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MILITARY MALTHUSIANISM AND THE STRATEGIC PARTNERSHIP IN THE FX-2 PROGRAM

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ABSTRACT

Jurgen Brauer and Paul Dunne detect in Military Malthusianism a vulnerability in the occurrence of offsets. This vulnerability is perceived from the fact that the unit cost of large arms systems increases faster than government budget revenues. One of the consequences of this fact is the governments' search for greater economic efficiency through the globalization of the production and acquisition of arms. If in one hand this theory affirms that we will see more and more unconventional conflicts, on the other it justifies the construction of strategic partnerships in the production of weapons systems, such as the Brazil-Sweden Strategic Partnership, under the FX-2 Program. Thus, this article seeks to evaluate the presence of Military Malthusianism in the Brazilian case, the compliance of the Brazil-Sweden Strategic Partnership with the National Defense Strategy (END, in Portuguese), and analyzes the role of this Partnership in the FX-2 Program.

Keywords: Military Malthusianism. Strategic Partnership. FX-2 Program. National Defense Strategy.

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INTRODUCTION

In 2004, Jurgen Brauer and Paul Dunne presented Arms Trade Offsets: What do We Know?, in Bristol, England. In this paper, the authors bring up the concept of Military Malthusianism. Such a concept is portrayed as a vulnerability in the occurrence of offsets. This vulnerability is perceived from the fact that the unit cost of large arms systems increases faster than government budget revenues. One of the consequences of this fact is the governments' search for greater economic efficiency through the globalization of the production and acquisition of arms. If in one hand this theory affirms that we will see more and more unconventional conflicts, on the other it justifies the construction of strategic partnerships in the production of weapons systems.

The Brazil-Sweden Strategic Partnership, within the framework of the FX-2 Program, is an example of a strategy used by the Brazilian State to achieve its dual objective of modernizing its air superiority capabilities and qualifying the national industry, while at the same time worrying about issues related to economic efficiency in the face of high costs of acquiring and developing military aviation means and technologies.

This article tries to evaluate the presence of Military Malthusianism in the Brazilian case, that is, the confirmation of the existence of the conditions that structure this concept in the recent period of Brazilian history, and the conformity of the Brazil-Sweden Strategic Partnership with the National Defense Strategy, the main national defense standard, considering the discussions about its updating, as well as analyzing the role of this Partnership in the FX-2 Program.

Thus, the first section describes the development of the Strategic Partnership under the FX-2 Program. The next one addresses the central concept of this article - the Military Malthusianism concept, as understood by Brauer and Dunne. The third section deals with the costs evolution of air superiority aircraft. Then, defense expenditures in Brazil are presented in relation to the country's GDP, as well as the evolution of the Brazilian GDP, and the composition of expenditures of the Ministry of Defense of Brazil. In the fifth section are exposed the sections set in the NDS that allow the identification of the conformity of the Strategic Partnership with this norm. And finally, the last considerations of this article are made.

1) THE FX-2 PROGRAM AND THE BRAZIL-SWEDEN STRATEGIC PARTNERSHIP

The FX-2 Program is a program created by the Ministry of Defense (MD), through the Defense Acquisition and Equipment Plan (PAED, in Portuguese), with the objective of acquiring, through international competition, and deploying new multi-employment fighters, simulators and logistics for the implementation in the collection of the Aeronautics Command (COMAER, in Portuguese). It also aims the necessary transfer of technology for the operation and maintenance autonomy of this fleet throughout its life cycle, and also, in a short term, the replacement of the Mirage 2000 aircraft - retired in 2013 and, in the long term, the replacement of the F-5 and A-1.

The FX-2 Program came out in 2008 after reformulating the original FX program. This program, which began in 2000, within the scope of the Program to Strengthen the Combat of Brazilian Airspace (PFCEAB, in Portuguese), was not adequate to the first updates of the National Defense Policy, in 2005, and to the National Defense Strategy of 2008. After approximately 13 years of negotiation, in the Dilma Rousseff's Command, the Brazilian government chose, on December 18, 2013, the JAS 39 Gripen NG, of the Swedish company Saab, as the winner of the international competition. In order to win such a dispute, Saab's offer had to surpass other offers such as the Sukhoi Su-35 Super Flanker, from the Russian manufacturer Sukhoi, the F-16 Fighting Falcon, from the North American Lockheed Martin, the Eurofighter Typhoon EF-2000, from the consortium European Eurofighter, the F/A-18 E/F Super Hornet, from the North American Boeing, and the French fighter Rafale F3, from the company Dassault.

The final phase of the international competition of the FX-2 program included three participants: JAS 39 Gripen NG, F/A-18 E/F Super Hornet, and Rafale F3. On August 3, 2010, the journalist Eliane Cantanhêde pointed out that the report approved by the Brazilian Air Force (FAB, in Portuguese) High Command on December 18, 2009, indicated the Gripen NG aircraft as the best choice for Brazil, despite the fact that President Lula and his Defense Minister Nelson Jobim, have "chosen" the French Rafale – that was ranked third in the FAB report (CANTANHÊDE, 2010). On September 7, 2009, therefore, prior to the release of the aforementioned Air Force report, President Lula stated that the Brazil-France agreement for

the acquisition of military equipment would also include the purchase of the disputed Rafale fighters under the FX-2 Program (MILITARY POWER, 2018). In a conversation with FAB's high-ranking military officer, the Professor of the Federal University of Fluminense, Luiz Pedone, gathered some possible criteria involved in preparing the report of the FAB, which classified the Swedish aircraft in the first place: a) the relationship between industrial technology and logistics ; b) pilot preference (this is a controversial factor, since many of them preferred the US F/A-18 E/F Super Hornet); c) the counterparty of offsets guaranteed by the Swedish offer; d) the Swedish financing, which covered 100% of the value of the contract, relating to the purchase of aircraft, logistical support and purchase of armaments for the operation of fighters; and e) the internal policy of the FAB that had a bad experience with the old French fighters Mirage.

The estimated value of the total purchase to be made by the Brazilian government was US$ 5.4 billion. Thirty-six aircraft were purchased, with 28 single-seaters and 8 double-seaters, with a promise of delivery of the first one established for 2019, and the last one for 2024. However, in a new schedule published by the FAB, the delivery of the first single-seated to Brazil was established for 2021 (FAB, 2017), thus configuring two years of delay to the schedule initially programmed.

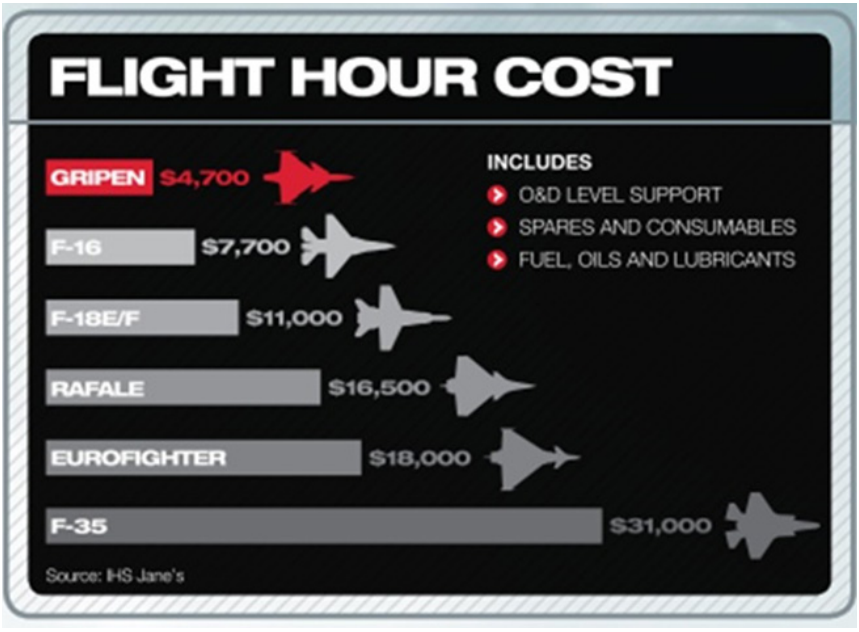
The Swedish funding covered 100% of the total value of the contracts, with interest being reduced from 2.54% to 2.19%, which generated savings of up to R$ 600 million for the Brazilian accounts. The Gripen NG can be exported from Brazil to South America, and even aircraft produced outside the country will have Brazilian parts. According to the manufacturing process defined by the FAB, thirteen fighters will be developed in Sweden, with the accompaniment of Brazilian engineers; eight other fighters will also be produced in Sweden, but already under the coordination of Brazilians, although supervised by Swedish engineers; and the fifteen remaining fighters will be built and assembled in Brazil (PEDONE, 2017, p.444).

The Gripen NG is an aircraft with a multipurpose mission scope, capable of performing air-to-air and air-surface reconnaissance and combat missions, and changing roles in flight. Prepared to operate in all weather conditions, the aircraft is equipped to perform aerial refueling, operating within a maximum range of 1,500 km. Its high performance is due to its greater stability provided by the flex-stabilized canard/wing configuration and a triple fly-by-wire aerodynamic control system, which allows for

more agile and safe maneuvers. The weapons system is prepared to operate several types of missions, and is capable of receiving national weapons, such as the new A-Darter missile, manufactured by the South African company Denel Aerospace Systems, in partnership with the Brazilian companies Avibrás, Mectron and Opto Eletrônica. Its advanced sensors allow the aircraft to be enabled for network warfare (Gripen NG, 2014).

The FX-2 Program consists of a first aircraft acquisition contract, which also includes two flight simulators, mission planning stations, ground stations, armament integrations and auxiliary equipment; a second logistical support contract (CLS, in Portuguese) to the Gripen NG aircraft and associated support equipment, consisting of contracting Saab for the provision of logistical support services for 26,400 (twenty-six thousand and four hundred) flight hours or five years - whichever finish first; and a third armaments acquisition contract, which consists of the supply of arms by Saab company to the initial operation of the Gripen NG aircraft by FAB, as well as the integration and operational assessment of the aircraft. In addition to these three contracts, there is also the Offset Agreement, which involves 60 offset projects, with industrial, technological or commercial compensation, valued at US$ 9 billion, representing 170% of the contract value.

According to the Ministry of Defense, aircraft manufactured by the Swedish company Saab were chosen on technical and price criteria. In this way, data such as performance, technology transfer, acquisition costs and maintenance costs were especially considered. According to Saab, Gripen NG has lower life cycle costs than its competitors. These costs range from the value of the initial acquisition to operating expenses over the entire life of the aircraft. The figure below shows the cost per hour of flight of various air superiority aircraft. The F-16, F-18 E/F, Rafale and Eurofighter aircraft participated in the international competition in the FX-2 Program. However, the Gripen featured is the C/ D version, a version prior to the modern Gripen NG.



Source: LIVE FIST DEFENSE.COM (2017).

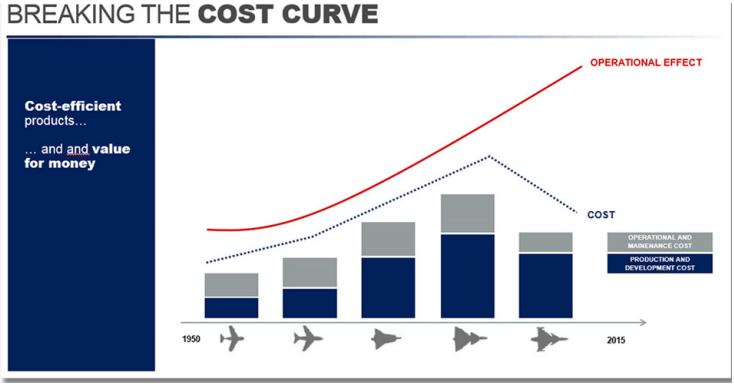
As we can see in figure 2, in a source provided by Saab, the company presents the development cost curve of Gripen E, or Gripen NG. Both the production and development costs of the Gripen E as well as the operating and maintenance costs are lower than the two previous versions. The latter have the minors costs of all the aircraft already mentioned, since the first generation of Saab fighters.

Saab's concern with the costs of an air superiority aircraft is made explicit by the company itself:

> From the outset, cost was the central design parameter of Gripen. So did Gripen NG. Throughout the design and development phases, Saab ensured that the aircraft was easy to operate and repair - even in outdoor areas, and by conscripts with few resources. Our engineers had to maximize performance without changing costs. Thus, Saab avoids costly solutions that may not add much to the performance as the costs would suggest. The cost is also a parameter of the project in that each

> detail is created for maximum ease of use and low maintenance costs, and the entire lifecycle is taken into consideration when such prioritization are made. This is not something that can be added later. This must exist from the outset (SAAB, 2017, p.14).

FIGURE 2: DETAILING THE COST CURVE



Source: SAAB AIRCRAFT INDUSTRY (2016).

The FX-2 Program establishes a transfer of technology (ToT) process that takes place within a long-term strategic partnership established by Brazil and Sweden. ToT is performed through on-the-job training of professionals. To that end, about 357 professionals from several Brazilian companies involved in the Program are being trained at the Saab plant in Linköping. These professionals were distributed as follows: 240 from Embraer, 8 from AEL Sistemas, 7 from Akaer, 26 from Atech, 12 from Mectron, and 43 from Inbrafiltro Group, as well as 21 professionals from the Department of Science and Technology of Aerospace (DCTA, in Portuguese), of the Aeronautics Command. In March 2017, Saab confirmed the presence of 150 engineers in the city of Linköping, Sweden, and the return of 34 engineers to Brazil (ABREU PEDROZO, 2017).

At the same time, the strategic partnership between Brazil and Sweden has expanded to other areas beyond the original purchase, industrial cooperation and financing contracts. On October 19, 2015, the new Plan of Action of the Brazil-Sweden Strategic Partnership was signed, whose countries decided to advance bilateral ties by

establishing regular political dialogues with a view to developing and identifying opportunities for closer cooperation among countries, and for joint action in the international arena. The strategic partnership signed involves cooperation commitments and expansion of investments and trade, defense, science, technology, innovation and education, sustainable energy, environment, climate change and sustainable development, social security, and cultural exchange (BRAZIL, NEW PLAN STRATEGIC PARTNERSHIP OF THE BRAZIL-SWEDEN STRATEGIC PARTNERSHIP, 2015).

The Plan of Action established allowed the necessary support for the formation of a High Level Group on Aeronautics. This group was charged with developing a work plan to promote strategic cooperation, especially in science, technology and innovation (S, T & I), through the academia, industry, governments of both countries, and in support of initiatives to create joint programs, projects, studies and other activities related to the aeronautical sector. Was also signed the Term of Reference between Brazil and Sweden for aeronautical cooperation. This document defines the vision of the partnership, an efficient bilateral cooperation in science, technology and innovation, which will allow actors in both countries access to technologies and key capabilities for future aeronautical, civil and military systems, in order to combine industrial relevance, academic excellence and innovative ways of working.

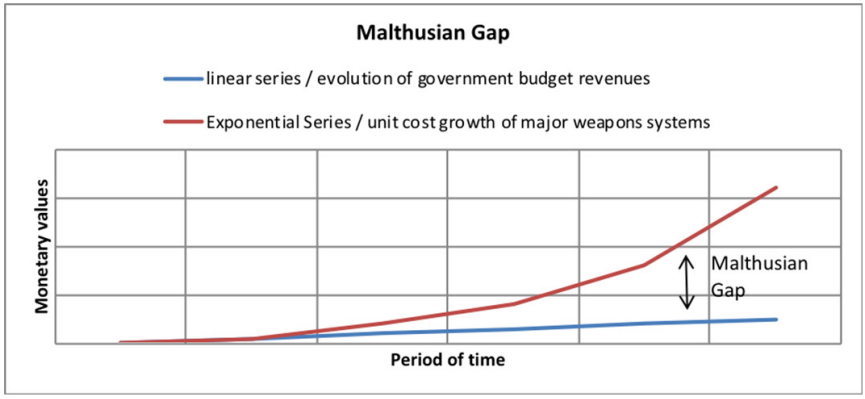
Imbued with the idea that cost sharing, to be realized through this strategic partnership, can be a way to seek reduction of financial risks and costs, given the increasing costs and complexities of high technology intensive sectors, as well as the understanding that Brazil and Sweden would be ideal partners in the aeronautical field, since both combine competence centers, advanced industry actors and government support, the High Level Group has set goals in its Work Plan for the three-year period of 2016, 2017 and 2018. These include: the start of a pre-study for the development of 30 joint research projects (10 per year), the organization of workshops, and the presentation of scripts and results of joint dialogues. The following work plans will be responsible for the formulation of objectives for every two years.

2) MILITARY MALTHUSIANISM

In an article titled Arms Trade Offsets: What do We Know ?, presented in June 2004, during the eighth Annual Defense Economics and Security Conference, University of the West of England, Bristol, Jurgen Brauer and Paul Dunne question the ability of offsets to support the long-term objectives of the countries. For them, offsets do not result in the reduction of costs in the acquisition of arms, do not stimulate civil economic development on a broader basis, there are no substantial or sustainable job creations, even in the military sector, there is no transfer of successful technology to the sector civilian, and only limited technology transfer to the military sector is carried out, often for decades and at high cost. They also criticize the fact that the transferred technology is continually surpassed by new technological advances in the main developed countries, especially the United States. The authors also point out that the defense of offsets depends on pre-offsets statements rather than post-offsets evidence, and there are incentives for governments to exaggerate their benefits and to underestimate or ignore their costs.

One vulnerability of the offsets understood by Brauer and Dunne is around the question of Military Malthusianism. This concept is best developed by Thomas Scheetz in The Argentine Industry, its Past and Current State, an Evaluation, and will be discussed below. Military Malthusianism presents itself as a vulnerability due to a single inescapable fact: the unit cost growth of major arms systems is faster than government budget revenues. While the former would grow by an exponential series, the latter would grow linearly. This Malthusian gap, over time, causes the decline in the acquisition of weapons systems, what puts pressure on the national industry, which tends to have the national state as its main client. This occurrence is noticeable in developing and developed countries. Even the US needed to select countries to co-develop the Joint Strike Fighter Program, which led to the development of the F-35 fighter, due to its high costs of development. The graph below illustrates the Malthusian gap from the difference between both time series, and their mentioned meanings.

Graph 1 - The Malthusian gap



Source: own elaboration

Four options for action are presented to the States as a consequence of military Malthusianism: a) cutting off defense programs; b) a defense review that would reduce countries' defense commitments; c) an increase in the defense budget, at the cost of non-defense programs or tax increases, for example; or, finally, d) by increasing efficiency with the search for economies with the globalization of production and acquisition of arms.

For Brauer and Dunne, options a), b) and c) have been variously attempted or are not feasible. Option d) would make the arms industry of the countries mutually dependent, a current trend, and would have as a long-term consequence the fact that these countries could not fight each other when important production components are located in their territories. Thus, the Military Malthusianism concept raises the hope that as the unit cost of weapon systems becomes inaccessible, we can dedicate ourselves to peace. However, this will not happen because countries will find a substitute to defend themselves, dissuade and offend differently. For Brauer and Dunne, this has been true for some time, as exemplified by state sponsored or state-supported terrorism, guerrilla warfare, low-intensity warfare, low-tech warfare, proxy wars, and the use of private military enterprises in war. Military Malthusianism implies that we will see more unconventional conflicts.

In the aforementioned article by Thomas Scheetz, the author seeks to learn lessons about the production and acquisition of weapons from the Argentine experience. To this end, it establishes criteria for the development of an arms industry in developing countries and analyzes the possibilities

of the country.

In his analysis of the "failure of the Argentine arms industry" (SCHEETZ, 2002, pp. 25-27) the author presents Military Malthusianism as an additional reason for the fate of this industry in the country. The growing gap between the rising costs of major arms systems, that grows in an exponential manner, and the increasing of governments' revenues, that grows in a linear manner, has led to a decline in the number of weapons systems acquisition.

In order to obtain this conclusion, the author uses the study of Pugh (1993, p.179-94) and Kirkpatrick (1995, pp.263-94; 1997, pp. 58-63), who estimate that since 1950 the unit cost of arms has grown at an average of 9% to 11% per year. Argentina's budget revenue growth was calculated from the country's annual GDP growth rate, at an average of 1.73% between 1970 and 2001, data from the Economic Commission for Latin America and the Caribbean. As government tax revenues, as a proportion of GDP, remained constant over the same period, at a rate of 13.1% (International Monetary Fund data), the author concludes that it can be said that Argentina's fiscal revenues grew at the same rates of its GDP. Thus, it is from this inference that the Military Malthusianism is confirmed in the Argentine case, between 1970 and 2001.

Pugh and Kirkpatrick argue that this is the determining factor, through a change in the ratios between budget and unit costs, of the numbers and types of equipment purchased, and, hence, of military and industrial roles and structures (PUGH, 1993, p.179). For Scheetz, the fact that the Argentine Armed Forces did not take this Military Malthusianism into account led them to be extremely labor intensive, since 80% of the military budget is spent on personnel.

3) THE COST EVOLUTION OF AIR SUPERIORITY AIRCRAFT

When we come across the evolution of the costs of an air superiority aircraft, such as the Gripen NG, we realize that this weapons system also suffered enormous cost impact. According to Barbieri Ferreira, the fighters achieved a cost increase of more than 700% between the 1950s, when the production of the second generation of fighters, and the current fifth generation fighters (2009, 38).

This significant increase in costs is due in large part to the need to incorporate new technologies, the necessary integration of these technologies with others from other industrial sectors, such as information and communication technologies (ICT), the increase of costs with a rigid quality

control of products and processes as a result of the introduction of these new technologies and the increase of uncertainties with the possible negative consequences of the introduction of innovations. According to Barbieri, "uncertainty is related not only to the success of the innovation, but also to the correct timing of adopting it" (BARBIERI FERREIRRA, 2016, p.3).

The table below lists the unit cost, units produced and start date of operations of two models of each generation of fighters used by the United States Air Force (USAF) from the Second World War to the recent models of fifth generation fighters. As shown, the unit cost of the P-51 Mustang, used during the II World War, was valued at US$ 623,000, a value 221.50 times lower than the unit cost of the F-22 Raptor, where each unit cost US$ 138 million (values referring to the 2008 dollar).

The F-22 Raptor had its production line closed in 2005 due to excessive program costs. Thus, only 187 operational units were delivered. When considering its total costs, this model cost US$ 67.3 billion, which resulted in a value of US$ 360 million per aircraft (BARBIERI FERREIRA, Industrial Defense Base Mapping, 2016, p.412). Thus, a value 577.84 times greater than the costs of the P-51 Mustang model. The F-35 Lightning model, developed over 15 years, reached a total cost of US$ 400 billion in 2016, due to various problems in its development (PAYÃO, 2016). Which means that it is the most expensive airplane ever produced.

Geração de caças	Modelo[2]	Início das operações	Unidades produzidas	Custo Unitário *(US$ mil)*
Segunda Guerra	*P-51 Mustang*	1942	15.875	623
	P-38 Lightning	1941	10.037	1.214
1° Geração Jato	*P-80 Shooting Star*	1945	1.715	1.344
	F-86 Sabre	1949	9.860	2.028
2° Geração Jato	*F-101 Voodoo*	1957	807	13.730
	F-104 Starfighter	1958	2.578	10.552
3° Geração Jato	*F-4 Phantom II*	1960	5.195	16.759
	F-5E Tiger II	1972	1.400	11.050
4° Geração Jato	*F-15 Eagle*	1976	1.200**	40.349
	F-16 Fighting Falcon	1978	4.400**	25.370
5° Geração Jato	*F-22 Raptor*	2005	184**	138.000
	F-35 Lightning II	2011*	-	83.000

1. Custo unitário de aquisição (excluídos os custos de P&D e suporte) em US$ mil, corrigido para o ano de 2008 pelo *Consumer Price Index (CPI)*.
2. Os dois principais aviões de caça da Força Aérea Norte-Americana para cada geração.
* Ano previsto para entrar em operação.
** Ainda se encontram em produção.

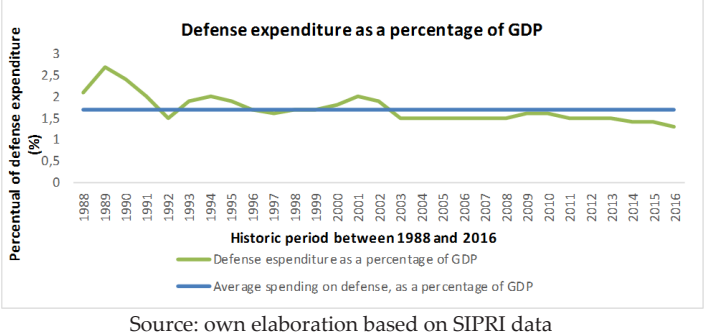
Other Generation 4.5 fighters, an intermediate generation of fighters between the fourth and fifth generation, developed between the 1990s and the first decade of the 21st Century, such as JAS 39 Gripen NG from Sweden, the Rafale from France, and the Eurofighter Typhoon, manufactured by European consortium, had development costs valued at US$ 4.4 billion, US$ 9.6 billion, US$ 10.4 billion, respectively (BARBIERI FERREIRA, 2009). What makes the Swedish model the most competitive in terms of development costs.

4) DEFENSE SPENDING IN BRAZIL

With regard to defense spending in Brazil, it is possible to verify its evolution in relation to the GDP between 1988 and 2016, from the available data found on the Stockholm International Peace Research Institute (SIPRI) website. Graph shows that there is a significant reduction in defense spending in Brazil, when analyzed in relation to GDP. The expenditure curve starts high, reaching 2.7% of GDP, its highest value in the period. Then, the curve turns downward, remaining below the average for the period from 2003 onwards, at 1.71% of GDP. Since 2014, there is a new drop in expenses. These reached 1.3% in 2016, the lowest values in the analyzed period. This value also represents a percentage of GDP of less than half of the amount spent with defense in Brazil in 1989, which means a sharp contraction in the share of defense spending in the country.

However, there is an increase in absolute defense spending, which amounts to 82.594 billion reais in 2016 (SIPRI). This absolute growth is perceptible through the growth of the Brazilian GDP.

GRAPH 2 - DEFENSE EXPENDITURE AS A PERCENTAGE OF GDP

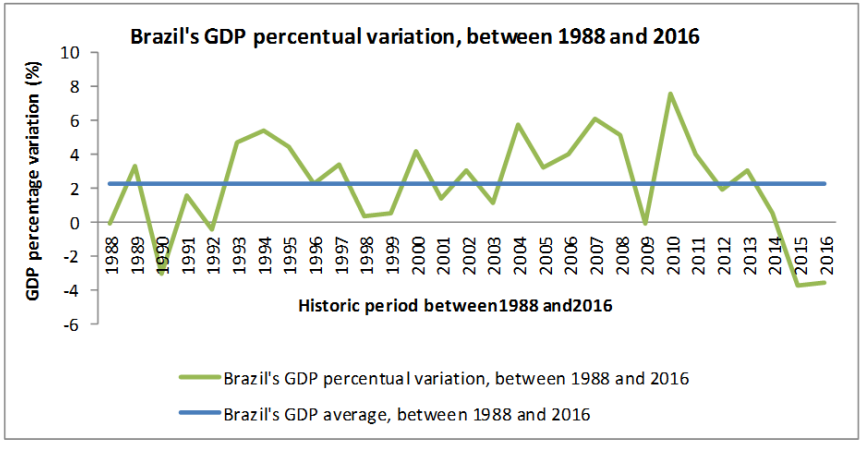


Source: own elaboration based on SIPRI data

The GDP change curve is more volatile than the defense spending curve, as shown in the Graph. However, the arithmetic mean of GDP variation in the period is slightly higher, reaching 2.24%.

Regarding to the composition of defense spending in Brazil, this does not differ from the Argentine situation. According to Patricia Matos (2016), the expenses of personnel, retirees and pensioners on defense expenditures in Brazil reached 78% of the total in 2014. In Brazil, in the same year, the bulk of the defense budget was committed to pay active personnel, retirees and pensioners, in approximately 72% of total expenses. Even so, it was an improvement over 2006, when these values consumed 80% of total expenditure. In the period between 1995 and 2008, as can be seen in Table 2, personnel expenses vary between 74.02% and 84.96% of the total expenditures of the Ministry of Defense. The investments made by this Ministry varied between 3.61% and 8.92%.

GRAPH 3 - PERCENTAGE VARIATION OF THE GDP OF BRAZIL BETWEEN 1988 AND 2016.



Source: Own elaboration based on data from the World Bank

Thus, Brazil is in a similar position to Argentina, whose budgetary performance demonstrates a specialization of the country's defense in labor, to the detriment of other factors of production such as technology, defense Research & Development (R & D), and innovation. A consequence of the country's failure to take into account the existence of Military Malthusianism.

TABLE 2 - RELATIONSHIPS OF THE BUDGETARY PERFORMANCE OF THE MD FROM THE PERSPECTIVE OF THE PRIMARY EXPENSES

Relações do Desempenho Orçamentário do Ministério da Defesa pela Ótica das Despesas Primárias														
RELAÇÕES	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
(DP-União)/PIB %	14,59	14,13	14,50	15,12	15,19	15,65	16,39	16,35	15,71	16,12	16,91	17,61	18,45	18,05
(DP-MD)/PIB %	1,79	1,63	1,55	1,64	1,57	1,64	1,82	1,74	1,46	1,43	1,45	1,48	1,52	1,54
Pessoal/PIB %	1,33	1,25	1,20	1,30	1,24	1,28	1,44	1,44	1,24	1,16	1,16	1,22	1,20	1,23
Custeio/PIB %	0,31	0,26	0,25	0,24	0,26	0,22	0,23	0,18	0,17	0,19	0,20	0,18	0,19	0,20
Investimentos/PIB %	0,15	0,12	0,10	0,11	0,08	0,15	0,15	0,11	0,05	0,08	0,09	0,08	0,13	0,12
(DP-MD)/(DP-União) %	12,30	11,53	10,68	10,87	10,36	10,50	11,12	10,65	9,31	8,88	8,55	8,43	8,23	8,55
Pessoal/(DP-União) %	9,10	8,82	8,28	8,62	8,17	8,19	8,77	8,83	7,91	7,23	6,85	6,95	6,52	6,79
Custeio/(DP-União) %	2,14	1,87	1,74	1,55	1,69	1,37	1,42	1,12	1,06	1,15	1,17	1,04	1,02	1,08
Investim./(DP-União) %	1,06	0,84	0,67	0,70	0,50	0,94	0,93	0,70	0,34	0,50	0,53	0,44	0,70	0,67
Pessoal/(DP-MD) %	74,02	76,44	77,45	79,25	78,87	77,99	78,88	82,90	84,96	81,40	80,06	82,38	79,17	79,50
Custeio/(DP-MD) %	17,36	16,25	16,27	14,30	16,33	13,09	12,78	10,51	11,43	12,94	13,72	12,35	12,36	12,66
Investim./(DP-MD) %	8,62	7,31	6,28	6,46	4,80	8,92	8,34	6,59	3,61	5,66	6,22	5,27	8,46	7,84

Source: Brustolin (2009, p. 32). In Portuguese.

5) THE BRAZIL-SWEDEN STRATEGIC PARTNERSHIP AND THE NATIONAL DEFENSE STRATEGY

The Brazil-Sweden Strategic Partnership, which is part of the FX-2 Program and involves the purchase of 36 Gripen NG aircraft, at a total cost of US$ 5.4 billion, cannot be in disagreement with the rules of national defense established by the National Congress, due to the Brazilian society. Its compliance with the standards of defense allows both the legal background (also base) and security necessary for the development of the designed partnership. For this reason, this article proposes to verify the conformity of this Strategic Partnership with the National Defense Strategy, in its first two versions, 2008 and 2012, in addition to situating this issue within the debate about the last update of this norm. Currently, the National Defense Strategy of 2016 is in a condition of draft / proposal of the texts and data, a situation that must remain until it is finally approved and published. Despite of this, its content is made available to the academic, civil and military communities by the Ministry of Defense (BRAZIL, MINUTA END, 2016).

The first two versions of the National Defense Strategy resemble each other in many ways. However, in what relates to the Strategic Partnership developed in the scope of the FX-2 Program, the highlights are a little different. Four relevant excerpts from these first two versions can be emphasized in order to relate the Strategic Partnership to this standard. First, Directive 22 of the END, which deals with the capacity building of

the Industrial Defense Base – BID, in Portuguese, in order to the country autonomy gain, related to indispensable defense technologies, states that:

> Partnerships with other countries will be sought with the purpose of developing technological capacity building and the production of national defense products in order to progressively eliminate dependence on imported services and products. Whenever possible, partnerships will be built as expressions of a more comprehensive strategic partnership between Brazil and the partner country. The association will be manifested in defense and development collaborations, and will be guided by two orders of basic motivations: the international and the national (END, 2012).

This excerpt emphasizes the importance of seeking international partnerships to capacitate the national BID. Next, the Item 4 of the strategic objectives of the Brazilian Air Force stresses the concern with the replacement of the FAB combat aircrafts. It relates directly, then, to the FX-2 Program. In order to face the dilemma of maintaining the priority of future capacities on current expenditures without accepting the lack of air protection, END 2012 states:

> the rejection of extreme solutions - simply buying a fifth generation fighter on the international market, or sacrifice the purchase to invest in the modernization of existing aircraft, in the projects of Remotely Piloted Aircraft (ARP, in Portuguese), in the development, along with another country, of the prototype of a manned fighter of the future and in the massive formation of scientific and technical personnel. A decisive consideration is the need to choose the option that minimizes the technological or political dependence on any supplier who, because he owns components of the airplane to be bought or modernized, may wish to inhibit or influence initiatives of defense launched by Brazil (END, 2012).

Such a solution is sought through the formation of the country's strategic partnership with Sweden, since it allows the joint development of the Gripen NG aircraft, the transfer of technology aimed at enabling the national industry, and the replacement of the F-5 and A-1 fighters, before the end of their life cycles. Third, the second structuring axis of the END addresses the reorganization of the BID. In item 1 (a), the condition for building international partnerships is established: the "priority to the development of independent technological capabilities" (END, 2012, page 99). Finally, in item 6, it is established the purpose of the international partnerships and the necessary posture of the country in the formation of this relationship, described as such:

> In the effort to reorganize the Industrial Defense Base, partnerships will be sought with other countries, with the objective of developing national technological capacity, in order to progressively reduce the purchase of services and finished products abroad. To these foreign partners, Brazil will always make it clear that it intends to be a partner, not a customer or a buyer. The country is more interested in partnerships that strengthen its independent capabilities, than in the purchase of finished products and services. Such partnerships should contemplate, in principle, that a substantial part of research and manufacturing be developed in Brazil, and will gain greater prominence when they are the expression of broad strategic associations (END, 2012).

The National Defense Strategy, in its latest version, and still to be approved and published, differs in large measure from its previous versions, in terms of its structuring. Without going into the merits of this discussion, and going straight to the point that this article proposes, it is perceived that the establishment of international partnerships with the purpose of strengthening national defense, through the purchase of military means and the capacity of the national BID, based on offsets and joint development of new technologies, such as the Brazil-Sweden Strategic Partnership, is also highlighted in this new version. In item 3.1, which addresses the fundamentals of National Power, it is stated that:

Considering the context of globalization in the commercial and industrial areas, the search for strategic partnerships with other countries should be a priority, requiring coordinated action by various government agencies and private entities, with the purpose of achieving and consolidating the capacity to develop and manufacture products, minimizing dependence on imports of critical components, products and services.

Such partnerships should be premised on strengthening national autonomous capacities. The Strategy therefore considers a substantial part of development, production and maintenance to be carried out in Brazil (MINUTA END, 2016, p.21).

Finally, Strategic Action for Defense No. 71 - AED-71, in order to meet the Defense Strategy "Strengthening Defense Science and Technology" (MINUTA END, 2016, p. 42), which in turn related to the National Defense Objective 7 - OND-7, which aims to promote productive and technological autonomy in the area of defense, stresses: "To stimulate the establishment of partnerships and exchanges in the research area of defense-related technologies" (MINUTA END, 2016, p.42). In these ways, the END 2016 draft not only stimulates the formation of strategic partnerships, as it gives it the priority character, and establishes purpose and premises, structuring specific actions for its implementation.

CONCLUSIONS

The FX-2 Program, which in short is an aircraft acquisition program, as well as logistics and armaments for its operation, and the transfer of technology to the Brazilian aeronautical industry, has resulted in the establishment of a long-term strategic partnership between Brazil and Sweden that goes beyond the Offset Agreement between the parties and will allow the South American State to produce the Gripen NG inside the country and participate in the value chain of these aircraft produced in Sweden. The offsets projects, which total US$ 9.0 billion (170% of the value of the signed contract), through 60 technology transfer projects, are complemented by a partnership aimed at the development of new future technologies. This partnership brings in its core a concern with the costs of technological development. Such concern with costs is also noticed in the Brazilian Government from the moment of the choice of the aircraft that won the international competition established in the FX-2. As seen in charts 1 and 2, the Gripen NG aircraft presented lower operating and

development costs than its competitors, and even lower than its last two versions, Gripen A/B and C/D.

The criticism brought by Brauer and Dunne, through the concept of Military Malthusianism, which presents itself as a vulnerability to offsets 'ability to favor the countries' long-term objectives, due to the fact that the unit cost growth of the main systems of weapons be faster than government budget revenues, has as one of its states options for action to seek an increase of efficiency through the globalization of production and the acquisition of weapons systems.

As seen, the growth of the defense budget in Brazil since 1988 has been at lower rates than those stipulated by Pugh and Kirkpatrick, between 9% and 11%, to increase the unit costs of weapons systems. This is noticeable because the average rate of growth of expenditures as a percentage of GDP was 1.71%, and the average rate of growth of Brazilian GDP in the period was 2.24%. The sum of these two arithmetic rates is a total of 3.95%, a value well below the rates stipulated by Pugh and Kirkpatrick. One consequence of this is that Brazil, like Argentina, has an intensive Labor Defense, rather than investment. As shown, personnel expenditures with the Ministry of Defense varied between 74.02% and 84.96% in the period between 1995 and 2008, while investments made by the MD ranged from 3.61% to 8.92%.

As we look at the evolution of air superiority aircraft costs, we realize that their unit costs are high. According to Ferreira, these aircrafts had a cost increase of more than 700% between the 50s and the fifth generation of fighters. This concern with the high costs reinforces the need to seek strategic partnerships for the acquisition and production of weapons, as it is one of the consequences of the existence of military Malthusianism.

In this way, the Brazil-Sweden Strategic Partnership seeks to respond these challenges by establishing a partnership in the technology transfer of an aircraft that presents lower costs than its rivals, in the international competition established by the FX-2 Program, when seeking the construction of a bilateral aviation cooperation in the development of future technologies, and by allowing the domestic industry not only to produce Gripen NGs in Brazil, but also to participate in the value chain in its international production, which, on the one hand, internationalizes the Brazilian industry, but on the other hand reflects the State's need to globalize the production of weapons systems in pursuit of greater economic efficiency, as seen, a consequence of military Malthusianism.

Finally, we sought to verify the conformity of this strategic partnership with the main standard of national defense, the National Defense Strategy, considering its changes in recent period. Four relevant sections of END 2012 were highlighted, which differ little from the 2008 version. And then two more excerpts from the END 2016 draft are highlighted, which bring the same conclusion of compliance. However, more than just the presence of such compliance, the character of priority was given to the search for strategic partnerships in order to minimize dependence on defense products and services from abroad, thus strengthening the national industry.

MALTUSIANISMO MILITAR E PARCERIA ESTRATÉGIA NO PROGRAMA FX-2

RESUMO

Jurgen Brauer e Paul Dunne detectam, no Maltusianismo Militar, uma vulnerabilidade na ocorrência de compensações. Esta vulnerabilidade é percebida a partir do fato de que o custo unitário de grandes sistemas de armas cresce mais rapidamente do que o orçamento do governo. Uma das consequências desse fato é a busca do governo por mais eficiência econômica por meio da globalização da produção e da aquisição de armas. Se, por um lado, esta teoria afirma que se testemunharão um crescente número de conflitos não convencionais, por outro. Justifica a construção de parcerias estratégicas na produção de sistemas de armas tais como a parceria estratégica brasileiro-sueca sob o programa FX-2. Assim, este artigo procura avaliar a presença do Maltusianismo Militar no caso brasileiro, o cumprimento da parceria estratégia brasileiro-sueca em relação à Estratégia de Defesa Nacional e analisar o papel desta parceria no Programa FX-2.

Palavras-chaves: Maltusianismo Militar. Parceria Estratégica. Programa FX-2. Estratégia Nacional de Defesa

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