



Received: 7 June 2023

Received in revised form: 30 August 2023

Accepted: 31 August 2023

Fiscal Policy Effects on Shadow Economy: Empirical Evidence from Developing Countries

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Abstract

In most developing countries, the large size of the shadow economy is often attributed to ineffective macroeconomic policies, particularly fiscal policy. Additionally, any empirical analysis of the shadow economy, as well as policy recommendations that disregard the role of fiscal policy, would be incomplete and potentially misleading. Therefore, this present study empirically examines the impact of fiscal policy on the shadow economy in developing countries. Utilizing an annual panel dataset spanning 127 selected developing countries from 2002 to 2018, the study employs panel data estimation methods including fixed effects and system GMM. Overall, the study reveals that expansionary fiscal policy tends to reduce the size of the shadow economy, whereas contractionary fiscal policy increases it. Specifically, tax revenue contributes to the growth of the shadow economy, while government expenditure reduces its size. Furthermore, the study identifies a stronger impact of tax revenue compared to government expenditure on the shadow economy. The findings of this study imply that governments in developing countries can influence the size of the shadow economy through expansionary fiscal policies, with a particular emphasis on the structure of taxation. However, the effective utilization of government spending also proves to be a viable strategy for controlling the size of the shadow economy.

Keywords: fiscal policy; shadow economy; developing countries; GMM

JEL Classification: H30; O17; O10; C23

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1. Introduction

The global economy has witnessed remarkable expansion over the past few decades, resulting in growth in economies worldwide. Research into economic indicators indicates an expansion of the shadow economy in parallel with the formal economy (Medina et al., 2017). Shadow economic activities have become an integral part of daily life, and many of us contribute to such activities regularly.

Numerous studies, including those by Schneider et al. (2010) and Dybka et al. (2019), have revealed that in many countries, the value of the shadow economy exceeds 70% of the formal economy, with a significant contribution from the developing world. Elgin and Uras (2013) reported that during the period 1999–2007, the informal economy represented an average of 16% of GDP in developed countries, while its volume more than doubled in developing countries, making up approximately 38% of GDP. As per Schneider et al. (2010), the informal economy accounted for 19% of the official gross national income in OECD economies and 29% in developing economies in 2007. Additionally, Schneider and Enste (2000) observed that 75% of production occurs unofficially in developing nations.

Regarding economic activities measured as a percentage of total employment, Bacchetta and Bustamante (2009) estimated that in 2007, the shadow economy constituted around 10% in developed regions and roughly 60% in developing regions. The findings of Medina and Schneider (2018) indicate that the average size of the informal sector across 158 economies during the period 1991–2015 was 31.9%. The largest was observed in Bolivia, accounting for 62.3% of GDP. In certain developing countries, the shadow economy sector exhibits alarmingly high percentages, often surpassing 50% of official GDP.

However, the informal sector frequently serves as a substantial source of employment, particularly in economies burdened with elevated levels of unemployment. It offers jobs to individuals who might otherwise find themselves without employment opportunities (Schneider & Enste, 2000). Informal businesses have the agility to swiftly adapt to shifting market conditions and evolving consumer preferences, fostering innovation and enriching market diversity. They can even enhance competition and productivity within the formal sector by alleviating stringent regulations or providing outsourced services at a lower cost, thus catalyzing growth in the formal economy (Bovi & Dell'Anno, 2010). In such scenarios, the informal economy acts in harmony with the formal economy.

The phenomenon of the informal sector has garnered significant attention from scholars and government officials, aiming to discern its primary causes and devise an effective policy framework for curtailing its growth. In economies where the expansion of the shadow economy is prominent or where upward trends are noticeable, these shadow economies often signal underlying disruptions in the economic system, institutions, and regulations (Goel & Nelson, 2016).

The foremost objective for any government is the establishment of effective macroeconomic policies. In numerous developing countries, formal businesses and individuals grapple with elevated tax rates and intricate regulatory structures. This environment incentivizes them to elude taxes and engage in informal sector activities,

where they can evade the burdensome costs and complexities tied to compliance. Consequently, fiscal policies that prove ineffective in balancing revenue generation and the promotion of formal economic activities may inadvertently drive economic participants toward the shadow economy (Torgler & Schneider, 2007). As a result, in many developing countries, the substantial growth of the shadow economy can be attributed to inadequacies in macroeconomic policies (Tanzi, 2002; Ihrig & Moe, 2004). Furthermore, any empirical analysis of the shadow economy, along with policy recommendations, that overlooks the role of fiscal policy would render the analysis incomplete or potentially misleading.

Two schools of thought argued the fiscal policy effects on the shadow economy: i) the Voluntarist school of thought; and ii) the Legalist school of thought. According to the first school of thought, the shadow economy consists of businessmen or individuals who choose to work unofficially to escape taxes (Maloney, 2004; Brown & McGranahan, 2016). Higher tax rates decrease income levels, leading individuals to seek greater benefits by working in shadow economy activities to lower the tax wedge (Schneider et al., 2010; Dell'Anno, 2022). On the other hand, the second school of thought argues that better quality of public goods and services leads to minimizing transaction and production costs, increasing the advantages for individuals and businessmen to participate in the formal economy (Huynh & Nguyen, 2020). Therefore, if the government spends more on public goods and services, it can encourage people and business owners to engage in formal economic activities while discouraging them from taking part in shadow economic activities (Friedman et al., 2000). Hence, fiscal policy has the potential to both promote the formal economy and simultaneously control shadow economic activities.

The developing world is a focal point of discussion in this research because it provides valuable background for studying the after-mentioned issues due to its specific characteristics, such as the large size of shadow economies and ineffective macroeconomic policies. The average estimated size of the shadow economy in 127 selected developing economies for the period 2002–2018 is 36.89% of the formal GDP. The largest size is estimated in Georgia with 68.9% in 2009, while the smallest size is estimated in China with 11.2% of the official GDP in 2018 (Elgin et al., 2021).

In light of the above-discussed issues, this study explores the effects of fiscal policy instruments on the shadow economy in 127 selected developing countries. The literature has predominantly concentrated on the taxation effects on the shadow economy. However, there is a gap in research regarding the role of government expenditure in influencing the shadow economy. This gap is significant since the expenditure made by the government can not only reduce shadow economic activities by providing public goods and reducing poverty but also contribute to the development of the formal economy (Huynh & Nguyen, 2020). To address this gap, we argue that government expenditure can play a crucial role in controlling the expansion of the shadow economy by promoting economic growth, poverty reduction, and improving the provision of public goods.

The present study contributes to the existing literature in several significant ways. Firstly, unlike previous studies that have focused solely on taxes, or a limited number of studies that have examined government

expenditure, this study explores the impact of both factors on the shadow economy. By adopting this approach, a more comprehensive understanding of the relationship between fiscal policy and the shadow economy is achieved. Secondly, this study utilizes two distinct datasets of the shadow economy, as measured by MIMIC and DGE models in the research conducted by Elgin et al. (2021). This methodological choice enhances the robustness of the findings. By incorporating diverse datasets, a more comprehensive and nuanced analysis is made possible. Lastly, the study draws upon a substantial sample of 127 developing economies and incorporates the most up-to-date available data. This choice not only strengthens the generalizability of the findings but also enhances their relevance to a broader spectrum of countries. Overall, the present study's multifaceted approach and rigorous methodology significantly contribute to the advancement of our knowledge in this field.

2. Literature Review

2.1 Definition and Measurement of Shadow Economy

In the literature, various terms such as irregular, unrecorded, hidden, black, invisible, underground, moonlighting, parallel, and informal economy have been used to define the shadow economy. The nature of shadow economic activities seems to be different for taxation specialists, macroeconomists, national revenue accountants, labor economists, and criminologists (Dell'Anno & Davidescu, 2018). Therefore, the shadow economy has no universally accepted definition, and estimates of its size can differ depending on the technique employed. However, the present study followed the definition given by Schneider et al. (2010) that the shadow economy contains all economic activities that are not reported by official authorities for regulatory, institutional, and monetary reasons. Regulatory reasons include avoiding governmental bureaucracy or the burden of a regulatory framework. Institutional reasons include weak rules of law, high corruption, and low-quality political institutions. Monetary reasons include avoiding taxes and other social security contribution payments. This definition is used by Elgin et al. (2021), whose estimated data is employed in this research for empirical analysis.

The estimation or measurement approaches of the shadow economy include indirect, monetary, global indicators, latent variables, or model-based methods. Examples of indirect or survey-based methods are household surveys and enterprise or establishment surveys. Indirect methods are mostly applied to measure the narrow aspects of the informal sector economy. However, other methods have been used to measure much broader aspects. Currency demand and transaction approaches are examples of the monetary method. The studies carried out by Tanzi (1980, 1983) are one of the most significant works on the currency demand approach. Feige (1979, 1990) first introduced the transaction approach, which is a replacement for the currency demand approach. The study by Kaufman and Kaliberda (1996) developed a global indicator approach. Finally, the latent variables or model-based methods, developed by Frey and Weck-Hanneman (1984) and popularized by Schneider et al. (2010), involve identifying a set of causes and indicators of the informal sector economy. In the present study, we borrowed the data of the shadow economy from 'The Informal Economy Database of World Bank' developed by Elgin et al. (2021) study; they also used model-based methods (e.g., multiple

indicators multiple causes (MIMIC), and dynamic general equilibrium (DGE) model) to measure the shadow economy.

2.2 Fiscal Policy and Shadow Economy

According to the Keynesian school of thought, the government may apply fiscal policy to stabilize the economy by adjusting the rate of taxation and government spending, thereby influencing economic activity and aggregate demand (O'Sullivan & Sheffrin, 2003). On the other hand, endogenous growth models provide pathways by which fiscal policy can impact economic growth in the long run (Barro, 1990). The theoretical and empirical relationships between fiscal policy and the formal economy have been extensively examined in the past four to five decades. However, the linkages between fiscal policy and the informal sector are missing in the economic literature. Stankevicius and Vasiliauskaite (2014) argued that in the current economic situation, fiscal policy is one of the most important formal driving forces controlling the expansion of the informal sector. In a similar vein, Schneider et al. (2010) suggest that effective public policies, such as a moderate tax level and spending on productive public goods, can effectively reduce the shadow economy's size. Hence, this study presents fiscal policy with the two tools of tax revenue and government expenditure.

2.2.1 Tax Revenue and Shadow Economy

It is widely accepted in the literature that taxes play a significant role in driving the expansion of the shadow economy. The growth of the shadow economy in developing countries is primarily attributed to high tax rates and a substantial tax burden (Lyulyov et al., 2021). The tax burden on individuals and businesses is alleviated by concealing certain economic activities. In the case of indirect taxes, both buyers and sellers benefit; they collaborate to obscure some or all of their trading activities (Vousinas, 2017). In essence, to evade hefty taxes, individuals and businesspeople often turn to engage in shadow economic activities, which presents them with considerable advantages (Schneider & Enste, 2000). In developing countries, businesses derive greater advantages from participating in the informal economy to reduce production costs, evade high taxes, and offer their goods at lower prices to compete with the formal economy (Schneider et al., 2010).

Numerous studies have yielded consistent findings, establishing a robust and statistically significant association between tax rates and the shadow economy. Torgler and Schneider's (2007) comprehensive cross-country analysis revealed a significantly positive connection between high tax rates and the magnitude of the shadow economy. Likewise, Schneider and Enste (2000) conducted a study across countries, demonstrating a positive correlation between higher tax rates and larger shadow economies. Additionally, Gerxhani's (2004) investigation conducted in Albania underscored the substantial role played by the tax burden in driving the expansion of the informal sector. Bajada and Schneider (2005) further contributed to the understanding of this relationship by revealing a non-linear correlation, with the apex occurring at intermediate tax rates. The empirical findings of Schneider et al. (2010), Buehn (2012), and Hassan and Schneider (2016) have consistently established a significant positive relationship between the burden of taxes and the size of the shadow economy. A recent study conducted by Lyulyov et al. (2021) revealed that a 10% rise in tax rates correlates with a corresponding 1% increment in the shadow economy.

The literature also examines the effect of different types of taxes on the shadow economy. Schneider's (1986) research in Sweden, Norway, and Denmark demonstrates the significant effect of different direct and indirect taxes on the informal sector; he has found the expected positive and significant effect on the shadow economy. A recent study by Huynh & Nguyen (2020) indicates that direct and indirect tax burdens increase informal sector activities in developing Asian nations. Furthermore, indirect taxes can contribute to market inequalities as governments may impose taxes on some sectors but not others. Therefore, the first tool of fiscal policy is taxation.

2.2.2 Government Expenditure and Shadow Economy

The second instrument of fiscal policy is government expenditure. People's choices to either enter the informal sector or remain within the formal sector are notably influenced by government spending (Khan & Rehman, 2022). However, except for a handful of studies, the connection between government expenditure and the shadow economy has been largely overlooked in economic literature.

On one hand, as per Nchor and Adamec (2015), government spending enhances economic productivity, thereby diminishing informal sector activities. Huynh and Nguyen (2020) put forth three compelling reasons asserting that government spending can lower the extent of the informal sector. Firstly, government expenditure curtails the resources available to the informal sector and redirects them to the formal sector. Secondly, government spending boosts the growth rate through aggregate demand, subsequently leading to a reduction in unofficial activities within the official economy. The dualist perspective argues that economic growth is the primary tool against the shadow economy (Williams, 2014). Thirdly, increased government spending could result in greater provision of public goods and services, ultimately enhancing their quality. This, in turn, discourages businesses from engaging in the informal sector (Friedman et al., 2000). The legalist school of thought posits that improved public goods and services reduce business costs and offer incentives for participation in the formal economy (Dreher & Schneider, 2010). Utilizing cross-national data from 162 countries, Goel & Saunoris (2014) found a negative impact of military spending on the informal economy. Similarly, a study conducted by Goel & Saunoris (2016) revealed that government spending diminishes the size of the informal economy. In a similar vein, Berger et al. (2018), in an OECD study, demonstrated that the informal economy is adversely affected by total economic spending.

On the other hand, Dell'Anno & Davidescu (2018) put forth the argument that government expenditure can lead to the distortion of resource allocation. When the government allocates funds to specific programs or industries, it can introduce economic imbalances, resulting in inefficiencies and market distortions. This, in turn, might dissuade businesses and individuals from engaging in the formal economy and instead encourage their participation in the informal sector. Likewise, Schneider et al. (2010) and Mai & Schneider (2016) posited that an increase in government spending can trigger a crowding-out effect and disrupt market competition. With the expansion of the formal economy, competition may intensify, leading smaller businesses to exit the market. This could potentially drive these businesses to operate within the informal economy to evade competition. In a recent study by Khan & Rehman (2022), a positive correlation between government expenditure and the

shadow economy was established in both OIC and non-OIC countries. This suggests that the relationship between government spending and the shadow economy is not confined to any specific region or nation. Another recent study conducted by Tran et al. (2022) unveiled a beneficial impact of government expenditure on the informal sector economy in emerging markets. However, this relationship is undermined by the presence of a fiscal deficit.

3. Data and Methodology

3.1 Model Specifications

To explore the effects of fiscal policy instruments on the shadow economy, the present study proposes a model based on the Voluntarist and Legalist schools of thought, the above arguments, and previous studies. The following dynamic model has been developed to adapt to panel data:

$$SE_{it} = \gamma_0 + \gamma_1 SE_{it-1} + \gamma_2 FP_{it} + \gamma'_3 Z_{it} + v_i + \omega_t + \mu_{it} \quad (1)$$

In the above expressions, subscripts i shows the country and t shows the period. Where, v_i and ω_t are the country and period-specific effects, respectively, and μ_{it} is the usual error term. The expressions $\gamma_0, \gamma_1, \gamma_2, \gamma_3$ are the respective coefficients. The shadow economy (SE) is the dependent variable, and the regressors are fiscal policy (FP). Where Z represents the vector of control variables. Since, the present study measures fiscal policy through two tools, namely tax revenue and government expenditure. So, the estimation of model 1 is presented through the following two equations:

$$SE_{it} = \alpha_0 + \alpha_1 SE_{it-1} + \alpha_2 TAXR_{it} + \alpha'_3 Z_{it} + v_i + \omega_t + \mu_{it} \quad (1.1)$$

$$SE_{it} = \beta_0 + \beta_1 SE_{it-1} + \beta_2 GE_{it} + \beta'_3 Z_{it} + v_i + \omega_t + \mu_{it} \quad (1.2)$$

Where α, β : respective coefficients; v_i and ω_t are the country and period-specific effects respectively, and μ_{it} is the usual error term. Z represents the vector of control variables. In equation (1.1), tax revenue ($TAXR$) is added to represent fiscal policy. In equation (1.2), government expenditure (GE) is included to measure fiscal policy.

3.2 Data

The present study uses annual panel data from 127 developing economies for the period 2002–2018. The selection of time and economies is based on data availability. The time starts in 2002 because the Worldwide Governance Indicators database only covers continuous data starting in 2002 and due to the constraints in data availability (particularly the shadow economy), the time under investigation ends in 2018.

3.3 Variables

The variables selected for this study have effectively captured the four segments of the shadow economy: i) burden of tax and social security contributions; ii) level of regulatory intensity; iii) provision of public sector services; iv) size of the formal economy. By incorporating these segments, the study can provide a comprehensive assessment of the factors that influence the shadow economy. We selected the variables based on the previous studies by Schneider et al. (2010), Buehn and Schneider (2012), and Goel and Nelson (2016).

The shadow economy (SE) is the dependent variable in this study. Two independent estimates of the shadow economy are taken from the Informal Economy Database of the World Bank. Details regarding the definition, anticipated signs, and sources of all variables utilized in this study are presented in Table 1 and 2.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
SE	2081	36.894	10.92	11.173	68.913
SE1	2148	34.233	10.908	8.552	66.283
TAXR	1659	14.318	5.893	0.052	45.253
GE	1563	18.305	3.572	3.049	68.042
GDPG	2147	4.339	5.028	-36.392	86.827
COR	2159	0.433	0.686	-1.725	1.816
UNR	2159	7.932	6.41	0.11	37.25
EF	2021	57.604	8.347	21.4	79
FDI	2141	4.374	6.478	-17.081	103.337
FD	2142	0.226	0.147	0.029	0.739

Table 2: Variables of the study

Variable	Definition	Expected Signs	Sources
<i>Dependent Variables</i>			
SE	Shadow Economy as % of GDP (MIMIC-based Measure)		Informal Economy Database, WB
SE1	Shadow Economy as % of GDP (DGE-based Measure)		Informal Economy Database, WB
<i>Independent Variables</i>			
TAXR	Tax Revenue as % of GDP	+	GFS, IMF
GE	General Government Final Consumption Expenditure as % of GDP	-	GFS, IMF
<i>Control Variables</i>			
GDPG	GDP Growth (%)	-	WDI, WB
COR	Rescaled the control of corruption index in this study. Score (-2.5 (lowest corruption) to +2.5 (Highest Corruption))	+	WGI, WB
UNR	Unemployment Rate (%)	+	WDI, WB
EF	Economic Freedom Index: Score (0 (Lowest Freedom) to 100 (Highest Freedom))	-	Heritage Foundation
FDI	Inflows of Foreign Direct Investment as % of GDP	-	WDI, WB
FD	IMF's Financial Development Index: Score (0 (Lowest Financial Development) to 1 (Highest Financial Development))	-	FD, IMF

3.4 Econometric Methodology

Some prior studies have argued that the lagged value of the shadow economy can affect its current value, whereas the present shadow economy's size has to some extent relied on its past size (Berdiev et al., 2015; Huynh & Nguyen, 2020). Therefore, instead of static models, we examine dynamic forms of models (1.1) and (1.2), which are estimated by the Generalized Method of Moments (GMM) estimator. Many recent studies conducted on the shadow economy have also used the GMM estimator (e.g., Imamoglu et al., 2018; Huynh & Nguyen, 2020; Canh & Thanh, 2020; Khan & Rehman, 2022).

The GMM estimator is commonly divided into two types: "difference" GMM and "system" GMM. Difference GMM is based on first-differenced equations, where the endogenous variable is differenced once, while system GMM uses both levels and differences of the variables to construct moment conditions. System GMM is considered more efficient than difference GMM because it makes better use of the information contained in the data (Arellano & Bover, 1995). Moreover, it allows for the inclusion of more instruments than difference GMM, which can help mitigate the issue of weak instrument problems, especially in small time-series data, and system GMM is better able to handle unobserved heterogeneity than difference GMM (Blundell & Bond, 1998; Roodman, 2009). Furthermore, system GMM estimates cope with the problems of autocorrelation, heteroskedasticity, and endogeneity (Blundell & Bond, 1998). Therefore, the present study preferred system GMM over difference GMM for empirical analysis.

Arellano and Bond (1991) proposed two different types of tests to assess the empirical model. Firstly, the Hansen-J test is applied to verify the significance of the instruments and specifications of the model. Secondly, the Arellano and Bond test is conducted to test the hypothesis that the residuals obtained from the model estimations exhibit first-order correlation (AR1) but not second-order correlation (AR2). To check the reliability of the results, the study also uses the fixed effect as a benchmark.

4. Results and Discussion

The present study employs two estimators, namely the fixed effect estimator and the system GMM estimator, to estimate equations (1.1) and (1.2). The fixed effect estimator serves as a useful benchmark, while the GMM estimator is more robust and reliable. To address the heteroscedasticity and autocorrelation concerns in the standard errors, we have incorporated the 'robust' option in the Stata command when implementing both estimators. The 'xtabond2' procedure is used in Stata to implement the system GMM technique.

The empirical results and related test statistics for equation (1.1) are presented in Tables 3 and 4 for the fixed effect and system GMM, respectively. The individual impact of the tax revenue is examined in specification (1). The control variables are then included step by step in specifications (2) to (7), and in specification (8), all significant variables are included. The results from equation (1.2) are presented in Tables 5 and 6. In specification (1), only government expenditure is included as an explanatory variable in the model and examined its effects on the shadow economy. Then, add all control variables one by one in specifications (2) to (7), and in specification (8), all significant variables are included.

Following the estimation of system GMM, two types of tests are conducted. First, the findings from the Hansen-J tests demonstrate the suitability of the instruments employed in the study and the accurate determination of the specifications, as indicated by the significant p-values observed in all specifications. Second, the results obtained from the Arellano-Bond tests show no evidence of second-order serial correlation in the residuals (AR2) across all specifications.

Table 3: Tax revenue effects on shadow economy (Fixed Effect)

Variable	1	2	3	4	5	6	7	8
TAXR	0.174*** (0.024)	0.172*** (0.025)	0.167*** (0.024)	0.170*** (0.022)	0.166*** (0.027)	0.174*** (0.024)	0.184*** (0.025)	0.177*** (0.027)
GDPG		-0.025** (0.011)						-0.023** (0.008)
COR			1.419*** (0.232)					1.099*** (0.225)
UNR				0.141*** (0.029)				0.125*** (0.028)
EF					-0.066*** (0.016)			-0.040*** (0.014)
FDI						-0.020** (0.008)		-0.014 (0.008)
FD							-5.452*** (1.655)	-3.777*** (1.301)
Constant	35.32*** (0.358)	35.45*** (0.379)	34.87*** (0.376)	34.15*** (0.460)	39.07*** (0.963)	35.37*** (0.353)	36.12*** (0.425)	36.62*** (0.951)
Obs.	1,596	1,595	1,596	1,596	1,553	1,596	1,586	1,542
Groups	107	107	107	107	106	107	106	105
R-squared	0.497	0.504	0.542	0.534	0.510	0.502	0.519	0.596

Notes: In all estimated models, the dependent variable is the shadow economy (SE), a measure of the MIMIC-based model. TAXR is the tax revenue, GDPG is GDP growth, COR is the corruption index, UNR is the unemployment rate, EF is economic freedom, FDI is foreign direct investment, and FD is financial development. Time dummies are included in each model's estimation. Robust standard errors are shown in parentheses. ***p-values < .01, **p-value < .05, and *p-value < .1.

The findings from Tables 3 and 4 indicate that tax revenue has a significant and positive impact on the shadow economy across all eight specifications. This confirms that the primary factor contributing to the expansion of the shadow economy is the tax burden. The main reasons behind these results are that when the government imposes high tax rates on formal economic activities, individuals and businesses might be more inclined to engage in informal, unreported activities to evade taxes. High tax rates can create an incentive for individuals and businesses to operate in the shadow economy where tax evasion is more feasible. Furthermore, a complex and burdensome tax system can discourage compliance, leading to a larger shadow economy. If

individuals and businesses find it difficult to understand and calculate their tax obligations, they might opt for informal economic activities to avoid dealing with the complexity of the formal tax system.

Table 4: Tax revenue effects on shadow economy (System GMM)

Variable	1	2	3	4	5	6	7	8
L.SE	1.097*** (0.060)	1.101*** (0.051)	1.036*** (0.054)	1.074*** (0.056)	1.055*** (0.046)	1.112*** (0.052)	1.009*** (0.033)	0.990*** (0.046)
TAXR	0.184*** (0.021)	0.140*** (0.024)	0.183*** (0.020)	0.184*** (0.020)	0.195*** (0.021)	0.184*** (0.022)	0.177*** (0.014)	0.154*** (0.025)
GDPG		-0.071*** (0.017)						-0.099*** (0.015)
COR			0.352* (0.195)					0.269 (0.218)
UNR				0.061*** (0.019)				0.028 (0.022)
EF					0.021* (0.012)			0.095 (0.086)
FDI						-0.006 (0.004)		
FD							-1.907* (1.014)	-4.476* (2.471)
Constant	-6.253*** (2.319)	-5.632*** (1.969)	-4.203** (2.066)	-5.896*** (2.134)	-6.139*** (2.161)	-6.793*** (1.998)	-2.553* (1.405)	-6.450* (4.984)
Obs.	1,510	1,509	1,510	1,510	1,474	1,510	1,500	1,463
Groups	107	107	107	107	106	107	106	105
Instruments	20	32	24	24	26	25	50	26
AR(2)	0.170	0.227	0.173	0.188	0.146	0.167	0.163	0.481
Hansen-J	0.544	0.147	0.707	0.636	0.501	0.332	0.219	0.452

Notes: Same as Table 1, except that L.SE (dependent variable lag) is included.

These results are consistent with various empirical studies, such as Mai and Schneider (2016), Huynh and Nguyen (2020), and Canh and Thanh (2020), and support the perspective of the Voluntarist school of thought. According to this viewpoint, the shadow economy consists of businessmen or individuals who choose to work unofficially to evade taxes (Maloney, 2004; Brown & McGranahan, 2016).

The findings from Tables 5 and 6 indicate that government expenditure has a significant and negative impact on the shadow economy in all cases except Specification (5) of the system GMM, where government expenditure is found to be insignificant. This finding confirms that government expenditure restricts the growth of the shadow economy. This is because when the government allocates funds to improve public services such

as healthcare, education, transportation, and public utilities, it can reduce the incentives for individuals and businesses to engage in the shadow economy. As public services and infrastructure improve, the benefits of operating in the formal economy become more attractive, thereby reducing the need to evade taxes or regulations by participating in the shadow economy. Furthermore, government spending that promotes economic growth and job creation can contribute to a larger formal economy. With more job opportunities available in the formal sector, individuals are more likely to choose legal and legitimate employment over informal activities. These results are consistent with empirical studies such as Goel and Saunoris (2014), Nchor and Adamec (2015), Goel and Saunoris (2016), and Huynh and Nguyen (2020).

Table 5: Government expenditure effects on shadow economy (Fixed Effect)

Variable	1	2	3	4	5	6	7	8
GE	-0.117** (0.052)	-0.109** (0.049)	-0.109** (0.049)	-0.101* (0.052)	-0.109** (0.048)	-0.111** (0.050)	-0.112** (0.052)	-0.079* (0.048)
GDPG		-0.032*** (0.011)						-0.024* (0.014)
COR			1.124*** (0.332)					0.898*** (0.293)
UNR				0.155*** (0.039)				0.146*** (0.038)
EF					-0.036* (0.021)			-0.027 (0.022)
FDI						6.920 (0.008)		
FD							-2.896* (1.493)	-1.918 (1.441)
Constant	40.09*** (0.998)	40.06*** (0.939)	39.47*** (0.959)	38.48*** (1.058)	41.89*** (1.546)	40.07*** (0.965)	40.46*** (1.172)	39.59*** (1.610)
Obs.	1,544	1,540	1,544	1,544	1,479	1,535	1,535	1,466
Groups	98	98	98	98	97	98	97	96
R-squared	0.327	0.346	0.352	0.366	0.364	0.337	0.331	0.439

Notes: Same as Table 1, except that we added the variable government expenditure (GE) in place of the tax revenue (TAXR).

This finding further supports the argument from the Legalists' school of thought that a better quality of public goods and services minimizes transaction and production costs and increases the incentives for individuals and businesses to participate in the formal economy (Friedman et al., 2000; Elgin & Erturk, 2019). The findings from Tables 5 and 6 also indicate that utilizing government expenditure is an effective strategy for restricting the size of the shadow economy. According to Huynh and Nguyen (2020), there are three possible reasons to support this claim. Firstly, government spending redirects limited resources towards the formal economy, leading to a reduction of resources in the informal economy. Secondly, government spending

contributes to economic growth, which in turn reduces the informal economy. Lastly, allocating government expenditure towards public services may enhance their quality, thereby discouraging individuals from participating in informal activities.

Table 6: Government expenditure effects on shadow economy (System GMM)

Variable	1	2	3	4	5	6	7	8
L.SE	0.965*** (0.023)	0.983*** (0.025)	0.967*** (0.028)	1.035*** (0.044)	1.039*** (0.038)	0.970*** (0.025)	0.970*** (0.023)	0.976*** (0.041)
GE	-0.054** (0.024)	-0.025** (0.012)	-0.061** (0.026)	-0.066* (0.039)	-0.027 (0.051)	-0.056** (0.025)	-0.047** (0.019)	-0.019* (0.011)
GDPG		-0.091*** (0.015)						-0.111*** (0.013)
COR			0.403* (0.230)					0.492** (0.217)
UNR				0.085*** (0.028)				0.039* (0.021)
EF					0.074** (0.035)			-0.007 (0.034)
FDI						-0.004 (0.004)		
FD							1.439* (0.843)	1.228 (0.779)
Constant	2.210*** (0.830)	1.263 (0.874)	2.093** (0.983)	-0.682 (1.802)	-5.559* (3.295)	2.070** (0.886)	1.421 (0.950)	1.080 (2.965)
No of Obs.	1,449	1,445	1,449	1,449	1,391	1,440	1,440	1,378
Groups	98	98	98	98	97	98	97	96
Instruments	32	33	31	27	25	33	33	47
AR(2)	0.528	0.295	0.544	0.646	0.452	0.530	0.540	0.595
Hansen –J	0.234	0.614	0.277	0.338	0.147	0.203	0.422	0.558

Notes: Same as Table 1, except we added the variable government expenditure (GE) in place of tax revenue (TAXR) and included L.SE (lag of dependent variable).

The overall results indicate that in the developing world, the shadow economy is adversely impacted by expansionary fiscal policies, whereas positive effects stem from contractionary fiscal policies. Additionally, this study sheds light on other influential factors within the developing world that also affect the shadow economy. These factors include economic growth, corruption, unemployment, economic freedom, and financial development.

4.1 Robustness Checks

To ensure robustness and address the identification issues associated with utilizing tax revenue, government expenditure, and unemployment as independent variables in estimating the shadow economy (dependent variable) via the MIMIC model (Elgin et al., 2021), this present study use an alternate measure of shadow economy. Elgin et al. (2021) also employed the two-sector Dynamic General Equilibrium (DGE) model to estimate the size of the shadow economy, which comprises both the official and shadow economies. The data for the DGE-based measure of shadow economy by Elgin et al. (2021) is sourced from the Informal Economy Database of the World Bank. This DGE-based measure is used as a dependent variable for regression in Models 1.1 and 1.2. Detailed results can be found in the Appendices, specifically in Tables A1, A2, A3, and A4. The outcomes of this analysis reveal that expansionary fiscal policy leads to a reduction in the size of the shadow economy, while contractionary fiscal policy results in an increase in its size. Importantly, these results align with those obtained from the MIMIC-based measure of the shadow economy.

5. Conclusion

In many developing countries, the substantial size of the shadow economy can be attributed to ineffective macroeconomic policies, with fiscal policy playing a prominent role. Furthermore, any empirical investigation into the shadow economy and any policy recommendations that overlook the significance of fiscal policy would be lacking in thoroughness and might even lead to misguidance. Hence, this study takes on the task of empirically investigating how fiscal policy influences the shadow economy in developing countries. This is achieved by scrutinizing the impact of fiscal policy tools such as tax revenue and government expenditure.

By using annual panel data from 127 selected developing economies from 2002–2018, this study applies panel data estimation methods, including the fixed effect and system GMM. The overarching trend observed is that expansionary fiscal policy leads to a reduction in the size of the shadow economy, while contractionary fiscal policy causes it to expand. More specifically, the study finds that tax revenue contributes to an increase in the shadow economy's size, while government expenditure has the opposite effect of decreasing its size. Additionally, the outcomes highlight that the influence of tax revenue on the shadow economy is more pronounced than that of government expenditures. The study also identifies several other factors that contribute to the size of the shadow economy in the developing world, including economic growth, corruption, unemployment, economic freedom, and financial development.

Based on the findings, this study proposes that authorities in developing economies can exert influence over the expansion of the shadow economy through the implementation of expansionary fiscal policies. Notably, the findings underline that tax revenue wields a more substantial impact on the shadow economy than government expenditure. Consequently, governments should prioritize the structuring of their tax policies ahead of their expenditure strategies when crafting fiscal measures aimed at curtailing the growth of the shadow economy within the developing world.

Furthermore, this study suggests that the effective utilization of government expenditure also serves as a potent approach to curbing the expansion of the shadow economy. By directing government spending towards enhancing the quality of public services, the attraction of informal employment opportunities within the shadow economy can be mitigated.

However, the study underscores that solely relying on taxes for financing government expenditure might not be an optimal route for developing countries. Given the prevalent high volume of shadow economies in such nations, taxes are a primary contributor to their existence. Hence, a more comprehensive discussion is required on how to finance these expenditures. In tandem, complementary policies geared towards quelling the expansion of the shadow economy should encompass the enhancement of economic growth, fostering economic freedom, and promoting financial development, while concurrently addressing corruption and unemployment concerns.

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Appendices

Table A1: Tax Burden Effects on Shadow Economy (Fixed Effect)

Variable	1	2	3	4	5	6	7	8
TAXR	0.174*** (0.024)	0.172*** (0.025)	0.167*** (0.024)	0.170*** (0.022)	0.166*** (0.027)	0.174*** (0.024)	0.184*** (0.025)	0.177*** (0.027)
GDPG		-0.025** (0.011)						-0.023** (0.008)
COR			1.419*** (0.232)					1.099*** (0.225)
UNR				0.141*** (0.029)				0.125*** (0.028)
EF					-0.066*** (0.016)			-0.040*** (0.014)
FDI						-0.020** (0.008)		-0.014 (0.008)
FD							-5.452*** (1.655)	-3.777*** (1.301)
Constant	35.32*** (0.358)	35.45*** (0.379)	34.87*** (0.376)	34.15*** (0.460)	39.07*** (0.963)	35.37*** (0.353)	36.12*** (0.425)	36.62*** (0.951)
Obs.	1,596	1,595	1,596	1,596	1,553	1,596	1,586	1,542
Groups	107	107	107	107	106	107	106	105
R-squared	0.497	0.504	0.542	0.534	0.510	0.502	0.519	0.596

Notes: Same as Table 3, except that the shadow economy DGE-based measure is the dependent variable.

Table A2: Tax Revenue Effects on Shadow Economy (System GMM)

Variable	1	2	3	4	5	6	7	8
LSE1	1.048*** (0.052)	1.037*** (0.047)	1.034*** (0.055)	1.061*** (0.057)	1.025*** (0.044)	1.048*** (0.052)	0.920*** (0.049)	1.037*** (0.041)
TAXR	0.177*** (0.019)	0.135*** (0.022)	0.176*** (0.019)	0.177*** (0.018)	0.190*** (0.022)	0.177*** (0.018)	0.176*** (0.015)	0.139*** (0.024)
GDPG		-0.082*** (0.025)						-0.078*** (0.018)
COR			0.323* (0.172)					0.362 (0.234)
UNR				0.059*** (0.018)				0.0374* (0.020)
EF					0.019 (0.012)			
FDI						-0.003 (0.004)		
FD							-3.300** (1.437)	-0.419 (1.379)
Constant	-4.508** (1.885)	-3.133* (1.732)	-4.138** (1.976)	-5.263*** (2.006)	-4.792** (1.892)	-4.345** (1.841)	0.676 (1.854)	-3.025* (1.602)
No of Obs.	1,566	1,565	1,566	1,566	1,510	1,566	1,556	1,555
Groups	111	111	111	111	110	111	110	110
Instruments	20	22	21	21	30	21	40	53
AR(2)	0.149	0.202	0.162	0.180	0.164	0.149	0.153	0.242
Hansen –J	0.155	0.144	0.178	0.157	0.454	0.156	0.144	0.153

Notes: Same as Table 4, except that the shadow economy DGE-based measure is the dependent variable.

Table A3: Government Expenditures Effects on Shadow Economy (Fixed Effect)

Variable	1	2	3	4	5	6	7	8
GE	-0.117** (0.052)	-0.109** (0.049)	-0.109** (0.049)	-0.101* (0.052)	-0.109** (0.048)	-0.111** (0.050)	-0.112** (0.052)	-0.079* (0.048)
GDPG		-0.032*** (0.011)						-0.024* (0.014)
COR			1.124*** (0.332)					0.898*** (0.293)
UNR				0.155*** (0.039)				0.146*** (0.038)
EF					-0.036* (0.021)			-0.027 (0.022)
FDI						6.920 (0.008)		
FD							-2.896* (1.493)	-1.918 (1.441)
Constant	40.09*** (0.998)	40.06*** (0.939)	39.47*** (0.959)	38.48*** (1.058)	41.89*** (1.546)	40.07*** (0.965)	40.46*** (1.172)	39.59*** (1.610)
Obs.	1,544	1,540	1,544	1,544	1,479	1,535	1,535	1,466
Groups	98	98	98	98	97	98	97	96
R-squared	0.327	0.346	0.352	0.366	0.364	0.337	0.331	0.439

Notes: Same as Table 5, except that the shadow economy DGE-based measure is the dependent variable.

Table A4: Government Expenditures Effects on Shadow Economy (System GMM)

Variable	1	2	3	4	5	6	7	8
L.SE1	0.959*** (0.028)	0.975*** (0.030)	0.956*** (0.036)	0.990*** (0.036)	1.043*** (0.038)	0.962*** (0.031)	0.973*** (0.025)	0.975*** (0.039)
GE	-0.058** (0.027)	-0.023* (0.013)	-0.057** (0.025)	-0.053** (0.025)	-0.005* (0.032)	-0.061** (0.028)	-0.052** (0.023)	-0.018* (0.012)
GDPG		-0.089*** (0.015)						-0.110*** (0.015)
COR			0.425* (0.224)					0.504** (0.215)
UNR				0.095*** (0.023)				0.043* (0.023)
EF					0.091*** (0.029)			-0.011 (0.034)
FDI						-0.003 (0.005)		
FD							1.625* (0.875)	1.310* (0.789)
Constant	2.409** (0.951)	1.433 (0.944)	2.273** (1.117)	0.570 (1.199)	-6.993** (2.823)	2.176** (1.073)	1.263 (0.973)	1.149 (2.860)
No of Obs.	1,464	1,460	1,464	1,464	1,392	1,455	1,455	1,379
Groups	99	99	99	99	98	99	98	97
Instruments	30	33	31	33	34	31	31	44
AR(2)	0.551	0.259	0.542	0.609	0.436	0.554	0.562	0.598
Hansen –J	0.202	0.545	0.253	0.429	0.307	0.174	0.338	0.428

Notes: Same as Table 6, except that the shadow economy DGE-based measure is the dependent variable.