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# DEFENSE EXPENDITURE AND STRATEGIC CAPABILITIES: DISSIMILARITIES AMONG SOUTH AMERICAN COUNTRIES

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## Introduction

From an interstate conflict perspective, South America is generally characterized as a stable region marked by the absence of wars and defense investments below global averages (Vaz 2019), constituting what is commonly called the as "tradition of the long South American peace" (Villa 2018).

At the beginning of the second decade of the twenty-first century, there was also the hope that the UNASUR Defense and Security Council could strengthen the bonds of mutual trust and cooperation in defense, which would further promote a "permanent zone of (democratic) peace in South America" (Villa and Souza-Pimenta 2016). Some authors question the tradition of the "long peace" and argue that there is in fact a "violent peace" in South America. From this perspective, they discard the classification of conflicts made based on extra regional comparisons that do not take into account historical traditions and characteristics of the countries in the region, as they do not account for correctly perceiving the tensions existing between nations (Franchi, Migon, and Jimenez 2017). Also, South American countries deal with intra-state threat issues, such as drug production and trafficking, urban violence, illegal arms trafficking, and environmental threats for which, as a rule, the Armed Forces are deployed (CEPAL 2014; Costa Vaz 2015; Andrade et al. 2019; Oliveira 2017).

To think about how countries organize themselves to promote their security and defense, Barry Buzan proposed the theory of regional security

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complexes. In this theory, South America may be divided into two complexes: (i)Southern Cone countries, more peaceful and aimed at building a security community; and the (ii)Andean Region countries, which experienced more internal instabilities and border issues (Buzan et al 2003).

However, Buzan's conception has suffered criticism for failing to account for the complexity of regional political realities (Fuccille and Rezende 2013), and even for being unable to realize that defense expenditure and military modernization spending do not respect the proposed security complexes.

> "In fact, arms purchases transform the region into a single regional security complex since it is operated not only in the Andean system nor in the Southern Cone but by countries from both sub-regions" (Villa 2018,139).

Another way to think about it, considers the question from a defense economy view, since it reflects events occurring in the country. In this sense, the amount a country separates from its wealth for maintaining its sovereignty and security reflects how unstable and threatened it is (Hartley 2013).

The fact is that in the beginning of the twentieth century there was an augmentation in the investment in defense, with nominal expenditures and the percentage relative to the Gross Domestic Product (GDP) increasing, reflecting in greater acquisition of technology and quantity of equipment by South American countries, most notably by Brazil, Chile, and Venezuela. This behavior made South America responsible for 5% of the volume of international arms imports in the 2003-2007 period, and the amount in this period was 47% higher than the previous period of analysis, 1998-2002 (Pagliari and Sources 2010). The second fact that stands out is that defense investments and expenditures have declined in the last decade, as a direct consequence of the economic crisis in South American countries. This does not correspond to a big change in the percentage of the GDP allocated to Defense, but is a reflection of the drop in the nations' GDP. Hence, the amount of resources allocated to the Defense expenditure has diminished — with an increase in personnel spending and a decrease of technology and capabilities investment (Costa Vaz 2019). Defense economics is the branch of economic science that is devoted to these analyses.

Defense economics deals with the application of economic theory to defense-related issues, being "the reasoning and application of economic methods to study defense and the economic aspects related to this area" (Leske 2018, 784). It has an expanded focus on peace and war studies, covering defense and its consequences, disarmament, and peace spending.

The determinants of defense expenditure — investment and personnel, including base defense industry, arms races, and military alliances — are this area interests and scope (Hartley 2013).

> Defense economics is the study of resource allocation, income distribution, economic growth, and stabilization applied to defense-related topics. As such, defense economics involves an investigation of the impact of defense expenditures, both domestically and internationally, on macroeconomic variables such as employment, output, and growth. It also has a microeconomic dimension involving analysis of the defense industrial base, collaborative programs, offsets, the pricing and profitability of military contracts, and the regulation of contractors. (Hartley 2013, 6).

The historical development of the concept of defense economy shows the concern based on the concept of "national interest understood as the integration of the political and economic interests of a geographical unit in a nation in an integral way, making itself predominant in the face of external ideas, policies and actions" (Castro-Gómez et al. 2013, 44).

National defense, as a public good, requires policies to meet social needs for security and defense, in which the economics of this sector must be directed to provide the necessary strategic capabilities (Jimenez 2016). Historically, South American countries have modest defense expenditures (World Bank 2020). And perhaps because of the experience of recent military governments, the few inter-state conflicts in the region, and the poor communication between the Ministry of Defense and the Armed Forces with the civilian population, the subject of defense and its expenditure is little discussed among these countries, being obscure to them the need for a robust defense expenditure, at the expense of other social needs, such as education and health (Almeida 2010). Despite this similar political and cultural experience and limited expenditures, countries may behave differently in investing their economic resources — given the distinct challenges they encounter in their territories and on their borders —, creating their defense identity by moving away from or closer to other countries (Fonfría 2012).

If the interpretations of security complexes, or traditions of long peace or violent peace do not fully explain how South American countries are organized regarding Defense, we can start from this more pragmatic point of view, the defense expenditures, and the material defense capabilities to understand the dissimilarities and approximations among the South American countries. This is because a country's security and defense needs are reflected in its defense economy:

> Based on the definition of the Armed Forces' mission and strategic planning, a plan and a expenditure are structured, with a multi-year horizon, from which an estimate of the resources required to meet the proposed objectives is made. These resources are the personnel, physical facilities, equipment, supplies, technology, and the operating expenditure.
> The defense economy is related to two important areas of national coexistence: economic and defense. In this sense, it seeks the best way to allocate resources to provide protection to the nation, not only in periods of conflict, but also in times of peace, considering that the scarcity of resources is a permanent situation (Ecuador 2018).

Taking into account these considerations, we return to the question of this research: how are South American countries organized, considering defense macroeconomic data and their current strategic capabilities? Answering this question will allow us to understand the current events and threat scenarios considered by countries, as these are reflected by defense economy (Hartley 2013).

The information on the proximities between countries, based on the analysis of macroeconomic data and joint defense strategic resources, can be useful for planning cooperation treaties, investments in equipment and even in the defense industrial base in bi, tri or multinational actions.

This study, based on data from the *Stockholm International Peace Research Institute* (SIPRI) and *Military Balance,* analyzes a macro-economic dataset, seeks to identify how South American countries are organized, determining those that are most similar to each other (which would form complexes) and how they differ from the others (dissimilarities), only with respect to variables such as: % GDP for the defense budget; defense investment per capita; defense spending; acquisitions of defense equipment.

## Defense Economy Trends in South American countries

In this section, we will present some information about the macroeconomic indicators and defense investment of South American countries. As we have already stated, these are countries that historically have low military expenditure (Table 1).

Table 1: Percent of GDP allocated to Defense Expenditure

| Country | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Argentina | 0.88 | 0.85 | 0.81 | 0.86 | 0.85 |
| Bolivia | 1.9 | 1.74 | 1.63 | 1.54 | 1.5 |
| Brazil | 1.33 | 1.37 | 1.35 | 1.42 | 1.47 |
| Chile | 1.96 | 1.9 | 1.92 | 1.94 | 1.89 |
| Colombia | 3.13 | 3.13 | 3.08 | 3.19 | 3.17 |
| Ecuador | 2.74 | 2.62 | 2.51 | 2.36 | 2.38 |
| Guyana | 1.28 | 1.46 | 1.51 | 1.68 | 1.69 |
| Paraguay | 0.99 | 1.07 | 0.95 | 0.89 | 0.93 |
| Peru | 1.58 | 1.72 | 1.3 | 1.24 | 1.19 |
| Uruguay | 1.81 | 1.82 | 1.88 | 1.98 | 1.95 |
| Venezuela | 1.16 | 0.94 | 0.45 | 0.49 | --- |
| Latin America & Caribbean | 1.29 | 1.28 | 1.24 | 1.26 | 1.26 |

Source: World Bank[3] and Macro Data (specifically for Guyana)[4]

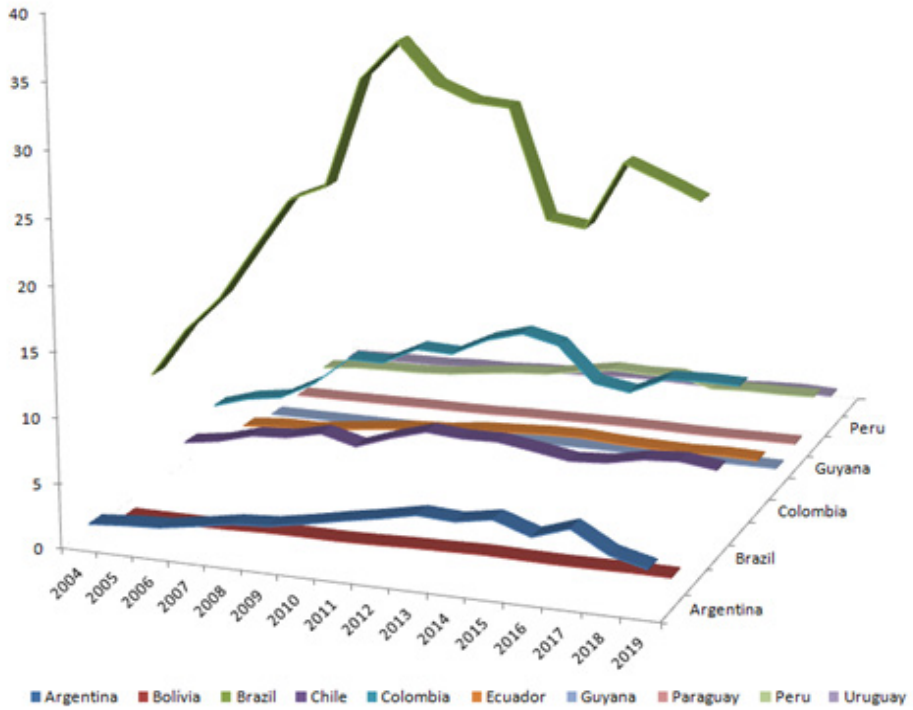
However, one cannot try to understand these countries as a single — South America — and homogeneous entity. Each country has its own particularities. Colombia, for example, consistently devotes more than 3% of its GDP above the 2% recommended by the UN (LEE 2015). In 2019, Brazil (51% of the region total; 1.5% of its GDP), Colombia (19% of the region total, 3.2% of its GDP) and Chile (5.2% of the region total and 1.8% of its GDP) were the three countries with the largest defense expenditures in South America (SIPRI 2019).

However, the percentage of GDP devoted to the defense expenditure does not exactly represent the amount of resources invested. For example, take Ecuador: The percentage of GDP is relatively stable, but the number of resources has been decreasing year after year, especially since 2014 (Figure 1).

3 Available at: https://databank.worldbank.org/reports.aspx?source=2&series=MS.MIL.XPND.GD.ZS&country=.

4 Available at: https://datosmacro.expansion.com/estado/gasto/defensa/guyana.

Figure 1: Defense expenditures (US$ Billion) in South American countries – 2008-2019




Source: World Bank (2020)[5]

In the case of Chile, although the amount of resources has been gradually increasing, the percentage of GDP dedicated to the defense expenditure is stable.

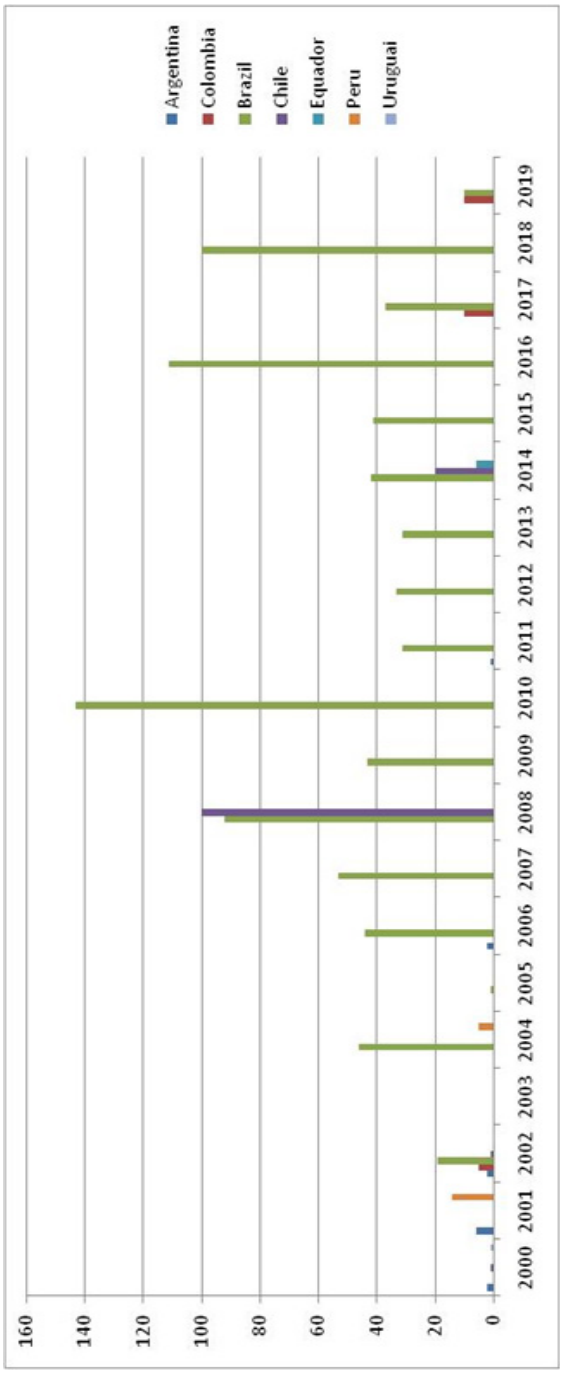
> Chile has not increased its defense spending as a percentage of GDP. The indicator ranged from 1.7% in 2001 to 0.93% in 2016. Additionally, in relation to the behavior of both curves ("total expenditure" and "Expenditure Law") in the same period, a proportionally homogeneous spending can be observed, although, since 2011, a stage of stagnation or equilibrium of spending is evidenced (Chile 2017).

Approximately in the last decade, especially Brazil, Chile, and

5 Available at: https://www.macrotrends.net/countries/USA/united-states/military-spending-defense-budget.

Venezuela, and to a lesser extent Peru, have increased their spending on defense acquisitions and investments, in order to carry out a technological upgrade and address the insufficiency and obsolescence of equipment (Costa Vaz 2017). Specifically, Chile's ambition was to become a regional military power, achieving North Atlantic Treaty Organization (NATO) military status (Gonzales 2005), which has not yet materialized. At the time of the beginning of this movement, it was speculated that there was an "arms race in South America," while in fact, it was also a reflection of the periods of economic growth that these countries had during this period (Villa 2018). Figures 2 and 3 summarize the arms export and import transactions by South American countries in the 2000-2019 period, respectively. What is observed is a Chilean increase in arms exports in 2008, followed by a Brazilian response in 2010. Furthermore, Brazil is the country that exports the majority of arms, followed only by far by Colombia in the last three years.

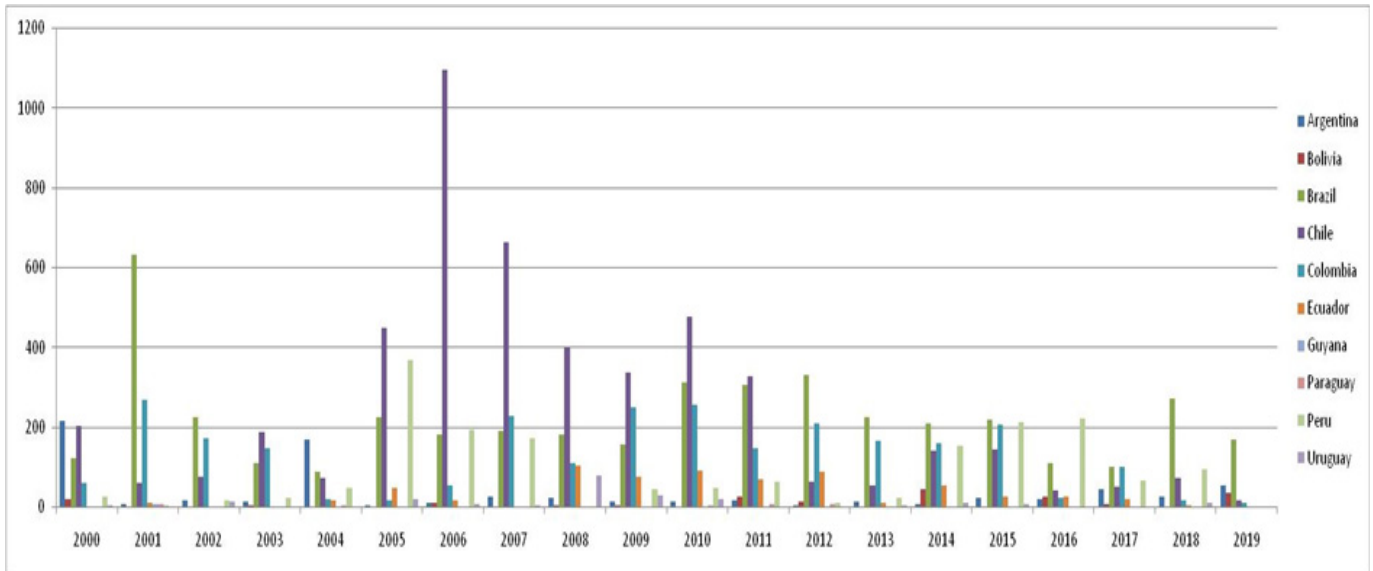
Figure 2: Arms exports by South American countries




Source: SIPRI 2020[6]

6 Available at: http://armstrade.sipri.org/armstrade/page/toplist.php.

Figure 3: Arms imports by South American countries




Source: SIPRI 2020[7]

7 Available at: http://armstrade.sipri.org/armstrade/page/toplist.php.

The Chilean movement toward greater weaponry beginning in 2005 provoked a response from the Peruvian and Argentine governments, countries with which Chile still has territorial disputes, triggering an increase in defense investment in those countries (Gutierrez 2007). The analysis of figure 3 also allows us to infer a response from Ecuador, which, in turn, has a history of conflicts with Peru and Colombia. There was a slowdown in all this movement in 2014-2015 compared to previous years (with cuts ranging from 56.5% to 7.2%), when the performances of the economies of these countries declined, but with a subsequent pickup (Costa Vaz 2017)

Even though they do not have this configuration of a "race," Chile, Peru, Colombia, Venezuela, and Brazil continue to invest in improving their military capabilities, with a stable or slightly higher defense expenditure each year (IISS 2017). What is interesting to note is that in that 2014-2015 period, Argentina, Colombia, Guyana and Uruguay and Paraguay increased their defense spending. When analyzing the specific issue of investment in military modernization — with the acquisition and improvement of defense resources — Argentina has a less accentuated pace than Brazil, Chile and Venezuela (Moraes 2011).

Defense expenditure is not completely devoted to investing in equipment, training, and funding operations. Part of it is also committed to the personnel payroll. The average proportion of investments drops when the total expenditure decreases, because personnel expenditure requires a larger portion of the expenditure, since the number of staff — unless the government acts directly — does not decrease. To this picture we can add a deficient management of resources to limit investments in defense.

> In a severely restricted scenario, where "fixed costs" in terms of personnel represented the largest part of the expenditure, suboptimal management of the resources available for variable costs was unacceptable. This reality became a constant in which spending was applied in an unnecessary and redundant way due to the lack of integration between the Armed Forces (Argentina 2010, 193).

Recently, between 2012 to 2016, Brazil, Venezuela, Colombia, Peru, Bolivia, and Chile experienced an increase in the proportion of personnel spending in their defense expenditures (Brazil 2020; Costa Vaz 2017; Chile 2017; Peru 2005). Ecuador, meanwhile, had a slight decrease from 2014 onwards, with strong governmental action to "increase the contribution of defense investment in order to achieve a more efficient, technology-based institution" (Ecuador 2018, 123)

Peru and Venezuela have an off-expenditure mechanism, which allocates 20% of gas revenues from the *Camisea* field to the defense expenditure, which minimizes in part the impact of fluctuations in the economic performance of these countries (Costa Vaz 2017). Chile, for its turn, relies on the *Ley Reservada del Cobre*, since 1958, which reallocates 10% of the amounts obtained from the export of state-owned copper companies to the acquisition of strategic defense purchases (Silva Filho and Moraes 2012)

The impact on the proportion of investment can also be minimized, in the long run, by the development of a sustainable defense industrial base, which refers to the set of state and private companies engaged in research, development, production, distribution and maintenance of strategic defense products (Brazil, Ferreira and Sarti 2011). In South America, the development of this industry has not been historically homogeneous; there are countries with a more structured defense industry than the others, such as Brazil, Chile, Argentina and Colombia (Parra, Játiva and Vásquez 2019).

The development of the defense industry in the different countries of South America depends on public policies and specific strategies, taking into consideration that there are many other demands other than defense issues still to be addressed, such as the social components of health and education. This reality is generalizable to almost all spheres of public spending, marked by limited expansionary potential for defense industry investment in the region (Esquivel and Loaiza 2018).

Taking into all these different information regarding defense expenditure and investment, it is hard to reach a clear conclusion on how South American countries behave. A method that combines and finds similarities among data is helpful to generate an understanding of how South American countries can be seen through these economic perspectives.

## Methods

This research has a cross-sectional research design, being exploratory in nature, using discrete and continuous data (Gil 2017).

### Data and Data Source

Two data sources were consulted for this research. The information about the macroeconomic indicators analyzed (defense expenditure; % of GDP to defense expenditure; defense expenditure *per capita*; % of defense expenditure in government spending), active duty personnel and data on arms

imports and exports were collected from the Stockholm International *Peace Research Institute* (SIPRI), considering the base year of 2019. Of the eleven countries and one French overseas territory that make up South America, there were available data on Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, and Uruguay. Specifically, the databases *Data for all countries from 1988–2019 in constant (2018) USD* and *Data for all countries from 1988–2019 as a share of GDP* were consulted.

The eighth chapter of the *Military Balance* 2020 report (2019 database), titled Latin America and the Caribbean, was consulted to collect the data about equipment and active personnel. Data from all South American countries were found there.

## Procedures

In SIPRI's platform, the data were consulted for the available countries and transcribed into an Excel spreadsheet, keeping the reference currency (US dollar).

In the *Military Balance* the data were queried and transcribed only for those countries that were also present in SIPRI. The number of capabilities — such as weapons, helicopters, transport and combat ships, missiles — present in the document for each country was recorded by type of Force (Army, Navy — including naval aviation and *mariners* — and Air Force). The total number of capabilities for each category was registered, but without specifying the quantity per equipment type (e.g.: there are five transport helicopters of three different models in the Brazilian air force. It is the total number of helicopters that was recorded, and no the number by model).

The second author made the spreadsheet and, independently, it was checked by the first author in order to identify errors in recording and even interpretation of the data. This procedure was taken to ensure the reliability of the analyzed information. Only four occurrences out of a total of eighty-three variables were identified, and these were checked and corrected. After this process, the data were transferred to the software SPSS 22 for statistical analysis.

## Statistical Analysis

To achieve the objective of this research conglomerate cluster analysis was chosen. It is a descriptive, non-inferential multivariate approach,

exploratory in essence. Conglomerate cluster analysis is a multivariate interdependence statistical technique used to combine observations into groupings or clusters. In other words, it classifies objects (respondents, variables), separating groups with internal homogeneity and, at the same time, dissimilarity among themselves (Hair et al 2009).

With hierarchical cluster analysis it is sought that: i) each group or cluster is homogeneous in certain characteristics. That is, the observations of one group are similar to those of the other; ii) each group should be different from the other groups with respect to the same characteristics, that is, the observations of one group should be different from the observations of the other groups (Sharma 2008).

*Clusters* identification is based on the increment of distances between each cluster stage. When the increments rise substantially, it indicates that inhomogeneous countries are being clustered, indicating that the *cluster* should be formed by the variables or cases belonging to the previous stage (Hair et al. 2009).

Because of the exploratory nature of this study and because there is not a priori establishment of potential causal relationships and, consequently, of the number of clusters, the seven hierarchical clustering methods, with and without normalization by the Z score, were tested to verify which would best separate the countries analyzed. It was determined that the Euclidean distance measure would be used to infer the (dis)similarities between the variables, as it is one of the most widely used in cluster analysis (Malhotra 2012). *Listwise* deletion was adopted to avoid bias in the results. SPSS software, version 22, was used in the analyses.

## Results

Ward's hierarchical method with the interval determined from the squared Euclidean distance and variables normalized by the Z score per case showed the best separation of the variables. The cluster analysis' dendrogram solution indicates the existence of four distinct clusters (Figure 4; Table 2). In the schematic composition added to the dendrogram each color illustrates a *cluster*. Countries in gray are those whose data were not available for analysis. Countries of the same color are those belonging to the same *cluster*.

The first *cluster* is composed by Chile, Peru, Argentina, and Bolivia. Considering the set of variables analyzed, these countries are the most similar, but not homogeneously so. In this *cluster*, Chile, Peru and Argentina are the closest countries, and there is a proximity in the second stage between Bolivia

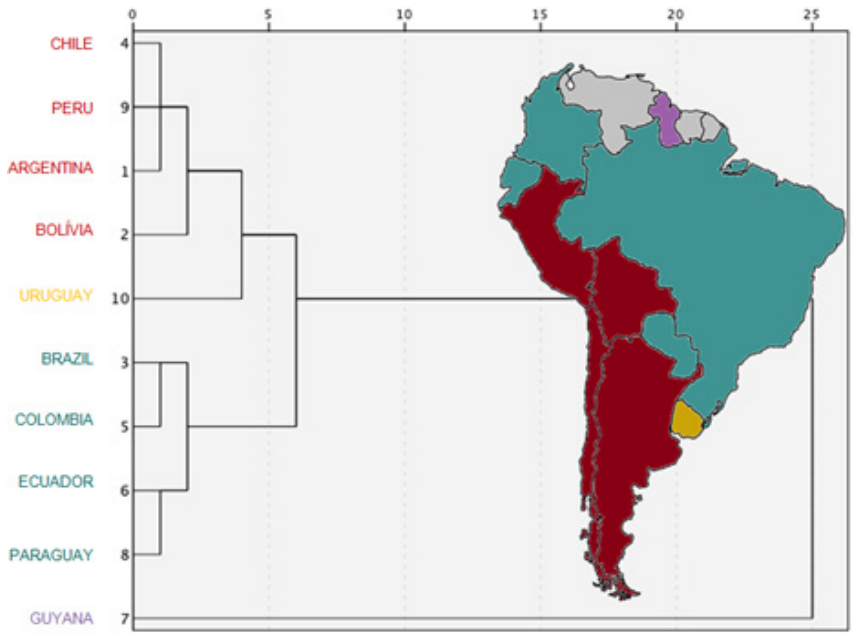
specifically with Argentina.

In the second *cluster,* we find two pairs of closer countries: Brazil and Colombia; and Ecuador and Paraguay. In the second stage of this cluster, Brazil and Ecuador are the closest countries. In these clusters, the proximity of the countries is even greater than in the first *cluster*.

Table 2 – Clustering Patterns

| Stage | Combination | | Clustering coefficient | Next Stage |
|---|---|---|---|---|
| | Variable | Variable | | |
| 1 | 4 | 9 | 0.57 | 3 |
| 2 | 3 | 5 | 1.41 | 6 |
| 3 | 1 | 4 | 2.81 | 5 |
| 4 | 6 | 8 | 4.69 | 6 |
| 5 | 1 | 2 | 7.55 | 7 |
| 6 | 3 | 6 | 10.60 | 8 |
| 7 | 1 | 10 | 17.37 | 8 |
| 8 | 1 | 3 | 28.65 | 9 |
| 9 | 1 | 7 | 75.09 | 0 |

Figure 4: South American Countries with Schematic Composition




Source: World Bank and author's calculation

Finally, the third and fourth *clusters* are made up of two isolated countries: Guyana and Uruguay.

## Discussion

The present research aimed to identify those countries in South America that are most similar to each other (which would form *clusters*) and how they differ from the others (dissimilarities), considering defense macroeconomic data and defense strategic resource data available from the *Stockholm International Peace Research Institute* (SIPRI) and *Military Balance*, through a multifactor analysis, exploratory in essence.

The data points out that Guyana would be a country isolated from the others. Despite sharing territorial tensions with Colombia over Venezuelan migration and sharing the problems of transnational illegalities in the Amazon

region with the Pan-Amazon countries (Costa Vaz 2017), this is a new country, independent only in 1966 from the United Kingdom, with originally Dutch colonization. Besides this cultural difference, unlike the other countries in the region, it is experiencing an economic "boom" with the recent discovery of oil deposits on its coast, with growth estimated at 85% by the International Monetary Fund (IMF) for the year 2020 (Guyana, 2020), which could allow it to no longer be the second poorest country in South America. Its recent structuring as an independent country and its peculiar economic situation allow us to understand Guyana's unique position on the continent, evidenced in the results.

The cluster formed by Brazil, Colombia, Ecuador, and Paraguay is the one that has established closer relationships, with two pairs of countries very close — Brazil and Colombia; Ecuador and Paraguay. Despite being countries from different "geographical blocks", Ecuador is an Andean country and Paraguay is a Southern Cone country, Ecuador and Paraguay have similarities in relation to their low territorial size — that could lead to a misinterpretation that the investment demands could be less in defense resources to safeguard their security and sovereignty. But, Ecuador has a history of past interstate conflicts and some issues still existing — which in turn, require permanent investment in quantity and quality of strategic defense resources (Villa 2018). And Paraguay, in turn, uses its Armed Forces also in public security actions, especially in combating criminal groups and factions linked to illicit activities, when combating the Paraguayan People's Army (EPP).

Brazil and Colombia, in turn, are the two great powers of the region, both Pan-Amazonian countries. These two are responsible for the largest defense expenditure share in the region, with the largest amount of strategic defense resources. The two countries have been acting jointly in the surveillance of the Amazonian borders and share very similar public security issues, with the authority of the State threatened in the face of drug trafficking. In 2019, Brazil had a $450 million increase in its defense expenditure, followed by Colombia with an increase close to $300 million. Brazil is one of the most capable countries in the region, but Colombia has had an important improvement in its strategic defense resources, keeping its expenditure stable with an upward trend (IISS 2020). Even though they have a good portion of their defense resources committed to personnel payments, since these countries historically have higher defense expenditures in the region, they are significantly closer to each other than the others.

Still in this *cluster*, Ecuador is also close to Brazil — less so than Colombia, but still relevantly so. The countries deal with very different demands in terms of defense: while Ecuador deals with external threats, Brazil

has the issues of internal violence, with areas where the State's monopoly on violence is called into question, as in the communities of Rio de Janeiro and on national borders regarding the issue of illicit activities. Ecuador had a special increase in the 1990s with the Cenepa War (1995), with the country receiving a considerably higher defense budget than the current one for its maintenance and technological updating. "Due to changes in the international arena, in a relatively short period of time, States rapidly changed their behavior in relation to their military spending" (HEYE 2015, 125). It also has different behaviors in terms of investments: Ecuador is in the direction of increasing defense investments, cutting personnel expenses and keeping constant the percentage of GDP applied, even though there is a real decrease in the amount invested. Brazil commits a large part of its defense expenditure to personnel, imports and exports arms in a very different way from Ecuador, increasing in recent years the percentage of GDP and the actual amount allocated to the defense expenditure. So, how to explain the similarities identified?

A common point between Paraguay, Ecuador, Brazil and Colombia is the use of their Armed Forces in public security actions, especially in the fight against illegal acts and international criminal factions. The origins, the historical trajectories of the origins, the fields of action and the war capabilities of drug cartels, criminal factions, narco-guerrillas and other non-state violent actors are different in each country, but are not investigated in this text[8]. This perception does not end the need for more detailed studies comparing the countries within the cluster that the study identified.

In the other *cluster*, Chile, Bolivia, Peru, and Argentina are very close to each other. In addition to being Andean countries, they share border tensions, which leads them to seek to match their strategic defense capabilities (Gutierrez 2007). Since the loss of access to the sea in the Pacific War in the 19th century, Bolivia has had a historical demand for part of the Chilean territory. The abrupt increase of % of GDP allocated to defense, in the acquisition of arms promoted by Chile in the first decade of the twenty-first century may explain this similarity identified in these countries, in a wave of response to the Chilean movement for greater armament. As Chile has applied resources to acquiring better and larger quantities of strategic defense capabilities, there has been a response from its neighbors Peru and Argentina (to a lesser degree), countries with which it has historical disputes (Franchi, Migon and Jimenez 2017), and this is an expected move from the perspective of defense economics (Leske 2018). Chile and Argentina have built a defense cooperation agenda, with emphasis on the creation of the *Cruz del Sur* Combined Peacekeeping Force, which helps create a bi-national defense

8 For further information, please read: Ferreira; Framento, 2020. Valera, 2018.

identity, requiring applied resources from both countries (Aita 2020).

Unlike Chile, the Argentine Armed Forces suffer from gradual deterioration since the defeat in the Falklands War (1982), and like Bolivia, they have been receiving less and less defense resources and have deteriorated equipment and facilities (IISS 2020). With these partial arguments, we can observe that this cluster has in common dormant border rivalries, with origins dating back to the 19th and 20th centuries, and that, with the exception of Chile, the three countries faced military defeats and territorial losses. We understand that this scenario is responsible for pointing out the similarity only between these two countries in this *cluster*. If the defense expenditure and defense spending are indeed a reflection of a country's defense needs and strategies, this *cluster* identifies this fact well.

Finally, Uruguay stands out in isolation from the other countries. A small country, it has kept the % of GDP devoted to defense relatively stable, but with a continuous decrease in the amount of defense expenditure since 2014. This data puts it close to several countries, but Uruguay really seems to be a case apart in South America:

> Uruguay has only 3.4 million inhabitants, but is among the top ten troop contributors to the UN PKO (Peacekeeping Operations) and is the top contributor *per capita*. In 2002 and 2003, it was the seventh largest contributor of troops to the UN, and by the end of 2005 it was eighth in the UN ranking. Uruguay has never had any imminent external threat to its security after its independence in 1828, and has not had any internal threat since the end of the urban guerrilla actions in the 1970s. The country has no defense industry, and has always had an entirely voluntary military service, which currently involves almost 1% of the total population and about 2% of the workforce [...]. Uruguayan defense spending was influenced mainly by internal factors, mostly of an economic nature (Pelaéz 2007, 281).

With these characteristics, it is possible to ratify the distinctive position of Uruguay in relation to the other South American countries, in terms of strategic defense resources, which are much more focused on internal problems, and on actions in peace missions, far away from the continent.

## Final Remarks

Using data from the *Stockholm International Peace Research Institute* (SIPRI) and *Military Balance*, we analyze a set of recent macro-economic dataset and identify that it is possible, from this perspective, to understand that South American countries can be organized into four *clusters,* reflecting not only their similarities in macroeconomic terms of the defense expenditure, but also over time, regarding their acquisition of strategic defense resources.

Despite its contribution to the understanding of the dynamics in South America from an economic perspective, the research is limited by the absence of data from Venezuela, Suriname, and French Guyana (a French overseas territory) — which falls under the French defense expenditure. Future research can use other databases in order to fill this gap.

Likewise, they can explore comparisons between countries in each cluster of other aspects such as the history of foreign military missions, evolution of military doctrines, notions of threats in the national defense documents of each country; development of each country's defense industrial base, as well as other issues.

The value of this research lies in the use of statistical analysis to analyze macroeconomic data and determine approximations – clusters – that are apparently unnatural, when we think of countries only through theoretical lenses such as regional security complexes.

## REFERENCES

Aita, Edson. 2020. "A Força De Paz Conjunta-Combinada Cruz Del Sur Como Catalisadora Da Construção De Uma Identidade De Defesa Regional.". Ph.D, *Escola de Comando e Estado – Maior do Exército*.

Almeida, Carlos Wellington de. 2010. "Política De Defesa No Brasil: Considerações Do Ponto De Vista Das Políticas Públicas". *Opinião Pública* 16 (1): 220-250. doi:10.1590/s0104-62762010000100009.

Andrade, Israel, Valerio Lange, Oscar Medeiros Filho, and Raphael Lima. 2019. *Desafios Contemporâneos Para O Exército Brasileiro*. 1st ed. Brasilia: IPEA.

Argentina. 2010. "Libro Blanco De La Defensa". Buenos Aires: *Ministério de la Defensa*.

Brazil. 2020. "Livro Branco De Defesa Nacional". Brasilia: *Ministerio da Defesa*.

Brazil, Agência Brasileira de Desenvolvimento Industrial, Marcos José Ferreira, and Fernando Sarti. 2011. *Diagnóstico: Base Industrial De Defesa Brasileira*. 1st ed. Campinas: ABDI, NEIT-IE-UNICAMP.

Buzan, Barry, and Ole Wæver. 2003. *Regions And Powers: the structure of international security*. Cambridge: Cambridge University Press.

Castro-Gómez, Santiago, Alberto Flores-Malagón, Guillermo Vásquez, and Carmem Benavides. 2007. *Pensamiento Colombiano Del Siglo XX*. Bogotá: Pontificia Universidad Javeriana.

CEPAL (Comisión Económica para América Latina y el Caribe). "UNASUR: Un Espacio De Cooperación E Integración Para El Desarrollo". 2021. *Comisión Económica Para América Latina Y El Caribe*. http://ceed.unasursg.org/Espanol/09Downloads/Biblioteca/UNASUR-COOPERACION.pdf.

Chile. 2021. "Libro De La Defensa Nacional De Chile". Santiago: *Ministerio de Defensa Nacional*.

Costa vaz, Alcides. 2021. "Tendências E Perspectivas Sobre Gastos Militares Dos Países Amazônicos: Implicações Para Os Objetivos E Interesses De Defesa Do Brasil". In *Desafios Contemporâneos Para O Exército Brasileiro,* 1st ed., 37-58. Brasilia: IPEA.

Ecuador. 2018. "Política De La Defensa Nacional Del Ecuador: "Libro Blanco". Quito: *Instituto Geográfico Militar.*

Esquivel Monge, Manfred, and Kerry Loaiza Marín. 2018. "Inversión En Infraestructura Y Crecimiento Económico, Relevancia De Factores Institucionales". *Economía Y Sociedad* 23 (53): 40-61. doi:10.15359/eys.23-53.3.

Ferreira, M. A. S., & Framento, R. S. 2020. *Atores não-estatais violentos transnacionais na América do Sul:* um exame dos casos do Primeiro Comando da Capital e da Família do Norte. Revista Brasileira de Segurança Pública, 14(1), 72-87.

Franchi, Tássio, Eduardo Xavier Ferreira Glaser Migon, and Roberto Xavier Jiménez Villarreal. 2017. "Taxonomy Of Interstate Conflicts: Is South America A Peaceful Region?". *Brazilian Political Science Review* 11 (2): e0008 1-23. doi:10.1590/1981-38212017000200008.

Fonfria, Antonio. 2012. "Sobre La Naturaleza Y Alcance De La Economía De La Defensa.". *Revista Del Instituto Español De Estudios Estratégicos* 79: 1-21. https://dialnet.unirioja.es/servlet/articulo?codigo=7471052.

Fuccille, Alexandre, and Lucas Pereira Rezende. 2013. "Complexo Regional De Segurança Da América Do Sul: Uma Nova Perspectiva". *Contexto*

*Internacional* 35 (1): 77-104. doi:10.1590/s0102-85292013000100003.

Gil, Antonio. 2017. *Como Elaborar Projetos De Pesquisa*. São Paulo: Atlas..

Gonzalez Cabera, P. 2005. "Chilean Military Plans To Be Military-Standard For NATO For 2010". *El Mercurio,* 2005.

Guyana. 2020. "Oficina De Información Diplomática". *Exteriores.Gob.Es*. http://www.exteriores.gob.es/Documents/FichasPais/Guyana_FICHA%20PAIS.pdf.

Gutiérrez, Carlos. 2007. "Chile, Perú Y Bolivia: Entre El Conflicto Y La Cooperación". In *Seguridad Humana Y Nuevas Políticas De Defensa En Iberoamérica*, 291-321. Madrid: Instituto Universitario General Gutiérrez Mellado.

Hair, Joseph F, William C Black, Barry J Babin, and Rolph E Anderson. 2009. *Multivariate Data Analysis*. London: Pearson..

Hartley, Keith. 2003. *Handbook Of Defense Economics*. Amsterdam: Elsevier.

Heye, Thomas Ferdinand. 2015. "Democracia, Controle Civil E Gastos Militares No Pós-Guerra Fria: Uma Análise Realista". *Carta Internacional* 10 (1): 105 - 134. doi:10.21530/ci.v10n1.2015.206.

IISS – International Institute for Strategic Studies. 2017. *Military Balance 2017:* The Annual Assessment Of Global Military Capabilities And Defence Economics. London: ISS.

IISS – International Institute for Strategic Studies. 2020. *Military Balance 2020:* The Annual Assessment Of Global Military Capabilities And Defence Economics. London: ISS.

Jimenez, José Lorenzo. 2016. "Un Análisis Macroeconómico De Los Efectos De La Inversión En Defensa Nacional Sobre La Base Industrial Y Tecnológica En España.". Ph.D, *Universidad Rey Juan Carlos*.

Lee, Robert Victor. 2021. "China Builds Space-Monitoring Base In The Americas". *The Diplomat*. https://goo.gl/6rHNYv.

Leske, Ariela. 2018. "Economia De Defesa". In *Dicionário de Segurança e Defesa*, 784-810. São Paulo: Editora UNESP.

Malhotra, Naresh K. 2012. *Pesquisa De Marketing:* uma orientação aplicada. Porto Alegre: Bookman.

Moraes, Rodrigo. 2011. "A Indústria De Defesa Na Argentina". *Boletim De Economia E Política Internacional* 6: 49-61. http://repositorio.ipea.gov.br/bitstream/11058/4619/1/BEPI_n6_industria.pdf.

Oliveira, Marcos Guedes. 2017. "Ameaças Regionais E Extrarregionais E As Respostas Do Brasil". *Revista Artigos Estratégicos* 3 (2): 15 - 27. http://

ebrevistas.eb.mil.br/index.php/CEEExArE/article/view/1277..

Pagliari, Graciela. 2010. "Gastos Militares Na América Do Sul: Considerações Acerca Dos Investimentos No Período Pós-Guerra Fria". *Diálogo* 16 (1): 13 - 29. doi:10.18316/68.

Parra, Cárdenas, Salvador Játiva, and Freddy Vasquez. 2019. "Industria De La Defensa Y Desarrollo De Capacidades Estratégicas En Ecuador". *Revista Internacional Del Mundo Económico Y Del Derecho* 17: 1 -12..

Peláez, Amílcar. 2007. "Country Survey XX: Defence Spending And Peacekeeping In Uruguay". *Defence And Peace Economics* 18 (3): 281-302. doi:10.1080/10242690600924679.

Peru. 2005. "Libro Blanco De Aa Defensa Nacional.". Lima: *Ministerio de la Defensa*.

Salgado, Vitória Totti. "Conflito no norte do Paraguai: entre a força-tarefa conjunta e o Exército do Povo Paraguaio". *Dossiê de Conflitos Contemporâneos*. Volume 1, Número 1: 49-54.

Sharma, Subhash. 2008. *Applied Multivariate Techniques*. New York, NY: Wiley & Sons.

Silva Filho, Edison, and Rodrigo Moraes. 2013. *Da Guerra Contra O Terror À Crise Econômica Internacional*: Perspectivas Para A Defesa Brasileira Em Um Cenário De Transição Nos Gastos Militares Mundiais. Brasilia: IPEA.

SIPRI - Stockholm International Peace Research Institute. 2020. "4. Military Expenditure | SIPRI". *SIPRI Yearbook 2019*. https://www.sipri.org/yearbook/2019/04.

Villa, Rafael, and Marilia Carolina De Souza Pimenta. 2017. "A Longa Paz Na América Do Sul: Questionamentos Às Teses Da Paz Negativa Na Região". *Papel Político* 21 (2): 435- 468. doi:10.11144/javeriana.papo21-2.lpas.

Villa, Rafael. 2018. "Armament Modernization In South America: Empirical And Theoretical Pressures On The Dualistic Views Of Regional Security". *AUSTRAL: Brazilian Journal Of Strategy & International Relations* 7 (14): 138-163. doi:10.22456/2238-6912.87990.

World Bank. 2020. "Gasto Militar (% Del PIB) | Data". Datos.*Bancomundial.Org*. https://datos.bancomundial.org/indicator/MS.MIL.XPND.GD.ZS?view=chart.

## ABSTRACT

We take into account that interpretations of security complexes, traditions of long peace, and violent peace do not fully explain how South American countries are organized regarding Defense. Given those, we ran a cluster analysis with data from the *Stockholm International Peace Research Institute* (SIPRI) and *Military Balance* report with economic defense expenditure and capabilities investment from South American countries to identify how they are organized, determining those that are most similar to each other (which would form complexes) and how they differ from the others (dissimilarities). The results showed four different clusters: the first formed by Chile, Peru, Argentina, and Bolivia; the second by Brazil, Colombia, Ecuador and Paraguay; the third only by the Guyana; and the fourth, formed only by Uruguay. We interpreted these clusters considering the history of conflicts, current countries threats and treaties.

## KEYWORDS

Defense Economics; South America; Defense Capabilities; Defense Expenditure.

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