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Consumption Taxes, Income Distribution and Poverty –

Evidence from Kenya

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Consumption Taxes, Income Distribution and Poverty – Evidence from Kenya

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Zusammenfassung

*Verbrauchssteuern, Einkommensverteilung und Armut –
Empirische Evidenz aus Kenya*

Zu den Zielen für eine nachhaltige Entwicklung der Vereinten
Nationen zählen sowohl die Beseitigung von Armut als auch
das Erlangen von weniger Ungleichheit. Derzeit prägen Armut
und Ungleichheit Kenia: 36 Prozent der Bevölkerung leben
unter der Armutsgrenze, im Jahr 2015 betrug der Gini Koeffi-
zient 0,445. Vor diesem Hintergrund untersucht diese Arbeit
den Einfluss von Konsumbesteuerung auf Einkommensvertei-
lung und Wohlfahrt in Kenia. Mit Hilfe von ökonometrischen
Modellen untersuchen wir, inwiefern Konsumbesteuerung zur
Reduktion von Ungleichheit, gemessen am Gini-Koeffizient,
und zur Wohlfahrtssteigerung, gemessen am Pro-Kopf-
Einkommen, führen kann. Im Einklang mit der Literatur kön-
nen wir bestätigen, dass Konsumsteuern regressiv wirken.
Diese Wirkung kann jedoch durch differenzierte Steuersätze
abgeschwächt werden. Das Pro-Kopf-Einkommen in Kenia
lässt sich mit Hilfe von Konsumsteuern steigern. Das deutet
darauf hin, dass in Kenia das Konsumsteueraufkommen zur
Bereitstellung öffentlicher Güter, die überproportional die
unteren Einkommensschichten nutzen, verwendet wird und
dadurch die Wohlfahrt steigt.

Schlagworte: Verbrauchssteuer, Einkommensungleichheit,
Armut, Kenya

Abstract

*Consumption Taxes, Income Distribution and Poverty – Evi-
dence from Kenya*

'No Poverty' and 'Reduced Inequalities' are two out of the 17
sustainable development goals of the United Nations. Nowa-
days, Kenya faces high levels of poverty and inequality: 36
percent of the population live below the poverty line and the
Gini coefficient was 0.445 in 2015. Against this background,
this paper investigates how consumption taxes can be used to
reduce poverty and promote income equality in Kenya. Using
econometric models we show the effect of consumption taxes
on income inequality and on GDP per capita. In line with the
literature, our findings confirm that consumption taxes are
regressive. Thus, fiscal policy could reduce this consequence
by using differentiated tax rates with lower rates applied to
basic goods on which the poor spend a higher share of their
disposable income. In Kenya, consumption tax revenue is
positively related to the GDP per capita. This might point to a
successful fiscal policy in Kenia that uses consumption tax
revenue to provide essential facilities for the poor leading to
an increase of overall welfare.

Keywords: Consumption taxes, income inequality, poverty,
Kenya

Contents

1   Introduction

Over the last decades, inequality around the world has been rising with richer countries generally growing faster than poorer ones (Milanovic, 2011). This phenomenon affects developed and developing countries alike. In Kenya, the gap between the rich and the poor is wide and the poverty level remains high. The government has made efforts to reduce this gap through projects like Kazi kwa Vijana (Work for Youth), the Constituency Development Fund (CDF), the Local Authority Transfer Fund (LATF), the Youth Development Fund, and the Uwezo Fund (GoK, 2005). These projects provide funding for economic activities that generate income for the poor. Despite these efforts, there are still many Kenyans living in poverty.

A further increase in the income gap between the poor and the rich may deteriorate an already precarious situation and have detrimental effects on general economic welfare. Strong income inequalities negatively affect the economic growth of a country (e.g. Alesina and Rodrik, 1994; Barro 2000; Cingano, 2014; Perotti, 1996). Great inequality is also associated with social problems such as high crime rates and political instability, which increase the risk of civil wars and threaten democracy (Alesina and Perotti, 1996). On the other hand, a certain income inequality can promote growth by enabling more savings, resulting in capital accumulation and as a consequence a higher GDP (Kaldor, 1955; or more recent Benhabib, 2003: 329), by having more incentives to invest in one's own education or for more effort and hence a higher labour output. Higher income inequality can also promote growth because it encourages risk-taking.

Taxes can be used to redistribute income. They can directly and indirectly influence the income distribution depending on how they are raised and revenue is spent. There are a number of studies on fiscal policy and income distribution, taxes (both direct and indirect), and distributive efficiency, but none have focussed on consumption taxes and income distribution in Kenya. So far, the impact of consumption taxes – which mainly constitute VAT and excise taxes – has been neglected. Those studies that deal with the effects of consumption taxes on income distribution are not conclusive (Rosen and Gayer, 2014).

In order to raise more revenue and simplify the tax system, the Kenyan government made continuous reforms in the administration of Value Added Tax (VAT) and excise tax. Major reforms were seen in 2013 with the introduction of the VAT Act introducing VAT at the rate of 16 percent on goods that were previously exempt or zero-rated (GoK, 2013). The introduction of indirect taxes on previously exempt goods aggrieved the public but raised significant revenue. The reason for previous exemptions and the zero-rating was to enhance equity by making the necessities affordable for lower income earners. Too many exemptions, however, made the tax system more complicated and created loopholes. The removal of such exemptions may, therefore, affect the income distribution and poverty level in Kenya.

This paper addresses two questions: first, can we use consumption taxes to reduce the level of poverty? And second, can we use consumption taxes as a tool to redistribute income? We conduct an empirical analysis to determine how changes in consumption taxes in Kenya between 1970 and 2014 affected poverty and income distribution.

Our results contribute to the existing literature by shedding more light on understanding income inequality and poverty, and how to use tax policy to address that phenomenon. The remaining paper is organised as follows. After presenting the status quo on taxation, inequality and poverty in Kenya in the second chapter, we outline the theoretical and empirical background in the third chapter. There, we also derive our hypotheses. The empirical analysis, including data description, econometric estimations, results, robustness checks and discussion, takes place in chapter four. The paper concludes with a summary and policy recommendations.

2 Theoretical and Empirical Background

2.1 Characteristics and dimensions of income inequality

Inequality refers to the degree to which the distribution of economic welfare generated in an economy differs from that of equal shares among its inhabitants (KNBS and SID, 2013). Inequality can be reflected in terms of access to basic services, opportunities and income, among others. Income is generated from the factors of production: labour, capital and land. Due to high income inequality around the world, many governments have made the redistribution of income a major goal (Kakwani, 1980).

According to Krugman (2014), it is unequal compensation and high incomes that have led to the accumulation of wealth on a few individuals, rather than high capital to income ratios as proposed by Piketty (2014). Overall, globalisation, technological change, falling tax rates for high income earners, changes in demography and disparities in the distribution of wages and salaries are seen as the major causes of inequality (OECD 2008; Kayizzi-Mugerwa, 2001). Kayizzi-Mugerwa (2001) finds other factors such as social and economic problems leading to high income inequality in Africa. Finally, unemployment might be a cause of inequality (Stiglitz, 2012).

Inequality might slow down economic growth under certain circumstances (Bourguignon, 2004; Kayizzi-Mugerwa, 2001; Perotti, 1996; Alesina and Rodrik, 1994). High inequality is associated with unequal access to basic facilities and opportunities, political instability and social problems such as high crime rate and the use of illegal drugs, and further worsens social inequalities, even more so among children (Wilkinson and Pickett, 2010; Alesina and Rodrik, 1994). Conflicts due to social problems may emerge and could lead to instability; violence that is politically motivated is more likely to happen in highly unequal societies (Ortiz and Cummins, 2011).

Developing countries tend to have a higher Gini index than developed countries, which means they have greater inequality than the latter (Kakwani, 1980). Ortiz and Cummins (2011) found the Gini for Sub-Saharan Africa to average to 0.442 in 2008. This can be compared to 0.483 for Latin America, 0.354 for Eastern Europe and Central Asia, and 0.309 for high-income countries for the same period. The Gini for Kenia was 0.445 in 2009 (KNBS and SID, 2013).

2.2   Characteristics and dimensions of poverty

There are many definitions of poverty. Amartya Sen (1981) defines poverty as the deprivation of capability. These capabilities are factors like human rights, literacy levels and health; determinants thereof include gender, age and locality, among others. Some indicators of deprivation of capability are undernourishment and high mortality rates. Deprivation of access to essential services increases poverty and deteriorates the well-being of the people (KNBS and SID, 2013). For development to take place, Sen (1999) recommends alleviating negative factors such as poverty and inadequate and neglected public health facilities that inhibit individual freedom.

The UN defines poverty as lack of opportunity; it means not being able to meet basic needs such as enough food, clothing, schools and healthcare (HDR, 1997). This view of poverty overlaps to a certain degree with Sen's (1999) deprivation of capability and freedom. The underlying line is that poverty manifests itself when people lack access to necessities. Both views reflect poverty as not only having an income dimension but also a non-income side, which could be a social or a psychological dimension.

Furthermore, poverty can be described in absolute or relative terms (Bourguignon, 2004). Absolute poverty is defined in reference to a poverty line. Relative poverty is defined as a fixed proportion of the average income of the population; it classifies the poor as the individuals in the bottom income group. For example, individuals are in danger of becoming poor if they earn less than 60% of the median income of the population (Laderchi et al., 2003). Alternatively, individuals are poor in absolute terms if they are unable to attain a given minimum income level required to meet the basic needs, defined by the poverty line. The poverty line first needs to be established for a region, a country or for a given study. Having a universal poverty line across different regions or countries, however, is often problematic (Laderchi et al., 2003). Therefore, different countries or jurisdictions have defined the poverty line differently.

The most common approach to measure poverty is the monetary approach using the consumption level or income to show the extent of poverty. The simplest way to measure poverty in terms of money is the GDP per capita. Empirical evidence suggests that economic growth is important for poverty reduction (Dollar and Kraay, 2002). The GDP has, however, been widely criticised as a measure of social progress since it ignores non-monetary aspects of economic transactions such as social and environmental costs (Costanza et al., 2009). Consequently, many alternative measures for economic and social progress have been developed to compen-

sate for the shortfalls of the GDP, such as the United Nation Human Development Index,[1] OECD Better Life Index[2] and the Genuine Progress Indicator.[3]

2.3   Taxation and economic growth

New growth theories stress the importance of savings, technical progress, development of human capital and generally the effect of public policy on growth (Lucas, 1988; Rebelo, 1991; Barro, 1996). This allows economic modelling of the influence of tax policy on growth. Yet studies investigating the relationship between taxes and economic growth have not given a clear direction on the relationship between the two variables.

Gale et al., (2015), e.g., examine the effects of tax policy on economic growth and entrepreneurial activity. Changes in the tax rate affect the desire to work, save and invest, hence this is likely to influence economic growth. However, the study finds no evidence of a stable relationship between tax revenue and personal income growth, neither do top income tax rates have a significant effect on economic growth. Easterly and Rebelo (1993) find no solid evidence that taxes affect growth, too. However, Slemrod et al. (1995) see a non-robust relationship between taxes and economic performance. Although empirical evidence of the influence of taxes on economic performance is mixed, most studies point to a significant negative relationship between taxes and economic growth. McBride (2012) in his analysis of literature finds that most studies show corporate income taxes to be the most harmful to economic growth, followed by personal income tax, consumption taxes, and property taxes.

2.4   Relation of taxes, inequality and poverty

The potential for taxation to reduce inequality and poverty has been widely investigated. Chu et al. (2000) as well as Bird and Zolt (2005) show that the effect of taxes on inequality and poverty is small and/or weak, even more so in developing countries. Generally, indirect taxes are considered to be regressive since all households are subject to the same tax rate irrespective of their level of income. They, therefore, tend to increase inequality (Obadić et al., 2014; Barnard, 2010). Direct taxes are progressive and, thus, preferred for redistributing income (Martinez-Vazquez et al., 2012; Saez, 2010; Barnard 2010; Weller, 2007).

Indirect taxes, especially VAT, have been playing an increasing role in generating revenue for developing countries (Bahl and Bird, 2008; Casale. 2012). Casale (2012) attributes this to the wider tax base for consumption taxes compared to that of personal income tax (PIT) and corporation tax, and the increase in tax competition between countries. Consumption tax is borne

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[1] http://hdr.undp.org/en/content/human-development-index-hdi

[2] http://www.oecdbetterlifeindex.org/

[3] Cobb, C., Halstead, T. and Rowe, J. 1995, The Genuine Progress Indicator. *Redefining Progress, San Francisco, CA.*

by all consumers both in the formal and informal sector, while PIT and corporation tax is usually paid by the firms in the formal sector; the informal sector escapes paying income taxes. However, the existence of nontradables and intermediate goods, the differential administrative costs of different taxes, smuggling and cross-border shopping (Emran and Stiglitz, 2005) make measuring the exact effects of VAT difficult at times.

Alavuotunki and Pirttilä (2015) looked at the effects of VAT on inequality. They graphed Gini coefficients by region before and after the adoption of VAT and find that "the direct impact of VAT adoption has had a benign impact on inequality, especially in the period up until the year 2000". IFS (2010) shows that the benefits of a single VAT rate outweigh those of a differentiated rate. The revenue lost from zero-rating and exemptions is much higher than the equity gained by the poor since the rich also benefit from such exemptions. Therefore, a differentiated commodity tax may be inadequate, complicated, ineffective and suboptimal in redistributing income and enhancing equity (Obadić et al., 2014; Saez, 2010; IFS, 2010).

Still, this does not rule out indirect taxes as redistributive instruments. Low tax rates and exemptions on basic commodities and a high tax rate on luxury goods can render consumption taxes progressive. According to Saez (2010), commodity taxes can be used to complement direct taxes to redistribute income in the short run. Well-targeted zero-rating of a few specific basic items usually consumed by poor households, such as paraffin and basic food items, is redistributive and benefits the poor (Casale, 2012). A comprehensive literature overview can be found in the 'Supporting Information' (Table 1).

3 Taxes, Income Inequality and Poverty in Kenya

3.1 Taxation in Kenya

Kenya is a vibrant lower middle-income country with an average growth rate of 5.5 percent between 2015 and 2017 and a population of 46 million people (KNBS, 2018). Alas, the economic growth does not trickle down to poor households; it is not pro-poor growth (Kabubo-Mariara et al., 2013; Gakuru and Mathenge, 2012).

As one of East Africa's fastest growing economies, Kenya's GDP per capita was US $1,169.3 in 2017, compared to that of Tanzania $936.3, South Africa $6,160.7, and Mauritius $10,547.2 (in constant 2010 US$) (WB, 2018). It is the fourth largest economy in Sub-Saharan Africa after Nigeria, South Africa and Ethiopia (WB, 2018). Characterised as a consumer society, Kenya's gross savings rate of 11.2 percent of GDP in 2016 was comparatively low; its East African counterparts Uganda and Tanzania featured savings rates of 19.7 and 23.7 percent, respectively, during the same period (WB, 2018). Overall, the country has a relatively stable economy: the inflation rate averaged about 6.9 percent between the years 2015 and 2017 (KNBS, 2015)

As the main source of government revenue, taxes fund roughly two-thirds of the Kenyan budget, with public debt and external grants funding the rest (KNBS, 2018). The tax revenue to GDP ratio was estimated at 15.6 percent in 2016; compared to 11.8 and 13.5 percent in Tanzania and Uganda, respectively (WDI, 2018). Taxation is governed by legislation. In Kenya, the Kenya Revenue Authority (KRA) was established on 1 July 1995 to administer taxes. Besides administration, the KRA is also responsible for the assessment, collection and enforcement of tax laws. Since the establishment of the KRA, tax collection has been increasing significantly. As shown in figure 1, tax revenue increased from Kshs. 122 billion in the financial year 1995/1996 to Kshs. 1.3 trillion (in current market prices) in the financial year 2016/2017 (KRA, 1995–2017).

Figure 1: Tax Revenue Collections (Nominal value)
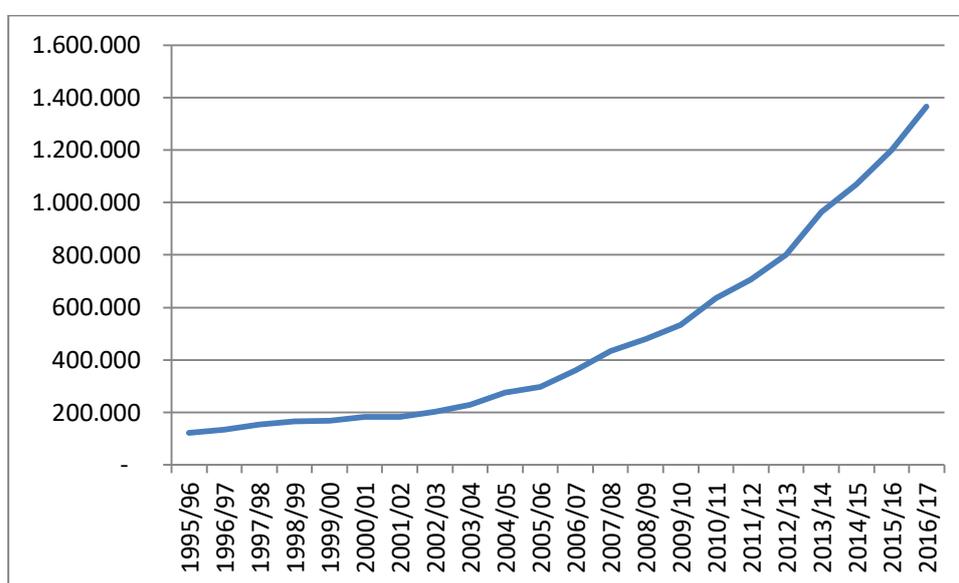
Source: Kenya Revenue Authority (various years).

The main taxes administered by the KRA are the income taxes on individuals (PAYE) and companies (corporation tax), as well as VAT, customs duties on imports and exports, excise duty, stamp duties and capital gains tax. The shares of various taxes as a percentage of total tax revenue (nominal revenue) in Kenya are shown in figure 2 below:

Figure 2: Various taxes as a percentage of total tax collection
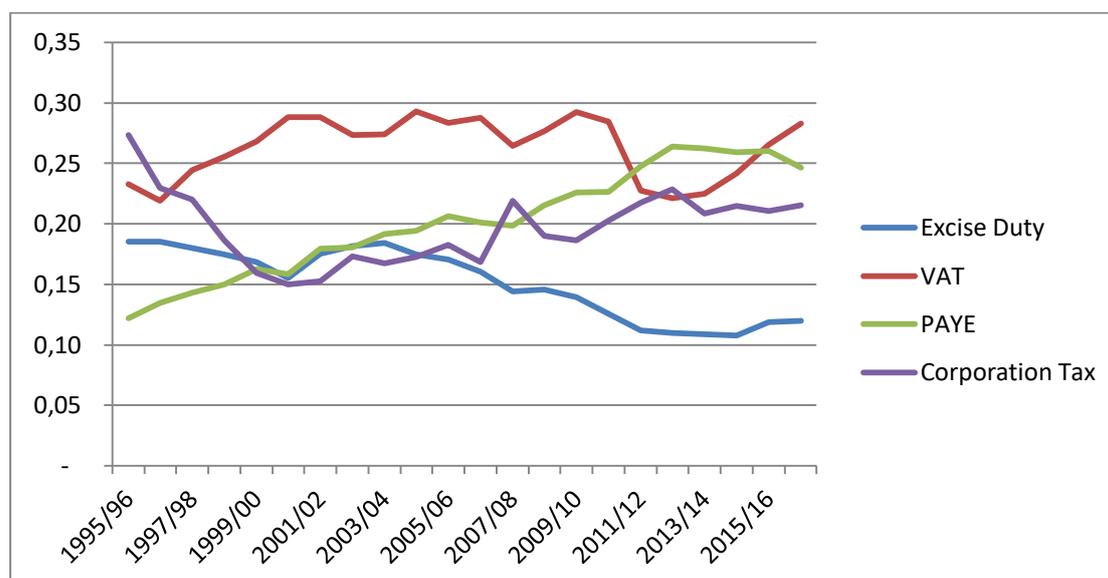
Source: Kenya Revenue Authority (various years).

There are three rates of VAT: the standard rate (16 percent), zero rate, and exempt as stipulated in the VAT Act, 2013. VAT accounts for about 25 percent of the total tax revenue as shown in figure 2. This share has remained nearly constant in recent years, but experienced a dip in 2011/2012, after the suspension of withholding VAT. The suspension was due to a huge backlog of refund claims for VAT withheld (Muriithi and Moyi, 2003). Kenya's reliance on VAT instead of trade taxes is part of a larger development: globally, trade liberalisation has led to a decreased importance of trade taxes. Generally, as recommended by Keen (2008), VAT can be used to compensate for forgone revenue from trade taxes. Thus, Emran and Stiglitz (2005) doubt that VAT is more suitable for raising revenue in developing countries compared to trade taxes – especially in the presence of a large informal sector. Furthermore, Boadway and Sato (2009) emphasize that both VAT and trade taxes influence the size of the informal sector; impacts on the informal sector should, therefore, be closely assessed. One additional caveat of VAT is the potential inefficiency in developing countries as high rates of illiteracy and inadequate record-keeping may make trade taxes the bureaucratically more efficient alternative (Ebrill et al., 2001). Kenya's adult literacy rate was 78.7 percent and the youth literacy rate was 86.5 percent in 2014 (WDI, 2018). Proponents of VAT, however, prefer VAT to direct taxes as they cause fewer distortions in terms of savings and investment (Świstak et al., 2015; Rosen and Gayer, 2014).

Excise duty is charged on goods and services to raise revenue; it is also used to discourage the consumption of certain goods such as tobacco, alcohol and petroleum products. Excise duty accounted for an average of 15 percent of total collection for the period 1997/1998 to 2016/2017, as shown in figure 2. This share of excise duty on to-

tal collections has been declining over time, but remains a significant part of total collections.

Income taxes have gained importance in recent years. This can be attributed to the fact that they are easier to administer and capture the ability to pay. The share of personal income tax—which mainly constitutes PAYE—currently stands at 25 percent, as shown in figure 2. Lastly, the share of corporation taxes (tax on business income) has been rising gradually in recent years up to 22 percent for the financial year 2016/2017. It includes rental income, turnover tax, capital gains tax and income tax withheld at source.

Overall, revenue from taxes has been increasing. One reason could be the expanding economy and improvements in tax collection.[4] The GDP has continued to rise over the years: in constant terms from 524 billion Kenya shillings in 1970 to 4.5 trillion Kenya shillings in 2017 (WDI, 2018). Enabled by the above characterised recent reforms of VAT and excise duty and their significant share of total tax revenue in Kenya, the focus of this research will lie on these two consumption taxes.

3.2 Income distribution and poverty in Kenya

Kenya adopted both the Millennium Development Goals (MDG) and the Sustainable Development Goals (SDG) by the UN. Kenya also developed and implemented the National Poverty Eradication Plan for the period 1999 to 2015. Moreover, a new constitution was established in 2010 that led to fiscal decentralisation. However, cases of mismanagement are rampant and the funds may hence not be as effective as intended (ICPAK, 2015). Some progress has certainly been made in areas such as the provision of free primary education. Alas, in general, not enough progress has been made in the fight against poverty and too much inequality.

Kenya is a low human development country. The Human Development Index (HDI) ranked it at position 147 out of 188 countries in the year 2015. The HDI is a United Nations Development Program (UNDP) measure of poverty based on literacy level, life expectancy and standards of living, inter alia. The 2016 Human Development Report (HDR) by the UNDP indicates that the HDI for the country improved from 0.446 in 1980 to 0.555 in 2015. Thus, the positive development reflected in the HDI should not be mistaken for an absence of poverty. Almost half of the population live below the poverty line. The number of people living in poverty increased from 27 percent in 1970 to 36 percent in 2015 (UNDP, 2016; KNBS, 2015); 47 percent of the population were not

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[4] Kenya's Revenue Analysis 2010–2015. P.16-18. https://www.icpak.com/wp-content/uploads/2016/10/ICPAK-FISCAL-ANALYSIS-2010-2015.pdf and Moyi, E. D and Muriithi M.K. 2003. *Tax Reforms and Revenue Mobilization in Kenya*, Research Paper No 131, African Economic Research Consortium (AERC), Nairobi, Kenya.

able to meet the daily recommended nutritional requirement in the year 2005/2006 (WB, 2009). This number fell to 32 percent for the financial year 2015/2016 (KIHBS). Income is unequally distributed too; the top 20 percent controlled 59.4 percent of total expenditure, while the bottom 20 percent only controlled 3.6 percent of the expenditure in 2014 (KNBS, 2015). The Gini index was estimated to be 0.445 in 2009 (KNBS and SID, 2013) indicating high income inequality.

The key drivers of inequality in the country are believed to be access to essential services such as fuel, water and education (Kabubo-Mariara et al., 2013). The continued lack of access to basic services results in more poverty and an increase in vulnerability (KNBS and SID, 2013). Various development funds and policies have been set up to reduce poverty levels and inequality, such as the Constituency Development Fund (CDF), the Local Authority Transfer Fund (LATF), the Youth Development Fund, school bursaries and free primary education. Other efforts to address poverty and inequality made through taxation include the exemption from VAT of basic food items and agricultural implements to make them available to all. Their effectiveness in addressing the issues remains unclear.

Wanjala et al. (2006) reveal that as much as VAT exemptions increase progressivity, it is still gender-biased in Kenya. Female-headed households bear a heavier tax burden of VAT as compared to male-headed households despite there being tax exemptions in place. The results for Kenya contradict those for South Africa (Casale, 2012). This could be due to differences in tax structures. Gakuru and Mathenge (2012) use a social accounting matrix (SAM) to model how poverty, growth and inequality interact in Kenya. The sectors included in the matrix are agriculture, manufacturing, trade and hospitality, as they are vital sectors of the economy. The results indicate that growth in the agriculture and manufacturing sector mainly benefits the rich urban households that control factors of production. Kabubo-Mariara et al. (2013) investigate whether economic growth benefits the poor, and how it affects inequality and institutions in Kenya. Their findings reveal that growth is a necessary condition for the reduction of poverty but it does not guarantee poverty reduction. Increases in access to basic services, which include education, health, sanitation and clean water, reduce inequality. However, big disparities between different groups in accessing these services make it difficult to reduce poverty only with economic growth (KNBS and SID, 2013). Finally, AfDB (2010) conducted a quantitative case study for Kenya to show how to improve domestic revenue mobilisation to fight poverty. It points out that taxes can reduce poverty but also that exemptions in taxation create distortions, undermine the equity of the tax system and reduce the revenue potential (AfDB, 2010; Chu et al., 2000).

To the best of our knowledge, studies on Kenya have not extensively investigated the distributional effects of taxes. Studies have mainly focussed on domestic resource mo-

bilisation for poverty reduction, poverty, and income distribution (Kabubo-Mariara et al., 2013; Gakuru and Mathenge, 2012; AfDB, 2010; GoK, 2005).

4 Empirical Analysis

4.1 Data and model specifications

The period of study is 44 years, from the year 1970 to 2014. We estimate two models; the first model uses inequality as the dependent variable, the second one poverty. In line with the existing literature (Obadić et al., 2014; Martinez-Vazquez et al., 2012; Chu et al., 2000) we use the Gini coefficient as a measure of income distribution in the first model. The GDP per capita is taken to measure poverty in the second model. Explanatory variables are consumption taxes, i.e. taxes on goods and services comprising VAT and excise duty. VAT includes taxed not only on locally produced goods and services, but also on imported goods and services. Income and trade taxes are included as control variables. The first comprises personal income taxes, including PAYE and corporation taxes. Trade taxes are taxes on international trade, composed of import and export duty.

Further control variables – being also in line with the literature (see above) – are expenditure on education and health and population growth, showing how the population expands/declines annually.

Data on income inequality is scarce and not fully available for the current years. Extrapolation is done to fill in the missing years for the Gini coefficient. Inconsistent data from the various sources of data posed a challenge, too. To resolve this issue, data on a specific variable is obtained from a single data source wherever possible. For example, the data on all the taxes, education and health expenditures, as well as the population growth rate, come solely from the statistical abstracts by the Kenya National Bureau of Statistics (KNBS) and data on the Gini and GDP per capita in constant local currency is obtained from the World Development Indicators.

Education expenditure is composed of the money spent by the national government on education administrative expenses; pre-primary, primary, secondary and tertiary education. Health expenditure constitutes the national government expenditure on hospital outpatient and inpatient services and public health services. The tax and the expenditure variables are expressed as percentages of the GDP.

The table below gives a summary of the measurement of the variables used in the study.

Table 2: Measurement of Variables

Variable	Indicator	Measurement	Source of Data	Justification
Gini Co-efficient	The extent to which the distribution of net income among households deviates from a perfectly equal distribution.	As a percentage; zero perfect equality and one represents perfect inequality.	WDI (World Bank)	Gini analyses income inequal-ities of a coun-try (Lorenz, 1905)
GDP per Capita	GDP is the sum of the gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	GDP (in Constant Local currency) di-vided by the size of population – repre-sents the average income of the popu-lation	WDI (World Bank)	A simple com-mon measure of standards of living – poverty. (Milanovic, 2011).
Con-sump-tion Tax	Taxes on goods and services, both local and imported (VAT and Excise du-ty).(current market price)	As a percentage of GDP (at current market price)	KNBS	Consumption taxes have a negative effect on the income distribution. Martinez-Vazquez et al. (2012)
Income Tax	Personal income tax and corporation tax (includes PAYE and withholding income tax) (at current mar-ket price)	As a percentage of GDP (at current market price)	KNBS	Direction of relationship with GDP per capita is debat-able (Easterly and Rebelo, 1993;
Trade Tax	Taxes on international trade (import and export duty) (at cur-	As a percentage of GDP (at current market price)	KNBS	Slemrod et al., 1995;

				McBride, 2012)
Educa-tion ex-pendi-ture	National government spending on educa-tion administrative expenses; pre-primary, primary, secondary and ter-tiary education. (at current market price)	As a percentage of GDP (at current market price)	KNBS	Education and health are pub-lic services that are powerful in reducing ine-quality (OECD, 2008; Bourgui-gnon, 2004).
Health expendi-ture	National government expenditure on hospi-tal outpatient and inpatient services, and public health ser-vices. (at current mar-ket price)	As a percentage of GDP (at current market price)	KNBS	
Popula-tion Growth	Total size of the popu-lation	Rate of growth of the population	KNBS	Population growth affects the functional distribution of income. (Bouli-er, 1975).

The first model is specified as follows:

$$Gini = \beta_0 + \beta_g Gini_{-1} + \beta_i CT + \beta_j(IT, TT) + \beta_k Z + Error\ term$$

$$Z = (EDU, HLTH, PPG, GDP)$$

$Gini$ is the Gini coefficient. CT is consumption tax, which comprises VAT and excise tax. IT is income tax, and TT is trade tax. Z is a control vector which consists of educa-tion expenditure (EDU), health expenditure($HLTH$), population growth rate (PPG) and economic performance (GDP).

Taxes in general are expected to have a negative relationship with the Gini coefficient due to their positive redistributive effects (Obadić et al., 2014). Yet the burden of a commodity tax can be shifted, depending on the elasticities of the supply and demand of the respective commodity (Rosen and Gayer, 2014). Thus, the effect might be ambiguous. However, consumption taxes are regressive, and a tax increase might worsen income inequality (Karanfil and Özkaya, 2013; Martinez-Vazquez et al., 2012; Barnard, 2010; Saez, 2010). Therefore, we expect a positive coefficient for consumption taxes due to their regressivity.

Education and health are public services that are powerful in reducing inequality (OECD, 2008; Bourguignon, 2004) i.e. a negative coefficient is expected for education and health expenditures. Population growth affects the functional distribution of income. The process may be complex since it depends on how population growth affects the rate of growth of capital and labour, final demand and market mechanisms (Boulier, 1975). A high population growth is likely to result in a higher return on capital in the form of rent and profits. This income will not be evenly distributed among the population, resulting in a less equal income distribution over time. Thus, a positive coefficient is expected for population growth (Boulier, 1975; Rougoor and Marrewijk, 2015).

Our second model shows the effects of consumption taxes on poverty. Getting a poverty measure that represents the extent of poverty fairly is challenging since human poverty is a complex issue with many dimensions that cannot be captured in one single number (UNDP, 1997). The poverty ratio is a common measure of poverty. Karanfil and Özkaya (2013) estimate a model using this measure to investigate the effects of indirect taxes on poverty. However, the sparse data on the poverty ratio and the HDI for the study period presented a challenge. In line with the literature (Milanovic, 2011), we use a close measure of living standards, i.e. GDP per capita growth rate (GDPPC) – despite its many critics. Increasing the GDP per capita is good for poverty reduction but a high GDP per capita does not mean every household is better off (Kabubo-Mariara et al., 2013). The GDP per capita is poverty-reducing only if the economic growth is pro-poor (Kabubo-Mariara et al., 2013; UNDP, 1997).

To investigate how the GDPPC varies with consumption taxes, it was regressed against consumption taxes and control variables, just like in the first model.

$$GDPPC = \beta_0 + \beta_i CT + \beta_j(IT, TT) + \beta_k Z + Error\ term$$

$$Z = (EDU, HLTH, PPG)$$

As previously explained, whether taxes have a positive or negative impact on poverty is an open question. It all depends on who bears the tax burden and on how the tax revenue is used.

The expenditure on education and health reduces poverty, (Kabubo-Mariara et al., 2013). Education is an important determinant of human development; attainment of higher education enhances participation in the economy, increases growth and leads to good social and economic outcomes in the long term (KNBS and SID, 2013). Hence, we expect two positive coefficients. Ordinary Least Squares (OLS) method is used, assuming a linear relationship between the variables, to test a set of two null hypotheses:

1) H_0: consumption tax does not affect the poverty level.

   H_A: consumption tax affects the poverty level.

2) H_0: consumption tax does not affect income distribution.

   H_A: consumption tax affects income distribution.

4.2 Results and discussion

4.2.1 Descriptive statistics

Looking at the Gini coefficient (GINI) from 1970 to 2014 we see an average of 0.51. The highest GINI ever attained over the study period was 0.7 in 1970, while the lowest was 0.425.

Table 3: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GINI	45	.5144	.0765312	.425	.7
GDPPC	45	68143.3	6626.382	46648.15	85456.3
CTGDP	45	.0833333	.0201133	.03	.12
ITGDP	45	.075556	.0130655	.05	.11
TTGDP	45	.0357778	.0133976	.02	.06
HLTHGDP	45	.0167929	.0033667	.0080742	.022968
EDCGDP	45	.0604988	.0076158	.00447502	.0803948
PPG	45	.0315089	.0051871	.0246	.0382

As figure 3 shows, it was quite high in the 1970s, pointing to the oil price shocks in 1973 and to a coffee boom in the late 1970s. These external shocks led to huge price fluctuations which benefitted some members of society while hurting others.

Figure 3: Gini coefficient
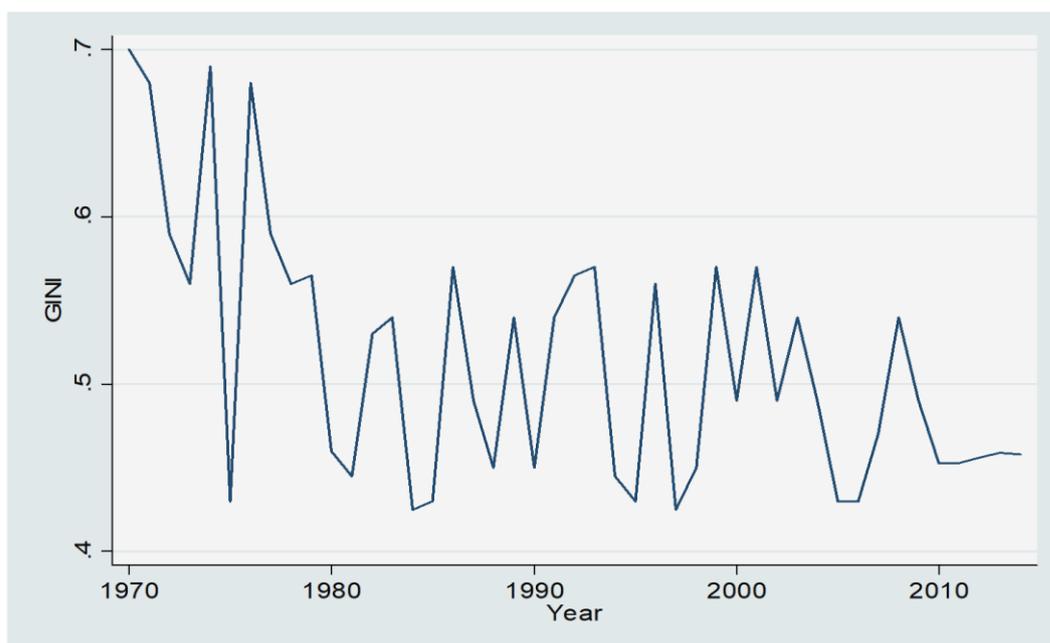
Source: (World Bank, WDI)

The GDP per capita (GDPPC) averaged about 68,143 Kenya shillings. It has been in-creasing over the years, though it stagnated during the 1990s and early into the new

millennium, as can be seen in figure 4. Kenya experienced an almost stagnant and even negative growth at that time based on economic factors and the political regime. Growth picked up in 2003 when a new government took power and implemented new economic strategies. It has been consistent since, but it becomes stunted during election years.

Figure 4: GDP per capita
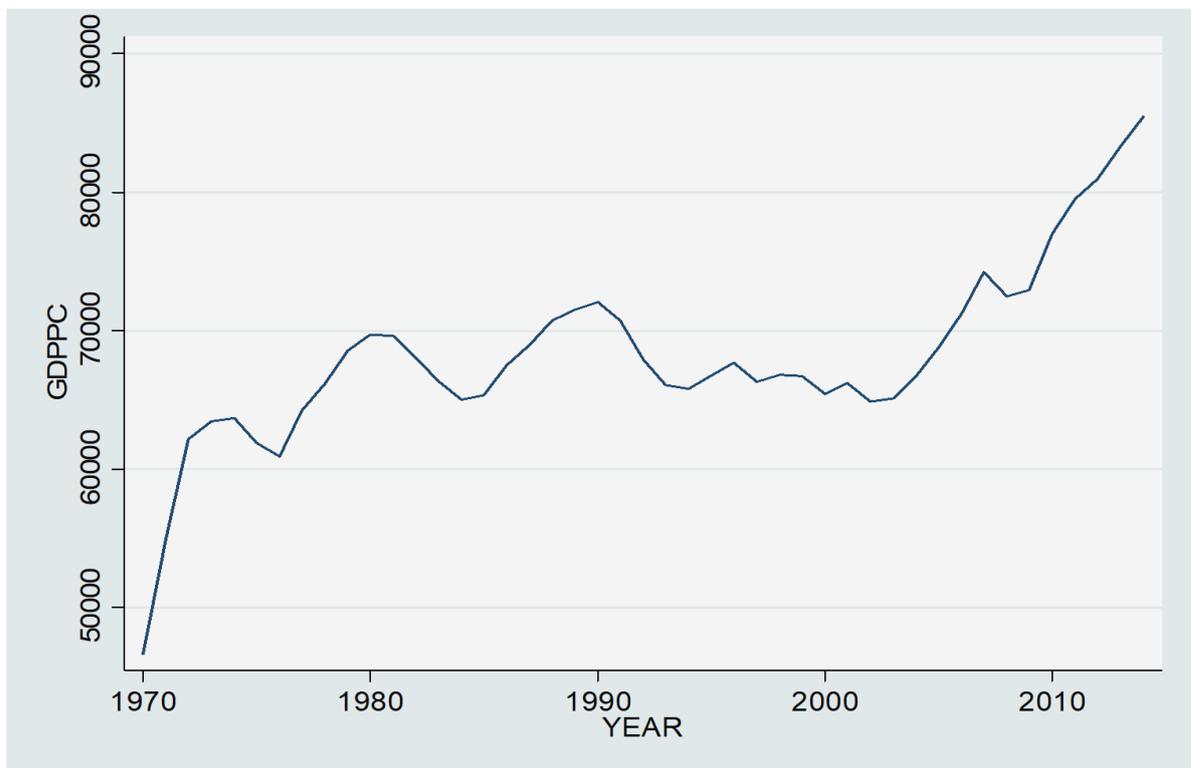
Source: (World Bank, WDI)

4.2.2   Consumption taxes and income distribution

The Gini coefficient is regressed against its own lag (GINI_1), the first differences of the variables consumption tax to GDP ratio (d_CTGDP), income tax to GDP ratio (d_ITGDP), trade tax to GDP ratio (d_TTGDP), education to GDP ratio (EDCGDP), health to GDP ratio (d_HLTHGDP) and GDP per capita (GDPPC). Population growth is differenced three times to make it stationary (d_d_d_PPG). Differencing the variables is done to ensure that we do not get spurious regression.

Table 4: Estimated regression model for Gini coefficient

Model 1: OLS, using observations 1973–2014 (T = 42)
Dependent variable: GINI

	Coefficient	Std. Error	t-ratio	p-value	
const	1.12453	0.244994	4.5900	<0.0001	***
d_CTGDP	1.63684	0.770884	2.1233	0.0413	**
d_ITGDP	−0.502759	1.26796	−0.3965	0.6943	
d_TTGDP	−0.617481	1.19357	−0.5173	0.6084	
d_d_d_PPG	−21.5005	37.8705	−0.5677	0.5741	
GDPPC	−5.47383e-06	1.86938e-06	−2.9282	0.0061	***
EDCGDP	−2.57904	1.1655	−2.2128	0.0339	**
d_HLTHGDP	3.10358	3.39097	0.9152	0.3667	
GINI_1	−0.168013	0.157417	−1.0673	0.2936	

R-squared	0.270745	Adjusted R-squared		0.093956
F (8, 33)	2.530573	P-value(F)		0.028767
Log-likelihood	60.87236	Durbin-Watson		2.224384

The estimated model explains 28 percent of the variation in the Gini coefficient. The F-statistic shows that the independent variables explain the dependent variable. The Durbin-Watson (DW) statistic is almost equal to 2, which indicates the absence of serial correlation.

Consumption tax affects the Gini coefficient positively at a 5 percent level of significance. This is consistent with the literature that suggests consumption taxes are regressive (Obadić et al., 2014; Martinez-Vazquez et al., 2012). A 1 percent increase in consumption taxes to the GDP ratio is likely to increase the GINI coefficient by 1.6368 percent. An increase in VAT or excise tax will increase income inequality while a decrease will reduce income inequality. For re-distributional purposes, the VAT rate and excise duty should not be increased as this will worsen inequality.

Income tax and trade taxes have a negative effect on the Gini, but they are not significant determinants of income inequality. This supports the view of income taxes as being progressive (Martinez-Vazquez et al., 2012; Saez, 2010; Barnard, 2010). However, the effect on income distribution is not significant; this is in line with studies by Chu et

al. (2000) as well as Bird and Zolt (2005) who find tax policies to be weak determinants of income inequality.

The GDP per capita is a strong determinant of the Gini coefficient; both are negatively related. This means that the higher the GDP per person, the lower the income inequality. Raising the GDP per capita will reduce inequality, which further supports our choice of GDP per capita as a measure of poverty in our second model.

Education expenditure is another significant determinant of income inequality. As expected, more expenditure on education reduces inequality (IMF, 2014; Martinez-Vazquez et al., 2012). The results further indicate that health expenditure is not a significant determinant of income inequality. This could be due to a poor targeting of health expenditure; it may mean that the poor do not benefit much from health expenditure. This corresponds to findings by Chu et al. (2000) which show that health expenditure in developing countries is poorly targeted. The rich end up benefitting more than the poor from public health expenditure. The lagged GINI coefficient has no significant influence on the current one.

4.2.3 Consumption taxes and poverty

The results for poverty with the dependent variable as the GDP per capita are as follows:

Table 5: Estimated regression for GDP per capita
Model 2: OLS, using observations 1970–2014 (T = 45)
Dependent variable: GDPPC

	Coefficient	Std. Error	t-ratio	p-value	
const	54265.7	9531.39	5.6934	<0.0001	***
CTGDP	120787	68955.5	1.7517	0.0879	*
ITGDP	133162	66253.4	2.0099	0.0516	*
TTGDP	−262307	104196	−2.5175	0.0162	**
EDCGDP	−85869.5	163458	−0.5253	0.6024	
HLTHGDP	−450400	429212	−1.0494	0.3006	
PPG	504436	337502	1.4946	0.1433	

R-squared	0.456621	Adjusted R-squared	0.370824
F(6, 38)	5.322122	P-value(F)	0.000457
Log-likelihood	−445.5694	Durbin-Watson	0.501240

Consumption taxes positively influence the GDP per capita at a 10 percent level of significance, and so do income taxes. It could mean that taxes generated through consumption and income can reduce poverty when utilised to provide public goods increasing welfare. Trade taxes negatively influence the GDP per capita at a 5 percent level of significance. High trade taxes seem to discourage international trade, hence lowering the GDP per capita.

The model explains 45 percent of the variations in the GDP per capita. The independent variables are valid determinants of GDP per capita, from the F-statistic. The Durbin-Watson statistic is quite low, which indicates a positive serial correlation.[5] The model might not be sufficient for analysing determinants of poverty. The GDP per capita is widely criticised as a measure of poverty, but it is still widely used due to its simplicity (Bérenger and Verdier-Chouchane, 2007; Sen, 1999). Future research can focus on using other measures of poverty to investigate how taxes affect poverty in the country.

4.3 Robustness Checks

The data were tested for autocorrelation using correlograms and partial correlograms. The correlograms for the Gini coefficient and the GDP per capita growth do not show any trend, while that of consumption taxes shows a trend that disappears after the sixth lag. This preliminary analysis points out that consumption taxes could be non-stationary.

We use the Augmented Dickey-Fuller (ADF) test to test for stationarity (Supporting Information). The test reveals that for the variables GINI, GDPPC, EDCGDP, we reject

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[5] The Durbin-Watson statistic becomes even lower when lagged variables are used.

the null hypothesis since the test statistic is higher than the critical values at a 1 percent level of significance. They are stationary at level. For the variable CTGDP, ITGDP, TTGDP and HLTHGDP, we do not reject the null hypothesis at level; this means they are non-stationary at level. They become stationary after the first difference. The PPG is non-stationary and is differenced three times to make it stationary.

Furthermore, the Johansen Cointegration test is conducted to check whether there is a long-run relationship between the variables. Two non-stationary series integrated of the same order are said to be cointegrated if a linear combination of the two forms a stationary series. Cointegration avoids spurious or inconsistent regression in non-stationary series. When two series are cointegrated, estimation is done in a vector error correction model (VECM). The variables that are integrated of order one are tested to find out whether they have a long-run relationship; these are CTGDP, ITGDP, TTGDP and HLTHGDP. We do not reject the null hypothesis since trace statistics are less than the critical value. Both tests indicate an absence of a long-run relationship among the variables. Therefore, the VECM cannot be applied because the variables are not cointegrated (Supporting Information).

In sum, the robustness checks confirm our estimation method and our results.

5   Summary and Policy Recommendations

The aim of the study is to investigate the influence of consumption taxes on income inequality and poverty in Kenya. Among other reasons the motivation lays in the recent changes in the tax legislation concerning VAT and excise tax. Existing research has not covered how this is likely to influence inequality and poverty in the country. The UN's SDGs and the World Bank are leading the effort to end poverty and have made increased equality a top priority. Kenya's long-term plan, Vision 2030, is aligned with this global agenda. This research comes in useful at such a time as it helps to understand how tax policy can influence redistribution and may help towards achieving Vision 2030.

We find that consumption taxes are positively related to the Gini coefficient, which means they are regressive. Thus, to address inequality consumption taxes should be lowered. However, this may not be a viable move as the government is trying to cover all the bases to maximise tax collections to mobilise domestic resources for development. Another way of addressing the inequality problem is to make the taxes more progressive by having differentiated rates; this may include having a reduced rate, zero rate or exemptions for a wider range of basic necessities. Still, this is suboptimal, too, and may cause inefficiencies and revenue loss as previously noted. There seems to be a trade-off between efficiency and income redistribution with regard to consumption taxes (IMF, 2014; OECD, 2012; Saez, 2010).

We also find consumption taxes are positively related to GDP per capita. Revenue collected from these taxes is obviously used to provide social good and services, such as education, to improve the welfare of low-income earners. This redistributes income to the poor. If public spending programmes are well targeted, the poor stand to benefit and the level of poverty can be reduced (OECD, 2012; Chu et al., 2000). Another way of redistributing income is through direct transfers to the interest group. This increases efficiency by reducing the complexity of designing effective, differentiated consumption tax rates and the costs of the administration of such a tax (IFS, 2010; Wanjala et al., 2006).

Consumption taxes are not to be set too high as they will discourage investment and entrepreneurial activity. They should be sufficient to provide essential public goods and services, and progressive enough to redistribute income among the population with minimal distortions in the economy. Governments should be keen to achieve this balance.

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7 Appendix

Table 6: Literature overview

Author(s) (Year)	Object of investigation	Findings	Country/Region
Obadić et al. (2014)	Effect of taxes and social contribution on income inequality	Tax policies, especially labour taxes, affect inequality	EU
Martinez-Vazquez et al. (2012)	Effects of taxes and public spending on income distribution	Consumption taxes increase income inequality	150 Countries around the world
Engel et al. (1999)	Taxes, income redistribution	Taxes are not very effective in income redistribution. A proportional tax can yield more revenue, which the government can transfer to the poor. Expenditures are more effective.	Chile
Acosta-Margain (2011)	Distributional effects of VAT rate increase on food and medicine to fund progressive social expenditure	The regressive effect of the VAT increase compensates through the progressive social expenditure	Mexico
Świstak et al. (2015)	Effects of an increased VAT rate and reduced rates on equity on redistribution	Ineffective; gains are outweighed by the cost of implementing	Poland
Correia (2010)	Effects of consumption taxes on inequity	A uniform and constant rate of consumption taxes will improve income equity	USA
Karanfil/ Özkaya (2013)	Effects of indirect taxes on the poverty ratio	Higher indirect taxes increase poverty	Turkey
Gemmell/ Morrissey (2005)	Impacts of tax reforms on distribution and poverty	No significant redistribution possible through indirect taxes; VAT has little direct effect on the poor	Developing Countries
Jenkins et al. (2006)	Effects of VAT on poverty	VAT is progressive, tax administrators put less effort into collecting taxes to where lower-income households do their shopping	Dominican Republic
Bhasin/ Annim (2005)	Effects of trade taxes/VAT on poverty and income distribution	Replacing import taxes with VAT reduces the incidence of poverty and improves income distribution while replacing export taxes with VAT increases poverty and adversely affects income distribution	Ghana

Ilaboya/ Ohonba (2013)	Effects of taxes on income inequality	Taxes have a significant negative effect on income inequality	Nigeria
Casale (2012)	Effects of indirect taxes on gender equity	Male households have a heavier burden of indirect tax than female-headed households due to high taxation on items like fuel, alcohol and tobacco.	South-Africa;

Table 7: Augmented Dickey-Fuller (ADF) Test Results

Variable	At level		1st difference		2nd difference		3rd difference	
	test statistic	Prob	test statistic	Prob	test statistic	Prob	test statistic	Prob
GINI	-5.427	0.0000						
CTGDP	-2.921	0.0429	-6.192	0.0000				
ITGDP	-2.181	0.2133	-7.525	0.0000				
TTGDP	-1.885	0.3391	-7.601	0.0000				
HLTHGDP	-1.754	0.4035	-9.063	0.0000				
EDCGDP	-3.952	0.0017						
PPG	0.032	0.9611	-1.557	0.5053	3.007	0.0343	-7.303	0.000
GDPPC	-5.710	0.0000						
critical values: 1%	-3.621		-3.628		-3.634		-3.641	
5%	-2.947		-2.950		-2.952		-2.955	
10%	-2.607		-2.608		-2.610		-2.611	

Table 8: Johansen Cointegration Test Results

Maximum rank	Parms	LL	Eigenvalue	Trace statistic	5% critical value
0	20	645.37573	.	46.5908*	47.21
1	27	658.17064	0.44850	21.0010	29.68
2	32	664.86108	0.26742	7.6201	15.41
3	35	668.57193	0.15852	0.1984	3.76
4	36	668.67113	0.00460		
Maximum rank	Parms	LL	Eigenvalue	Trace statistic	5% critical value
0	20	645.37573	.	25.5898	27.07
1	27	658.17064	0.44850	13.3809	20.97
2	32	664.86108	0.26742	7.4217	14.07
3	35	668.57193	0.15852	0.1984	3.76
4	36	668.67113	0.00460		

Sample: 1972-2014, constant trend; no. of observations: 43, lags: 2

Table 9: Correlogram for Gini coefficient

Lag	AC	PAC	Q	Prob >Q
1	0.2401	0.2441	2.7711	0.0960
2	0.2217	0.2124	5.1892	0.0747
3	0.3025	0.2988	9.7963	0.0204
4	0.1571	0.1093	11.07	0.0258
5	0.1053	0.0888	11.656	0.0398
6	0.1679	0.1037	13.184	0.0402
7	0.1484	0.1679	14.411	0.0443
8	0.0023	-0.0063	14.411	0.0717
9	0.0252	0.1255	14.448	0.1073
10	0.0545	0.1562	14.628	0.1462
11	-0.2017	-0.2055	17.159	0.1033
12	-0.0032	0.0439	17.159	0.1437
13	-0.0080	0.0133	17.164	0.1919
14	-0.1483	-0.0362	18.665	0.1782
15	0.0578	0.2457	18.9	0.2183
16	0.0504	0.0596	19.085	0.2643
17	0.0348	0.0697	19.177	0.3185
18	-0.0950	-0.1381	19.884	0.3394
19	-0.0082	-0.1882	19.89	0.4012
20	-0.0167	-0.1761	19.913	0.4634

Table 10: Correlogram for GDP per Capita growth rate

Lag	AC	PAC	Q	Prob >Q
1	0.2057	0.2069	2.0338	0.1538
2	-0.1272	-0.2420	2.8294	0.2430
3	-0.1196	-0.0158	3.5497	0.3144
4	-0.1883	-0.1581	5.378	0.2507
5	0.0136	0.1751	5.3878	0.3704
6	0.1745	0.0871	7.0395	0.3172
7	0.0667	-0.0799	7.2874	0.3996
8	0.1492	0.1369	8.5593	0.3808
9	0.0895	-0.0287	9.0297	0.4345
10	-0.0329	-0.0201	9.0949	0.5231
11	-0.1098	-0.0480	9.8446	0.5444
12	-0.1424	0.0103	11.144	0.5166
13	-0.1349	-0.0021	12.347	0.4995
14	-0.0363	-0.0938	12.436	0.5713
15	0.0440	0.0302	12.573	0.6353
16	0.0461	-0.1014	12.728	0.6926
17	0.0691	-0.1125	13.089	0.7302
18	0.0010	-0.1310	13.089	0.7863
19	-0.0635	0.1566	13.417	0.8166
20	-0.1944	-0.2027	16.613	0.6779

Table 11: Correlogram for consumption tax/GDP

Lag	AC	PAC	Q	Prob >Q
1	0.7990	0.7993	30.687	0.0000
2	0.5868	-0.0724	47.621	0.0000
3	0.3783	-0.0278	54.827	0.0000
4	0.2784	0.0408	58.825	0.0000
5	0.2328	0.0874	61.692	0.0000
6	0.1685	-0.0922	63.232	0.0000
7	0.0874	0.0465	63.657	0.0000
8	0.0362	0.0305	63.732	0.0000
9	-0.0094	0.0307	63.737	0.0000
10	0.0350	0.1936	63.811	0.0000
11	0.0961	0.1667	64.386	0.0000
12	0.1049	-0.0771	65.091	0.0000
13	0.0855	0.0165	65.574	0.0000
14	0.0062	-0.2536	65.577	0.0000
15	-0.0674	0.0896	65.897	0.0000
16	-0.1692	-0.1802	67.984	0.0000
17	-0.2409	-0.1137	72.37	0.0000
18	-0.2547	0.0040	77.451	0.0000
19	-0.3021	-0.3155	84.876	0.0000
20	-0.3571	-0.0329	95.661	0.0000

Table 11: Normality test

Variable	Obs	Pr (Skew-ness)	Pr (Kurtosis)	Adf chi2(2)	Prob>chi2
Gini	45	0.0220	0.7420	5.20	0.0742
ctgdp	45	0.0167	0.0546	8.17	0.0168
itgdp	45	0.0069	0.1523	8.12	0.0173
ttgdp	45	0.5892	0.0001	11.93	0.0026
hlthgdp	45	0.1149	0.6781	2.83	0.2433
edcgdp	45	0.5018	0.7821	0.54	0.7625
gdppc	45	0.0029	0.0012	14.98	0.0006

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