EDUCATION AND MILITARY EXPENDITURES: COUNTERVAILING FORCES IN DESIGNING ECONOMIC POLICY

A CONTRIBUTION TO THE EMPIRICS OF PEACE*.

Anna Balestra
CSEA, Università Cattolica del Sacro Cuore

Raul Caruso
Department of Economic Policy and CSEA, Università Cattolica del Sacro Cuore
CESPIC, Catholic University 'Our Lady of Good Counsel'.

Abstract: *This paper contributes to the empirical analysis of social peace, specifically aiming to assess the suitability of an economic policy instrument for the maintenance of social peace. The contention advanced in this paper is that identifying the ratio of public education investment to military expenditure (hereafter referred to as Edumilex) serves as a pertinent instrument for fostering peaceful economic policies. To empirically evaluate this instrument, we employ a target variable serving as a measure of internal peace, structured as a concise metric of positive peace based on four pillars: (i) Health; (ii) Standard of living; (iii) Quality of institutions; (iv) Spread of violence. More precisely, we empirically estimate the impact of Edumilex on social peace, utilizing a panel comprising 85 countries spanning the years from 1990 to 2020. We utilize an Instrumental Variable approach. In particular, in the baseline estimation we employ an IV/GMM estimator. The robust and positive relationship identified in our analysis suggests the viability of Edumilex as an instrument of economic policy. This proposition constitutes a noteworthy innovation since governments commonly perceive education and military spending as distinct policy domains. However, in the light of this work, such a perspective appears flawed, as these factors both exert influence on the levels of peace within a society.*

Keywords: Peace, Education, Military Expenditures, Development.
JEL Codes: H56, H52, O47

* Earlier versions of this paper have received valuable feedback from attendees of the conference titled 'The National State: Institutional Causes and Consequences,' held at New York University on April 27th and 28th, as well as the workshop 'Conflict and the Economy' held at Università Cattolica del Sacro Cuore on June 9th, 2023. It is related to companion research papers such as Caruso (2017) and Balestra and Caruso (2022).

INTRODUCTION

This paper takes Jan Tinbergen seriously. In his well-known 1956 book Tinbergen listed 'International Peace' as the first objective of economic policy. In his words: "[…] *Maintainance of international peace.* This point would not have usually been considered as an item on the agenda of economic policy even up to a few decades ago. Today it has to be, since the very foundations of our existence are at stake. […]". While reviewing the book, Arrow (1958) underlined: "[…]Actually, the aim of peace, despite its prominence on the list, is referred to again only once in the book and then in a manner which can be described best as an obiter dictum. Clearly, peace affects economic wellbeing as it affects most other things but it seems to me that it can hardly be regarded as an aim of policy until it can be shown that economic policy affects peace […]".

In summary, Arrow observed a disconnect between the aspiration to integrate peace as an objective of economic policy and the available tools for implementation. This paper argues that it is possible to bridge this gap by identifying the ratio of public education investment to military expenditure (hereafter referred to as Edumilex) as a relevant instrument for promoting peaceful economic policies. To empirically evaluate this instrument, we utilize a target variable serving as a measure of social peace. In particular, we adopt a concise metric of positive peace (hereafter referred to as Social Peace), encompassing four pillars: (i) Health; (ii) Standard of living; (iii) Quality of institutions; (iv) Spread of violence. In essence, this paper posits that a balance between investments in education and military spending contributes to explaining the establishment of social peace over time. The overall approach draws inspiration from Baumol (1990), who considers the balance between potentially productive and unproductive activities within societies as a reference point for long-term development. In a similar vein, we employ the idea that the balance between productive and destructive activities is a key factor in the long-term establishment of a peaceful society.

This paper attempts to validate such an approach through empirical analysis. Specifically, we empirically estimate the impact of Edumilex on social peace in the long run, exploiting a panel comprising 85 countries spanning the years from 1990 to 2020. As an econometric methodology, we employ an IV approach. In particular, in the baseline estimation we employ an IV/GMM estimator. The relationship we find is robust and positive.

A plausible reinforcing interpretation of our findings is that Edumilex may contribute to peace through the transmission mechanism of economic development. A substantial body of literature, both theoretical and empirical, elucidates how a spectrum of economic opportunities acts as a deterrent to violence, primarily due to the increasing opportunity cost. While the majority of economists acknowledge the favourable influence of education on long-term economic growth, prevailing existing literature suggests that military expenditures may have a detrimental effect on economic development.

Consequently, it is logical to regard military expenditures and investment in education as opposing factors that can influence economic growth.

In the context of policy formulation, employing Edumilex as an instrument of economic policy would represent a noteworthy innovation. Governments commonly perceive education and military spending as disparate policy domains when crafting policies. Nonetheless, in the light of this work, this perspective appears to be flawed, as both factors exert an influence on the levels of peace within a society. In this context, the present paper fulfils the normative dimension within the realm of peace economics, a sub-field of economics underscored by Isard (1994), Arrow (1995), Coloumb et al. (2008), and Caruso (2010).

It is important to emphasize that this paper aligns only partially with Tinbergen's aspirations, as the findings of the study are specifically confined to the context of domestic peace within a political entity, rather than addressing peaceful dynamics between distinct political entities. This aspiration warrants further investigation through supplementary research. Concurrently, it is essential to recognize that, due to data limitations, the analysis excludes several countries globally. Consequently, while the analysis remains robust, its generalizability necessitates some further expansion to a more extensive sample of countries. We have excluded the United States due to its significant outlier status in military expenditure. Such a choice allowed us to employ US military spending as an instrument in the IV estimation.

The paper is organised as follows: in the first section we present the conceptual background and some facts and figures on Edumilex whereas in the second section, we present the index of social peace. In the third section, we present the econometric model and in the fourth paragraph, we present the baseline results. Conclusions summarise and discuss the results while pointing to suggestions for further research.

I. EDUMILEX: THE RATIO BETWEEN EDUCATION AND MILITARY EXPENDITURES

I.1 The conceptual background

In what follows, we present the reference variable of this paper, namely the ratio between public investment in education and military expenditures, (hereafter Edumilex for sake of brevity):

$$EDUMILEX = \frac{Public\ investment\ in\ education}{Military\ spending}$$

As mentioned earlier, Edumilex specifically represents the ratio of productive to destructive activities that would manifest within a society. This equilibrium is anticipated to play a crucial role in fostering peace. It can be argued that the peaceful impact is both 'direct' and 'indirect.' In the latter scenario, economic growth is expected to serve as the transmission

mechanism. The selection of this ratio might seem intuitive, but it is also based on existing literature.

A consensus emerges in empirical literature suggesting that elevated levels of education mitigate the emergence of violence and the risks of armed conflict. In his renowned book *The Better Angels of Our Nature*, Pinker (2011) identifies education as a crucial factor contributing to the long-term reduction of violence. The peace-inducing impact of education is acknowledged in various studies. There is a large set of papers which analyse the impact of education on the likelihood of civil armed conflicts. Thyne (2006) emphasizes that heightened levels of primary enrolment, increased secondary male enrolment, augmented expenditure on education, and elevated literacy rates are associated with a decreased risk of conflict. For example, secondary male enrolment is correlated with a lower risk of civil war initiation (Collier and Hoeffler 2004) and shorter conflict durations (Collier et al. 2004). Subsequently, Østby et al. (2019) conduct a comprehensive review of 42 quantitative studies spanning the period from 1996 to 2016, investigating the relationship between various education measures and political violence. They underscore the intricate and multifaceted nature of the pacifying effects of education. Hegre et al. (2013) incorporate education levels among the predictors of armed conflict until 2050, finding that improvements in education may lead to a minor incidence of armed conflicts. There is also a large literature on the negative relationship between education and violent crime [see among others Zepeda Gil and Pérez Ricart (2023), Gleditsch et al. (2022), Rashkit and Neog (2021), Furquan and Mahmood (2020), Rivera (2016), Heckman et al. (2010), Groot and van der Brink (2010), Lochner and Moretti (2004), Grogger (1998)].

The impact of education on peace is also 'indirect' since it is related to the long-term economic development. Indeed, further debate on this matter is superfluous, as the consensus among economists is nearly unanimous regarding the positive long-term impact of education on economic growth. [see among others Hanushek and Woessmann (2020), Marconi (2018), Benos and Zotou (2014), Barro (2013), Krueger and Lindhal (2001)].

Instead, there exists also a well-established and interdisciplinary body of literature that underscores how military expenditures and militarization instigate internal violence, manifested in civil strife, state violence, repression, and violations of human rights. Carlton-Ford et al. (2018) show that military expenditures per troop as a ratio to the GDP per capita are associated with child mortality by exploiting of 142 countries from 1996 through 2008. Dube and Naidu (2015) highlight that US military assistance has increased non-state violence in Colombia, suggesting therefore that it would undermine domestic political institutions. Vadlamannati and Pathmalal (2010) found that irrespective of war or peace years, any increase in military spending is detrimental to human rights conditions. Collier and Hoeffler (2006) find that high military spending post-conflict significantly increases the risk of renewed conflict. This effect of military spending is distinctive to the post-conflict period and becomes progressively more

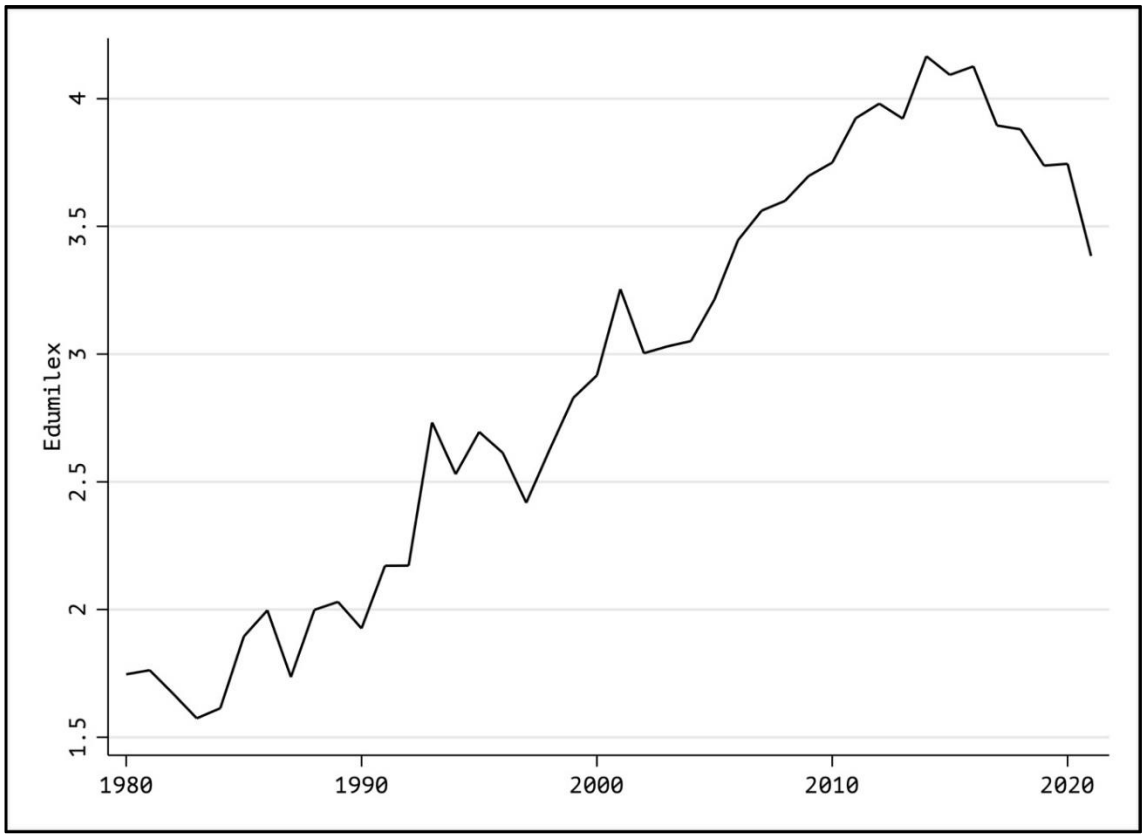
pronounced over the decade. Nafziger and Auvinen (2002) had shown that military centrality, proxied by means of the ratio of military expenditure to GNP, contributes to humanitarian emergencies, characterized by war, state violence, and refugee displacement.

In conjunction with the discourse on the impact of militarization on violence and internal conflicts, there is also a large literature which focuses on the impact of military expenditures on international conflicts. As highlighted in Eloranta and Harrison (2015), the anticipation of both World War I and World War II was preceded by arms races among rival states in Europe. The seminal work by Richardson (1960) predicts the instability of arms races, which can ultimately lead to war through a system of differential equations. Greif (2007) employs a game-theoretical approach to explain the deterrence equilibrium established in medieval Genoa between rival clans. Such equilibrium was characterized by mutual deterrence but in the long run this equilibrium became unstable precipitating Genoa into social unrest. Rider et al. (2011) show that arms races may lead to war in the presence of enduring rivalries between states. On the other hand, if considering the indirect approach, prevailing literature shows the negative impact of military expenditures on growth [see among others Dunne and Tian (2020, 2016), D'Agostino et al. (2019), Kollias and Paleologou (2019); Awaworyi Churchill and Yew (2018)].

I.2 Facts, figures and trends of Edumilex.

Figure 1 reports the global average of Edumilex between 1980 – 2020 for the 85 countries considered (see the appendix for the complete list). While not incorporated into the subsequent empirical estimations, we provide illustrative data on Edumilex since 1980 to underscore the marked contrast between the Cold War era and the subsequent years. Both investment in education and military expenditures used in the calculation of Edumilex were expressed in current terms. Educational data were sourced from UNESCO, while military expenditure data were obtained from SIPRI. Due to a substantial number of missing values in the dataset, particularly in the education data, we conducted a Little's chi-squared test to assess the assumption of missing completely at random (MCAR) for both the education investment and military expenditure series. The test results indicated a chi-square distance of 20.68 with 2 degrees of freedom. The associated p-value was found to be 0.000, leading us to reject the null hypothesis of missing data occurring completely at random. As stepwise deletion is not considered the optimal approach for addressing non-completely at random (non-CAR) missing values, we opted for linear interpolation of the education and military expenditure data when computing the variable Edumilex. Regrettably, the absence of data on education precludes the inclusion of a large number of countries. Subsequently, and in the estimations, the United States has been omitted due to its significant outlier status in military expenditure.

Figure 1 - Edumilex - Global Average (1980 – 2020)



A noticeable upward trend has manifested in the aftermath of the Cold War. The minimum value recorded was 1.74 in 1980, with an average of 1.87 between 1980 and 1992. Subsequently, from 1993 to 2008, the average level rose to 2.97. In the most recent years (2009-2020), the average has climbed to 3.91. In general, Edumilex has grown by 114.4% in the whole period 1980-2020. In Figure 2, we report the regional trends. In the European and Eurasian countries under consideration, Edumilex exhibited a growth of 64.12% between 1980 and 2020, starting at 2.4 in 1980 and reaching 4 in 2020. However, it attained its peak in 2015 at 4.6 and has since experienced an average decrease of 3%. Sub-Saharan African countries (SSA) have shown a smooth increasing trend since 1990 when the value of Edumilex was 1.75 to reach its peak in 2020 at 4.2. The growth rate of Edumilex in SSA has been equal to 82.7% between 1980 and 2020. In Latin American and Caribbean countries, Edumilex has shown significant long-term growth (+240.5%). However, the growth was more pronounced until 2014 (+449.8%). Indeed, in

2014, the average Edumilex reached its peak at 7.6 (from 1.4 in 1980), but subsequently, it has been decreasing to 4.7 in 2020.

Figure 2 - Edumilex - Regional Trends (1980 – 2020)

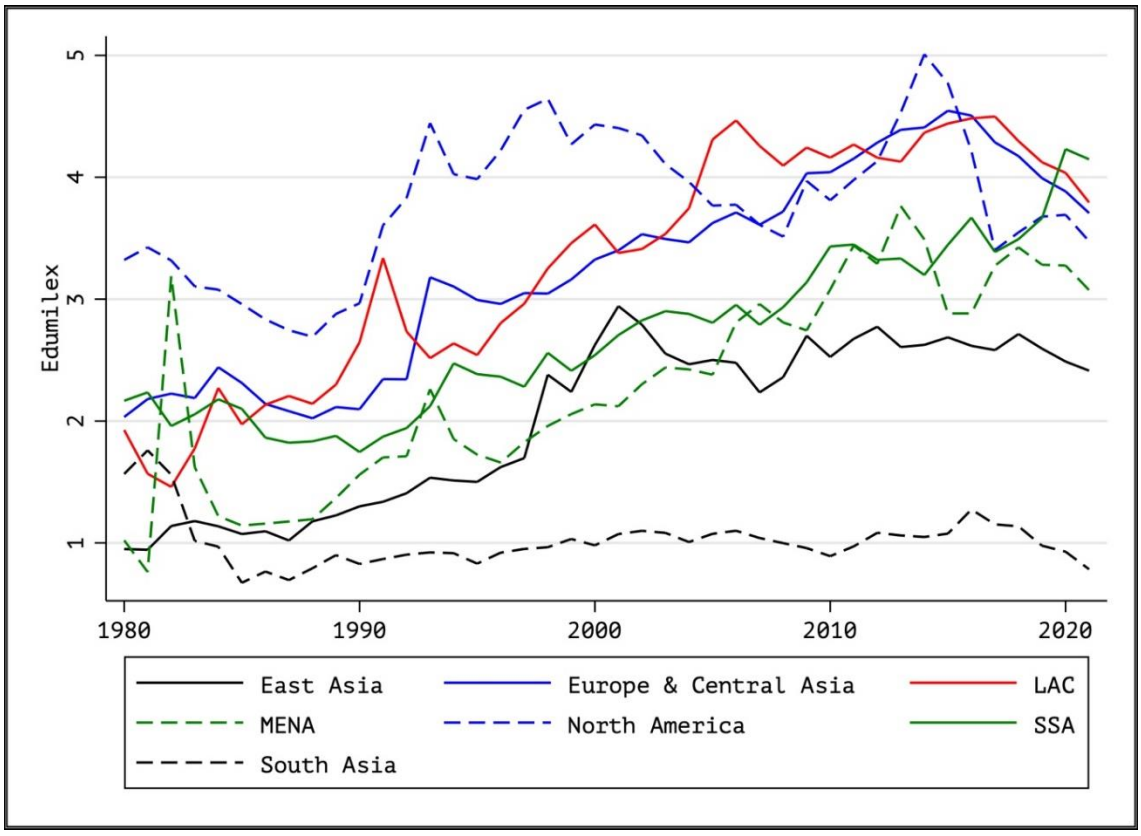


Figure 3 illustrates the mean Edumilex values across distinct state groups categorized by income levels, following the World Bank's 2020 classification. The data clearly demonstrates elevated Edumilex ratios in the considered high-income countries. The growth rate of Edumilex in this group has been 115.32% between 1980 and 2020, starting at 1.83 in 1980 and reaching 3.93 in 2020. The peak occurred in 2015 at 4.55, with an ensuing annual average decrease of 2.84%. In low-income countries, the long-term growth in Edumilex appears less substantial, with an increase of only 16.57% observed between 1980 and 2020. However, two distinct trends emerge. In the period 1980-1990, the average Edumilex decreased by 42.16%, reaching its minimum value in 1990 at 1.47. Since then, Edumilex has increased by 76.25%. For lower-middle-income countries, a substantial long-run improvement is observed (+146.65%). Similarly, upper-middle-income countries also exhibit significant improvement. Specifically, Edumilex has increased by 112.01% between 1980 and 2020, from 1.6 to 3.39, slightly below the peak recorded in 2019.

Figure 3 - Edumilex by income levels

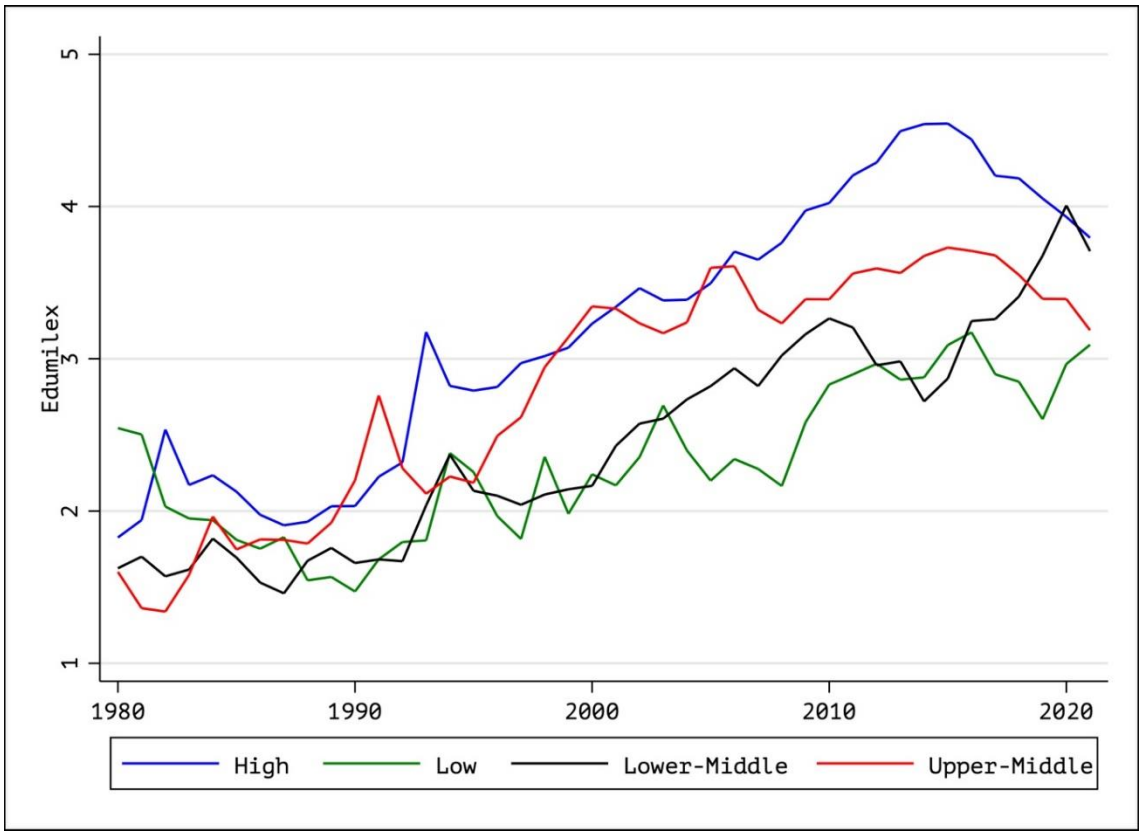


Table 1 highlights the mean Edumilex values for designated countries throughout four distinct periods. The initial period aims to underscore the average figure in the aftermath of the Cold War, followed by the years' post-September 11th, the immediate aftermath of the 2008 Great Financial Crisis, and the post-2014 era subsequent to the Russian Federation's invasion of Ukraine.

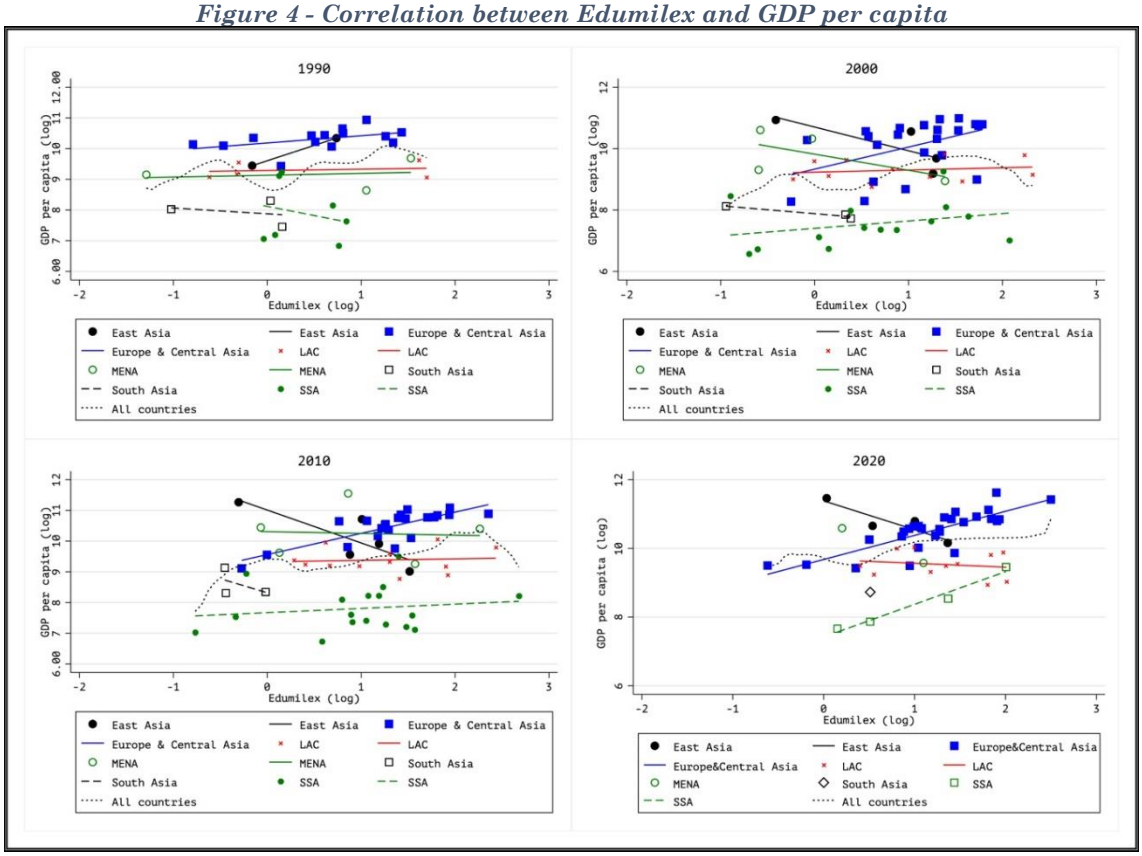
Table 1 – Average Edumilex figures in selected periods

Country	Region	Aftermath of Cold War 1992-2001	Post September 11th 2002-2008	Post 2008 Great financial Crisis 2009-2014	Post - 2014 2015-2020
China	East Asia & Pacific	0.97	0.68	0.32	0.23
Indonesia	East Asia & Pacific	1.75	3.81	4.64	4.29
South Korea	East Asia & Pacific	1.20	1.62	1.68	1.75
Germany	Europe & Central Asia	3.27	4.26	4.07	4.19
France	Europe & Central Asia	2.49	2.45	2.37	2.91
United Kingdom	Europe & Central Asia	1.49	1.83	2.24	2.75
Italy	Europe & Central Asia	2.69	2.75	2.93	3.01

Türkiye	Europe & Central Asia	1.07	1.90	2.12	1.96
Argentina	Latin America & Caribbean	2.90	4.61	6.19	6.71
Brazil	Latin America & Caribbean	3.07	2.96	4.07	4.42
Colombia	Latin America & Caribbean	1.23	1.19	1.40	1.45
Iran	Middle East & North Africa	1.02	1.33	1.26	1.70
Israel	Middle East & North Africa	0.81	0.93	0.98	1.14
Saudi Arabia	Middle East & North Africa	0.55	0.75	0.63	0.69
India	South Asia	1.28	1.09	1.29	1.61
Botswana	Sub-Saharan Africa	2.91	3.13	3.73	3.54
Cameroon	Sub-Saharan Africa	1.96	2.27	2.29	2.82
Kenya	Sub-Saharan Africa	3.61	3.47	3.21	3.95
Rwanda	Sub-Saharan Africa	1.27	2.75	3.64	2.77
Tanzania	Sub-Saharan Africa	1.68	4.04	4.10	3.22
South Africa	Sub-Saharan Africa	3.29	3.40	5.00	6.23

The scatter plots in Figure 4 show the correlation between Edumilex and GDP per capita in selected years. The graph depicts the correlation between Edumilex and GDP per capita across regions for the years 1990, 2000, 2010, and 2020. Two discernible patterns seem to emerge from the data. Firstly, there is substantial heterogeneity among regions. For instance, the Europe & Central Asia region exhibits a consistently positive correlation each year, while the South Asia region demonstrates a consistently negative correlation throughout the observed years. Secondly, the relationship between Edumilex and per capita GDP, when analyzing the entire sample of countries, appears to be non-linear. Specifically, the lowest point of the curve consistently occurs near 0. This suggests that Edumilex values exceeding 1 are globally associated with a positive correlation with per capita GDP across all considered time periods.

Figure 4 - Correlation between Edumilex and GDP per capita



II. A TENTATIVE MEASURE OF SOCIAL PEACE

In this section, we introduce our metric of social peace. It is an index of positive peace. The proposed proxy for social peace aims to depict the level of social peace attained by a country at the specific moment when the index is calculated. Our measure of peace is informed by the greed-grievance analysis elucidated by Collier and Hoeffler (2004) in their examination on the emergence of civil wars. Specifically, we endeavor to formulate a peace metric that integrates both the greed and grievances arguments. Concerning the former, we incorporate the opportunity cost of armed conflict, mirroring the GDP per capita as delineated in the Collier-Hoeffler greed model. Secondly, we aim to integrate the opportunity cost with a proxy capable of capturing social grievances, particularly in terms of resource access and power dynamics. Additionally, in constructing the index, we draw inspiration from the Human Development Index (HDI) developed by UNDP. In particular, guided by the HDI, our proxy for social peace is the geometric mean of four pillars: (i) Health; (ii) Standard of living; (iii) Quality of institutions; (iv) Spread of violence. We identify these four domains as contributing factors to the establishment of a peaceful society. That is, our metric of social peace is given by:

$$Social\ Peace_{it} = (Health_{it} \times Standard\_of\_living_{it} \times Institutions_{it} \times Violence_{it})^{\frac{1}{4}}$$

Following the HDI, the first pillar $Health$ is proxied by means of a female life expectancy index. Then, it is computed as:

$$Health_{it} = \frac{Life\ Expectancy\ (female)_{it} - 20}{85 - 20}$$

The decision to utilize female life expectancy rather than overall life expectancy stems from a concern related to gender discrimination. Despite the biological fact that women generally outlive men by approximately 5 years, numerous acknowledged social determinants of health are more adverse for women than for men. Consequently, enhancements in this particular indicator within a country could potentially signify not only improved living conditions but also the contributions of women to these improvements. Furthermore, in cross-country comparisons, it proves beneficial to underscore disparities not only in favorable health conditions but also, albeit indirectly, in the extent to which women have access to social determinants of health. The benchmarks for standardizing the index between 0 and 1 are derived from the HDI.

The second pillar is the Standard of living which is proxied through the level of GDP per capita. Then, it is computed as:

$$Standard\_of\_Living_{it} = \frac{\ln(GDP\ per\ capita) - \ln(100)}{\ln(75{,}000) - \ln(100)}$$

As noted above, also in this case the benchmarks for standardization are drawn from the HDI. Specifically, the lower bound, set at $100, is justified by the substantial volume of unmeasured subsistence and nonmarket production in economies near the minimum, aspects not captured in official data. The upper limit is established at $75,000 per capita, a threshold beyond which Kahneman and Deaton (2010) have demonstrated that there is a negligible additional gain in human development and well-being from annual income. Incorporating the standard of living into a peace metric is reasonably anticipated, given the ample empirical evidence in the literature, which suggests that the probability of violence is elevated in declining economies. This reflects the idea of opportunity cost of armed conflict as envisioned in the Collier-Hoeffler greed model.

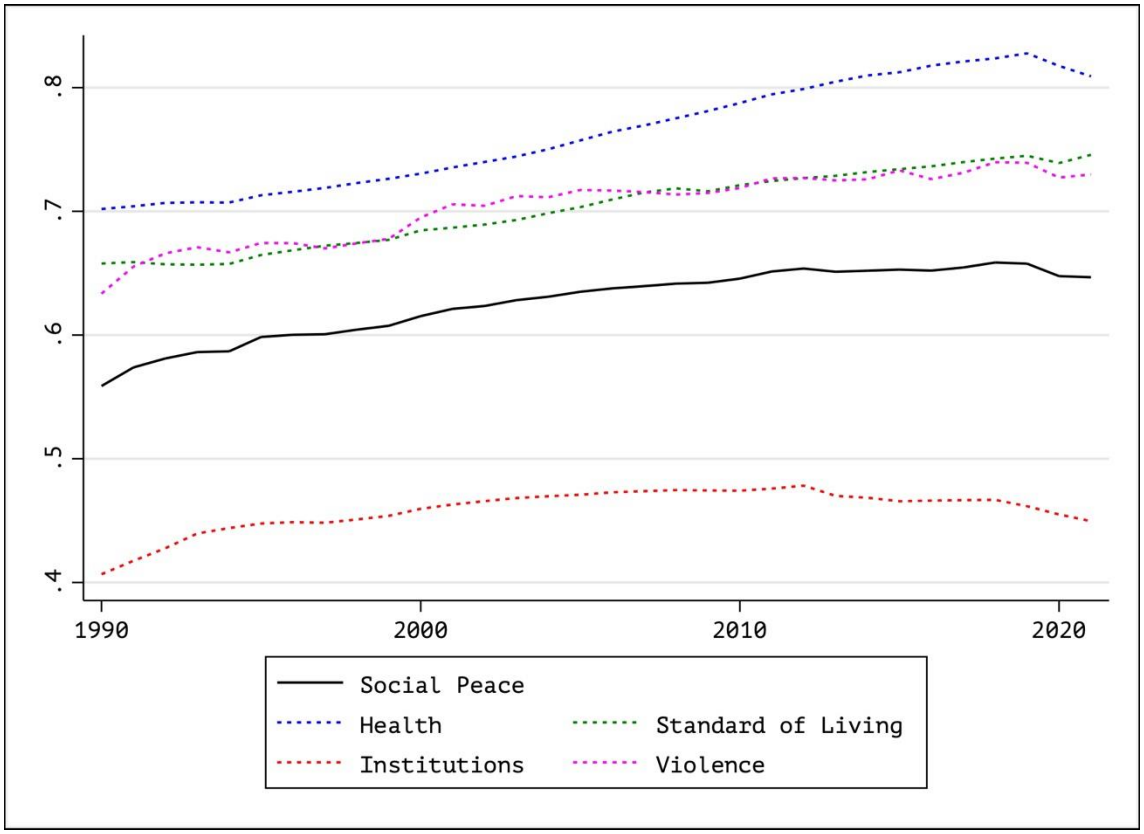
The third pillar ($Institutions$) is intended to capture the quality of institutions. As noted above, another key argument in elucidating conflicts is based on grievances. However, the resolution of disputes among different groups within a society is intricately linked to the quality of institutions. In simpler terms, it pertains to how institutions handle conflicts among different groups. To assess the extent to which a country addresses the likelihood of potential grievances as a motivator for conflict, we employ the Egalitarian democracy index produced by V-Dem project. It measures the extent to which

the regime incorporates (1) equal protection of rights and freedoms, (2) equal distribution of resources, and (3) equal access to power. In brief, hence, a more equal distribution of resources, education, and health across various social groups should enhance political equality. It ranges between 0 (low) and 1 (high).

The fourth pillar here termed Spread of violence is intended to capture the spread of violence within a society. It is proxied through the Physical Violence index also produced by V-Dem project. It captures if citizens are safe from political killings and torture by the government or government agents. The index spans from 0 to 1, with higher values indicating lower levels of violence perpetrated by governments agents.

Figure 5 below reports the global average Social Peace Index between 1990 and 2020. The global average of Social Peace Index exhibits an upward trend from 1990 to 2020. However, upon closer examination of its four subcomponents, such increase is primarily attributed to enhancements in female life expectancy and GDP per capita. It is noteworthy to highlight the deterioration of the Physical Violence Index, especially in the very recent years. Between 2018 and 2020 it decreased by 1.7%.

Figure 5 - Social Peace index (Global Average)

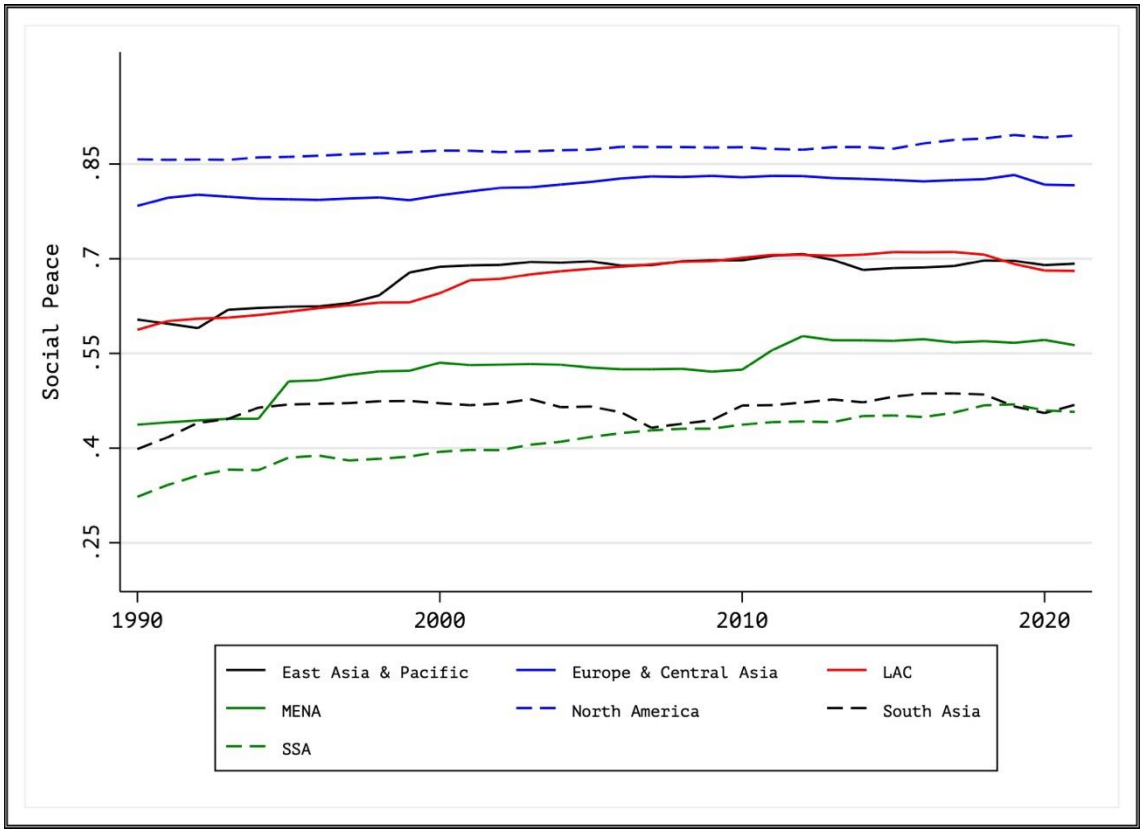


In Figure 6, we present the regional trends of Social Peace Index. In 2020, North America, European and Eurasian countries display the highest levels

of Social Peace, followed by East Asia and Pacific. Within the European and Eurasian countries under consideration, the level of peace exhibited a growth of 4.3% between 1990 and 2020, starting at 0.78 in 1990 and reaching 0.82 in 2020. In the East Asia and Pacific region, the average level of Social Peace Index increased by 14.27% between 1990 and 2020, rising from 0.60 to 0.69. However, the region achieved its peak peace level in 2012 at 0.71, after which it experienced a decline. In Sub-Saharan African countries (SSA), there has been a consistent upward trend since 1990, with the Social Peace value increasing from 0.32 to its peak in 2019 at 0.47. The growth rate of Social Peace in SSA amounts to 42.3% between 1990 and 2020.

In Latin American and Caribbean nations, the level of peace has exhibited a long-term growth of 16%. However, this growth was more pronounced until 2017, with a 21% increase when the regional average Social Peace reached its peak at 0.71 (up from 0.59 in 1990). Subsequently, it has decreased to 0.68 in 2020. In Middle East and North Africa (MENA) countries, the long-term advancement appears substantial (+30.69%). Nevertheless, the absolute value of Social Peace seems notably distant from the levels observed in Europe and the East Asian and Pacific regions.

Figure 6 - Social peace - Regional trends



In order to have a deeper look at the regional trends we report in figure 7 the regional trends of four pillars of the peace index.

Figure 7 - Regional trends of subcomponents of the social peace index

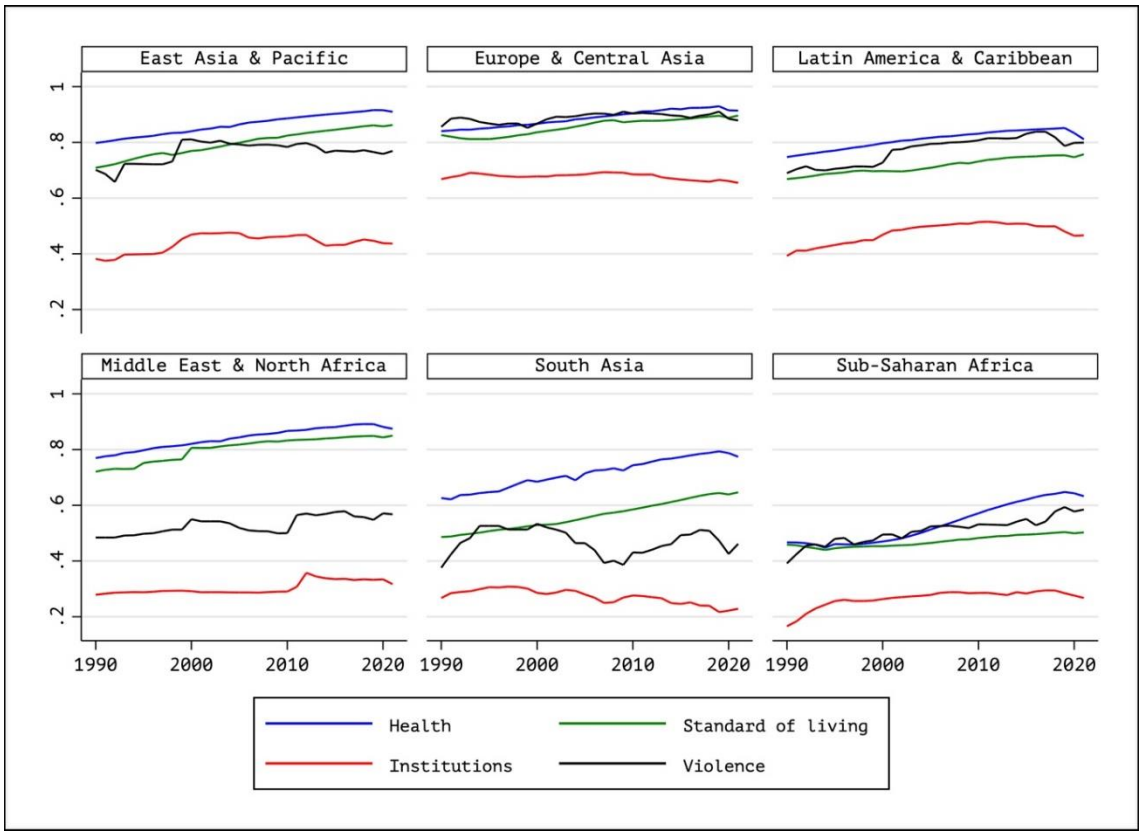


Table 2 presents the values of the social peace index for selected countries during the envisioned four periods. Notably, in China the social peace index exhibits a relatively stable trend, with no substantial changes observed between the early 2000s and 2020. Conversely, certain emerging economies, including Saudi Arabia, Turkey, Brazil, and India, display a deterioration in peace over time.

Table 2 - Social Peace by countries in selected periods

		Aftermath of Cold War	Post September 11th	Post 2008 Great financial Crisis	Post - 2014
Country	**Region**	**1992-2001**	**2002-2008**	**2009-2014**	**2015-2020**
China	East Asia & Pacific	0.37	0.40	0.41	0.41
Indonesia	East Asia & Pacific	0.38	0.63	0.65	0.64
South Korea	East Asia & Pacific	0.80	0.86	0.85	0.88
Germany	Europe & Central Asia	0.90	0.91	0.92	0.92
France	Europe & Central Asia	0.88	0.90	0.91	0.91
United Kingdom	Europe & Central Asia	0.84	0.88	0.88	0.88
Italy	Europe & Central Asia	0.87	0.89	0.89	0.89
Türkiye	Europe & Central Asia	0.52	0.68	0.63	0.50
Argentina	Latin America & Caribbean	0.79	0.80	0.80	0.78

Brazil	Latin America & Caribbean	0.67	0.72	0.74	0.64
Colombia	Latin America & Caribbean	0.51	0.54	0.62	0.61
Iran	Middle East & North Africa	0.36	0.42	0.37	0.43
Israel	Middle East & North Africa	0.80	0.82	0.82	0.82
Saudi Arabia	Middle East & North Africa	0.39	0.38	0.39	0.38
India	South Asia	0.58	0.59	0.60	0.54
Botswana	Sub-Saharan Africa	0.63	0.64	0.68	0.69
Cameroon	Sub-Saharan Africa	0.39	0.41	0.42	0.42
Kenya	Sub-Saharan Africa	0.31	0.44	0.47	0.49
Rwanda	Sub-Saharan Africa	0.24	0.32	0.36	0.32
Tanzania	Sub-Saharan Africa	0.48	0.50	0.54	0.55
South Africa	Sub-Saharan Africa	0.55	0.64	0.67	0.67

Table 3 presents the pairwise correlation between Edumilex and the Social Peace Index. Edumilex demonstrates a positive and statistically significant correlation with each subcomponent of the Social Peace Index. It is noteworthy, however, that the correlation with variables representing the quality of institutions and the diffusion of violence displays higher coefficients in comparison to Health and Standard of Living.

Table 3 – Edumilex and Social Peace - Pairwise correlations

	(1) Edumilex	(2) Social peace	(3) Health (Female Life exp.)	(4) Standard of living (GDP per capita)	(5) Institutions (Egalitarian democracy)	(6) Violence (Physical Violence Index)
(1) Edumilex (log)	1					
(2) Social Peace	0.416***	1				
(3) Health (Female Life Expetancy)	0.274***	0.784***	1			
(4)Standard of Living (GDP per capita)	0.270***	0.824***	0.887***	1		
(5)Institutions (Egalitarian Democracy)	0.431***	0.954***	0.671***	0.703***	1	
(6)Violence (Physical Violence index)	0.440***	0.919***	0.627***	0.654***	0.844***	1

III. THE EMPIRICAL STRATEGY

To assess the influence of Edumilex on the Social Peace Index, we suggest employing an IV estimation to address endogeneity concerns. The estimation is conducted for panel of 85 countries spanning the period from 1990 to 2020. We use the following econometric model:

$$SP_{it} = \alpha + \beta Edumilex_{it} + \gamma \boldsymbol{X}_{it} + \varepsilon_{it}$$

In our analysis, SP denotes the Social Peace Index in country i in year t, X is a set of controls and ε an error term. The key coefficient of interest is denoted as beta, capturing the effect of Edumilex on Social Peace, our target. The array of control variables initially includes two demographic indicators employed interchangeably: the ratio of the youthful population to the overall population. This choice is informed by extensive literature exploring whether societies exhibiting a higher percentage of young individuals tend to display lower levels of peace or not. [see among others Al-Jabri et al. (2022), Acemoglu et al. (2020), Nordas and Davenport (2013), Urdal (2006)] Secondly, we also employ the proportion of urban population relative to the total population. In several studies, the increase in urban population is associated with the emergence of social unrest [see among others Gizelis et al. (2021), Østby (2016), Fox and Bell (2016), Buhaug and Urdal (2013)]. Controls also encompass two indicators of concentration, specifically the Gini index for income and the Gini index for wealth. We anticipate a negative association with SP since concentration in the distribution of resources influences both the motivations of greed and grievances for social unrest, consequently diminishing the overall peacefulness of a society [see among others Hillesund and Østby (2023), Ray and Esteban (2017), Moore et al. (1996), Lichbach (1989)]. We additionally account for trade openness in our analysis, aligning with scholarly literature that posits global economic integration associated with internal peace [de Soysa and Vadlamannati (2021), Magee and Massoud (2011)]. We also employ water withdrawals as a control variable, expressed as a percentage of internal resources. Assessing the proportion of water withdrawals in relation to internal resources provides insights into the degree of competition and dependency on water assets. Finally, our analysis incorporates controls for country size, recognizing that larger countries exhibit a larger number of armed conflicts [Raleigh and Hegre (200), Hegre and Sambanis (2006)]. Additionally, we account for net migration count as an indicator, given that countries characterized by lower levels of peacefulness are often associated with negative net migration counts [Rüegger (2019), Raleigh (2011)]. The table below provides a summary of all the variables utilized in the analysis.

Table 4 – Description of variables

Variable	Definition	Source
SP	Social Peace Index is the geometric mean of Health, Standard of Living, Quality of Institutions and Physical Violence	World Bank; V-Dem
Edumilex	Investment on Education/Military Expenditure	UNESCO; Sipri
Young Population	Population between the ages 0 to 14 as a percentage of the total population.	World Bank
Urban Population	Urban population refers to people living in urban areas as percentage of total population.	World Bank
Gini Income	Gini of Pre-tax national income. Pre-tax national income is the sum of all pre-tax personal income flows accruing to the owners of the production factors, labor and capital, before taking into account the operation of the tax/transfer system, but after taking into account the operation of pension system.	World Inequality Database

Gini Wealth	Gini of Net personal wealth. Net personal wealth is the total value of non-financial and financial assets (housing, land, deposits, bonds, equities, etc.) held by households, minus their debts. .	World Inequality Database
Trade Openness	Exports and imports of goods (% of GDP).	KOF
Water withdrawls	Annual freshwater withdrawals refer to total water withdrawals, not counting evaporation losses from storage basins.	World Bank
Size	Surface area is a country's total area, including areas under inland bodies of water and some coastal waterways.	World Bank
Net Migration	Net migration is the net total of migrants during the period, that is, the number of immigrants minus the number of emigrants,	World Bank

A crucial concern within the model pertains to potential endogeneity, introducing the possibility of bias and inconsistency in Ordinary Least Squares (OLS) estimation. Endogeneity may manifest due to reverse causality, where higher levels of Social Peace in a country might lead to increased Edumilex, subsequently contributing to elevated Social Peace. In response to this issue, we employ an IV approach to mitigate endogeneity concerns and enhance the robustness of our estimations. Edumilex is instrumented by means of two factors: (i) US military expenditure and (ii) the incidence of conflict.

Table 5 – Instruments

Variable	Definition	Source
US Military Expenditure (log)	Military expenditure in constant 2021$	SIPRI
Conflict	Dummy which is equal to 1 is a country is a primary part of a conflict and 0 otherwise.	V - Dem

They both appear to be correlated with Edumilex but they have no direct effect on the social peace index. Specifically, we employ US military expenditure because is it expected it has an impact on the military expenditures of other countries. There is an established literature which highlights the interdependence of military expenditures worldwide and in particular the role of US [see among others Hou (2018), Caruso and Di Domizio (2016), Smith (1995), Sandler and Murdoch (1990), Murdoch and Sandler (1984)]. Moreover, we incorporate conflict as an instrument for Edumilex, as empirical evidence indicates that during conflicts, countries tend to reallocate resources from education spending to military expenditure [see among others Bertoni et al. (2019), Lai and Thyne (2007), Ichino and Winter-Ebmer (2004)].

Table 6 – Descriptive Statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
Social Peace	2,731	62.65	22.13	4.46	94.52
Edumilex	2,655	3.14	2.36	0.04	17.39
Young Population (% ot total population)	2,752	29.48	11.60	11.89	51.18
Urban Population (% total population)	2,752	59.46	23.42	5.42	100.00
Gini Income	2,752	56.46	10.04	30.72	78.14
Gini Wealth	2,319	77.64	6.83	53.60	99.90
Trade Openness	2,744	53.15	19.27	14.28	96.39

Water withdrawls (% internals resources)	2,490	120.57	729.36	0.02	7,750
Size (log)	2,742	7.74	1.91	1.16	11.96
Net migration	2,752	-4,022	189,056	-2,290,411	1,375,419
US Military Expenditure (log)	2,752	13.42	.20	13.09	13.73
Conflict	2,752	0.18	0.38	0	1

IV. THE EMPIRICAL RESULTS

IV.1 General Results

In this section, we present the general findings of our analysis. To address potential serial correlation, we utilize an IV/GMM estimator. The summarized results are presented in Table 7. For the sake of facilitating result interpretation, the Social Peace Index has been rescaled on a 0-100 basis.

Column 1 presents the outcomes of first-stage estimates. The logarithm of US military expenditure exhibits a significant positive association with Edumilex, while conflict is inversely related to Edumilex. The positive association between US military expenditures indirectly highlights that US allies are less prone to spend in defence in the light of the massive US spending. The negative relation between conflict and Edumilex confirms the results of the literature on the negative impact of conflict on education. Specifically, the occurrence of conflict diminishes Edumilex by -0.3.

Columns 2 to 6 display results of the second stage for various model specifications. Across all specifications, Edumilex consistently demonstrates a positive and statistically significant relationship with our measure of internal peace. Specifically, a one-unit increase in Edumilex correlates with a four-point rise in the Social Peace Index out of 100 since the coefficients range between 3.19 and 4.92. In summary, when the government opts to invest multiple amounts of dollars in education for each dollar spent on the military, there is an improvement in social peace.

Alongside the outcomes concerning Edumilex, the control variables exhibit the anticipated associations with the dependent variable, diverging solely in terms of statistical significance. In Column 2, consonant with the extant literature on youth bulges, the correlation between the proportion of the youthful population and the Social Peace Index is negative. However, it fails to attain statistical significance in Column 5. Conversely, the percentage quota of urban population appears to have no discernible effect on the Social Peace Index. As anticipated, both income and wealth concentration adversely impact the Social Peace Index. Precisely, a one-unit increase in Gini income reduces social peace by -0.3 points, while a comparable rise in Gini wealth diminishes the Social Peace Index by -0.35. This suggests that heightened resource concentration detrimentally affects societal peacefulness, with

wealth concentration proving to be more disruptive than income concentration.

Water withdrawals are negatively associated with the Social Peace Index, with a coefficient of approximately -0.007. Albeit small in magnitude, this result suggests that competition for fundamental resources, such as water, exerts a negative influence on societal peacefulness. Conversely, neither country size nor net migration count yields statistically significant coefficients. Of particular interest is the result of the latter coefficient, indicating that a positive net migration count does not significantly impact the level of peacefulness in a country.

Table 7 – General Results

Dep. Var. **Social Peace**	**(1)** **FS**	**(2)** **IV/GMM**	**(3)** **IV/GMM**	**(4)** **IV/GMM**	**(5)** **IV/GMM**	**(6)** **IV/GMM**
Us Military Expenditure (log)	**1.92*** **					
	(0.333)					
Conflict	**-0.303***					
	(0.175)					
Edumilex		**4.924*** **	**3.189** **	**3.693** **	**4.385*** **	**4.452** **
		(1.057)	(1.576)	(1.742)	(1.653)	(1.926)
Young Population (% of total population)			**-0.421** **		-0.199	
			(0.194)		(0.214)	
Urban Population (% total population)				0.225		0.122
				(0.158)		(0.194)
Trade Openness			-0.018	-0.003	-0.051	-0.037
			(0.071)	(0.077)	(0.076)	(0.080)
Gini Income			**-0.295** **	**-0.318** **		
			(0.132)	(0.136)		
Gini Wealth					**-0.351** **	**-0.364*** **
					(0.137)	(0.138)
Water Withdrawls (% internal resources)			**-0.007*** **	**-0.006** **	**-0.008*** **	**-0.008** **
			(0.002)	(0.002)	(0.002)	(0.003)
Size (log)			-5.373	-7.480	-9.782	-10.310
			(6.480)	(7.452)	(7.667)	(8.227)
Net Migration			0.002	0.005	-0.003	-0.002
			(0.011)	(0.013)	(0.011)	(0.013)
Country FE		Y	Y	Y	Y	Y
Countries	85	85	85	85	84	84
Obs.	2641	2641	2407	2407	2110	2110
Hansen J, p-value		0.6137	0.7608	0.8546	0.4823	0.5233

Robust standard error are in parentheses. *** *p<0.01* ** *p<0.05* * *p<0.1*

Table 8 displays the results of IV regressions for the same models delineated in Table 5, incorporating regional dummy variables to discern potential regional effects and considering the level of Social Peace in 1990, namely at the beginning of the observed period. The results are consistent with those presented in the previous table. Our variable of interest, Edumilex, confirms its robust positive correlation with the Social Peace Index. The magnitude of the coefficients is also confirmed. Specifically, a one-unit increase in Edumilex results in a 3.8-point increase in social peace.

Remarkably, the coefficients linked to Social Peace at the beginning of the period warrant attention. Despite being relatively modest in size, the peace measure in 1990 demonstrates a statistically significant positive influence on subsequent levels of social peace. In essence, the current state of social peace is positively correlated with the initial peace level. This implies that peace could be interpreted as a self-reinforcing path.

Consistent with observations in the previous table, trade openness, country size, and net migration exhibit no discernible effects on the level of social peace. Conversely, demographic factors appear to be more influential. Specifically, the percentage quota of young population confirms its negative association with social peace and the outcome is also more robust. On the other hand, urban population displays a positive relationship with social peace. This suggests that plausibly increased population aggregation correlates with higher economic returns, with urban areas positively correlated with economic performance. Moreover, the reduced physical distance between people in urban settings may contribute to the development of more egalitarian institutions that consider the needs of a larger segment of the population.

Table 8 – estimation with Regional Effects

Dep. Var. **Social Peace**	**(1)** **FS**	**(2)** **2SLS**	**(3)** **2SLS**	**(4)** **2SLS**	**(5)** **2SLS**	**(6)** **2SLS**
Us Military Expenditure (log)	**1.923*** **					
	(0.214)					
Conflict	**-.316***					
	(0.175)					
Social peace in 1990		**0.239***	**0.188***	0.165	**0.197***	**0.180***
		(0.120)	(0.105)	(0.095)	(0.111)	(0.100)
Edumilex		**4.955*** **	**2.939** **	**3.578*** **	**3.886** **	**4.315*** **
		(0.852)	(1.093)	(0.783)	(1.689)	(0.976)
Young Population (% of total population)			**-0.460*** **		**-0.312***	
			(0.113)		(0.164)	
Urban Population (% total population)				**0.230*** **		**0.156***
				(0.062)		(0.082)
Trade Openness			-0.010	0.005	-0.045	-0.034
			(0.038)	(0.040)	(0.064)	(0.065)
Gini Income			**-0.297** **	**-0.325*** **		
			(0.111)	(0.106)		
Gini Wealth					**-0.320** **	**-0.347*** **
					(0.135)	(0.106)
Water Withdrawls (% internal resources)			**-0.005*** **	**-0.005*** **	**-0.005*** **	**-0.005*** **
			(0.001)	(0.001)	(0.001)	(0.001)
Size (log)			-0.061	0.022	0.088	0.157
			(1.046)	(1.010)	(1.327)	(1.229)
Net Migration			0.003	0.006	-0.002	-0.001
			(0.006)	(0.009)	(0.007)	(0.010)
Regional Effects: Baseline Sub-Saharan Africa						
Australia and New Zealand		**32.088*** **	**22.361*** **	**22.047*** **	**24.604*** **	**24.371*** **
		(6.753)	(7.028)	(6.864)	(5.861)	(7.843)
Eastern Asia		**24.179*** **	5.787	**11.955*** **	**12.809** **	**17.085*** **
		(2.177)	(4.858)	(3.855)	(5.742)	(4.431)
South-eastern Asia		**16.051*** **	3.804	**6.969** **	9.584	**11.693*** **
		(1.981)	(3.545)	(2.491)	(5.823)	(3.224)
Southern Asia		**11.186*** **	0.053	**6.676*** **	3.174	**7.865*** **
		(1.407)	(2.985)	(1.894)	(4.302)	(2.240)
Western Asia		**24.474*** **	**12.349** **	**12.779*** **	**17.723** **	**18.268*** **
		(1.235)	(4.466)	(3.292)	(8.133)	(4.319)
Eastern Europe		**23.714*** **	6.098	**10.538*** **	**19.032*** **	**22.548*** **
		(2.932)	(4.108)	(2.948)	(5.597)	(3.209)
Northern Europe		**29.740*** **	**17.689*** **	**18.947*** **	**24.459*** **	**25.498*** **
		(5.968)	(5.019)	(4.068)	(4.188)	(5.063)
Western Europe		**25.914*** **	**14.995** **	**16.796*** **	**20.033*** **	**21.399*** **
		(7.737)	(5.771)	(4.870)	(5.282)	(6.113)
Southern Europe		**28.790*** **	**14.861*** **	**19.541*** **	**20.039*** **	**23.293*** **
		(5.656)	(4.660)	(3.508)	(5.113)	(4.602)
Northern Africa		**-2.479*** **	6.947	**6.728***	8.981	**10.354** **
		(0.384)	(4.099)	(3.686)	(6.342)	(4.078)
Latin America and the Caribbean		**13.989*** **	**12.714*** **	**11.557** **	**12.201*** **	**11.447** **

		(3.333)	(3.446)	(3.898)	(2.707)	(4.188)
Northern America		**27.545*** **	**18.252***	**19.976****	**20.138****	**21.315****
		(6.915)	(8.682)	(8.044)	(7.430)	(9.187)
Constant		**19.320*** **	**67.032*** **	**37.768****	**65.228*** **	**46.271*** **
		(5.598)	(12.037)	(13.250)	(15.940)	(13.193)
Regional FE		Y	Y	Y	Y	Y
Countries	85	85	85	85	84	84
Obs.	2641	2641	2407	2407	2110	2110
Hansen J, p-value		0.3509	0.7136	0.8302	0.3572	0.4149
Standard error clustered at regional level are in parentheses. *** *p<0.01* **p<0.05* *p<0.1*						

Similar to the previous table, the concentration of resources, as indicated by both Gini income and Gini wealth, negatively affects the Social Peace Index. Notably, wealth concentration has a more adverse impact than income concentration. Once again, competition for a vital resource, such as water, is negatively correlated with our measure of peace. Examining the coefficients of regional effects reveals an intriguing pattern. Compared to Sub-Saharan Africa, certain Asian regions (South Eastern Asia, Southern Asia, and Western Asia) exhibit no significant differences when accounting for the influence of the young population.

IV.2 Macro-Regional Results: Europe and Asia

The latter results as well as the visual analysis in figures 4 and 6 suggest that significant differences exist between regions of the world. In what follows, we conduct estimations separately for European and Asian countries. In our sample, Europe is made up of 25 countries whereas Asia encompasses 11 countries. This scrutiny aims to assess whether the impact of Edumilex varies significantly in the presence of different developmental stages of regions.

The detailed results are presented in Table 9. The findings affirm that Edumilex appears to be a distinct determinant of internal peace. This strengthens the proposition of utilizing it as a viable policy instrument for fortifying societal peace. Nonetheless, certain distinctions merit attention. Firstly, the Edumilex coefficients in Europe are slightly below the average value we highlighted above in table 7. Specifically, within European countries, a one-unit increase in Edumilex is associated with a 1.9-point increase in the Social Peace Index.

In contrast, the influence of Edumilex on Social Peace in Asia exceeds the global average significantly. Specifically, a one-unit increase in Edumilex correlates with a 10-point increase in the Social Peace Index. These variations in the impact of Edumilex on social peace could be attributed to diverse factors. The mean social peace in Europe stands at 84.97, while in Asia, it is 52.92. Therefore, the marginal effect of Edumilex on peace may be reasonably linked to the initial conditions of each country. Additionally, the mean value of Edumilex in Europe is 4.2, whereas in Asia, it is only 1.66. This suggests that the marginal effect of Edumilex on social peace might be diminishing. In other words, higher Edumilex values correspond to a lower incremental increase in social peace.

Additionally, it is noteworthy that among the control variables, only the Gini coefficient demonstrates a statistically significant influence on social

peace in Europe. Notably, in the European context, income concentration appears to exert a more pronounced negative impact on peace compared to wealth concentration. This outcome diverges from the overarching patterns observed when analysing the entire panel. On the other hand, in Asia, no other controls seem to have an impact on the Social Peace Index. This reasonably may be attributed to the limited number of observations in the panel. However, Edumilex remains highly significant. That is, it seems that only Edumilex contributes to the establishment of social peace.

These results suggest the need for further exploration. Firstly, for analyzing the heterogeneous effects of Edumilex on peace, and secondly, to investigate possible non-linearities in the relationship between Edumilex and social peace.

Table 9 – Regional Results: Europe[1] and Asia[2]

	Europe				Asia			
Dep. Var.	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Social Peace	**IV/GMM**	**IV/GMM**	**IV/GMM**	**IV/GMM**	**IV/GMM**	**IV/GMM**	**IV/GMM**	**IV/GMM**
Edumilex	**2.090*** **	**2.310*** **	**1.548*** **	**1.870*** **	**9.550*** **	**10.572** **	**10.399** **	**9.969*** **
	(0.499)	(0.443)	(0.449)	(0.447)	(3.101)	(4.135)	(4.354)	(3.337)
Young Population (% of total population)	-0.303		-0.397		-0.183		0.175	
	(0.266)		(0.259)		(0.192)		(0.286)	
Urban Population (% total population)		-0.010		-0.029		0.032		-0.124
		(0.109)		(0.100)		(0.253)		(0.274)
Trade Openness	-0.036	0.023	-0.009	0.069	-0.080	-0.066	-0.055	-0.064
	(0.063)	(0.086)	(0.071)	(0.105)	(0.182)	(0.186)	(0.142)	(0.141)
Gini Income	**-0.248** **	**-0.289** **			0.212	0.267		
	(0.114)	(0.129)			(0.392)	(0.431)		
Gini Wealth			**-0.159***	**-0.196***			0.574	0.592
			(0.087)	(0.103)			(0.377)	(0.486)
Water Withdrawals (% internal resources)	0.028	0.019	0.023	0.013	0.010	0.013	0.007	0.007
	(0.076)	(0.079)	(0.071)	(0.083)	(0.013)	(0.016)	(0.007)	(0.006)
Size (log)	-2.539	-2.131	-3.354	-2.766	-9.864	6.437	14.081	-3.835
	(3.075)	(3.806)	(2.467)	(3.444)	(68.527)	(85.610)	(28.958)	(33.542)
Net Migration	0.029	**0.037***	0.014	0.021	0.016	0.026	0.001	0.000
	(0.022)	(0.022)	(0.016)	(0.017)	(0.022)	(0.022)	(0.016)	(0.013)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Countries	25	25	24	24	11	11	11	11
Obs.	743	743	641	641	301	301	261	261
Hansen J, p-value	0.560	0.865	0.914	0.842	0.951	0.623	0.627	0.641

Robust standard errors are in parentheses. *** *p<0.01* **p<0.05* *p<0.1*

[1]Europe includes Albania, Austria, Belgium, Bulgaria, Belarus, Switzerland, Czechia, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Sweden, Ukraine.
[2]Asia includes Bangladesh, China, Indonesia, Iran, South Korea, Sri Lanka, Malaysia, Pakistan, Singapore, Thailand, India.

CONCLUSION

This paper aimed to analyze the efficacy of an economic policy instrument in enhancing peace within a polity. In essence, the paper asserts that the equilibrium between investments in education and military expenditure contributes to elucidating the evolution of social peace over time. The identified policy instrument is characterized as the ratio between public investment in education and military spending, denoted as Edumilex. To empirically assess the viability of this potential policy instrument, a target variable as a measure of social peace was constructed. Specifically, we adopted a concise metric termed Social Peace, encompassing four dimensions: (i) Health; (ii) Standard of living; (iii) Quality of institutions; (iv) Spread of violence. In the construction of this metric, inspiration was drawn from the Collier-Hoeffler greed/grievance models and the Human Development Index (HDI). Subsequently, we empirically estimated the impact of Edumilex on social peace using a panel dataset comprising 85 countries spanning the years from 1990 to 2020. An instrumental variable (IV) approach was employed, with the baseline estimation utilizing an IV/GMM estimator. In addition to the overall estimation, separate analyses were conducted for European countries and selected Asian countries. The findings from the latter analysis have provided insights warranting further exploration.

In summary, across all model specifications, Edumilex consistently exhibits a positive and statistically significant association with our metric of internal peace. Recalling that Edumilex is the ratio between public investment in education and military spending. To succinctly put it, when the government chooses to allocate a multiple amount of dollars to education for each dollar spent on the military, there is a discernible enhancement in social peace. This empirical evidence substantiates the proposition that Edumilex could serve as an apt instrument for economic policy to establish and fortify social peace.

Finally, two caveats merit further acknowledgment. Firstly, due to insufficient education data, this study excluded several countries. Consequently, future research should encompass a broader array of countries to enhance the robustness of the findings. In this respect, as noted above, we have intentionally excluded the United States as it constitutes a significant outlier in terms of military expenditure. Secondly, Edumilex has been exclusively presented in the context of within-polity peace. At this juncture, no analysis has been presented regarding armed conflicts between polities. Further research should be directed at explaining how a domestic economic policy instrument can have an impact also on peaceful relations between states. The empirical findings regarding the internal pacifying impact of international economic integration serve as a nexus facilitating the connection of the approach of this paper with the established body of literature on the relationship between economic integration and global peace [Polachek and Sieglie (2007), Polachek et al. (2007), Polachek (1980)].

Finally, the primary novelty asserted in this study is the evidence-based proposition advocating for the necessity to integrate education and military expenditures in the design of economic policy. This is due to their collective and substantial influence on the level of societal peace.

REFERENCES

Acemoglu D., Fergusson L., Johnson S., (2020), Population and Conflict, *The Review of Economic Studies*, vol. 87, n.4, pp. 1565–1604, https://doi.org/10.1093/restud/rdz042

Albalate, D., Bel, G.,Elias, F., (2012), Institutional determinants of military spending. *Journal of Comparative Economics*, vol.40, n.2, pp. 279-290.

Al-Jabri N., Campbell N., Saha S., Khan S., (2022) The role of youth bulge on political instability: Cross-country evidence, *Economic Analysis and Policy*, Vol. 76, pp.1053-1074, https://doi.org/10.1016/j.eap.2022.09.013.

Arrow K.J., (1958), Tinbergen on Economic Policy, *Journal of the American Statistical Association*, vol. 53, n.281, pp. 89-97.

Arrow K.J. (1995). Some General Observations on the Economics of Peace and War. *Peace Economics Peace Science and Public Policy*, 2, 2

Balestra A., Caruso R., (2022), Should Education and Military Expenditures be Combined for Government Economic Policy? *The Economics of Peace and Security Journal*, vol. 17, n.1, pp. 37-54

Barro, R. J. (2013). Education and Economic Growth. *Annals of Economics and Finance,* vol.14, n.2, pp. 301–328

Baumol, W.J., (1990). Entrepreneurship: productive, unproductive, and destructive. *The Journal of Political Economy*, vol. 98, n.5, pp. 893-921.

Benos, N. and Zotou, S. (2014). Education and growth: a meta-regression analysis. *World Development*, vol.64, pp. 669-689.

Bingley P., Lundborg P., Lyk-Jensen S.V. (2020). The Opportunity Costs of Mandatory Military Service: Evidence from a Draft Lottery. *Journal of Labor Economics*, vol. 38, n.1, pp. 39-66.

Buhaug, H., Urdal H. (2013) An urbanization bomb? Population growth and social disorder in cities. *Global Environmental Change*, vol.23, n.1, pp. 1-10, https://doi.org/10.1016/j.gloenvcha.2012.10.016.

Bertoni, E., Di Maio, M., Molini, V., Nisticò, R. (2019), Education is forbidden: The effect of the Boko Haram conflict on education in North-East Nigeria. *Journal of Development Economics*, vol.141, https://doi.org/10.1016/j.jdeveco.2018.06.007.

Carlton-Ford, S., Durante, K. A., Evans, T. D., Graham, C. (2019). Guns and Butter: Child Mortality and the Mediators of Militarization. *Armed Forces & Society*, vol. 45, n.1, pp. 177-197. https://doi.org/10.1177/0095327X18758288

Caruso, R. (2017). Peace economics and peaceful economic policies. *The Economics of Peace and Security Journal*, vol. 12, n.2, pp. 16-20.

Caruso, R. (2010). On the Nature of Peace Economics. *Peace Economics, Peace Science and Public Policy*, vol.16, pp.1-18. https://doi.org/10.2202/1554-8597.1216

Caruso, R., Di Domizio, M. (2016) Interdependence between US and European military spending: a panel cointegration analysis (1988-2013), *Applied Economics Letters*, vol.23, n.4, pp. 302-305. 10.1080/13504851.2015.1071466

Churchill A., S., Yew, S.L., (2018). The effect of military expenditure on growth: an empirical synthesis. *Empirical Economics,* vol. 55, pp. 1357–1387.

Collier, P., Hoeffler, A. (2004), Greed and Grievance in Civil War. *Oxford Economic Papers*, vol.56, n.4, pp. 563-395

Collier, P., Hoeffler, A. (2006) Military expenditure in post-conflict societies. *Economics of Governance*, vol.7, pp. 89–107. https://doi.org/10.1007/s10101-004-0091-9

Collier P., Hoeffler, A., Söderbom Måns. (2004), On the Duration of Civil War, *Journal of Peace Research,* vol.41, n.3, pp.253-273.

Coulomb F., Hartley K., Intriligator M. (2008). Pacifism in Economic Analysis: A historical perspective. *Defence and Peace Economics*, vol.19, pp. 373-386

Coppedge et al. (2022). V-Dem. Country–Year/Country–Date Dataset v12. Varieties of Democracy (V-Dem) Project. https://doi.org/10.23696/vdemds22. (Accessed: 10 January 2022).

D'Agostino, G., Dunne, J.P. and Pieroni, L. (2019). Military expenditure, endogeneity and economic growth. *Defence and Peace Economics*, vol. 30, n.5, pp. 509- 524.

de Soysa, I., Vadlamannati, K. C. (2021) Does free-market capitalism drive unequal access to health? An empirical analysis, 1970–2015. *Global Public Health,* vol.16, n.12, pp.1904-1921.

Dube O., Naidu S. (2015), Bases, Bullets, and Ballots: The Effect of US Military Aid on Political Conflict in Colombia. *The Journal of Politics*, vol.77, n.1, pp. 249-267

Dunne, J.P. and Tian, N. (2015). Military expenditure, economic growth and heterogeneity. *Defence and Peace Economics*, vol.26, n.1, pp. 15-31.

Dunne, J.P. and Tian, N., 2020. Military expenditure and economic growth. *Oxford Research Encyclopedia of Politics.* doi: https://doi.org/10.1093/acrefore/9780190228637.013.1929

Eloranta J., Harrison M. (2015). War and Disintegration, 1914-1950, in Harrison (ed.), *The economics of Coercion and Conflict*, World Scientific Publishing, pp. 39-65. https://doi.org/10.1142/9789814583343_0002

Furqan, M., Mahmood, H. (2020), Does education reduce homicide? A panel data analysis of Asian region. *Quality and Quantity,* vol.54, ppp. 1197–1209. https://doi.org/10.1007/s11135-020-00981-z

Fox, S., Bell, A. (2016) Urban geography and protest mobilization in Africa. *Political Geography*, vol.53, pp. 54-64. https://doi.org/10.1016/j.polgeo.2016.02.004.

Gizelis, T., Pickering, S., Urdal, H. (2021) Conflict on the urban fringe: Urbanization, environmental stress, and urban unrest in Africa. *Political Geography*, vol.86. https://doi.org/10.1016/j.polgeo.2021.102357.

Gleditsch K., Rivera, M., Zárate-Tenorio, B. (2022) Can Education Reduce Violent Crime? Evidence from Mexico before and after the Drug War

Onset. *The Journal of Development Studies*, vol.58, n.2, pp.292-309. 10.1080/00220388.2021.1971649
Greif A. (2007), *Institutions and the Path to the Modern Economy, Lessons from Medieval Trade*, Cambridge University Press, New York.
Grogger, J. (1998) Market wages and youth crime. *Journal of Labor Economics*, vol.16, pp. 756-791
Groot W., van den Brink, H. M. (2010) The effects of education on crime. *Applied Economics*, vol.42, n.3, pp. 279-289. DOI: 10.1080/00036840701604412
Hanushek, E.A., Woessmann, L. (2020). The Economics of Education, A Comprehensive Overview. *Education, knowledge capital and economic growth*, pp. 171-182.
Heckman, J. J., Moon, S. H., Pinto, R., Savelyev, P. A., Yavitz, A. Q. (2010). The rate of return to the High Scope Perry Preschool Program. *Journal of Public Economics*, vol.94, n.1, pp.114–128.
Hegre, H., Karlsen, J., Nygård, H. M., Strand, H., Urdal, H. (2013). Predicting Armed Conflict, 2010–2050, *International Studies Quarterly*, vol.57, n.2, pp. 250–270. https://doi.org/10.1111/isqu.12007
Hegre, H., Sambanis N. (2006) Sensitivity analysis of the empirical literature on civil war onset. *Journal of Conflict Resolution*, vol.50 , pp. 508-535.
Hillesund, S., & Østby, G. (2023). Horizontal inequalities, political violence, and nonviolent conflict mobilization: A review of the literature. *Journal of Economic Surveys*, vol.37, pp. 1589–1635. https://doi.org/10.1111/joes.12539
Hou, D. (2018), The Determinants of Military Expenditure in Asia and Oceania, 1992–2016: A Dynamic Panel Analysis. *Peace Economics, Peace Science and Public Policy*, vol. 24, n. 3. https://doi.org/10.1515/peps-2018-0004
Ichino, A., Winter-Ebmer R., (2004), The Long-Run Educational Cost of World War II. *Journal of Labor Economics*, vol. 22, n.1, pp. 57-87
Isard W. (1994). Peace Economics: A Topical perspective. *Peace Economics, Peace Science, and Public Policy*, vol.1, pp.6-9.
Kahneman, Daniel & Deaton, Angus. (2010). High Income Improves Evaluation of Life But Not Emotional Well-Being. *Proceedings of the National Academy of Sciences of the United States of America*. 107. 16489-93. 10.1073/pnas.1011492107.
Kollias, C. and Paleologou, S.M., (2019). Military spending, economic growth and investment: a disaggregated analysis by income group. *Empirical Economics*, vol. 56, n.3, pp.935-958.
Krueger, A.B., Lindhal, M. (2001). Education for growth: why and for whom? *Journal of Economic Literature*, vol. 39, n.4, pp. 1101-1136.
Lai, B., Thyne, C. (2007). The Effect of Civil War on Education, 1980—97. *Journal of Peace Research*, vol.44, n.3, pp. 277-292. https://doi.org/10.1177/0022343307076631

Lochner, L., Moretti, E. (2004). The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports. American Economic Review, vol.94, n.1, pp.155-189.

Magee, C. S. P., Massoud, T. G. (2011). Openness and internal conflict. *Journal of Peace Research*, vol.48, n.1, pp.59-72. https://doi.org/10.1177/0022343310388834

Marconi, G., (2018). Education as a long-term investment: the decisive role of age in the education-growth relationship. *Kyklos*, vol. 71, n.1, pp.132-161.

Marquez-Ramos, L. and Mourelle E., 2019. Education and economic growth: an empirical analysis of non-linearities. *Applied Economic Analysis*, vol.27, n.79, pp.21-45

Moore, W.H., Lindström, R., O'Regan, V. (1996) Land reform, political violence and the economic inequality-political conflict nexus: A longitudinal analysis. *International Interactions*, vol.21, n.4, pp.335-363. DOI: 10.1080/03050629608434872

Murdoch, J. C., and T. Sandler. (1984), Complementarity, Free Riding, and the Military Expenditures of NATO Allies. *Journal of Public Economics* vol.25, pp. 83–101. doi:10.1016/0047-2727(84)90045-8.

Nafziger, E.V., Auvinen, J. (2002), Economic Development, Inequality, War, and State Violence. *World Development*,vol.30, n.2, pp.153-163. https://doi.org/10.1016/S0305-750X(01)00108-5.

Nordås, R., Davenport, C. (2013), Fight the Youth: Youth Bulges and State Repression. *American Journal of Political Science*, vol.57, pp.926-940. https://doi.org/10.1111/ajps.12025

Østby, G. (2016). Rural–urban migration, inequality and urban social disorder: Evidence from African and Asian cities. *Conflict Management and Peace Science*, vol. 33, n.5, pp. 491-515. https://doi.org/10.1177/0738894215581315

Østby, G., Urdal, H., Dupuy, K. (2019). Does Education Lead to Pacification? A Systematic Review of Statistical Studies on Education and Political Violence. *Review of Educational Research*, vol.89, n.1, pp.46-92. https://doi.org/10.3102/0034654318800236

Pinker S. (2011). *The better angels of our nature: Why violence has declined*. New York, NY: Viking.

Polachek, S. W. (1980). Conflict and Trade. *Journal of Conflict Resolution*, *24*(1), 55-78. https://doi.org/10.1177/002200278002400103

Polachek S.W., Seiglie C., (2007) Trade, Peace and Democracy: An Analysis of Dyadic Dispute, in Eds: Sandler T., Hartley K., Handbook of Defense Economics, Elsevier, Vol. 2, pp. 1017-1073, https://doi.org/10.1016/S1574-0013(06)02031-X.

Polachek, S.W., Seiglie C., Xiang J., (2007), The Impact of Foreign Direct Investment on International Conflict, Defence and Peace economics, vol. 18, n.5, pp. 415-429, DOI: 10.1080/10242690701455474

Raleigh, C. (2011), The search for safety: The effects of conflict, poverty and ecological influences on migration in the developing world. *Global Environmental Change*, vol.21, pp. S82-S93. https://doi.org/10.1016/j.gloenvcha.2011.08.008.

Raleigh, C., Hegre, H. (2009) Population size, concentration, and civil war. A geographically disaggregated analysis. *Political Geography*, vol.28, n. 4, pp. 224-238. https://doi.org/10.1016/j.polgeo.2009.05.007.

Raskhit B., Neog Y. (2021), Does higher educational attainment imply less crime? Evidence from the Indian states. *Journal of Economic studies*, vol.48, n.1, pp. 133-165. https://doi.org/10.1108/JES-05-2019-0218

Ray, D., Esteban, J. (2017), Conflict and Development. *Annual Review of Economics*, vol.9, pp.263-293

Richardson, L.F. (1960) Arms and Insecurity: A Mathematical Study of the Causes and Origins of War. Pittsburgh, PA: Boxwood.

Rider, T. J., Findley, M. G., Diehl, P. F. (2011). Just part of the game? Arms races, rivalry, and war. *Journal of Peace Research*, vol.48, n.1, pp.85-100. https://doi.org/10.1177/0022343310389505

Rivera, M. (2016). The sources of social violence in Latin America: An empirical analysis of homicide rates, 1980–2010. *Journal of Peace Research*, vol.53, n.1, pp.84-99. https://doi.org/10.1177/0022343315598823

Rüegger, S. (2019). Refugees, ethnic power relations, and civil conflict in the country of asylum. *Journal of Peace Research*, vol.56, n.1, pp. 42-57. https://doi.org/10.1177/0022343318812935

Sandler, T., and Murdoch, J. C. (1990). Nash-Cournot or Lindahl Behavior?: An Empirical Test for the Nato Allies. *The Quarterly Journal of Economics,* vol.105, n.4, pp.875–894. doi: 10.2307/2937877.

Smith R., (1995), The demand for military expenditure, in K. Hartley, T. Sandler (Eds.), *Handbook of Defense Economics*, North-Holland, Amsterdam, NL (1995), pp. 69-87

Thyne, C.. (2006) ABC's, 123's, and the Golden Rule: The Pacifying Effect of Education on Civil War, 1980–1999. *International Studies Quarterly*, vol.50, n.4, pp.733-754

Tinbergen J., (1956), *Economic Policy: Principles and Design*, North Holland, Amsterdam.

Urdal, H. (2006) A Clash of Generations? Youth Bulges and Political Violence, *International Studies Quarterly*, vol. 50, n.3, pp. 607–629, https://doi.org/10.1111/j.1468-2478.2006.00416.x

Vadlamannati, K. C., Shakya Lahiru Pathmalal, K.K. (2010) Exploring the relationship between military spending and human rights performance in South Asia. *The International Journal of Human Rights*, vol.14, n.2, pp.147-165. 10.1080/13642980802583807

Zepeda R. G., Pérez Ricart, C.A. (2023) Effects of long-term development and schooling expansion on the decline in homicide rates: Mexico from 1950 to 2005. *Journal of Crime and Justice*, vol.46, n.1. pp.1-23. 10.1080/0735648X.2022.2050277

Appendix

A1 List of countries

East Asia and Pacific (8)	Australia, China, Indonesia, Korea, Malaysia, Singapore, Thailand, New Zealand
Europe and Central Asia (27)	Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Belarus, Cyprus, Switzerland, Czech Republic, Denmark, Spain, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Sweden, Turkey, Ukraine, UK
Latin America and Caribbean (15)	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Haiti, Jamaica, Mexico, Paraguay, Peru, Uruguay
Middle East and North Africa (6)	Egypt, Iran, Israel, Qatar, Saudi Arabia, Tunisia.
North America	Canada
South-Asia (4)	Bangladesh, India, Pakistan, Sri Lanka,
Sub-Saharan Africa (24)	Angola, Burundi, Benin, Burkina Faso, Botswana, Central African Republic, Cote d'Ivoire, Cameroon, Democratic Republic of Congo, Congo, Ethiopia, Ghana, Guinea, Gambia, Kenya, Madagascar, Mali, Malawi, Rwanda, Tanzania, Togo, Uganda, South Africa, Zambia