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Exploring the Defence Industry´s Macroeconomic and Microeconomic Perspectives under New Security Conditions

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Abstract

The purpose of this paper is to explore the economic aspects of the defense industry under new security conditions. The paper utilizes data from SIPRI. To address the impact of the defense industry, descriptive and comparative analysis methods were employed. From statistical methods, regression analysis was applied to selected countries for the years 2014 and 2022. GDP per capita, military expenditures, arms exports, and the granting of military licenses are interconnected. Arms exports, along with issued arms export licenses, can be considered a driving force for gross domestic product growth.

KEY WORDS: *defence industry, arms export, arms import, military spending, defence expenditures, new security conditions, arms trading, economic growth, national security*

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1. Introduction

In the presented analysis, aspects of the defence industry under new security conditions are examined from both macroeconomic and microeconomic viewpoints. At the macroeconomic level, it is investigated how the export of arms can be conducive to the stimulation of gross domestic product (GDP) growth, augmentation of public sector revenues, and the bolstering of foreign trade [1]. At the microeconomic level, attention is given to the exploration of research, development, employment, and issues pertaining to fixed capital.

As part of the current paradigm, the focus is primarily on examining the impact of military expenditures on economic development. This paper focuses on arms exports and the impact of the defense industry on GDP. This constitutes the novelty within the neoliberal paradigm, and the practical significance lies in supporting the defense industry as a means of economic growth and enhancing national security.

Since arms transactions are essentially long-term, and the acquisition of major weapon systems is commonly followed by years of support and the supply of spare parts, suppliers aiming to maximize profit over the entire lifecycle of the transaction are prepared to offer major weapon systems at low prices, seemingly unrelated to costs. They take advantage of the buyer´s subsequent dependency (on spare parts, etc.) to charge highly profitable prices in the later stages. This leads to an increase in the volume of military exports of dual-use goods.

Government involvement in the arms trade is derived not only from purely economic circumstances and sometimes supports transactions lacking economic justification. If a sale is not profitable for the company but is in the interest of the government's strategy and policy, the government may subsidize the transaction in various ways. Conversely, if a sale is profitable for the company but undesirable for other reasons, the government can prevent the sale through administrative means. Thus, government policy and involvement affect arms supplies no less than the fundamentals of comparative advantage. National economies are required to incessantly adjust to global shifts that encompass financial aspects, climate change, warfare conflicts, migration waves, economic cycles, among others. Numerous analyses that portray global trends and the adaptation of the defense industry to these trends are also reviewed. Analyses conducted post-2008 [5] and 2021 [3] imply a substantial necessity for the restructuring of the defense industry and defense policy. Such restructuring is suggested

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to encompass the identification of critical technologies and competencies for national security and defense, the establishment of acquisition agencies for the centralization and enhancement of public procurement, as well as the mitigation of the habitual underestimation of the defense sector´s significance in comparison to other sectors [3]. Mainly the current war in Ukraine has been identified as an influential factor contributing to the macroeconomic and microeconomic fortification, as well as to an improvement in the industry´s reputation. Increased support for arms manufacturing by the banking sector is observed. The standing of the arms business has transitioned to becoming pivotal post the invasion by Russia, indicating a shift in the approach of governments and society towards the growth in military expenditures.

2. The Mathematical Background

The data for this paper were sourced from Stockholm International Peace Research Institute´s databases (SIPRI databases [6], [7]. These databases contain comprehensive information about companies involved in the manufacturing of weapons and the provision of military services. This includes both, public and private entities but excludes production or maintenance units of armed forces. Access to these databases enabled the acquisition of data for arms companies based on open sources. The sources included annual corporate reports and articles in journals and newspapers. Data for all years are revised annually based on new information. Since the early 1990s, an increasing number of governments have decided to publish national reports on their arms exports. Currently, there are no data series comparing the values of arms exports between countries, apart from SIPRI yearbooks. Methods for generating data series are largely based on already available data series relevant for arms production [2]. This pertains to the import and export of weapons, state contracts, and the turnovers of the world´s largest arms companies. Various methods employ different definitions of the scope of arms production; therefore, it was necessary to adhere to a single definition, namely SIPRI.

For addressing the behavior of the defense industry in new security conditions, the method of descriptive and comparative analysis was employed. From statistical methods, regression analysis and statistical representation of arms exports of selected countries between 2014 and 2022 were employed. The results of this study were subjected to literary verification within the framework of the Popperian paradigm. It asserts that for a theory to be considered scientific, it must be able to be tested and potentially proven false.

For a comprehensive assessment of the impact of arms production on economic development, it would be suitable to create a multivariable model used by Yesilyurt et al. [1].

$$Q_{it} = \delta_i + \beta 1 * \ln(MILEX_{it}) + \beta 2 * \ln(GDPPC_{it}) + \beta 3 * \ln(X_{it}) + \beta 4 * \ln(M_{it}) + \lambda_t + \varepsilon_{it} \quad (1)$$

where: Q – arms production; $MILEX$ – military expenditures; $GDPPC$ – real gross domestic product (GDP) per capita; X – arms exports; M – arms imports; δ_i and λ_t – country-specific and time-specific effects; indexes i – country; t – time; $\beta 1\text{-}4$ – parameters; X – arms export that includes export of approved military licenses.

When using this equation (1), it follows that arms production depends on the level of government military expenditures, i.e., the state´s demand for arms production, the standard of living in that state, the level of arms production exports, the level of arms production imports, and specific parameters of the given state.

In this paper, the analysis of the economic determinants of arms production in selected countries over the period from 2020 to 2022 was conducted using regression analysis. The findings indicate that the magnitude of GDP per capita, military expenditure, arms exports, and military licensing are interrelated. These factors mutually influence arms production.

3. Investigation Results

The macroeconomic perspectives of the defence industry under new security conditions reveal a significant impact of increased defense expenditures on national economies. According to SIPRI, 2023 has experienced the steepest year-on-year increase in global military expenditure since 2009. The impact of influence on the national economy is confirmed by studies from authors in Spain, published in the journal Defense and Peace Economics, titled “The Determinants of Arms Production”. These studies utilized a wide spectrum analysis [1]. World military spending per person has been the highest since 1990, amounting to $306 [10]. The rise in global military spending in 2023 can be attributed to the new security conditions, primarily the ongoing war in Ukraine and the escalating geopolitical tensions in Asia and Oceania and the Middle East. Elevated investment in defense often leads to real GDP growth as it stimulates domestic production capabilities and supports employment within the sector. States are compelled to reallocate substantial resources from other public expenditures such as healthcare and education, potentially leading to fiscal strain. Additionally, increased defense spending can drive inflation, especially if financed through borrowing. On an international level, sustained growth in military expenditures can bolster a nation´s geopolitical position but simultaneously deepen international tensions and the arms race. Thus, the overall macroeconomic impact of new security conditions on the defense industry is intricate and requires careful management and coordination.

At the microeconomic level, the defence industry under new security conditions is facing significant changes affecting individual firms and market dynamics. The increased demand for advanced defense technologies pushes companies to invest in research and development, which escalates their costs, and the risks associated with new projects. For many firms, it is crucial to diversify their customer bases and develop export markets to mitigate reliance on domestic government contracts. New competitive pressures emerge, where smaller and more agile companies can compete with traditional defense giants through innovation and specialization. Additionally, there is an increase in regulatory and compliance requirements that can pose significant challenges for some actors. Companies in the defence sector must adapt swiftly to changing security conditions and market demands, shaping their strategic decision-making and operational practices.

In addition to the analysis of the microeconomic and macroeconomic aspects of arms production, a regression analysis for selected countries was conducted, yielding the following results:
Arms Export: Trend-indicator value: p-value: 4.726e-09 and Pearson: 0.9904353
Regression analysis for selected countries in 2014 and 2022 is presented in Fig. 1.

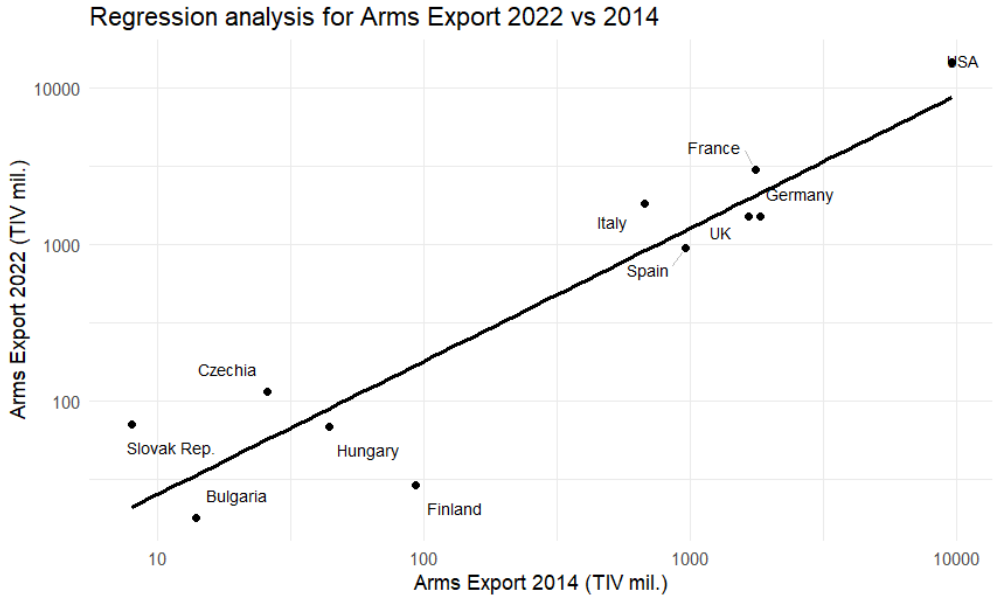

Fig. 1. Regression analysis of arms export in selected countries in 2014 and 2022

Fig. 1 shows an increase in arms exports for most of the examined countries during the period of 2014 to 2022. The greatest growth in arms exports has been recorded by Slovak Republic, Czechia, Italy, France and USA. The results of this survey indicate that the size of arms exports is influenced by the economic development associated with the technological innovativeness of the industry. Table 1 shows that during the analyzed period, only UK, Spain, Finland and Germany of examined counties decreased their arms exports in 2022 compared to 2014.

Table 1.
Arms export in selected countries in 2014 and 2022

E – Arms Export (TIV mil.)	Country	Hungary	Slovak Rep.	Finland	Bulgaria	Czechia	Germany	Spain	Italy	France	UK	USA
	2014	44	8	93	14	26	1 822	962	677	1 755	1 658	9 588
	2022	68,36	71	29	18	116	1 510	950	1 825	3 021	1 504	14 515

TIV = Trend-indicator value, it is used by SIPRI to measure the volume of international arms transfers, it reflects trends in arms flows between countries and is not directly related to financial transaction values but rather indicates the volume of arms transfers
Source of data: SIPRI, 2024

The size of arms exports is also influenced by the licensing policy of arms production. Arms exports together with issued licenses for the export of weapons can be seen as a driver of gross domestic product growth. The European Union´s licensing policy regarding the export of arms applies to individual arms transactions and serves as a permit for trading military goods. The licensing policy also covers the trade of dual-use goods. Each arms transaction should obtain a license, although the procedure may slightly differ in various countries. Hence, the term "arms export license" is used. Some authorities do not specify the volume of sold goods and services, but rather the number of approved licenses for these transactions. An arms export license refers to the permission granted by the national export licensing authority. Export licenses represent the authorization for arms manufacturers to export projects, technologies, and materials. The licenses also pertain to the sale of information that could have military or dual use. Some countries, instead of reporting the actual transfers of arms goods, publish the number of issued licenses, within which the values of the exported goods are also mentioned [9]. The sale of military licenses supports arms exports. In all developed countries, such as the USA, UK, France, Italy, Spain, Germany, and Finland, there has been an increase in the volume of military licenses. Countries like Slovakia and the Czech Republic had lower military license sales in 2020 compared to 2014. Military licenses then have a multiplicative effect on economic development. Fig. 2 shows regression analysis of arms licenses in selected countries between 2014 and 2022.

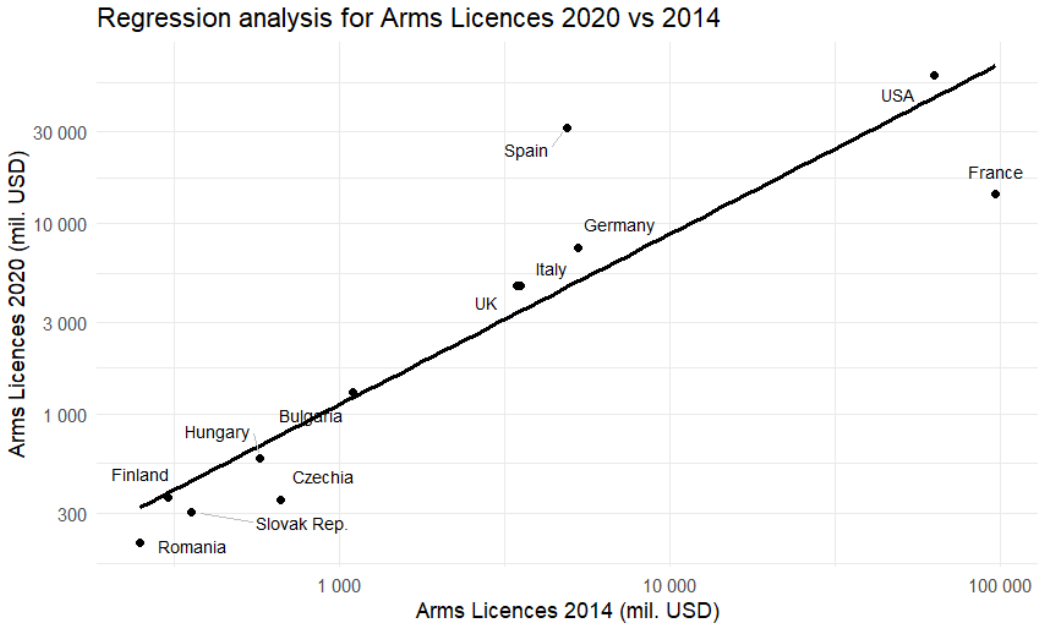

Fig. 2. Regression analysis of arms licenses in selected countries in 2014 and 2020

Table 2 presents the values of the volume of military licenses from selected countries for the regression analysis shown in Figure 2. "License" typically refers to the authorization granted by the National Export Licensing Authority, signifying that the goods, projects, and technologies approved for export in the arms industry are permitted. This includes weapons, explosives, goods, technology, software, parts, and equipment modified for military use (such as vehicles), as well as dual-use items. Licenses also cover the sale of information that could have military or dual-use applications – such as technology, training manuals, plans, and projects. They are required for information in all its forms. Instead of reporting on the actual transfers of arms goods, some countries disclose the number of licenses issued, under which the values of the exported goods are also indicated.

Table 2.
Selling of military licenses in selected countries in 2014 and 2020

Selling of Military Licenses (mil. USD)	Country	Hungary	Slovak Rep.	Bulgaria	Finland	Czechia	Germany	Spain	Italy	France	UK	USA
	2014	573	355	1 098	301	664	5 271	4 862	3 516	97 211	3 429	63 034
	2020	585	304	1 301	366	355	7 453	31 782	4 702	14 152	4 664	59 577

Source of data: UK Parliament (2023), Council of the European Union (2023), SIPRI (2024)

Manufacturing technologies used in arms production are less widespread than in other industries. As a result, this sector is dependent on domestic resources for its transformation. Significant investments in industrial research and development are essential to maintain an advanced technological level and continuous production. Arms production in the implementation of licenses can have a positive impact on real product growth in economies if it contributes to increased employment and technology development. Arms production of dual-use goods can create jobs in the manufacturing of weapons and military equipment. It can also contribute to technological progress, as it requires the development of new technologies to produce weapons and military equipment. These technologies can later be utilized in other sectors of the economy, which can contribute to their growth. This phenomenon is known as the diffusion effect.

The production of weapons constitutes a separate sector in the economy, which employs many workers and creates business opportunities, as noted by Britz [8]. This sector can include the manufacturing of weapons, their distribution, sales, maintenance, etc. Military licenses contribute to the growth in the volume of weapons and thus can also contribute to increased employment in areas where this production is concentrated. The production of weapons can support investments and innovations in the technological sector. The development of new weapons, highly specialized technologies, and other related industrial fields can stimulate progress and growth in the broader economic context.

Arms trade is considered a special case of international trade under conditions of imperfect competition, where suppliers make decisions about sales not only based on economic profit but also in terms of their security implications. Arms transfers that have a positive effect on the security of suppliers in the short term may turn into a negative effect in the long term, and vice versa. For example, arms transfers that are initially intended for legitimate self-defense can accumulate to the point where the

recipient gains offensive capability, thereby threatening the interests of the supplier. From the perspective of individual corporations, the first group is only interested in economic profit and its maximization, while the second group of corporations seeks to maximize the aggregate present value of economic profit and aims for the best possible security implications over time. Time is also significant for the recipient: they see the supplier's willingness and ability to maintain long-term relationships as crucial, especially regarding the supply of spare parts and re-supply during times of conflict. Defense companies and other advocates of arms exports argue that suppliers must ignore the externalities arising from sales, or the security implications, due to competition. It is often stated that if they do not sell weapons, someone else will do so in the competitive market.

Conclusions

The defense industry is undergoing a far-reaching process of adaptation because of changes in the security environment [8]. Based on our study, the following main trends can be distinguished:

• defense production markets in several countries have been affected by greater market freedom, competition, and exhaustion of arms deliveries for Ukraine; the sustained support for Ukraine has led to a depletion of existing arms stockpiles, necessitating rapid production to meet ongoing demands. This situation has pressured manufacturers to not only ramp up their production capacities but also to ensure that their supply chains are robust and flexible, consequently, there is a growing need for diversified sourcing of raw materials and advanced components to mitigate vulnerabilities and maintain steady production flows, the interplay between increased market freedom and the urgency of replenishing defense inventories underscores the complex and evolving landscape of the defense production markets;

• new conditions are leading to transformations in the traditionally close relationship between the state and producers [3]; the evolving geopolitical landscape and increasing emphasis on cost-efficiency and technological advancement have prompted governments to re-evaluate their ties with defense contractors. Instead of the previous model that heavily relied on long-term contracts and guaranteed government backing, there is now a shift towards more competitive bidding processes and performance-based assessments;

• the military conflict in Ukraine is driving the modernization and expansion of the defense industry[4]; the exigencies of the conflict have highlighted the need for advanced technological capabilities and state-of-the-art equipment, prompting countries to accelerate the development and deployment of next-generation defense systems, this modernization effort encompasses a wide range of innovations, including enhanced cyber warfare tools, autonomous vehicles, precision-guided munitions, and advanced surveillance technologies;

• increased defence budgets are triggering a crisis in the defense industry, which is now operating in a much more complex environment than before and is seeking new resources for production – bank loans, raw materials; the substantial infusion of funds has led to an unprecedented demand for rapid expansion and modernization, but this surge has also exposed significant challenges within the industry; companies are finding it increasingly difficult to secure the necessary raw materials due to global supply chain disruptions and geopolitical tensions, which drive up costs and delay production timelines; to finance the scale-up of operations and meet production goals, many defense firms are turning to financial institutions for substantial loans, increasing their financial risk and debt burden.

Additionally, the economic impacts of these changes cannot be overlooked. The intensification of defense activities has led to significant economic ramifications, including job creation and technological advancements that benefit civilian sectors. However, it also raises ethical and sustainability concerns, particularly regarding the environmental impacts of defense manufacturing and the potential for an arms race. Addressing these issues requires a balance between national security interests and responsible stewardship of resources, underscoring the need for comprehensive policies that guide the future trajectory of the defense industry.

Limitations

Restrictions were set on the number of countries for the analysis of developments in the arms industry and arms exports, relying on available data. In the future, the availability of published data for 2023 and subsequently 2024 will benefit this analysis.

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