IN THE SEARCH FOR DEFENSE SPENDING IMPACT: LITHUANIAN CASE STUDY, 2009–2018

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Abstract. The aim of this study is to discuss *nexus* between defense spending and certain economic variables in Lithuania during 2009–2018. Considering the fact that there are no universal analytical tools for measuring defense expenditure *nexus* with economic growth, in this study, data comparison and correlation analyses are conducted with key economic variables being interpreted. Increased defense spending, successful reforms in the Armed Forces, and NATO/EU activities contributed to the security of Lithuania and provided positive stimulus for the national economy. The term *security fluctuate factor*, describing the yearly security investment responsiveness effect on the state economy, is offered in the study for the first time. The main results support *nexus* findings between defense spending and economic growth as they indicate positive correlation between distinctive state economic variables and extensive defense spending in Lithuania, especially in the post-2014 period.

Keywords: Emile Benoit, GDP, FDI, armed forces, security, security fluctuate factor

1. Introduction

Does a nexus between defense spending and economic growth exist? Is there a universal theory describing that relationship? – These two questions raise great discussions in defense economics worldwide. The majority of studies and theories on this issue were developed during the Cold War, when defense spending increased considerably. Discussions continue with new approaches introduced to address this phenomenon. Despite the fact that Emile Benoit's theory has its *pro et contra*, these were the primal studies which concluded that defense spending could stimulate economic development (Benoit 1973, 1978).

Previously, interrelations between defense expenditure and economic growth in Lithuania were studied for different timeframes using different analytics. Dudzeviciute *et al.* (2016) studied defense expenditure trends of Baltic states (Estonia, Latvia and Lithuania) during 2007–2014 and revealed a negative correlation between defense expenditure and economic growth in Lithuanian. Other studies have not focused on Lithuania in particular as they use only statistical data as raw material for other topics. Financing for the Lithuanian Armed Forces increased by 628 million Euro between 2013–2018 (MoD 2017). Such considerable defense spending increases suggest an imprint on stronger defense capabilities and could have an influence on overall economic picture in Lithuania.

The *aim* of this study is to discuss nexus between defense spending and certain economic variables in Lithuania during 2009–2018. The impact of defense spending on the Lithuanian economy during 2009–2018 is analyzed for the first time. Therefore, this paper has an intention to contribute for ongoing discourse on the impact of defense spending while examining a single-country case; provide specific details on Lithuanian economy for follow-up analysis; reveal enhanced security perception effects for national economy in post-2014 period, and introduce the *security fluctuate factor* as a tool to measure it.

To investigate the case, further *tasks* were set: indicate contact points for the methodological approach by reviewing theoretical ideas in relation to *nexus*; assess national and international shifts in defense posture reinforcing deterrence and enabling economic development; discuss the impact of defense spending for the economic situation in Lithuania while prior reviewing the key state economic variables.

The correlation between defense spending and the main economic variables such as Gross Domestic Product (GDP), Foreign Direct Investment (FDI), and unemployment indexes are investigated using comparable and correlation analyses. Data sets are processed from primary and secondary sources. The scope of this analysis is limited to the mentioned variables and does not include other relevant data found in other similar studies, i.e. GDP per capita, education, debt, etc. Increased manning in the Armed Forces is considered as a consequent effect of increased defense spending.

The time period 2009–2018 is analyzed to consider any interrelation between the defense spending and economic variables of two distinctive periods in relation to the Ukraine crisis. In 2014–2018 defense expenditures were increased as a reaction to possible threats, while the 2009–2013 timeframe marks anterior 5-year equivalent as a period of stability in the security domain.

Based on the fact that the impact of security investments on state well-being is visible over time, the hypothesis describing cohesion between military investments and state economy is presented in this paper for the first time. Herein, the term *security fluctuate factor* is proposed to describe the yearly security investment responsiveness for the state economy during insecure period. Correlation analysis (Pearson coefficient model) is used in pursuit of validating the hypothesis of *security fluctuate factor* in Lithuania.

2. Continuous *nexus* discourse between
military expenditure and economic growth

Countless numbers of studies have been committed to investigating the links between defense spending (otherwise military expenditure) and economic growth. However, since the 1970s there is a lack of consensus regarding direct or inverse impact of military expenditures on economic growth. The disagreement is caused and strengthened by theoretical and methodological distinctions, along with differences in assessments and estimation techniques (Arshad *et al.* 2017, Sandler and Hartley 2007, Ram 1995).

Prior to Benoit's study, economic managers agreed that military spending was redirecting resources from investments to defense. However, Emile Benoit's idea was quite opposite:

> The empirical findings of his [Benoit's] study revealed that a country with a huge defense burden shows a rapid economic growth in general, whereas the country with a very low defense budget depicts a really slow growth rate (Arshad *et al.* 2017).

Pioneer researcher Benoit analyzed the economic situation in 44 less developed countries (LDCs) within a 1950–1965 time period (Benoit 1978). His study showed new correlations as "one-percentage-point rise in the defense burden raises the real GDP growth rate by 0.30 percentage points", and he presented the ways by which defense spending could stimulate economic growth (Grobar and Porter 1989). Interestingly, Benoit's study was done for the US Arms Control and Disarmament Agency using simple regression analysis (Ball 1983). Once the research was released, it faced harsh criticism, which continues to this day. Biswas and Ram (1986) stated that Benoit's findings were due to a particular timeframe and analysis extent. As an argument, they reassessed 58 countries within 1960–1970, while running regression, and found the military burden coefficient as 'statistically insignificant'. In his study, Saadet Deger (1986) showed that, if defense expenditure would rise in a non-developmental way, LDC economy would be unable to 'channelize it into the productive sources', and that would lead to negative correlation between economic growth and defense expenditure. By re-estimating Benoit's data, Deger's correlation between civilian output growth and the military was zero for the 1965–1973 timeframe. Lisa Grobar and Richard Porter (1989) concluded that Benoit findings were deviant. However, their repeated study revealed that, instead of Benoit's positive correlations, negative or statistically insignificant correlation could occur. At the same time, their study indicated that defense spending could affect economic growth through different channels but, nevertheless, the net effect is negative. Authors outlined that "higher military spending reduces national saving rates, thereby reducing the rate of capital accumulation". Robert Alexander (1990) indicated that data used in Benoit's study did not meet any theoretical considerations. According to Daniel Landau (1993), Benoit did not consider driving parameters, such as human

capital, technological development, natural resources, and political conditions. Landau indicated 30 possible variables that could be considered. His study, based on 60 countries within the 1960–1980 timeframe, rarely showed positive correlation. As some scholars significantly contributed to the ongoing discussion on Benoit's findings and even tried to re-investigate his case studies, other scholars continued analysis in defining *nexus* between defense spending and state economics while proposing new approaches and methodologies. However, findings are still diverse.

D'Agostino *et al.* (2012) analyzed 28 African countries by using exogenous and endogenous growth models, concluding a negative effect of military spending on economic growth and, moreover, outlined a critique for classical Feder-Ram and Solow models. Another study of the same authors covered multiple countries over the 1970–2014 period, revealing a "significant and persistent negative effect of military burden on economic growth" (d'Agostino *et al.* 2017). The latest research was based on 109 countries within the 1998–2012 period (d'Agostino *et al.* 2019). It depicted a significant negative effect of military spending on economic growth in the case of unrest in a country. Paul Dunne (2012) studied 170 countries within the 1988–2006 period using the dynamic first-order model and fixed effect panel data estimation method. He concluded that "there is little or no evidence for a positive effect on economic growth". Dunne and Nikolaidou (2012) studied 15 EU countries in the period 1961–2007 using augmented Solow-Swan model, concluding that military spending does not promote economic growth. Dunne and Tian (2015) analyzed 106 countries over the 1988–2010 period using the exogenous growth model, concluding that the military burden had a negative effect on growth in the short and long run. As a follow-up step, the authors grouped countries based on relevant factors; e.g. levels of income, conflict experience. The results for the different groups were in line with the main findings, nevertheless some results indicated that military spending has no significant effect on growth. Authors (Raza *et al.* 2017, Shahbaz *et al.* 2013) analyzed a Pakistan case from 1972 to 2009 using cross-section and time series data analysis with the Kenesian model to investigate the short and long run impact of military spending on economic growth. They indicated a negative effect of military expenditure for Pakistani economic growth. Arshad *et al.* (2017) analyzed 61 countries in the period 1988–2015 using the augmented Solow growth model. They concluded that "military expenditure and arms imports have a negative impact on GDP per capita; military expenditure in the presence of external conflicts also has a negative <...> impact on growth".

However, several studies support the positive relationship between military expenditure and economic growth. In his study, Sonmez Atesoglu (2002) introduced co-integration methodology and modelling. He analyzed a US case and found a positive relation between defense spending and aggregate output. In a later study, Atesoglu (2009), however, outlined that definitive conclusions for positive interrelations should be avoided due to contrary findings. Yildirim *et al.* (2005) analyzed Middle Eastern countries and Turkey in the 1989–1999 period by using the Feder model, cross-section and dynamic panel estimation techniques. It was concluded that military expenditures enhance economic growth due to productivity

and usage of high technologies. The following research on Middle Eastern countries and Turkey within 1988–2012 was conducted using non-linear panel data models; it revealed an asymmetric relationship when compared to previous study (Yolcu *et al.* 2017). Pavel Yakovlev (2007) analyzed 28 countries within the 1965–2000 period using augmented Solow growth and Barro models. His findings suggested that higher military spending leads to lower economic growth and is less detrimental to growth if the country is an arms exporter.

Besides the positive and negative aspects of defense spending interpretation, there are other ideas worth consideration. Arthur Westing (1978) analyzed 159 developing countries to determine the cause of military expenditure level. Leading factors for positive correlation with defense expenditure were as follows: population size; productive land area; and GDP. Westing concluded that military expenditures rises due to increases in state wealth. Political correctness defines positive (or negative) impact of military expenditures. The resultant force deployment and military mission depend on policy-makers getting defense 'right' or 'wrong' (Scheetz 2002). External threats and safety stimulus are considered an essential driving factor for accelerating economic growth with respect to military spending (Aizenman and Glick 2006, Dunne *et al.* 2005). A study by Araujo Junior *et al.* (2008) correlates well with the findings of Scheetz. According to the study, a rise in military sector spending was noticed in those countries that underwent significant external threats, however showing a mindful governance. Dash *et al.* (2016) mentioned factors such as extremisms, geographical constraints and strategic features that effect defense financing. The authors concluded that 1.0 percent GDP rise had impact on 0.54 percent rise in defense expenditure per capita and 0.86 percent increase in real defense expenditure, respectively. According to Arshad *et al.* (2017) defense spending could negatively affect economic growth due to 'crowding out' effects. A trade-off between productive and non-productive governmental expenditures is also important. The positive effects of defense spending are forming supply side spillovers that aggregate a demand. At the same time, the Authors hypothesized that increases in defense spending is disadvantageous to economic growth in LDC. Outcomes in the above-mentioned studies from 1973 to 2017 are based on different methodological approaches used.

In conclusion, since 1970 the researches were making attempts to develop analytical tools for measuring defense expenditure impact on economic growth for single country or groups of countries. However, applicability of designed models is still questionable. Any theory related to this topic could be criticized straightforwardly. The phenomenon could be explained by the fact that the devisors of the models contradicted each other with regard to their methodologies used and, thus, their resultant conclusions. For the sake of clarity and to avoid versatile interpretations, only data comparison and correlation analyses are used in the Lithuanian case study. The main logic for that is fourfold. Firstly, the country-related statistical data could provide valuable information for further research while employing other methodologies. Secondly, interpretation of outlined *nexus* brings a subjective retrospective view on defense spending tendencies in Lithuania. Thirdly, correlation analysis is used to indicate the

descriptive status of *nexus* between defense expenditures and economic variables; and lastly, this approach has an intention to prompt follow-up *nexus* discussions in general, as well as for further Lithuanian case studies.

3. Enabling better security perception in Lithuania

Have post-2014 actions conducted by Lithuanian Armed Forces, NATO and EU enabled better security perception and therefore contributed to country's economic variables? Due to the changed security environment in Eastern Europe, starting from 2014, extensive military reforms in Lithuania have been implemented (Jokubauskas 2018). In parallel with the reforms, national security policy was adjusted. One of the main documents defining security priorities is National Security Strategy (Seimas of the Republic of Lithuania 2017). It states "The foundation of defense of the Republic of Lithuania is the ability of the Lithuanian Armed Forces together with Allies ensure credible deterrence, and in the case of failure to deter – to defend the Republic of Lithuania individually and together with Allies". In order to meet this objective, the following medium- and long-term strategies were foreseen: a) strengthening the capabilities of national defense; b) enhancing NATO collective defense; c) strengthening civil and state preparedness; d) contributing to regional and international security. National defense capabilities (point 'a') cover a wide range of activities, including, but not limited to: defense financing; combat capacity of the Armed Forces; personnel preparedness and developing a mobilization system. NATO collective defense (point 'b') plays an important role for national security of Lithuania. Herein Lithuania provides host nation support and contributes adequately for NATO's decisions concerning long-term and substantial NATO military presence. Personnel readiness (point 'c') is a key factor of Armed Forces' success. It includes the strengthening of civil and state preparedness for military and non-military threats, using a mixed model for manning forces, enlarging the reserve, maintaining high readiness of the units, and developing a mobilization system. Lithuania is aiming to develop national defense capabilities which are sufficient for national defense and independently withstanding a conflict, regardless to Allied reinforcement. In conflict, Lithuania would be defended by its war-time Armed Forces structure which includes current Armed Forces and governmental security services (MoD 2017).

The size of the defense budget is based on the several factors, such as threat assessment, political will and the economic situation. According to Ministry of National Defense (MoD) and NATO the allocations for defense needs in Lithuania have tripled within the 2009–2018 period (Figure 1) (MoD 2017, NATO PDD 2017, 2019). Lithuania began expanding its defense budget in 2014, strategically reacting to Russia's annexation of Crimea and Russian aggression in Ukraine. The rapid growth of defense expenditures allowed Lithuania to significantly boost its national defense capabilities. From two perspectives a clear and unambiguous message is sent to potential aggressors while also sending a strong, unified message to Allies that Lithuania understands its commitments.
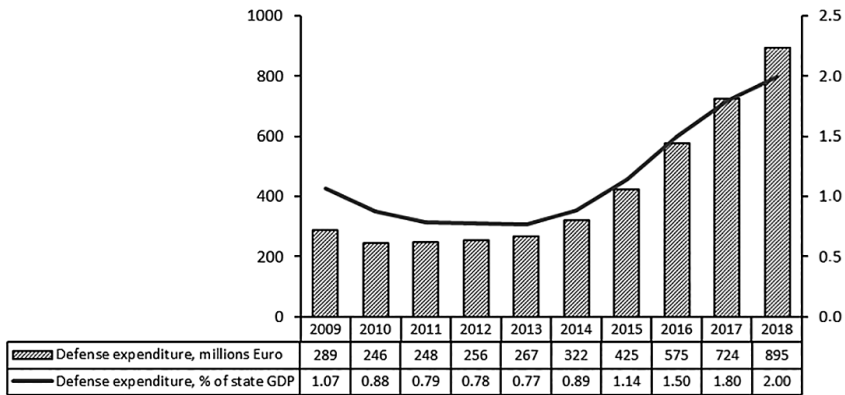
Figure 1. Defense spending in Lithuania in the period from 2009 to 2018
(MoD 2017, NATO PDD 2017, 2019).

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Defense expenditure, millions Euro	289	246	248	256	267	322	425	575	724	895
Defense expenditure, % of state GDP	1.07	0.88	0.79	0.78	0.77	0.89	1.14	1.50	1.80	2.00

Lithuania's main political parties committed to increase defense spending yearly within the next decade, reaching at least 2.5 percent GDP by 2030 (Sytas 2018). Defense spending is planned according to NATO standards: no less than 20 percent of budget is allocated for the procurement of armament and military equipment, and no more than 50 percent for personnel sustainment. According to NATO requirements, a portion of resources should be devoted to modernization investments. Lithuania's commitment in this case was one of the highest among NATO countries (NATO PDD 2019).

Adjustments in Armed Forces structure – with respect to readiness, manning, training, and equipping - were made in response to emerging and changing threats. In 2014, Lithuania established its Rapid Response Force with readiness from 2 to 24 hours. It comprises approximately 2500 troops, divided into two battalions, with elements from other services (MoD 2017). Since 2015 units of National Defense Volunteer Forces (NDVF) were revived in various parts of Lithuania (Jokubauskas 2018). Meanwhile, the 1st Brigade, Mechanized Infantry Brigade Iron Wolf, was reinforced by a new logistics battalion. On January 1, 2016, the 2nd Brigade, Motorized Infantry Brigade Žemaitija, was restored. Lastly, on March 27, 2017 the 3rd Brigade, Light Infantry Brigade Aukštaitija, was established. The 3rd Brigade comprises institutional training units and mobilized reservists in case of armed conflict (Lietuvos kariuomenė 2018).

In total, more than 2.5 billion Euros will be spent for the acquisition of armament, military equipment and stockpiling of ammunition during 2017–2022. <…> the 2016 procurement of Infantry Fighting Vehicles (Figure 2a) is the largest investment project ever undertaken since the restoration of independence in 1990. Two battalions of the "Iron Wolf" Brigade will be equipped with the modern wheeled "Boxer" infantry fighting vehicles armed with a 30 mm automatic cannon and "Spike" anti-tank missiles <…>. In order to achieve a medium range ground

based air defense capability Lithuania is procuring NASAMS air defense systems (Figure 2c). <…> Lithuania is also acquiring the 155 mm self-propelled "PzH2000" howitzers from Germany (Figure 2b) with the goal to significantly increase fire support capabilities up to 40 km. Plans to procure long-range anti-tank systems <…>. Major investments plans are also approved in order to increase the mobility of the Lithuanian Armed Forces with tracked and wheeled vehicles (MoD 2017).

Figure 2. Modernization of armament and military equipment in the Lithuanian Armed Forces: a) "Boxer" Infantry fighting vehicle; b) 155 mm PzH 2000 self-propelled howitzer; and c) National Advanced Surface-to-Air Missile System (NASAMS) firing (MoD 2019b).

According to MoD (2019a), the manning table within the period from 2009–2014 was fairly stable (Figure 3), with a mean number of personnel 15,550 ±296 (standard error of the mean). Beginning in 2015, the situation changed, and the number of personnel increased, reaching the 40 percent augment in 2018 (if comparing with the average number within 2009–2013). Comparing the stable 2009–2013 period and 2018 year, the number of professional soldiers, volunteers from NDVF, conscripts, cadets, and civilians increased by 27, 562, 14, 3.5 and 20 percent, respectively. Herein, the renewed conscription system had an enormous impact on personnel growth, while the augment of professional soldiers, civilians and volunteers was likewise significant.
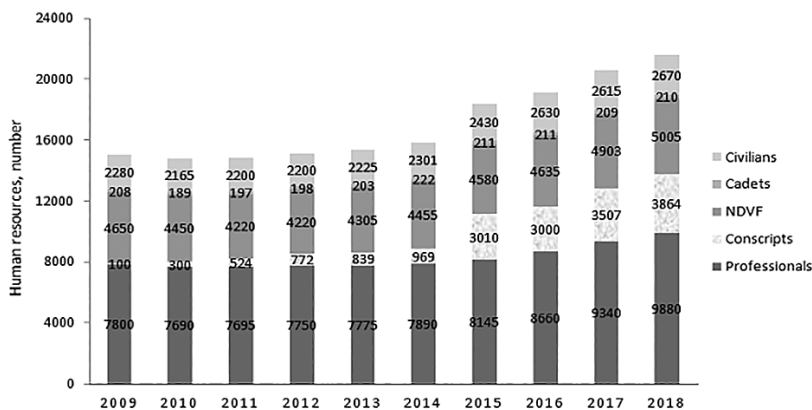

Figure 3. Personnel of Lithuanian National defense system during 2009–2018 period (MoD 2019a).

Previously abolished in 2008, the nine-month conscription service was reintroduced beginning in 2015, with a goal to increase manning in military units and to prepare sufficient reserves. Active reserves are not included in this particular calculation because, generally, those people are retired from military service and/or work as civilian employees and they, therefore, are not counted as Lithuanian Armed Forces personnel.

Major improvements at NATO brought appreciable benefits to Allies since mid-2014 when the Wales Summit declaration was signed as a response to Russia's aggression in Ukraine. As an outcome, the Readiness Action Plan was released, which allowed NATO to evolve two major lines of effort: a) triple the size of the NATO Response Force; and b) introduce the Very High Readiness Joint Task Force (VJTF). The aim of VJTF is to be capable to deploy within days as a deterrent force. To ensure the efficiency of the VJTF, NATO set up the NATO Force Integration Units in eastern and central Europe parts. Putting integration units in place facilitated reception, staging, and onward movement of NATO Response Force. Military headquarter of Multinational Corps North East received additional support and tasks to command and control affiliated military units. Multinational Division North East and Multinational Division North were reorganized and additionally supported to assume new responsibilities. NATO enabled deployment of four battalion-size military elements in the Baltic states and Poland. Those military elements are known as "enhanced Forward Presence". The establishment of these units considerably increases costs for potential aggressors (Jopling 2018) and they serve as a credible deterrence. There were also increases in the visibility of NATO sea and air military units in the Baltic region. The NATO Baltic Air Policing Mission was reinforced by deploying additional fighter aircraft. NATO military naval vessels regularly perform various tasks in the Baltic Sea, visiting harbors of the Baltic states, and participating in different exercises. The number and scale of the international exercises in the Baltic region have increased and shifted to collective defense scenarios. This not only sends a clear message that the Alliance is properly prepared, but is also enhances interoperability between the Lithuanian military units and Allied forces (MoD 2017).

EU is a key player in building resilience to hybrid threats, particularly disinformation and cyber-attacks, by using its considerable resources and soft power. The 2016 EU-NATO Joint Declaration lists more than 40 specific areas of cooperation and as many as 10 of those relate to strengthening cooperation on hybrid threats. In order to improve situational awareness through sharing intelligence analysis, the Hybrid Fusion Cell was established. As a response to Russia's disinformation campaigns, the EU created the East StratCom Task Force. The EU has recently established Permanent Structured Cooperation on Defense (PESCO) that focuses mainly on hard security investments (Jopling 2018). In this context Lithuania leads one of the 17 PESCO projects approved by EU member states: Cyber Rapid Response Force formation and mutual assistance in cyber security. Six EU members (Spain, France, Croatia, Netherlands, Romania, and Finland) are participants of the project and five more EU countries are observers. In addition to the project, Lithuania is the member of the Dutch-led military mobility initiative that focuses on smooth and

effective removal of procedural, legal, and infrastructural obstacles for the quick movement of forces in Europe (MoD 2018).

To conclude, Lithuania sends a very clear message to the Alliance that major national defense capabilities are improving, combined, and interoperable with other NATO countries militaries. NATO enhanced Forward Presence elements contribute to expanded-in-scale training and frequency of international exercises. Lithuania is, thus, more committed to its country defense due to increased defense spending, restructuring of Armed Forces. These facts show Lithuania as a reliable NATO member. Lithuanian Armed Forces alone and in concert with NATO and the EU, are efficient and capable to withstand an aggressor. The perception of the secure environment is the factor which played an important role for the state's economic development, especially in post-2014 period.

4. Reviewing Lithuanian economic variables within 2009–2018

Recent studies on economics enlighten correlation between economic growth and certain variables, such as real GDP growth, inflation rate, employment rate and FDI inflows (Simionescu 2018). Abovementioned variables for Lithuania are presented in the timetable period 2009–2018 (Table 1 and Table 2). The growth rate of GDP is assumed as an important indicator of economic performance to determine situation in general. It means an increase of GDP is interpreted as a sign that the economy is doing well (Callen 2008).

Table 1. Lithuanian economic variables within recent decade (Eurostat 2019, OSP 2019)

Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP, million Euro	26,934	27,955	31,233	33,331	34,985	36,544	37,321	38,893	42,269	45,264
GDP per capita, Euro	8,710	9,030	9,790	10,300	10,780	11,250	11,590	12,040	12,720	13,310
Inflation, %	4.2	1.2	4.1	3.2	1.2	0.2	-0.7	0.7	3.7	2.5
Population, millions	3.183	3.141	3.052	3.003	2.971	2.943	2.921	2.888	2.847	2.808
Unemployed, millions	0.236	0.265	0.202	0.192	0.167	0.147	0.129	0.112	0.097	0.087
Unemployment rate, %	15.5	17.2	13.9	13.2	11.4	10.1	8.8	7.6	6.7	6.0

Global financial crisis (2008–2009) had major impact on Lithuanian economic where in 2009 GDP growth was negative (-14.8 percent). Slowly recovering markets influenced national economic status with minimum 1.5 percent growth rate in 2010. From that point on GDP growth continues steadily by increasing 3.3±0.8 percent GDP annually with exception for 2010 where GDP increase reached 6.0 percent. GDP per capita remains stable with annual growth by 511±118 Euro. As described by Ayyoub *et al.* (2011), high inflation rates correlated with increased prices that led to uncertainty about the future profitability of investment projects. Some studies showed that an inflation rate above 7 percent was harmful for the economic growth of a state. In Lithuania, the highest inflation rate was registered ten years ago, reaching 4.2 percent, while a steady rate of inflation level contributed to the economic stability in the country. The population of Lithuania moderately decreased within the last decade by 375,000. However, employment of citizens shows promising growth, because a noticeable decline in the unemployment rate is evident. Over the last decade, the unemployment rate fell by nearly 40 percent, showing a positive sign for the economy.

The outlook towards the FDI has changed as most countries have liberalized their policies to attract investment from foreign corporations. Governments lower entry barriers and open new sectors for investments with an expectation of foreign corporations raising local employment, exports and knowledge spill-over effect. To encourage foreign investments, host governments provide various incentives, e.g. tax holidays, lower taxes, grants, preferential loans, infrastructure and monopoly rights (Blomström *et al.* 2003). Average inward FDI in Lithuania was 13,828.26 ± 1,302.1 million Euro for the period of 2009–2018 (table 2).

Remarkable increase of inward FDI by nearly 1.3 billion Euro, compared to previous years, was observed in 2010, which could have indicated the end of the financial crisis and the market's belief in the stability of the Lithuanian economy. Exceptional decrease of FDI by nearly 0.3 billion Euro was registered in 2014, which could be related to the events in Ukraine and the cascading feeling of insecurity in the Baltic states. In 2018, the majority of investments in Lithuania came from European and Asian countries (table 2, annex 1). Sweden, Netherlands, Germany, Cyprus, Estonia and Hong Kong were the main countries providing the most of the inward FDI. The situation was similar as in 2009, where most investors also came from Denmark, Sweden, Poland, Germany and Estonia. Countries from Africa's continent invest the least, with an average 11.57±1.97 million Euro. America's investments come mainly from the USA, Canada, and former tax heaven countries, with an average 519.7±121.2 million Euro. Asia increased inward FDI into Lithuania's economy by 4.7 times within the last decade. International organizations increased invest beginning in 2013, with an average 48.4±15.2 million Euro for 2013–2018.

Currently, Lithuania is evaluated as 14th out of 190 countries with ease in doing business; 40th out of 140 countries evaluated in the Global Competitiveness Index; and 13th out of 162 evaluated countries for Economic Freedom of the World (Invest Lithuania 2019). Lithuania is able to provide an educated labor force, connectivity to markets, great quality-to-cost, ratio and a business-friendly environment.

Table 2. Total inward FDI in Lithuania by a) continents and b) international organizations for period 2009–2018, million Euro (BoL 2019)

Location	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Europe	9585.99	10924.03	11446.96	12477.59	13182.43	13005.16	13766.4	14173.31	14954.6	15899.41
Africa	24.46	10.02	10.81	8.02	13.42	11.40	10.10	9.92	7.38	10.25
Americas	424.83	319.06	672.19	582.33	582.93	521.75	545.23	547.45	685.68	315.69
Asia	155.97	202.3	246.99	243.2	195.15	183.54	198.11	447.93	590.63	739.76
International organizations	18.48	24.39	11.30	10.66	35.44	34.29	37.16	51.03	69.64	62.97
Total	10212.2	11479.6	12387.6	13320.8	14011.1	13755.4	14554.7	15224.5	16305.0	17031.8

In conclusion, since the restoration of its independence in 1990, Lithuania has experienced rapid economic development with open market opportunities for investors. This is clearly visible by: positive annual GDP and GDP per capita growth; decreased unemployment; stable inflation; and increasing inwards FDI figures. Moreover, European countries remain leaders of inward FDI in Lithuania with increasing involvement from Asia countries.

5. Military spending relationship with economic variables in Lithuania

A long-term commitment to increase defense spending could enhance Armed Forces and national security, provide wider deterrence effect, and finally contribute to state's economic development. Data analysis of Lithuanian GDP, FDI and Defense spending revealed (Figure 4) rapid GDP growth (increase by 1.7 times throughout 2009–2018 period), regardless to the challenges caused by restructuring exports (2009) and adopting market to sanctions and potential threat (from 2013).
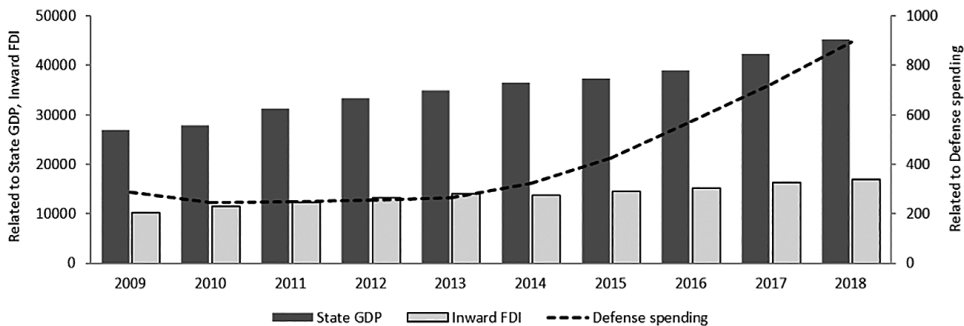

Figure 4. Lithuanian GDP, inward FDI and Defense spending within period 2009–2018, in million Euro (BoL 2019, Eurostat 2019, MoD 2017, NATO PDD 2017, 2019, OSP 2019).

Inward FDI was increasing with minimum annual growth of 670 million Euro, except in 2014 when the figure was negative. Comparing the stability period (2009–2013) and the period where security was a concern (2014–2018), FDI totals were higher by 0.5 billion Euro in the stability period. Correlation analyses was conducted to determine if defense spending had a statistical relationship with GDP and inward FDI growth, respectively (Figure 5).

The results show that, in the first case (Figure 5a), the Pearson product-moment correlation coefficient (r) is equal 0.9064, $p < 0.001$ and, in the second case (Figure 5b), $r = 0.8745$, $p < 0.001$. Strong positive correlation in both cases was determined in 2009–2018 period, where GDP had stronger correlation with defense spending. Inward FDI for 2015 showed growth by nearly 800 million Euro with increased investments from following nations: UK, the Netherlands, Sweden, Switzerland,
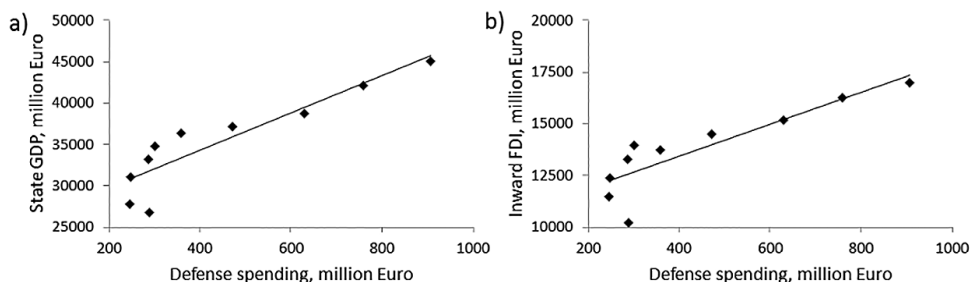
Figure 5. Graphical representation of correlation between defense expenditure
and a) state GDP; b) inward FDI within 2009–2018.

Finland, Norway, Germany, and USA (annex 1). This fact could be explained in two ways: either companies decided to take risks, trying not to lose markets and opened opportunities (but this is not likely due to investment nature, whereas security for investment is a top priority for investor (Kharlamova 2014)); or they were influenced by enhanced security perception created on different levels. Those levels were: 1) national, such as increased defense spending, introduced conscription, and other defense enhancement reforms; 2) NATO level, such as outcomes of the Wales's Summit and rapid implementation of Readiness Action Plan; 3) USA immediate increase of force posture and presence in the region and other investments in security; 4) initiatives in EU domain; 5) other bilateral arrangements.

It was discovered that investments in security are not providing immediate effect for other spheres of state well-being and it takes time to notice improvements. In this study, a term *security fluctuate factor* is proposed to describe yearly security investment responsiveness for state economy during the insecure period. Correlation analysis (Pearson coefficient model) was used to validate hypothesis of *security fluctuate factor* by using Lithuanian case as an example. Firstly, increase of defense spending (X) in a year (Z) is compared with increase of inward FDI (Y) in a following year ($Z+1$). Secondly, correlation analysis between variables X and Y was done using the same year Z to prove the hypothesis (Figure 6). As an example, increased defense expenditure in 2015 (103 million Euro) likely contributed to increase of inward FDI in 2016 (669 million Euro).
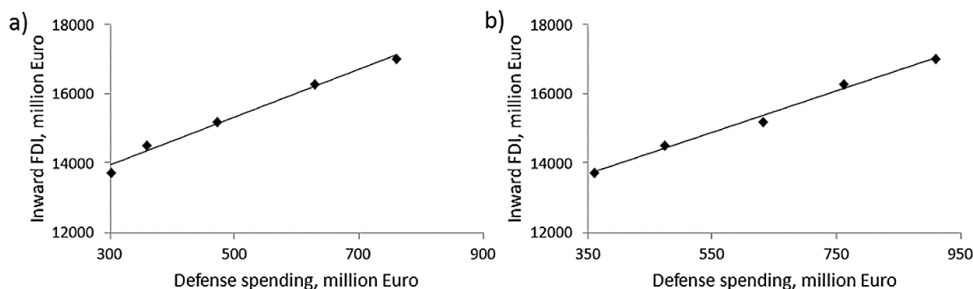

Figure 6. Graphical representation of correlation between defense spending and inward FDI
in the period: a) 2013–2018 using ($Z+1$) year shift and b) 2014–2018 using (Z) year.

In the first case (Figure 6a), correlation between X (at Z timeframe) and Y (within Z+1 timeframe), showed $r = 0.9925$, $p < 0.001$ value; while in the second case (Figure 6b) it was $r = 0.9958$, $p < 0.001$. Statistically, the difference of calculated standard deviations in the given case is marginal, therefore *security fluctuate factor* hypothesis is neither confirmed, nor denied. However, r values for 2014–2018 and 2009–2018 periods (Figure 6b and Figure 5b, respectively) relate to stronger correlation between defense expenditure and inward FDI once there is a threat for a state. This observation correlates well with the findings of few studies. Aizenman and Glick (2006) concluded that "military expenditure in the presence of threats increases economic growth", and in a study of Araujo Junior *et al.* (2008) data suggested positive military and economic growth relationship in the countries that have significant external threats and at the same time possess good governance. Worth to highlight that in those studies different economic variables and methodology were used, indicating casual *nexus* between chosen parameters.

A strained security environment facilitates increase in defense spending and raise personnel numbers inside Armed Forces. In 2015–2018, nine-month conscription service was introduced, which currently comprises nearly 20 percent of all personnel in National defense system (Figure 3). The overall increase of personnel in National defense system within 2009–2018 reached 44.7 percent (Figure 7) playing an important role for personnel enrolment into a labor market.
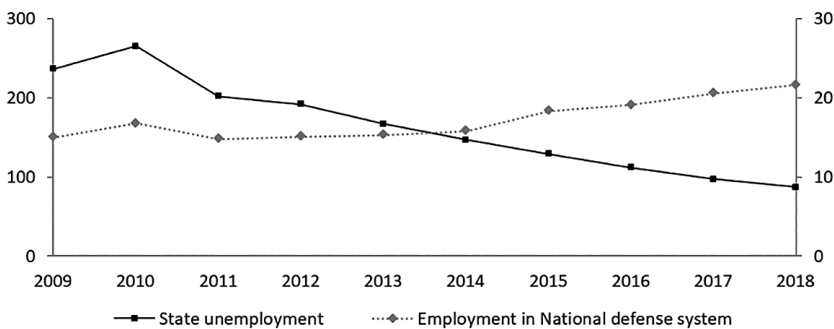

Figure 7. Employment figures in Lithuania within 2009–2018, persons,
in thousands (MoD 2019a, OSP 2019).

Interrelation between the employment of personnel in the National defense system and state unemployment figures could be divided into two distinct intervals. From 2009 to 2012, state unemployment figures decreased by 18.6 percent, while employed personnel figures in defense system remained stable (15,433±788). Situation changed for the second interval (2013–2018) where negative interrelation was observed in-between figures of state unemployment and personnel in defense system. Therein, employment of personnel in Lithuanian Armed Forces enabled higher state's employment numbers in the presence of external threats. Results of the correlation analysis for the 2009–2018 and 2013–2018 periods (Figure 8) support the findings.
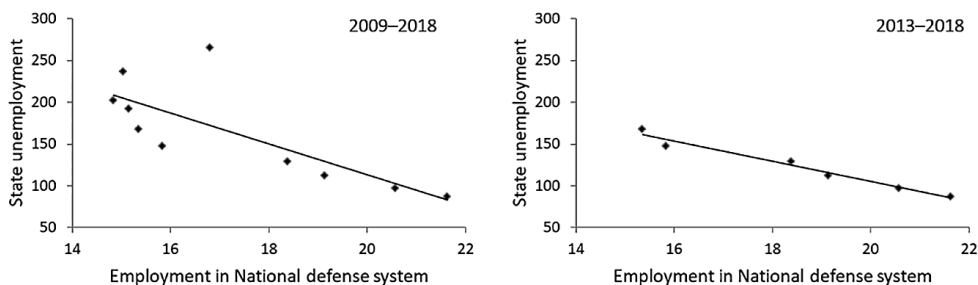
Figure 8. Correlation between employment in the National defense system and State unemployment figures, personnel in thousands.

In the first case (2009–2018 period), (un)employment correlation showed $r = -0.7692$, $p < 0.001$ value; while in the second case (2013–2018) it was $r = -0.9852$, $p < 0.001$. Results of correlation analysis suggest strong negative interrelations between employed personnel numbers in the National defense system and state unemployment numbers, especially in the 2013–2018 period. The correlation could be explained by the fact that in the presence of external threat Lithuanian Seimas, i.e. Parliament, decision to enlarge Armed Forces contributed directly to the lower personnel unemployment numbers in 2013–2018.

6. Conclusions

The attempts to find contact points for a comprehensive analytical tool which would enable to measure the *nexus* between defense expenditure and economic growth remain questionable, as methodologies and variables used in the literature differ. In this study, data comparison and correlation analyses for distinctive Lithuanian economic variables were used to breach this gap. However, in the context of this study, the correlation analysis reveals only the descriptive *nexus* status between defense expenditures and selected economic variables.

Perception of a secure environment plays a role for a state's economic development. Increased defense spending enhanced capabilities in the Lithuanian Armed Forces both quantitatively and qualitatively. USA military posturing in the Baltic states, as well as NATO/EU regional and country related activities contributed to the security perception in Lithuania. As a result, combined activities had created stimulus for the national economy development, especially in post-2014 period.

Findings of this study suggest that a raise of defense spending, especially in the presence of external threats, correlates with a rise in the state's GDP growth, increasing inward FDI figures and decreasing unemployment rate. These findings in general terms, support conclusions developed by Aizenman and Glick, and Araujo Junior and co-authors, although different methodology and economic variables were used.

In this study, the term *security fluctuate factor* was proposed for the first time to describe responsiveness of security investment for state economy. However, correlation analysis (Pearson coefficient model) did not provide convincing grounds for factor's validation. As a result, s*ecurity fluctuate factor* could be considered in further research since it proposes an alternative look into the topic and helps to define a delayed impact of military expenditures on economic growth.

The Lithuanian case study covers the newest developments in the security domain and its impact to the state's economic variables. Author fully recognizes that 10 annual data could be interpreted as a short sample period if looking from a perspective of economic analysis, however, the period covers one third of contemporary Lithuanian, as independent state, history. Descriptive nature of the analyses is used with intention to provoke follow-up discussions on defense spending and its *nexus* with economic variables for other, especially Baltic state countries.

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Annex 1

Inward FDI in Lithuania by country[1] for period 2009–2018, in million Euro (BoL 2019)

Index		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Europe	Ireland	84.61	50.96	53.16	56.19	27.96	30.86	40.42	46.69	52.93	72.54
	Austria	70.44	53.13	43.96	83.57	147.19	156.18	159.64	203.34	157.98	140.25
	Belarus	35.79	37.32	41.44	47.84	92.49	82.09	97.28	87.1	106.84	108.13
	Belgium	58.34	56.82	55.5	110.42	122.18	116.18	117.87	90.48	116.66	120.84
	Denmark	1070.28	1612.6	649.87	668.5	798.58	659.3	622.66	648.59	681.63	729.97
	Estonia	1288.54	1341.15	520.39	600.74	917.16	884.55	984.84	1291.61	1487.79	1729.79
	Iceland	51.29	50.31	48.56	49.28	35.66	28.07	26.26	24.33	20.78	20.01
	Spain	6.0	10.48	9.81	5.91	0.22	-23.36	-3.47	10.22	23.64	40.48
	Italy	19.89	12.76	12.26	19.84	14.08	12.7	9.24	26.82	30.12	39.86
	United Kingdom	174.09	118.42	139.2	207.24	222.13	365.69	432.25	211.84	223.98	-101.16
	Cyprus	153.17	187.99	194.77	370.7	648.37	897.16	699.6	930.74	1113.3	1261.17
	Latvia	447.02	422.87	353.98	339.79	80.96	249.54	298.77	358.51	369.3	381.4
	Poland	933.08	1161.26	1373.83	1343.86	1244.16	718.44	648.17	985.8	888.62	969.99
	Liechtenstein	24.82	28.7	34.28	33.28	37.55	38.01	49.34	62.8	69.93	75.07
	Luxembourg	112.96	179.07	135.91	222.94	315.81	282.38	243.63	201.68	196.85	263.77
	Malta	170.89	158.98	125.52	138.59	153.32	432.44	436.33	431.62	40.95	328.9
	Isle of Man	23.76	27.66	33.86	36.72	16.92	18.34	–	6.84	0.18	-2.28
	Netherlands	697.35	813.8	854.46	928.7	1213.49	1521.32	1759	2203.25	2387.89	2521.71
	Norway	347.59	316.32	1010.85	961.78	978.18	985.61	951.9	1013.06	427.26	450.89

Index		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	France	212.81	249.78	256	315.05	289.71	297.8	333.55	360.68	499.2	423.61
	Russian Federation	493.74	716.74	598.4	574.79	513.74	186.1	219.44	264.04	261.49	258.04
	Finland	490.56	479.82	575.38	542.41	505.26	526.98	521.72	563.29	549.67	485.54
	Sweden	1435.33	1470.29	2890.63	3018.11	3250.84	3054.63	3336.37	2751.93	3762.85	3879.55
	Switzerland	244.55	285.41	265.49	284.96	288.98	321.49	533.52	278.61	325.03	401.65
	Ukraine	7.62	10.54	7.88	10.74	8.17	14.0	22.84	20.53	32.73	74.75
	Germany	860.99	968.63	1115.61	1447.81	1230.82	1118.99	1154.62	1037.73	1065.5	1158.78
Africa	Totals	24.46	10.02	10.81	8.02	13.42	11.4	10.1	9.92	7.38	10.25
Americas	United States	259.04	139.19	142.88	131.89	132.19	155.23	188.51	215.4	309.64	229.89
	Canada	48.56	60.57	405.67	336.19	316.15	276.89	282.02	273.79	309.73	262.54
	Virgin Islands	13.46	28.28	68.95	60.35	58.66	56.03	51.22	50.58	62.01	64.02
	Panama	11.58	11.71	9.91	4.14	30.53	34.44	33.65	13.38	10.81	14.01
	St Kitts and Nevis	86.07	76.39	–	42.59	43.97	–	–	–	–	–
Asia	Hong Kong	0.58	2.18	3.9	2.12	1.05	2.06	13.21	296.93	425.33	590.73
	Israel	20.61	16.66	14.81	17.22	21.95	17.4	25.02	38.3	45.43	51.95
	Thailand	103.03	169.93	207.67	210.59	153.97	144.93	128.3	73.18	77.52	70.86
International organizations		18.48	24.39	11.3	10.66	35.44	34.29	37.16	51.03	69.64	62.97

Countries with less than 20 million inward FDI are not reflected.