How Buoyant Is the South African Tax System? An ARDL Approach

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ERSA working paper 835

September 2020

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September 18, 2020

Abstract

This study aims to scrutinize the responsiveness of the South African tax system to changes in economic performance. The study made use of annual time series data spanning from 1995 – 2017. The tax system was found to be fairly buoyant, albeit there is still room for improvement. The ARDL bounds test results indicate that VAT revenue and custom duties grow at a faster pace than the growth in final household consumption and import value, respectively. VAT revenue has a long run buoyancy coefficient of 1.35 while custom duties have a long run buoyancy coefficient of 1.42. This implies that VAT revenue and custom duties are perfectly elastic to variations in their respective bases, at least in the long run. The estimated buoyancy coefficient for total tax revenue growth is 0.82, implying that the growth in total tax revenue did not match the growth of the economy during the estimation period. The government can improve the efficiency and responsiveness of the tax system through good governance and strong political leadership. Furthermore, structural economic reforms are necessary to boost growth and tax revenue mobilisation.

Keywords: *Tax buoyancy, bounds test, tax performance, South Africa*
JEL Classification: O57, H29, E62, H21, H68

1 INTRODUCTION

Academics across the globe have studied taxation from different standpoints. For example, authors such as Gupta, 2007; Khwaja and Iyer, 2014 and Raczkowski, 2015 examined taxation from a revenue generating standpoint while others such as Gcabo and Robinson, 2007; Alabede et al., 2011 and Pratomo, 2018 found interest in investigating tax compliance. Amongst other tax concepts, is tax

*The financial assistance of the National Treasury towards this research is hereby acknowledged. Opinions expressed, and conclusions arrived at are those of the authors and should not be attributed to the National Treasury.

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buoyancy, which this study aims to scrutinize. To this day, tax buyouncy remains the widely used measure of the efficiency and responsiveness of the tax revenue sytem to the growth of the economy (Carolissen, 2017). Academics such as Upender (2008); Belinga et al., (2014); Omondi et al., (2014) and Jalles (2017) have widely studied this concept. It is worth noting however, that the tax buoyancy literature remains scant in South Africa, a gap which this study aims to fill. Figure 1 illustrates buyouncy estimates for the period 1994/95 - 2015/16. Notably, buyoyancy estimates are known to be more accurate over long horizons than short horizons. Furthermore, this estimates are largely affected by tax policy changes, economic growth drivers and shocks to the economy. For example, revenue buoyancy was largely affected by the 2008 GFC, contracting from 1.15 in 2007/08 to a mere record low of -0.75 in 2009/10. On average, the tax revenue system in South Africa has been fairly responsive, averaging 1.09.

It is also evident in Figure 1 that between the period 2004/05 – 2007/08 and 2010/11 – 2015/16, tax revenue grew faster than the economy. This indicates that automatic stabilizers were extremely efficient during this period. National Treasury (2017) notes that this trend was expected to continue in 2015/16 and 2016/17 due to the substantial tax increases. However, actual market outcomes were far below market expectations as the growth in tax revenue subsequently slowed, matching the growth of the economy. Even worse, tax revenue buoyancy fell below unity during the 2017/18 fiscal year, to a value of 0.91, indicating that the growth in tax revenue was below the growth of the economy. This could be due to numerous reasons, including inefficiencies in tax administration, poor governance and leadership, lack of tax compliance as well as shifts in dividend withholding tax revenue in attempt to avoid higher tax rates.

Against this backdrop, this study aims to scrutinize the responsiveness of the South African tax system to changes in economic patterns, tax policy and shocks. This will be achieved by estimating tax buoyancy for different tax revenue types in relation to their relevant tax bases. The rest of the study is arranged in this manner: Section 1 provided an introduction to the topic and objective. Section 2 will unpack the literature supporting the topic while Section 3 will detail the empirical strategy and econometric techniques utilised in this study. Section 4 will be a discussion of findings while Section 5 will conclude the study and provide recommendations in line with findings.

2 LITERATURE REVIEW

2.1 THEORETICAL LITERATURE

This section outlines the theoretical literature supporting tax policy. Mahdavi (2008: 2) states that "tax reforms in developing countries must necessarily include changing the level of tax revenue and/or its composition". It is worth noting however, that sources of tax revenue differ from one country to another based on factors such as the availability of resources, economic structures and political mandate. In Figure 2, different types of taxes levied are identified.

Taxes are typically broken into two categories which are direct and indirect taxes. This is known as the tax-mix and plays a crucial role in shaping and encouraging savings, investment and work. Direct taxes encompass all taxes levied on income, profits, property and capital gains while indirect taxes take the form of sales tax/Vat, fuel levy, payroll, and exercise and import duties. Although different taxes are levied on different sources of revenue, what matters ultimately is not necessarily the impact of each tax in isolation, but the overall impact of the tax-mix on the welfare of individuals (Creedy, 2009). Notably, there is no clear and direct connection between taxes paid by an individual and the provision of public goods and services to the individual taxpayer. This is because; individuals are obliged to pay taxes by law even if there are no direct benefits in return (Australia's Future Tax System Review, 2008). Economists regard the best tax systems as those characterised by broad tax bases and low tax rates. The reasoning is that, the tax burden is much greater when a small pool of individuals is taxed at higher rates than when a large pool of individuals is taxed at lower rates. Moreover, higher tax rates are presumably associated with issues of tax avoidance and evasion. As apparent in Figure 2, a large fraction of total government revenue is made up of tax revenue, complemented by non-tax revenue and grants. Non-tax revenue includes fines, interest income, dividends and other profits earned by government.

2.1.1 Canons of Taxation

One of the economic contributions of the classical economists, Adam Smith in particular, was their recognition of the canons of tax policy. According to Smith (1776), a well-designed tax system is one that is based on several principles including efficiency, equity, certainty and convenience. Efficiency to begin with, speaks to the manner in which the cost of collecting and paying taxes should be economical. Smith (1776) accentuates that the cost of collecting taxes should be as low as possible as higher tax administration costs would reduce the net yields of taxes. Since taxes are an expense to taxpayers, they need not incur additional costs in the payment of taxes as this would make them reluctant to pay taxes. Neill (1997) on the other hand, states that tax systems should be structured in such a way that both parties (taxpayers and public good recipients) benefit equally. In her view, equality of taxation means equality of sacrifice.

The equity principle has also been stressed by Smith (1776) in which he contended that the tax contributions ought to be in proportion to the taxpayer's respective abilities and the income which they enjoy under the insurance of the state. On that note, the equity principle takes two forms: horizontal equity and vertical equity. In short, vertical equity refers to the idea that people at different income levels should be taxed differently, based on their ability to pay of course. In other words, high-income earners should pay a larger proportion of their income in taxes than low-income earners (Kiprotich, 2016). "The principle of horizontal equity demands that similarly situated individuals face similar tax burdens" (Elkins, 2006; 1). Pigou (1954) adds to the tax literature by thoroughly explaining the principle of certainty. He notes that a tax system

ought to be predictable, as individuals and businesses often plan ahead. The time and sum of taxes to be paid should be clearly stated and not arbitrary (Smith, 1776). Kiprotich (2016) further states that although tax reforms take place and tax systems change over time, these changes should be timely and inclusive. The principle of convenience to end with, implies that the sum, time and manner of payment of tax should be convenient to the contributor. In addition, tax laws ought to be clearly stated, implemented and understandable to a common person. A simple tax system has the potential to reduce corruption in tax administration and inconveniences to the taxpayers.

2.2 EMPIRICAL LITERATURE

Farooq (2006) conducted an analysis of tax buoyancy coefficients for a number of variables in the Pakistan economy utilising annual time series data spanning from 1980 to 2004. The study found significant buoyancy rates for GDP, Money supply (M0) and volume of Trade as tax bases for tax revenue.

Upender (2008) studied tax buoyancy in India pre-tax reform and post-tax reform to see the prognoses of tax reforms initiated by government. He found that the tax buoyancy estimate was above unity pre-tax reform before falling below unity post-tax reform. This implies that gross tax revenue has been relatively inelastic post-tax reform.

Belinga et al., (2014) estimated short-run and long-run tax buoyancy in OECD countries over the period 1965 - 2012. By means of Pooled Mean Group, they find that long-run buoyancy is greater than one in about half of the countries. This implies that economic growth has benefited tax revenues in OECD countries. Even more, they find that company income taxes are by far the most buoyant, whereas property taxes and excises are the least buoyant.

Jalles (2017) followed a similar pattern to Belinga et al (2014) by estimating short-run and long-run buoyancy for 37 Sub-Saharan African countries over the period 1990 - 2015. Based on findings, the buoyancy estimate is greater than one only in 11 out of 37 countries. Additionally, the results revealed that the buoyancy estimate is larger during contractions than during economic expansions.

Dudine and Jalles (2017) studied tax buoyancy dynamics in low-income, emerging and advanced economies. They utilised Fully Modified OLS and Pooled Mean Group on panel data spanning from 1980 – 2014. Based on findings, both short-run and long-run buoyancies in advanced market economies do not differ from one. In addition, the results reveal that corporate tax buoyancies in emerging market economies are larger during contractions than during economic expansions. Interestingly, they find that both trade openness and human capital increase buoyancy while inflation and output volatility decrease it.

Omondi et al., (2014) investigated the effects of tax policy changes on tax buoyancy and elasticity for Kenya. They made use of regression analysis on annual time series data spanning from 1960 to 2010. Based on findings, the estimated buoyancy for Kenya was found to be 1.17, implying that revenue grew at a faster pace than the growth in GDP. Additionally, they find a bi-

directional causation from tax revenues to GDP and from GDP to tax revenues. Notwithstanding, the elasticity for Kenya's overall tax system is 0.690.

3 EMPIRICAL STRATEGY

This section unbundles the methodological approach pursued to estimate tax buoyancy coefficients. Furthermore, various econometric techniques employed are explained as well as the variables, type and sources of data utilised.

3.1 DATA

The study made use of annual time series data spanning from 1995 to 2017. This choice of period was solely based on the availability of data. The databases utilised include the South African Revenue Service (SARS), South African Reserve Bank (SARB) and the National Treasury of South Africa (NTSA).

3.2 MODEL

3.2.1 A Measure of Tax Buoyancy

$$Ln\left(RT_t\right) = \mu + \beta_1 Ln\left(TB_t\right) + \varphi + \varepsilon_t \tag{1}$$

where $Ln(RT_t)$ is different types of tax revenues namely: Value Added Tax (VAT), Total Tax Revenue Growth (TREV) and Custom Duties (CUST). TB_t is the tax base consisting of GDP growth (GDPG), Final Consumption by Households (FCONS), Import Value (IMPV) and φ is a 2008 dummy to account for the 2008 GFC shock. Nkoro and Uko (2016: 3) state that "cointegration has become an over-riding requirement for any economic model using non-stationary time series data". In this study, we employed the ARDL Bounds Test to cointegration of Pesaran (1997) and Pesaran et al., (2001). Given that we used small sample data (26 observations) and the variables are integrated in different orders, ARDL Bounds test became appropriate. Equation (1) is thus transformed as follows:

$$\Delta Ln(RT)_t = \mu_0 + \sum\nolimits_{i=1}^{q} \beta_1 \Delta Ln(RT)_{t-i} + \sum_{i=1}^{q} \beta_2 \Delta Ln(TB)_{t-i} + \varphi + ECT_{-1} + \varepsilon_t \tag{2}$$

in which case ECT_{-1} is the Error Correction Term, also known as the speed of adjustment, which shows how much of disequilibrium is corrected. The null hypothesis of no cointegration is $H_0 : \beta_1 = 0$ against the alternative hypothesis of cointegration $H_1 : \beta_1 \neq 0$. It is sufficient to note that the ARDL Bounds test is preferable and robust when dealing with small sample data and variables integrated in different orders. To determine the optimal lag length, several information criterions (i.e. Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Criterion (HQC) were utilised following unrestricted Vector Autoregressive (VAR) approach.

The variables were tested for stationarity using the Augmented Dickey Fuller (Dickey and Fuller, 1979) and Philips Perron (Phillips and Perron, 1988) stationarity tests. The tests were chosen based on their common use as there is no uniformly better test. As stated earlier, we employed the ARDL Bounds test of (Pesaran, 1997: Pesaran, Shin and Smith, 2001) to test for cointegration among the variables in question and estimate buoyancy coefficients. Lastly, several residual diagnostic tests were performed to ensure that the models estimated do not suffer from spurious regression. Some of the tests performed include Serial Correlation test by Breusch-Pagan-Godfrey (Breusch and Godfrey, 1978), Heteroskedasticity tests by Breusch-Pagan-Godfrey and Harvey and Normality test by Jarque Bera.

3.2.2 Justification of Variables

For tax buoyancy estimates, private consumption by households was used as the tax base for VAT since most of the variations in VAT revenues are explained by private consumption. Import duties on the other hand, are largely explained by changes in import value, hence the base. Notably, variations in personal and corporate income taxes are largely explained by the wage bill and company profits, respectively. Due to lack of data, we failed to estimate tax buoyancy for personal and corporate income taxes. Nonetheless, GDP growth was used as the tax base for total tax revenues since changes in revenue growth are largely explained by the growth of the economy.

4 FINDINGS AND DISCUSSIONS

This section details findings for tax buoyancy estimates. These include unit root tests, cointegration tests, buoyancy coefficients and residual diagnostics.

4.1 Stationarity analysis

The formal stationarity tests results are discussed in this sub-section. It is sufficient to note that visualizing the data graphically is not sufficient for one to conclude on the characteristics of the data. Thus, for consistency and formality sake, we performed formal stationarity tests albeit it is not a formal requirement in the ARDL technique. The results are provided in Table 1. Interestingly, we find that all variables are consistent across both the ADF and PP stationarity tests.

Based on the results given in Table 1, total revenue growth, final private household consumption and GDP growth are found to be stationary at level. Import value, custom duties and VAT revenue are stationary after first difference. Given that the variables are integrated in different orders and that the sample size is small, the ARDL Bounds test to cointegration was the most appropriate technique to apply.

4.2 Cointegration and Buoyancy Estimates

Table 2 provides results for the ARDL Bounds test to cointegration, as well as short run and long run tax buoyancy coefficients for South Africa. The regressions consisted of a series of equations; thus, each specification was given a different optimal-lag structure. The optimal lag structure was determined through the unrestricted VAR. The information criterion chosen was SIC over AIC since AIC often recommends higher lags than normal, consequently a loss in degrees of freedom.

The results provided in Table 2 show that a long-run relationship exists between VAT revenue and private consumption expenditure by households and between total tax revenue growth and the growth of the economy. The null hypothesis of no cointegration is thus rejected against the alternative hypothesis of cointegration. This is because; the t-statistics in both models are greater than the critical lower and upper bounds. We find no long-run relationship between custom duties and import value. Thus, we fail to estimate the speed of adjustment for the custom duties model. The speed of adjustment for VAT revenue is 51% and 99% for total tax revenue growth. Further to this, the speed of adjustments was found to be negative and statistically significant.

Moving along Table 2, we estimated the tax buoyancy coefficients. A tax buoyancy coefficient equal to 1 implies that tax revenue grows at the same pace as the economy/base whereas a tax buoyancy below 1 insinuates that tax revenue grows at a slower pace than the economy/base. The total tax revenue buoyancy estimate is 0.82 both in the short-run and long-run. This is almost in line with the National Treasury value of 0.91 (National Treasury, 2017). Also, this implies that the growth in tax revenue did not match the growth of the economy in South Africa over the estimation period. Nonetheless, the estimated tax buoyancy for VAT revenue is 0.69 in the short-run and 1.35 in the long-run. This means that, VAT revenue is growing at a faster rate than changes in final consumption expenditure by households, at least in the long run. Likewise, customs duties are found to growth at a faster pace than variations in import value. The estimated tax buoyancy for custom duties is -0.41 in the short-run, which is quite disappointing, albeit in the long-run the estimate is above unity (1.42). All tax buoyancy estimates, except short run custom duties, are found to be statistically significant.

4.3 Residual diagnostics

Table 3 provides results for the residual diagnostic tests. It is sufficient to note that performing diagnostic checks has become a standard procedure in econometric analysis.

It is apparent in table 3 that the models for total tax revenue and custom duties are free from serial correlation and heteroscedasticity. This is because, the corresponding p-values are above 5%. Moreover, the Jarque-Bera normality test confirms that the data is normally distributed given the p-values above 5%. The kurtosis for both models are reasonably high, approaching 3.7. As per the

Harvey test, the model for VAT revenue suffers from heteroscedasticity though the Breusch-Pagan test contradicts this. The result on heteroscedasticity is thus inconclusive. The model, however, is free from serial correlation and the data is normally distributed.

5 CONCLUSION

This study was aimed at scrutinizing the responsiveness of the South African tax system. This was achieved by estimating the tax buoyancy coefficients over the period 1995 – 2017. The tax system was found to be fairly buoyant for specific tax revenue types, although there is still room for improvement. The ARDL results indicate that VAT revenue and custom duties grow at a faster pace than the growth in final household consumption and import value, respectively. The estimated buoyancy coefficient for total tax revenue growth is 0.82, implying that the growth in total tax revenue did not match the growth of the economy during the estimation period. The government can improve the efficiency and responsiveness of the tax system through good governance and strong political leadership. Furthermore, structural economic reforms are necessary to boost growth and tax revenue mobilisation.

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Table 1: Stationarity tests results

Variable	Augmented Dicker Fuller test			Phillip-Perron test		
	Intercept	Trend and intercept	Order of integration	Intercept	Trend and intercept	Order of integration
VAT	-2.04	-1.20		-2.16	-1.20	
D(VAT)	-3.64**	-4.35**	| (1)	-3.64**	-4.35**	| (1)
TREV	-3.30**	-3.56***	| (0)	-3.32**	-3.54***	| (0)
FCONS	-3.69**	-0.18	| (0)	-4.34*	0.12	| (0)
GDPG	-3.15**	-3.99**	| (0)	-3.10**	-3.99**	| (0)
IMPV	-1.93	-1.88		-2.38	-1.91	
D(IMPV)	-4.08*	-3.89**	| (1)	-4.09*	-5.39*	| (1)
CUST	-1.17	-2.84		-1.17	-2.11	
D(CUST)	-3.18	-5.74*	| (1)	-3.08**	-2.98	| (1)
Critical values				Critical values		
1%	-3.86	-4.57		-3.86	-4.57	
5%	-3.04	-3.69		-3.04	-3.69	
10%	-2.66	-3.29		-2.66	-3.29	

VAT – value added tax revenue

TREV – total tax revenue growth

FCONS – final private household consumption

GDPG – GDP growth

IMPV – import value

CUST- custom duties

Asterisks in parentheses (*, **, ***) indicate significance at 1%, 5% and 10%, respectively.

Table 2: ARDL Bounds test to Cointegration results

Pair:	Lags	F-stat	^Ho	ECM	DUM	SRC	LRC
						Buoyancy	
VAT & FCONS	3	6.19**	**Reject**	-0.51***	-0.14*	0.69***	1.35*
TREV & GDPG	1	6.80*	**Reject**	-0.99*	-2.53	0.82***	0.82***
CUST & IMPV	1	1.48	**Accept**	-	-0.21	-0.41	1.42*

SRC – short run coefficient

LRC – long run coefficient

^Ho -> no cointegration

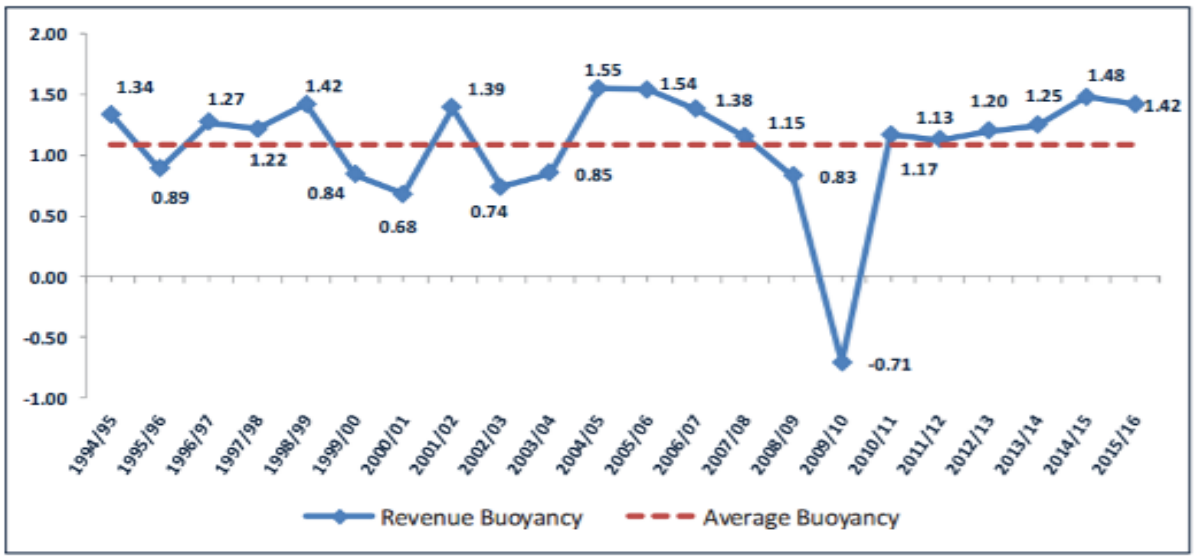
Asterisks in parentheses (*, **, ***) indicate significance at 1%, 5% and 10%, respectively

Table 3: Residual diagnosis results

	Serial Correlation	Heteroscedasticity (Breusch-Pagan)	Heteroscedasticity (Harvey)	P-value (Normality)	Kurtosis
VAT & PCONS	0.08	0.22	0.00	0.70	2.09
TREV & GDPG	0.23	0.91	0.62	0.06	3.80
CUST & IMPV	0.54	0.64	0.04	0.95	2.62

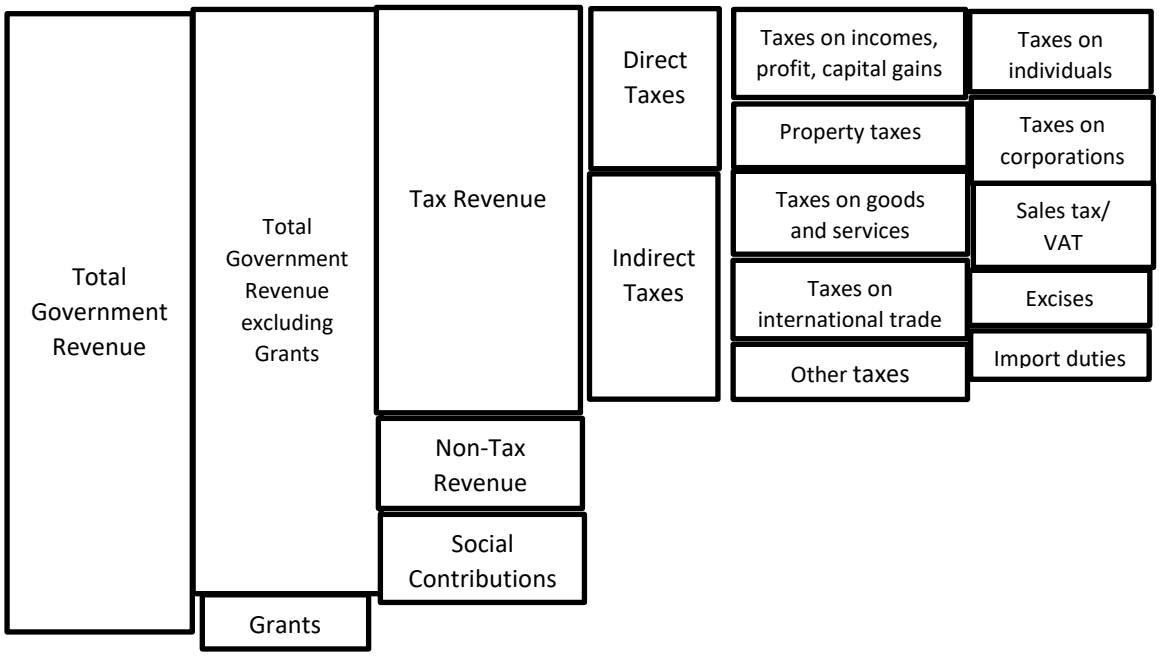
Source: authors' computations

Figure 1: Trends in Tax Buoyancy



Adopted from: Omarjee (2018)

Figure 2: Classification of different sources of government revenues



Adapted from: Prichard et al (2014)