Montenegrin Journal of Economics

ELIT
Economic Laboratory Transition
Research Podgorica

Effects of Military Spending on the Size of Shadow Economy: An Empirical Investigation

TOAN KHANH PHAM TRAN[1]

[1] Graduate School, Ho Chi Minh City Open University, Viet Nam, e-mail: khanhtoan014@gmail.com; toantpk.19ae@ou.edu.vn

ARTICLE INFO

ABSTRACT

Despite the extensive literature on the military spending, little is known about the empirical relationship between military spending and the size of shadow economy. This study investigates the impact of military spending on the shadow economy for 30 Asian economies from 1995 to 2017 by applying DOLS, and FMOLS techniques. Empirical finding indicates that an increase in military spending leads to an expansion of the informal economy. Our empirical results also show that enhancing economic growth and attracting more foreign direct investment appears to reduce the shadow economy in Asian countries. Therefore, policies targeting reducing the shadow economy should be considered with conventional economic policies on economic growth, trade, and unemployment.

INTRODUCTION

In the last decade, there has been a renewed emphasis on the issue of the shadow economy, both in academic and policy. The shadow economy encompasses all economic activities carried out by workers and economic units that, for both legal and practical reasons, are not or inadequately covered by formal systems (OECD/ILO, 2019). The global size of the shadow economy is alarming, and it continues to be a highly persistent, ubiquitous, and complex economic phenomenon (Medina and Schneider, 2018). Over the period 1990-2018, the shadow economy accounted for 32-33 percent of global GDP.

Given its importance in proposing and implementing economic policy, scholars and policymakers have good reasons to identify the drivers of the shadow economy (Elgin and Erturk, 2019). A substantial body of literature has identified the factors influencing the size of the shadow economy. Among the leading causes of the expansion of informality are tax burden (Dell'Anno and Solomon, 2008; Schneider and Enste, 2000), unemployment (Prado, 2011; Balanton and Peksen, 2019), and institutional quality (Friedman, et al., 2000; Schneider and Enste, 2000).

Due to the evolution of socioeconomic structures in recent decades, analyzing and identifying factors of the shadow economy is still ongoing. According to our review of the literature, military spending does not receive much attention from researchers conducting empirical studies on the shadow economy. Furthermore, the recent economic crisis has highlighted the long-term unsustainable nature of budget deficits, forcing the government to reconsider the need for various types of government spending. Military spending is one of the most contentious areas of government spending. There is a substantial body of research on the effects of military spending on various macroeconomic indicators such as economic growth, employment, income inequality, and the environment (Ali and Solarin, 2020; Desli and Gkoulgkoutsika, 2021). Military spending, in particular, may have positive spillover effects on employment, infrastructure, and a variety of social benefits such as health and education. All of these factors may have an impact on the size of the economy. For these reasons, we will concentrate on the impact of military spending on the shadow economy in this paper.

The Asian countries provide a fruitful research context to investigate this critical relationship. The countries studied account for more than half of global defense spending, with China, India, Japan, and South Korea ranking among the top ten in defense spending over three decades. Furthermore, many Asian countries have a large shadow economy, which accounts for about 28% of national GDP on average. The COVID-19 pandemic has had a particularly severe humanitarian and economic impact on Asian countries.

The remainder of this paper is organized as follows. Section 2 of the paper presents and synthesizes the literature review on the relations between the variables under consideration. Section 3 describes the data and methodology. Empirical findings and discussions are shown in Section 4, followed by the conclusions and implications in Section 5 of the paper.

1. LITERATURE REVIEW

The shadow economy has long been at the center of academic studies and economic policy debates because of both its pervasiveness and its complex relationship with the development outcomes (Dell'Anno, 2021). The review of literature on shadow economy is also referred to as informal economy, undeclared economy, underground economy, or black economy…. It ensures a taxonomic understanding of shadow economy which enables cross-disciplinary linkages: legal, political, social, and cultural connections (Davidescu et al., 2022). Measurement the size of the shadow economy is a difficult task since it is a fuzzy concept. Despite the fact that methods for assessing the shadow economy have been analyzed for a long time, it is still an open issue. The three basic estimation techniques are direct, indirect, and model-based approaches (Psychoyios et al., 2021) Previous studies has identified tax burden, economic growth, unemployment, and institutional quality as the primary drivers of the existence and growth of the shadow economy (Goel and Nelson, 2016; Wu and Schneider, 2019).

Nonetheless, the impacts of military spending on the shadow economy have received little attention. We consider that military spending might be a key determinant for the shadow economy for the following reasons. First, military-controlled property, such as land and real estate, can be misused for illegal economic activities (Gupta et al., 2001). Second, military expenditures are the most opaque expenditures made by governments. This increases the potential for corruption, and illegal incomes can increase demand for goods and services produced in the shadow sector. It is also known that the size of shadow economy depends on the effectiveness of the government to provide public goods and services (Johnson et al., 1999). In general, people tend to work legally if they understand that their contributions will return to them in the form of public goods (Alm et al., 1992; Alm et al., 1995; Kanniainen et al., 2004). However, not all people understand the usefulness of military expenditures, or at least, the obtained feeling of safety does not outweigh the tax burden used for financing these expenditures. Consequently, a number of people prefer to operate in shadow economy if military expenditure grows.

2. RESEARCH METHODOLOGY

2.1 Data sources

This study covers 30 Asian countries over the period 1995-2017. A list of countries is presented in Table 1.

Table 1. List of countries included in the analysis

Armenia	Iran, Islamic Rep.	Malaysia	Sri Lanka
Azerbaijan	Israel	Mongolia	Syrian Arab Republic
Bahrain	Japan	Myanmar	Thailand
Bangladesh	Jordan	Oman	Turkey
Brunei Darussalam	Kazakhstan	Pakistan	United Arab Emirates
China	Kuwait	Philippines	Yemen, Rep.
India	Korea, Rep.	Saudi Arabia	
Indonesia	Lebanon	Singapore	

The variables considered come from several reputable sources – see Table 2 for variable sources, and definitions. The shadow economy is collected from Elgin, Kose, Ohnsorge, and Yu (2021). Data on military spending, economic growth, unemployment, and foreign direct investment are from the World Development Indicators. Meanwhile, the data for institutional quality proxied by corruption is extracted from International Country Risk Guide (ICRG), published by Political Risk Services (PRS).

Table 2. Description of variables and measurement

No.	Variable	Measurement	Abbreviation	Source
1	Shadow economy	The size of shadow economy (per cent of GDP)	SE	
2	Military spending	Military expenditure (per cent of GDP)	MS	World Development Indicators
3	Institutional quality	An index measuring the risk of political corruption based on expert ratings from 0 to 6 with higher number denoting less corruption	IS	International Country Risk Guide
4	Economic growth	GDP growth (annual %)	GDPg	World Development Indicators
5	Unemployment	Unemployment, total (% of total labor force) (modeled ILO estimate)	UE	World Development Indicators
6	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	FDI	World Development Indicators

2.2 Research model

The following general equation is used to explore the impacts of military spending on the shadow economy for 30 Asian countries from 1995 to 2017

$$SE_{it} = \beta_0 + \beta_1 MS_{it} + \beta_2 IS_{it} + \beta_3 GDPg_{it} + \beta_4 UE_{it} + \beta_5 FDI_{it} + \varepsilon_{it} \qquad (1)$$

in which *i* and *t* represent a country and time, respectively. SE stands for shadow economy size. MS represents military spending, while GDPg, UE, and FDI stand for economic growth, unemployment and foreign direct investment, respectively.

Table 3 presents the descriptive statistics of all variables. The largest and smallest sizes of the shadow economy are 60.6 per cent and 10.31 per cent of the national GDP. The average size of the shadow economy of the Asian countries is about 28.5 per cent GDP. The mean value of military spending is about 3.594 with a standard deviation of 2.397, a minimum of 0.571, and a maximum of 14.311 per cent GDP.

Table 3. Descriptive statistics

	Observations	*Mean*	*Std. Dev.*	*Min*	*Max*
SE	690	28.527	12.288	10.317	60.600
Δ SE	660	-0.074	0.457	-2.489	2.322
MS	690	3.594	2.397	0.571	14.311
ΔMS	660	-0.052	0.600	-3.452	4.721
INS	690	2.506	0.8776	1	5
ΔINS	660	-0.036	0.305	-2.25	1.333
GDPg	690	0.046	0.047	-0.279	0.345
ΔGDPg	660	-0.007	0.046	-0.291	0.187
UE	690	5.884	3.8886	0.25	19.01
ΔUE	660	0.029	0.695	-2.799	4.582
FDI	690	3.916	6.346	-37.172	55.073
ΔFDI	660	0.052	4.390	-37.984	50.188

Notes: SE: Shadow economy; MS: Military spending; INS: Institutional quality; GDPg: GDP growth rate; UE: Unemployment; FDI: Foreign direct investment

3. EMPIRICAL RESULTS AND DISCUSSIONS

3.1 The cross-sectional dependence test

The cross-sectional dependence, which may cause inefficiency in the results, frequently happens in the panel data estimation. The Pesaran CD (2004) test is used to examine cross-sectional dependence in this study. Table 4 presents the results of the test. At the 1 per cent significance level, the hypothesis of cross-sectional dependence cannot be accepted. This finding indicates that the panel unit root test is more reliable when the first difference of variables is used in the analysis.

Table 4. Cross-section dependence test results

Variables	*SE*	*MS*	*INS*	*GDPg*	*UE*	*FDI*
CD test	37.274***	13.249***	12.432***	37.423***	13.225***	5.113***
p-value	0.000	0.000	0.000	0.000	0.000	0.000

3.2 The panel unit root test

The panel unit-root test is employed to examine the stationarity for variables used in our paper. We utilize the panel unit-root test by Pesaran (2003) to examine the stationarity and determine the integration order of the concerned variables. Results from Table 5 indicate that all variables are stationary at the first difference. These results imply that a long-run co-integrating relationship among the variables used in our analysis is possible.

Table 5. Panel unit root test results

Variables	Level		First Difference		Order of Integration
	Constant (1)	Constant and Trend (2)	Constant (3)	Constant and Trend (4)	
SE	-1.246** (0.038)	-1.143 (0.115)	-4.965*** (0.000)	-2.733*** (0.000)	I (1)
MS	-1.445** (0.027)	-2.147** (0.017)	-6.544*** (0.000)	-3.154*** (0.000)	I (1)
INS	-1.155 (0.147)	0.683 (0.654)	-6.145*** (0.000)	-3.451*** (0.000)	I (1)
GDPg	-0.741 (0.254)	-1.445* (0.061)	-3.254*** (0.000)	-4.654*** (0.000)	I (1)
UE	-2.125** (0.035)	0.981 (0.744)	-1.541*** (0.000)	-4.655*** (0.000)	I (1)
FDI	-5.251** (0.045)	-1.558** (0.037)	-6.485*** (0.000)	-5.575*** (0.000)	I (1)

Notes: *, **, *** significant at 10 per cent, 5 per cent and 1 per cent level, respectively. The p-values are shown in parentheses. The Z[t-bar] is reported. SE: Shadow economy; MS: Military spending; INS: Institutional quality; GDPg: GDP growth rate; UE: Unemployment; FDI: Foreign direct investment

3.3 The panel cointegration test

We use Pedroni's (1999, 2004), Kao's (1999), and Westerlund (2005) residual cointegration tests to examine the long-run relationship among the variables. The results from these tests are presented in Table 6. Our results confirm that the null hypothesis of no cointegration cannot be accepted at the 5 per cent significance level. These findings imply a long-run relationship between military expenditure, corruption, and the infromal economy.

Table 6. Results of the cointegration test

	Statistics
Pedroni	
Modified Phillips-Perron t	5.769***
Phillips-Perron t	-3.422**
Augmented Dickey-Fuller t	-4.927**
Kao	
Modified Dickey-Fuller t	-19.287***
Dickey-Fuller t	-18.153***
Augmented Dickey-Fuller t	-13.872***
Unadjusted modified Dickey-Fuller t	-20.873***
Unadjusted Dickey-Fuller t	-19.726***
Westerlund	
Variance Ratio	17.739***

Notes: **, *** significant at 5% and 1% level, respectively

3.4 Empirical findings on the relationship between military spending and shadow economy

The relationship between military spending and shadow economy is examined using the panel DOLS estimator suggested by Kao and Chiang (2000) and the panel FMOLS estimator developed by Phillips and Hansen (1990).

Table 7. Empirical findings on the relationship between military spending and shadow economy using the DOLS and FMOLS estimation techniques

	DOLS	FMOLS
MS	0.257***	0.286***
INS	0.172***	0.152***
GDPg	-6.453***	-6.342***
UE	0.225***	0.219***
FDI	-0.043*	-0.054*

Notes: *, **, *** significant at 10 per cent, 5 per cent and 1 per cent level, respectively.
MS: Military spending; INS: Institutional quality; GDPg: GDP growth rate; UE: Unemployment; FDI: Foreign direct investment

The empirical results are shown in Table 7.

First, an increase in military spending contributes to the expansion of the shadow economy. This finding supports a crowding-out effect hypothesis, which considers that large military spending has long-term adverse effects on growth by crowding out civilian resources. This negative relationship has been confirmed by Chang et al., (2011), D'Agostino et al., (2020), Ali & Solarin (2020); Desli & Gkoulgkoutsika (2021). The modernization theory considers shadow economy behaves countercyclically, which means shadow economy expands while the formal economy contracts (Owolabi et al., 2022; Baklouti & Boujelbene, 2020).

Second, contrastly, institutional quality impacts negatively on the shadow economy. Institutions proxied by corruption incentivizing firms to move into the informal sector as they see bribery to obtain permits and licensing as another tax that they would like to avoid (Johnson et al., 1997). This result is in line with findings from Hibbs & Piculescu (2010) and Torgler & Schneider (2009) studies. Furthermore, our findings indicate that economic growth reduces the shadow economy. This finding supports the dualism and voluntarism schools of thought on informality, demonstrating that the shadow economy and formal economy are substitutes (Maloney, 2004; La Porta & Shleifer, 2014).

Informality would likely decline with greater prosperity due to increased opportunity costs of working in the shadows, as prosperity comes with more and better prospects in the formal sector, and strengthened monitoring of unlawful activities in wealthier nations (Goel & Nelson, 2016). This finding is consistent with studies by Baklouti & Boujelbene (2020), Njoya et al., (2022). Foreign direct investment might be associated with fewer informal activities by creating more employment (Blomström et al., 1997) and contributing to the official economic development (Romer, 1994; Li & Liu, 2005). Finally, unemployment increases the size of the shadow economy because high unemployment provides individuals more incentive to work unofficially to earn a living.

CONCLUDING REMARKS AND POLICY RECOMMENDATIONS

This study examines the effects of military spending on the shadow economy for 30 Asian countries from 1995 to 2017 by employing the DOLS and FMOLS estimation techniques. Our findings suggest a significant relationship between military spending and the shadow economy. Specifically, higher military spending, institutional quality is associated with a larger shadow economy. In addition, our empirical results also indicate that economic growth and increased foreign direct investment play an important role in declining the size of the shadow economy of the Asian economies. The results from our analysis also

demonstrate that an increase in unemployment significantly increases the size of the informal sector as workers have incentives to move into the informal sector to earn a living.

Policy implications have emerged based on the results of this study. We consider that the governments should carefully consider implementing a military policy with a clear understanding that increasing military spending may contribute to the expansion of informality. As policy advice, we could suggest that governments make more effort to explain the need for military spending and ensure greater transparency in military expenditure. In addition, for the Asian countries, the key drivers leading to the reduction of the shadow economy are economic growth and attracting foreign direct investment. Policymakers should implement supportive policies to boost economic growth in their economic development agenda. In addition, controlling unemployment appears to play an essential role in reducing shadow economy size. Simultaneous policies to attract foreign direct investment should also be considered. Firms can enjoy noted benefits from foreign direct investment, leading to creating more employment in the official sector, thereby reducing the incentive for people to engage in the underground. In conclusion, we advocate for a comprehensive set of policies targetting at reducing the shadow economy. We consider that policies tackling the shadow economy should be considered in conjunction with other conventional policies supporting economic growth and trade and addressing high unemployment.

REFERENCES

Ali, H.E., Solarin, S.A. (2019), "Military Spending, Corruption, and the Welfare Consequences", *Defence and Peace Economics*, Vol. 31, pp. 677-691.

Baklouti, N., Boujelbene, Y. (2020), "A simultaneous equation model of economic growth and shadow economy: Is there a difference between the developed and developing countries?", *Economic Change and Restructuring*, Vol. 53, No. 1, pp. 151-170.

Blanton, R.G., Peksen, D. (2019), "Labor laws and shadow economies: A cross-national assessment", *Social Science Quarterly*, Vol. 100, No. 5, pp. 1540-1565.

Blomström, M., Fors, G., Lipsey, R.E. (1997), "Foreign direct investment and employment: home country experience in the United States and Sweden", *The Economic Journal*, Vol. 107, No. 445, pp. 1787-1797.

Chang, H.C., Huang, B.N., Yang, C.W. (2011), "Military expenditure and economic growth across different groups: A dynamic panel Granger-causality approach", *Economic Modelling*, Vol. 28, No. 6, pp. 2416-2423.

d'Agostino, G., Dunne, J.P., Lorusso, M., Pieroni, L. (2020), "Military spending, corruption, persistence and long run growth", *Defence and Peace Economics*, Vol. 31, No. 4, pp. 423–433.

Davidescu, A.A., Petcu, M.A., Curea, S.C., Manta, E.M. (2022), "Two faces of the same coin: Exploring the multilateral perspective of informality in relation to Sustainable Development Goals based on bibliometric analysis", *Economic Analysis and Policy*, Vol. 73, pp. 683-705.

Dell'Anno, R., Solomon, O. H. (2008), "Shadow economy and unemployment rate in USA: is there a structural relationship? An empirical analysis", *Applied Economics*, Vol. 40, No. 19, pp. 2537-2555.

Dell'Anno, R. (2021), "Theories and definitions of the informal economy: A survey", *Journal of Economic Surveys*, https://doi.org/10.1111/joes.12487.

Desli, E., Gkoulgkoutsika, A. (2021), "Military spending and economic growth: a panel data investigation", *Economic Change and Restructuring*, Vol. 54, No. 3, pp. 781-806.

Elgin, C., Erturk, F. (2019), "Informal economies around the world: Measures, determinants and consequences", *Eurasian Economic Review*, Vol. 9, No. 2, pp. 221-237.

Elgin, C., Kose, M.A., Ohnsorge, F., Yu, S. (2021), "Chapter 2: Understanding the Informal Economy: Concepts and Trends" in *The Long Shadow of Informality: Challenges and Policies*, ed. by F. Ohnsorge and S. Yu, World Bank, Washington, DC.

Friedman, E., Johnson, S., Kaufmann, D., Zoido-Lobaton, P. (2000), "Dodging the grabbing hand: the determinants of unofficial activity in 69 countries", *Journal of Public Economics*, Vol. 76, No. 3, pp. 459-493.

Goel, R.K., Saunoris, J.W. (2014), "Military versus non-military government spending and the shadow economy", *Economic Systems*, Vol. 38 No. 3, pp. 350-359.

Goel, R.K., Nelson, M.A. (2016), "Shining a light on the shadows: Identifying robust determinants of the shadow economy", *Economic Modelling*, Vol. 58, pp. 351-364.

Gupta, S., De Mello, L., Sharan, R. (2001), "Corruption and military spending", *European Journal of Political Economy*, Vol. 17, No. 4, pp. 749-777.

Hibbs, D.A., Piculescu, V. (2010), "Tax toleration and tax compliance: How government affects the propensity of firms to enter the unofficial economy", *American Journal of Political Science*, Vol. 54, No. 1, pp. 18-33.

Johnson, S., Kaufmann, D., Shleifer, A., Goldman, M.I., Weitzman, M.L. (1997), "The unofficial economy in transition", *Brookings Papers on Economic Activity*, Vol. 1997 No. 2, pp. 159-239.

Kao, C. (1999), "Spurious regression and residual-based tests for cointegration in panel data", *Journal of Econometrics*, Vol. 90, No. 1, pp. 1-44.

Kao, C., Chiang, M.H. (2001), "On the estimation and inference of a co-integrated regression in panel data", *Advances in Econometrics*, Vol. 15, No. 1, pp. 179–222.

La Porta, R., Shleifer, A. (2014), "Informality and development", *Journal of Economic Perspectives*, Vol. 28, No. 3, pp. 109-26.

Li, X., Liu, X. (2005), "Foreign direct investment and economic growth: an increasingly endogenous relationship", *World Development*, Vol. 33, No. 3, pp. 393-407.

Maloney, W.F. (2004), "Informality revisited", *World Development*, Vol. 32, No. 7, pp. 1159-1178.

Medina, L. Schneider. F. (2018), "Shadow Economies around the World: What Did We Learn over the Last 20 Years?", African Department, *IMF Working Papers*, No. 18/17.

Njoya, L., Ibrahim, N., Asongu, S., Schneider, F. (2022), "The role of economic prosperity on informality in Africa: evidence of corruption thresholds from PSTR", European Xtramile Centre of African Studies, WP/22/012.

OECD/ILO (2019), *Tackling vulnerability in the informal economy*, OECD Publishing.

Owolabi, A.O., Berdiev, A.N., Saunoris, J.W. (2022), "Is the shadow economy procyclical or countercyclical over the business cycle? International evidence", *The Quarterly Review of Economics and Finance*, Vol. 84, pp. 257-270.

Pedroni, P. (1999), "Critical values for cointegration tests in heterogeneous panels with multiple regressors", *Oxford Bulletin of Economics and Statistics*, Vol. 61, pp. 653–670.

Pedroni, P. (2004), "Panel cointegration; asymptotic and finite sample properties of pooled time series tests, with an application to the PPP hypothesis", *Econometric Theory*, Vol. 20, No. 3, pp. 597-625.

Pesaran, M. H. (2003), "A Simple Panel Unit Root Test in the Presence of Cross Section Dependence", *Working Papers in Economics*, No. 0346, Faculty of Economics, University of Cambridge, Cambridge.

Pesaran, M.H. (2004), "General diagnostic tests for cross-section dependence in panels", *Cambridge Working Papers in Economics*, No. 0435.

Pesaran, M.H., Smith, R. (1995), "Estimating long-run relationships from dynamic heterogeneous panels", *Journal of Econometrics*, Vol. 68, No. 1, pp. 79-113.

Pesaran, M.H., Shin, Y., Smith, R P. (1999), "Pooled mean group estimation of dynamic heterogeneous panels", *Journal of the American Statistical Association*, Vol. 94, No. 446, pp. 621-634. P

hillips, P.C., Hansen, B.E. (1990), "Statistical inference in instrumental variables regression with I (1) processes", *The Review of Economic Studies*, Vol. 57, No.1, pp. 99-125.

Psychoyios, D., Missiou, O., Dergiades, T. (2021), "Energy based estimation of the shadow economy: The role of governance quality", *The Quarterly Review of Economics and Finance*, Vol. 80, pp. 797-808.

Romer, P.M. (1994), "The origins of endogenous growth", *Journal of Economic Perspectives*, Vol. 8, No. 1, pp. 3-22.

Schneider, F., Enste, D.H. (2000), "Shadow economies: Size, causes, and consequences", *Journal of Economic Literature*, Vol. 38, No. 1, pp. 77-114.

Torgler, B., Schneider, F. (2009), "The impact of tax morale and institutional quality on the shadow economy", *Journal of Economic Psychology*, Vol. 30, No.2, pp. 228-245.

Westerlund, J. (2005), "New simple tests for panel cointegration", *Econometric Reviews*, Vol. 24, No. 3, pp. 297-316.

Wu, D.F., Schneider. F. (2019), "Nonlinearity between the Shadow Economy and Level of Development", *IZA Discussion Papers*, No. 12385.