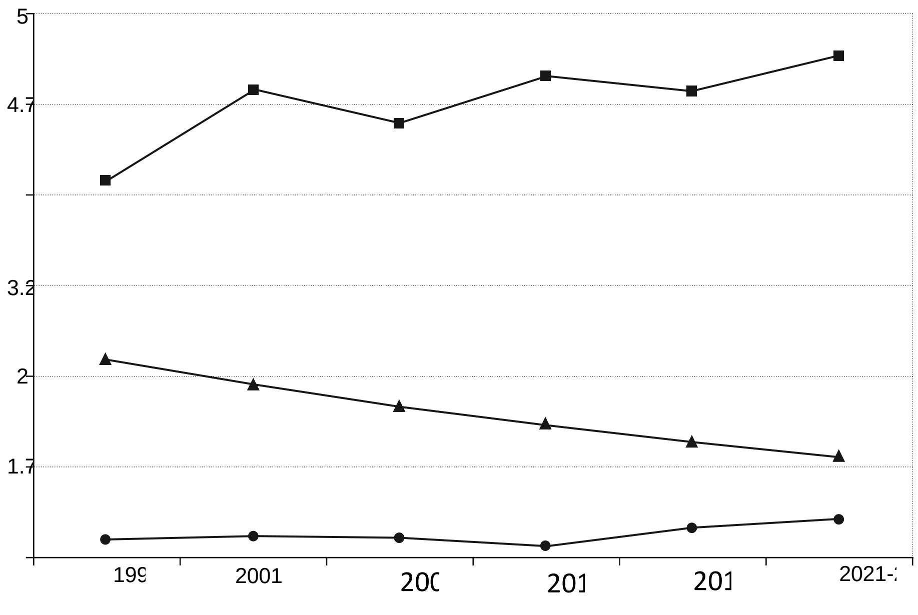
Due to the unequal historical integration of states into the modern global economy, a system of militarily and economically stratified nations has developed (Jorgenson, 2016). According to (Jorgenson, 2016b) the systematic exploitation of nature via a worldwide division of labor is a key aspect of the present interstate system. In a similar spirit, asserts that that processes of unequal development are influenced by "the concentration of industrial production, commerce, population, and so forth in developed zones" and "the concentration of agriculture and raw material extraction in underdeveloped zones." In his account of Latin American history from 1979, Eduardo Galeano observes that "once integrated into the world economy. The more a product is desired by the global market, the greater the misery it brings to the... peoples [and environment] whose sacrifice creates it". From the standpoint of political economics, the division of states and the worldwide division of labor support numerous unequal exchange patterns, which in turn contribute to global inequalities e.g. (Emmanuel, 1972; Galtung, 1971). According to traditional dependence theories, core countries drain away their economic surplus at the cost of the less developed countries (Santos, 1971). International commerce's structure and effects on ecological consequences studied in environmental sociology and related disciplines e.g. (NcNeil et al. 2007; Jorgenson & Kick, 2006). Theory of ecologically unequal exchange: powerful countries externalize consumption through exports, building on classic unequal exchange and uneven development traditions (e.g., Emmanuel 1972; Frank 1967), as well as Bunker's (1984). Natural resource extraction shaped Amazon's underdevelopment. Treadmill orientations and environmentally unequal exchange converge, fueled by perpetual growth and consumer markets (Gould et al. 2008. Treadmill of destruction drives resource consumption for military interests, security, innovation, power, and influence (Hooks and Smith, 2005;

Jorgenson, 2005). Powerful militaries gain better access to natural resources and sink capacity of weaker, less developed countries (Dunn, 1998).

Ecological Footprints of Nations

In the parts following, we investigate the per capita ecological footprints of countries to evaluate the theoretical articulations presented in the prior sections. The ecological footprint, which measures the amount of biologically productive land needed to sustain the consumption of renewable natural resources and absorption of carbon dioxide waste products by a particular population, was largely created by (Husain et al., 2021). The Global Footprint Network (2016a) provides estimates of each country's ecological footprint. These statistics enable comparisons of a country's environmental demand to its domestic and international natural capital resources. The latter speaks of the stock of natural resources that provide human communities with resources and services, such as water and forest resources.

The national footprint estimations calculate the amount of farmland, grassland and pasture, fishing grounds, and forestland needed to sustain a certain population's level of consumption(Moros-Ochoa et al., 2022) Measurements of ecological footprint consider infrastructure development space and carbon dioxide absorption. The footprint includes imports, domestic output, and deducts from exports. Over 600 items, raw materials, and finished goods are accounted for. Yield and equivalency factors adjust for regional variations. The nuclear footprint is a small but emerging component.



—●— Median Footprint Per —■— Median Footprint —▲— Ecological footprint = F (Defense Spending, Internal Conflict, External Conflict, Governance, GDP per capita, GDP per capita2, Energy Consumption, Population Density, FDI, Error Term)

Figure 1: the Ecological Footprints of Nations and Global Bio capacity Per Capita, 1996–2021-22

Worldwide average for production across all land types. Social scientists have put theories from various theoretical perspectives to the test in macro-comparative analyses of countries' ecological footprints thanks to the increasing accessibility and usefulness of these theories (Jorgenson & Clark, 2009b).

The global GDP per capita, which is derived by dividing all biologically productive land and sea on Earth by the entire world population and gives a broad estimate of human sustainable consumption levels, may be used to compare the per capita footprints of different countries. The Global Footprint Network sells this international index of sustainable consumption, which was also created by Wackernagel and coworkers in 2002. Figure 1 shows the worldwide GDP per capita, the median footprint per capita for 15 developed nations (labelled as DCs), and the median footprint per capita for 54 less developed countries (labelled as LDCs). From 1975 to 2000, these three measurements are shown at 5-year intervals. The data set's developed countries' median per capita footprint increased from 4.13 hectares in 1975 to 5.16 hectares in 2000, but the sample's less developed nations' median per capita footprint only increased by 13.79 percent, from 1.16 hectares in 1975 to 1.32 hectares in 2000. The median per capita footprints for the developed countries were well above (and increasingly so) the global GDP per capita for each of the time points, whereas the median per capita footprint for the less developed countries remained below the globally sustainable threshold for the entire 25-year period. This is in addition to the widening gap between the midpoints for these two groups of countries.

The significant relationships between defence spending, governance tactics, and their combined ecological effect within the particular setting of industrialised nations may not have been thoroughly explored in the literature up to this point. Even though there may be distinct studies on defence expenditure, governance strategies, and ecological implications, there don't seem to be many studies on how these aspects combine and impact one another in advanced countries. The integration of these factors, especially within the context of industrialised countries, is an understudied subject that promises new insights into the intricate interactions between governmental agendas, environmental sustainability, and national security considerations. Such research contributes to policy debates to balance defence, governance, and environmental preservation in developed nations. The absence of thorough research on how military expenditures, governance tactics, and ecological effects interact in wealthy countries is An Evidence from wealthy Countries. Although there are specific research on each of these topics, the integration of their overall impacts is still little understood, especially in industrialized countries. The study's potential value lies in analyzing the intricate connections and possible feedback loops among these factors, considering bidirectional causation, interaction effects, and long-term sustainability implications. The research might also explore how sociopolitical variables, laws, and international agreements influenced the associations seen. By bridging these gaps, the study may provide insightful information for decision-makers looking to balance defence objectives, governance structures, and environmental protection in industrialized countries.

Material and Methods

The quantitative research approach is used in this research. Examine a panel data collection that includes numbers for 21 developed countries between 1996 and 2022 in this research. These are the nations where data on the dependent variable and important independent aspects are available. At 5-year intervals (1996, 2001, 2006, 2012, 2017, and 2022) the data are point estimates. Allow sample sizes to vary amongst the models in order to make the most of the data that is available. Overall, sample sizes for the tested models, which included developed nations, vary from 806 to 796 observations, with a minimum of three and a maximum of six observations per nation. With the same minimum and maximum numbers of observations per country, the analyses limited to developed nations are undertaken to see if the impacts of ecologically unequal trade connections alter over time. The total sample sizes range from 796 to 806 for these analyses. The study's participating nations are listed in Appendix A.

Countries having HDI of greater than 0.80 will be developed and less than 0.80 will be developing. This study examine the impact of defense spending, internal conflict, external conflict, governance, GDP per capita, energy consumption, population density and FDI on ecological footprint and PPH for a panel of developing and developed countries . The time and data for this study will be from 1996 to 2022. Data of GDP per capita, energy consumed, total military spending, population density and FDI will be taken from World Development Indicators (WDI). The ecological footprint the data source used is Global Footprint Network. This proxy is used by number of studies as an effective measure of environmental degradation such as (Dogan et al., 2020; Wang et al., 2020). The Worldwide Governance Indicators (WGI) project constructs aggregate indicators of six broad dimensions of governance as voice and accountability, political stability and absence of violence/terrorism, government effectiveness, and regulatory quality, a rule of law and control of corruption. The variable of governance will be collected from World Governance Indicators the six aggregate indicators are based on over 30 underlying data sources reporting the perceptions of governance of a large number of survey respondents and expert assessments worldwide. Details on the underlying data sources, the aggregation method, and the interpretation of the indicators are given by (Wang et al., 2020). Dependent variable Ecological footprint , Independent variables are Defense Spending, Governance, GDP per capita, GDP per capita2, Energy Consumption, Population Density, FDI, Error Term)

$$Ecological\ footprint = \beta_0 + \beta_1 * Defense\ Spending + \beta_2 * Governance + \beta_3 * GDP\ per\ capita + \beta_4 * GDP\ per\ capita^2 + \beta_5 * Energy\ Consumption + \beta_6 * Population\ Density + \beta_7 * FDI + \varepsilon$$

In this equation: β_0 represents the intercept or constant term. β_1, β_2, β_3, β_4, β_5, β_6, and β_7 are the coefficients or effects of the independent variables Defense Spending, Governance, GDP per capita, GDP per capita^2, Energy Consumption, Population Density, and FDI, respectively. ε is the error term, representing the random variation or unexplained factors.

Results and Discussion

Random Effects Models

For all presented results, estimate generalized least squares (GLS) random effects (RE) models with robust standard errors for methodological and substantive reasons 10. We compare countries in the top quartile of the distribution of military spending versus all other countries in undisclosed sensitivity studies. The temporal trajectories closely resemble those shown in Figure 1'. A RE modelling technique is often preferred to fixed effects (FE) in panel studies when the time dimension is relatively short (e.g., six time points or less), since it requires fewer degrees of freedom to account for the subject-specific factors (Frees, 2004). The second sort of model might suffer from significant Multicollinearity when one or more independent variables have very modest variance over time per instance because variables under these circumstances will likely be extremely collinear with the country-specific fixed effects. The estimate process for the FE model may be substantively read as "throwing away" theoretically meaningful between-country variation that is present in the data, which is another reason why FE models are unsuitable for completely time-invariant variables of potential importance. Results of the Hausman test statistic (all no significant) further suggest that for the present analysis, RE modelling is favored over FE modelling. Apart from the tropical dummy variable explained below, all applicable reported models were re-estimated elsewhere using FE panel regression, and the conclusions of special importance for this research are quite comparable to those of the GLS RE models. We also draw the conclusion that there are no highly influential instances in the whole sample of the present research based on pertinent diagnoses.

OLS Regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

$$\begin{aligned} Ecological\ footprint &= \beta_0 + \beta_1 * Defense\ Spending + \beta_2 * Governance + \beta_3 \\ &* GDP\ per\ capita + \beta_4 * GDP\ per\ capita\char`^2 + \beta_5 \\ &* Energy\ Consumption + \beta_6 * Population\ Density + \beta_7 * FDI \\ &+ Error\ Term \end{aligned}$$

Table 1
OLS Regression

Source	SS	df	MS	Number of obs	=	733
				F(6, 726)	=	24.53
Model	57.5757246	6	9.59595409	Prob > F	=	0.0000
Residual	284.06086	726	.391268403	R-squared	=	0.1685
				Adj R-squared	=	0.1617
Total	341.636585	732	.466716646	Root MSE	=	.62551
lnEF_biocap	**Coefficient**	**Std. err.**	**t**	**P>|t|**	**[95% conf.**	**interval]**
ln_milexp	1.143711	.1410674	8.11	0.000	.8667619	1.420659
lnEn_Use	-.7073137	.1572721	-4.50	0.000	-1.016076	-.3985513
lnpop_denisty	-.1052452	.0459991	-2.29	0.022	-.1955522	-.0149381
lnV_A	.6621097	.1292831	5.12	0.000	.4082963	.9159232
lnFDI	-.0646378	.044539	-1.45	0.147	-.1520783	.0228027
ln_gdppc2015	.6280091	.1129432	5.56	0.000	.4062748	.8497433
_cons	6.318397	.4442797	14.22	0.000	5.44617	7.190623

The table 1 shows the results of Ordinary Least Squares (OLS) regression analysis. The model as a whole is statistically significant with an F-statistic of 24.53 and a p-value of 0.0000. This indicates that the model is a good fit for the data and that at least one of the independent variables has a significant relationship with the dependent variable. The coefficients for each independent variable provide information on how changes in each independent variable are associated with changes in the dependent variable, while holding all other variables constant. The coefficient for ln_milexp is 1.1437, which means that a one-unit increase in ln_milexp (log of military expenditure) is associated with a 1.1437 unit increase in lnEF_biocap (log of ecological footprint per biocapita) (Wang et al., 2020). The coefficient for lnEn_Use is -0.7073, which means that a one-unit increase in lnEn_Use (log of energy use) is associated with a 0.7073 unit decrease in lnEF_biocap. the coefficient for lnpop_density is -0.1052, which means that a one-unit increase in lnpop_density (log of population density) is associated with a 0.1052 unit decrease in lnEF_biocap. The coefficient for lnV_A is 0.6621, which means that a one-unit increase in lnV_A (log of vulnerability to natural disasters and climate change) is associated with a 0.6621 unit increase in lnEF_biocap. The coefficient for lnFDI is -0.0646, which means that a one-unit increase in lnFDI (log of foreign direct investment) is associated with a 0.0646 unit decrease in lnEF_biocap, although this relationship is not statistically significant with a p-value of 0.147. Finally, the coefficient for ln_gdppc2015 is 0.6280, which means that a one-unit increase in ln_gdppc2015 (log of GDP per capita) is associated with a 0.6280 unit increase in lnEF_biocap. The intercept (or constant) is 6.3184, which represents the expected value of lnEF_biocap when all independent variables are equal to zero. A study conducting in 2012 country survey: military expenditure and its impact on productivity in Italy, (Caruso et al., 2012).

Table 2
Unstandardized Coefficients for the Regression of Per Capita Ecological Footprints

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10

ln_milexp	.138** (.013)	.169** (.013)		.135** (.013)	.175** (.015)	.181** (.016)	.181** (.015)	.142** (.016)	.147** (.015)	.152** (.016)
lnEn_Use	[.455]	[.559]		[.388]	[.470]	[.488]	[.489]	[.366]	[.373]	[.384]
lnpop_denisty		.032** (.005)								
lnV_A		[.155]								
lnFDI			.037** (.008) [.094]	.151** (.014) [.260]	.184** (.014) [.336]	.190** (.015) [.349]	.191** (.016) [.350]	.140** (.015) [.273]	.145** (.016) [.284]	.149** (.015) [.293]
ln_gdppc2015	.003** (.001)	.002* (.001)	.005** (.001)	.003** (.001)	.004** (.001)	.005** (.001)	.005** (.001)	.003** (.001)	.004** (.001)	.005** (.001)
Constant	.231	-.145	.734	-.171	.072	-.195	-.056	.312	.157	.304
R2 within	.167	.209	.023	.157	.185	.191	.191	.208	.244	.241
R2 between	.787	.851	.696	.757	.830	.831	.830	.872	.873	.876
R2 overall	.774	.838	.681	.744	.818	.819	.819	.861	.862	.865
N	318	318	318	318	297	297	297	297	297	297
Min/max # of obs.	6/6	6/6	6/6	6/6	3/6	3/6	3/6	3/6	3/6	3/6

The unstandardized coefficients for the regression of per capita ecological footprints are shown in the above table. Model 1 through Model 10 are the names of the several regression models that are represented by each column in the table. The independent variables or predictors that were used in the regression analysis are represented by the rows in the table. For instance, the variable "ln_milexp," which is the natural logarithm of milexp, is represented in the top row. For each model, the coefficients for this variable and their corresponding standard errors are given. When ln_milexp is changed by one unit while holding all other variables fixed, these coefficients show the predicted change in the Per Capita Ecological Footprints.

The variable "lnEn_Use," which denotes the natural logarithm of En_Use, may be found in the second row. The coefficients for this variable, however, are shown in square brackets, suggesting that they are not statistically significant and could not have a substantial influence on the per-capita ecological footprints. Additional independent variables like "lnpop_density" and "lnV_A" are shown in the subsequent rows. However, some factors only have coefficient estimates in certain models, indicating that the model may affect how these variables affect the per capita ecological footprint(Jorgenson & Clark, 2009b).

Table 3
Unstandardized Coefficients for the Regression of Per Capita Ecological Footprints

	Baseline	*Model 1*	*Model 2*	*Model 3*	*Model 4*
ln_milexp	.099**	.147**	.177**	.162**	.178**
	(.015)	(.017)	(.016)	(.017)	(.016)
	[.291]	[.432]	[.521]	[.478]	[.523]
Military expenditures	.065**	.085**	.099**	.093**	.099**
lnV_A	(.012)	(.011)	(.011)	(.012)	(.011)
	[.178]	[.232]	[.270]	[.253]	[.271]
lnpop_denisty	.001	.003**	.005**	.004**	.006**
	(.001)	(.001)	(.001)	(.001)	(.001)
	[.057]	[.125]	[.232]	[.177]	[.234]
lnFDI	-.258**	-.193**	-.160**	-.175**	-.159**
	(.071)	(.058)	(.055)	(.058)	(.057)
	[-.392]	[-.293]	[-.243]	[-.266]	[-.241]
ln_gdppc2015		-.093**	-.023	-.060**	-.020
Constant	.432	1.096	.334	.784	.323

R2 within	.125	.172	.264	.198	.265
R2 between	.599	.709	.694	.712	.696
R2 overall	.575	.675	.666	.679	.667
N	234	213	213	213	213
Min/Max # of obs.	6/6	3/6	3/6	3/6	3/6

The table 3 represents the unstandardized coefficients for the regression of Per Capita Ecological Footprints. The table provides valuable insights into the relationships between various independent variables and Per Capita Ecological Footprints in different regression models. Starting with the first row, the variable "ln_milexp" (natural logarithm of milexp) shows the coefficients for each model, indicating the expected change in Per Capita Ecological Footprints for a one-unit change in ln_milexp. These coefficients are statistically significant, denoted by **, suggesting a meaningful impact on Per Capita Ecological Footprints. Moving to the second row, the variable "Military expenditures lnV_A" displays coefficients that are not statistically significant, as indicated by the square brackets. This implies that this variable may not have a significant influence on Per Capita Ecological Footprints in these specific models. The third row represents the variable "lnpop_density" (natural logarithm of pop_density), with coefficients that are statistically significant. These coefficients provide insights into the expected changes in Per Capita Ecological Footprints for a one-unit change in lnpop_density.

In the following row, the variable "lnFDI" (natural logarithm of FDI) shows coefficients that are statistically significant, highlighting its potential impact on Per Capita Ecological Footprints(Zafar, 2019). The negative coefficients suggest a negative relationship between lnFDI and Per Capita Ecological Footprints. The table also includes the variable "ln_gdppc2015" (natural logarithm of gdppc2015) in Model 1, indicating its impact on Per Capita Ecological Footprints. The coefficient suggests the expected change in Per Capita Ecological Footprints for a one-unit change in ln_gdppc2015(Numan et al., 2022).

Conclusion

This study contributes to our knowledge of how civilization and the environment interact on a comparative level. First, we investigated the consumption-based environmental effects of economic expansion, the military and environmentally unfair contractual relationships using a variety of theoretical approaches within a broad political economics framework. According to the findings of the panel regression studies, a country's ecological footprint per person is correlated with both economic growth, as shown by GDP per person, and military expansion. These findings strongly support environmental sociology's treadmill of production and destruction hypotheses. Still, they emphasize the need to consider both theories when determining how human behaviors and social structures affect the environment. Although they are connected, the military and economy are not just mirror images of one another. They both have distinctive ecological effects independent of one another, which are in part related to the various dynamics that drive them to expand and evolve in more resource-dependent ways. The hazards or advantages of economic growth have long been a focus of the environmental and social sciences. Although this is a significant area of research, our results show that it is also vital to take other institutions, particularly the military, into account. We, therefore, urge environmental sociologists and colleagues in our sister disciplines to include the military in their future theoretical frameworks and related empirical investigations, in line with other scholars.

It is important to understand that this is happening at the expense of the increasingly unsustainable consumption levels of the most economically and militarily powerful countries, even though opponents may argue that the reduction of resource consumption in many less developed countries, regardless of the mechanisms that shape such processes is ultimately desirable from a sustainability perspective.

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