Military expenditures and shadow economy in the Baltic States: Is there a link?

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Military expenditures and shadow economy in the Baltic States: Is there a link?

by

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Abstract

The main goal of our paper is to determine the existence of a link between government (military) expenditures and the shadow economy in the Baltic States. The empirical investigation is done over the years 2003-2014 for Estonia, Latvia and Lithuania. We showed that there is a highly statistically significant positive dependence between the size of the shadow economy and military expenditures in the Baltic States. Our conclusion is that higher military expenditures indeed lead to a higher shadow economy and this result is robust to different model specifications. In order to demonstrate the importance of our highly statistically significant results we undertook a simulation where we calculated how much the size of the shadow economy would increase if the size of military expenditure as a percentage of GDP doubled: In Estonia such an expansion would have led to an increase in the size of the shadow economy from 27.1% to 30.1%, in Latvia from 24.7% to 26.1% and in Lithuania from 27.1% to 28.4% in 2014.

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Keywords: Shadow economy, military expenditures, Baltic States

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1 Introduction and Literature Review

The shadow economy and its determinants are of great interest for academic researchers and policy-makers - the amount of economic knowledge in this field is permanently increasing. Our paper contributes to the topic by providing an empirical estimation of a link between government (military) expenditure and the shadow economy in the Baltic States. We find that there is dependence between government military expenditure and the shadow economy. This effect is very robust and it remains significant in many alternative specifications of the model after a number of socioeconomic factors are controlled for, such as level of corruption, rule of law and GDP per capita. We explained this result in the following way: It is known that the size of the shadow economy depends on the effectiveness of the government to provide public goods (Johnson, Kaufmann, and Zoido-Lobaton 1998a). In general, people tend to work legally if they understand that their contributions will return to them in the form of public goods (Kanniainen et al. 2004). However, many people do not understand the usefulness of military expenditures; consequently, they prefer to operate in the shadow economy if military expenditures grow. The alternative explanation of this phenomenon could arise from the fact that military expenditures are the most opaque expenditures made by governments. This increases the possibilities for wasteful spending and misuse of funds.

The most straightforward way for shadow economy reduction is deterrence (Andreoni, Erard, and Feinstein 1998); however, other papers do not support its effectiveness (Fenge and Schneider 2010; Fugazza and Jacques 2004). A much more important role is played by taxes and social contributions, regulation quality of institutions, public sector services and tax morale (Schneider and Enste 2000; Schneider 2005; Schneider 2010; Tanzi 1999). Our paper contributes to the topic by expanding the knowledge in the role of public sector services, namely, the role of composition of government expenditures, which are used to finance public services.

The link between the provision of public services and the shadow economy has not been studied extensively up to now. It is known that production reallocation to the unofficial economy undermines tax collections, and reduces the ability of the government to provide public goods and services in the official sector (Johnson et al. 1997, Johnson et al. 2008a/b). This makes being in the official sector even less attractive, and leads to a further growth in the size of the shadow economy. Two equilibria are possible: One equilibrium is “good" with low taxes, high tax revenues and a low level of shadow economy, like in most western countries. The other equilibrium is “bad" with high taxes,

low tax revenues, and a high level of shadow economy. It corresponds to the situation observed in many post-Soviet countries and Latin America.

The link between government expenditures and the shadow economy was also indirectly studied by Prado (2011). In his model, government expenditures are financed by taxes collected in the formal sector and enforcement, which the government extracts from the informal sector. Higher taxes increase the size of the shadow economy, higher enforcement reduces it. Government expenditure is fixed in the model, but its expansion would affect the size of the shadow economy depending on whether the government decides to finance it by increasing taxes or enforcements.

Contributions paid by agents often return to them in one form or another. So, higher state transfers received by agents reduce the size of the shadow economy, higher pensions increase it (Kanniainen et al. 2004). The authors hypothesize that people understand that contributions to the system return to them (at least partly) in the form of public goods and transfers. Consequently, higher government transfers increase tax morale.[4] However, demographic developments make people uncertain about their future pensions, which leads to the opposite results. The authors conclude that governments shall inform agents about the link between their contributions to the public system and benefits received from it.

Kanniainen et al. studied the role of government transfers and public pensions on the size of shadow economy, the role of other expenditures remaining unclear. Our paper aims to fill this gap. We find that there is a positive effect of military expenditures on the size of the shadow economy in the Baltic States. The effects of other expenditures are statistically insignificant in most of the specifications. Using the logics of Johnson et al. 1997 and Johnson et al. 2008a/b, we could expect that a higher provision of public goods, which are available for all firms or individuals independently of whether they work in the official or unofficial sector, shall increase the shadow economy, and higher spending for public goods, which are available for the official sector only, shall reduce it. Military expenditures provide security for the whole country, not only agents or firms working officially; therefore, individuals receive this service for free, and they may wish to escape from paying contributions. However, in the Baltic States provision of education does not discriminate between agents working in either the official and unofficial sectors. Hence, the same logic shall also be applied to education, but we find no empirical confirmation for this hypothesis.

There are a number of studies on the shadow economy devoted to the Baltic States. Meriküll and Staehr (2010) analysed the prevalence and determinants of unreported

[4] The negative link between public transfers and shadow economy was also confirmed by Stankevičius and Vasiliauskaitė (2014) for the Southern and Eastern EU countries.

employment on the microeconomic level in the Baltic States. They showed that unreported employment is mainly determined by firms-related factors, such as sector, firm size and employment trends, while agent-related characteristics play the secondary role and vary in these three countries over time. Kukk and Staehr (2014) studied the underreporting of agents' income with the use of income and expenditure data from the Estonian Household Budget Survey. They found that agents with different shares of business income under-report different shares of their incomes. Williams and Horodnic (2015) found that the higher gap between `state morality' (codified laws and regulations of formal institutions) and `civic morality' (trust in government, the norms, values and beliefs of the informal institutions) leads to a higher probability of participation in the shadow economy. This study is based on face-to-face interview in the three countries. Our paper complements this research by studying a link between the shadow economy and the structure of government expenditure.

In our model, we find that higher military expenditures increase the level of the shadow economy. This can be explained by higher misuse of budget funds in this sector of the economy. In fact, we do not have reliable information about higher level of misuse of budget funds in these sectors in the Baltic States. However, in other countries it seems to be so. For example, in 2002 US secretary of defense Donald Rumsfeld confirmed that the Pentagon could not track 2.3 trillion dollars of transactions.[5] Academic literature suggests that there is a strong link between military expenditure and corruption (d'Agostino et al. 2012; Delavallade 2006; Gupta et al. 2001; Hessami 2014). In our model, even if we control for corruption, the coefficient of military expenditures remains significant. This means that there is also a direct link between military expenditures and shadow economy.

The rest of the paper is structured as follows: In the next section we discuss the data used in the model and methodology. Section 3 presents the results of the paper, section 4 performs robustness checks, section 5 concludes.

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2 Data and methodology

We collect data on the Baltic States from several sources. Our dependent variable is the size of the shadow economy as a percentage of official GDP. This variable is unobserved, but it can be estimated with various methods. We took the values estimated by Schneider et al. (2015); their range is 2003-2014. The size of the shadow economy was estimated with Multiple Indicators Multiple Causes (MIMIC) method. The shadow economy is defined as “unregistered activities aimed at yielding tangible benefits, in either natural or in monetary form, generating given consequences of value creating

[5] http://www.cbsnews.com/news/the-war-on-waste/

and/or distribution character", and it does not include activities of a criminal nature. Definitely, in our paper, it is defined in the same way.

The size of the shadow economy is limited by zero from below; therefore, it is logical to transform it in such a way that fitted values in our regressions would be above zero. Theoretically, the size of the shadow economy as a percentage of the official GDP is not limited from above. However, it is possible to notice that, not only in the Baltic States but in all European countries, estimates of the size of the shadow economy, received by Schneider et al. (2015), is very much below 100% of the official GDP level. This observation is also in line with the estimates of the size of the shadow economy in most countries in the world (Buehn and Schneider 2012). Therefore, we used a slightly modified logit transformation, for our dependent variable, such that its domain is (0; 100). In a robustness check we also perform estimations with other functional forms, leading to similar results.

Government expenditures were collected from two sources: World Bank development indicators, and Eurostat. Military expenditures and expenditures on education as a percentage of GDP were obtained from the World Bank development indicators. Moreover, World Bank development indicators provide data on total health expenditures in the country as a percentage of GDP and a percentage of public expenditures in total health expenditures. We use this data to calculate public health expenditures as a percentage of GDP. Eurostat provides data on the total government expenditures as a percentage of GDP. We use this data to calculate government expenditures other than military, health and education. We use observations for the period 2002-2014. However, the data on education expenditures is available for the period 2004-2012; and a couple of observations inside this period are missing. This also limits the number of observations for the “other government expenditures". Because of this, we provide two estimations of the model: with education and other government expenditures and without them.

If we regress the size of the shadow economy on the government expenditures directly, it can give us biased results, because both shadow economy and government expenditures may be correlated with the GDP per capita, level of corruption and other socioeconomic variables (Dreher, Kotsogiannis, and Mc-Corriston 2009; Dreher and Schneider 2010). Therefore, we use GDP per capita (2002-2014) as an exogenous variable, expressed in prices of 2002. The data on the nominal GDP per capita and inflation is obtained from the World Bank development indicators. These factors were used in the calculation of GDP per capita, in 2002 prices.

Furthermore, we control for corruption, regulatory quality and the rule of law, which are obtained from the World Bank's worldwide governance indicators. The higher values of

these indexes according to their definitions indicate the lower level of corruption, higher regulatory quality and the higher rule of law. The descriptive statistics of the data we use are presented in table 1. The data and algorithms written in R can be found on the corresponding author's personal web-page.

Tab. 1: Descriptive statistics. For representational reasons, we divide explanatory variables by their arithmetic means.

Variable	Description	Data range	Arithmetic mean	Standard deviation	Min	Max
	Dependent variable:					
Shadow	Shadow economy, % of GDP	2003-2014	28.51	1.96	23.6	32.0
	Government expenditures:					
Mil. exp.	Military expenditures, % of GDP	2003-2015	1.4089	0.4303	0.7646	2.2091
Educ. exp.	Education expenditures, % of GDP	2004-2011	5.0515	0.3456	4.5906	5.9542
Health exp.	Public health expenditures, % of GDP	2003-2014	4.2936	0.5745	3.2495	5.4855
Other exp.	Other expenditures, % of GDP	2003-2011	20.8396	3.1898	16.4067	28.0256
	Other variables:					
GDP/cap.	GDP per capita in 2002 prices	2003-2015	8550.66	2748.126	3530.147	13234.86
Regul. qual.	Regulatory quality	2003-2014	83.7846	5.0593	77.0	93.3
Corruption	Corruption index	2003-2014	68.4385	8.7411	54.1	87.5
Rule of law	Rule of law	2003-2014	76.2436	4.2060	69.4	84.4

It is also known from the very early literature on the shadow economy that taxes play a crucial role in determining its size (Allingham and Sandmo 1972; Cagan 1958). However, we cannot include taxes in our models because they were used by Schneider et al. (2015) for estimation of the size of the shadow economy.

For representational reasons, we divide all explanatory variables by their arithmetic means. This also improves optimization performance, because R, which was used for model estimation, works imprecisely with very small values such as the coefficient which would correspond to the unnormalised GDP per capita.

The collected data constitute an unbalanced panel, which is much better than cross-country data in our case for the following reason. MIMIC model, which was used to estimate the shadow economy, determines only relative magnitude between the shadow economy and indicators which are used as inputs. The absolute size of the shadow economy remains unknown (Frey and Weck-Hanneman 1984). Therefore, there is a need for an evaluation of the absolute size of the shadow economy with a different method at least for one period. This is often performed with the currency demand approach (Schneider 1986). But, in such a case, mistakes in the estimation of the

absolute level of the shadow economy are persistent for countries and do not vanish with time. Country-specific fixed effects, which can be used for panel data analysis, mitigate this problem.

Our core hypothesis reads: The higher the military expenditures are, the higher is the shadow economy, ceteris paribus. We also expect that higher GDP per capita, lower corruption, higher regulatory quality and a higher rule of law reduce the shadow economy ceteris paribus.

3 Results

We estimate regression of the following form:

$$log\left(\frac{Shadow_{c,t}}{100-Shadow_{c,t}}\right) = f_c(+f_t) + \beta_1 X_{1,ct} + \cdots + \beta_k X_{k,ct} + \varepsilon_{ct}, \qquad (1)$$

where $X_{i,ct}$, $i = 1…k$ denote other explanatory variables, c is a country-specific index, t stands for time; f_c denotes country-specific effects; f_t represents time-specific effects. We include or exclude time-fixed effects depending on the Hausman test.

Table 2 presents estimated coefficients of the equation (1). In the first column, we present the case in which our dependent variable is regressed on the government expenditures only. In this case, there are no time-fixed effects because Hausman test accepts the hypothesis that there are no time-fixed effects (p-value is equal to 0.4287). Standard errors are ordinary because Wooldridge's test for serial correlation does not reject the null hypothesis (p-value is equal to 0.1366). We see that military expenditures have a positive coefficient, which is significant at the 0.05 significance level. The coefficient corresponding to health expenditures is also significant at the 0.05 significance level, but its sign is negative. The other variables are insignificant.

The positive sign of military expenditures can be explained in two ways. First, agents prefer not to pay taxes if they do not see benefits from public policies financed with these taxes. Military expenditures (in contrast to health expenditures, for instance) do not provide tax-payers with direct tangible benefits, reducing agents' willingness to reveal their incomes. Second, military expenditures are usually the least transparent expenditures in the governments' budgets. This may increase the possibilities for improper use of budget resources. However, it is unlikely that there is a reverse causality: increasing shadow economy leads to an increase in military expenditures, because struggling with the shadow economy in the Baltic States is a task of police, not soldiers, expenditures for police being a part of the `other expenditures'.

In models 2-4 we extend model 1 with GDP per capita, and one of the socioeconomic variables: regulatory quality, corruption and the rule of law. In fact, we cannot insert all the variables into one equation, because they are highly correlated (see table 4 in the appendix), and the number of observation is relatively small. Therefore, we show three different equations. In these cases, based on the results of Hausman and Wooldrige tests, we do not use time-fixed effects and also provide ordinary standard errors. In all three cases, we received very similar results: the coefficient corresponding to military expenditures is positive and very significant. Health expenditures remained negative but became insignificant at the 0.1 significance level. Education expenditures changed their signs and remained insignificant. GDP per capita has a negative sign, and is highly significant in all cases. None of the three socio-economic variables has a significant coefficient, and only regulatory quality has the expected sign.

Tab. 2: Dependent variable: logit-transformed shadow economy

Variable	1 CFEF	2 CFEF	3 CFEF	4 CFEF	5 BFEF	6 BFEF	7 BFEF
Mil. exp.	0.1840**	0.1875***	0.1856***	0.1848***	0.1038***	0.1019***	0.1061***
	(0.0753)	(0.0436)	(0.0445)	(0.0446)	(0.0158)	(0.0172)	(0.0164)
Educ. exp.	0.0794	-0.0411	-0.0436	-0.0452			
	(0.1525)	(0.0880)	(0.0891)	(0.0906)			
Health exp.	-0.2945**	-0.0740	-0.0729	-0.0701	0.0158	0.0200	0.0013
	(0.1034)	(0.0687)	(0.0687)	(0.0689)	(0.0194)	(0.0186)	(0.0212)
Other exp.	-0.0095	-0.0466	-0.07015	-0.0548			
	(0.0997)	(0.0571)	(0.0479)	(0.0602)			
GDP/cap.		-0.1718***	-0.1824***	-0.1918***	0.1253***	0.1494***	0.1500***
		(0.0344)	(0.0285)	(0.0470)	(0.0235)	(0.0272)	(0.0346)
Regul. qual.		-0.2062			-0.0284**		
		(0.3622)			(0.0120)		
Corruption			0.0512			-0.0872*	
			(0.1740)			(0.0489)	
Rule of law				0.0608			-0.1549
				(0.2602)			(0.1035)
R^2	0.6334	0.8755	0.8737	0.8735	0.6811	0.6937	0.6963
R^2-adj	0.2436	0.5724	0.5713	0.5711	0.3405	0.3470	0.3481
N	26	26	26	26	36	36	36

* p < 0:1
** p < 0:05
*** p < 0:01 significance level
CFEF - country fixed effects
BFEF - Both (country and time) fixed effects

It is often considered that in the absence of time-fixed effects, the model represents global dependence between variables. Therefore, we can conclude that the global dependence between military expenditures and the size of the shadow economy is positive. Higher health expenditures are likely to have a negative impact on the shadow economy; however, probably because of a small number of observations, we cannot reject a hypothesis that the impact is equal to zero in most of the cases. The global dependence between GDP per capita and the size of the shadow economy is negative.

Education and other expenditures have a smaller number of observations than other variables. Hence, in models 5-7 we present estimation results having omitted these factors. In these cases we include time-fixed effects to the model because Hausman test provides p-values lower than 0.01. Moreover, we provide standard errors, which are robust for auto-correlated residuals (the highest p-value is $8*10^{8}$). In the presence of time fixed effects, the impact of global trends in variables are removed. Moreover, time fixed effects remove the impact of different political regimes and common structural breaks. Only deviations from global trends do matter.

In models 5-7 the coefficient corresponding to military expenditures declined, but it remained positive and highly significant. This result is rather logical, because it basically means that global trends in military expenditures have a higher impact on the shadow economy than short-run deviations from the global trend. It is very likely that people deciding whether they wish to hide or disclose their incomes do observe global trends in government expenditures. However, it would be rather surprising if deviations from the trends used in models 5-7 do indeed affect their decisions. Probably, this result shall be attributed to a higher level of improper use of budget resources in the military sector compared to the other sectors of the economy.

Health expenditures changed their sign and remained insignificant at the 0.1 significance level. The change in sign can be explained as follows: It is likely that agents observe general trends which exist in the government expenditures for health. Most people use public health services at some time, getting direct benefits from these government expenditures; therefore, they do not mind paying taxes, which finance such activities. This behaviour is captured by models 1-4. On the other hand, it is doubtful that agents keep track of all short-run changes in public expenditures. If we remove long-run trends with fixed effects, the result does not hold anymore. However, as the coefficient is insignificant, the change in its sign may also be attributed to randomness.

GDP per capita changed its sign and remained highly significant. Such a difference with models 2-4 is not surprising, because many people in the Baltic States receive salaries, which consist out of the official and unofficial parts. Under a temporal increase in income, captured by models 5-7, people do not rush do disclose their benefits; however, the steady growth in income, which is captured by equations 2-4, provides more incentives for people to legalise the gray parts of salaries.

It is interesting that, in model 5, regulatory quality is significant at the 0.05 significance level, in model 7, the rule of law is insignificant even at the 0.1 level.[6] However, R^2 is higher in model 7 than in 5. We take model 7 for further analysis and robustness checks.

[6] The corresponding p-value is equal to 0.1519.

We used the logit transformation for our dependent variable modification. This makes marginal effects more complicated. In order to calculate marginal effects of an increase in military expenditures, we used model 7. We estimated marginal effects of military expenditures to be 0.0216 in Estonia, 0.0209 in Latvia and 0.0230 in Lithuania in 2014. However, these numbers are not very intuitive neither. To facilitate the intuition of the estimates, we also calculate how much the size of the shadow economy would increase, if the size of military expenditures as a percentage of GDP doubled. In Estonia, such an expansion would have led to an increase in the size of the shadow economy from 27.1 till 30.1 per cent of GDP, in Latvia from 24.7 till 26.1, and in Lithuania from 27.1 till 28.4 in 2014. These changes where calculated keeping in mind the nonlinear nature of the logistic transformation.

Table 3 presents more counterfactual results. First, we estimated how much the shadow economy increased or declined between 2003 and 2014 due to the actual increase or decline in military expenditures. In Estonia military expenditures raised 15.52% increasing the shadow economy by 1.41% of GDP. In Lithuania, the impact is limited by 0.04%. In Latvia, military expenditures declined, the impact of this change on the size of shadow economy being negative. Next, we estimated that an increase in military expenditures by 10% in 2014 would have raised the shadow economy by 0.1-0.3% of GDP, the impact for Estonia being the largest.

Tab. 3: Counterfactual analysis.

Estonia		Latvia		Lithuania	
Δ Mil. exp. %	Δ Shadow % of GDP	Δ Mil. exp. %	Δ Shadow % of GDP	Δ Mil. exp. %	Δ Shadow % of GDP
15.52% (2003-2014)	0.43%	-0.88% (2003-2014)	-2.89%	1.92% (2003-2014)	0.04%
10% (2014)	0.29%	10% (2014)	0.13%	10% (2014)	0.13%
100% (2014)	2.97%	100% (2014)	1.37%	100% (2014)	1.33%

In model 7, Augmented Dickey-Fuller Test rejects the hypothesis of a unit root existence in the residuals at the 0.05 significance level, the corresponding p-value being equal to 0.015. Phillips-Perron Test gives a p-value of 0.018. However, normality tests reject the hypothesis that the residuals are normal (Kolmogorov test gives a p-value of $1.6*10^{8}$). Therefore, we may expect that the significance of the coefficients presented in table 2

can be lower than the reported results. Nevertheless, t-test is a robust test, and the deviation from the reported significance levels should not be large.

4 Robustness

In this section, we provide robustness tests of the results. First, we take model 7 in table 2 as a benchmark, and try different functional forms. The results are presented in table 3. In model 1, we take a logarithm of the shadow economy as a percentage of GDP and explanatory variables enter the model linearly. In model 2, we take a logarithm of both dependent and explanatory variables. In model 3, the functional form is linear. In all three models military expenditures have a positive and highly significant impact. GDP per capita have a positive impact; in 2 models out of 3 it is highly significant, and in the log-log form it is insignificant at the 0.1 significance level, but its sign remained unchanged. Health expenditures and the rule of law remained insignificant in all the cases for reasonable significance levels.

Tab. 4: Dependent variable: Shadow economy or its transformation

Variable	1 log-linear	2 log-log	3 linear	4 differences	5 IV	6 lags
Mil. exp.	0.0763***	0.0857***	2.1343***	0.0466***	0.0725*	0.1043***
	(0.0113)	(0.0219)	(0.3606)	(0.0286)	(0.0378)	(0.0286)
Health exp.	0.0009	-0.0056	0.0286	0.0257		-0.0458
	(0.0152)	(0.0180)	(0.4369)	(0.0199)		(0.0495)
GDP/cap.	0.1219***	0.0113	2.4294***	0:1068***	0:1525*	0.1217***
	(0.0255)	(0.0707)	(0.6799)	(0.0320)	(0.0846)	(0.0295)
Rule of law	-0.1207	-0.00152	-2.7332	-0.1125***	-0.4091**	-0.1650**
	(0.0741)	(0.0105)	(2.1070)	(0.0277)	(0.1768)	(0.0641)
R^2	0.7131	0.5043	0.6636	0.2369	0.7022	0.5124
R^2-adj	0.3566	0.2521	0.3318	0.1292	0.3617	0.2562
N	36	36	36	33	33	36

* p < 0:1
** p < 0:05
*** p < 0:01 significance level

In column 4, we differentiated equation (1) having eliminated country-fixed effects, and estimated the model for the first-order differences. The coefficients for military expenditures, GDP per capita and the rule of law are highly significant with the same signs.

The models presented in table 2 may suffer from endogeneity, because there can be omitted variables, correlated both with military expenditures and the residual of the model. To address this problem we used an instrumental variables approach, with the lagged variables used as instruments. In fact, if we take the functional the same as in model 7 in table 2, all coefficients become insignificant at the 10% significance level. But this may happen due to a small number of degrees of freedom, which is the consequence of a small number of observations and a large number of parameters. If we

remove health expenditures from the model (table 3, column 5), which are insignificant anyway, military expenditures become significant at the 10% significance level, the corresponding coefficient being smaller than those reported in table 2.

Finally, model 6 presented in table 3 is similar to model 7 in table 2, with the difference that explanatory variables were taken with a one year lag. The advantage of this approach is that causality is clear (explanatory variables at t-1 affect the endogenous variable at t and not vice versa.) The size and significance of the coefficient corresponding to the military expenditures remained approximately the same as in model 7 (table 2). The other parameters also haven't changed greatly, the coefficient corresponding to the rule of law becoming significant at the 0.05 significance level.

Therefore, we can draw a conclusion that higher military expenditures indeed lead to a higher shadow economy, and this result is robust to different model specifications.

5 Discussion and conclusions

We showed that there is a positive dependence between the size of the shadow economy and military expenditures in the Baltic States. We attribute this dependence to the fact that usually civilians do not get direct benefits from this spending, and they do not understand the importance of this spending. Therefore, they tend not to declare their incomes. The second explanation could be that military expenditures are the least transparent expenditures in the government budgets; consequently, there can be more opportunities for a misuse of budget resources. The other expenditures do not have a statistically significant impact on the size of the shadow economy. In the absence of time-fixed effects, the link between the GDP per capita and the size of the shadow economy is negative, implying that the global trend increasing the real GDP per capita, also leads to a decline in the shadow economy. However, if time-fixed effects are included, the dependence between these two variables is positive. This means that if agents get a temporal increase in their benefits, they do not rush to disclose it.

As policy suggestions to governments, we could suggest to make more effort to explain to people the need for military expenditures and make them as transparent as possible. Also, there could be a better control for the use of budget funds to prevent their misuse.

Suggestions for future research would be to check whether similar results hold for Western Europe, other post-Soviet countries and Latin America. Also it would be useful to verify the results on longer time series, when more data become available.

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Appendix

Tab. 5: Correlation matrix

Variable	1	2	3	4	5	6	7	8	9
Shadow	1								
Mil. exp.	0.1455	1							
Educ. exp.	0.0514	0.1772	1						
Health exp.	-0.0164	0.2553	0.4221	1					
Other exp.	-0.6206	0.4579	-0.8703	-0.1552	1				
GDP/cap.	-0.1627	0.2993	-0.0029	0.6090	0.0655	1			
Regul. qual.	0.1511	0.1765	-0.3180	0.2733	0.2799	0.6061	1		
Corruption	0.1721	0.2022	-0.3747	0.2024	0.3441	0.4459	0.9172	1	
Rule of law	-0.1333	0.2399	-0.3796	0.3824	0.4517	0.6875	0.8949	0.8810	1

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