



**MILITARY ENGAGEMENT AND INCOME INEQUALITY IN LAC REGION.
EMPIRICAL EVIDENCE FROM 1990 TO 2022**

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Abstract: *This paper explores the effect of military engagement and income inequality in a panel of countries in Latin America and Caribbean (LAC) region in the period 1990-2022. This study focuses on both short and a long-term effect of military engagement defined as a country's overall involvement in military activities, including defense spending, military personnel maintenance, and militarization efforts. Results show that: (i) military expenditure as share of GDP appears to have a positive effect on reducing income inequality and (ii) the Global Militarization index play a role in exacerbating income inequality.*

Keywords: income inequality, Gini index, military engagement, military spending, political regime, LAC region

JEL Classification: D6; D3; O15; C23

1. Introduction

This paper investigates the impact of military engagement on income inequality in a panel of countries in the Latin America and Caribbean (LAC) region over the period 1990-2022. By ‘military engagement’ we refer to a country's comprehensive involvement in military activities, including defense spending, maintaining military personnel, and overall militarization efforts. Existing research on this topic has not yet reached a consensus on the direction of the relationship between military spending and income inequality (Lin and Ali, 2009; Ali, 2012; Elveren, 2012; Kentor et al., 2012; Meng et al., 2015; Shahbaz et al., 2016; Wolde-Rufael, 2014, 2016; Tongur and Elveren, 2015; Chletsos and Roupkias, 2020; Michael et al., 2020; Biscione and Caruso, 2021).

Differences in findings can be attributed to differences in economic development levels, the scale of defense spending, political contexts, behavior of neighboring countries, and the methodologies and time periods used in analyses (Ghosh, 2022). This study adds to the literature by examining both the short- and long- term effects of military engagement on inequality the LAC region. Over recent decades, economies in this region have experienced varying trends in inequality: an increase in the 1990s; a sustained reduction in the 2000s, and a slowdown or stagnation in the 2010s (Cord et al., 2017). In the 1990s inequality did not increase uniformly; in some countries, such as Mexico and Nicaragua, inequality declined or remained steady.

The 2000s saw a more homogeneous decline in inequality across the region, with Costa Rica being a notable exception (Lustig et al., 2013). This period of decreasing inequality has been referred to as the “golden decade” due to its stability, economic growth, and reduction in inequality. However, recent data indicate a significant slowdown in inequality reduction (Lustig et al., 2016). This trend is particularly pronounced in the Southern Cone (Argentina, Brazil, Chile, Paraguay, and Uruguay) and less discernible in the Andean countries and Central America. Interestingly, during the 2010s, countries such as Colombia, Costa Rica, Honduras and Panama did not experience a deceleration in inequality reduction (Gasparini and Cruces, 2021).

Despite progress over the last two decades, the LAC region remains the second most unequal in the world, with higher income inequality than other regions at similar development levels. These countries also exhibit volatile and low economic growth, combined with poor productivity trends. Hence, LAC countries are constrained in a “dual trap” of high inequality and low growth (Gasparini and Cruces, 2021; Dunne et al., 2004). In this context, it is important to explore whether military spending exacerbates or mitigates income inequality. In the 2000s, several LAC countries increased military spending as a percentage of government expenditure to modernize the armed forces and address emerging security threats (Battaglino, 2013). In some of these countries, this rise in military spending has led to a decline in productivity and growth (Marwah and Klein, 2005). Despite this increase, the LAC countries included in our study exhibit a lower defense burden compared to the global average (Kollias et al., 2017). To investigate this relationship in depth, we created a dataset for 22 countries in the LAC region covering the period 1990–2022.

To observe a country's military engagement, we use the military spending as a share of GDP interpreted as a short-term measure while the GMI (Global Militarization Index) score serves as a long-term indicator. We begin with a baseline regression and proceed to alternative estimations. The main findings show a negative correlation between military burden and inequality, while the GMI exhibits a positive correlation with inequality. The alternative estimation also confirmed the negative effect of military burden on income inequality.

The paper is organized as follows: next section contains the data, the empirical approach, followed by the presentation and discussion of results. Section 3 summarizes alternative estimations and Section 4 concludes.

2. The data, the empirical strategy and the results

2.1 The data

For this study, we constructed a panel of 22 Latin American and Caribbean countries from 1990 to 2022 (see the Table A1 in appendix for the list of countries) exploiting information from different sources. Our dependent variable is the income inequality measured by Gini index. The Gini index ranging from 0 (indicating perfect equality) and 100 (reflecting maximum inequality). Data on Gini index come from the Standardized World Income Inequality Database (SWIID, version 9.5). We use both gross and net scores of the Gini index, indicating income inequality before and after taxes and transfers, respectively. As explanatory variables we consider two distinct measures of military commitment of a country. First, the military burden that is the proportion of military spending to GDP and the Global Militarization Index (GMI). We interpret the first as a short-term indicator while the second a long-term measure. Data on military burden are drawn from the Stockholm International Peace Research Institute, while GMI data are calculated by Bonn International Center for Conversion (BICC) as coded in Bayer et al. (2021). The GMI encompasses different factors, such as: (i) the proportion of military expenditure to GDP and healthcare spending; (ii) the ratio of military personnel to both the overall population and physicians, and finally (iii) the quantity of heavy weapons held by an armed force in relation to the total population. We also employ two dummy variables that could be related to the allocation of resources for military spending and national security of a country: (i) military conscription and (ii) existence of a conflict. The dummy 'conscription' coded 1 if the country has mandatory conscription and 0 otherwise. Information on military conscription is from The World Factbook published annually by the U.S. Central Intelligence Agency (CIA).

Control variables are included to account for other factors that also potentially impact the income inequality. To assess the effect of the change in the population's human capital endowments on income inequality, we consider the human capital index extracted from Version 9.1 of the Penn World Table (PWT 9.1). This index is based on the average years of schooling and the rate of return to education derived from estimates in Mincer's equation. To assess the openness of the economy, we add the sum of imports and exports as a share of GDP. Additionally, we account for the political regime of countries exploiting scores taken from V-dem dataset.

Finally, we include inflation level and unemployment rate. The latter variables are taken from the World Bank WDI dataset. Table 1 presents the descriptive statistics, Table A2 in Appendix highlights the sources of variables.

Table 1. Descriptive statistics

Variables	Number of Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
Inequality					
Gini Net	601	3.837	0.100	3.584	4.004
Gini Gross	601	3.896	0.109	3.603	4.157
Global Militarization Index (GMI)	648	4.598	0.615	1.389	5.480
Military Burden	633	-4.495	0.738	-7.961	-3.113
Openness	634	4.056	0.508	2.621	5.617
Human Capital	630	0.844	0.183	0.300	1.146
Inflation	640	1.905	1.231	-2.586	8.920
Unemployment	569	1.914	0.512	0.641	3.021
Democracy	726	-0.831	0.541	-3.576	-0.145
Conscription	724	0.409	0.492	0	1
Conflict	726	0.085	0.280	0	1

2.2 The regression model

To estimate the relationship between inequality and military engagement, we use a panel static model which assumes that the disturbance term is first-order autoregressive. This controls for autocorrelation between the errors due to correlation between inequality and military spending at time t and these variables at time $t-1$. Formally, the model is:

$$\ln Gini_{it} = \alpha + \beta_1 \ln Military_{it} + \beta_2 X_{it} + v_i + \epsilon_{it} \quad (1)$$

$$\epsilon_{it} = \rho \epsilon_{i,t-1} + \eta_{it} \quad (2)$$

where $\ln Gini_{it}$ is the log of the Gini index in country i at time t while $Military_{it}$ is the proxy for military engagement in the country at a given year. X_{it} is a vector of time variant controls as described in the data section. To estimate the elasticity and mitigate the skewness, continuous explanatory variables have been converted into natural log. V_i is country fixed effects.

2.3 The results

Table 2 presents the results of the analysis. Findings in columns 1 and 3 refer to the baseline model with the Gini index estimated after taxes and transfers as dependent variable, while columns 2 and 4 present results with the Gini index estimated before taxes and transfers.

Table 2. Military engagement and income inequality- Main Results

VARIABLES	(1) Net Gini	(2) Gross Gini	(3) Net Gini	(4) Gross Gini
Military Burden	-0.027*** (0.009)	-0.022*** (0.007)		
Global Militarization Index (GMI)			0.028** (0.011)	0.019** (0.009)
Openness	0.075*** (0.014)	0.051*** (0.011)	0.061*** (0.012)	0.040*** (0.010)
Inflation	-0.006*** (0.002)	-0.004*** (0.002)	-0.004*** (0.002)	-0.003** (0.001)
Unemployment	0.012** (0.006)	0.011** (0.005)	0.013** (0.005)	0.011*** (0.004)
Human Capital	1.470*** (0.158)	1.386*** (0.138)	1.088*** (0.149)	1.068*** (0.130)
Democracy	0.064** (0.028)	0.053** (0.023)	0.066*** (0.025)	0.054*** (0.020)
Conflict	0.010 (0.006)	0.008 (0.005)	0.007 (0.006)	0.006 (0.005)
Military Conscription	0.006 (0.011)	-0.000 (0.009)	0.010 (0.010)	0.004 (0.008)
Constant	1.602*** (0.007)	1.776*** (0.005)	2.096*** (0.006)	2.232*** (0.005)
Observations	364	364	385	385

R-squared within	0.352	0.346	0.253	0.251
R- squared between	0.002	0.028	0.000	0.060
R-squared overall	0.085	0.012	0.062	0.001
Number of countries	17	17	17	17

Standard errors in brackets. Statistical significance ***p < 0.001, **p < 0.005, *p < 0.10
Significant coefficients are in bold.

Results show a significant (at 1% level) and negative association between military burden and income inequality values. This negative association holds for both Gini scores, with a slightly stronger effect observed when considering the net Gini index. A 1-point percent increase in the military burden correlates with a 0.027% decrease in income inequality for the net Gini index and a 0.022% decrease for the gross Gini index. As for the GMI on income inequality, the effect is positive and significant at 5% level. One per cent rise in GMI leads to an increase of 0.028 percent and 0.019 percent in the net Gini index and gross Gini index, respectively. In other words, while military burden is associated with reduced income inequality, increased GMI is related to worsening income inequality.

Trade openness exhibits a robust and statistically significant positive associations with income inequality, likely due to the unequal distribution of trade benefits favoring some sectors or groups more than others (Rodrik, 2021). Results also show a robust negative association between inflation and income inequality, suggesting that higher inflation rates tend to lower income inequality levels. This is probably due to the redistributive measures that governments implement to address inflationary pressures (Siami-Namini and Hudson, 2019). Human capital also exhibits a strong negative correlation with income inequality. This result could be attributed to specific programs such as conditional cash transfers that improve education levels and positively impact income inequality reduction (Lustig et al., 2013). Conversely, unemployment exacerbates income distribution disparities, especially in countries with underdeveloped social welfare systems (Autor et al., 2015).

Finally, countries with more democratic political systems tend to experience higher levels of inequality. This result aligns with existing literature suggesting that in some contexts democracy, can be associated with income inequality (Caruso and Biscione, 2022; Bahamonde and Trasberg 2021; Wong 2016; Bonica et al. 2013).

3. Alternative estimation

As an alternative estimation we use a probit model to analyze the effect of military engagement on income inequality change. For this purpose, we first calculate the mean of the Gini index (both net and gross) for each country in the period under examination. Then we create a dummy variable equal to 1 if the Gini index is greater than the mean of Gini index, 0 otherwise. Table 3 reports the results. Given the nature of our dependent variable, in this estimation we observe only the short-run effect of military engagement on income inequality.

Table 3. Military engagement and income inequality- further estimation

VARIABLES	(1) Net Gini	(2) Gross Gini	(3) Net Gini	(4) Gross Gini
Military Burden	-1.137*** (0.397)	0.393 (0.414)		
Global Militarization Index (GMI)			-0.876 (0.525)	0.356 (0.633)
Openness	-0.143 (0.512)	-0.028 (0.577)	0.051 (0.484)	-0.104 (0.560)
Inflation	-0.243*	-0.469***	-0.220*	-0.464***

	(0.135)	(0.144)	(0.124)	(0.138)
Unemployment	2.165***	1.678***	1.942***	1.801***
	(0.690)	(0.372)	(0.331)	(0.361)
Human Capital	-17.184***	-21.234***	-16.440***	-21.323***
	(2.300)	(2.700)	(2.266)	(2.648)
Democracy	2.576**	2.041	3.161***	2.081
	(1.297)	(1.404)	(1.213)	(1.387)
Conflict	0.341	-0.361	0.282	-0.365
	(0.553)	(0.582)	(0.551)	(0.582)
Military Conscription	0.768*	2.233***	0.668*	2.126***
	(0.431)	(0.645)	(0.395)	(0.605)
Constant	6.088**	15.887***	12.924***	12.608***
	(3.029)	(3.694)	(4.145)	(4.715)
Observations	382	382	403	403
Number of countries	18	18	18	18

Standard errors in brackets. Statistical significance ***p < 0.001, **p < 0.005, *p < 0.10
Significant coefficients are in bold.

Results indicate that there is a negative association between military burdens and income inequality in the short run. This relationship is observed when the net Gini index is considered, supporting the results obtained with the baseline model. This suggests that higher military spending may be associated with a more equal distribution of income, at least in the short run. However, the GMI does not have a significant effect on income inequality. The evidence from the control variables also aligns with earlier results, with the exception of military conscription. It appears that countries with compulsory military conscription exhibit a positive correlation with inequality compared to their counterparts. This finding contrasts with Caruso and Biscione (2022), Biscione and Caruso (2021) Card and Cardoso (2012) who assert that military conscription may have a redistributive effect.

4. Final Remarks

To investigate the correlation between military engagement and inequality in LAC countries, we regress our chosen measure of inequality, the Gini index (both net and gross Gini scores), on two distinct measures of military engagement: (i) the military burden and (ii) the Global Militarization Index (GMI).

The main findings indicate that while the military burden is negatively correlated with inequality, the correlation is reversed when considering a comprehensive measure like the GMI. These results suggest that although the military burden may initially reduce inequality, this effect diminishes over time, as the GMI seems to increase inequality. Alternative estimates confirm that military engagement is negatively correlated with inequality in the short term.

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Appendix

Table A1. List of countries included in the analysis

Argentina	Honduras
Bolivia	Jamaica
Brazil	Mexico
Chile	Nicaragua
Colombia	Panama
Dominican Republic	Paraguay
Ecuador	Peru
El Salvador	Suriname
Guatemala	Trinidad and Tobago
Guyana	Uruguay
Haiti	Venezuela

Table A2. Definition and sources of variables

Variable	Definition	Source
Inequality	Gini Index	The Standardized World Income Inequality Database - SWIID
GMI	Global Militarization Index	Bonn International Center for Conversion -BICC
Military Burden	Military Expenditure as percent of GDP	Stockholm International Peace Research Institute (SIPRI)
Conscription	Country with military conscription	The World Factbook CIA
Conflict	Country in an armed conflict	UCDP/PRIO
Openness	Exports plus imports as percent of GDP	WDI, World Bank
Inflation	Inflation Rate	WDI, World Bank
Unemployment	Unemployment Rate	WDI, World Bank
Human Capital	Human capital index.	Penn World Table (PWT 9.1)
Democracy	Deliberative Democracy Index	V-Dem database