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Shifting from deductions to credits

Unpacking the distributional effects of medical expenditure considerations in South Africa

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Abstract: The recent National Health Insurance White Paper proposes redirection of medical tax credits revenue towards the financing of the national health insurance. This raises critical questions about the impact on affordability for the poor as well as fundamental legal implications. The 2012 tax reforms which saw the move from deductions to credits were justified on the basis of equitable income redistribution. This paper examines the redistributive effects of the medical tax credit system. With the shift from deductions to credits, we interrogate whether the data indeed yields the desired effects of a more equitable distribution. We find that the core medical tax credit has the desirable qualities of a progressive tax system. However, the additional medical tax expenses appear to be distortionary, introducing great inequality across income groups as it turns out that the high-income earners tend to benefit more from these additional medical tax expenditures.

Key words: medical tax credit, medical expenses, tax deductions, distributional impacts, inequality, tax progressivity, South Africa

JEL classification: D31, H23, H51, I13

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1 Introduction

Medical expense deductions and their impact on income inequality have been a subject of discussion for many countries globally. The arguments are centred on rising healthcare costs, medical insurance coverage, and the fairness of the entire tax system (Serocki and Murphy 2009). It is also because taxpayers who encounter high medical expenditure are likely to encounter financial hardships that can ultimately affect their ability to honour their tax obligations.

The structure of medical relief in South Africa has changed over the years. Initially, a deductions system was followed, wherein allowances within specified limits were deducted from income to cater for both medical aid contributions and out-of-pocket medical expenditure (National Treasury and SARS 2018). The purpose of the deductions system was to provide some relief to taxpayers for the medical scheme contributions and some out-of-pocket expenses, as well as cushioning families against catastrophic health expenditure. However, the deductions system was criticized for being inequitable (National Treasury 2011). High-income taxpayers were afforded greater benefit, owing to the progressive marginal tax rate. As shown by Zee (2005), the higher the taxpayer's marginal rate, the higher the given deduction.

Following discussions on the inadequacy of the deductions system, the replacement of the deduction with a non-refundable tax credit was first suggested in the 2009/10 budget, which had a number of tax proposals focusing on relief for individuals such as medical scheme contributions and tax deductibility of post-retirement medical contributions (National Treasury 2009). In order to allow for administrative adjustment, the proposal indicated implementation in two years' time, i.e. in 2012. There were, however, suggested immediate changes, wherein medical aid contributions lost their status of 'tax-free fringe benefits' as all contributions paid by the employer would be treated as taxable. This was followed by a budget review with a proposal to introduce tax credits from 1 March 2012 (National Treasury 2011). A discussion document was issued on 17 June 2011. Based on the discussion document, the tax credit had five major objectives: i) equity and proportionality; ii) alignment with national health insurance (NHI) objectives; iii) fairness; iv) affordability and fiscal sustainability; and v) administrative simplicity (National Treasury 2011).

Within five years of implementing the credit system, it is expected that administrative systems are all in place and that this is a supposedly reasonable lag for the policy shift to yield results. Yet a signal of dissatisfaction with the credit system appeared in 2017, when the budget review expressed the government's intentions to explore a possible reduction of medical tax credit (MTC) to allow the initial setting up of the NHI (National Treasury 2017). These sentiments were echoed again in the 2019 budget speech. Clearly, this is a pertinent issue and before hastily abandoning the credit system, it is valuable to investigate its attendant benefits in relation to income distribution.

In this paper, we seek to interrogate the evidence of equity and proportionality effects arising from this policy shift, using the administrative tax database. Specifically, we aim to assess the pattern of MTC by income group and to determine the impact of the medical tax expenditure on income distribution. Equity and proportionality are achieved through increased tax relief for medical expenditure of the lower-income households: the elderly, persons with a disability and households confronted with higher medical bills. We answer the question concerning the impact of the shift to the credit system on income distribution. While the deductions era could have meaningful insights into how the system worked and how it faired on the actual distribution of income, data limitations inhibit such analysis.

There are a few international academic studies that have used administrative data to establish the facts about the effective regressivity of the deduction system (Mitchell and Vogel 1975; Steaerle and Hoffman 1979; Ehrlich 1980), but not for South Africa. The reason for this paucity of studies is linked to the general inaccessibility of tax administrative data. The initiative by the South African Revenue Services (SARS), the National Treasury, and UNU-WIDER to make administrative data available presents opportunities for in-depth data analysis.

The rest of the paper is structured as follows. In Section 2, we discuss issues pertaining to inequality in general and more specifically inequalities in the health sector. The approach taken is to learn from the rich global context, and the continental and regional focus, with the aim of drawing lessons for South Africa. In Section 3, an intensive literature review is undertaken, specifically focusing on deductions and credits and the impact on income distribution. This is followed by methodological considerations in Section 4. Section 5 presents and discusses the findings and limitations of the study. Finally, Section 6 draws conclusions, with emphasis on the possible policy directions. In addition, this final section points to further areas of research.

2 The South African health expenditure, historical reforms, and possible future reforms

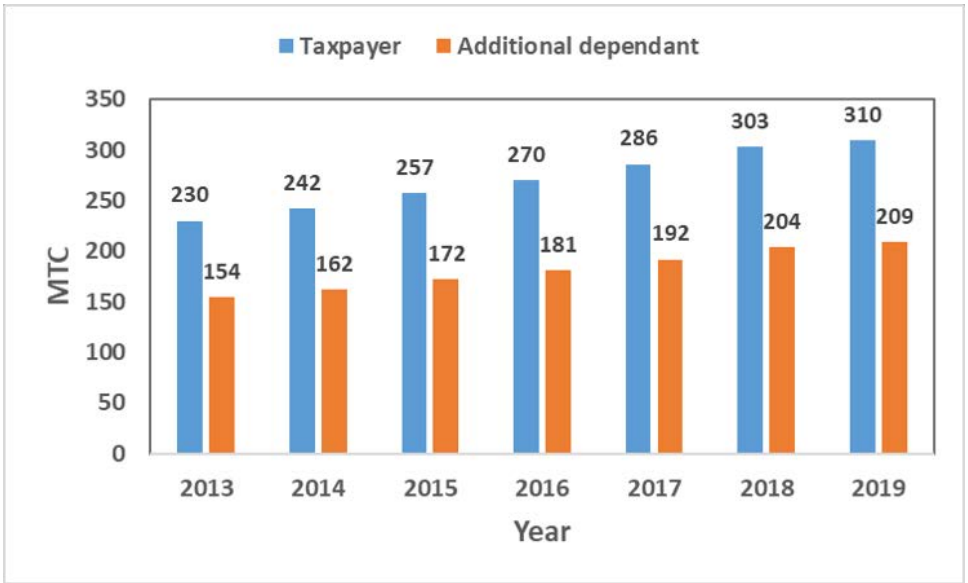
The South African National Health System is divided into two sectors: public and private sectors (Department of Health 2011; Omotoso and Koch 2018). The public sector, which serves approximately 85 per cent of the population, largely depends on general tax revenues, which consume around 11 per cent of the government budget (Chopra et al. 2009). Income inequality is among many factors that affect health care in South Africa. The private sector, which serves less than 15 per cent of the population, offers excellent facilities to those who can afford medical insurance or pay on an out-of-pocket basis and is utilized mostly by urban dwellers. Privatization of health care services in South Africa dates back to as early as the 1970s (Jaques and Fehrsen 2007), with medical aid schemes being the primary private health-financing mechanism. While the pre-1994 health system was characterized by racial segregation and systemic fragmentation, the post-1994 system reflects improved unification and is more coordinated (Omotoso and Koch 2018).

Given the levels of inequality in the health sector, the government is at work in an attempt to resolve this challenge. Phased-in changes from a deduction system to a tax credit system began on 1 March 2012 (National Treasury 2011). A two-tier credit system has been established, which includes (i) capped MTC and ii) additional medical tax credit (AMTC). Capped MTC, as covered in Section 6A of the Income Tax Act, is given only to taxpayers who pay any portion of medical scheme contributions themselves. It does not consider the size of the medical scheme contribution and taxpayers whose medical scheme contributions are fully subsidized by their employer. The main member and all dependants receive a monthly tax 'credit' which is reviewed every tax year (see Figure 1). The taxpayer's credit is the same as that for the first dependant, and that of the additional dependants thereafter is slightly lower. Due to the phased-in approach, from 1 March 2012 it was applicable to taxpayers below 65 years of age—and structured as a hybrid system of deductions and credits. With effect from 1 March 2014, taxpayers aged 65 years and older were included.

The AMTC, which came into effect on 1 March 2014, is specified in Section 6B of the Income Tax Act. It is applicable to all taxpayers regardless of age. It speaks to other additional qualifying medical expenses not covered by the medical scheme, usually referred to as out-of-pocket expenses (OOP). Over-the-counter medicines do not qualify under OOP unless they are prescribed by a

registered medical practitioner and dispensed from a pharmacy. Calculation formulas of AMTC depend on the taxpayer's age and disability of the taxpayer or any of their dependants. AMTC, like MTC, is non-refundable. It can only reduce the normal tax payable. No portion of AMTC is carried over to the next year of assessment.

Figure 1: Medical tax credit for the period 2013–19



Source: authors' illustration based on National Treasury and SARS (2018).

In pursuit of solutions for the health sector, a proposal was made to redirect tax credits towards NHI funding as stipulated in the 2017 National Health Insurance White Paper (Department of Health 2017). This was also emphasized in the July 2019 National Health Insurance Bill, Chapter 10, which focuses on financial matters and lists the '…reallocation of funding for medical scheme tax credits paid to various medical schemes towards the funding of National Health Insurance' (Republic of South Africa 2019: 25). Reacting to the 2017 proposal, Armstrong (2017) assessed the impact of tax credits on the affordability of medical schemes. The study finds that total removal of tax credits would lead to a disproportionate impact on the poorer medical scheme beneficiaries. This amounts to approximately 21.86 per cent of beneficiaries that would move above the affordability threshold (Armstrong 2017). While Armstrong's (2017) study directly advocates for holding MTCs, our study will further interrogate the role played by these tax credits over the years in ensuring equitable income distribution.

3 Literature review

The relevant literature informing this study is packaged in various emerging themes. There is literature pertaining to health inequality in general and how policy can respond in order to address these problems. Another strand of literature focuses on the desirability of NHI, particularly for South Africa in the current era, and possible financing instruments. It is within this literature that the total elimination of tax credits has been envisaged in order to release funding for the NHI. We also explore literature that has a bearing on the methodology of teasing out tax progressivity. Finally, albeit very scant, there is literature that focuses directly on how the health expenditure affects income distribution, depending on the structure, whether deductions or credits.

Martinez-Vazquez et al. (2012) focus on the potential role of taxation and public expenditure policies in affecting income distribution in a large panel of 150 countries. They observe that, in general, higher shares of public expenditures towards health, education, social welfare, and housing affect income distribution positively. In a study focusing on thirteen Asian territories, it was observed that the question of who pays for health as well as the progressivity of health finance has been widely researched by many scholars (O'Donnell et al. 2008). Applying a new decomposition technique and counterfactual simulations to twelve European countries, Bargain (2007) alludes to the importance of answering the central economic and policy questions about the impact of tax–benefit policies on income distribution. In fact, dating as far back as the 1970s, Buchanan and Pauly (1970) focused on understanding the incidence of tax deductibility. More recently, a number of studies have continued with the quest to find answers to the income distribution effects of medical expenditure deductions. Focusing on the United States of America (USA), Southwick and Cardigan (1983) maintain that medical expenditure deductions make the tax structure more progressive and, in fact, the medical expenditure deductions ultimately lead to the desired equality of after-tax incomes. They define progressivity or regressivity on the basis of the way in which after-tax income is affected.

According to Serocki and Murphy (2009), the findings of the 2005 USA President's Advisory Panel on Federal Tax Reform noted the tendency of health-related tax benefits to favour higher-income households. Serocki and Murphy (2009) confirm a U-shaped pattern in average deductions. At low-income levels, the deductions are high due to the possibility of many medical problems. The middle-income earners have lower deductions and then the deductions increase for high-income earners—at the 85th percentile. This arises due to the high likelihood that the wealthy will self-insure. Furthermore, the high-income group is associated with positive income elasticity for medical services. This is where a MTC (rebate) system would be beneficial as it does not depend a lot on how much the deductions are but is the same across individuals. We, however, note that, based on the positive income elasticity of medical services for high-income earners observed by Serocki and Murphy (2009), there is still a possibility that through AMTC the rich may still stand to benefit. As a result, the desirable effects of the MTC can be eroded by the AMTC.

In the Canadian context, Reuber and Poschmann (2002) show that a tax credit is much better than a deduction based on the ease of administration, fairness, and stability of the health management system. They argue that a tax credit can either be refundable or non-refundable, emphasizing how the refundable system would be difficult to administer due to its implied effect of extending a subsidy to households who fall below the income threshold. Currently, for South Africa, the system is non-refundable and indeed excludes those below the tax threshold.

Hoynes and Patel (2016) interrogate whether the US earned income tax credit (EITC) is an effective policy for reducing poverty and inequality. Using quasi-experimental research design, they quantify both the pre-tax and credit effects. Their findings reveal that a US$1,000 increase in EITC would lead to an 8.4 per cent reduction in the proportion of families with after-tax income below 100 per cent poverty. While this does not focus on the medical expenditure credit, rebate systems tend to work in a similar fashion in terms of income distribution. In a more recent study, Moosa (2016) illustrates how qualifying medical expenses affect the income of persons living with disability in South Africa. In addition, the author explores the impact of limiting a person's ability to claim from qualifying medical expenses.

The extant literature varies widely based on the nature of the data that is available. Our study is informed by the work of Humbelin and Farys (2017) who use Swiss administrative data to analyse income redistribution through taxation, specifically focusing on how the deductions actually undermine taxes. They find that deductions for real estate expenses undermine the redistributive effect of taxes.

4 Data and methodology

4.1 The administrative data set

In this working paper we use tax data collected by the SARS. The National Treasury in conjunction with SARS and UNU-WIDER have worked in creating an anonymized tax database. This data hosts rich income information for individuals, hence its popularity among economists using empirical data to evaluate public policies and provide greater insight into employment and economic inequalities (Ebrahim and Axelson 2019). Two data sources are used in the development of the tax database for the formally employed in South Africa: the IRP5 certificate (Employee Tax Certificate) and the ITR12 returns (Personal Income Tax Return).

Employers registered with SARS for pay as you earn (PAYE) in South Africa are required by law to submit a yearly IRP5 certificate for each employee who received remuneration in the given tax assessment year, regardless of the level of remuneration. The ITR12 is completed by the taxpayer and contains all information in an IRP5 certificate and additional income information from self-employment, investment income, other sources of income, and other deductions. Taxpayers are not required to submit an ITR12 return if they have an income below a compulsory submission threshold which is revised on a regular basis, mostly annually, and do not have investment income, additional deductions, and multiple sources of income. The final tax liability for taxpayers who meet ITR12 submission requirements is determined after submission of ITR12 to SARS.

The tax database used for this research was created by linking these two data sources. The database contains 142 million IRP5 certificates data from tax year 2010/11 to tax year 2017/18 and approximately 39 million ITR12 returns data from tax year 2010/11 to tax year 2017/18. The tax database has four linked panels, namely: i) IDs panel, ii) source code panel, iii) employment panel and, iv) income panel. The IDs panel contains IRP5 certificate and ITR12 returns anonymized identification variables. The source code panel represents all the sources of income for each taxpayer. The employment panel contains information about a taxpayer's certificates, lump-sum incomes, and some other variables that can be used to determine PAYE for each taxpayer. The income panel provides information about a taxpayer's total income and total tax paid. See Ebrahim and Axelson (2019) for a detailed explanation of the four data panels. After merging and cleaning the data set, each data panel has an average of approximately 13 million unique data entries.

4.2 Assessing inequality in the distribution of income within a credit system

While the database contains rich taxpayer information from the IRP5 and ITR12 forms, in this study we focus only on variables pertaining to medical expenses and their impact on taxpayers' taxable income. We aim to establish whether the shift from medical deductions to MTC system reduced inequality in South Africa. Our analysis is based on data from 2013[1] to 2018. There are three variables in the tax database that capture information on MTC: IRP5_MTC_d variable from IRP5 forms (source code 4116) populated by the employer; ITR12_MTC, which captures information from a taxpayer through the ITR12 form using information from the tax certificate issued by a medical aid scheme for each medical aid scheme member; and ITR12_MTC_expenses, which represents calculated medical expenditure due to qualifying OOP expenses. The IRP5_MTC_d and ITR12_MTC variables represent the capped MTC for medical scheme

[1] Data for capped MTC is available for ITR12 returns from 2013 to 2018 and from 2014 to 2018 for IRP5 certificates.

contributions. What follows is the description of the approach taken in order to interrogate the impact of these variables of interest on income distribution.

Analysis based on income categories as defined by SARS

The capped MTC variables in the data panel depend on the duration of medical scheme membership in a given tax year and the number of qualifying dependants registered with the medical aid scheme. To accommodate the variation in the amount paid to each taxpayer in a given taxable income category,[2] an estimated weighted average for capped MTC is calculated using population weights for each taxable income category. A back-calculation method using yearly deductible credits is used to estimate the number of taxpayers with a given number of dependants in each taxable income category (see Table A2 in Appendix A). Information on medical aid membership duration is not available in the database and is not easy to impute from available data. Hence, we work with the assumption that taxpayers subscribe to the medical scheme for a full tax year.

The third variable of interest is ITR12_MTC_expenses (AMTC). AMTC is divided into two categories: (i) medical expenses paid by the taxpayer that were claimed from the medical aid scheme but not covered by the scheme—this amount is obtained from a taxpayer's medical tax certificate issued by a medical aid (code 4020); and (ii) any qualifying medical expenses paid by the taxpayer not claimed from any medical scheme and not reflected on any medical tax certificate (code 4034). Physical impairment and disability are captured using codes 4022 and 4023 (see Table A1 in Appendix A), respectively, for any qualifying OOP medical expenses. The final amount for AMTC heavily depends on the information provided by the taxpayer and hence varies across all income groups. The ITR12_MTC_expenses variable in the tax database used for our analysis represents an aggregate of all categories of AMTC. This implies that one cannot do a disaggregated analysis of the impact of AMTC on MTC attributed to physical impairment and disability. We analyse this variable to understand the degree to which taxpayers in the various income categories take up AMTC and to identify the taxable income groups that benefit most from the AMTC.

In our analysis, due to lack of meaningful data for the years 2011 and 2012, we use hypothetical data (Council for Medical Schemes to current credit information) to infer distributional effects that would have prevailed had the deductions system prevailed. We use capped MTC and AMTC data from 2014 to 2018 as proxies in our calculations to compare the two systems. This means calculations for the medical deductions system are approximate. Age rebates and other rebates are not considered in our calculations as they do not add any value in the comparison of the two medical tax systems.

To fully understand the impact of MTC on income distribution, we examine the extent to which it affects the average tax rate paid by each taxable income category. Tax relief under the medical tax deduction system is calculated by multiplying the marginal tax rate and the average MTC for each taxable income group. MTC is used as a proxy for deductions beyond 2012. Calculation of the total medical deduction requires total medical aid contributions for each taxpayer. This variable is not available in the data set. Therefore, an estimate using code 3810 data was used where the assumption was that the employer's contribution is 50 per cent (upper limit) of the total medical aid contribution. Under the MTC system, tax relief is calculated as the sum of capped MTC and AMTC. The tables in Appendix B examine the extent to which the credit system and the deduction system affect the average tax paid by taxpayers in different taxable income categories.

[2] In the analysis, we use the taxable income categories defined by SARS in the annual Tax Statistics Reports.

Gini-based decomposition analysis

Gini coefficients have for a long time been used to measure inequality in the distribution of income, in consumption, and in other welfare measures (López-Feldman 2006). Within the Stata framework, several user written commands are available to assess income inequality, either through Gini decomposition by sub-population or by income source. These include: i) 'Ineqdeco' and 'Ginidesc', which decompose inequality by sub-population group, and ii) 'descogini' and 'ineqfac', which decompose inequality by factor components of total income. We use the 'descogini' command to tease out the marginal effects of the two source incomes MTC and AMTC. This enables us to draw conclusions on whether the variables render equalizing effects on income distribution or whether they perpetuate the inequality.

In explaining the 'descogini' command, López-Feldman (2006: 107) presents a framework which is an extension of the results from Shorrocks (1982) and Lerman and Yitzhaki (1985). The Gini-based decomposition is shown in equations (1) and (2).

$$G = \sum_{k=1}^{K} S_k G_k R_k \tag{1}$$

Where S_k is the share of source k in total income. G_k is the source Gini corresponding to the distribution of income from source k, and R_k is the Gini correlation of income from source k with the distribution of total income

$$R_k = Cov\{y_k, F(y)\} / Cov\{y_k, F(y_k)\} \tag{2}$$

Where $F(y)$ and $F(y_k)$ are cumulative distributions of total income and of income from source k, respectively.

Tracing redistributive effects of tax credits

In a fairly recent analysis of the income redistribution through taxation and particularly on how deductions tend to undermine the progressivity of taxes, Humbelin and Farys (2017) define Gini-based decomposition analysis to trace redistributive effects of tax rates and tax credits. Following this approach, we interrogate whether the data under the credit system indeed yields the desired effects of a more equitable distribution. The redistributive effects are traced using a sequential approach, which is specified as follows:

Step 1: What is the distribution that would result if no deductions/credits were issued?
Step 2: Distribution after deductions/credits
Step 3: Calculation of differences in Gini coefficients.
Step 4: Reynolds and Smolensky (1977) net redistribution
Step 5: Kakwani (1977) progressivity index
Step 6: Vertical equity
Step 7: Re-ranking.

Humbelin and Farys (2017: 11) explain the decomposition of redistributive effects using the concept developed by Reynolds and Smolensky (1977). As shown in equation (3), the net

redistribution given by the Reynolds–Smolenskly (RS) measure is the result of the difference of Gini coefficients of pre-tax incomes (G_x) and post-tax incomes (G_{x-t}).

$$RS = G_x - G_{x-t} \tag{3}$$

Using a sequential approach, the RS measure is further decomposed into two components: the Kakwani (1977) index of progressivity (K_i) and the horizontal re-ranking effect (RR_i) as shown in equation (4).

$$RS_i = G_x - G_{x-ti} = K_i * \frac{t_i}{1-t_i} - RR_i \tag{4}$$

The Stata Ado command 'Progress' executes these seven steps and enables us to tease out the distributional impact by comparing the before-credit distribution and after-credit distribution of income. The progress command considers the pre-tax and post-tax income data and computes measures of net redistributive effects (Peichl and van Kerm 2007). It measures progressivity, vertical equity and re-ranking (horizontal inequity). The derivation of the indices is based on (generalized) Gini coefficients of inequality and (generalized) concentration coefficients. In our case, the pre-tax variable used is the ITR12_taxable_income and the post-tax variable is the disposable income variable as defined in equation 5.

$$\text{After tax income} = \text{Taxable Income} - (\text{Tax liability} - \text{capped MTC} - \text{AMTC}^{3}) \tag{5}$$

Estimating Lorenz and concentration curves

Lorenz curves have been used widely in the analysis of inequality and redistribution (Jann 2016). Jann (2016) describes in detail how Lorenz curves are estimated in Stata. There are several other user commands that have the same functionality. These include glcurve, svylorenz, clorenz, and alorenz. We use the 'lorenz' command in our analysis of the distribution of MTC and AMTC ranked by taxable income.

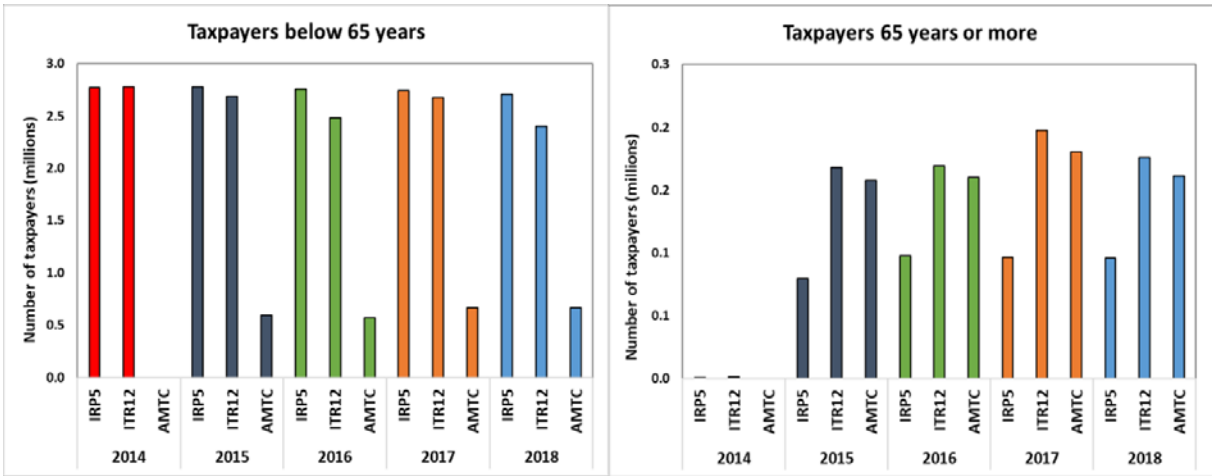
5 Findings

5.1 The distribution of capped medical tax credit (MTC)

Approximately 21 per cent of IRP5 forms between 2014 and 2018 had a value greater than zero for capped MTC. This gives an indication of the proportion of the employed population who pay any portion of medical scheme contributions themselves. This excludes employees whose medical aid contributions are fully subsidized by their employer since they are not eligible for capped MTC.

[3] This is calculated on the assumption that the tax-liability variable has not yet incorporated MTC and AMTC. An alternative definition of disposable income (B), which assumes that tax liability has already incorporated the credit yields similar results and very close magnitudes of coefficients.

Figure 2: Number of taxpayers who claim capped medical tax credit and additional medical tax credit by age



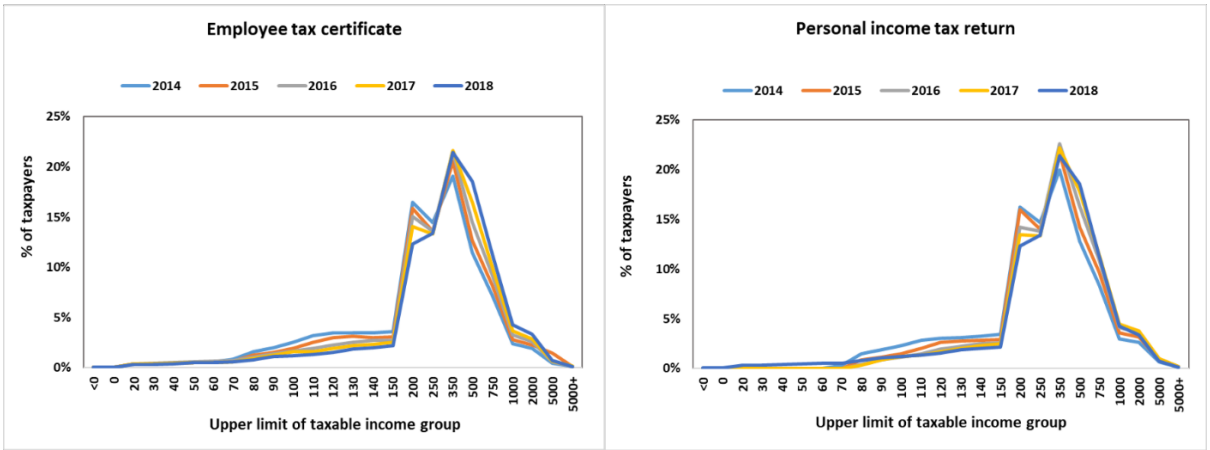
Source: authors' illustration based on tax administrative data.

From 2014 to 2018, the proportion of male taxpayers who claim capped MTC is higher (55 per cent) than the proportion of females (45 per cent). Approximately 96 per cent of the taxpayers who claim capped MTC are aged below 65 years. The absolute numbers of taxpayers aged less than 65 years with a non-zero capped MTC on their IRP5 and on the ITR12 form is approximately equal, as shown in Figure 2. This pattern is different for taxpayers aged more than 65 years, with more taxpayers claiming capped MTC via ITR12 form.

A general increase in the percentage of middle- to upper-income taxpayers (taxable income >= ZAR150,000) who claim capped MTC is observed from 2014 to 2018. A decrease is, however, observed for taxpayers with less than ZAR150,000 taxable income. The percentage of taxpayers with capped MTC>0 exhibits a sharp increase at ZAR150,000 taxable income from an average of 3 per cent to an average of 15 per cent, with a peak between the ZAR250,001 and ZAR350,000 taxable income category. A general decline by income category is observed thereafter (see Figure 3). The decline can be associated to some extent with the decrease in number of taxpayers who earn taxable income above ZAR350,000.

Taxable income categories between ZAR150,000 and ZAR750,000 have the highest number of taxpayers with medical cover for only the taxpayer and across all number of dependants. This group of taxpayers constitute on average 73 per cent (capped IRP5_MTC) and 75 per cent (capped ITR12_MTC) of all taxpayers with capped MTC>0. Most taxpayers have medical cover for only themselves (35.81 per cent). This phenomenon is common across all taxable income groups over the five-year period.

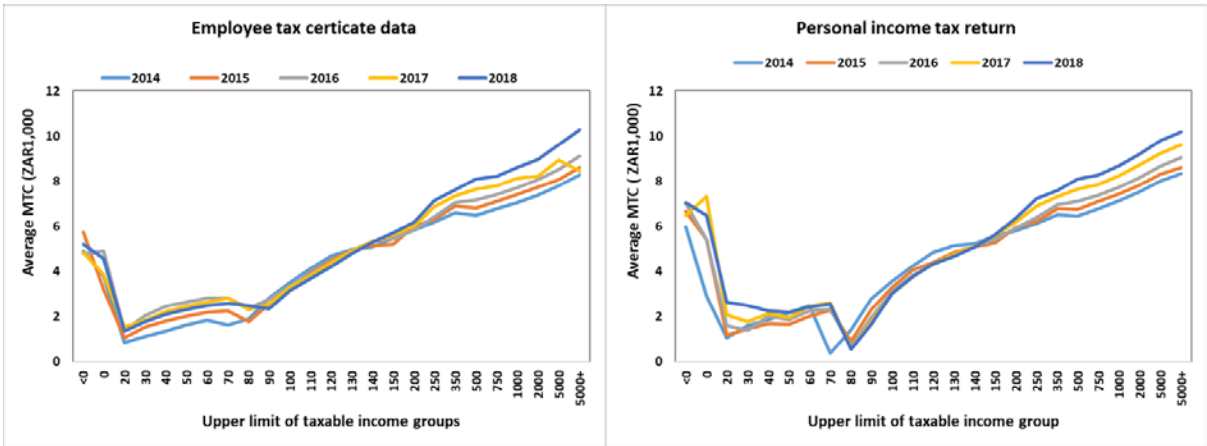
Figure 3: Percentage of taxpayers with capped medical tax credit greater than zero per taxable income group



Source: authors' illustration based on tax administrative data.

Average capped MTC by income group is relatively high in income groups with less or equal to zero[4] annual taxable income (see Figure 4, left panel). A general steady increase in average capped MTC (approximately ZAR2,000 per annum) starting from the margins of lower middle-income class reaching a maximum of approximately ZAR9,000 per annum in the upper-income category is observed. This distribution of capped MTC exhibits a U-shape skewed to the right. The observed pattern reveals that the wealthy are most likely to subscribe themselves and their dependants to medical schemes and hence receive the larger share of capped MTC. Data from IRP5 capped MTC shows that the lowest average capped MTC return is in the 0 to ZAR20,000 annual taxable income category, whereas data from ITR12 has minimum average capped MTC between ZAR60,000 and ZAR80,000 annual taxable income category (Figure 4, right panel).

Figure 4: Average capped medical tax credit by taxable income group



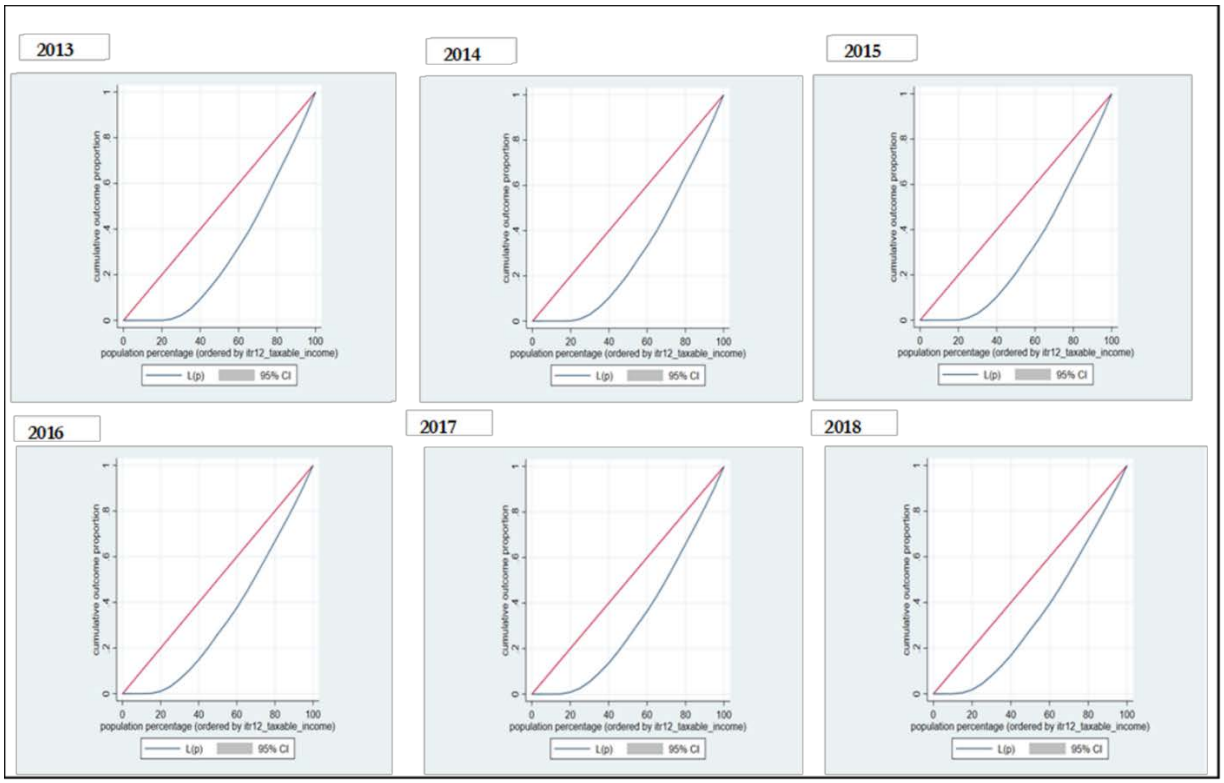
Source: authors' illustration based on tax administrative data.

The descriptive analysis of the data above shows how the existing system seems to favour high-income earners, in terms of them being the absolute beneficiaries of both capped MTC and AMTC. The Lorenz curves for the years 2013 to 2014 show that, over the years, the inequality

[4] There are 863,877 cases where the itr12_taxable_income variable is negative. This is possible given the occurrence of assessed losses in cases of e.g. business income from individuals.

associated with the MTC is persistent, with very small reduction in the inequality gap (see Figure 5).

Figure 5: Lorenz estimate of medical tax credit ranked by taxable income group

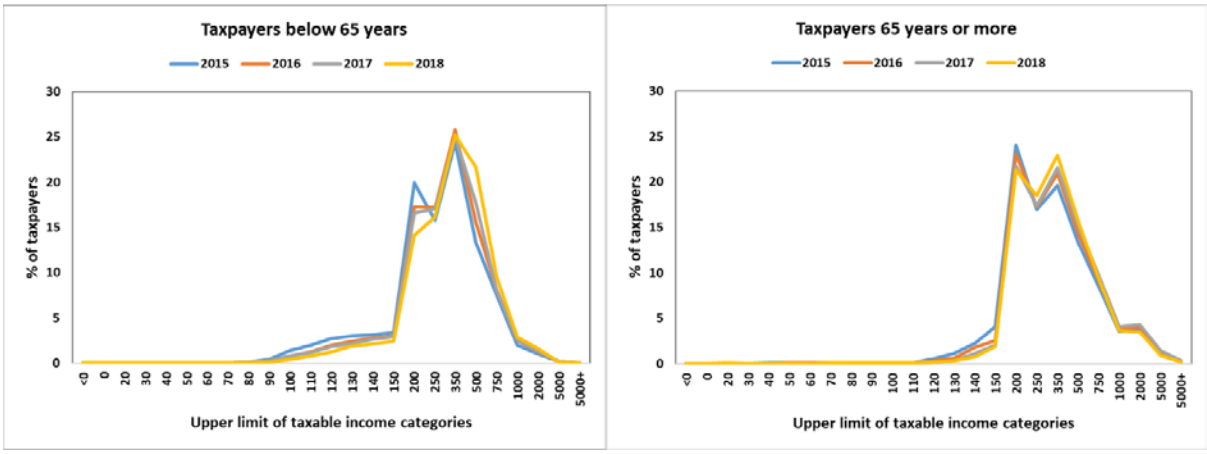


Source: authors' illustration based on tax administrative data.

5.2 Additional medical tax credit (AMTC)

The percentage of taxpayers aged both below 65 years and 65 years plus claiming AMTC is negligible in the lower-income categories. It rises sharply at ZAR150,000 taxable income (from an average of 3 per cent to an average of 15 per cent) for taxpayers aged under 65 years with the highest percentage (average of 25 per cent) when taxable income is between ZAR250,001 and ZAR350,000 (see Figure 6, left panel). For taxpayers aged 65 years and older, it rises sharply and also reaches a peak at ZAR150,000 to ZAR200,000 taxable income category. Thereafter the percentage of taxpayers with AMTC>0 starts to decline (see Figure 6, right panel). Taxpayers with taxable income between ZAR150,000 and ZAR500,000 constitute on average 76 per cent (aged under 65 years) and 75 per cent (aged 65 years plus) of taxpayers with AMTC>0. This same taxable income category has the highest number of taxpayers who claim capped MTC. The percentage claiming AMTC decreases to negligible levels in taxable income categories above ZAR1 million. The proportion of male taxpayers who claim AMTC is higher (53 per cent) than the proportion of females (47 per cent). This distribution in gender is similar to that of taxpayers who claim capped MTC.

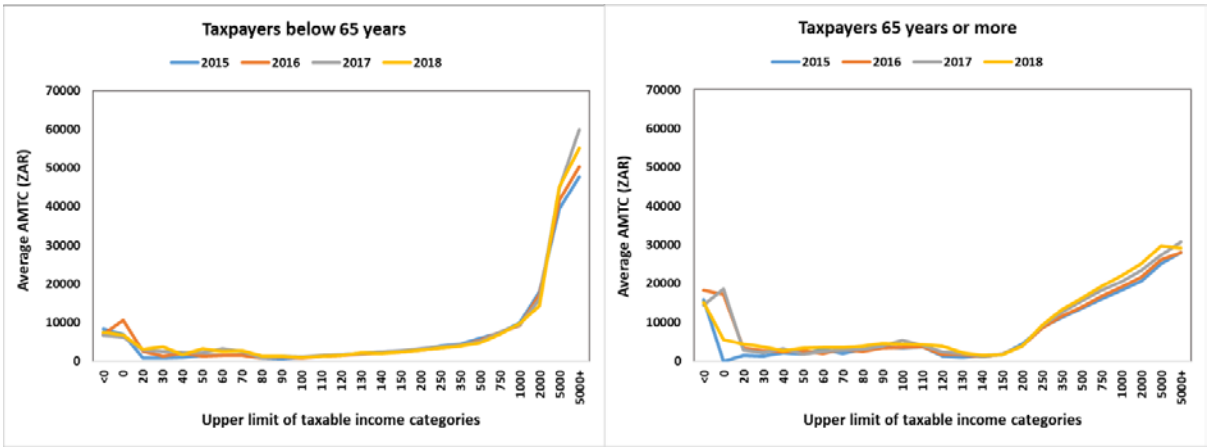
Figure 6: Percentage of taxpayers with additional medical tax credit greater than zero per taxable income group



Source: authors' illustration based on tax administrative data.

The average AMTC by income group shown in Figure 7 is relatively high in income groups with less or equal to zero annual taxable income for both those aged under 65 years and 65 years plus. There is minimum variation in average AMTC (ranges between ZAR800 to ZAR3,000 per annum) through low- and middle-income categories. AMTC gets progressively larger from the upper middle-taxable income (ZAR150,000) to upper-income categories where AMTC is on average above ZAR50,000 (aged under 65 years and ZAR30,000 (aged 65 years plus) per annum. This distribution in average AMTC claimed exhibits a clear U-shape. The observed pattern reveals that the wealthy are most likely to subscribe to medical schemes and claim more AMTC, which is facilitated by the positive income elasticity (Ringel et al. 2002) to pay for the qualifying medical expenses out of pocket. This phenomenon substantiates our observation that the AMTC perpetuates the inequality aspects that prevailed in the deductions system.

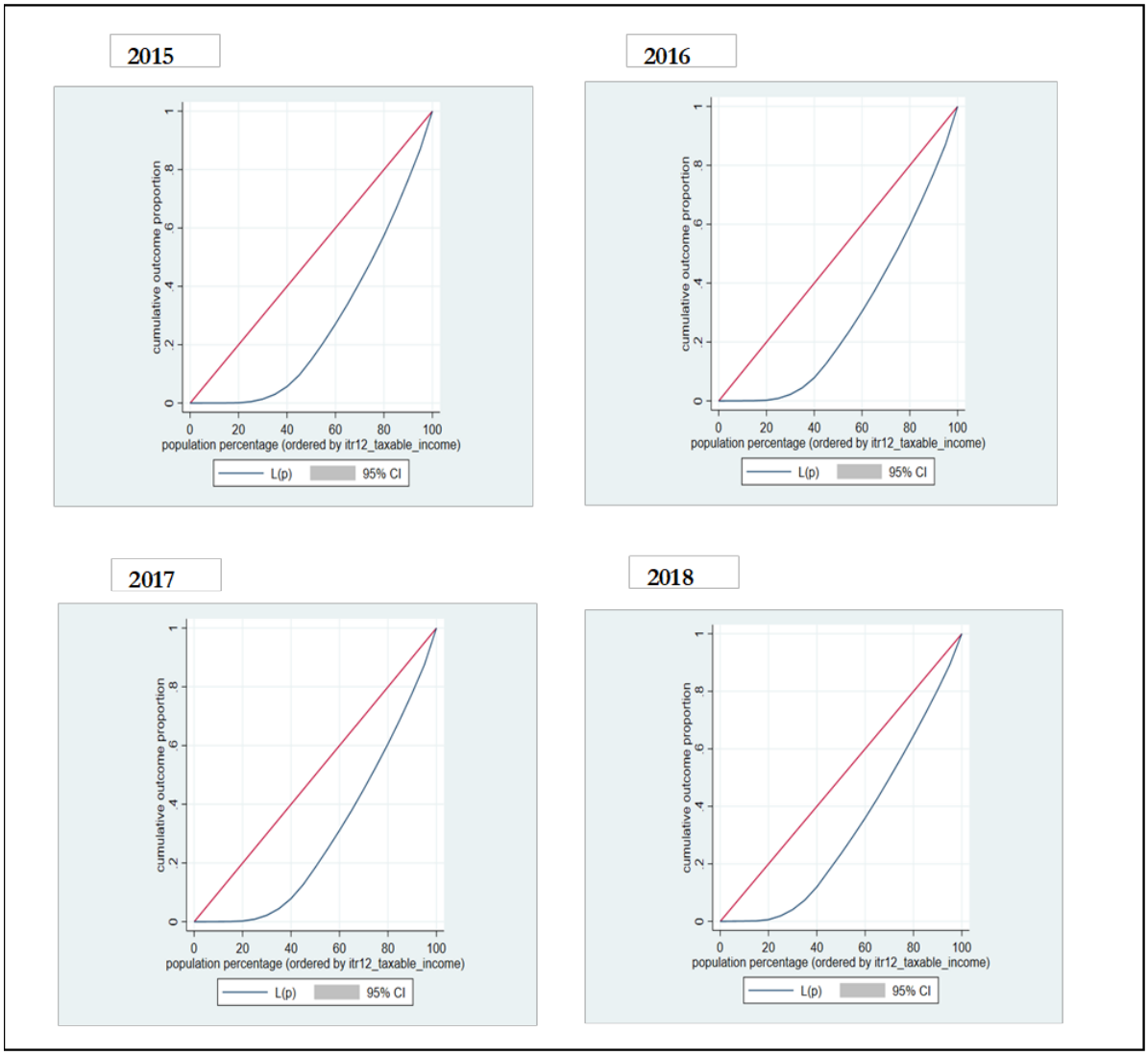
Figure 7: Average additional medical tax credit per return by income group



Source: authors' illustration based on tax administrative data.

While the descriptive statistics above point to sizeable differences in the distribution pattern by gender, age, and income category, here we focus on the AMTC variable and plot a Lorenz curve in contrast to taxable income. The pictures that emerge are captured in Figure 8.

Figure 8: Lorenz estimate of additional medical tax credit ranked by taxable income



Source: authors' illustration based on tax administrative data.

As depicted in Figure 8, the inequality gap in the distribution of taxable income associated with AMTC appears to be declining over the years.

5.3 Approaches that decompose the effects of both MTC and AMTC

In this section, we decompose the marginal effects using the 'descogini' command developed by López-Feldman (2006)[5] and assess the distributive effects using the method by Humbelin and Farys (2017), which enables us to comment on the measures of progressivity, vertical equity, and re-ranking.

'Descogini' allows us to estimate the marginal effects that a particular income source will have on the distribution of income. Since the credit system works through the reduction of tax liability/tax

[5] For a detailed exposition of how this decomposition works, refer to Lerman and Yitzhaki (1985), López-Feldman et al. (2007) and Taylor et al. (2005).

payable, our income variable of interest would be after-tax income. We generate after-tax income or disposable income by subtracting the effective tax liability as indicated in equation (5).

The results are presented in Table 1.

Table 1: GINI decomposition by income source

YEAR	Source	S_k	G_k	R_k	Share	% change
2015	MTC	0.015	0.5966	0.5753	0.0117	-0.0032
	AMTC	0.0033	0.9416	0.5174	0.0036	0.0004
2016	MTC	0.0149	0.5838	0.558	0.0115	-0.0034
	AMTC	0.0033	0.9385	0.4959	0.0036	0.0003
2017	MTC	0.015	0.5965	0.5727	0.0119	-0.0031
	AMTC	0.0036	0.9344	0.487	0.0038	0.0002
2018	MTC	0.016	0.5668	0.5403	0.0124	-0.0036
	AMTC	0.0038	0.9232	0.4448	0.0039	0.0001

Source: author's calculations based on tax administrative data.

According to Stark et al. (1986), the three terms S_k, G_k and R_k yield an intuitive interpretation. S_k focuses on how important the income source is in contributing towards total income. In our case, it shows the importance of capped MTCs and AMTC to total income. G_k, reflects the income distribution of the income source, that is how equally or unequally distributed the MTC and AMTC are. R_k is an interesting term, in so far as it shows the correlation between the income source and the distribution of total income. It helps to answer the question focusing on the extent to which MTC and AMTC actually influence the distribution of income.

Focusing on the MTC, for the year 2015, we observe that a 1 per cent increase in the income source, all else being equal, decreases the Gini coefficient of disposable income by 0.0032 per cent. Capped MTC is moderately distributed (0.5966) and the Gini correlation between capped MTC and total income is moderately high (0.5753). This shows that the MTC has an equalizing effect as expected. Looking at the years 2016, 2017, and 2018, there is not much variation in both the G_k and R_k values, with the Gini taking coefficients of 0.5838, 0.5965, and 0.5668, respectively. The R_k coefficients for the years 2016, 2017, and 2018 are 0.5580, 0.5727, and 0.5403, respectively, again not showing much variation and maintaining the equalizing effect as shown in Table 1.

Considering AMTC, we find that for the years 2015 to 2018, the Gini coefficients are 0.9416, 0.9385, 0.9344, and 0.9232, respectively. This is a very high source Gini, suggesting regressivity in the system wherein the high-income earners benefit from this system. However, the correlations between the income source and the distribution of income (R_k) for the same years are 0.5174, 0.4959, 0.4870, and 0.4448, respectively. This reveals an interesting fact that while itr12_mtc_expenses is unequally distributed, as shown by the G_k, the influence on the income distribution (R_k) tends to be equalizing and therefore presenting some benefits to the poor.

Gini-based decomposition analysis to trace redistributive effects of tax credits

Applying the sequential approach highlighted in the methodology section, the results from the Gini-based decomposition are presented in Table 2. Comparing the outcome over time, we observe that, for both the taxable income and the disposable income Ginis, inequality declines over the years, with the exception of the year 2017. The redistributive effect of the MTC and AMTC remains constant across the years. The Kakwani progressivity index measures the overall degree progressivity of the credit intervention. The Stata Ado command 'Progress' executes the

seven steps in the Gini-based decomposition analysis. In this case, we observe that across all years, the index is positive, confirming the progressivity of the tax credit era, even though not pronounced (ranging between 0.1904 and 0.2001).

Table 2: Tracing redistributive effects of tax rates and tax credits

	Measures	2015	2016	2017	2018
1	Pre-tax Gini	0.4603	0.4489	0.4560	0.4268
2	Post-tax Gini	0.4273	0.4142	0.4227	0.3895
3	Average tax rate	0.1556	0.1626	0.1634	0.1719
4	Reynolds–Smolensky net redistributive effect	0.0330	0.0347	0.0332	0.0372
5	Kakwani progressivity index	0.2001	0.1978	0.1904	0.1989
6	Vertical equity	0.0369	0.0384	0.0372	0.0413
7	Re-ranking (horizontal inequity)	0.0038	0.0037	0.0039	0.0041
8	Suits progressivity index	0.2394	0.2325	0.2248	0.2357
9	Musgrave–Thin redistributive effect	1.0612	1.0630	1.0611	1.0650
10	Atkinson–Plotnick horizontal inequity	0.0045	0.0045	0.0047	0.0052

Source: authors' calculations based on tax administrative data.

The results from the Suits progressivity index also confirm progressivity of the system. The redistributive effect measures the difference between pre-tax and post-tax Ginis, hence indicating how the progressive tax system works in pushing the Lorenz curve towards the line of equality. Over the years 2015 to 2018, the redistributive effect is very small, with a coefficient of 0.03 (rounded up to two decimal places) for all years. Re-ranking, which tends to increase horizontal inequality, is also very small, ranging between 0.0037 and 0.0041. Associated with re-ranking is the Atkinson–Plotnick horizontal inequity, which tends to increase horizontal inequity. While this is very small in size, it seems to be increasing over the years.

5.4 Tax-saving credit system versus deduction system using hypothetical data

Since there is no data for the medical tax deduction system, we use hypothetical data (rooted to current MTC information) to infer distributional effects that would have prevailed had the deductions system prevailed. We assume that capped MTC and AMTC under the credit system are equivalent to capped deduction and out-of-pocket expenses under the deduction system, respectively. Medical aid contributions are estimated using medical aid contributions paid on behalf of an employee (source code 3810 in the database). We assumed that the employer's contribution is 50 per cent (upper limit) of the total medical aid contribution. Under the medical tax deduction system, the amount of medical expenses is deducted from taxpayers' income, whereas under the MTC system medical expenses reduce the taxable amount. Using the same data for the two systems allows easier comparison of the two systems.

Table B1 in Appendix B reports the absolute amount of tax relief for taxpayers aged under 65 years. Tax relief under the deduction system gets progressively larger as income rises, reaching a peak (average ZAR6,500 tax relief) at ZAR500,000 taxable income, and generally decreases thereafter but remains above ZAR2,600. Under the credit system, tax relief gradually increases from an average of ZAR1,800 to ZAR58,600 as taxable income increases. Tax relief under the tax credit system is generally higher than under the deduction system across all taxable income groups. Also, in the lowest taxable income (ZAR1–ZAR20,000) tax liability is reduced to zero since medical tax relief is more than tax liability for this taxable income group. For taxpayers aged 65 years and older, tax relief generally increases for both systems (Table B2 in Appendix B). However,

taxpayers in upper taxable income categories (ZAR750,000+) do not benefit from the tax reform since their tax relief decreased under the credit system.

Tables B3 and B4 in Appendix B report tax relief relative to taxable income for taxpayers aged under 65 years and 65 years plus, respectively. As a percentage of taxable income, tax relief from MTC generally decreases as taxable income increases in both systems. The shift from the deduction system to the credit system allowed lower taxable income groups to capture significant tax relief relative to taxable income. For example, taxpayers with taxable income less than ZAR20,000 under the credit system have tax relief more than tax liability. Hence their tax liability is reduced to zero. However, the opposite is observed for upper-income (ZAR750, 000+) taxpayers aged 65 years and older. Tax relief relative to taxable income for these taxpayers decreases by between 0.09 per cent and 0.48 per cent.

5.5 Limitations of the study and areas for further study

The data analysed takes into consideration taxpayers who pay any portion of the medical scheme contribution themselves. It excludes taxpayers whose medical aid contributions are fully subsidized by their employer and taxpayers with income below the taxable income threshold since they are not obliged to submit ITR12. These taxpayers are classified as low-income earners. Hence, the results from our analysis may not be generalized to the South Africa income-earners population. Using this data, we can only make conclusions for a portion of taxpayers registered with medical aid schemes and appearing in the tax database. As Humbelin and Farys (2016) observe, the major limitation of using tax databases for such analyses is that the unit of account is a tax unit that is subject to tax assessment as opposed to real households. As such, there is a tendency to overestimate inequality.

Though the dataset hosts rich income information for taxpayers, there is no data on the actual medical aid contributions for each taxpayer. Hence, we estimated medical aid contributions across taxable income groups using medical aid contributions paid on behalf of an employee (source code 3810 in the database). In addition, the number of taxpayer dependants on medical aid and the duration a taxpayer contributes to medical aid in a given tax year are not explicitly available in the dataset. This information is ideal for a better understanding of the impact of the credit system on inequality. The database has MTC data from 2014 to 2018. No data is available for medical deductions from 2011 to 2013. Hence, to compare the deduction system to the credit system, we used the capped MTC and AMTC values for 2014 to 2018 as proxies for the medical tax deduction system. We are aware that the calculation of additional medical expenses is different under the two systems and the capped deduction is lower under the credit system than it would be under the deduction system, but due to unavailability of data for the medical deductions period we used available data in our calculations.

6 Discussions and conclusions

One of the main objectives of shifting from the deductions system to the credit system was to address financial inequalities where the deductions system favoured high-income earners over low-income earners. Looking at tax relief as a percentage of taxable income, we find that low-income earners with medical cover are at an advantage under the credit system.

However, the number of taxpayers who subscribe to medical aid as indicated by capped MTC>0 in our database is quite low for low-income earners as compared to middle- to upper-income earners. The few low-income earners subscribing to medical schemes tend to have fewer

dependants on medical aid, which negatively affects their capped MTC. In addition, our data shows that AMTC is claimed mainly by middle- to high-income earners. The bulk (average 75 per cent) of the taxpayers who claim AMTC have taxable income between ZAR150,000 and ZAR500,000. Comparing the percentage of taxpayers who claim capped MTC to those who claim AMTC, we find that fewer individuals claim AMTC. This can be partially attributed to low expenditure by low and middle taxable-income taxpayers on additional medical expenses due to a negative income elasticity to pay OOP for medical services not covered by medical aid schemes. For upper taxable income categories (ZAR500,000 plus), it may be due to the difficulty in accumulating qualifying additional medical expenses to the levels necessary to satisfy the 7.5 per cent of taxable income standard.

Tax relief under the credit system for low-income earners (<ZAR20,000) is greater than their tax liability and hence reduces their tax liability to zero. The credit system therefore partially achieved one of its objectives of equity and proportionality through increased tax relief for lower-income taxpayers. However, the fact that the MTC is non-refundable still favours high-income earners since their tax lability is always greater than MTC. Additionally, they can afford to increase their MTC by increasing AMTC. According to the National Treasury (2011) discussion document, a Risk Equalization Fund has been proposed, which would be part of the national health insurance (NHI) reform. This would, in future, expand the scope to allow for a refundable tax credit benefit to those who fall below the tax threshold and those who qualify for credits that exceed their tax liability. However, to realize maximum benefit of MTC (refundable or non-refundable), there is a need to promote access to medical scheme membership for low-income earners. According to the tax data available, there are very few low-income (<ZAR100,000 taxable income) earners who currently subscribe to medical aid schemes (average 8 per cent). Another cause of concern is that the credit system does not benefit high-income earners aged 65 years and older as they pay more tax under the credit system.

From the Lorenz curves analysis, we observe very insignificant changes in the reduction of the inequality gap across the years. This persistency of the inequality gap may point to the neutrality of the MTC with regards to closing the inequality gap. This finding may be related to the design of the credit, wherein an equal amount is given to taxpayers regardless of the amount paid (or type of cover—whether open schemes or restricted schemes) as well as the duration of membership. The inequality gaps associated with AMTC, as shown by the Lorenz plots in Figure 8, appear to be declining over the years. Using the decomposition of marginal effects, we observe that MTC does not show much variation and presents an equalizing effect. AMTC on the other hand exhibits greater inequality but favours the poor. Tracing the redistributive effects, we confirm progressivity of the post-credit tax system.

We analysed the impact of MTC using detailed individual tax return data. Our work extends earlier research and introduces several new results. Chief among the new results in our findings is the profile of taxpayers who benefit from the credit system. A general decrease in low-income earners who claim capped MTC and AMTC is observed, while an increase is observed for the middle- to high-income earners. A large percentage of taxpayers benefiting from the tax credit system are in the middle to upper-middle taxable income categories. Researchers like Moosa (2016) used hypothetical data to give an overview of how the MTC system compares to the deduction system in South Africa. Results from our analysis using actual tax return data show that capped MTC and AMTC cannot be generalized to a fixed value across taxable income groups as they tend to increase as the taxable income increases. In conclusion, we found that the MTC system has a small but generally progressive effect across the income spectrum of South African taxpayers. Moving towards a refundable tax rebate system and promoting access to medical scheme membership for low-income earners may add to the current progressivity of the system. Further exploration of the

dataset when given the opportunity will lead to further research questions, with a possibility of further tracing socio-demographic effects as permitted by the data.

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Appendix A

Table A1: Medical aid tax codes

Code	Description
3810	Medical aid contributions paid on behalf of an employee. Code 3860 must be used for foreign service income. Appears in the IRP5 Form only.
4005	Total medical contributions made by a taxpayer and/or an employer to a medical scheme. Appears in the ITR12 form only.
4116	Medical aid credit against taxes owed by a taxpayer based on the taxpayer's contribution to the medical aid.
4120	Additional medical scheme fees credit.
4493	Medical subsidies from former employer.
4020	Medical expenses paid by the taxpayer that were claimed from the medical aid scheme and not covered by the scheme. This amount is reflected in the tax certificate issued by medical schemes as claims not covered by the scheme. Physical impairment and disability excluded.
4034	Any qualifying medical expenses paid by the taxpayer not claimed from any medical scheme and not reflected on any medical scheme certificate. Physical impairment and disability excluded.
4022	Any qualifying physical impairment expenses paid by the taxpayer and not recovered from any medical scheme(s) and not included in any of the codes above.
4023	Qualifying disability expenses paid by the taxpayer for the taxpayer and qualifying** dependants not recovered from any medical scheme and not included in any expenses claimed above

Source: authors' illustration based on IRP5 and ITR12 templates

Table A2: Medical tax deductions (2011 & 2012) and credits (2013 onwards) calculated based on number of dependants in ZAR

			Number of dependents									
Year	First two members	Third dependent and above	0	1	2	3	4	5	6	7	8	9
2011	670	410	8,040	16,080	21,000	25,920	30,840	35,760	40,680	45,600	50,520	55,440
2012	720	440	8,640	17,280	22,560	27,840	33,120	38,400	43,680	48,960	54,240	59,520
2013	230	154	2,760	5,520	7,368	9,216	11,064	12,912	14,760	16,608	18,456	20,304
2014	242	162	2,904	5,808	7,752	9,696	11,640	13,584	15,528	17,472	19,416	21,360
2015	257	172	3,084	6,168	8,232	10,296	12,360	14,424	16,488	18,552	20,616	22,680
2016	270	181	3,240	6,480	8,652	10,824	12,996	15,168	17,340	19,512	21,684	23,856
2017	286	192	3,432	6,864	9,168	11,472	13,776	16,080	18,384	20,688	22,992	25,296
2018	303	204	3,636	7,272	9,720	12,168	14,616	17,064	19,512	21,960	24,408	26,856
2019	310	209	3,720	7,440	9,948	12,456	14,964	17,472	19,980	22,488	24,996	27,504

Note: 2011 & 2012—medical tax deductions. 2013 onwards—medical tax credits. This table shows total medical tax deductions and credits up to nine dependants. We use the amount for nine dependants as the cut-off point for ten plus dependants.

Source: authors' calculations based on SARS annual tax pocket guides.

Appendix B: Tax relief deduction system versus credit system

Table B1: Average tax relief in ZAR under 65 years of age by income group, 2015 to 2018

Taxable income	Average tax relief (ZAR) deduction system				Average tax relief (ZAR) credit system			
	2015	2016	2017	2018	2015	2016	2017	2018
A: <0	0	0	0	0	0.00	0.00	0.00	0.00
B: = 0	0	0	0	0	0.00	0.00	0.00	0.00
C: 1–20,000	809.27	1,125.43	1,175.60	1,220.29	1,800.09	1,800.09	1,800.09	1,800.09
D: 20,001–30,000	1,199.98	1,305.02	1,502.66	1,728.12	2,282.28	3,347.21	3,347.21	3,347.21
E: 30,001–40,000	1,527.90	1,710.08	1,741.63	1,626.53	2,849.51	4,512.82	4,512.82	4,512.82
F: 40,001–50,000	1,513.53	1,471.30	1,627.17	1,812.90	3,566.12	3,964.50	3,964.50	3,964.50
G: 50,001–60,000	1,562.41	1,568.80	1,875	1,763.45	3,608.92	4,271.40	4,271.40	4,271.40
H: 60,001–70,000	1,431.23	1,394.78	1,588.26	1,615.93	3,851.52	4,222.06	4,222.06	4,222.06
I: 70,001–80,000	1,480.67	1,476.30	1,478.21	1,594.26	2,492.17	3,060.49	3,060.49	3,060.49
J: 80,001–90,000	1,459.02	1,540.85	1,563.97	1,559.29	3,225.09	3,869.98	3,869.98	3,869.98
K: 90,001–100,000	1,655.04	1,626.94	1,677.19	1,642.49	4,288.50	4,216.59	4,216.59	4,216.59
L: 100,001–110,000	1,993.51	2,007.23	2,040.66	1,996.32	5,253.59	5,248.83	5,248.83	5,248.83
M: 110,001–120,000	2,472.08	2,449.36	2,483.28	2,460.51	6,100.30	5,894.46	5,894.46	5,894.46
N: 120,001–130,000	3,672.73	3,643.32	3,686.72	3,700.59	6,868.23	6,690.69	6,690.69	6,690.69
O: 130,001–140,000	3,423.30	3,390.18	3,433.01	3,384.71	7,430.68	7,412.90	7,412.90	7,412.90
P: 140,0001–150,000	3,874.51	3,843.76	3,882.18	3,838.63	7,749.67	7,814.49	7,814.49	7,814.49
Q: 150,001–200,000	4,690.39	4,684.01	4,741.02	4,667.97	8,961.28	8,752.72	8,752.72	8,752.72
R: 200,001–250,000	6,171.40	6,058.26	6,108.34	6,038.80	10,274.01	9,806.23	9,806.23	9,806.23
S: 250,001–350,000	6,232.67	6,172.06	6,219.42	6,148.46	11,243.29	11,110.66	11,110.66	11,110.66
T: 350,001–500,000	6,641.19	6,496.77	6,408.00	6,306.43	12,827.04	12,599.47	12,599.47	12,599.47
U: 500,001–750,000	5,785.01	5,813.06	5,814.51	5,686.41	14,491.61	14,877.78	14,877.78	14,877.78
V: 750,001–1,000,000	5,193.42	4,946.12	4,996.10	5,135.90	17,386.97	16,913.01	16,913.01	16,913.01
W: 1,000,001–2,000,000	2,471.86	2,569.64	2,624.68	2,856.70	25,770.43	25,337.04	25,337.04	25,337.04
X: 2,000,0001–5,000,000	2,572.09	2,717.12	2,847.51	3,063.53	47,520.40	50,267.46	50,267.46	50,267.46
Y: 5,000,001 +	2,746.43	2,905.06	2,695.66	3,274.43	56,261.81	59,323.58	59,323.58	59,323.58

Source: authors' calculation based on tax administrative data.

Table B2: Average tax relief in ZAR over 65 years by income group, 2015 to 2018

Taxable income	Average tax relief (ZAR) deduction system				Average tax relief (ZAR) credit system			
	2015	2016	2017	2018	2015	2016	2017	2018
A: <0	0	0	0	0	0	0	0	0
B: = 0	0	0	0	0	0	0	0	0
C: 1–20,000	1,078.02	1,408.23	1,307.18	1,582.95	1,800.09	1,800.09	1,800.09	1,800.09
D: 20,001–30,000	1,639.93	1,878.93	1,800.97	2,057.10	2,761.82	4,025.62	3,969.48	4,500.09
E: 30,001–40,000	2,194.47	2,224.66	2,392.69	2,305.18	3,786.92	4,285.60	5,352.03	4,972.42
F: 40,001–50,000	2,180.61	2,315.73	2,176.68	2,447.80	3,548.42	4,485.63	3,804.72	5,571.57
G: 50,001–60,000	2,590.28	2,409.90	2,500.89	2,674.99	5,033.61	4,255.55	4,961.84	5,915.98
H: 60,001–70,000	2,378.51	2,574.07	2,526.86	2,646.03	4,248.25	5,416.84	5,418.77	6,012.04
I: 70,001–80,000	2,914.74	2,809.18	2,891.47	3,051.01	3,965.16	3,137.03	3,501.65	4,383.22
J: 80,001–90,000	3,141.29	3,079.68	3,176.79	3,291.20	5,934.88	5,249.03	5,562.02	6,122.85
K: 90,001–100,000	3,348.84	3,387.37	3,740.01	3,552.59	6,586.07	6,625.25	8,503.66	7,471.96
L: 100,001–110,000	3,837.51	3,856.85	3,912.21	3,935.37	7,728.28	7,612.33	7,841.46	7,986.52
M: 110,001–120,000	3,966.42	4,020.46	4,155.57	4,431.17	5,671.88	5,871.49	6,670.59	8,183.31
N: 120,001–130,000	5,192.00	5,292.66	5,355.82	5,409.40	5,837.13	6,266.94	6,675.13	6,860.51
O: 130,001–140,000	5,110.03	5,038.29	5,035.40	5,109.56	6,622.83	6,235.08	6,229.85	6,608.32
P: 140,0001–150,000	5,674.23	5,693.98	5,686.73	5,677.79	6,925.46	7,182.00	7,332.86	7,321.97
Q: 150,001–200,000	7,536.58	7,439.53	7,429.36	7,429.52	10,359.18	9,843.45	10,055.04	10,235.06
R: 200,001–250,000	10,377.89	10,358.02	10,456.15	10,472.44	14,856.49	14,941.34	15,956.94	16,376.18
S: 250,001–350,000	12,728.80	12,774.03	13,024.05	13,150.33	18,068.53	18,462.91	19,964.97	20,804.25
T: 350,001–500,000	16,563.37	16,654.32	17,025.50	17,223.13	20,384.16	21,117.82	23,130.12	24,360.48
U: 500,001–750,000	21,277.87	21,464.93	21,895.77	22,186.05	23,108.61	24,053.23	26,086.15	27,537.06
V: 750,001–1,000,000	28,764.10	29,040.10	29,470.52	29,965.85	25,627.88	26,790.43	28,641.00	30,658.39
W: 1,000,001–2,000,000	35,655.33	36,008.19	36,553.92	37,091.76	28,433.76	29,871.56	32,127.95	34,298.41
X: 2,000,0001–5,000,000	45,580.43	45,888.34	46,267.48	47,052.15	33,434.69	34,771.17	36,509.70	39,558.75
Y: 5,000,001 +	55,800.19	55,828.76	56,673.93	56,205.19	36,577.11	37,102.24	40,306.92	39,403.99

Source: authors' calculations based on tax administrative data.

Table B3: Average tax relief as a percentage of taxable income under 65 years of age by income group, 2015 to 2018

Taxable income	Average tax relief as a percentage of taxable income deduction system				Average tax relief as a percentage of taxable income credit system			
	2015	2016	2017	2018	2015	2016	2017	2018
A: <0	0	0	0	0	0	0	0	0
B: = 0	0	0	0	0	0	0	0	0
C: 1–20,000	8.09	11.25	11.76	12.20	18.00	18.00	18.00	18.00
D: 20,001–30,000	4.80	5.22	6.01	6.91	8.77	10.85	16.75	18.00
E: 30,001–40,000	4.37	4.89	4.98	4.65	7.74	11.58	12.46	10.93
F: 40,001–50,000	3.36	3.27	3.62	4.03	7.15	7.04	9.17	12.04
G: 50,001–60,000	2.84	2.85	3.41	3.21	6.27	6.74	10.20	9.05
H: 60,001–70,000	2.20	2.15	2.44	2.49	5.94	5.75	7.81	7.95
I: 70,001–80,000	1.97	1.97	1.97	2.13	2.16	1.81	1.70	2.55
J: 80,001–90,000	1.72	1.81	1.84	1.83	3.49	3.62	3.50	3.38
K: 90,001–100,000	1.74	1.71	1.77	1.73	4.53	4.18	4.39	4.20
L: 100,001–110,000	1.90	1.91	1.94	1.90	5.10	4.96	5.07	4.85
M: 110,001–120,000	2.15	2.13	2.16	2.14	5.21	5.02	5.22	5.10
N: 120,001–130,000	2.94	2.91	2.95	2.96	5.42	5.18	5.42	5.39
O: 130,001–140,000	2.54	2.51	2.54	2.51	5.46	5.34	5.52	5.30
P: 140,0001–150,000	2.67	2.65	2.68	2.65	5.38	5.36	5.64	5.50
Q: 150,001–200,000	2.68	2.68	2.71	2.67	5.08	5.05	5.37	5.26
R: 200,001–250,000	2.74	2.69	2.71	2.68	4.52	4.34	4.68	4.67
S: 250,001–350,000	2.08	2.06	2.07	2.05	3.70	3.67	3.87	3.85
T: 350,001–500,000	1.56	1.53	1.51	1.48	3.00	2.95	3.00	3.01
U: 500,001–750,000	0.93	0.93	0.93	0.91	2.32	2.38	2.45	2.45
V: 750,001–1,000,000	0.59	0.57	0.57	0.59	1.99	1.94	2.01	2.11
W: 1,000,001–2,000,000	0.17	0.17	0.19	0.20	1.72	1.70	1.65	1.57
X: 2,000,0001–5,000,000	0.08	0.08	0.08	0.09	1.36	1.44	1.54	1.57
Y: 5,000,001 +	0.05	0.06	0.06	0.06	1.13	1.19	1.39	1.31

Source: authors' calculations based on tax administrative data.

Table B4: Average tax relief as a percentage of taxable income over 65 years of age by income group, 2015 to 2018

Taxable income	Tax relief as a percentage of taxable income deduction system				Tax relief as a percentage of taxable income credit system			
	2015	2016	2017	2018	2015	2016	2017	2018
A: <0	0	0	0	0	0	0	0	0
B: = 0	0	0	0	0	0	0	0	0
C: 1–20,000	10.78	14.08	13.07	15.83	18.00	18.00	18.00	18.00
D: 20,001–30,000	6.56	7.52	7.20	8.23	11.05	16.10	15.88	18.00
E: 30,001–40,000	6.27	6.36	6.84	6.59	10.82	12.24	15.29	14.21
F: 40,001–50,000	4.85	5.15	4.84	5.44	7.89	9.97	8.45	12.38
G: 50,001–60,000	4.71	4.38	4.55	4.86	9.15	7.74	9.02	10.76
H: 60,001–70,000	3.66	3.96	3.89	4.07	6.54	8.33	8.34	9.25
I: 70,001–80,000	3.89	3.75	3.86	4.07	5.29	4.18	4.67	5.84
J: 80,001–90,000	3.70	3.62	3.74	3.87	6.98	6.18	6.54	7.20
K: 90,001–100,000	3.53	3.57	3.94	3.74	6.93	6.97	8.95	7.87
L: 100,001–110,000	3.65	3.67	3.73	3.75	7.36	7.25	7.47	7.61
M: 110,001–120,000	3.45	3.50	3.61	3.85	4.93	5.11	5.80	7.12
N: 120,001–130,000	4.15	4.23	4.28	4.33	4.67	5.01	5.34	5.49
O: 130,001–140,000	3.79	3.73	3.73	3.78	4.91	4.62	4.61	4.90
P: 140,0001–150,000	3.91	3.93	3.92	3.92	4.78	4.95	5.06	5.05
Q: 150,001–200,000	4.31	4.25	4.25	4.25	5.92	5.62	5.75	5.85
R: 200,001–250,000	4.61	4.60	4.65	4.65	6.60	6.64	7.09	7.28
S: 250,001–350,000	4.24	4.26	4.34	4.38	6.02	6.15	6.65	6.93
T: 350,001–500,000	3.90	3.92	4.01	4.05	4.80	4.97	5.44	5.73
U: 500,001–750,000	3.40	3.43	3.50	3.55	3.70	3.85	4.17	4.41
V: 750,001–1,000,000	3.29	3.32	3.37	3.42	2.93	3.06	3.27	3.50
W: 1,000,001–2,000,000	2.38	2.40	2.44	2.47	1.90	1.99	2.14	2.29
X: 2,000,0001–5,000,000	1.30	1.31	1.32	1.34	0.96	0.99	1.04	1.13
Y: 5,000,001 +	1.12	1.12	1.13	1.12	0.73	0.74	0.81	0.79

Source: authors' calculations based on tax administrative data.