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FISCAL INCIDENCE, INEQUALITY, AND POVERTY IN KENYA: A CEQ ASSESSMENT

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Fiscal incidence, inequality and poverty in Kenya: A CEQ assessment

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Abstract
The objective of this paper is to evaluate the effects of fiscal policy actions by the Government of Kenya on inequality and poverty. The paper uses the Kenya Integrated Household Budget Survey (KIHBS) dataset for 2015/16 combined with administrative data for the same period to construct various income concepts that are used in an analysis of welfare effects of fiscal measures following the methodology developed by the Commitment to Equity (CEQ) Institute (Lustig, 2018). The results show that the combined impact of government taxes and expenditure actions is to reduce inequality and increase poverty, a finding that is similar to effects reported in CEQ studies done in other African countries, such as Ghana, Tanzania, Uganda and Ethiopia. The study also finds that people in the first six deciles of the income distribution are net beneficiaries of taxation plus all social expenditures while those at the richer three deciles are net tax payers, indicating that individually and jointly, taxation and social spending in Kenya are progressive. On a cash only basis (i.e., excluding in-kind health and education benefits), however, only the first decile is a net beneficiary, largely because indirect taxes are paid by everyone, including the poor. This is despite the fact that, contrary to expectation, indirect taxes in Kenya are generally progressive. However, direct taxes are significantly more progressive than the indirect taxes, i, e., they are paid at higher rates in richer deciles. Further, cash and near-cash transfers, basic education and health benefits are pro-poor while tertiary education benefits are not. Cash and near-cash transfers lead to a reduction in poverty. Finally, simulation results show that increasing cash transfer to existing beneficiaries by 50% and increasing coverage could lead to greater reduction in poverty and inequality. The main conclusion of our analysis is that Kenya's fiscal policy can be redesigned to support both inequality and poverty reduction.

Keywords
Fiscal incidence, CEQ methodology, poverty, inequality, concentration coefficients, Kenya.

Classification JEL
H2, H22, I14, I24

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Introduction

Kenya has witnessed increased economic growth despite facing several shocks in the last two decades. While economic activities faltered following the 2007 post-election violence and 2008 global economic recession, Kenya experienced a rebound in economic growth making it one of the fasted growing economies in Sub-Saharan Africa (see World Bank, 2020). Kenya's real GDP growth rate increased from 0.6% in 2000 steadily to 8.41% in 2010; fell to 5.72% in 2015 and was 6.3% in 2018. Between 2005/06 and 2015/16 economic growth rate averaged around 5.3 percent, exceeding the average growth of 4.9 percent observed for Sub-Saharan Africa. The increase in economic expansion was boosted by a stable macroeconomic environment, positive investor confidence and a resilient services sector. Furthermore, significant political, structural and economic reforms during the decade contributed to the sustained economic growth, social development and political gains during the 2005-2016 decade (World Bank, 2018a).

Since independence and over time, the Kenyan government has used enhanced economic growth strategy as one of the mechanisms to reduce inequality and poverty. Overall, high economic growth is regarded as a key solution not only to poverty, but also to unemployment, poor health, and inequality. The effectiveness of this strategy is assumed to be achieved through the trickle down of the benefits of economic growth to households and individuals (World Bank, 2018a). The proportion of the population living under the national poverty line fell from 46.8 percent in 2005-06 to 36.1 percent in 2015-16, showing an improvement in the living standards of the Kenyan population. Much of the decline was in the rural areas where poverty declined from around 50.5 percent in 2005/06 to 38.8 percent in 2015-16 as compared to the urban areas where it declined minimally over the same period. This pattern is worth contrasting with that observed in previous surveys, where poverty decline was stronger in urban areas. However, the proportion of the population living in poverty remained comparatively high in Kenya and the rate at which growth translated into poverty reduction was lower than in comparable African countries. For instance, Kenya's growth elasticity of poverty reduction, was 0.57 which was lower than in Tanzania, Ghana, or Uganda (World Bank, 2018b). On the inequality front, the Gini index fell from 46.5% in 2005/06 to 40.8% in 2015/16, indicating that Kenya made considerable progress in reducing inequality. The Gini index in rural areas declined from 37% to 33%, a significant improvement for an indicator that is usually very stable over time. The level of inequality in Kenya is moderate but higher than that of her neighboring countries, Tanzania, Uganda, and Ethiopia.

Apart from pursuing high economic growth, the Kenya government has over time committed itself to reducing poverty and inequality particularly through fiscal policy which has also been used to redistribute resources, especially to the most disadvantaged members of society (World Bank, 2018b). The fiscal policy thrust has been to use progressive taxation to redistribute and to raise revenue for essential public services in an attempt to tackle inequality and poverty. In pursuit of this channel of development, the Kenyan government has taken commendable measures that include decentralization and devolution of fiscal functions through the Constituency Development Fund (CDF); the Local Authority Transfer Fund (LATF); cash transfers to vulnerable groups; and progressive taxation and social expending. Furthermore, the government has implemented several pro-poor and

pro-equity sectoral reforms in sectors such as education and health among others that are likely to have an impact on reducing inequality and poverty (World Bank, 2018a). While there is considerable disagreement over both the extent and the means to effect such redistribution, most people would agree that society would be better off if inequality and poverty can be reduced, and that all governments should redistribute income with their tax and expenditure policies. However, there is scarcity of studies in Kenya that analyze the impacts of fiscal actions on both inequality and poverty. This study attempts to fill this knowledge gap.

Most previous studies analyze the impacts of fiscal policy on either inequality or poverty reduction but not on both. For instance, Odusola, (2017) and Wanjagi and Ondabu (2018) analyze the impact of fiscal policy on inequality while studies such as those by Adukonu and Ofori-Abebrese (2016) and Owuru and Farayibi (2016) look at the impact of fiscal actions on poverty reduction. This study analyses the impact of fiscal policy on both inequality and poverty and makes it easier to identify whether government tax and social expenditure actions have a differential effect on income distribution and poverty reduction. Unlike several previous studies (e.g Wanjagi and Ondabu, 2018; Maina, 2017) that employ descriptive statistics and the ordinary least squares regression approach to measure the effect of fiscal policy on inequality and poverty, this study uses a new methodology for incidence analysis developed by Commitment to Equity (CEQ) Institute (see Lustig, *ed* 2018) to examine the causal impacts of the Kenyan fiscal actions. An important advantage of the CEQ methodology is its ability to detect the links between income inequality, poverty and fiscal incidence. This is done by computing Gini and poverty indices before and after implementation of fiscal measures, individually and as a redistributive package. Although the calculations from this methodology cannot be given strict causal interpretations, they suggest fiscal actions that have the greatest potential to reduce inequality and poverty. Further, the comprehensiveness of the CEQ approach in fiscal incidence analysis gives it a distinct advantage over previous procedures.

For fiscal policy to be truly effective in reducing inequality and poverty, progressive taxation must redistribute welfare at the time of tax collection; and furthermore, the revenue received must be spent on inequality-reducing and poverty-reducing public services. This paper examines the extent to which the Kenyan government redistributes income, as desired, and reduces poverty through its tax and expenditure policies and how effective are the taxes and government expenditures in improving wellbeing of people. The paper addresses the following four related questions:

i. How much income redistribution and poverty reduction is being accomplished in Kenya through fiscal policy?
ii. How progressive are taxes and government social spending?
iii. How effective are taxes and government spending in reducing inequality and poverty?
iv. Within the limits of fiscal prudence, what could be done to increase redistribution and poverty reduction through significant changes in taxation and social spending?

The paper uses the Kenya Integrated Household Budget Survey (KIHBS) 2015/16 and administrative data for the same period to construct various income concepts that are required for the application of the methodology developed by Commitment to Equity (CEQ) Institute (see Lustig *ed* 2018). As already noted, this methodology, enables us to carry out a comprehensive fiscal incidence analysis and to assess effectiveness of various fiscal policies in redistributing income in an attempt to

reduce poverty and inequality. Furthermore, we use the methodology to simulate effects of expansions of Kenya's main transfer payments and/or increases in the amounts transferred in those schemes. The information generated by the assessment is useful to policy makers in two broad ways. First, Kenya has adopted the SDGs 2030, committing itself to reducing poverty and inequality and has thereby increasingly adopted policies explicitly intended to achieve these two goals. Second, the paper compares findings of this study to those from similar studies in Kenya and other African countries. In the era of the 2030 Agenda for Sustainable Development Goals (SDGs), addressing inequality and poverty reduction is not only crucial for political stability and social cohesion, but is also a development imperative. This study will be useful in informing policy making in Kenya on how to overcome inequalities and poverty, the two major constraints to sustainable national development.

Several studies have been done in Africa using the CEQ methodology.[1] In comparing this paper with previous works, its contributions to policy making is given special attention. Although this study uses the same methodology and datasets as a similar Kenyan CEQ paper (Pape and Lange, 2018), it goes beyond the previous CEQ study in several ways. First, the paper takes into account welfare effects of excise taxes on everyday essential items in Kenya, such as the mobile phone airtime, electricity, liquefied petroleum gas (LPG), kerosene, soda and water, which were not considered in the Pape and Lange (2018) study. Second, it examines at the marginal effects of government tax and expenditure actions. Marginal effects have a straightforward policy interpretation because they are equivalent to asking the following counterfactual question: what would inequality or poverty level be like if the economic system did not have a particular tax (transfer), or if a tax (transfer) were to be modified? Finally, the study carries out simulations of changes in specific government transfers to assess the impacts of scaling them up on inequality and poverty.

The remainder of the paper is structured as follows. The ensuing section (Section 2) presents the CEQ methodology, highlighting its structure and welcome innovations in the conceptualization and measurement of household income. Section 3 broadly outlines the Kenya's fiscal system, and Section 4 describes the survey and administrative data used in the analysis. Section 5 presents the main findings and section 6 analyses policy simulation results based on increases in size and coverage of cash transfer funds. Section 7 contains the summary and conclusions. Additional findings and data details are presented in three appendixes.

[1] See the CEQ Assessment coverage map at http://commitmentoequity.org/ for a complete list.

1. Methods and approaches

The paper uses the methodology developed by the Commitment to Equity (CEQ) Institute[2] (see Lustig *ed*, 2018) to conduct an incidence analysis of fiscal policies in Kenya. A fiscal incidence analysis describes who benefits when the government spends money and who loses when the government implements its tax measures. The thrust of the CEQ assessment is to get a comprehensive picture of the redistributive effects of as many tax and expenditure items as possible although it is also possible to use the tool to examine the effect of a particular fiscal instrument. The CEQ framework carries out the analysis using four core income concepts as illustrated in Figure1. The figure shows the relationship between the different income constructs and helps to illustrate how the income types are used to analyze the distributional and poverty effects of fiscal actions.

Market Income as outlined in Figure 1 is income before the government has had any influence on the income distribution with its tax and spending policies. It includes all earned and unearned income except government transfers and contributory pension receipts. This is sometimes called the "pre-fisc" income though in Kenya, market income plus pensions is best viewed as the "pre-fisc" income because social insurance pensions in Kenya are deferred income from labour services previously performed.[3]

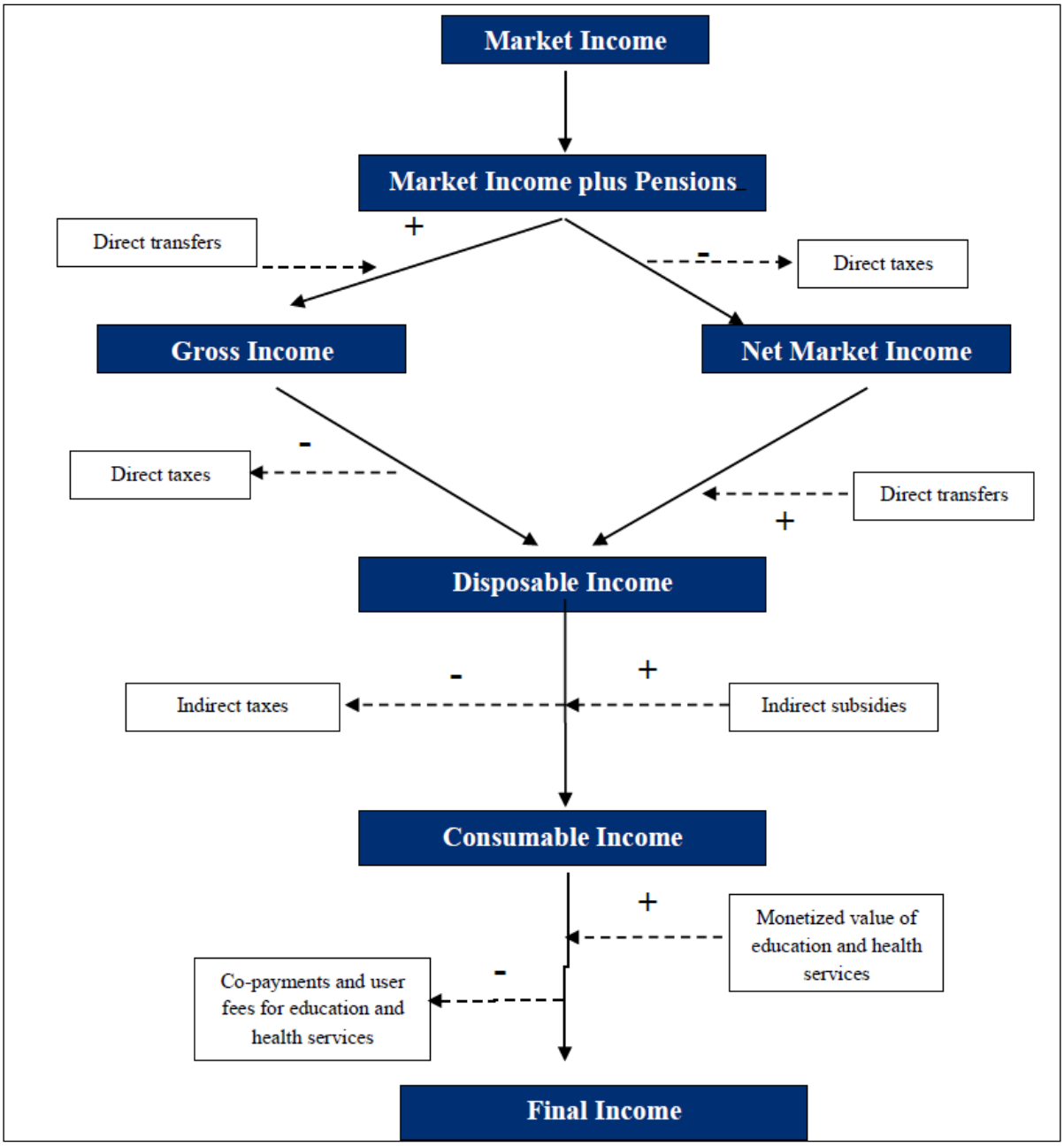
Disposable income is defined as the cash income available after government has taken away direct taxes such as income tax (Pay as you earn (PAYE)) from market income plus pensions and distributed direct transfers, such as conditional cash transfers and as well as "near cash" transfers. However, direct taxes and transfers often have very different distributional consequences so it is useful to examine their influence separately. Therefore, there are the two intermediate income concepts between market and disposable income, that is, Gross income and Net market income (see Figure 1). Gross income is market income plus pensions plus direct transfers while Net market income is market income plus pensions less direct taxes. This can be looked at as the government's direct impact through fiscal action on real income.

Government also affects households' real income indirectly through indirect taxes and subsidies that affect the prices paid for goods and services. Consumable income is disposable income less indirect taxes such as VAT, sales tax, services tax, import duties, and excise taxes plus indirect subsidies. These indirect taxes and subsidies affect households' welfare by changing the prices they pay for goods and services. In Kenya, subsidies are generally non-existent and therefore moving from disposable income to consumable income will mainly involve deducting indirect taxes. Thus, moving from disposable to consumable income in Kenya highlights effects of indirect taxes on poverty and inequality.

[2] For more details visit www.commitmentoequity.org.

[3] In some countries, CEQ assessments treat social insurance pensions as transfers rather than deferred income. This is most appropriate when there is not a clear, actuarially fair link between contributions and eventual pensions. However, for public servants, contributions are funded from the budget just as salaries are, so any eventual pension is best viewed as deferred compensation for work done in the civil service.

Figure 1. Definition of CEQ Income Concepts
Source: Adapted from the CEQ income concepts presented in Appendix III



Finally, the government influences the income distribution through the provision of free or subsidized services as is the case in health and education sectors. Final income is looked at as consumable income plus the value of these in-kind benefits in the health and education segments, less any user fees paid for those services. Moving from consumable to final income will capture the effect on poverty and inequality of public health and education expenditures.

The CEQ approach involves comparing and assessing standard indicators of inequality and poverty for each of the income concepts specified in Figure 1 to show how each aspect of the taxation and expenditure affects the distribution of income and poverty. It also examines how specific individual line items affect inequality and poverty.

In carrying out the CEQ analysis in Kenya, we follow the standard accounting approach to fiscal incidence, assuming that the economic incidence of direct taxes is borne entirely by the income earner and that indirect taxes are borne entirely by the consumer. These assumptions may not be entirely appropriate as markets are not completely competitive. In Kenya as in other developing countries, the extent to which monopolies or oligopolies shift indirect taxes to consumers is not clear and could be either greater or less than 100%, depending on the nature of the demand functions. Given the limited information available on demand functions, we assume that 100% of indirect taxes are shifted to consumers regardless of market structure.

2. Kenya's fiscal system

Table 1 gives a broad outline of the budget items included in our study and also compares survey data with administrative data with the view of verifying the authenticity of survey data which was used to estimate the associations between fiscal measures and welfare. Direct and indirect taxes are roughly equal shares of GDP in Kenya and their sum, nine percent of GDP, is rather small. Budgets for spending on health and education are also small relative to other developing countries. Cash transfers are negligible.

Table 1. The comparison between the survey data and administrative data
Source: Own computation based on data from KNBS Economic Survey (2019)

Variable	KIHBS 2015/16 Estimate, M.Ksh	Admin Value, 2015/16, M.Ksh	Admin Value as Share of GDP	Included in Analysis?	Ratio, KIHBS to Admin
Direct Taxes		*627,714*	*0.047*		
PAYE	278,642	286,166	0.022	Yes	0.97
income tax on business profits, pensions, and rent	25,151	8,205	0.001	Yes	
Other direct taxes		333,343	0.025	No	
Social Insurance Contributions	*31,730*				
Retirement	6,851	n.a.		Yes	
Health	24,879	31,996	0.002	Yes	0.78
Direct Transfers	*18,709*				
Hunger safety net program	2,981	4,980	0.000	Yes	0.6
Orphans and vulnerable children	5,388	8,340	0.001	Yes	0.65
Older persons	7,427	6,620	0.000	Yes	1.12
Severely disabled	874	1,120	0.000	Yes	0.78
Cash- or food-for-work	33	n.a.		Partial	
School feeding	62	n.a.		Partial	
Other cash transfers	862	n.a.		Partial	
In-kind food	313	n.a.		Partial	
In-kind clothing	13	n.a.		Partial	
In-kind medical services	723	n.a.		Partial	
In-kind, other	32	n.a.		Partial	
Pensions	*20,843*	n.a.			
Public servants	20,843	n.a.		Yes	
Indirect taxes	*281,893*	*566,664*	*0.043*		
VAT - direct effect	127,124	289,213	0.022	Yes	0.59

VAT - indirect effect	44,462			Yes	
Import duties - direct effect	33,067	79,188	0.006	Yes	0.59
Import duties - indirect effect	13,915			Yes	
Excises	*63,325*	*139,540*	*0.010*		*0.45*
All Petrol Excises	*36,972*	*48,169*	*0.004*	Yes	*0.77*
Petrol excise	6,063	23,217			
Diesel excise	483	22,666			
Kerosene excise	2,339	2,285			
Petrol excise, indirect effect	28,087				
Beer excise	6,414	21,990	0.002	Yes	0.29
Liquor excise	414	8,415	0.001	Yes	0.05
Cigarette excise	1,922	12,336	0.001	Yes	0.16
Soda and bottled water excise	1,557	2,917	0.000	Yes	0.53
Mpesa excise	981	9,268	0.001	Yes	0.11
Airtime excise	15,065	14,840	0.001	Yes	1.02
Indirect subsidies					
Education	*267,200*	*280,323*	*0.021*	Yes	*0.95*
Pre-primary	6,581			Yes	
Primary	71,677			Yes	
Post-primary technical	1759	2,308		Yes	0.76
Secondary	54,224			Yes	
College	4,429			Yes	
University	45,478	39,525		Yes	1.15
Health	*98,974*	*90,236*	*0.007*	Yes	*1.10*
Outpatient - hospital	18,010			Yes	
Outpatient - health center	6,858			Yes	
Outpatient - dispensary	6,306			Yes	
Inpatient	18,059			Yes	
Delivery	4,185			Yes	
Vaccinations	119			Yes	

The survey estimate of PAYE is quite close to administrative data, but income tax on businesses owned by the households is far higher than the administrative data. This could be attributed to some households misreporting corporate income tax. The amounts on transfers are generally low, except for OPCT. This implies a large survey underreporting. Despite this, the programs involved are small and are unlikely to affect the results significantly.

The estimates of VAT and import duties were automatically scaled so that the relationship to the administrative data is the same as the relationship between consumption in the survey and the national accounts. However, excise duties were not scaled in the same way as VAT and import duties. The amounts reported for petrol excises are good once we include the indirect effects of petrol excise on other items' prices. Indeed, the probable indirect effects are the largest part of this duty. All the other excise estimates from the survey are far below the administrative data except for airtime. For alcohol and cigarettes, it is typical that survey respondents greatly underreport their consumption. The excise on soft drinks and bottled water is closer, and not far off the ratio of the survey to national accounts consumption. For Mpesa, the administrative data reports for all financial transactions and not just Mpesa only, so it is not surprising that it is much greater than the survey values.

Though we are unable to obtain administrative data on budgets for most specific line items, the overall estimates for education and health match the total budgets for these sectors well, 95 and 110 percent of the administrative values, respectively. The matches for post-primary technical education and university education are also close.

3. Data sources and construction of income measures

3.1. Data Sources

The income concepts specified in section 2 are constructed using the Kenya Integrated Household Budget Survey (KIHBS) 2015/16 data collected by the Kenya National Bureau of Statistics (KNBS) and information based on administrative data. KIHBS 2015/16 is a nationally representative survey and is the most recent household survey in Kenya. Information was collected from a total of 24,000 households in 2,400 clusters (see KNBS, 2018, for more details on the data). In addition, administrative data on tax and expenditure from fiscal year 2016 is used in the construction of some of the variables needed for the analysis, e.g. the estimation of per beneficiary amount of spending on public education and health services.

We try to include as many taxes and transfers in the analysis as possible. However, there are two limiting factors. For instance, many government expenditures are for genuine public goods like national defense (the military), public law and order (the police and courts), and policy development and implementation (the civil service) and it is not possible to know how much these services are worth to any particular individual because these are public goods and so do not have prices that people reveal themselves willing to pay, unlike market goods and services. Therefore, a large portion of government expenditure is excluded from the analysis. Also, we can only study taxes and expenditures for which we can observe or infer payers and beneficiaries in the KIHBS survey data. In this case, while it is possible to infer who pays wage income tax and most indirect taxes, it is not possible to attribute for instance, corporate income taxes to survey respondents due to lack of information in KIHBS data on corporate ownership. Appendix II gives detailed information about how we extract information on each of these items from the KIHBS 2015/16 data and administrative data to construct the various income concepts for our empirical analysis.

3.2. Construction of the Income and Expenditure Variables[4]

Disposable Income

The construction of the CEQ income concepts starts with disposable income and works backward to market income and forward to final income (see Figure 1). To start, we assume that the welfare measures that KNBS uses to estimate poverty, that is, household expenditure, is closest conceptually to disposable income. There are theoretical arguments as to why a household's expenditure may best reflect its permanent income, but our motivation is mostly practical: in countries with a high degree of informal and self-employment, surveys like the KIHBS measure expenditures more accurately than they measure incomes. To use this starting point, we assume that household net saving is zero, that is, disposable income is exactly equal to measured household expenditure. In estimating household expenditure in 2016, KNBS excluded expenditures on mobile phone airtime, electricity, LPG, and kerosene to maintain comparability with the household expenditure variable for the 2005/06 KIHBS which did not include the items. We add those expenditures back in our measure of disposable income because these items attract both VAT and excise tax that we want to include in the analysis.

[4] Appendix I gives a detailed description of how we calculate each element of the CEQ income and expenditure variables.

Market Income plus Pensions, Net Market Income, and Gross Income

We calculate gross income as disposable income plus all direct taxes paid. The direct taxes taken into account in the analysis include individual income tax (PAYE) and income tax on profits, pension and rent. We calculate net market income as disposable income less all direct transfers received. Only transfers for the Hunger Safety Net Program (HSNP), Orphans & Vulnerable Children (OVC), Older Persons Cash Transfer (OPCT), and Persons with Severe Disabilities (PWSD) have significant numbers of respondents in KIHBS 2015/16 and are the only ones included in our analysis. Market income plus pensions combines these two as per Figure 1.[5]

Consumable Income

To calculate consumable income, we subtract indirect taxes paid from the disposable income measure.[6] In Kenya, indirect taxes include VAT, import duties, and excise duties on petroleum products, beer, spirits, cigarettes, soft drinks and bottled water, financial transfers (Mpesa), and airtime. For all of the excise duties, we apply the statutory rates to either the quantity consumed or the amount spent depending on the statute.[7] In effect, we assume no tax evasion for these items, all of which are produced by large, formal sector enterprises. For VAT and import duties we use effective tax rates that reflect both tax evasion and the indirect effects of these taxes when they are imposed on products used as intermediate inputs. Appendix II provides details.

Final Income

Final income is estimated by adding in-kind transfers associated with public provision of education and health care to consumable income. The in-kind transfers are important as they are a large share of social spending in Kenya. For education, we use Pape and Lange's (2018) calculation of per student spending which divides the 2015/16 budget for each level of schooling reported in the KNBS 2019 Economic Survey by the estimated number of students for that level drawn from the KIHBS data. The benefits are estimated by school level – pre-school, basic school, secondary school, and post-secondary school. For health, budget data were not collected by type of service because much of the budget is at the county rather than national level. Instead, we use unit cost estimates calculated in 2011, before the de-centralization, and inflate them by the CPI to 2015/16 (see Appendix II for details).[8] For vaccinations, we use the cost of a pentavalent series as estimated by UNICEF and converted at the average market exchange rate for 2015\16. For all services, we subtract off consultation fees paid, but not fees for medicines, lab services, or x-rays, all of which we assume add to the value of the average consultation in an amount equal to the fee.

[5] Market income is market income plus pensions minus all social insurance pensions, which in the analysis are public servants' pensions. We do not use this income concept in our analysis.

[6] There are no indirect subsidies in Kenya.

[7] In the case of petroleum products, the excise duty is per litre but the survey does not collect quantities purchased, only total expenditures. We estimate the quantity consumed dividing the total expenditures by an average price for those products during the survey period: 89.4 Ksh/litre for petrol, 76.3 Ksh/litre for diesel, and 52.3 Ksh/litre for kerosene.

[8] This approach will thus miss any difference in incidence brought about by different spending in different counties subsequent to the decentralization.

4. Findings

This section provides a discussion of the results obtained from the analysis. The section starts by looking at the impacts of taxes and social expenditures on inequality and poverty followed by a discussion of who benefits from transfers spending and who bears the burden of taxes. Next is a discussion of the incidence of taxes and expenditures based on concentration coefficients and marginal effects on inequality and poverty. Finally, the section considers policy simulations of several changes to cash transfer policies.

4.1. Inequality and poverty from market income to final income

Table 2, column two shows the change in inequality indices as income moves from "Market Income plus Pensions" to "Final Income". The total change or reduction in Gini coefficient from market income plus pensions to final income is 9.3 percentage points.

Table 2. Gini coefficients and poverty indices for CEQ income concepts, Kenya
Source: Own calculations
Notes: /1Poverty statistics calculated at the national poverty line which ranges from US$2.14 per adult equivalent per day at PPP in rural areas to 3.95 in urban areas.

Income Concept	Gini Coefficient	Poverty Headcount Ratio/1	Poverty Gap
Market Income + Pensions	0.450	0.313	0.095
Gross Income	0.445	0.306	0.088
Net Market Income	0.414	0.325	0.097
Disposable Income	0.410	0.318	0.091
Consumable Income	0.402	0.369	0.109
Final Income	0.357	...	.....

Moving from market income plus pensions to gross income lowers the Gini coefficient from 0.450 to 0.445.[9] Gross income is defined as market income plus pensions plus any form of transfer funds and therefore the reduction implies that transfers lead to a small reduction in inequality. Net market income, which is defined as market income plus pensions less direct taxes, has a much lower Gini, 0.414. This means that direct taxation leads to a relatively higher reduction (based at market income plus pensions) in inequality compared to transfer funds, but both transfer funds and direct taxes in Kenya are inequality reducing. We thus expect the combined effect of transfer funds and direct taxation will be relatively bigger on inequality. Indeed, moving from market income plus pensions to disposable income by deducting direct taxes and providing transfer funds to vulnerable households' lead to a reduction in Gini coefficient from 0.450 to 0.410.

[9] The discussion in this section is of the marginal effects of the main aggregates of taxes and social expenditures. Lustig and Higgins (2018) explain that there are potential errors from estimating such effects "sequentially," i.e., changing the base income from/to which each tax/expenditure is subtracted/added to calculate the marginal effect. We have verified that these differences are all less than 0.1 percentage points for any income used as the base, so the discussion here is quantitatively accurate. Sections 4.2.1 and 4.2.2 calculate marginal effects all based on market income plus pensions, consistent with the advice of Lustig and Higgins (2018).

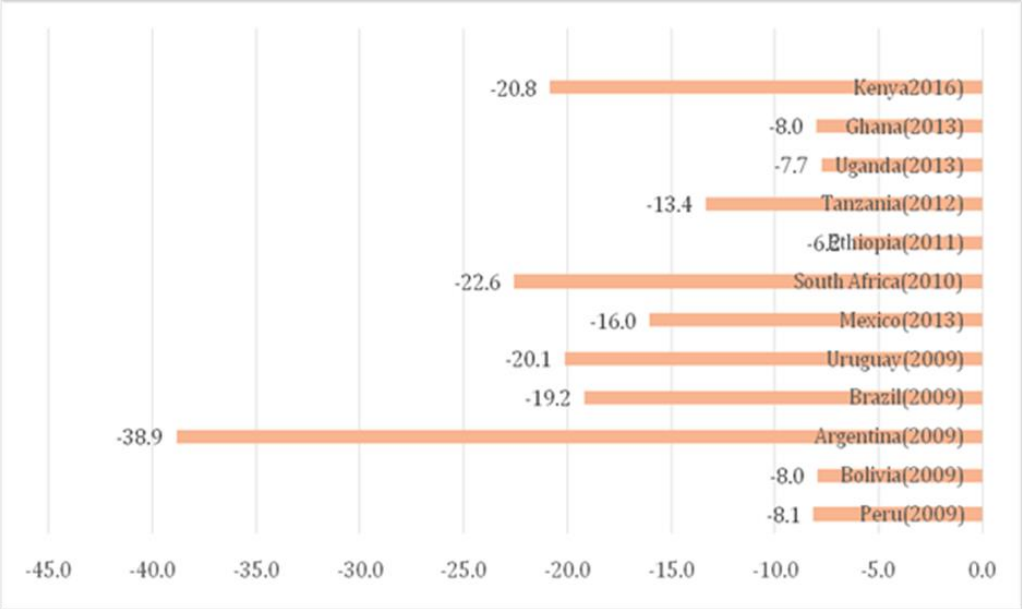
Imposition of indirect taxes leads to a reduction in Gini coefficient from 0.410 at the disposable income level to 0.402 at the consumable income level. This means that the combined effect of indirect taxes in Kenya reduces inequality (based at disposable income), albeit slightly. This finding seems to be contrary to the view of most people who assume that indirect taxes increase inequality and to previous studies such as Maina (2017) who find indirect taxes to be regressive. This difference in findings could be due to differences in data and approaches used in analysis in the two studies. Maina (2017) uses regression analysis and time series data and extrapolates Gini coefficient and poverty headcount ratio due to existing gaps on these measures. The provision of education and health services by Kenyan government leads to further reduction in inequality as shown by the reduction in Gini coefficient further from 0.402 at the consumable income level to 0.357 at the final income level. Thus, we can conclude that fiscal policy action in Kenya is inequality reducing.

Turning to poverty, the results show that moving down the income concepts has different effects on poverty headcount ratio and poverty gap. Moving from market income plus pensions to gross income lowers both the poverty headcount ratio and poverty gap from 0.313 and 0.095 to 0.306 and 0.088, respectively. This means that transfer funds lead to poverty reduction. On the other hand, the transition from market income plus pensions to net market income shows a small increase in poverty headcount ratio and poverty gap from 0.313 and 0.095 at the level of market income plus pensions to 0.325 and 0.097. While we do not usually think of those working in the formal sector (and thus paying PAYE) as vulnerable to poverty, PAYE does in fact force a few households below the poverty line.

Consumption taxes have a large and negative effect on poverty (based at disposable income). The headcount ratio and poverty gap increase from 0.318 and 0.091 at the disposable income level to 0.369 and 0.109, respectively at the consumable income level. While direct taxes are concentrated among the non-poor, everyone pays indirect taxes. So, while government fiscal actions lead to a reduction in inequality, they also lead to increases in both the headcount and poverty gap. This implies that the fiscal system pushes more people below the poverty line in Kenya. It is important to note that transfer funds lead to a reduction in poverty while direct and indirect taxation lead to worsening of the poverty situation. It is also, important to note that the effect of indirect taxes on increasing poverty is larger than that of direct taxes. For instance, direct taxes worsened poverty headcount by 0.5 percentage points while indirect taxes worsen poverty by 6 percentage points, an indication that there may be room for the government to adjust the composition of taxes to address poverty in Kenya.

Overall, taxes and expenditures have an effect on both inequality and the poverty headcount ratio and poverty intensity. As shown in Figure 2, the effect of taxes and expenditure in all the selected countries is to reduce inequality albeit in varying proportions across the countries. In Kenya, the combined effect of government taxes and expenditures reduced Gini coefficient by 20.8 percent (see Figure 2). The reduction in inequality in Kenya is much higher than for Ghana and the East African counties of Tanzania, Uganda and Ethiopia but less than for South Africa as shown in Figure 2. Further reduction in inequality in Kenya is lower that for most Latin American countries with CEQ assessments as shown in the same figure. It is important to note, therefore, that fiscal policy in Kenya is doing better in reducing inequality compared with the other East African countries and is among the largest reductions found in the CEQ database.

Figure 2. Percentage change in Gini coefficient for some selected countries from Market income plus pension to final income
Source: Author construction based on data from Lustig et al (2013); Scott, (2014); Bucheli et al(2013); Inchauste, et al (2017); Jellema(2017); Hill, (2017); Jaramillo, (2013); Younger et al (2016a& 2016b); Younger et al (2015& 2017).



Tuning to poverty, the combined effects of government taxes and expenditures lead to an increase in poverty headcount ratio in Kenya by 17.9 percent as one moves from market income plus pensions to consumable income (see Figure 3)[10]. The average decline of poverty headcount ratio as income moves from market income plus pensions to consumable income for the 12 countries in Figure 3 is 9.3 percent. However, the move from market income plus pensions to consumable income for Kenya, Tanzania, Ghana, Ethiopia and Bolivia leads to an increase in poverty headcount ratio while the same move for South Africa and most of the South American countries leads to a decline in poverty headcount ratio. However, there is need for caution here as different countries have different poverty levels and therefore, a given change in poverty headcount index would lead to a high percentage change in poverty for countries with low levels of poverty than countries with high poverty levels. In Kenya, the increase in poverty headcount over this range of income concepts is linked to both direct and indirect taxation while transfer funds result in poverty reduction over the same range of income. Reconsidering the structure of both direct and indirect taxes to ensure that it does not negatively affect the poor could help reduce poverty and inequality in Kenya.

[10] CEQ does not usually consider the poverty reducing impact of health and education expenditures. This is because CEQ believes that it is inappropriate to measure poverty for final income because the "consumption" of in-kind services in education and health were not taken into account when the poverty line was constructed. In the standard cost of basic needs approach, one would need to include these benefits in the non-food consumption component to get a proper poverty line for final income.

Figure 3: Percentage change in poverty headcount index for some selected countries from Market income plus pensions to consumable income
Source: Author construction based on data from Lustig et al (2013); Scott, (2014); Bucheli et al(2013); Inchauste, et al (2017); Jellema(2017); Hill, (2017); Jaramillo, (2013); Younger et al (2016a& 2016b); Younger et al (2015& 2017)

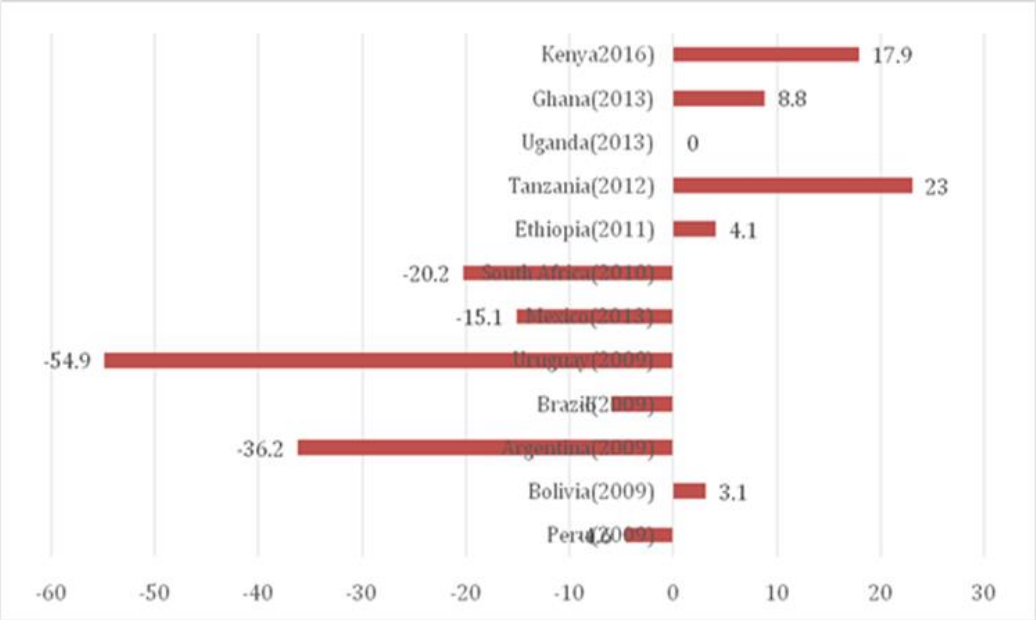
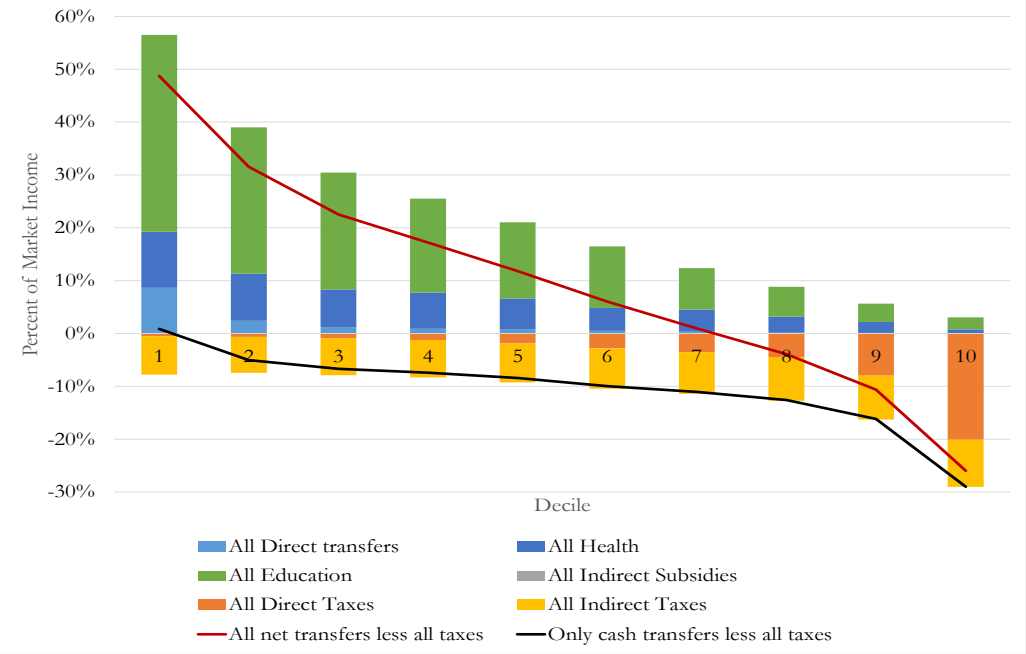


Figure 4 illustrates the net benefits for each decile of the income distribution broken down by the main tax and expenditure groups included in the study. The figure shows that in Kenya, people in the first six deciles are net beneficiaries of taxation and social spending compared to persons in the richer three deciles who are mainly net taxpayers. This seems to be a good outcome for a country like Kenya which does not have resource rents to fund its budget. The results indicate that the benefits for the poorer deciles are mostly educational followed by health transfers and to some extent cash or near-cash transfers. It can further be seen that the incidence of indirect taxes (consumption taxation) is universal, not even sparing the poorest deciles. It is evident from the tenth decile that while Kenya's indirect taxation of income is broadly based, as just noted, direct taxation of income is on a small group of the population, mainly persons holding jobs in the formal sector.

Figure 4. Net taxpayers
Source: Own calculations using 2015/16 survey data



In general, our results show that the taxes and social expenditures accounted for in our analysis reduce inequality in Kenya, a result that is qualitatively similar to every other country in Figure 2, but larger in Kenya than most other countries. On the other hand, those same taxes and social expenditures (excluding in-kind health and education benefits) cause an increase in poverty in Kenya, largely due to the effect of indirect taxes. Further, the poverty increase is larger in Kenya than almost all other countries. Indeed, some other countries have net reductions in poverty, unlike Kenya.

4.2. Targeting – The Incidence of Taxes and Expenditure

To discuss targeting of taxes and expenditure, we consider concentration coefficients and marginal effects. Concentration coefficients are calculated like Gini coefficients, that is, by ordering the population from poorest to richest and then constructing a concentration curve that shows the cumulative share of the taxes paid or benefits received across that income distribution. The concentration coefficient is the area between that concentration curve and an equal distribution (45-degree line) multiplied by 2. Concentration coefficients show how concentrated a tax or expenditure is among either the poor or the rich. However, unlike the Gini coefficients which ranges from zero (income is spread evenly across the population) to one (income is completely concentrated among the richest), concentration coefficients range from -1 to 1. A value of -1 indicates that all the tax or expenditure falls only on the poorest person; a value of 0 indicates that a tax or expenditure is spread evenly across the population; and a value of 1 indicates that a tax or expenditure falls only on the richest person. Generally, if we hope that fiscal policy will redistribute from the rich to the poor, then public expenditures should have more negative concentration coefficients and taxes should have more positive ones.

A tax is considered to be regressive if its concentration coefficient is smaller than the Gini coefficient for the distribution of income. If that is true but the concentration coefficient remains positive, poorer people pay a larger share of their income in tax, though the absolute amount they pay is smaller than for richer people. The opposite is true of benefits from expenditures. Spending is progressive whenever the concentration coefficient is lower than the Gini for market income. This means that the benefits from that spending as a share of market income concept *tend* to fall with market income. Spending is defined as *pro-poor* whenever the concentration coefficient is not only lower than the Gini but also its value is negative. Any time spending is *pro-poor* or neutral in absolute terms, by definition it is progressive. In principle, it would be desirable for the poor, especially the extreme poor, to be net receivers of fiscal resources in cash so that poor individuals can buy/consume the minimum amounts of food and other essential goods imbedded in the selected poverty line.

Marginal effects attempt to answer the question of whether inequality would be higher, the same or lower with one specific tax (or transfer) than without it. The marginal contribution of a tax (or transfer) is calculated by taking the difference between the inequality or poverty indicator without the tax (or transfer) and with it. For example, the marginal contribution of indirect taxes is the difference between the Gini for post-fiscal income plus indirect taxes (i.e., post fiscal income without the indirect taxes) and post-fiscal income. The marginal effect for the poverty headcount is defined in similar way. These definitions imply that a positive marginal effect shows a *reduction* in inequality and poverty.

4.2.1. Targeting of Taxes: Concentration Coefficients and Marginal Effects

Table 3 shows concentration coefficients, and marginal effects of taxes. Direct taxes are highly concentrated among the richest households in the country. This is shown by a concentration coefficient 0.821 that is much greater than the Gini coefficient, 0.402. It is the same case with the other two individual direct taxes. Individual direct taxes like PAYE and income tax on profits, pension and rent are concentrated among the rich due to the fact that they are mainly collected from workers in the formal sector, who tend to be better paid than those in informal sector. Also, those working in the formal employment but earning less than $122 per month are tax exempt improving on the progressivity of direct taxes. Again, ownership of rentals houses is a preserve of the rich in Kenya. As shown by the marginal effects on inequality and poverty, direct taxes reduce inequality by 4.1 percentage points but increases poverty by 1.4 percentage points.

Social insurance contributions which includes the pension contribution and social health insurance are fairly progressive due to the fact that their concentration coefficients are above the Gini coefficient of consumable income. The marginal effects for both inequality and poverty are close to zero reflecting the smaller amounts of these items relative to PAYE.

Indirect taxes have more mixed results in terms of individual tax progressivity. Globally, indirect taxes are progressive as their concentration coefficient is higher than Gini coefficient an indication that it is concentrated among the rich. This result is counter to theory, but reasonable given that the effective rates are lower on items consumed more heavily by the poor, especially food. The marginal effect of indirect taxes on inequality is positive, reducing inequality by 0.8 percentage points while the marginal effect of indirect taxes on poverty is negative increasing poverty by 5.1 percentage points (see Table 2)

Table 3. Targeting of Taxes - Concentration coefficients, marginal effects of taxes
*Source: O*wn calculations using the 2015/2016 survey data.
Notes: 1/ Concentration coefficients and marginal effects calculated at market income plus pensions.

Taxes and statutory contributions	**Size (Share of Consumable Income)**	**Concentration Coefficient[/1]**	**Marginal Effect[/1], Gini**	**Marginal Effect[/1], Poverty Headcount Ratio**
All direct taxes	*-0.0966*	*0.8213*	*0.0414*	*-0.0140*
HH income tax on formal wages, pa	-0.0790	0.8244	0.0346	-0.0122
HH income tax on business, pensions, rent, pa	-0.0105	0.8932	0.0058	-0.0004
Social Insurance Contributions				
Health Insurance contributions, pa	-0.0071	0.6807	0.0020	-0.0025
Retirement contributions, pa	-0.0009	0.6284	0.0002	-0.0004
All indirect taxes	*-0.0819*	*0.4944*	*0.0079*	*-0.0510*
VAT, direct effect, pa	-0.0368	0.5103	0.0043	-0.0210
VAT, indirect effect, pa	-0.0130	0.4649	0.0009	-0.0072
import duties, direct effect, pa	-0.0099	0.3728	-0.0004	-0.0070
import duties, indirect effect, pa	-0.0041	0.4638	0.0003	-0.0020
Excises				
Cigarette excise, pa	-0.0005	0.2838	-0.0001	-0.0002
Beer excise, pa	-0.0018	0.6865	0.0006	-0.0007
Other alcohol excise, pa	-0.0001	0.7795	0.0001	0.0000
Soda and water excise, pa	-0.0004	0.7101	0.0002	-0.0003
Mpesa transfer excise, pa	-0.0003	0.5959	0.0001	0.0000
Airtime excise, pa	-0.0043	0.5188	0.0006	-0.0019
Petrol excise, direct effect, pa	-0.0017	0.8191	0.0008	-0.0003
Diesel excise, direct effect, pa	-0.0001	0.8476	0.0001	0.0000
Kerosene excise, pa	-0.0007	0.2315	-0.0001	-0.0007
Petroleum excise, indirect effect, pa	-0.0082	0.5193	0.0011	-0.0039
All taxes	-0.1785	0.6713	0.0454	-0.0628
Headcount Poverty Ratio for Consumable Income				***0.369***
Gini Coefficient for Consumable Income			***0.402***	

Two individual taxes - excise duty on kerosene and excise duty on tobacco have concentration coefficients less than the Gini coefficient for consumable income.[11] This implies that these indirect taxes are regressive. Excise tax on kerosene is more regressive than all the other indirect taxes because kerosene is mainly consumed by the poor. Tobacco excise is regressive because cigarettes smoking is associated with many of the poor in Kenya. This result can create dilemma to the policymakers because as much as increasing the excise duty for tobacco can be a population health improving strategy it will disproportionately affect poor.[12]

VAT (both direct and indirect effect) and import duties (indirect effect) have their concentration coefficient greater than the Gini coefficient meaning they are concentrated among the rich. Their positive marginal effects on inequality shows that they lead to reduction in inequality but, they do lead to increased poverty as shown by the negative marginal effects

Petrol excise (indirect effect), air time excise, financial transfer excise and beer excise are mildly progressive as shown by their concentration coefficient that is slightly larger than the Gini coefficient of the consumable income. This is a fair representation of the population that consume the related services under these tax categories. Airtime for example is used by close to 98% of the population with usage being determined by ability to pay, thus expecting the rich to purchase more of the airtime than the rest of the population. The indirect effect of petrol that resembles the same magnitude of concentration coefficient as the airtime, implies that ability to pay dictates use of services that are facilitated by petrol such as public transport. Beer excise and other alcoholic drinks are fairly concentrated among the population that is relatively non-poor which also implies that the poor pay only very small shares of these taxes. Most likely their share in the consumable income could have been affected by genuine reporting to the extent that only the better off population might have responded to this question truthfully because it is considered as a "sin" by many religions.

Finally, petrol excise duties (direct effect), diesel excise (direct effect), soda and bottled water are progressive though their shares in consumable income are very small. All of them have a concentration coefficient far above the Gini coefficient for consumable income. This makes a lot of sense because the population group that owns either vehicles or machines that use these fuels is well off in Kenya. Their marginal effects on both inequality and poverty are practically zero probably due to their small shares in the consumable income. What is notable is that all of the excise taxes contribute small amounts of revenue as depicted by their respective shares in the consumable income; and thus have small marginal effects on inequality and poverty.

4.2.2. Targeting of Government Expenditures: Concentration Coefficients and Marginal Effects

Table 4 shows the transfers which were introduced by the government to cushion the economic burden of various groups of people in the community. All of them were started on a pilot basis, therefore, covering a small segment of the population. These transfers include: Older Persons Cash Transfer (OPCT), Orphans & Vulnerable Children (OVC) cast transfer,

[11] The direct effect of import duties is also regressive, but the indirect effect is not.

[12] There is a literature, summarized in Fuchs and Tarlovsky (2020) that argues that tobacco taxes become progressive once we take into account the behavioral response to tobacco taxes, which is stronger for the poor, and the future health benefits from reduced smoking. Our static analysis ignores these effects.

Cash Transfer for Hunger Safety Net Program (CT-HSNP), and Cash Transfer for Persons with Severe Disabilities (CT-PwSD). Each of these cash transfers has its objectives depending on the target group. For instance, OPCT targets elderly people in the society who are above 65 years while CT-PwSD targets people with severer disabilities. The CT-HSNP targets people within marginalized geographic regions facing hunger due to unreliable rainfall. It aims at fighting hunger and vulnerability among such groups. Lastly, the CT-OVC targets orphans and vulnerable children who are either partial or total orphans. It aims to build human capital among the orphans.

Table 4. Targeting of expenditure concentration coefficients, marginal ffects of expenditures
Source: Own calculations using the 2015/2016 survey data
Notes: 1/ Concentration coefficients and marginal effects calculated at market income plus pensions.

Expenditure	Size (as a Share of Consumable Income)	Concentration Coefficient[/1]	Marginal Effect[/1], Gini	Marginal Effect[/1], Poverty Headcount Ratio
All direct transfers excl. contributory pensions	0.005	-0.421	0.004	0.007
HSNP transfer, pa	0.001	-0.471	0.001	0.001
OVC transfer, pa	0.002	-0.406	0.001	0.003
OPTC transfer, pa	0.002	-0.459	0.002	0.003
PWSD transfer, pa	0.000	-0.368	0.000	0.000
Cash- or food-for-work, pa	0.000	-0.877	0.000	0.000
School feeding, pa	0.000	-0.309	0.000	0.000
Other cash transfers, pa	0.000	0.054	0.000	0.000
In-kind food, pa	0.000	-0.580	0.000	0.000
In-kind clothing, pa	0.000	0.127	0.000	0.000
In-kind other, pa	0.000	-0.555	0.000	0.000
In-Kind Benefits				
Net health transfers	*0.032*	*0.034*	*0.009*	*0.032*
Benefits, hospital out-patient, pa	0.010	0.101	0.002	0.008
Benefits, health center out-patient, pa	0.004	-0.055	0.002	0.006
Benefits, dispensary out-patient, pa	0.004	-0.160	0.002	0.005
Benefits, public in-patient stay, pa	0.011	0.046	0.003	0.009
Benefits, public delivery, pa	0.003	0.137	0.001	0.002
Benefits, public vaccination, pa	0.000	0.026	0.000	0.000
Net education transfers	*0.079*	*-0.051*	*0.034*	*0.114*
Benefits, public pre-primary school, pa	0.004	-0.280	0.002	0.006
Benefits, public primary school, pa	0.036	-0.259	0.024	0.064
Benefits, public post-primary tech, pa	0.001	-0.209	0.000	0.001
Benefits, public secondary school, pa	0.025	-0.050	0.010	0.030
Benefits, public college, pa	0.002	0.308	0.000	0.001
Benefits, public post-secondary, pa	0.012	0.594	-0.004	0.001
All net in-kind transfers	0.111	-0.027	0.045	0.154
Headcount Ratio for Market Income plus Pensions				0.313
Gini Coefficient for Market Income			0.451	

Table 4 shows the concentration coefficients with corresponding marginal effects or contribution of each category of spending on inequality and poverty in Kenya. Direct transfers are pro-poor as shown by concentration coefficient that is negative. This implies that these direct transfers are progressive and are well targeted. Their marginal effects are small but positive for both inequality and poverty indicating that they lead to a reduction in poverty and inequality. However, with increases in amount and coverage of direct cash transfer, there are chances of further reducing both inequality and poverty.

The results also indicate that all the individual transfers except the "in-kind clothing" have negative concentration coefficients an indication that they disproportionately go to the poor (as they should). Thus, nearly all the transfers are well targeted and are highly pro-poor despite the fact that their marginal effects are close to zero for both inequality and poverty reductions because the size of each transfer is small.

Overall, publicly funded health care has a positive concentration coefficient that is close to zero, an indication that it is progressive. It also has a positive marginal effect for both inequality and poverty, reducing inequality by 1 percentage point and poverty by 3 percentage points. Outpatient care, hospital inpatient care, inpatient delivery and vaccinations benefits are all progressive though very close to the zero line of equality. Outpatient care at health centres and dispensaries are pro-poor as shown by their negative concentration coefficients. The marginal effect of each item is small for inequality – between zero and three tenths of a percentage point – but larger for poverty, ranging from zero to nine tenths of a percentage point.

Schooling benefits at the pre-primary, primary, post-primary technical school, and secondary school are all pro-poor as shown by their negative concentration coefficient (see, also Figure 6 in Appendix II). Public pre-primary and primary are more progressive followed by public post-primary (technical), and then public secondary school. The progressiveness of public primary, secondary, and post-primary technical could be attributed to massive investment in education by the government through Free Primary education and free secondary education. On the other hand, college education and university education benefit have positive concentration coefficients. Whereas college education benefits are progressive due to the positive concentration coefficient that is less than the Gini coefficient, the university benefits are regressive as shown by their positive concentration coefficient that is greater than the Gini coefficient. Overall, the marginal effects of schooling benefits are positive for both inequality and poverty. As shown in Table 3, schooling benefits reduce inequality by 3 percentage points and poverty by 11 percentage points. Primary schooling benefits have the greatest impact on reducing inequality and poverty reduction as shown by their marginal effect.

4.3. Comparison with Findings of Previous African Countries CEQ Studies

In this section, we compare the findings of this study to five other studies in five African countries and one previous Kenyan study done by Pape and Lange (2018). The findings of this study compare well with those of most previous African studies done based on the CEQ methodology. Our study finds that the combined effect of government taxes and expenditures action leads to a reduction in inequality but an increase in poverty. This finding is similar to findings of studies done in Ethiopia, Ghana and Tanzania (see Younger et al 2015; Younger et al 2016; Hill et al 2014) with the degree of decrease in inequality and increase in poverty varying across countries (see Jellema, 2016). For Uganda, inequality declined but there is no change in poverty. As shown in Table 5, Kenya compares favorably (second to

South Africa) in terms of fiscal policy leading to a reduction in inequality but performs poorly in terms of poverty reduction as poverty increases by 6 percentage points. The poor performance in poverty reduction also applies to non-African countries. For instance, Younger et al. (2016) find that in Ethiopia, Tanzania, Ghana, Nicaragua, and Guatemala, the poverty headcount ratio is higher after taxes and transfers (excluding in-kind transfers) than before. However, in Africa, the performance of South Africa is impressive. The combined effect of government taxes and expenditures in South Africa leads to a reduction in both inequality and poverty (Inchauste et al. 2015). As discussed earlier, this could be explained in terms of the country's very high 'pre-fisc' inequality, a consequence of its history and the fact that South Africa has much larger transfer schemes than most African countries.

Table 5. Comparison of inequality, poverty and concentration ratios across African countries with CEQ studies

Source: Authors construction based on results of various CEQ studies done in Africa (Younger et al., 2015& 2017; Younger et al (2016a & 2016b); Hill et al 2014; Inchauste et al. 2017; Pape and Lange (2018); and Jellema, 2017); Hill, et al (2017).

"–"means not available; "WB" means World Bank; "AFD" means Agence Française de Développement.

* Not clear whether market income includes pensions

	Kenya AFD study (2016)	Kenya WB study (2016)	Ethiopia (2011)	Tanzania (2012)	Ghana (2013)	Uganda (2011)	South Africa (2010/11)	Average
Inequality								
Gini Market income plus pensions	0.45	0.36	0.32*	0.38	0.44	0.41	0.77	0.45
Gini Final Income	0.36	0.30	0.30	0.33	0.40	0.38	0.60	0.38
Difference in market and final income Gini coefficient	-0.09	-0.06	-0.02	-0.05	-0.04	-0.03	-0.17	-0.07
Poverty								
Poverty headcount ratio - Market income plus pensions	0.31	0.36	0.31	0.28	0.24	0.20	0.46	0.31
Poverty headcount ratio- Consumable income	0.37	0.42	0.32	0.35	0.26	0.20	0.39	0.33
Difference in Headcount ratio between market and consumable income	0.06	0.06	0.01	0.07	0.02	0.00	-0.07	0.02
Concentration coefficients								
Direct taxes	0.82	-	0.60	0.91	0.73	-	0.90	0.79
Indirect taxes	0.49	-	0.37	0.47	0.44	-	0.69	0.49
Cash and near-cash transfers	-0.42	-	-0.37	0.10	-0.37	-	-0.27	-0.27
Education								
-Pre-primary	-0.28	-	-	-0.12	-0.34	-	-0.11	-0.21
-Primary	-0.26	-	-0.03	-0.06	-0.27	-	-0.19	-0.16
-Post-primary technical school benefits	-0.21	-						
-Secondary	-0.05	-	0.21	0.14	0.01	-	-0.12	0.04
-College benefits	0.31	-						
-Tertiary benefits	0.59	-	0.41	0.62	0.62	-	0.50	0.55
Health	0.03	-	0.07	0.18	0.04	-	-0.06	0.05

The effect of fiscal policy on inequality and poverty depends on the income concept used in the analysis and specific country conditions. For instance, while in Kenya this study finds that implementing pensions, direct taxes, and cash transfers lead to an increase in poverty, in Ghana implementation of pensions, direct taxes (PAYE), and cash transfers (LEAP and school feeding) have almost no effect on poverty. Consumption taxes are the main culprits of fiscally-induced impoverishment in Ghana according to Younger et al., (2015), Similarly in Kenya, indirect taxes are the main cause of impoverishment. Lustig et al (2017) find that in almost all low- and middle-income countries like Kenya where the CEQ methodology has been applied, spending on pre-school and primary school is pro-poor while college and tertiary education spending tends to be progressive though in relative terms. Unlike for many countries where indirect taxes are regressive, Kenya, Ghana, Tanzania and Ethiopia boast of progressive indirect taxes as shown by concentration coefficient that are greater than the Gini coefficient (see Younger *et al* 2016 for the case of Tanzania and Ethiopia). In Uganda households pay more in indirect taxes than they receive in indirect subsidies with enough poor households receiving substantial amount of subsidies such that the poverty rate actually stays constant when indirect taxes and subsidies are allocated (Jellema *et al.* 2017).

As mentioned above, South Africa performs very well when compared with other African countries, as it has achieved the most redistribution and poverty reduction compared to the other countries in the CEQ analysis (Younger etal.2015). Most taxes in South Africa are progressive while education and health spending benefit the poorer parts of the income distribution relatively more than the rich. Perhaps most of the African countries could restructure their fiscal policy to ensure a twin effect of reduction in inequality and poverty through government taxation and expenditure actions. A starting point for Kenya and the other countries is to expand the coverage and increase the amount of funds distributed through transfer schemes.

As shown in Table 5, direct taxes are more progressive in the African countries relative to indirect taxes. It is also important to note that cash and near cash transfer benefit the poor in Kenya as compared to a country like Tanzania where the benefit seems to be relatively spread across the poor and the rich. A promising fiscal action in Kenya is the implementtation of cash and near-cash transfers which led to a reduction on both inequality and poverty as shown in Table 2. It would benefit Kenya in terms of both inequality and poverty reduction to scale up the current cash transfer levels and coverage to protect more vulnerable people.

4.4. Comparisons with Findings of the World Bank CEQ Study on Kenya

As mentioned earlier, this study is the second to use CEQ methodology on Kenya. The first study was done by Pape and Lange (2018) and is also based on the 2015/2016 KIHBS data. Our study has borrowed from the World Bank study some of measures of variables used in the estimation of the income concepts used in the CEQ analysis. But this study goes beyond the Pape and Lange (2018) study in several ways. First, it takes into account expenditures and excise taxes on mobile phone airtime, electricity, LPG, and kerosene, and excise taxes on soda and water which were not taken into account in the Pape and Lange (2018) study. It also includes in-kind food and in-kind clothing transfers which were not taken into account in the World Bank study estimates. Further, unlike the Pape and Lange (2018) study, this study looks at the marginal effect of impact of government tax and expenditure action on both inequality and poverty. Finally, this study carries out simulation of certain aspects of fiscal actions to assess their impact on inequality and poverty. Given this, we compare the

findings of this study with those of the Pape and Lange (2018) in this section. Some of the findings of the two studies are shown in Table 4. Also, since the Pape and Lange (2018) study did not estimate concentration coefficients, we try to compare the concentration curves in this study and those of the World Bank where possible.

There are substantial differences in the Gini coefficients for market income plus pensions and at the final income in this study and the Pape and Lange (2018) study. At the market income plus pensions level, our study finds a Gini coefficient of 0.45 while Pape and Lange (2018) find a Gini coefficient of about 0.36. Similarly, our study finds the Gini coefficient at the final income to be 0.36 while it is 0.30 for the Pape and Lange (2018) study. Thus, Gini coefficient estimates in our study are much higher than those estimated in the World Bank study, and the reduction in the Gini due to taxes and social expenditures is significantly greater in our study. The difference between the two is that the World Bank study scales incomes by the poverty line which is different for rural and urban areas while we use just the survey's actual incomes. Because rural areas are poorer than urban and the rural poverty line is also much lower (almost half) of the urban poverty, the World Bank adjustment significantly reduces their estimate of inequality.

Similar differences in poverty can be seen in the poverty results reported in the two studies with the Pape and Lange (2018) reporting a poverty headcount ratio of 36% and 42% at market income plus pensions and consumable income respectively. In this study, the poverty headcount ratio measures were 31% at the market income and poverty plus pensions and 37% at the consumable income level. In both studies however, the poverty headcount ratio increases by 6 percentage points due to fiscal actions taken when moving from market income plus pensions to consumable income.

Generally, comparison of the concentration curves shows that there are close similarities in the curves in this study and in the Pape and Lange (2018) study. However, there are instances where this study analyzed more variables than the Pape and Lange (2018) study. For instance, while the Pape and Lange (2018) study has excise duty for tobacco in general, this study specifically computed excise duty for cigarettes. Also, while the Pape and Lange (2018) includes wine and spirit excise duty separately, this study includes wine and spirits in other alcohol category. Further, this study includes the in-kind food variable in the transfers while the World Bank study did not include the in-kind food in the transfer. Despite this difference, this study's findings and those of the World Bank are similar in many respects as demonstrated by the concentration curves in the figures in Appendix II.

As shown in Appendix II, the Lorenz curve for this study and Pape and Lange (2018) study are similar with minor difference (see Figure 1C) due to our inclusion of expenditures on mobile phone airtime, electricity, LPG, and kerosene in the basic disposable income measure. Figure 2C panels a, b and c compares concentration curves for the various transfer funds for this study and the Pape and Lange (2018) study. The concentration curves are generally similar and all lie above the 45^0 line. However, there are noticeable differences in the concentration curves for hunger safety net program funds which all lie above the 45^0 line but are visibly.[13] Figure 3C, panels a, b, c, d and e in appendix II, compare the concentration curves for excise tax on various goods and services. Except for some visible differences in the concentration curves for airtime and alcohol excise taxes, the concentration curves for beer, water and beverage, and cigarettes are similar in this study and that of the Pape and Lange (2018). We

[13] We are unsure of the reason for this difference as we have used Pape and Lange's estimates of the value of hunger safety net transfers.

use a different expenditure code for airtime than Pape and Lange use[14] and we aggregate alcohol consumption differently. Also, important to note about the excise tax concentration curves is that they all lie below the Lorenz curve except for concentration curve on cigarette excise tax which lies between the Lorenz curve and the 45^0 line. On education benefits, the concentration curves are similar between this study and the Pape and Lange (2018) study except for the concentration curves for early childhood, which are visibly different[15] (see Figure 4C panels a - e) but they all lie above 45^0 line. Finally on health benefits, the concentration curves are similar with minor differences for this study and the Pape and Lange (2018) and all lie above the 45^0 line. Overall, despite some important differences in our approaches, the two studies have very similar incidence results.

[14] We use item code 1906; Pape and Lange use item codes 5101, 5103, and 9806.

[15] This appears to be due to a difference in how each paper handles user fees as the coding for pre-school benefits is identical.

5. Policy simulations

The previous sections describe the incidence of existing taxes and expenditures without illustrating what could happen to both inequality and poverty if a policy variable changes. In this section, the CEQ methodology is used to simulate policy changes and assess their potential impacts on poverty and inequality. The key variables of interest and scenarios simulated were agreed upon following consultations with senior policy makers drawn from the Ministry of Planning (Treasury), Commission of Revenue Allocation, and Kenya National Bureau of Statistics. Given that Covid-19 had significant impacts on vulnerability of the poor, cash transfer payments were identified as a suitable expenditure variable to increase. This evidence would guide government on whether to increase cash transfers to the most vulnerable groups in the society. Therefore, simulations are carried out on cash transfer payments which included transfers for the Hunger Safety Net Program (HSNP), Orphans & Vulnerable Children (OVC), Older Persons Cash Transfer (OPCT), and Persons with Severe Disabilities (PWSD). Four policy simulation exercise were carried out:

(1) Increasing all cash transfers, that is, HSNP, OVC, OPCT, and PWSD by 50%;
(2) Increasing all cash transfers that is, HSNP, OVC, OPCT, and PWSD by 100%;
(3) Increasing coverage of OPCT to include everyone except those who receive social insurance pensioners;
(4) Increasing all cash transfers by 50% and increasing coverage of OPCT to include everyone except those who receive social insurance pensioners.

Table 6 shows the results of the four-policy simulations. The concentration coefficients in simulations 1 and 2 remain unchanged at -0.281 because these are proportional increases in existing benefits.[16] Simulations 3 and 4 which involve changes in the coverage of the beneficiaries (OPCT to everyone above 60 years who do not receive it and who do not receive social insurance pensions), has the effect of reducing the magnitude of the negative concentration coefficient to -0.105 and -0.011 respectively compared to -0.281 for simulation 1 and 2. The reduction indicates that increasing the coverage brings in some of the elderly who may not necessarily be poor.

[16] Concentration coefficients are invariant to a change in a program's size.

Table 6. Direct transfers payment simulations
Source: Authors' calculation based on KIHBS 2015/16.

Simulation	Current cash transfers	Simulation (1)	Simulation (2)	Simulation (3)	Simulation (4)
Concentration coefficient /1:	-0.281	-0.281	-0.281	-0.105	-0.011
Change in:					
Inequality (Gini coefficient)		-0.0017	-0.0032	-0.0067	-0.0108
Poverty (headcount ratio)		-0.0047	-0.0092	-0.0201	-0.0324
Poverty (gap)		-0.0023	-0.0041	-0.0082	-0.0128
Size of the simulation /2		3.98	7.96	3.06	8.57
Size / GDP		0.005	0.011	0.006	0.010
Size / Government Expenditure		0.025	0.050	0.019	0.054

Description of simulation:

1) Increase all cash transfers -- HSNP, OVC, OPCT, and PWSD -- by 50%;
2) Increase all cash transfers -- HSNP, OVC, OPCT, and PWSD -- by 100%;
3) Add OPCT to everyone who does not receive it except for social insurance pensioners;
4) Increase all cash transfers -- HSNP, OVC, OPCT, and PWSD -- by 50%, and add OPCT to everyone who does not receive it except for social insurance pensioners.

Note: /1 Concentration coefficient calculated on disposable income, per adult equivalent.
/2 Size of the simulation refers to the net impact on the budget, in billion shillings. Negative is a reduction in expenditures or increase in taxes.

As shown by the change in Gini coefficient, the four-policy options lead to minimal reduction in inequality with the largest reduction being a one percentage point change in the fourth simulation. Policy options 3 and 4 have a greater impact on poverty. Option 3 leads to a 2 percent reduction poverty head count and 0.8 percent reduction in poverty gap while option 4 leads to a 3.2 percent reduction in poverty headcount and 1.3 percent reduction in poverty gap. Thus, increasing cash transfer to existing beneficiaries by 50% and adding OPCT to everyone who is 60 years old and do not receive social insurance pension has a greater impact on reducing poverty and inequality. The size variables show how large the budget for the proposed expenditure would be and its relative size to GDP and total government expenditure.

In general, all the policy options suggested would reduce inequality and poverty, though marginally for options 1 and 2. Nevertheless, it is important to point out that expanding the coverage and the amount of cash transfer has a more tangible effect on reduction of both poverty and inequality as seen in option 4. Increasing cash transfer without addressing the coverage is less likely to address the twin problems of inequality and poverty in Kenya.

6. Summary and conclusion

The main objective of this paper is to analyze the effect of fiscal policy action by the government of Kenya on inequality and poverty. To achieve the objective, the paper uses KIHBS 2015/16 dataset and administrative data to construct the various income concepts and carries out the analysis using the methodology developed by the Commitment to Equity (CEQ) Institute (Lustig, 2018). The advantage of using the CEQ tool is its comprehendsiveness and thoroughness in the assessment of incidence effects of taxes, transfers and social spending.

The results show that the combined impact of government taxes and social expenditures reduces inequality but increases poverty. The finding is similar to that of the other African studies done in Ghana, Tanzania, Uganda and Ethiopia but different from the findings of the South African CEQ study where the combined effect of fiscal policy leads to a reduction in both inequality and poverty. As in other African countries, the main source of improverishment in the budget is indirect taxation. While the poor rarely earn income that is taxed directly, they do consume items that attract indirect taxation. Contrary to expectation, we find that most indirect taxes are progressive, but far less so than the indirect taxes. Cash and near-cash transfers, basic education and health benefits are pro-poor while tertiary education benefits are regressive. Across the income distribution, we find that people in the first six deciles of income are net beneficiaries of government taxation and social spending while those in the richer three deciles are net payers, indicating that individually or jointly, taxation and social spending in Kenya are progressive. Simulations results show that increasing cash transfer to existing beneficiaries by 50% and increasing coverage could lead to a significant reduction in poverty and inequality.

The main conclusion of our analysis is that Kenya's fiscal policy can be redesigned to fight both inequality and poverty. In particular, since VAT incidence is felt by virtually everyone, and since taxation is poverty increasing, items that are used predominantly by low-income households can be exempted from this form of taxation. The targeting of the cash transfers is good and progressivity of transfers can be enhanced by improving coverage as well as increasing the amounts disbursed to achieve the twin impacts of poverty and inequality reduction.

Finally, it is important to note that even though we find that some taxes or expenditure are more redistributive to the poor than others, it is not possible to conclude that the former is preferable. This is because redistribution is only one of many criteria that matter when making public policy. In particular, efficiency matters too, so not all redistributive taxes or expenditures are good ones, and not all good taxes or expenditures are redistributive. The inequality and poverty effects arising from fiscal measures documented in this study and the effects reported in previous incidence studies in Africa, are but one input into public policy making, an input which should be weighed against other policy goals before deciding that a tax or expenditure is desirable.

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APPENDICES

Appendix 1. Detailed Discussion on Construction of Income Concepts

This appendix describes how we have estimated each variable in the analysis. Lustig (2018, ch.6) categorizes these estimates into direct observation, inference, imputation, simulation, and prediction. We mention the approach we have taken for each variable.

Disposable Income

Our construction of the CEQ income concepts starts with disposable income and works backward to market income and forward to final income (see Figure 1). We assume that the welfare measure KNBS uses to estimate poverty, household expenditure, is closest conceptually to disposable income. There are theoretical arguments as to why a household's expenditure may best reflect its permanent income, but our motivation is mostly practical: in countries with a high degree of informal and self-employment, surveys like the KIHBS measure expenditures more accurately than they measure incomes. To use this starting point, we assume that household net saving is zero, that is, disposable income is exactly equal to measured household expenditure.

We have modified the KNBS household expenditure variable by adding to it expenditures on mobile phone scratch cards, electricity, LPG, and kerosene. KNBS excludes these items to maintain comparability with the household expenditure variable for the 2005/06 KIHBS which did not include them. We do not need this comparability for our assessment and the items mentioned attract both VAT and excises that we wish to include in the analysis. All of this information is directly observed in the survey.

Market Income

We calculate gross income as disposable income plus all direct taxes paid. The direct taxes taken into account in the analysis include individual income tax (PAYE) and income tax on profits, pension and rent. We calculate net market income as disposable income less all direct transfers received. Only transfers for the Hunger Safety Net Program (HSNP), Orphans & Vulnerable Children (OVC), Older Persons Cash Transfer (OPCT), and Persons with Severe Disabilities (PWSD) have significant numbers of respondents in KIHBS 2015/16 and are the only ones included in our analysis. For each of these transfers except pensions and HSNP, the number of respondents who report receiving the transfer falls far short of the number of beneficiaries in the administrative accounts. Pape and Lange (2018) found the same problem when they did an incidence analysis with these data. To avoid underestimating the effect of these programs in the income distribution, they estimate the probability that a household receives a given transfer and use the predicted probabilities to assign transfer benefits to additional households who do *not* report receiving the transfer. This assignment goes to those with the highest probability of receipt until the number of beneficiaries in the survey matches those in the administrative accounts on a county-by-county basis. Pape and Lange were kind enough to share their estimated benefits for these transfers with us, which we have used without modification. Note that for all four benefits (but not pensions), Pape and Lange find that the reported amounts received are not accurate, so they assign

the statutory amounts to all beneficiaries and predicted beneficiaries. We do the same here. For pensions, we use the reported receipts. In sum, our estimates of transfers are based on prediction of beneficiaries and imputation of standard benefit amounts.

Because we calculate market income by subtracting off transfers and pensions from disposable income (assumed equal to household consumption), it is possible that market income is negative if the household spent less money than the sum of its pensions and transfers (less any direct taxes it paid). In these cases, 0.2% of the total sample, we assume that the sum of pensions and transfers is, in fact, the correct estimate of disposable income, so we adjust up all the income concepts by the difference between market and disposable income if market income is negative. This ensures that all the income concepts are non-negative.

For direct taxes, we calculate taxes withheld on wages and salaries (PAYE), and taxes on profits from household enterprises, pensions, and interest and other investment income. These last three we group together as "other income."

We impute direct taxes paid as follows. We assume that PAYE is assessed only on "formal" sector employees, where "formal" sector is defined as (1) working for the public sector (responses 1 to 7 for question D17) or (2) working for private firm or non-governmental organization (responses 8 to 12 and 20 for question D17) *and* reporting having had either NSSF or NHIF contributions withheld by one's employer. We assume that KIHBS respondents report their net wage or salary after all PAYE and social insurance contributions have been withheld and then use the structure of income tax brackets and NSSF and NHIF contributions to work backwards to gross wages or salary.[17] Once we have the gross wages or salary, we apply the standard income tax and NHIF rates to that gross income along with a constant NSSF contribution of Ksh 2180 per year for private sector employees. If a respondent has more than one formal sector job, we aggregate the income from the two jobs before calculating taxes but assume that NSSF and NHIF contributions are paid only on the first job (National Social Security Fund, 2015; and Nation Hospital Insurance Fund, 2018).

Table A1. The income tax schedule

Taxable Income (Ksh per year)	Tax Rate
up to 121,968	10%
121,968 - 236,880	15%
236,880 - 351,792	20%
351,792 - 466,704	25%
over 466,704	30%

Even though there is no zero-rate bracket, there is a general but non-refundable tax credit (called "tax relief") of Ksh 13,944 per year which eliminates income tax due for the poorest earners. Social insurance contributions for retirement are deductible; those for health are not.

[17] This requires a separate calculation for each of 26 different brackets defined by the intersection of the five income tax brackets and 17 NHIF brackets. Details and Stata code are available upon request.

Table A2. The schedule for NHIF contributions

Gross Income (Ksh per month)	Monthly NHIF Premium (Ksh)
0-5,999	150
6,000 – 7,999	300
8,000 – 11,999	400
12,000 – 14,999	500
15,000 – 19,999	600
20,000 – 24,999	750
25,000 – 29,999	850
30,000 – 34,999	900
35,000 – 39,999	950
40,000 – 44,999	1,000
45,000 – 49,999	1,100
50,000 – 59,999	1,200
60,000 – 69,999	1,300
70,000 – 79,999	1,400
80,000 – 89,999	1,500
90,000 – 99,999	1,600
100,000 and above	1,700
Self Employed (special)	500

For enterprise profits, we again assume that only formal enterprises pay income tax. We include as formal enterprises only those registered with the Registrar of Companies. Unlike wages, we assume that reported profits are before tax (gross), not net.

Pensioners must pay income tax as well, though they are allowed a Ksh 25,000 per month deduction that other income earners are not. We assume reported pensions are net of taxes and back out gross pensions and then the tax paid as with wages, but noting that pensioners do not make NSSF or NHIF contributions.

In addition to these taxes, there is a flat 15 percent withholding on interest and investment earnings. We assume that reported interest is net of this tax and calculate on that basis.

We group together enterprise profits, pensions, and interest as “other income” and apply the tax schedule to this income, assuming that it is aggregated in a year-end return, but not with labor income.

For 2.6 percent of the observed wages or salaries and 0.8 percent of the observed enterprise profits reported income is much greater than reported household consumption. For these observations, we limit the value of wages, salary, or profits to twice reported household consumption.

Consumable Income

To calculate consumable income, we return to our disposable income measure and subtract indirect taxes paid.[18] In Kenya, indirect taxes include VAT, import duties, and excise duties on petroleum products, beer, spirits, cigarettes, soft drinks and bottled water, financial transfers (Mpesa), and airtime. In all instances, we impute the value of indirect tax paid based on the reported consumption of taxable items in the survey. For all of the excise duties we apply the statutory rates to either the quantity consumed or the amount spent, depending on the statute.[19] In effect, we assume no tax evasion for these items, all of which are produced by large, formal sector enterprises.

Table A3. Excise duty rates

Item	Excise Duty
Petrol (regular)	Ksh 19.5 per litre
Diesel (automotive)	Ksh 10.305 per litre
Soft drinks and bottled water	Ksh 5 per litre
Fruit juices/1	Ksh 10 per litre
Beer	Ksh 70 per litre
Spirits	Ksh 175 per litre
Wine/2	Ksh 150 per litre
Cigarettes	Ksh 2500 per kilogram
Financial transfers (Mpesa)	10%
Airtime	10%

/1 combined with soft drinks in the analysis
/2 combined with spirits in the analysis

For VAT and import duties, using statutory rates is not advisable as there is considerable tax evasion and avoidance (in the informal sector) on these items. For both taxes we estimate an "effective" rate as the total amount of tax revenue in administrative accounts divided by total private consumption in the national accounts.[20] However, this is an average over many goods and services with different tax rates.[21] To estimate "effective" rates for items with different statutory rates, we assume that tax evasion and avoidance reduces effective rates by the same proportion over all taxed items. We then set a weighted sum of the statutory rates equal to the economy-wide effective rate with the weights equal to the consumption shares of the items in each tax rate. Solving that yields the effective rates for each statutory rate.

[18] There are no indirect subsidies in Kenya.

[19] In the case of petroleum products, the excise is per litre but the survey does not collect quantities purchased, only total expenditures. We estimate the quantity consumed dividing the total expenditures by an average price for those products during the survey period: 89.4 Ksh/litre for petrol, 76.3 Ksh/litre for diesel, and 52.3 Ksh/litre for kerosene.

[20] Both tax revenue and consumption information for 2015/16 taken from the KNBS 2019 Economic Survey.

[21] For VAT, the statutory rates are only 0, 16%, or exempt. For import duties, there are eight different rates.

Table A4. Statutory rates and our calculation of effective rates

Statutory VAT	Effective Rate	Statutory Import Duty	Effective Rate
0%	0%	0%	0%
Exempt	0%	10%	1.93%
16%	7.63%	25%	4.82%
		35%	6.75%
		50%	9.64%
		60%	11.57%
		75%	14.46%
		100%	19.29%

In addition to the direct effects of indirect taxes described above, we consider the possibility that VAT, import duties, and petroleum excises that fall on intermediate consumption cascade through the production structure to affect the prices of other goods and services that use taxed items as inputs. We calculate these indirect effects using a social accounting matrix (SAM) constructed by IFPRI (Randriamamonjy, J. and J. Thurlow. 2016. 2013 Social Accounting Matrix for Kenya: A Nexus Project SAM. International Food Policy Research Institute, Washington DC.) and the approach described in Jellema and Inchauste (2018).

Final Income

To calculate final income, we add in-kind transfers associated with public provision of education and health care to consumable income. We impute the value of all in-kind services based on survey responses that indicate use and an estimate of the value of those services based on administrative data. This step is important because these items are a large share of social spending in Kenya. For education, we calculate per student spending by dividing the 2015/16 budget for each level of schooling reported in the KNBS 2019 Economic Survey by the estimated number of students for that level drawn from the KIHBS data. For health, we were unable to collect budget data by type of service because much of the budget is at the county rather than national level. Instead, we use unit cost estimates calculated in 2011, before the decentralization, by Flessa, et.al. (2011), and inflate them by the CPI to 2015/16.[22] For vaccinations, we use the cost of a pentavalent series as estimated by UNICEF and converted at the average market exchange rate for 2015\16. For all services, we subtract off consultation fees paid, but not fees for medicines, lab services, or x-rays, all of which we assume add to the value of the average consultation in an amount equal to the fee.

[22] This approach will thus miss any difference in incidence brought about by different spending in different counties subsequent to the decentralization.

Table A5. Unit values for each in-kind service

Service	Estimated Unit Cost
Education	
Pre-primary	Ksh 5339 per year
Primary	Ksh 13,360 per year
Secondary	Ksh 34,578 per year
Technical	Ksh 28,205 per year
College	Ksh 28,205 per year
University	Ksh 99,197 per year
Health	
Out-patient consultation, hospital	Ksh 1074 per visit
Out-patient consultation, health centre	Ksh 463 per visit
Out-patient consultation, dispensary	Ksh 361per visit
In-patient care (excl. delivery)	Ksh 28,106 per visit
In-patient care, delivery	Ksh 8780 per visit
Vaccination	Ksh 230 per series

Appendix II. Lorenz and Concentration Curves comparison between Kenyan Study and Pape and Lange (2018) Paper

Figure 1C. Lorenz curves on market income for the Kenyan Study and Pape and Lange (2018) study
Source: Own calculations using the 2015/2016 survey data.

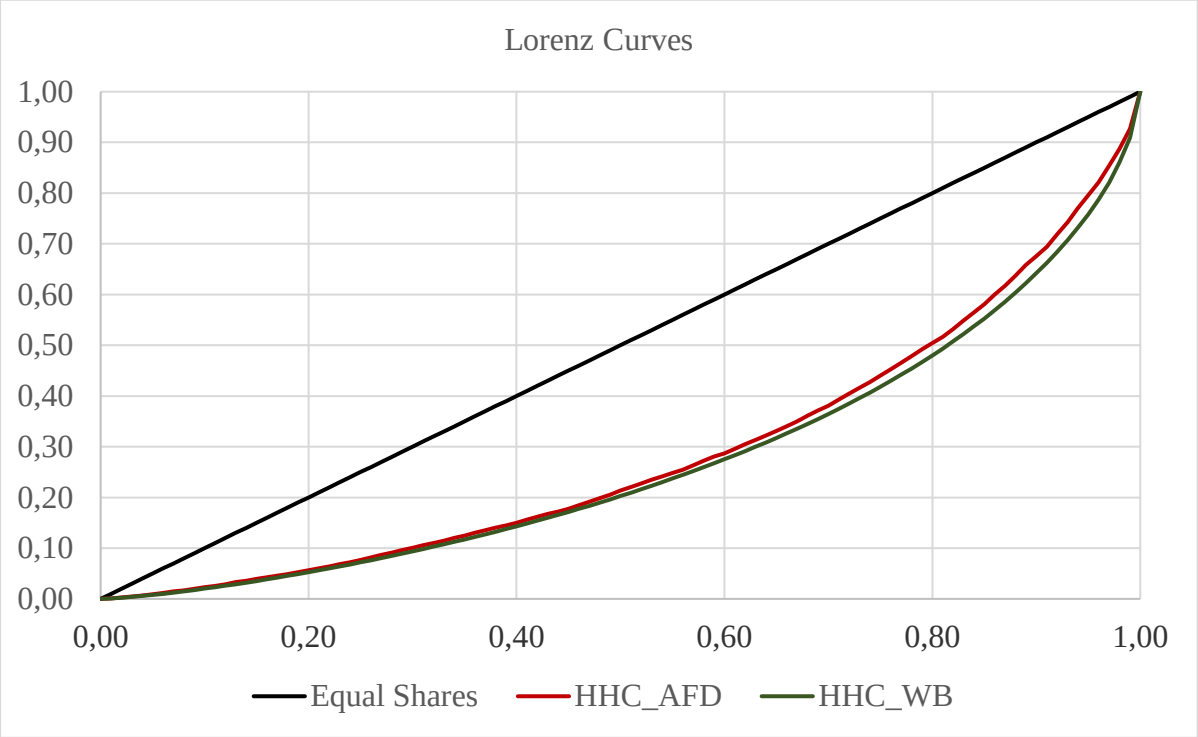

Figure 2C(a). Lorenz and concentration curves for cash transfer receipts ordered by market income (Older persons Cash Transfer)
Source: Own calculations using the 2015/2016 survey data

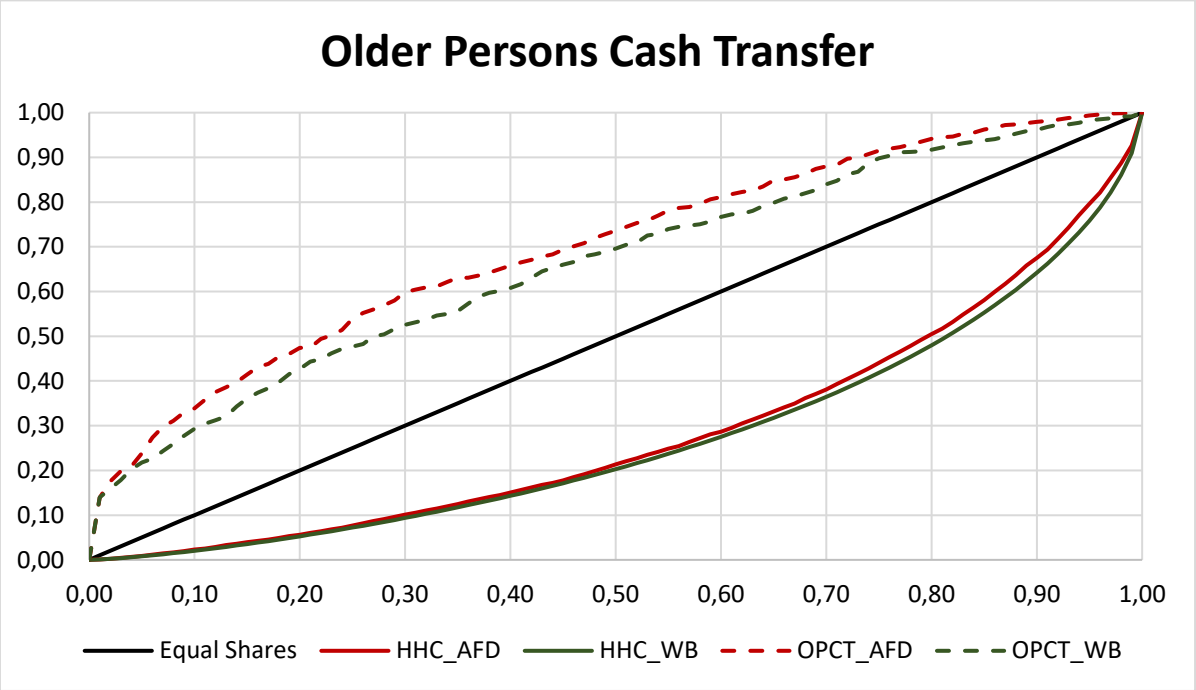

Figure 2C(b). Lorenz and concentration curves for cash transfer receipts ordered by market income (Hunger Safety Net Program)
Source: Own calculations using the 2015/2016 survey data

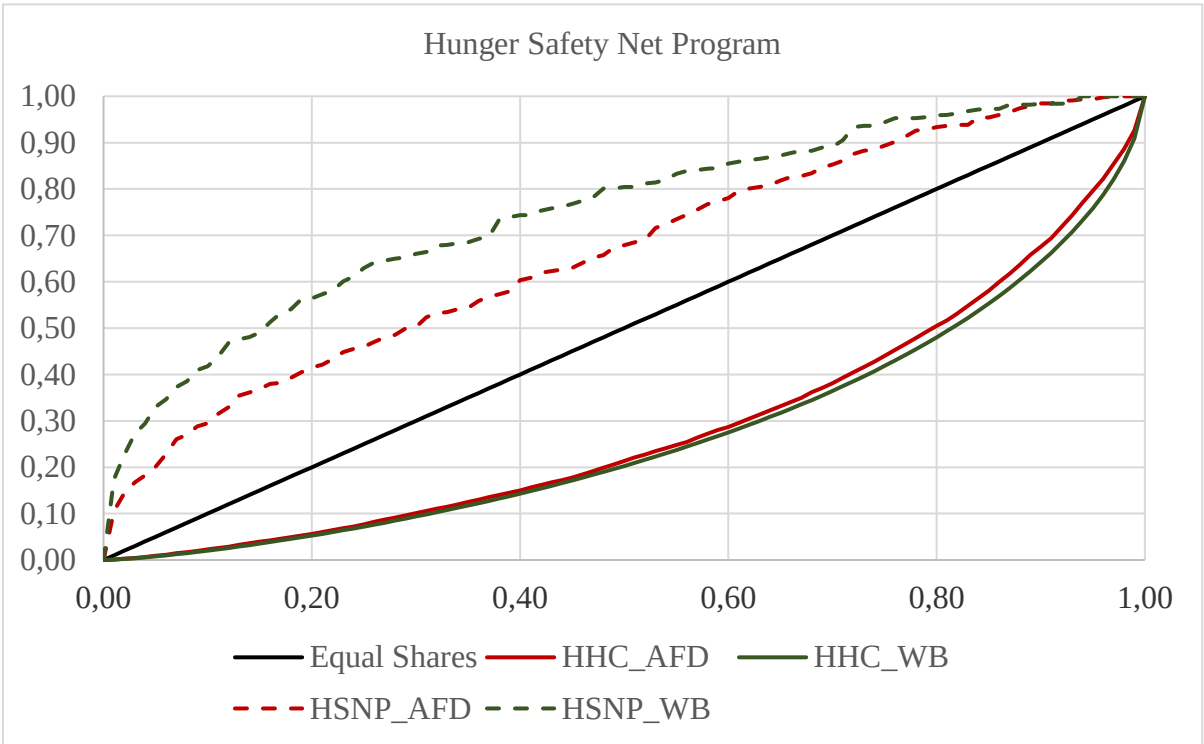

Figure 2C(c). Lorenz and concentration curves for cash transfer receipts ordered by market income (Orphans and Vulnerable Children)
Source: Own calculations using the 2015/2016 survey data

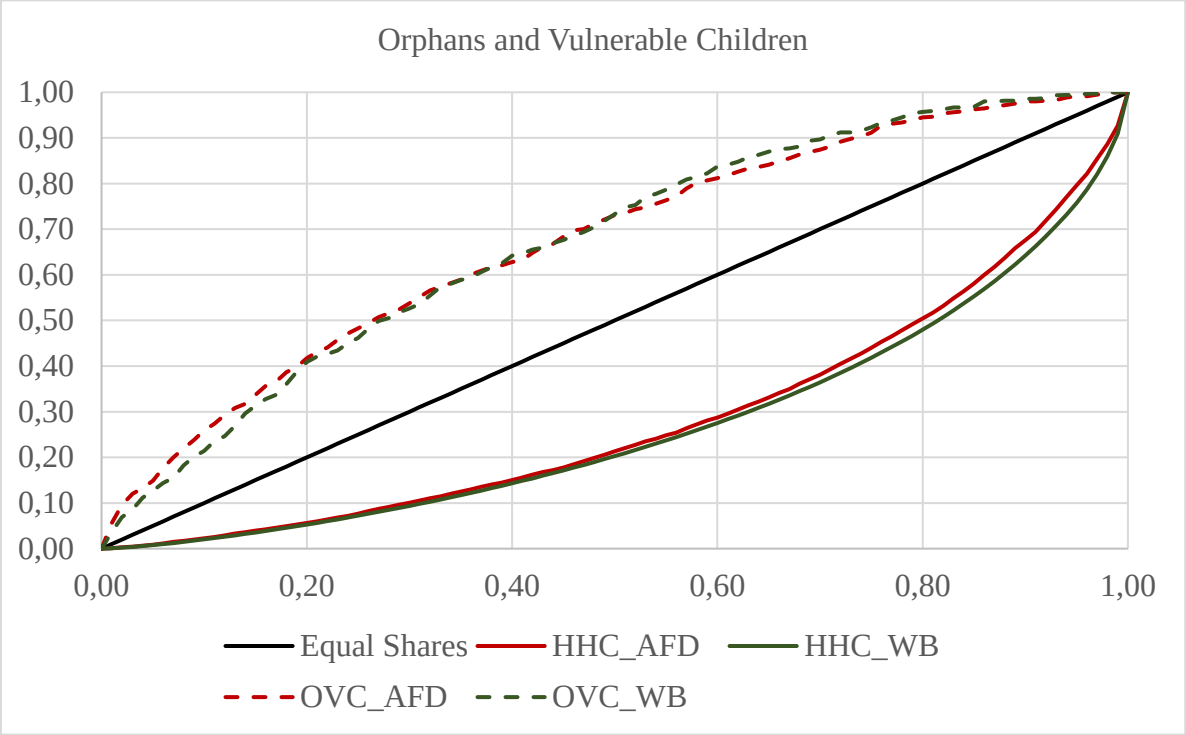

Figure 3C(a). Lorenz and concentration curves for market income and excise taxes (Beer Excise)
Source: Own calculations using the 2015/2016 survey data

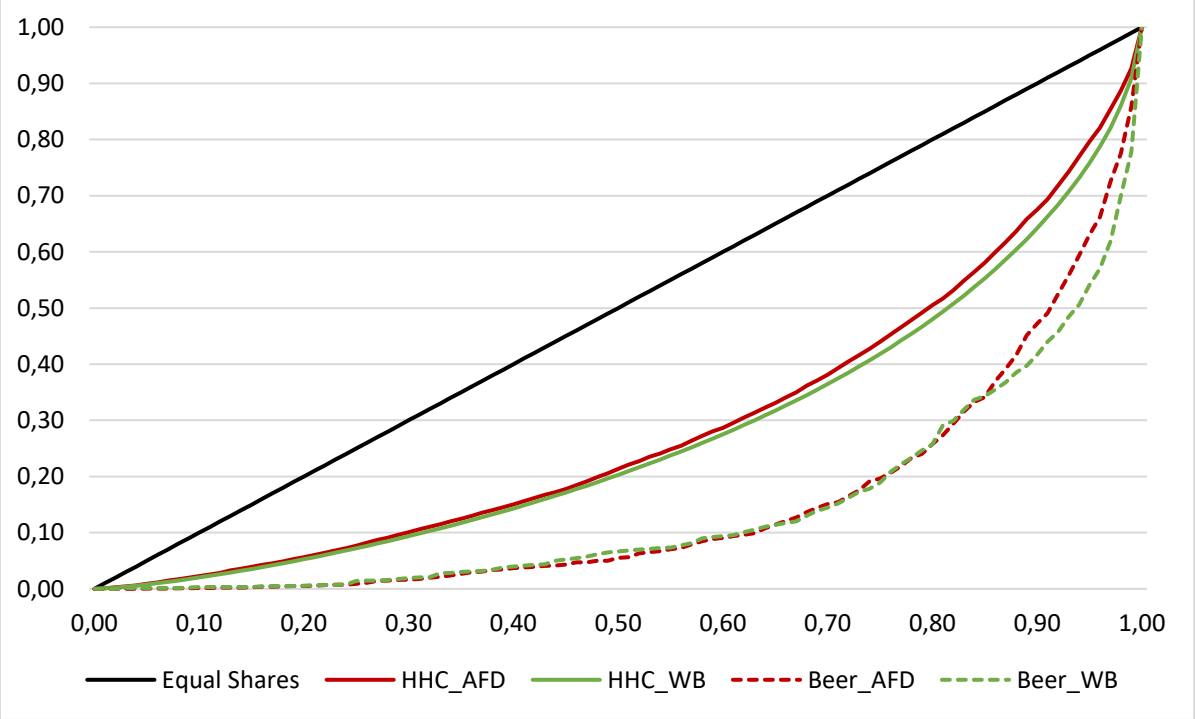

Figure 3C(b). Lorenz and concentration curves for market income and excise taxes (Other Alcohol Excise)
Source: Own calculations using the 2015/2016 survey data

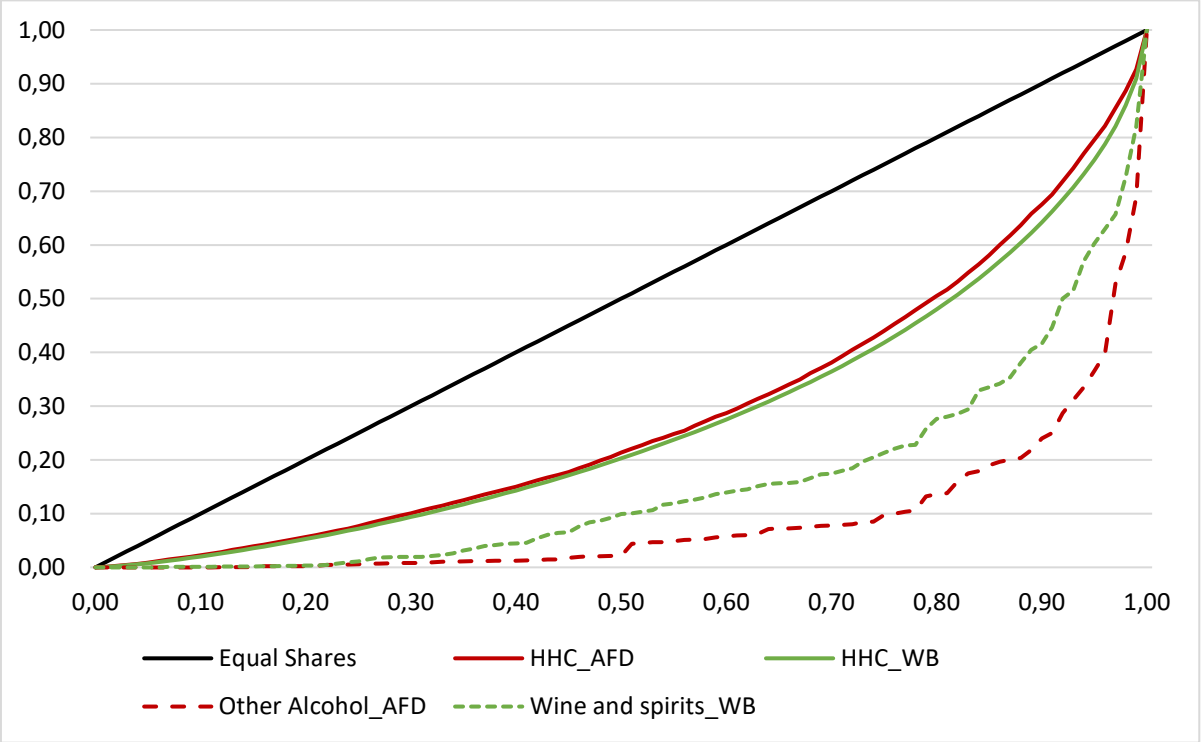

Figure 3C(c). Lorenz and concentration curves for market income and excise taxes (Excise water and other beverages)
Source: Own calculations using the 2015/2016 survey data

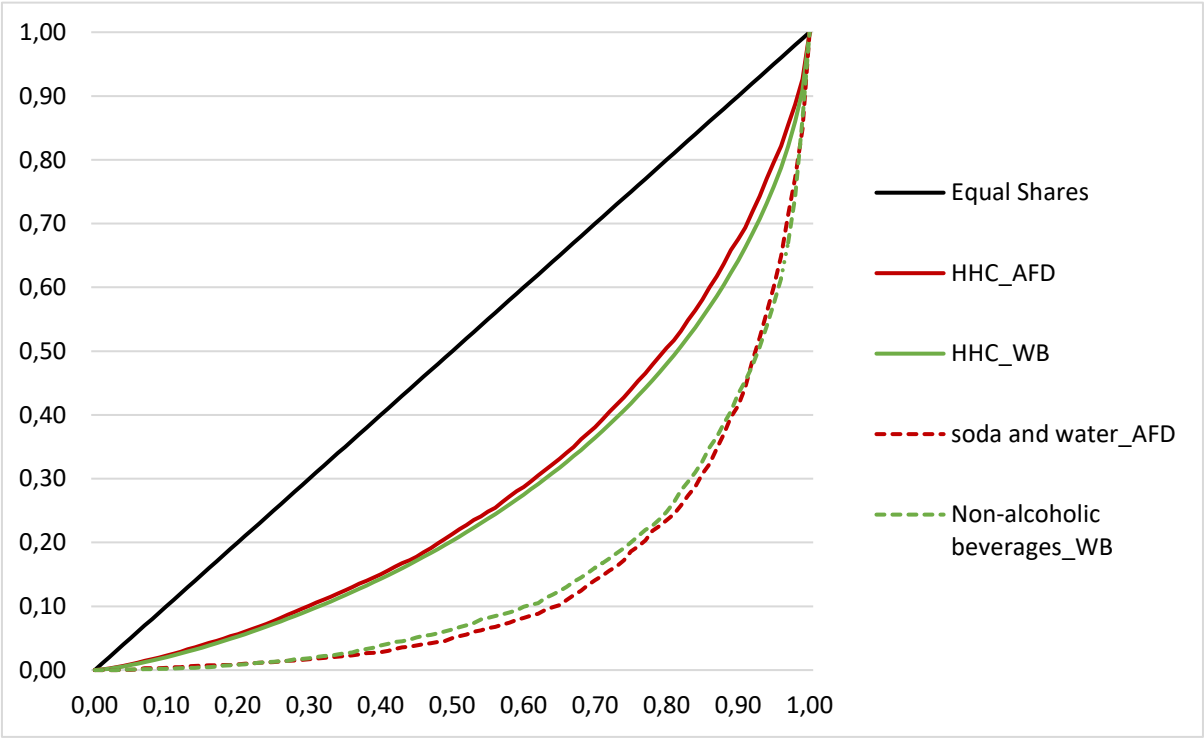

Figure 3C(d). Lorenz and concentration curves for market income and excise taxes (Excise Cigarette)
Source: Own calculations using the 2015/2016 survey data

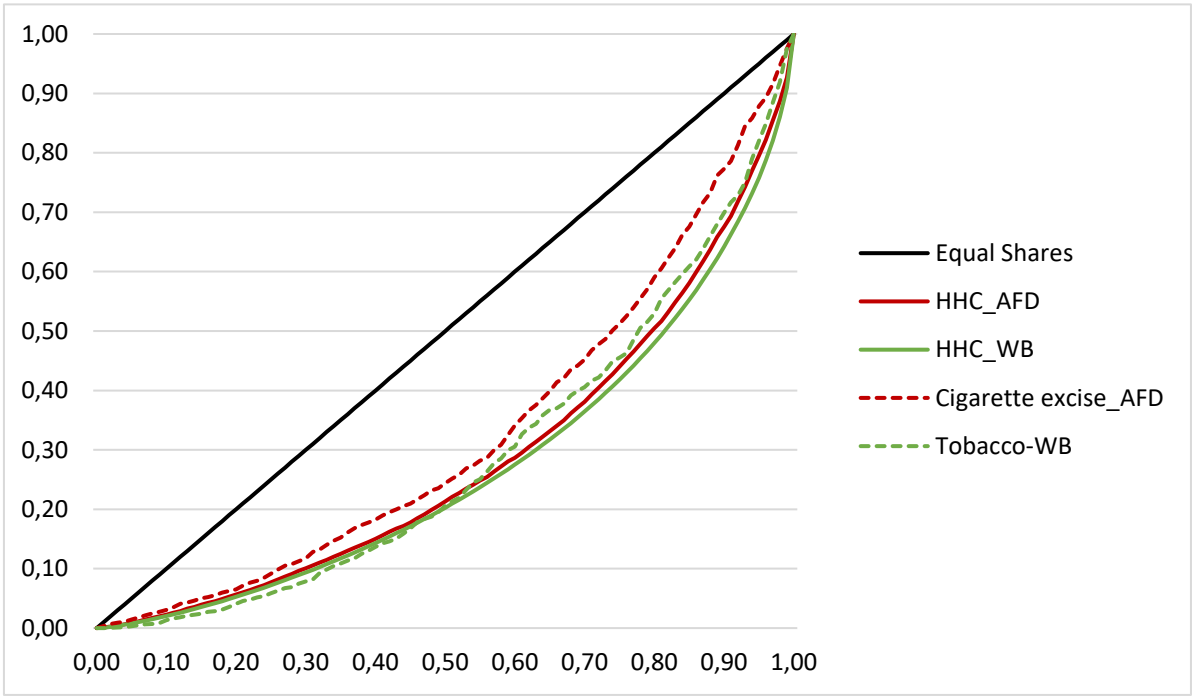

Figure 3C(e). Lorenz and concentration curves for market income and excise taxes (Airtime Excise)
Source: Own calculations using the 2015/2016 survey data

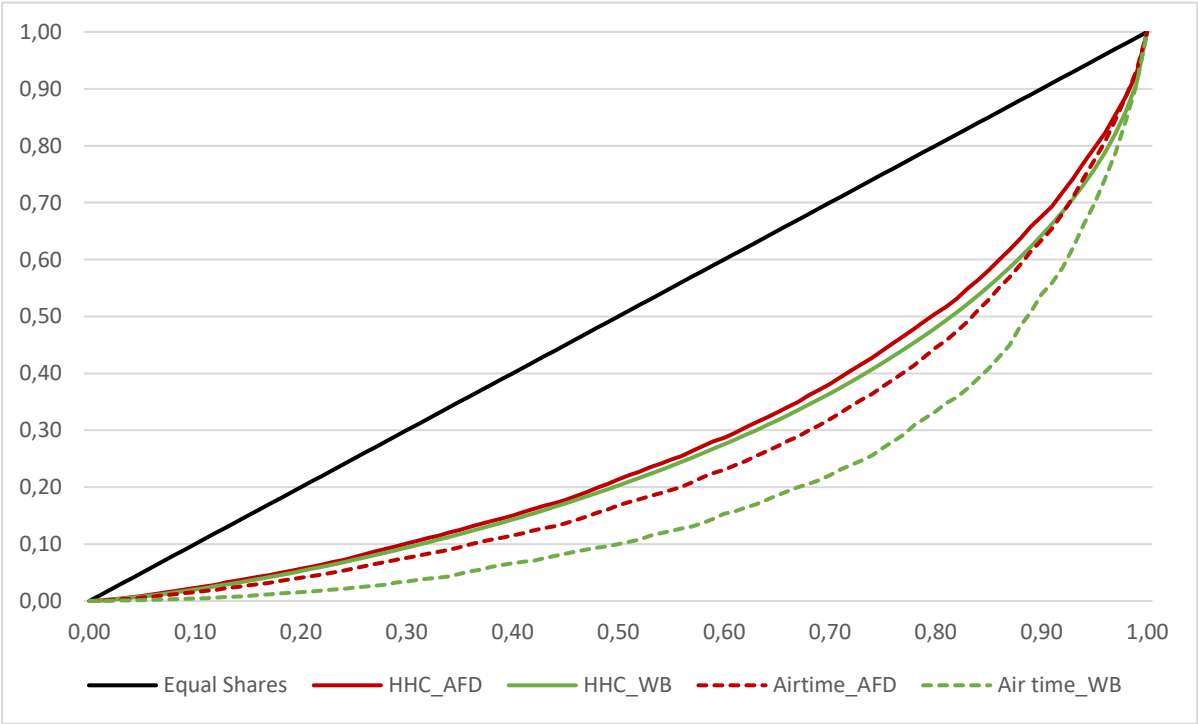

Figure 4C(a). Lorenz and concentration curves for per capita market income and the net benefit of public education expenditure (Benefits Early Child Development)
Source: Own calculations using the 2015/2016 survey data

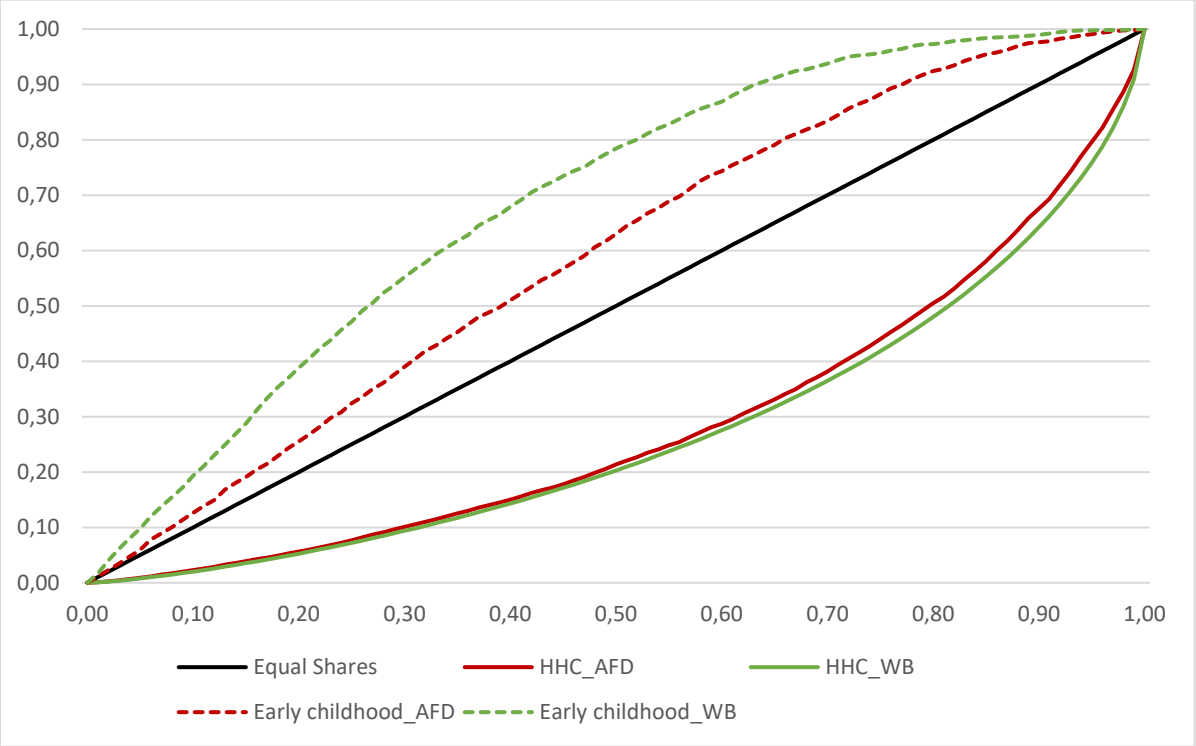

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Figure 4C(b). Lorenz and concentration curves for per capita market income and the net benefit of public education expenditure (Primary education)
Source: Own calculations using the 2015/2016 survey data

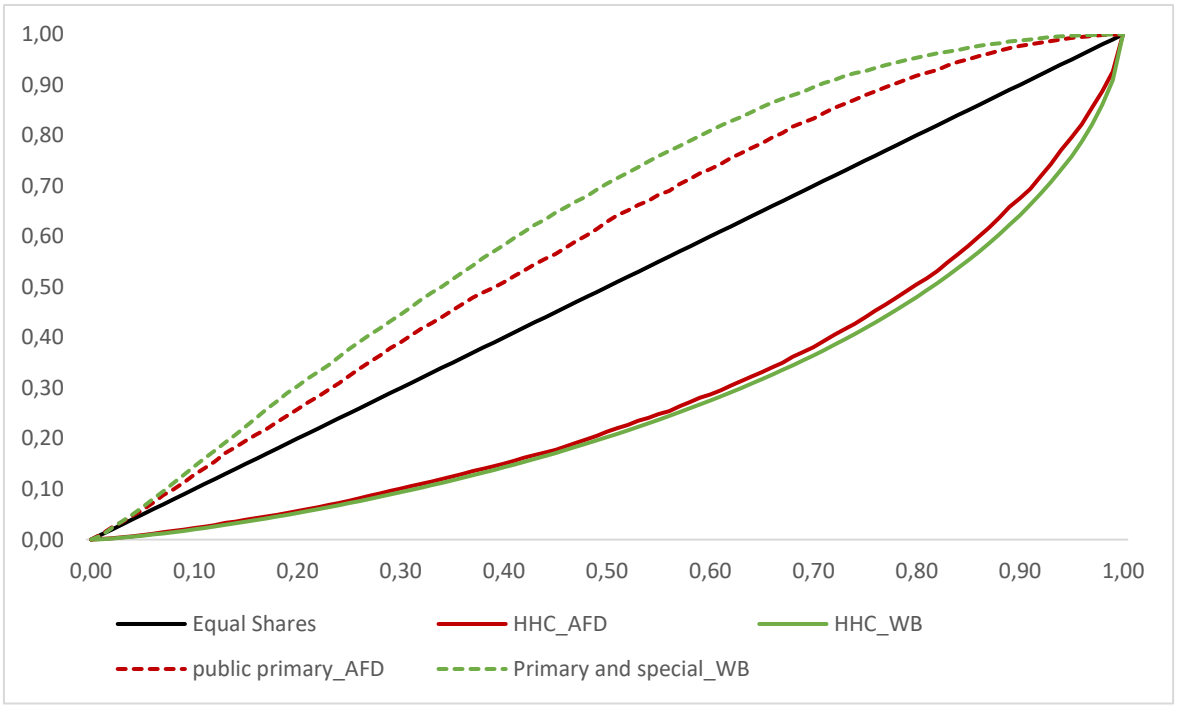


Figure 4C(c). Lorenz and concentration curves for per capita market income and the net benefit of public education expenditure (Secondary education)
Source: Own calculations using the 2015/2016 survey data

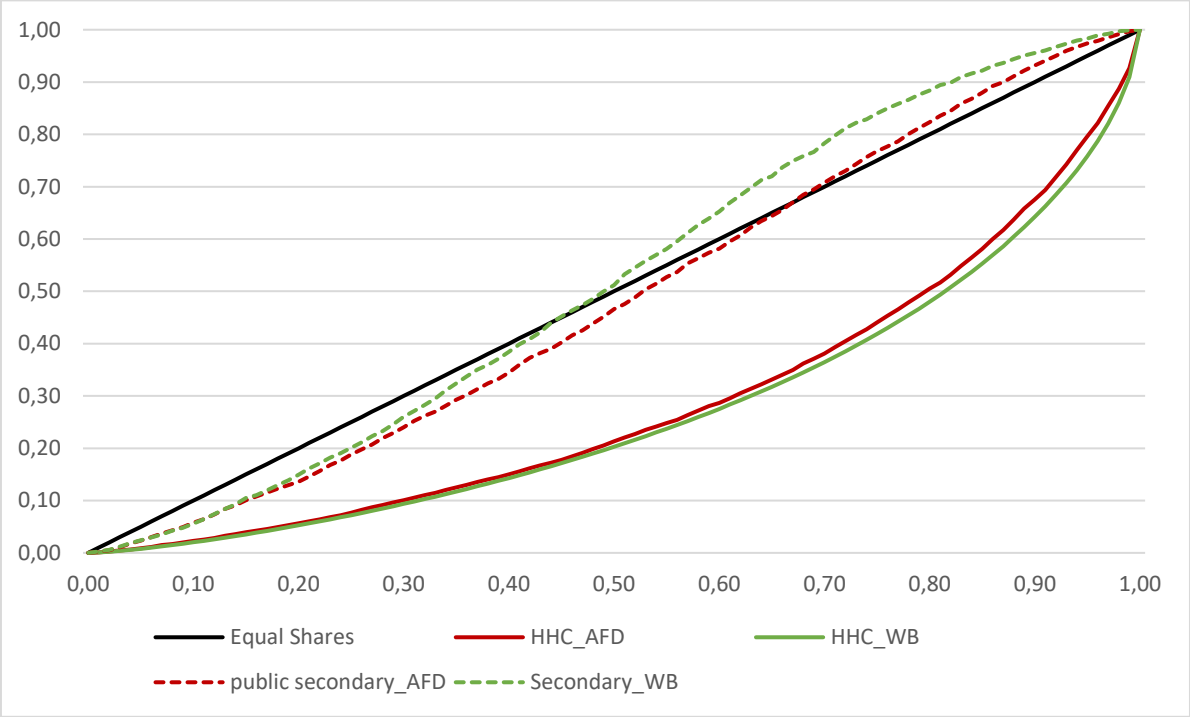


Figure 4C(d). Lorenz and concentration curves for per capita market income and the net benefit of public education expenditure (Technical/college)
Source: Own calculations using the 2015/2016 survey data

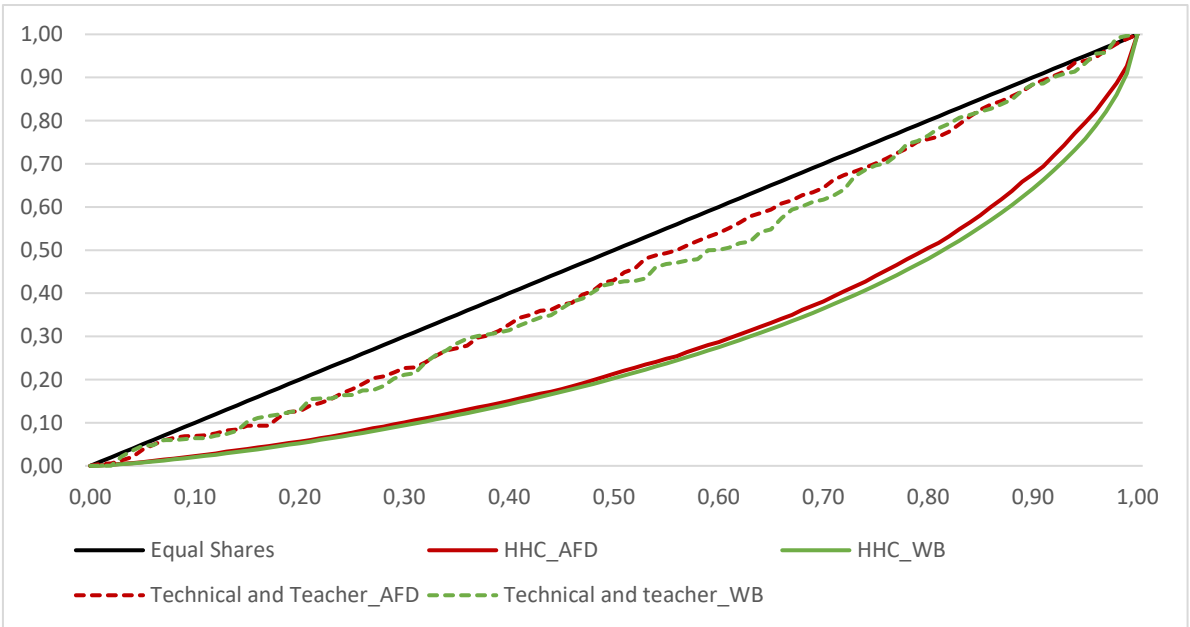


Figure 4C(e). Lorenz and concentration curves for per capita market income and the net benefit of public education expenditure (University education)
Source: Own calculations using the 2015/2016 survey data

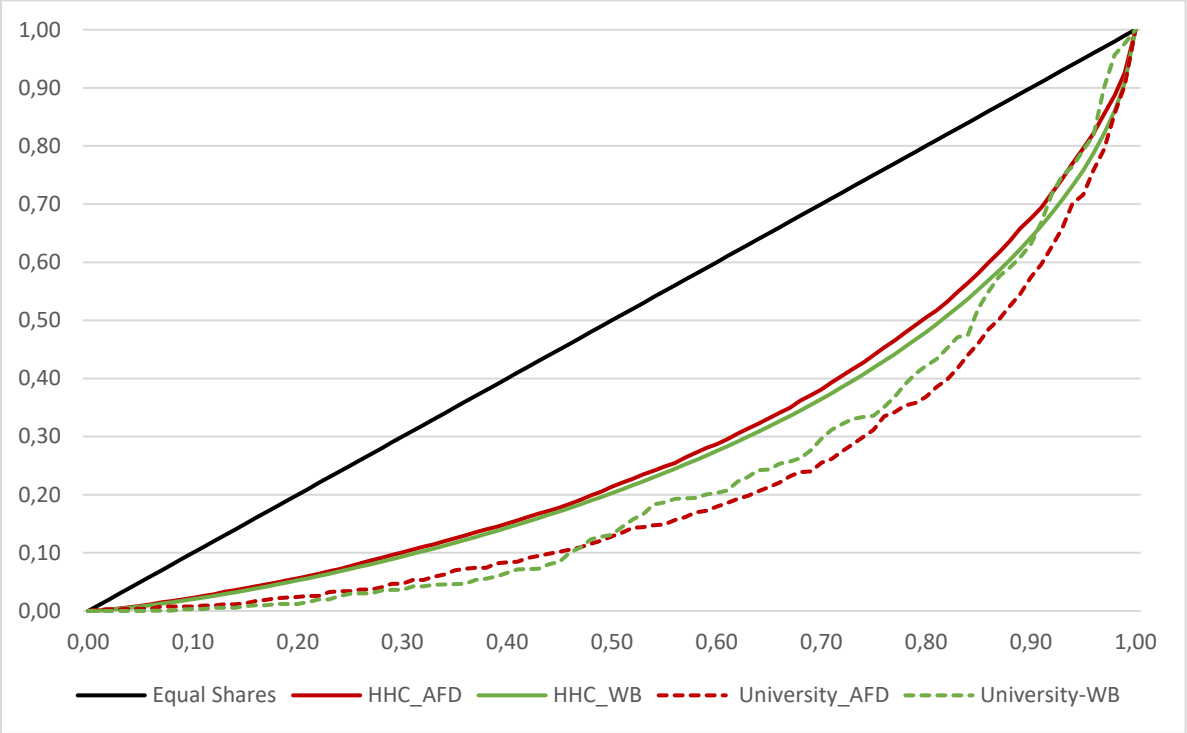


Figure 5C(a). Lorenz and concentration curves for per capita market income and the net benefit of public health expenditure (Outpatient hospitals)
Source: Own calculations using the 2015/2016 survey data

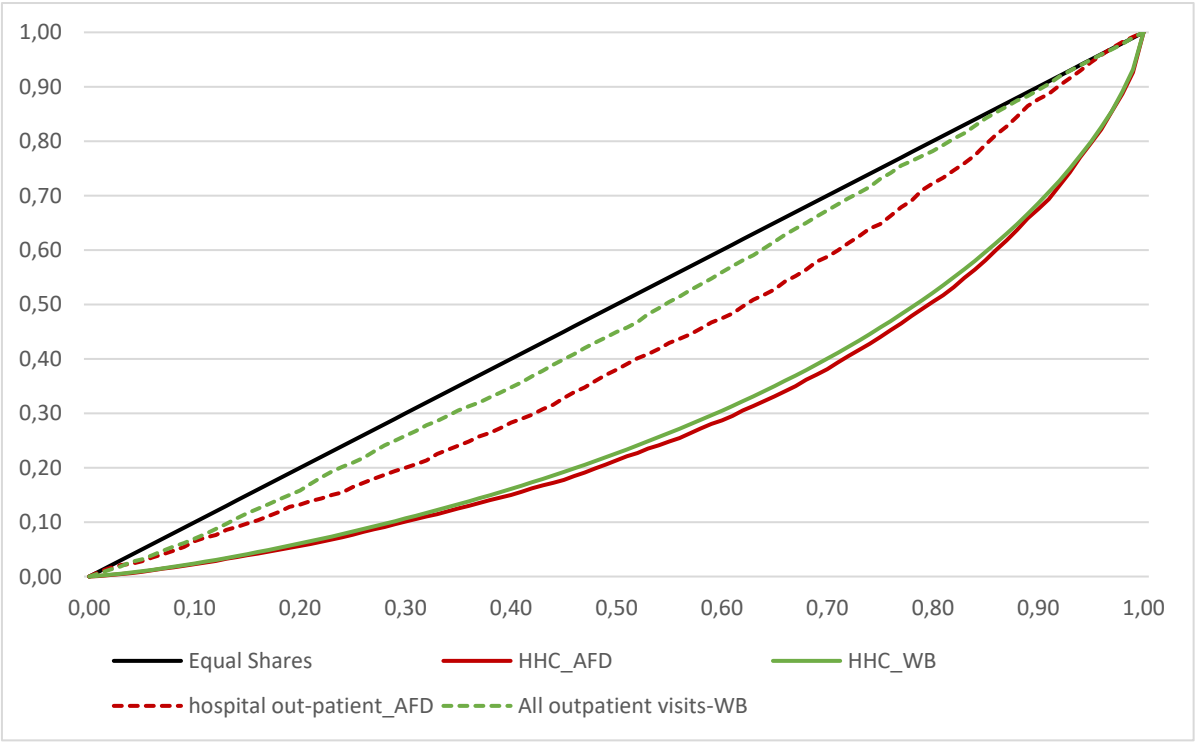


Figure 5C(b). Lorenz and concentration curves for per capita market income and the net benefit of public health expenditure (Outpatient Health Centers)
Source: Own calculations using the 2015/2016 survey data

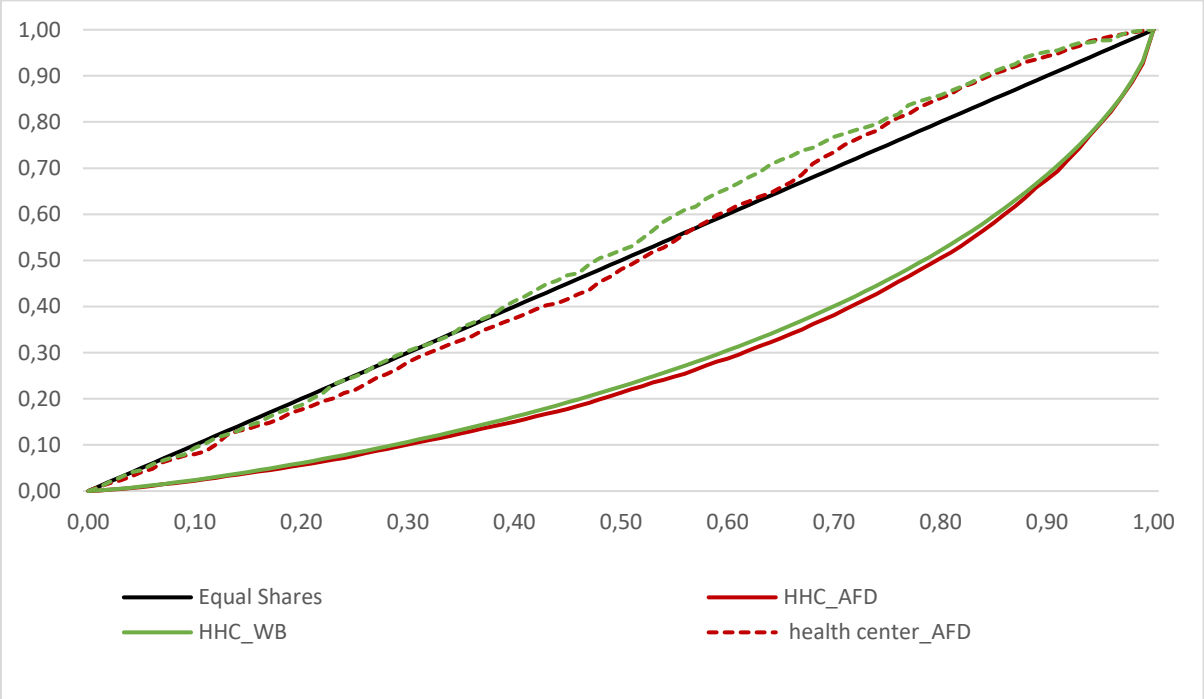
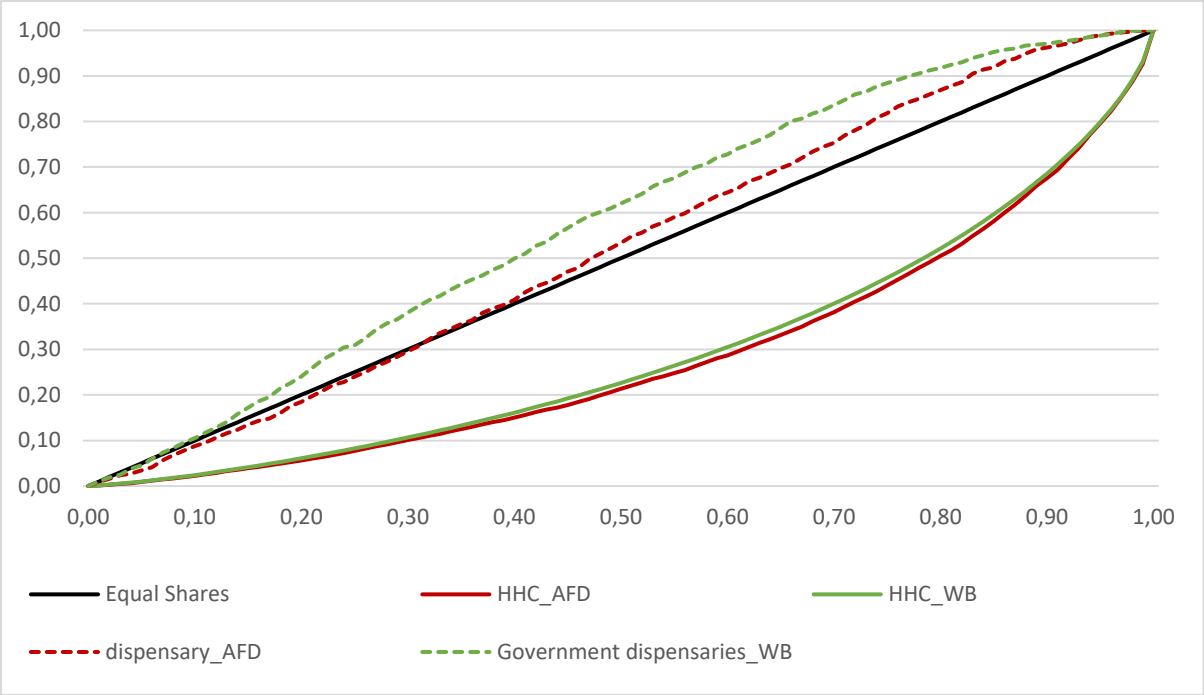
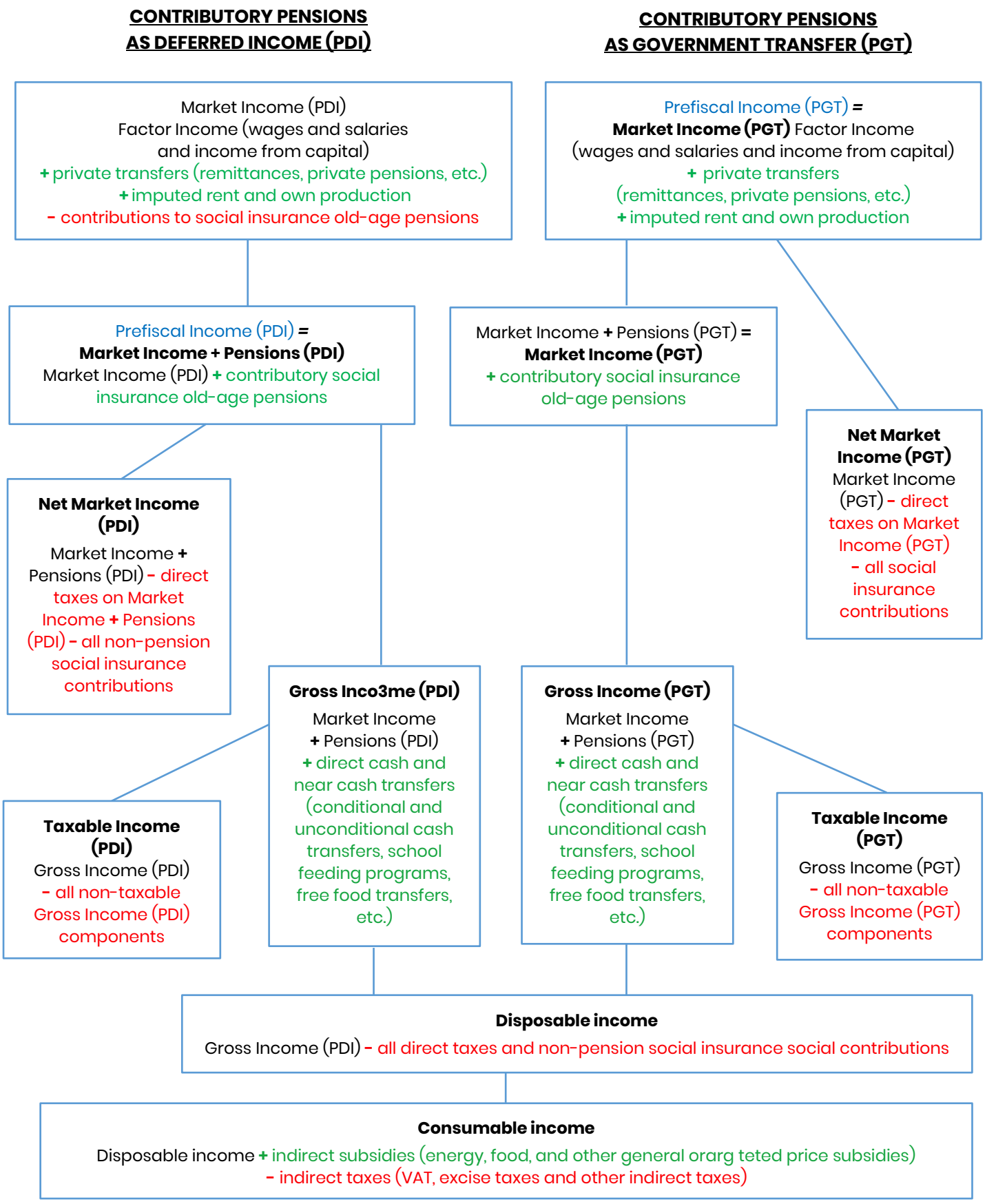


Figure 5C(c). Lorenz and concentration curves for per capita market income and the net benefit of public health expenditure (Outpatient dispensaries)
Source: Own calculations using the 2015/2016 survey data



Appendix III. Full CEQ Income Concepts Scheme



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