



ELIT

Economic Laboratory Transition
Research Podgorica

Montenegrin Journal of Economics

Nguyen, V.D., Duong, T.H.M. (2022), "Corruption, Shadow Economy, FDI, and Tax Revenue in BRICS: A Bayesian approach", *Montenegrin Journal of Economics*, Vol. 18, No. 2, pp. 85-94.

Corruption, Shadow Economy, FDI, and Tax Revenue in BRICS: A Bayesian approach

VAN DIEP NGUYEN¹, and TIEN HA MY DUONG²

¹ Ph.D., Lecturer, Faculty of Finance and Banking, Ho Chi Minh City Open University, Ho Chi Minh City, Vietnam.
E-mail: diep.nv@ou.edu.vn.

² Ph.D., Lecturer, Faculty of Economics and Public Management, Ho Chi Minh City Open University, Ho Chi Minh City, Vietnam.
E-mail: my.dth@ou.edu.vn.

ARTICLE INFO

Received April 02, 2021
Revised from May 07, 2021
Accepted June 10, 2021
Available online June 15, 2022

JEL classification: C11, E26, H21

DOI: 10.14254/1800-5845/2022.18-2.8

Keywords:

Bayesian approach;
Corruption;
FDI;
Shadow economy;
Tax revenue;
Gibbs sampler

ABSTRACT

The paper aims to test the hypothesis that corruption, shadow economy, and foreign direct investment (FDI) affect the BRICS economies' tax revenue collection. To accomplish this aim, we collected data from the Transparency International, World Development Indicators, and Worldwide Governance Indicators over the period 2001-2017. The Bayesian linear regression method simulated by the Monte Carlo Markov Chain (MCMC) technique through the Gibbs sampling algorithm is applied to uncover empirical results. The study indicates that the control of corruption has a strong positive impact on tax collection. Meanwhile, the shadow economy's size has a nonlinear relationship with the BRICS countries' tax revenue. Notably, this is an inverted U-shaped relationship. As long as the informality does not exceed the turning point, the shadow economy positively affects tax revenue collection. When the shadow economy's size is larger than this turning point, any further increase in the shadow economy can decrease the BRICS countries' tax revenue collection. Moreover, the results show that the size of FDI has a strong negative effect on these countries' tax revenue. We also find that GDP per capita and agriculture adversely affect tax collection, although their negative impact probabilities are different. In contrast, the Governance Index has a relatively strong positive effect on the BRICS economies' tax revenue collection.

INTRODUCTION

The government in any country needs tax revenue to finance public expenditures. A sound tax system is an essential condition to ensure a country's financial stability and economic growth. Moreover, a well-designed tax system can help reduce distortions and maximize social well-being. The researchers often argue about the factors that can influence tax collection in countries. Among the determinants of tax collection, a growing body of the literature examines the relationship and the effects of corruption, shadow economy and FDI on tax revenue collection.

Although there are different ways to define corruption, “*the most popular and simplest definition of corruption is that it is the abuse of public power for private benefit*” (Tanzi, 1998, p. 8). Previous studies investigate the impact of corruption on tax revenue collection and report a negative relationship between these two factors (Tanzi and Davoodi, 2000; Imam and Jacobs, 2007; Thornton, 2008; Arif and Rawat, 2018). In this regard, Feld and Frey (2007, p. 104) claim that people “may perceive their tax payments as contributions to the *bonum commune*”. Accordingly, when citizens perceive that the political process is fair and legitimate, they are willing to declare income honestly even if the public good they receive is not equivalent to the tax they pay. During the period 2001-2017, the BRICS’ Corruption Perceptions Index (CPI) ranges from 21 to 51, with an average value of 35.76. As this mean value is by far lower than 100 (no corruption), it denotes a relatively high level of corruption in these countries.

Another critical determinant of tax revenue collection is the shadow economy. According to Medina and Schneider (2019), the shadow economy or the informal economy can be defined as “*all economic activities which are hidden from official authorities for monetary, regulatory, and institutional reasons*” (Medina and Schneider, 2019, p. 4). The authors report that the average shadow economy size of 157 countries examined for 1991-2017 is 30.9% of GDP. On the theoretical front, an increase in the shadow economy's size causes a reduction in the official tax base and tax inputs, which can decrease the investment in public goods and services. Therefore, some studies suggest that the shadow economy's control can be conducive to tax collection in different countries (Kodila-Tedika and Mutascu, 2014; Mazhar and Méon, 2017; Neog and Gaur, 2020). However, other authors claim that the shadow economy can benefit a country's tax revenue under certain circumstances (Schneider and Enste, 2000; Schneider and Enste, 2002; Vlachaki, 2015).

Along with corruption and shadow economy, tax revenue is also determined by FDI. Although different empirical studies examine the impact of FDI on tax revenue, the results remain mixed and inconclusive. On the one side, FDI can positively indirectly influence tax revenue collection through promoting economic growth and employment (Bayar and Ozturk, 2018). On the other side, due to the growing competition for FDI, countries often provide tax exemptions and incentives to attract FDI. This policy can cause countries to lose a large amount of tax revenue. Therefore, the researchers warn that tax competition in some countries may lead to “*a race to the bottom*” (Tax Justice Network-Africa and ActionAid International, 2012).

This research, using the Bayesian approach, will shed light on the effect of corruption, shadow economy, and FDI on tax revenue of the BRICS over the period 2001-2017. The BRICS comprises five major emerging countries, namely Brazil, Russia, India, China, and South Africa. This group was formed in 2006 and was initially called “BRIC” before South Africa joined in 2010. These five countries collectively represent more than 40 percent of the global population and 30 percent of the territory. Moreover, the BRICS economies’ share in global GDP has increased significantly from 8 percent in 2001 to 24 percent in 2018 (Li, 2019). According to the World Development Indicators, the BRICS’ tax revenue for the 2001-2017 period ranges from 8.08% to 27.21% of GDP.

The remainder of the paper is structured as follows. Section 1 presents the literature review. Section 2 illustrates the research model and the methodology used in the paper, while section 3 mentions the main empirical results and discussion. Finally, the study concludes with some remarks.

1. LITERATURE REVIEW

Many authors indicate that corruption can have a corrosive effect on a country's tax revenue collection. Notably, Tanzi and Davoodi (2000) show that a one-point rise in the corruption index is related to 2.7% decrease in the tax-GDP ratio. They also add that a one-point corruption increase is connected to a 0.63% of GDP decrease in individual income taxes received. Imam and Jacobs (2007) examine the effect of corruption on tax revenue generation capacity in the Middle Eastern countries over the 1990-2003 period. The authors posit that the government revenue from taxes can increase if corruption decreases, especially in terms of trade taxes and excise taxes.

Likewise, Thornton (2008) examines a sample of 53 Middle East and African countries between 1984-2001. The author points out that corruption adversely impacts tax revenue, especially those collected from social security, domestic goods and services, and international trade transactions. Arif and Rawat (2018) analyze a panel dataset of 10 emerging and growth-leading economies (EAGLEs) during 2001-2015. The authors discover a significant positive relationship between corruption perception index and tax revenue. Thus, they suggest that the developing countries should introduce a strategy that may provide benefits for the fiscal officers to restrain their corruption incentives.

Apart from corruption, researchers also discuss the effect of the shadow economy on tax revenue collection. Kodila-Tedika and Mutascu (2014) apply a panel-model approach to analyze the relationship between the shadow economy and tax revenue in African countries between 1999-2007. The authors claim that the former can be detrimental to the latter. Based on this finding, they propose that the African governments maximize their tax revenues by controlling the shadow economy activities. Meanwhile, Schneider et al. (2015) examine the European Union countries for 2003-2014. The authors state that the shadow economy's size (percent of official GDP) in 28 EU countries decreases from 22.6 percent in 2003 to 18.6 percent in 2014. They also suppose that the shadow economy's main driving forces are indirect taxes, self-employment and unemployment (Schneider et al., 2015).

Likewise, Mazhar and Méon (2017) investigate data from up to 153 developed and developing countries between 1999–2007. The authors indicate that a one percentage point rise in the size of the shadow economy to GDP ratio is associated with a 0.15 point rise in the inflation rate and up to a 0.67 point decline in the tax burden to GDP ratio. Therefore, the authors suggest that the shadow economy can affect the sustainability of a government's budget and the commitment to monetary integration. Ishak and Farzanegan (2020) analyze 124 countries over the 1991-2015 period to examine whether the shadow economy affects the relationship between the negative oil rents shocks and tax revenues. The authors show that the shadow economy helps regulate market inefficiency and allows labor to deal with economic volatility. However, it can also hinder government taxation efforts in economic downturns.

In the other side, Schneider and Enste (2000) claim that at least two-thirds of the income earned in the shadow economy is quickly used in the official economy. Meanwhile, Bhattacharyya (1993, 1999) finds evidence for the United Kingdom between 1960-1984 that the hidden economy positively influences consumer expenditures of non-durable goods and services. The author adds that this positive effect is even stronger for durable goods and services. Hence, Schneider and Enste (2002) suggest that one should notice the positive impact of such spendings on economic growth and indirect taxes.

Meanwhile, Vlachaki (2015) investigates the relationship between the shadow economy and the indirect tax revenues using a sample of 125 countries over the 1990-2011 period. The author indicates that as long as the size of informality is not larger than a cutoff value, there exists a robustly significant positive impact of the shadow economy on the indirect tax revenues to GDP ratio. However, the opposite occurs if this size exceeds the cutoff value. Notably, if the informality's value is higher than 67% of official GDP, an increase in the size of the shadow economy negatively influences total indirect revenues.

Other researchers examine the effect of FDI inflows on tax revenue. The previous literature shows that FDI inflows can positively influence economic growth through raising the competitiveness, promoting the capital stock and technology, enhancing the human capital, and fostering the development of the financial sector (Hlavacek and Bal-Domanska, 2016). In this regard, FDI may positively indirectly affect tax revenue by enhancing economic growth and employment (Bayar and Ozturk, 2018). Nevertheless, other authors argue that FDI inflows can also negatively affect tax revenue since some countries provide a wide range of tax reductions, legal privileges and fiscal incentives to attract FDI (Tax Justice Network-Africa and ActionAid International, 2012; Bayar and Ozturk, 2018). Therefore, the net effect of FDI inflows on tax revenue is not unequivocal.

Notably, Gropp and Kostial (2000) analyze a panel data of 19 OECD countries over the 1988-1997 period to examine the relationship between FDI and tax revenue. The authors indicate that while FDI outflows have an adverse effect on the corporate tax revenue, FDI inflows positively influence such tax revenue. Meanwhile, Mahmood and Chaudhary (2013) uncover the effect of FDI on tax collection in Pakistan between 1972-2000. They conclude that FDI is positively associated with tax revenue collection.

Therefore, they claim that FDI is useful in enhancing general welfare by increasing tax revenue for the government.

However, a study by Tax Justice Network-Africa and ActionAid International (2012) warns that offering a wide range of tax exemptions and incentives to attract higher levels of FDIs into a country can significantly reduce tax revenue. The authors also propose that tax incentives may not always be essential to attract and retain FDI. Notably, they indicate that revenue losses from all incentives and exemptions in Tanzania can amount to US\$ 1.23 billion in 2008, or up to 6% of Gross Domestic Product (GDP). Based on the findings, the study suggests that a small group of foreign investors is the primary beneficiaries of tax exemptions and incentives. In contrast, the general population and the country as a whole can be the losers due to significant revenue losses.

Other authors show that the relationship between FDI inflows and tax revenue varies across countries and depends on certain factors. For instance, Bayar and Ozturk (2018) examine the effect of FDI inflows on total tax revenues using a sample of 33 OECD countries over the period 1995-2014. The authors state that FDI inflows have no significant impact on total tax revenues at the panel level. Nevertheless, the results also reveal that FDI inflows positively affect total tax revenues in Iceland, Israel, Sweden, the United Kingdom, and the United States. In contrast, FDI inflows have a negative effect on total tax revenues in Austria, France, Italy, and Poland. The authors posit that the host countries' FDI inflows composition and financial incentives level are the determinants of the relationship between FDI inflows and total tax revenues.

2. MODEL AND METHODOLOGY

2.1 Model

In the light of the above literature, we propose the following econometric model to examine the effect of corruption, shadow economy, and FDI on tax revenue in the BRICS countries over the 2001-2017 period:

$$TR = \beta_0 + \beta_1CPI + \beta_2SE + \beta_3SE^2 + \beta_4FDI + \beta_5\log GDP + \beta_6GOV + \beta_7AGR + \varepsilon$$

where TR = Tax revenue (% of GDP); CPI = Corruption Perceptions Index; SE = Shadow economy (% of GDP); SE² = the square of the shadow economy; FDI = Foreign direct investment, net inflows (% of GDP); logGDP = natural log of GDP per capita (constant 2010 US\$); GOV = Governance Index; AGR = Agriculture, forestry, and fishing, value added (% of GDP); and ε = random error.

The study employs a panel dataset of the five BRICS countries over the period 2001-2017. Data from various sources have been gathered. Mainly, TR, FDI, and GDP per capita were collected from World Development Indicators (WDI). CPI was compiled from Transparency International. GOV was the average value of the Worldwide Governance Indicators (WGI) component measures. However, the WGI dataset also includes Control of Corruption as a governance indicator. Therefore, we have removed it in the calculation of the governance index to avoid multicollinearity. Meanwhile, we collected SE data from the research results of Medina and Schneider (2019).

2.2 Methodology

We use the Bayesian linear regression method to analyze the effects of corruption, shadow economy, and FDI on the BRICS countries' tax revenue. Notably, the prior distribution applies the normal distribution $N(0, 1)$ for the observed variables and the Invgamma distribution (0.01, 0.01) for the variances in the model.

The prior distribution can be rewritten as follows:

$$\beta \sim (0, 1); \sigma^2 \sim \text{Invgamma}(0.01, 0.01)$$

Meanwhile, the posterior distribution is simulated by the MCMC technique through the Gibbs sampling algorithm. Finally, to deduce that Bayesian analysis is robust, the Gibbs sampling algorithm must be efficient, and the MCMC must converge.

3. EMPIRICAL RESULTS AND DISCUSSION

3.1 Descriptive statistics

Table 1 presents the descriptive statistics of the dependent variable, namely TR (Tax Revenue), and the focus-independent variables, namely CPI (Corruption Perceptions Index), SE (Shadow Economy), and FDI (Foreign Direct Investment) for the BRICS countries. From the results in Table 1, we can see that South Africa has the highest average tax revenue as a percentage of GDP with a mean value of 25.18% of GDP. This indicator of South Africa ranges from 22.77% to 27.21% of GDP. Meanwhile, China has the lowest average tax revenue with a mean value of 9.7%, a maximum value of 10.31%, and a minimum value of 8.57%.

Table 1. Descriptive Statistics of the Variables

<i>Countries</i>	<i>Summary statistics</i>	<i>TR</i>	<i>CPI</i>	<i>SE</i>	<i>FDI</i>
Brazil	Mean	14.76	38.41	34.62	3.09
	Std. Dev.	0.92	2.79	4.10	0.84
	Min	13.50	33.00	28.20	1.73
	Max	16.53	43.00	40.50	4.15
Russia	Mean	13.48	25.59	37.71	2.40
	Std. Dev.	2.19	2.87	3.58	1.15
	Min	9.18	21.00	32.50	0.50
	Max	16.60	29.00	42.90	4.50
India	Mean	10.30	33.35	21.83	1.68
	Std. Dev.	1.03	4.42	2.61	0.75
	Min	8.08	27.00	18.50	0.61
	Max	12.11	40.00	27.20	3.62
China	Mean	9.70	36.12	12.91	3.24
	Std. Dev.	0.56	2.55	1.59	0.96
	Min	8.57	32.00	11.00	1.35
	Max	10.31	41.00	16.00	4.55
South Africa	Mean	25.18	45.35	25.42	1.64
	Std. Dev.	1.35	2.62	2.35	1.46
	Min	22.77	41.00	21.90	0.23
	Max	27.21	51.00	29.40	5.98
BRICS	Mean	14.95	35.76	26.50	2.41
	Std. Dev.	5.82	7.18	9.45	1.24
	Min	8.08	21.00	11.00	0.23
	Max	27.21	51.00	42.90	5.98

Source: Author's calculations

In terms of CPI, South Africa has the highest average value of CPI, i.e. 45.35, in the BRICS countries with a maximum value of 51 and a minimum value of 41. For India, the average value of CPI is 33.35,

with a maximum value of 40 and a minimum value of 27. Meanwhile, Russia has the lowest average value of CPI, i.e. 25.59.

A country with the highest average value of shadow economy measured by % of GDP among the BRICS economies is Russia (i.e., 37.71%). By contrast, the size of the shadow economy measured by % of GDP in China is the lowest, with a mean value of 12.91%, a maximum value of 16% and a minimum value of 11%.

Moreover, China has the highest average value of FDI measured by % of GDP, i.e. 3.24%. A maximum value and a minimum value of China's FDI are 4.55% and 1.35%, respectively. Meanwhile, South Africa has the lowest average value of FDI among the BRICS countries, i.e., 1.64%, with a maximum of 5.98% and a minimum of 0.23%.

3.2 Correlation analysis

The correlation analysis is shown in Table 2. Lee and Wagenmakers (2014) argue that Pearson's correlation is only flagged significance when the evidence is strong in Bayesian's approach. That is, Bayes factors (BF) are greater than 10. Bayes factors show very strong evidence supporting the hypothesis of the relationship between TR and CPI (BF = 4.528×10^6), TR and logGDP (BF = 379.109), TR and GOV (BF = 3.998×10^{11}), TR and AGR (BF = 1.974×10^8). Nevertheless, the Bayesian correlation between TR and SE/FDI reports low BF values (BF are 0.663 and 0.665, respectively). These results indicate that there is only anecdotal evidence about the relationship between TR and SE/FDI.

Table 2. Bayesian Pearson Correlations

	<i>TR</i>	<i>CPI</i>	<i>SE</i>	<i>FDI</i>	<i>logGDP</i>	<i>GOV</i>	<i>AGR</i>
<i>TR</i>	—						
<i>CPI</i>	0.6040***	—					
<i>SE</i>	0.2000	-0.3360*	—				
<i>FDI</i>	-0.2000	-0.0620	-0.0570	—			
<i>logGDP</i>	0.4330***	0.0640	0.5910***	0.1880	—		
<i>GOV</i>	0.7370***	0.8100***	0.0320	-0.3570*	0.0890	—	
<i>AGR</i>	-0.6520***	-0.2500	-0.4890***	-0.0850	-0.9090***	-0.2580	—

Note: * BF > 10, ** BF > 30, *** BF > 100.

Source: Author's calculations

3.3 Posterior Simulations

Table 3 presents the results of Bayesian linear regression. Notably, all efficiency indexes of the parameters are greater than 0.01, thus the Gibbs sampling algorithm is effective (Roberts and Rosenthal, 2001). Simultaneously, since the maximum Gelman-Rubin (R_c) value of the model's parameters is 1.00014 lower than 1.1, the MCMC converges (Gelman and Rubin, 1992). Consequently, the Bayesian inference is robust.

Table 3. Results from Bayesian Linear Regression

<i>Variables</i>	<i>Mean</i>	<i>Posterior probability</i>	<i>Efficiency</i>	<i>Rc</i>
CPI	0.30213 (0.16580; 0.43862)	1.0000*	1.00000	1.00009
SE	1.18806 (0.77214; 1.59167)	1.0000*	0.98400	0.99997
SE2	-0.02123 (-0.02936; -0.01300)	1.0000**	0.98130	0.99998
FDI	-0.67335 (-1.23742; -0.11305)	0.9903**	1.00000	1.00013
logGDP	-0.56234 (-1.38932; 0.26735)	0.9066**	1.00000	1.00000
GOV	0.52268 (-1.22891; 2.29483)	0.7191*	0.98590	1.00014
AGR	-0.61562 (-0.75601; -0.47415)	1.0000*	1.00000	1.00007
_cons	0.36896 (-1.60853; 2.35614)	0.6424*	0.98460	1.00007
var	7.73844 (5.54071; 10.77625)	—	0.78040	1.00001
Turning point	27.98%	—	—	—

Notes: 95% credible intervals in parentheses, * Posterior probability of mean > 0, ** Posterior probability of mean < 0.

Source: Author's calculations

The estimated results of Bayesian linear regression reveal that Corruption Perceptions Index (CPI) positively affects the BRICS economies' tax revenue collection. Furthermore, the positive effect probability of CPI on tax revenue is 100%. This result implies that the positive relationship between these two factors is strong. In other words, higher corruption can lead to lower tax revenue in the countries examined.

Meanwhile, the shadow economy (SE) has a strong positive effect on tax revenue efficiency as the posterior probability of this factor is 100%. However, the shadow economy's square (SE2) has a strong negative impact on tax revenue of the BRICS countries with a negative effect probability of 100%. This result shows that an inverted U-shaped relationship links the size of the shadow economy and tax revenue of the BRICS countries. Notably, the marginal effect of the shadow economy on tax revenue is positive as long as the shadow economy's size does not exceed the turning point, i.e., 27.98%. For the shadow economy values higher than 27.98% of GDP, an increase in the shadow economy decreases total tax revenues.

If comparing the average value of the shadow economy with the turning point, we can see that the shadow economy size of Brazil and Russia is above the turning point. As a result, a rise in the size of the shadow economy will reduce tax revenue of these two countries. On the contrary, India, China, and South Africa have the size of the shadow economy under the turning point. Therefore, an increase in the shadow economy can raise tax revenue of these three countries.

Table 4. The size of the BRICS countries' shadow economy compared to the turning point

<i>Countries</i>	<i>SE average</i>	<i>SE versus the turning point</i>	<i>SE → TR</i>
Brazil	34.62%	Above	Negative
Russia	37.71%	Above	Negative
India	21.83%	Below	Positive
China	12.91%	Below	Positive
South Africa	25.42%	Below	Positive

Source: Author's calculations

This study's findings also indicate that FDI has a strong negative relationship with tax revenue in the BRICS countries. The negative effect probability of FDI on tax revenue is 99.03%. The result suggests that the government's tax incentives to attract FDI may reduce tax revenue collection.

Moreover, we find that logGDP adversely affects tax revenue. This negative relationship is strong as the negative effect probability of logGDP is 90.66%. Likewise, agriculture (AGR) is also strongly negatively associated with tax revenue of these economies. The posterior probability of agriculture is 100%. Indeed, the agricultural sector is considered a subsistence sector where most farmers' income is out of the tax brackets (Neog and Gaur, 2020). By contrast, the Governance Index (GOV) has a quite strong positive relationship to tax collection with a probability of 71.91%. This finding indicates that good governance will contribute to boosting the tax collection performance of the BRICS.

3.4 Discussion

We find that CPI has a strong impact on the BRICS countries' tax revenue collection with a positive effect probability of 100%. Therefore, the control of corruption is beneficial for tax collection. This finding is following the submissions of Tanzi and Davoodi (2000), Imam and Jacobs (2007), Thornton (2008), and Arif and Rawat (2018). In this regard, Torgler (2013) analyzes two data sets from the World Values Survey and the Taxpayers Opinion Survey and finds that trust positively affects tax morale. Notably, if citizens trust public officials and the legal system, they may be more likely to comply rather than evade taxes. For these reasons, the government should seek to control corruption as this helps increase tax revenue.

Moreover, the results indicate that the shadow economy has a strong positive impact on tax revenue collection of the BRICS countries. However, we also find that there exists a turning point of 27.98%. Consequently, if the shadow economy exceeds this turning point, any further increase in the size of the shadow economy can negatively influence the taxation. The result is consistent with the study by Vlachaki (2015). Based on this finding, we propose that the governments consider measures to manage the shadow economy so that the informal sector's size is not too large. Otherwise, it would hinder a country's tax collection.

Meanwhile, an increase in FDI size is not conducive to tax collection in the BRICS countries. Notably, FDI has a negative impact on tax revenue collection with a negative effect probability of 99.03%. The finding is in line with other studies conducted in this field, such as those by Tax Justice Network-Africa and ActionAid International (2012) and Bayar and Ozturk (2018). Indeed, to attract FDI, a country can offer tax exemptions and incentives. Although these policies may help boost FDI inflows, they also reduce tax revenue collection. Hence, as Tax Justice Network-Africa and ActionAid International (2012) suggested, the government should carefully consider whether these tax exemptions and incentives policies to attract FDI are beneficial to the general population and the country as a whole.

CONCLUDING REMARKS

Taxes are an important source of revenue that governments in any country need to finance public spendings. The paper aims to discover the determinants of tax revenue collection in the BRICS countries over 2001-2017. Notably, we focus on three variables: CPI, shadow economy, and FDI. The study applies the Bayesian linear regression method simulated by the MCMC technique through the Gibbs sampling algorithm to accomplish the objective.

The result indicates that CPI has a strong positive impact on tax revenue in the BRICS countries. The posterior probability of this indicator is 100%. We suggest that the governments focus more on controlling corruption since higher corruption can lead to lower tax revenue collection.

The study also reveals that the shadow economy promotes tax revenue as long as the informality does not exceed the turning point of 27.98%. Once the size of the shadow economy is higher than 27.98% of GDP, any further increase in the shadow economy can reduce tax revenue collection in the BRICS countries.

Moreover, the size of FDI impedes tax collection in the countries examined. The negative effect probability of this factor is 99.03%. This adverse impact of FDI occurs as a country often provides tax reductions, legal privileges, or fiscal incentives to attract FDI inflows. Indeed, the government needs to consider who benefits from these incentives.

REFERENCES

- Arif, I., Rawat, A.S. (2018), "Corruption, Governance & Tax Revenue: Evidence from EAGLE Countries", *Journal of Transnational Management*, Vol. 23, No. 2&3, pp. 119-133. <http://dx.doi.org/10.1080/15475778.2018.1469912>.
- Bayar, Y., Ozturk, O.F. (2018), "Impact of foreign direct investment inflows on tax revenues in OECD countries: A panel cointegration and causality analysis", *Theoretical and Applied Economics*, Vol. 25, No. 1(614), pp. 31-40.
- Bhattacharyya, D.K. (1993), *How Does the "Hidden Economy" Affect Consumers' Expenditure? An Econometric Study of the U.K. (1960-1984)*, International Institute of Public Finance (IIPF), Berlin.
- Bhattacharyya, D.K. (1999), "On the Economic Rationale of Estimating the Hidden Economy", *The Economic Journal*, Vol. 109, No. 456, pp. 348-359.
- Feld, L.P., Frey, S.B. (2007), "Tax Compliance as the Result of a Psychological Tax Contact: The Role of Incentives and Responsive Regulation", *Law & Policy*, Vol. 29, No. 1, pp. 102-120.
- Lee, M.D., Wagenmakers, E.J. (2014), *Bayesian cognitive modeling: A practical course*, Cambridge University Press, New York.
- Hlavacek, P., Bal-Domanska, B. (2016), "Impact of foreign direct investment on economic growth in Central and Eastern European countries", *Engineering Economics*, Vol. 27, No. 3, pp. 294-303.
- Gelman, A., Rubin, D.B. (1992), "Inference from iterative simulation using multiple sequences", *Statistical science*, Vol. 7, No. 4, pp. 457-472. <https://doi.org/10.1214/ss/1177011136>
- Gropp, R., Kostial, K. (2000). "The Disappearing Tax Base: Is Foreign Direct Investment Eroding Corporate Income Taxes?" *ECB Working Paper*, No. 31. European Central Bank, Frankfurt.
- Imam, P.A., Jacobs, D.F. (2007), "Effect of Corruption on Tax Revenues in the Middle East", *IMF Working Papers*, No. 270, International Monetary Fund.
- Ishak, P.W., Farzanegan, M.R. (2020). "The impact of declining oil rents on tax revenues: Does the shadow economy matter?," *Energy Economics*, Vol. 92, No. 104925. <https://doi.org/10.1016/j.eneco.2020.104925>
- Kodila-Tedika, O., Mutascu, M. (2014), "Shadow economy and tax revenue in Africa", *Economics Bulletin*, Vol. 34, No. 1, pp. 469-479.
- Li, L. (2019), "BRICS: A Limited Role in Transforming the World", *Strategic Analysis*, Vol. 43, No. 6, pp. 499-508. <https://doi.org/10.1080/09700161.2019.1677017>
- Mazhar, U., Méon, P.G. (2017), "Taxing the unobservable: The impact of the shadow economy on inflation and taxation", *World Development*, Vol. 90, pp. 89-103.

- Mahmood, H., Chaudhary, A.R. (2013), "Impact of FDI on tax revenue in Pakistan", *Pakistan Journal of Commerce and Social Science*, Vol. 7, No. 1, pp. 59-69.
- Medina, L., Schneider, F.G. (2019), "Shedding Light on the Shadow Economy: A Global Database and the Interaction with the Official One", *CESifo Working Paper*, No. 7981, CESifo Group Munich.
- Neog, Y., Gaur, A.K. (2020), "Shadow economy, corruption, and tax performance: A study of BRICS", *Journal of Public Affairs*, Vol. e2174. <https://doi.org/10.1002/pa.2174>
- Roberts, G.O., Rosenthal, J.S. (2001), "Optimal scaling for various Metropolis-Hastings algorithms", *Statistical science*, Vol. 16, No. 4, pp. 351-367. <https://doi.org/10.1214/ss/1015346320>
- Schneider, M.F., Enste, D. (2000), "Shadow economies around the world: Size, causes, and consequences", *IMF Working Papers*, No. 26, International Monetary Fund, Washington, DC.
- Schneider, M.F., Enste, D. (2002), "Hiding in the Shadows: The Growth of the Underground Economy", *IMF Working Papers*, No. 30, International Monetary Fund, Washington, DC.
- Schneider, F., Raczkowski, K., Mróz, B. (2015), "Shadow economy and tax evasion in the EU", *Journal of Money Laundering Control*, Vol. 18, No. 1, pp. 34-51. <https://doi.org/10.1108/JMLC-09-2014-0027>.
- Tanzi, V. (1998), "Corruption Around the World: Causes, Consequences, Scope, and Cures", *IMF Working Paper*, No. 63, International Monetary Fund, Washington, DC.
- Tanzi, V., Davoodi, H. (2000), "Corruption, Growth and Public Finances", *IMF Working Paper*, No. 182, International Monetary Fund, Washington, DC.
- Tax Justice Network-Africa, ActionAid International, (2012), "Tax competition in East Africa: A race to the bottom", <https://taxjusticeafrica.net/wp-content/uploads/2019/06/Tax-competition-report-Tanzania-2.pdf> (accessed 9 March 2011).
- Thornton, J. (2008), "Corruption and the Composition of Tax Revenue in Middle East and African Economies", *South African Journal of Economics*, Vol. 76, No. 2, pp. 316-320.
- Torgler, B. (2003), "Tax morale, rule-governed behaviour and trust", *Constitutional Political Economy*, Vol. 14, No. 2, pp. 119-140.
- Vlachaki, M (2015), "The Impact of the Shadow Economy on Indirect Tax Revenues", *Economics and Politics*, Vol. 27, No. 2, pp. 234-265. <https://doi.org/10.1111/ecpo.12054>.