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# *Income Tax Progressivity and Income Inequality: the Case of Payroll Tax with Evidence from Ethiopia*

**SUMMARY:** This research is intended to assess the progressivity of payroll tax in respect to employment income inequality. The research is based on only ten years' data on payroll income. Over time, the primary data were obtained using a systematic random sampling technique from nine different organisations. Qualitative data were analysed with descriptive tools and simple regression analysis, while the comparison between the marginal tax rate and the average tax rate, and the computation of the Suits Index and the Gini coefficients from the Lorenz curves were applied for the quantitative analysis. As a result, we found that the payroll tax was significantly progressive, but eventually declined after the 6th tax bracket. On the other hand, the varying and higher values of the Gini coefficient for different organisations show higher income inequalities before tax. Moreover, in comparison with other nations the tax rate appears less redistributive, reducing the value of the Gini coefficient only slightly. In addition, the prevailing level of inflation was found to reduce the exemption thresholds and the width of the tax brackets, while pushing income to higher brackets. Therefore, the skill gap among employees needs to earn fair payment that would be subjected to tax rate compatible with inflation. Lastly, preferential tax rates should be applied on employment income to ensure fair income distribution among households earning income from different sources and encourage labour intensive industries to ensure social, political and economic stability across the nation.<sup>1</sup>

**KEYWORDS:** Income inequality, progressivity of the tax rate, Gini coefficient, Suits Index.

**JEL CODES:** H00, H20, H24

Rising income inequality has been a growing concern for policy-makers in many economies. One of the fiscal policy tools governments rely on to correct income inequality is income tax with a progressive structure (Yohannes and Sisay, 2009; Roach, 2003; Norregaard, 1990). Thus, governments seek not only to increase tax revenues, but they also strive to achieve a fair and equitable income distribution among citizens, which remains a daunting,

if not impossible, task (Hyman, 2011). For instance, the inevitable globalisation process and technological changes pose a tremendous pressure on unskilled wage by highly favouring qualified professionals, leading to accelerated structural changes in the labour market. In addition, the currently prevailing high unemployment rate in most developing countries, the aftermath of the financial crisis in many advanced economies, the rapid income growth among the rich few and the social unrest in the Middle East have also contributed to increasing income

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disparities (Bastagli, Coady and Gupta, 2012). Furthermore, tax reforms aimed at reducing the level and progressivity of the tax system combined with minimising lavish government spending have widened the gap between families as well as inter-regional income (Slemrod, 1996).

Gradually, taxation has become the focus of attention for governments, scholars and researchers as a major tool of fiscal policy, for several reasons. To begin with, its primary and explicit objective in many countries is to raise revenues for governments to finance the supply of public goods and services. In terms of consumption, these goods and services are non-exclusionary and non-rivalrous in nature, and thus difficult to obtain in the competitive market. Secondly, tax plays a vital role in reducing income inequality among citizens as higher taxable incomes are subject to increasing average tax rates. This conforms to the ability to pay principle and promotes income redistribution, and therefore it is a desirable objective of taxation both from an equality and a stabilisation point of view (Hyman, 2011). However, payroll tax is thought to be unfair for it threatens labour intensive firms rather than capital intensive companies, inflating the price of products through increasing wages and salaries. Thus, the increasing cost of production stemming from the imposition of payroll taxes is claimed to hinder growth and distort fair competition in domestic and export markets alike (SWAOFM, 1999).

### Justifications of the study and research hypotheses

The Ethiopian government has taken steps to modernise the tax system in different reform strategies. For instance, the effort taken in formulating legislation to improve identified weaknesses in both direct and indirect taxes

increased its fairness and equitability by reducing the tax rate, while broadening the tax base allowed for maximum revenue collection. In addition, the rate structure has become progressive as a result of applying a higher rate on higher taxable income (FDRE, 2002). Secondly, the administration has been restructured by way of mergers and the enforcement of a relative autonomy to facilitate efficient and effective compliance. Thirdly, it endeavours to improve the skill and knowledge of human resources through training existing staff members and hiring skilled professionals. In addition, compliance costs were reduced by the application of simplified procedures combined with the use of appropriate technologies, such as the Standard Integrated Government Tax Administration System (SIGTAS), and taking advantage of the Cash Register Machine (CRM).

On the other hand, the income tax law could not tackle the salary/wage structure of a country that changes continuously over time. For example, many international and multinational Non-governmental Organisations (NGOs) pay their employees in foreign currency, while the domestic currency is continuously depreciating; consequently, the gap between payroll incomes has become extremely wide. Similarly, several private enterprises and companies use higher remuneration as a retention tool for skilled and competent professionals in the current competitive and global market. On the other hand, graduated tax rates without a clear justification for both the rate and the width of the brackets remain flat beyond a certain higher limit of taxable income, reducing the progressivity of the tax system. Furthermore, the Ethiopian government has aimed to achieve accelerated sustainable and equitable economic growth as part of its macroeconomic policy objectives under the Growth and Transformation Plan (GTP)

launched in recent years. Therefore, it was planned to attain low and stable inflation as well as foreign exchange rates through encouraging domestic saving and investments which, in turn, was expected to reduce the gap of Balance of Payment (BoP) to stabilise the macro-economic environment (MoFED, 2010).

The volatile inflation rates reported for the last decade have been posing an inevitable pressure on the Ethiopian tax system in general and the payroll tax in particular. This in turn challenges household income by increasing income disparity, as a result of which low income groups will not benefit from economic growth and technological development. The Ethiopian government and non-governmental organisations have revised the payment rates of their employees for a variety of reasons. As a result, the salary of employees will move into higher tax brackets, giving rise to the economic phenomenon known as the *bracket creep*, when brackets are not indexed to inflation. However, the issues associated with rising income inequality and the role of tax in reducing the gap have not yet raised sufficient attention and are yet to be assessed. Therefore, it is important to take a closer look at fairness and the redistributive role of the tax system along with the effect of inflation. This research paper is intended to address these issues.

**Research hypotheses**

There is some vertical difference in the payroll tax rates applied to payroll taxable income, with some exemptions allowed to promote vertical fairness. Therefore, it is necessary to set forth the following three predictive statements or hypotheses, which will be tested against the data obtained and either accepted or rejected regarding their applicability to the prevailing situation.

Null Hypothesis 1 –  $H_0: MTR \leq ATR$ , i.e. the payroll tax rate is not progressive but proportional or regressive.

Alternative Hypothesis 1 –  $H_1: MTR > ATR$ , which implies that the Ethiopian payroll tax rate is progressive.

Null Hypothesis 2 –  $H_0: G_{gross} \leq G_{net}$ , i.e. in this hypothesis, the Ethiopian payroll tax rate has no redistributive effect on the employees’ income.

Alternative Hypothesis 2 –  $H_1: G_{gross} > G_{net}$ , which means that the Ethiopian payroll tax rate has a redistributive effect on income.

Null Hypothesis 3 –  $H_0: G_1 = G_2 = G_3$ , which implies that there is no difference in income inequality in between consecutive years as a result of inflation.

Alternative Hypothesis 3 –  $H_1: G_1 < G_2 < G_3$ , i.e. the redistributive role of the payroll tax is reduced significantly from one year to another as a result of price increases consistent with the inflation of the period under review.

LITERATURE REVIEW

Payroll tax is the direct tax levied on income deriving from employment. It is a personal income tax. “Income is the money-value of the net accretion to one’s economic position between two points of time” (Haig, 1921). Similarly, Henry C. Simon (1938) defined personal income as the algebraic sum of the market value of rights exercised in consumption and the change in the value of the store of property rights between the beginning and the end of the period in question. The introduction of payroll taxes in the tax regimes of countries was related to the expansion of modern capitalism and industrial development. For instance, the United Kingdom introduced an income tax that included a payroll tax in 1799. The current characteristics of the tax took shape after it was gradually merged with National Insurance and a higher progressive rate was applied. Similarly, the Commonwealth introduced the

payroll tax in 1941, and transferred the power to levy to the state governments of Australia in 1971 (OECD, 2013). As Yohannes and Sisay (2009) established, Ethiopia introduced the income tax law in 1944, which went through gradual changes before it reached its current state with the application of the progressive tax rate.

Different individuals or groups bear the economic incidences of tax burden based on the possibility to shift the statutory burden of that particular tax to others (Slemrod, 1996). Moreover, business communities claim that the payroll tax is a tax imposed on their job, rather than a tax levied on employees and their wages. This is because the increase in wages raises the tax burden of employers and consequently, the cost of production also rises. This argument claims that the abolition of payroll taxes would allow businesses to increase employment, which in turn would raise the level of aggregate employment (SWAOFM, 1999).

Based on rate structure, taxes can be classified into three categories:

- proportional,
- progressive and
- regressive.

The progressivity of taxation usually starts with proportional tax where all taxpayers share tax liabilities in equal proportions. This does not necessarily mean that the taxable income is subjected to a flat rate; it is rather that the average tax rate remains unchanged from lower to higher taxable incomes. From this point of view, the progressive tax is not simply an increasing tax rate schedule applied to increasing income. More precisely, a system is said to be progressive when the average tax rate is increasing in function of taxable income. This can be clearly demonstrated by using a mathematical equation or as a measure of elasticity of the tax rate

$$\frac{\Delta T}{\Delta Y} = \frac{dT/T}{dY/Y}$$

with respect to income as;

$$\frac{\Delta T}{\Delta Y} > 1 \Leftrightarrow \frac{dT/T}{dY/Y} > 1,$$

or

$$\frac{MTR}{ATR} > 1 \Leftrightarrow MTR - ATR > 0.$$

This implies that the tax rate is progressive when the marginal tax rate (*MTR*) is greater than the average tax rate (*ATR*). On the other hand, the tax rate can be considered proportional when *MTR* is equal to *ATR*, and regressive when *MTR* is less than *ATR*. This can be further expressed mathematically where *dT/dY* represents the marginal tax rate and *t(Y)* is also the average tax rate. Therefore, the tax system is known as progressive if *dT/dY* > *t(Y)*, proportional if *dT/dY* = *t(Y)*, and regressive when *dT/dY* < *t(Y)* (Norregaard, 1990).

The overall progressivity of a tax system can be approached in three main ways based on the distribution of the tax burden. These approaches are:

- the benefit approach,
- the ability to pay principle and
- the utilitarian principle.

Neither approach is fault-free in practical application. Firstly, the benefit principle is a concept linking the tax burden to the public goods and services that taxpayers receive from government. This is an effective means to avoid the problem of free riders through the application of user fees in relation to the use of public goods, or the assignment of specific charges to a particular economic activity. For example, levying a specific tax rate on gasoline consumption can be associated with the use of public roads. However, this view is challenged on the grounds of the indivisible, non-exclusionary and non-rivalrous nature of most public goods (Hyman, 2011). Secondly, the utilitarian principle argues that tax burdens should be imposed with a fair distribution of income in mind, in order to maximise social welfare. This is based on the principle that

marginal utility declines after a certain level of consumption. However, this principle is not strong enough to be supported because individuals are not fully satisfied with the amount of wealth they own (Ibid). Thirdly, the ability to pay principle advocates the vertical and horizontal equity of the tax system. This approach seeks to enforce the vertical fairness of the tax burden, so that taxpayers' liability should increase in line with the increase in taxable income. The horizontal equity on the other hand, argues that taxpayers drawing similar taxable incomes should bear a similar tax burden. However, it is not easy to measure the real capacity of taxpayers due to various reasons both vertically and horizontally. For example, the asset holdings of individuals can be very different due to their intrinsic and undiscovered background. Similarly, the number of dependents supported by the taxpayers cannot be similar. Furthermore, measuring the ability to pay cannot be separated from the problem of subjective judgment (Bentley, 2005).

Normally, taxes affect both the supply and demand sides of the market. As all other taxes, payroll taxes increase the cost of production, prompting producers to reduce their output, and hence influence fair competition in the market. Thus, in order to remain profitable, employers tend to reduce their net payment either by reducing the number of employees or lowering the wages of their workers. On the other hand, tax has a direct or an indirect impact on how employees choose between working and leisure time. Therefore, the progressivity of the payroll tax depends on the elasticity of the labour market. If it is relatively elastic, i.e. employees can make some alternative decisions about the amount of time they work based on their net pay for the hours worked, then the payroll tax should be less progressive (Lamb et. al, 2005).

A fair tax ensures horizontal and vertical

equity. Horizontal equity suggests that people with similar economic circumstances and the same taxable capacity should be taxed similarly. Vertical equity, on the other hand, suggests that those with different taxable capacities should contribute with a different amount of tax. Obviously, this is one of the arguments for the ability to pay principle. Furthermore, the idea of optimal taxation seeks to combine both the criteria of efficiency and equity, which may not be possible to achieve at the same time. For instance, the progressive tax might be considered to be equitable but it may distort the efficiency of the labour market and hinder individuals to work more, save and invest (Lamb et. al, 2005). Income inequality is generally understood as the unfair dispersion of earnings at various levels (OECD, 2011). For example, the inequality among groups in the population as a whole include all active and inactive citizens, whereas the inequality in the working age population only accounts for the dispersion of wages in the labour force. On the other hand, the inequality among all workers concerns incomes from employment and self-employed earnings alike. Moreover, the dispersion of wages among workers only explains the inequality of payment in the labour market, while the inequality of disposable income also takes into account the impact of taxes and payment transfers.

By the same token, Bastagli et. al (2012) claim that different tax reforms since the mid-1990s have lessened the generosity of social benefits and the progressivity of income tax regimes, which rendered the fiscal policies of different countries less redistributive. However, the success of such policy measures depends on the apparent trade-off between inflation and unemployment. This phenomenon is captured by what has become known as the Phillips curve (Lamb et. al, 2005).

Inflation is the economic term used to describe the depreciation of money in relation

to the goods and services it will buy. It is the pervasive and sustained rise of the aggregate price level measured by an index expressing the price of certain goods and services. The causes of inflation can be demand pull when demand for goods and services exceeds the existing supply, while the cost push inflation is the pervasive rise of price to cover total expenses and preserve profit margin. Inflation is induced by governments, because the increase in price caused by the expansion of money supply to pay for costs of public goods and services reduces the purchasing power of money held by the public. This reduction of the real value of money is called the inflation tax (Hyman, 2011).

Inflation is no longer seen as a temporary aberration concerning only a few irresponsible countries, but it has rather become a more serious and universal current economic event. Inflation-induced, undesired price changes of goods and services in the market affect the overall tax system in general and the income tax in particular, in many ways, of which we will only mention a few. As the real value of income changes, it affects the assessment of the tax base. In addition, as no one can clearly understand the interaction between inflation and taxation, taxpayers are left to suffer from increased tax burden and reduced disposable income. Moreover, inflation reduces the real progression of the tax as the economic value of the exemptions, deductions, credits and rackets to which the rates apply. This increases the number of taxpayers seeking to evade tax, which puts a strain on the tax administration and fosters tax evasion (Tanzi, 2008). Therefore, governments facing such inflation-related, undesired distortion of the income tax structure can react in three basic ways, depending on its level and nature. Firstly, it is preferable to take no action when the rate of inflation is relatively low and its effect is limited. Secondly, it is advisable that govern-

ments introduce periodic and discretionary adjustments in order to neutralise more severe distortions. Finally, there is an option to take more permanent action through an automatic adjustment scheme, what is referred to as indexation (Ibid).

Different countries levy a combination of taxes in varying progressivity levels. For instance, in the United States the central and the state governments levy some taxes in common, while imposing other, specific taxes independently. Among the taxes imposed in the USA, the Federal Excise Tax, Federal Social Insurance and the state and local sale taxes are regressive, while the relative level of progressivity increases from the Federal Income Tax through the Federal Corporate Tax to the Federal Estate Tax, rendering the overall tax in the country slightly progressive (Roach, 2003). The tax revenues generated from payroll earnings now account for a considerable part of the GDP and tax revenues of different countries. For example, the Australian government rely heavily on the payroll tax revenue that made up 38.5% of South New Wales Treasury (SNW) in 1986/87, even though by 1995/96 it was reduced to 25% (SWAOFM, 1999). Similarly, data computed from the unpublished report of the Ministry of Finance and Economic Development (MoFED) indicated that the contribution of personal income tax – also known as the payroll tax – ranged between 20.46% and 39.18%, and thus remained the second largest contributor of all national direct taxes besides business profit taxes, which contributed to direct tax revenues by 40.73% to 74.13% in the period. According to the data referred to above, on average, payroll and business profit taxes comprise 30.50% and 55.80% of national direct taxes, respectively (MoFED, 2010).

Different countries have different levels of income inequality before and after tax, although what essentially matters for household

spending is the level of disposable income. For example, the Gini Index of income before tax was found to be lower than 30% in several Eastern European and Nordic countries, while the value registered in Italy and Greece did not even reach 20% in the mid-2000s. However, the Gini Index exceeded 30% in a few countries, such as Estonia, Poland, Israel, the United Kingdom and the United States and the average for OECD countries was about 28%, while the Gini Index as a measure of income inequality after tax was about 25% lower than income inequality before tax (OECD, 2012).

Accordingly, the moderation of income inequality observed in after tax income compared to income before tax is due to the progressivity of the tax rate structure, i.e. the income earned by higher income groups was intended to be redistributed to the lower income groups. In addition, the tax revenue collected from the higher income group would be redistributed as government expenditure to, or in favour of, the low income groups as a supply of public goods and services, which reduces income disparity and ensures the fair distribution of resources (Slemrod, 1996). Most of the redistributive impact of the fiscal policy was achieved through a combination of the expenditure side of budget and transfers, with income taxes also playing an important role. On the other hand, the redistributive role of fiscal policy in African and Asian developing countries is restricted by lower tax levels and transfers (Bastagli, Coady and Gupta, 2012). Nonetheless, household income inequality and inter-regional disparity have been growing at an increasing rate since the mid-1980s. It was reported that the Gini Index of Ethiopia stood at 32.4%, 40.0%, 30.0% and 29.8% in different years under review, recorded in 1982, 1995, 2000 and 2005, respectively (World Bank, 2012).

The market distortion arising from inflation challenges the economy in general and fiscal

policy in particular, and this phenomenon is not limited to Ethiopia; indeed, most African and Asian countries have faced the same problem in recent years (Durevall and Sjö, 2012). However, the inflation rates recorded in different countries vary widely. For example, World Bank data (2012) indicated that the Ethiopian inflation rate has increased rapidly for the last ten years, peaking at 55.3% in 2008, the highest value registered in the 178 countries assessed. Except for a decline observed in two consecutive years – by 8.5% and 8.1% in 2009 and 2010, respectively –, the inflation rate was found, for the most part, to be above 33.2%, ranking second highest next to Belarus with 53.2%. Meanwhile, advanced economies, such as Japan, Thailand, Denmark or Finland, reported inflation rates of less than 3% on average between 2008 and 2011.

Several institutions and researchers noted that Ethiopia had attained rapid and fair economic growth during the last decade. However, inflation, which had been considered to be under control, has become a major economic challenge. As indicated by *Table 1*, Ethiopia has recorded double-digit real GDP growth in recent years, especially in the years between 2004 and 2009, with growth rates doubling those observed in Kenya. However, while the growth rate in Kenya was achieved amid relatively stable inflation rates in the period, the growth in Ethiopia was constrained by high and volatile inflation rates, which embarked on a steady rise in 2005. Initially, there was little and ineffective policy response in this regard until 2009, when the government introduced bank-by-bank credit ceilings to control money supply and firmly peg the foreign exchange rate to the US dollar. As a result, the nominal exchange rate remained stable between 2000 and 2007. Subsequently, the prevailing inflation rate declined; however, this moderation was accompanied by a decline in real GDP growth rates as well. This, in

## GDP GROWTH AND INFLATION RATE IN ETHIOPIA AND KENYA

Country	Variable	Year												Átlag
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Ethiopia	Real GDP growth*	5,9	7,4	1,6	-2,1	11,7	12,6	10,5	11,8	11,2	10	8	7,5	8,01
	Inflation**	0,3	-11,4	-1	23,5	1,7	13	11,6	15,1	55,3	2,7	7,3	36,1	16,53
Kenya	Real GDP growth	0,6	4,7	0,3	2,8	4,6	6	6,3	7	1,5	2,6	5,6	5	3,92
	Inflation	11,8	1,6	4,2	8,3	17,1	4,7	7,3	5,6	15,5	8	4,5	18,6	8,93

\*GDP measured at a constant price, changes in percentages

\*\* Annual inflation in percentages, as at the end of the year

Source: World Development Database (World Bank, 2012)

turn, forced policy-makers to ease the country's monetary policy stance and devalue the domestic currency, whereby inflation started to rise again (IMF, 2011). Nevertheless, the fact that Ethiopia's tax rate structure has been unchanged since 2002 demonstrates that the country's government has failed to take important fiscal policy measures in due course.

On the other hand, the lower income deciles have been more vulnerable to the price rise engendered by continuous and high inflation for about the last ten years in the Ethiopia. This is because poor households spend more than 80% of their family income on food and consumption items, and the cumulative effect of inflation drove consumer prices as high up as 476.61% compared to 2002 as the base year (CSA, 2008). Similarly, according to the International Monetary Fund Report (IMF, 2012), the consumer price index (CPI) measuring the Ethiopian price increase – which has been generally on the rise since 1965 – rose extremely sharply to 223% by 2010 within a period of five years, considering 2005 data as 100%. The report also indicated that average

CPI in Ethiopia peaked at 260.98% in 2009, and is projected to rise further to 375.16% for the year 2015 compared to the base year of 2000. All of these factors rendered the distribution of income among employees and other workers not only unequal, but also inequitable. The adverse effect of growing income inequality has been frequently discussed and pointed out in various studies in the literature, of which this paper cites but a few. In addition, extensive research has been conducted on these topics and the related fields. Whatever the sources and causes of income inequality are, its effects on economic growth or on the fight against poverty in many nations have been assessed by a number of international and national organisations and authors in developed and developing nations, including Ethiopia. Moreover, some papers indicated that Ethiopia attained fast and fair economic growth during the last decade (IMF, 2011). Similarly, numerous scholars and academics have assessed the progressivity level of taxes and income equality in advanced economies. However, none of these studies assessed in-



equality in employees' income and the redistributive role of taxes in Ethiopia, the topics this research aims to address.

## RESEARCH METHODOLOGY

There are different forms of organisations operating in Ethiopia, depending on organisational structure, financial and non-financial resources and the features of payment. Primarily, these formal sectors can be classified into the categories of governmental and non-governmental organisations. Governmental organisations are divided further into organisations providing public services and profit-oriented organisations. Organisations engaged in the provision of public services are those organized at the federal, regional, district or township levels, in line with the levels of administration. These types of public organisations rely on the state treasury for financial and non-financial resources, and as such, they are commonly referred to as the budgetary civil service sector. On the other hand, non-governmental organisations are private profit-oriented business entities generating revenues either from rendering services, or the production of manufactured goods. In addition, some non-governmental organisations are founded as charity or social welfare organisations working for non-profit businesses. Unlike the organisations engaged in public services, governmental profit-oriented and non-governmental organisations do not have an administration-based hierarchical structure.

They all have various payment and remuneration structures. In the case of public organisations providing services, the payment rate increases relatively vertically from district/town to federal level. Furthermore, some NGOs have different rates of provident fund contribution as opposed to the pensions of-

fered by public organisations. Therefore, we intended to analyse the strata from the perspective of these differences.

### Sampling design and size

The essential guiding feature in determining the sample size to be drawn from a population is the extent to which the population is homogeneous. The more homogenous the population is, the less variance we find; hence, small sample sizes can yield precisely accurate results. Thus, variability exists within the data; the degree of accuracy or level of precision needed to be obtained from the available resource determines the sample size to be drawn from a population. Therefore, an optimum sample size can be drawn from a large finite population based on the following equation:

$$n = \frac{Z^2 pqN}{e^2(N-1) + Z^2 pq} \text{ (Kothari, 2004),}$$

where  $n$  is the sample size to be drawn from the total population;  $N$  is the total number of employees taken from the payroll sheets as at January 2013 from nine randomly selected organisations, which was 2,447. The 'e' in the equation represents the level of precision or acceptable error of accuracy, which is estimated to be 95% as the monthly payroll sheet comprises accurate, registered and reliable data; and the value of 'Z' is 1.96 as the standard variance at the given confidence level of 95%.  $P$  stands for sample proportion – experience shows that a sample drawn in the range of 5% to 10% of a consistent and homogenous population yields better results. Employees are also believed to have more similar and consistent awareness on the issues irrespective of the diversity of other opinions. Therefore, the proportion of the sample drawn was taken as 7.5% for acceptable accuracy.

Then,  $q=1-P$  and this implies that  $1-0.075 = 0.925$ . Then,

$$n = \frac{1.96^2(0.075)(0.925)(2447)}{(0.05)^2(2447-1) + (1.96^2)(0.075)(0.925)} = 102$$

The total population was stratified into nine sub-groups based on their organisational and payment structures. The first stratum comprises governmental organisations providing services at the level of the Federal Ministry, from which the Ministry of Finance and Economic Development (MoFED) was randomly selected both for primary and secondary data. Secondly, the regional bureaus represent three strata: the Bureau of Finance and Economic Development (BoFED), the Oromia Bureau of Revenues (OBR) and the Oromia Council and Office of Caffee (OCOC), given that these organisations clearly apply different payment rates. Thirdly, Sululta town administration was selected randomly from numerous district/town level offices providing public services in each region of the nation. Fourthly, Oromia Water Work and Construction Enterprise (OWWCE) was chosen from governmental profit-oriented enterprises. Fifthly, the Consortium of Christian Relief Development Association (CCRDA) was taken to represent the NGO for non-profit organisations. Lastly, the Sululta Branch of Co-operative Bank of Oromia (CBO) and Great Abyssinia Bottled Water Factory were selected from the private profit-making companies as two distinct strata representing service providing and manufacturing businesses respectively. Since each stratum has distribution as indicated by the difference in standard deviation, the sample drawn from the population for the qualitative or primary data should be determined using the following disproportionate equation from each stratum as derived by Kothari, (2004):

$$n_i = \frac{n(n_i \delta_i)}{\sum (N_i \delta_i)},$$

where ' $n_i$ ' represents ' $n_1$ ' to ' $n_9$ ', that is the number of samples to be drawn from each stratum and ' $n$ ' is the total sample size to be drawn from the total target population, which is also denoted by ' $N$ ' and ' $\delta_i$ ' standing for the standard deviation of each stratum.

The selected organisations were assessed using a systematic sampling technique based on the list of employees on the payroll sheet as at January 2013, as arranged in an increasing order and then selected for questionnaires in the intervals of ' $i^{th}$ ' to draw the required number of respondents from each strata. In addition, a purposive sampling method was applied in semi-structured interviews conducted with senior officers and experts on the underlying reasons and assumption in designing the tax laws exclusively in ERCA and MoFED.

### Types and sources of data

The research used both qualitative and quantitative data obtained from primary and secondary sources. The primary data on the consumption patterns of after-tax income – including how the taxpayers are subjected to other indirect taxes and supplementary sources of income – were obtained from the employees currently working for the different organisations. In addition, the methods, techniques and procedures used in designing the tax structure are qualitative data obtained from the senior officials for the assessment.

The secondary data used were mainly quantitative in nature, and were obtained from the source document submitted to the tax authorities as evidence in the reimbursement of withheld tax revenues by the withholding organisations. Therefore, these data were easily collected from the compiled payroll documents at the tax authorities; ERCA through its branches and Oromia Bureau of Revenues (OBR). Some secondary data related to infla-

tion were also obtained from the Ethiopian Central Statistics Agency (ECSA).

### Empirical analysis

The main feature of these data is basic salary – often referred to as taxable employment income –, which is used to compute tax and pension deductions. For the sake of simplicity and their effective consequences in calculating the disposable income, both of these deductions were taken into account as components of the tax system or total deduction. Secondly, the pension fund contributed from the employers is based on the basic salary. On the other hand, gross income includes the pension contributed by employers and some other non-taxable financial allowances. Finally, the net pay calculated as the difference between gross income and total deductions stands for the disposable income of employees. Therefore, the dispersion of these three categories of income was assessed from the secondary data and discussed in this research.

The Ethiopian payroll tax rate structure is known to be progressive. This is because monthly taxable income is classified into brackets of bases to which the increasing tax rate is applied. Secondly, the lower exemption threshold of ETB, 150.00 was allowed for each personal income earner. Unlike advanced western economies, the FDRE tax system does not purely take into account the pension deduction as part of the tax. Similarly, the contribution from employers – which is computed as 8% of the taxable monthly salary and credited as salary and wage expenditures in the employer’s account statement – is a less prominent part of remunerations. Nevertheless, it is clearly important to consider both the contribution and the deduction as part of the payroll tax system, as both have a direct impact on households’ disposable income. We

calculated the *MTR* as the unit value of tax collected per the unit value of the increase in taxable income and the *ATR* as the amount of the tax collected from total earnings. Thus, taking all payments and deductions on the payroll sheet into account, as well as the marginal tax rate,

$$MTR = \frac{\Delta T}{\Delta Y} = \frac{(T_i - T_{i-1})}{(Y_i - Y_{i-1})}$$

for each individual organisation and merging all the data into a single payroll resulted in a similar pattern increasing at the junction point, where the rate of the schedule changes and remains flat, irrespective of the frequency distribution of salary and the size of the organisation. However, there were a few outliers of marginal tax rate values due to provision of non-taxable allowances to a limited number of employees assigned to leadership positions. On the other hand, the average tax rate is the total tax paid out of the total income –  $ATR = T/Y$  – increased as the *MTR* was rising to be flat at 35%.

Gradually, the increasing rate of *ATR* subsided and the rate remained slightly increasing thereafter. As a result of the difference between these two rates,  $MTR - ATR$ , there was a rise and a steady decline between the two ends of a bracket and an abrupt rise at the point of junctions of the next bracket. For example, the difference of 7.34%, 9.40%, 11.15% and 13% was observed immediately after the beginning of the 4<sup>th</sup>, the 5<sup>th</sup>, the 6<sup>th</sup> and the last 7<sup>th</sup> brackets. The rates at which these differences fall gently and rise sharply widened up to the last bracket, and thereafter kept decreasing to levels as low as below 1% for the upper monthly income group. In addition, the lower exemption threshold provided by the tax law is less important, for it is as low as one third of the minimum salary scale set by governmental organisations, and less than one fifth of several private and non-governmental

organisations compared to the data obtained from these organisations.

The output of the regression of the curve estimation in the SPSS summarized the models for taxable income in *Table 2* indicates that  $R^2=0.842$  implies that there is a strong relationship between the parameters: about 84.20% of the value of *ATR* is predicted by taxable income, while the remainder may be influenced by some factors beyond this model. However, for the *MTR*,  $R^2$  is 0.427 indicates that the relationship is weak and only less than 50% of the magnitude of the *MTR* is predicted by taxable income for different reasons, such as the frequency distribution of payment. The difference between these rates –  $MTR-ATR$  – appears strong; indeed,  $R^2 = 0.742$  implies that 74.20% of the value can be estimated from the model. Furthermore, the summary indicated that the logarithmic equations these parameters labelling ‘*X*’ for taxable income as an independent variable, and ‘*Y*<sub>1</sub>’ and ‘*Y*<sub>2</sub>’ representing *ATR* and *MTR* respectively, can be expressed as:

$$Y_1=0.042\log^x-0.12 \Leftrightarrow Y_1=4.2 \times 10^{-2} \log^x-0.12 \dots \text{eg}_1$$

$$\Leftrightarrow Y_1=\log^{x(4.2 \times 10^{-2})}-0.12$$

$$Y_2=0.02\log^x+0.13 \Leftrightarrow Y_2=2 \times 10^{-2} \log^x-0.13 \dots \text{eg}_2$$

$$\Leftrightarrow Y_2=\log^{x(2 \times 10^{-2})}-0.13$$

$$Y_3=-0.022\log^x+0.25 \Leftrightarrow Y_3=-2.2 \times 10^{-2} \log^x+0.25 \dots \text{eg}_3$$

$$\Leftrightarrow Y_3=\log^{x(2.2 \times 10^{-2})}+0.25,$$

where the value of taxable income is ‘*X*’ > 0. Accordingly, it appears that the progressivity of the payroll tax from the lower up to the middle income groups is less than ETB 5,000.00 and continues to be less progressive than the increases in income after this limit. The progressivity of the tax system is diminishing for the payroll income increasing beyond the threshold of the last bracket, while salaries have wide ranges owing to a large variation between the minimum and maximum values at all public and non-governmental organisations.

This shows that the logarithmic functions of *ATR* and *MTR* in respect to taxable income increase at a decreasing rate with positive slopes and domain, as opposed to the exponential functions, which increase at an increasing rate and have a positive range instead (*see Chart 1*). These equations show that the curve of *ATR* is approaching the *MTR* from below, and the slope of the curve remains constant for *MTR* at 0.35 once the value of *X* reaches ETB 5,000.00. Consequently, the curve,  $MTR-ATR$  represented by ‘*Y*<sub>3</sub>’ undulates as well, rising and falling between brackets and increases to about 13% immediately after the taxable income reaches ETB 5,000.00. Thereafter, it eventually declines and approaches the ‘*X*’-axis from above with a negative slope as the taxable income increases. Even the value of *Y*<sub>3</sub> drops below 1% as the values of taxable income increase, implying that the tax rate

Table 2

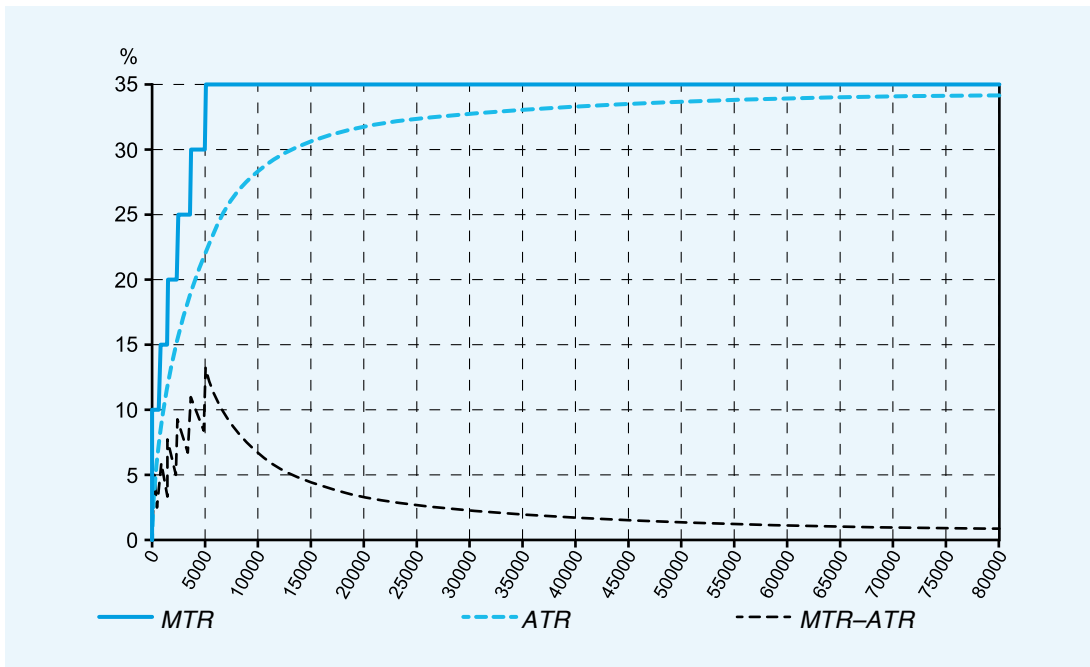
**MODEL SUMMARY FOR THE INDEPENDENT VARIABLE IN LOGARITHMIC EQUATION**

Dependent variables (rates)	R <sup>2</sup>	Constant value	Coefficient (b1)
ATR	0.842	-0.120	0.042
MTR	0.427	0.130	0.020
MTR-ATR	0.742	0.250	-0.022

Source: computed by the authors from data obtained from target organisations

Chart 1

**MTR AND ATR OF THE TARGET ORGANISATIONS' PAYROLL TAX**



Source: computed from the monthly payroll sheets of the target organisations

structure gradually becomes flat or proportional, in contrast with the theory that states that the average tax rate increases in line with the increase in taxable income.

The cumulative distribution of tax paid in each organisation and the consolidated salary computed against the cumulative distribution of taxpayers was found to be different for different populations. The Suits Index of statutory tax and total deductions including the pension subtracted from the employee’s pay check was calculated independently. Different organisations reported different results as computed from Suits Indices for the entire population of the target organisation, as shown on *Chart 2*. The Suits Index is calculated as a ratio comparing the area embedded by the Lorenz curve and the line of perfect proportionality with the total area of the triangle under the line of proportionality. The

Suits Index can be easily computed using the ratio of concentration denoted by ‘A’ to the maximum concentration represented by ‘A+B’ as seen on *Chart 2*, and can be equated as

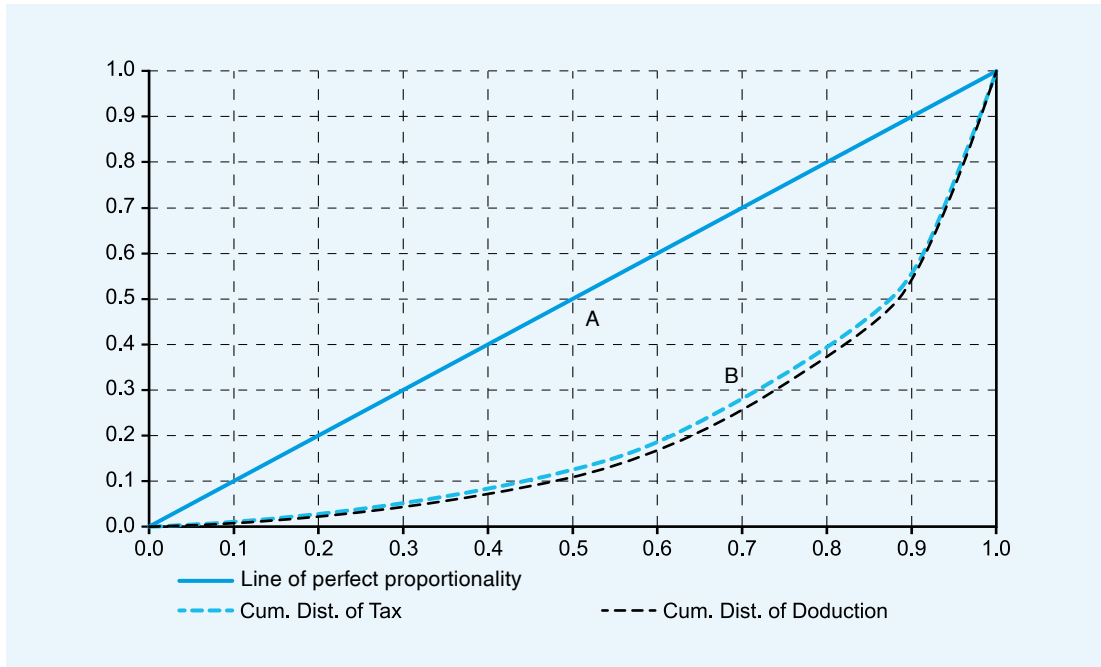
$$S = \frac{A}{A+B}$$

which implies that  $S = 1 - 2B$ , because  $A + B = 0.5$  unit square. It can also be calculated by decomposing the area under the Lorenz curve into a triangle and trapeziums that can be expressed as a series of pair coordinates,  $(P_i, q_i)$  on the Lorenz curve as

$$S = 1 - \sum_{i=1}^n [(q_i + q_{i-1})(p_i - p_{i-1})]$$

where  $(p_i, q_i)$  is a point represented by the coordinate on the Lorenz curve. This is the sum of the series of trapeziums after calculating the cumulative distribution of tax paid by the

**THE LORENZ CURVE OF PAYROLL DEDUCTIONS BY THE TARGET ORGANISATIONS**



Source: computed from target organisations' payroll sheets as at January 2013

deciles for each organisation under review. As an alternative, the Suits Index was computed from the Lorenz curve based on the model summary and parameter estimates obtained from an SPSS computation from the overall consolidated data instance, with the constant value as  $b_0 = 0.152$ ;  $b_2$  and  $b_1$  as  $-1.036$  and  $1.759$ , respectively. Accordingly, the Lorenz curve for the cumulative distribution of tax paid in respect of the taxpayers is derived as the following quadratic equation:

$$L(X) = b_2x^2 + b_1x + b_0$$

Thus,

$$Y = 1.759X^2 - 1.036X + 0.152 \dots \text{eg}_4$$

where 'X' is the cumulative distribution of taxpayers – contextually known as payroll earners –, and 'Y' is the cumulative distribution of the tax paid by the payroll taxpayers. In addition, the summary indicated that  $R^2 = 0.951$  for

total deductions not only confirms that the relationship between these parameters is strong, but also shows that about 95.10% of the model is determined and influenced by the value of the cumulative distribution of the tax paid. Consequently,

$$S = 1 - 2 \int_0^1 (1.759X^2 - 1.036X + 0.152) dX$$

$$S = 1 - 2 \left[ \frac{1}{3}(1.759)X^3 - \frac{1}{2}(1.036)X^2 + 0.152X + C \right]$$

for  $0 < X \leq 1$

$$S = 1 - 2(0.586X^3 - 0.518X^2 + 0.152X)$$

for  $0 < X \leq 1$

$$S = 1 - 2(0.21)$$

$$S = 1 - 0.42$$

$$S = 0.58$$

Similarly, the model summary for the total deduction as computed using SPSS showed that  $R^2 = 0.957$ ,  $b_0 = 0.142$ ,  $b_1 = -0.941$  and

$b_2 = 1.683$ , indicating that the relationship is strong for the pure tax and the equation would be:

$$Y = 1.683X^2 - 0.941X + 0.142 \dots \text{eg}_5$$

$$S = 1 - 2 \int_0^1 (1.683X^2 - 0.941X + 0.142) dX$$

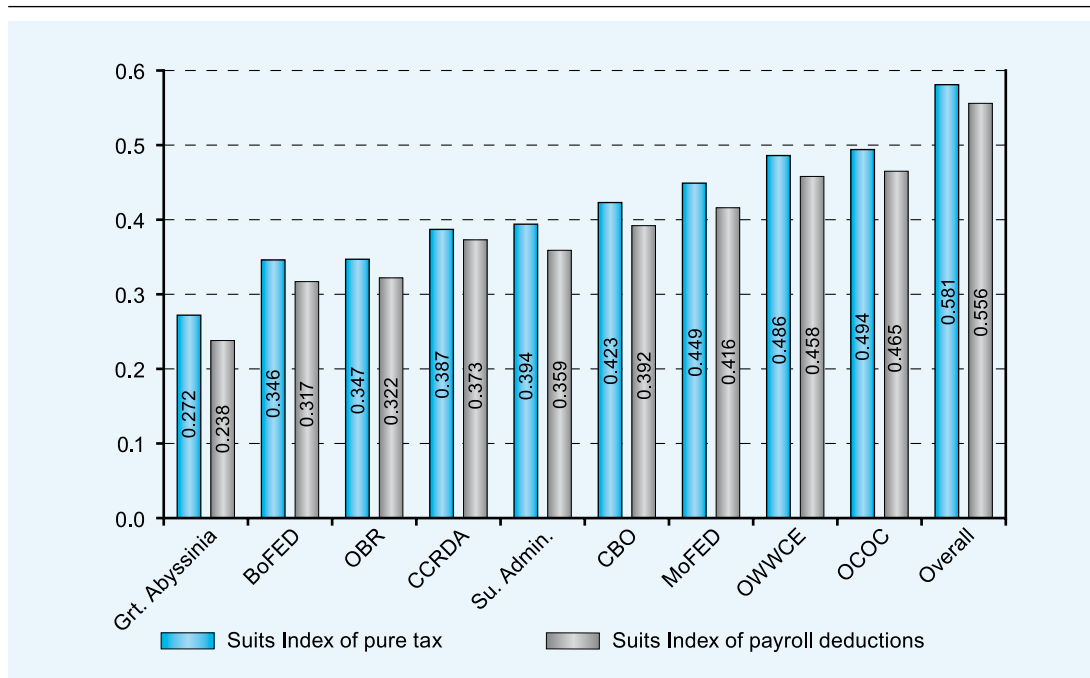
Therefore, the Suits Indices for pure tax and combined payroll deductions as the sum of pure tax and pension deduction from the employee's pay check were calculated in the same manner for each organisation, and the grand total and the results are presented on *Chart 3*. We found that the progressivity of the tax rate structure varies from one organisation to another based on the distribution of the payment structure.

The results of the analysis of the monthly salary income of employees at the organisations under review indicated that the Suits Index of pure tax ranges from 0.272 (for Great Abyssinia)

to 0.494 (for OCOC), reflecting the difference between the payment structures, rather than the tax rate structures, of the organisations concerned. Similarly, the rate structure was assessed for total deductions from payroll income, including pension deductions and contributions, whereby the progressivity of the rate structure dropped to 0.238 and 0.460 respectively for the two organisations mentioned above. Nonetheless, the decline in the Suits Indices from pure tax to total deductions varies from organisation to organisation, ranging between 3.62% (CCRDA) and 12.50% (Great Abyssinia) for pure taxes, compared to the average decline of 7.12%. Similarly, the Suits Index as a measure of progressivity for the grand total of all organisations was calculated as 0.581 and 0.556 for pure tax and total deductions, respectively. Therefore, the value of the Suits Indices both for pure tax and combined deductions suggests that the rate structure is progressive

Chart 3

**SUITS INDEX OF PAYROLL DEDUCTIONS BY TARGET ORGANISATIONS**



Source: computed from target organisations' payroll sheets as at January 2013

to different degrees owing to the difference in the payroll structures of the organisations concerned. For instance, CCRDA has the largest mean monthly salary and the greatest standard deviation shows highly dispersed payment rate structures; however, almost all payments are found within the last tax bracket. Thus the values of the Suits Indices as a measure of progressivity was found higher than OBR, BoFED and Great Abyssinia in sequential order only at the fourth lower level. The lowest Suits Index was recorded for Great Abyssinia, whose payments were concentrated only in two tax brackets: the 3<sup>rd</sup> and the 4<sup>th</sup>, as presented in Table 6, and it has the lowest mean salary and standard deviation among the groups of population.

Moreover, different portions of the deciles contribute to different degrees to the tax collected. For example, the first deciles contributed no more than 1% of the total tax and pension collected from the employees of all organisations; the first 5<sup>th</sup> deciles contributed about 13%, while the last 10<sup>th</sup> deciles pay

as much as 44.10% of the total deductions, whereas the upper 50% of taxpayers provided 87.50%. This indicates that the tax system is progressive in such a way that the upper income group contributes far more than the lower deciles. However, the payment structure of the organisations under review falls within the upper tax bracket mainly as a result of salary adjustments without any change to the tax rate structure, with the higher income group shouldering more of the tax paid. (See Table 3)

### Hypothesis test for the progressivity of the tax rate

The Null Hypothesis of this research assumed that  $MTR \leq ATR$ , which means that the tax rate structure is proportional. However, a comparison of the two means by way of a paired sample t-test resulted in a lower and upper limit of 0.0217766 and 0.0247089, respectively, at a 95% confidence interval of

Table 3

CUMULATIVE DISTRIBUTION OF INCOMES AND TAXES IN DECILES						
Decilis	Cumulative distribution Taxpayers	Cumulative distribution of incomes			Cumulative distribution of taxes	
		Basic salary	Gross income	Net pay	Pure Tax	Total Deduction
1	10.01	1.94	1.94	2.32	0.72	0.97
2	19.98	4.93	4.83	5.81	2.14	2.66
3	30.00	9.00	8.72	10.49	4.33	5.15
4	40.01	13.90	13.42	16.02	7.23	8.41
5	50.02	19.68	18.97	22.45	10.97	12.52
6	59.99	27.46	26.45	30.83	16.79	18.75
7	70.00	37.94	36.62	41.82	25.75	27.91
8	80.02	50.50	48.75	54.67	37.48	39.68
9	89.99	66.23	64.77	70.22	53.91	55.90
10	100.00	100.00	100.00	100.00	100.00	100.00

Source: computed by the authors from the data obtained



the difference. Since the probability of the Z value tested only from the right hand side of the normal curve indicates that the area,  $A=1-2$  (upper value – lower vale) means that  $A=1-2(0.0247089-0.0217766)=0.994135$ , the reading obtained from the Z-table would be 2.52, which is greater than 1.96 and hence, the Null Hypothesis is rejected. Therefore, the alternative hypothesis;  $MTR > ATR$ , is accepted, i.e. the tax rate structure is significantly progressive. In addition, the values of the Suits Index 'S' > 0 at each target organisation also point to the progressivity of the tax rate. This result is consistent with (Bellu, 2006).

Even though the analysis of the data supports the assumption that the tax rate is progressive, it decreases in tandem with the increase in taxable income, as suggested by the comparison between the MTR and ATR and the charts presented above. (See Chart 4)

We have also assessed the Gini coefficient, a

measure of income inequality among the payroll earners of the same organisation and the overall aggregate population. Moreover, the income dispersion before and after tax and pension deductions were also examined. Furthermore, we tested whether the inclusion of pension contributions from employers induce important changes in the Gini measure. The Gini coefficients for income at different levels was obtained in the same fashion as the Suits Indices for tax and total deductions were calculated, either by using the equation

$$G = \frac{A}{(A+B)} \Leftrightarrow G = 1 - 2B$$

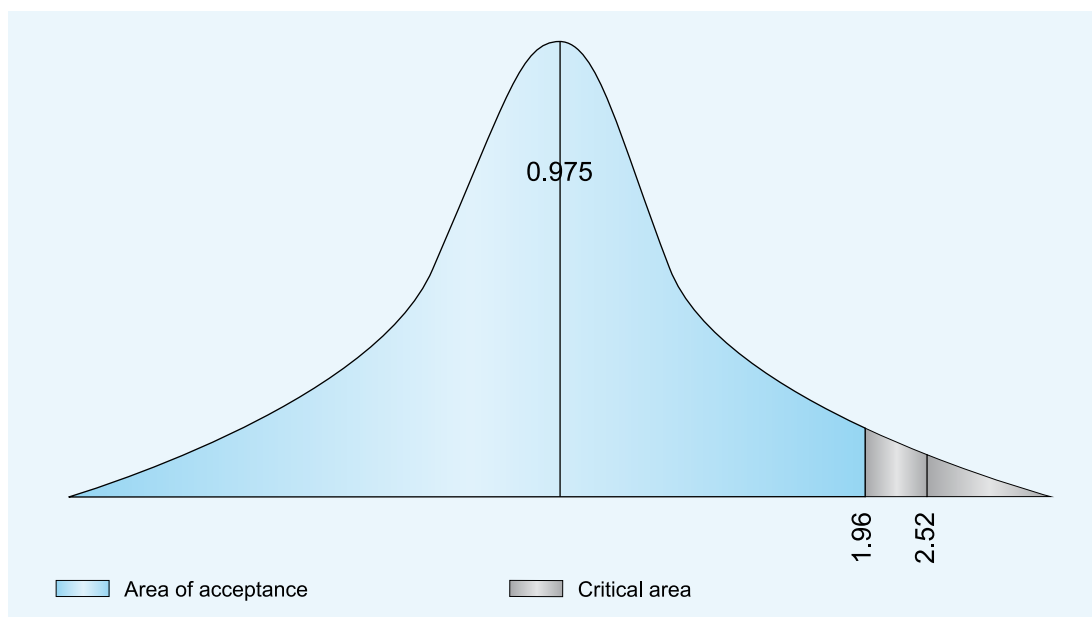
by adding up the areas of the trapezium from the Lorenz curve as

$$G = 1 - \sum_{i=1}^n [(qi + qi - 1)(pi - pi - 1)],$$

or computed from the integration of the Lorenz curve, which can be equated based on

Chart 4

**AREA UNDER THE NORMAL DISTRIBUTION CURVE**



Source: computed by the authors from data obtained from target organisations

the model summary in *Table 4*. The value of  $R^2$  in this summary indicates that the models are strongly correlated and influenced by the parameters, as it is greater than 98% in all the three cases.

Thus, the curve for the gross income is constructed from the model summary as

$$Y=1.37X^2-0.549X+0.099,$$

and the Gini coefficient is computed for gross income in the same manner as in the Suits Index:

$$G_{Gross} = 1 - 2 \int_0^1 (1.37X^2 - 0.549X + 0.099) dX \dots \dots eg_6$$

$$G_{Gross} = 1 - 2 \left[ \frac{1}{3}(1.37)X^3 - \frac{1}{2}(0.549)X^2 + 0.099X + C \right]$$

for  $0 < X \leq 1$

$$G_{Gross} = 1 - 2(0.456X^3 - 0.274X^2 + 0.099X),$$

for  $0 < X \leq 1$

$$G_{Gross} = 1 - 2(0.274)$$

$$G_{Gross} = 0.451$$

The Lorenz curve for taxable income and net income can be derived in the same manner:

$$Y_{taxable} = 1.325X^2 - 0.489X + 0.09 \dots \dots eg_7, \text{ and}$$

$$Y_{net} = 1.191X^2 - 0.318X + 0.071 \dots \dots eg_8.$$

Finally, the integral results were obtained as  $G_{taxable} = 0.437$ , and  $G_{net} = 0.391$ , respectively. The graphic representation of the Lorenz curves for the total population is presented in *Chart 5*.

The values of the Gini coefficients obtained from employees' income vary considerably from organisation to organisation. Neverthe-

less, the measure of inequality for gross income of the lower four organisations – Great Abyssinia, Sululta Administration, MoFED and OBR – came to 18.10%, 28.30% 28.40% and 28.70%, respectively, while the remaining five resulted in higher Gini coefficients even in comparison to the values recorded less than 30% in 1982, 1995 and 2000 for the Ethiopian economy. Similarly, the Gini coefficient was computed from the cumulative distribution of payroll income assessed for gross, taxable and net income. Primarily, the income inequality of gross income – which is thought to reflect the salary and remuneration structure of the organisation – ranges between 18.10% (Great Abyssinia) and 41.90% (Office of Oromia Council and Caffee, OCOC). However, for the total population of all groups, this coefficient was found to be as high as 45.10%. Secondly, at 43.70%, the coefficient proved to be relatively low for taxable salary in each group and the entire population. Even though the taxes are expected to reduce the value of the Gini coefficient for after-tax income, the measure of inequality was found to increase in five organisations, where Gini before tax ranged between 3.53% and 12.45%. That notwithstanding, the remaining four organisations and the overall data showed a decline between 2.93% and 10.53% for the Gini coefficient calculated from income before tax. (See *Chart 6*)

Furthermore, the dispersion of income among various segments of the population is

Table 4

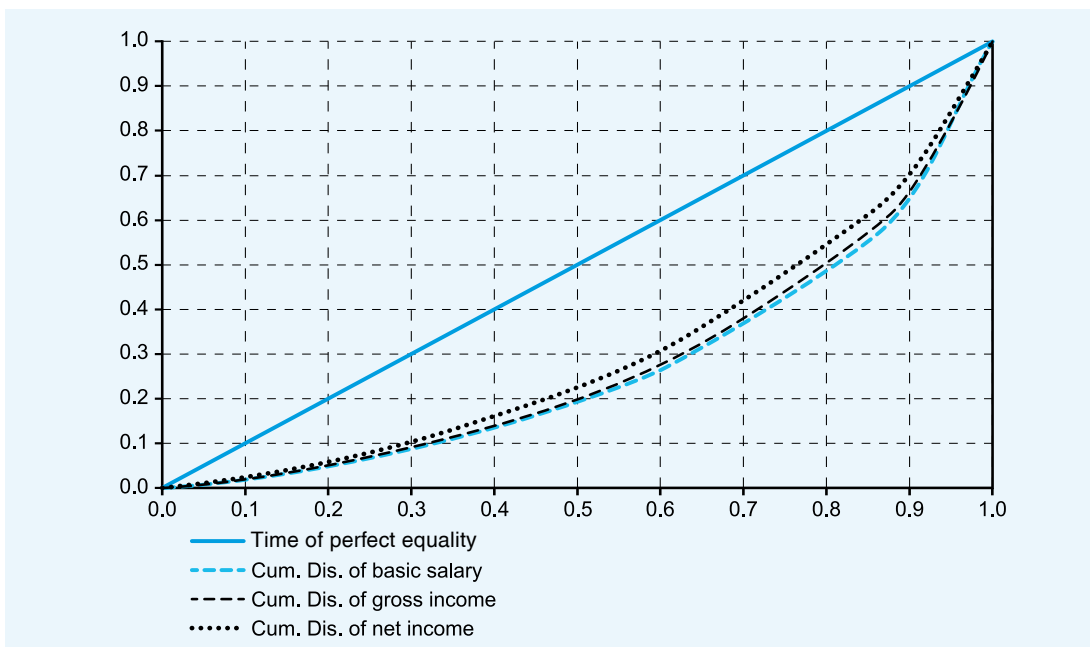
**MODEL SUMMARY OF PARAMETER ESTIMATE IN THE QUADRATIC EQUATION**

Parameter	Strength of relationship ( $R^2$ )	$b_0$	$b_1$	$b_2$
Gross income	0.980	0.099	-0.549	1.370
Taxable income	0.983	0.090	-0.489	1.325
Net pay	0.990	0.071	-0.318	1.191

Source: computed by the authors from data obtained from target organisations

Chart 5

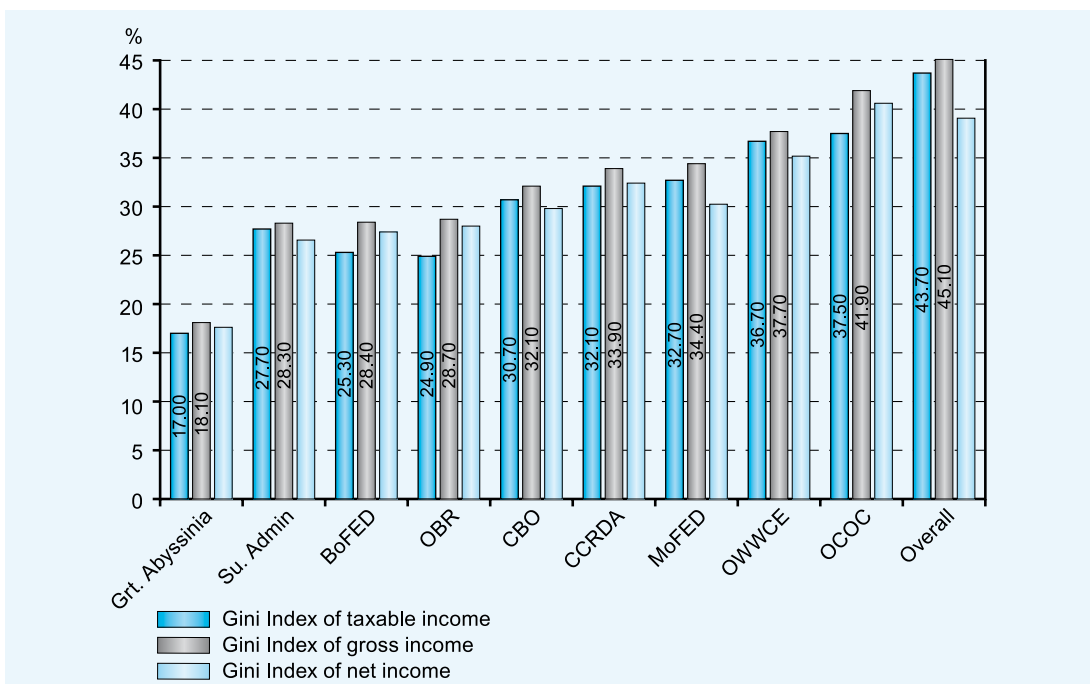
**THE LORENZ CURVE OF INCOMES AT THE TARGET ORGANISATIONS**



Source: computed by the authors from data obtained from target organisations

Chart 6

**GINI COEFFICIENT OF TAXPAYERS' INCOME AT TARGET ORGANISATIONS**



Source: computed from target organisations' payroll sheets as at January 2013

not equitable and evenly shared. For example, the first 10% of the total population as computed from the consolidated data received only 1.94% and the lower five deciles shared 18.97% of the total gross income, while the last highest deciles received 35.23% of the income before tax. Moreover, 94.17% (see Table 5) of the total income before tax was received by 83.80% of the employees as a percentage distribution of employees in the tax brackets. The distribution of employees' taxable income in the tax brackets also varies from organisation to organisation. Evidently, some organisations concentrated their payment in the lower bracket; for instance, in the case of Great Abyssinia more than 60% of the taxable employee payment was found within the 3<sup>rd</sup> tax bracket, while more than 90% of this payment was found only in the 7<sup>th</sup> bracket at CCRDA. The relevant details are available in Table 5.

Similarly, the share of income received by the last bracket was 42.72% in Table 5, while this value was only 38.52% in Table 6 as the

after tax income or net pay for the overall population. Even the share of the last bracket in BoFED, OBR and OCOC increased by about 57%, 67% and 11% of the Gini coefficient of before tax in the after tax income distribution, possibly due to a lack of tax allowances granted to higher income groups. As it is shown in the last bracket before tax income was reduced by 0.45% of the Gini coefficient before tax in CCRDA, standing at 93.75%. Obviously, there have been some increases in the share of lower deciles. For instance, the first 10% of the taxpayers increased to 2.32% and the lower 50% received 22.45% of the net income in the grand total of all organisations. Consequently, the share taken by the two highest income deciles was reduced by lowering the share of the 9<sup>th</sup> and 10<sup>th</sup> deciles to 15.54% and 29.78% in net income. This shows that the labour market offers an unfair payment structure, and the dispersion of income before tax among the employees is more concentrated in the upper-income group. Even though the tax rate structure is not pro-

Table 5

**PERCENTAGE DISTRIBUTION OF TAXABLE INCOME IN THE TAX BRACKETS BEFORE TAX**

Sr. No.	Organisations	Tax Brackets					
		2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>
1	CCRDA	–	0.05	0.10	0.47	5.21	94.17
2	OWWCE	1.48	7.64	11.09	10.09	29.84	39.86
3	OCOC	1.79	8.96	16.68	16.45	18.06	38.06
4	CBO	–	2.71	7.29	32.08	33.83	24.09
5	BoFED	0.79	3.15	19.32	26.17	42.93	7.64
6	OBR	0.71	3.21	27.34	33.26	28.39	7.09
7	MoFED	1.68	9.51	29.59	19.52	35.52	4.18
8	Grt. Abyssinia	–	66.47	24.11	–	9.42	–
9	Su. Admin.	0.87	26.72	37.49	24.07	10.85	–
10	Overall	0.95	7.35	14.15	11.86	22.97	42.72

Source: computed by the authors from the data obtained

Table 6

**PERCENTAGE DISTRIBUTION OF NET PAY AT THE TARGET ORGANISATIONS  
IN THE TAX BRACKETS**

Organisation	Tax Bracket					
	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>
CCRDA	–	0.06	0.11	0.53	5.55	93.75
OWWCE	1.90	8.37	11.50	10.35	28.73	39.15
OCOC	1.75	8.58	15.42	14.61	17.39	42.25
CBO	–	2.86	7.58	32.76	32.85	23.95
BoFED	0.84	3.21	19.00	24.74	40.22	11.99
OBR	0.73	3.22	26.21	30.64	27.32	11.88
MoFED	1.87	10.31	30.78	19.36	33.90	3.78
Gr. Abyssinia	–	65.90	23.57	–	10.53	–
Su. Admin.	0.93	27.54	37.17	23.03	11.33	–
Overall	1.14	8.56	15.78	12.58	23.42	38.52

Source: computed by the authors from the data obtained

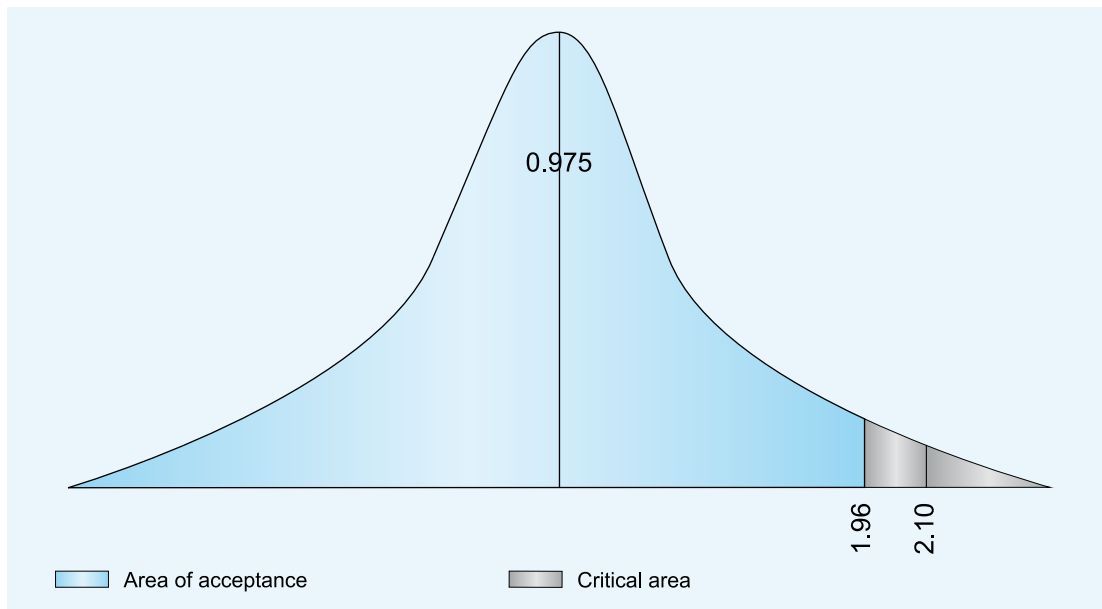
gressive enough to reduce income inequality as desired, the dispersion was about 10.16% lower than the inequality before tax. The redistributive effect of the payroll tax appears to be too low to reduce the value of the Gini coefficient after tax compared to the role of taxes in advanced countries, although the redistribution in these nations is not only due to taxes, but also assisted by the provision of social security benefits.

It was hypothesized that tax has no important redistributive effect on employees' income; therefore, the Null Hypothesis is:  $G_{Gross} \leq G_{net}$ . Accordingly, the mean comparison indicated that the lower value is 0.002178 and the upper value is 0.010913 at a 95% confidence interval of the difference. Consequently, the critical area,  $A=1-2(0.010913 - 0.002178)$ , equals 0.982528. The reading from the Z-table shows that the critical area under the normal curve is 2.10, which is greater than 1.96, confirming the rejection of the null hypothesis and supporting

the acceptance of the alternative hypothesis  $G_{Gross} \geq G_{net}$ . Therefore, payroll tax significantly reduces income inequality in payroll income. As a result, we accept the theory stating that besides revenue collection, taxation has a redistributive objective. However, it is still low in comparison with some other nations' tax rates, where inequality was found to be 20% lower than pre-tax inequality. (See Chart 7)

For the effect of inflation on the redistributive effect of the payroll tax, data revealed that the nominal values of federal and regional states increased throughout the period under review. For instance, in 2004, 2008 and 2011 employees' mean taxable salary increased from ETB 1,239.74 to ETB 1,514.66 and then ETB 2,095.15 respectively. As a result, the cumulative change in mean salary in 2002/03 to 2012/13 was found to be 69% compared to the base year. Similarly, the minimum wage rose by 79%, while the maximum salary grew only by 42% between these periods. This shows that higher incomes increased at a

**AREA UNDER THE NORMAL DISTRIBUTION CURVE**



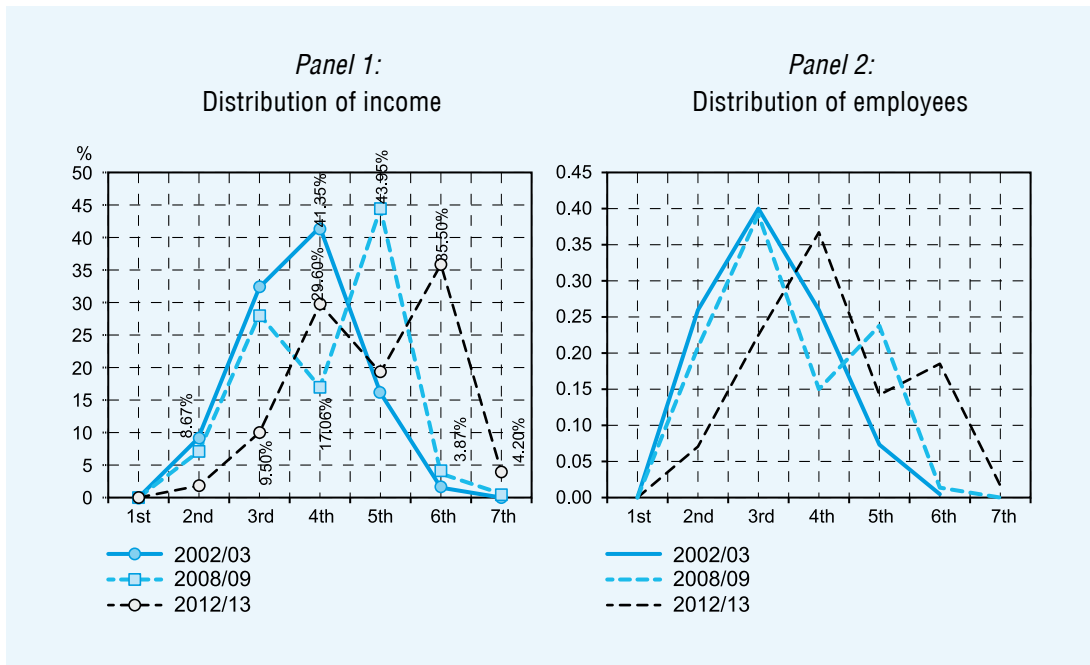
Source: computed from the data obtained from target organisations

lower rate than the less-paid segment, as opposed to the trends observed in OECD countries (OECD, 2011). From this point of view, the growth trend appears to reduce inequality as the lower income groups receive higher increments. However, rising salaries creep into the next tax brackets as they were not changed during these years. For example, looking at the salaries at MoFED from year 2002/03 to 2012/13, the income distribution decreased from 8.67% to 1.68% in the second bracket, while a large proportion of income shifted from the 4<sup>th</sup> to the 5<sup>th</sup> and to the 6<sup>th</sup> brackets from year 2002/03 to 2008/09 and 2012/13, respectively. However, the largest portion of the distribution of employees lags one bracket behind the income distribution, as indicated by Panels 1 and 2 on *Chart 8*. Similarly, the share of income in the 6<sup>th</sup> and 7<sup>th</sup> brackets stood at 1.57% or nil in 2002/03 before it rose to 35.52% and 4.18% in 2012/13 with a corresponding increase in the number of

employees as well. Similarly, the percentage distribution of employees in the last bracket above ETB 5,000.00 grew to 15.28%, representing a share of 42.72% in the organisations' aggregate income. All this demonstrates that the distribution of income and the number of employees in the upper brackets increased owing to the salary increment, and consequently reduced the lower brackets irrespective of the real value of employees' income.

On the contrary, such an increase is not large enough to offset rising market prices. In a simple arithmetic, the year-on-year increase in inflation as shown in Table 2 indicates that the cumulative rise of 396.81% from 2002/03 to 2012/13 was more than five times the increase in mean salary. This could be one of the reasons for the intensification of income inequality between employment salary earners and self-employed taxpayers. Furthermore, this comparison is meaningful when the recorded inflation is projected onto the exist-

**DISTRIBUTION OF EMPLOYMENT INCOME AND EMPLOYEES ACROSS THE TAX BRACKETS IN 2002/03 – 2012/13**



ing tax brackets resulting in an exemption threshold about ETB 745. Likewise, the lower threshold of the last brackets would rise to ETB 24,841 and if we traced back the present values of these thresholds to year 2002 using the annual inflation figure, ETB 150 would decline to ETB 30.20, and the upper limit of the second last bracket, i.e. ETB 5,000 would be equivalent to ETB 1,006.42 of that time. All this implies that inflation reduced the widths of the brackets and wages by about four times during these periods. In addition, the tax revenues collected from these incomes would decrease at the same rate in real terms. However, unlike some countries, the Ethiopian government took no fiscal policy measures aimed at either compromising or confronting the rising prices. Canada, the Netherlands, France and Luxembourg, on the other hand, apply full or partial adjustments on a temporary or permanent basis based on the magni-

tude of inflation. Therefore, there should be adjustments in line with the changes in the prices of goods and services both in respect of the tax structure and the payment structure. At the same time, the value of the Suits Index as a measure of the progressivity of the tax rate rose from 2002/03 to 2008/09, whereas it declined even below the level recorded in 2002/03 in 2012/13 both for pure tax and total deductions, possibly due to two obvious reasons. The first is that the lower exemption provided in employment income relatively decreased while payment increased. For example, even the lowest and the highest mean salary recorded at the target organisations was as large as nine and 70 times of the exception provided by the tax law. Similarly, the increase in salary shifted payments into two or three tax brackets, as about 60% of the salary in MoFED resided solely within the 5<sup>th</sup>, 6<sup>th</sup> and the 7<sup>th</sup> brackets in 2012/13.

### Hypothesis test for the impact of inflation on income inequality

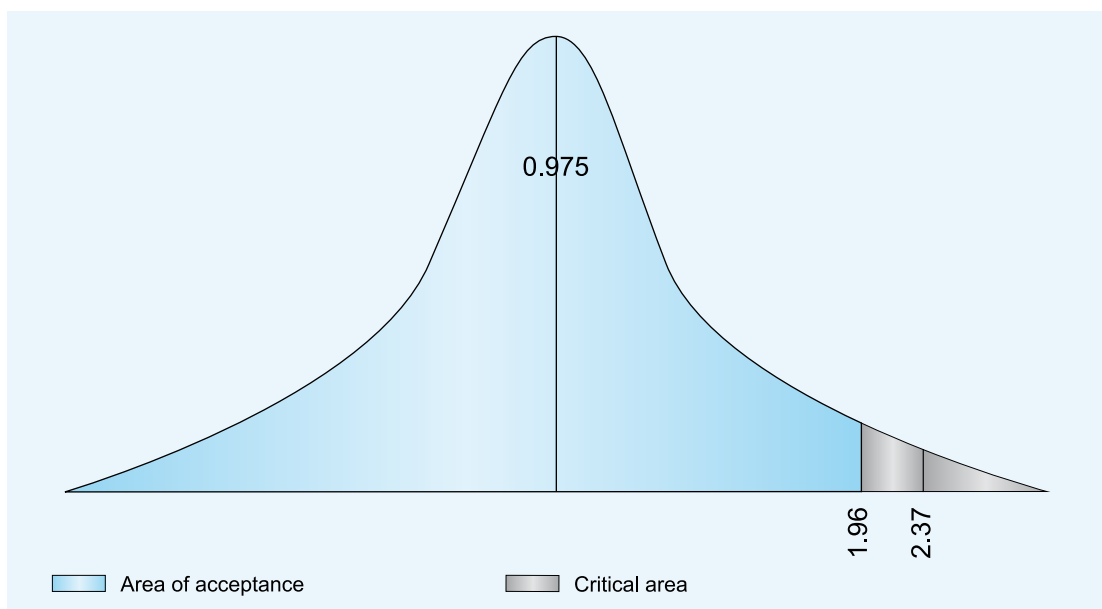
The hypothesis formulating the Null Hypothesis as  $H_0: G_1=G_2=G_3$  in the design stage of this research was the Gini coefficient, as the measure of income inequality after tax does not change from year to year. Accordingly, the paired sample test the lower and the upper values as  $-0.00942$  and  $0.000879$  at a 95% confidence interval. Thus, the probability would be computed as the area,  $A=1-2(-0.007462)-(-0.003084)=0.9912$  and in the Z-table it came to 2.37, which is greater than 1.96. Consequently, the Null Hypothesis is rejected, which means that the Alternative Hypothesis  $G_1 \neq G_2 \neq G_3$  is accepted. This confirms that inflation has a significant role in reducing the redistributive effect of tax on the payroll income in reducing the real value of taxable income and the tax brackets alike. (See Chart 9)

### CONCLUSIONS

A tax system can be progressive, proportional or regressive based on its rate structure. Accordingly, a progressive tax system features an increasing average tax rate applied to increasing taxable income and is considered to be fair; i.e. this type of rate structure conforms to the ability to pay principle in that it lowers income inequality among citizens. However, the disparity of household incomes and the inter-regional differences observed in several economies began to intensify in the mid-1980s as the international trade integration emerging in the context of globalization encouraged the advancement of skill-biased technologies both in domestic and overseas markets. To counteract this process, all states – including Ethiopia – need to promote fair, equitable and sustainable economic growth at a rate as high as possible. Therefore, policy-makers strive to achieve a fair fiscal policy in

Chart 9

#### AREA UNDER THE NORMAL DISTRIBUTION CURVE



Source: computed from the data obtained from target organisations



general and a progressive tax rate structure in particular, in order to improve the protection of the low income groups while stabilising the macroeconomic environment. From this perspective, the payroll tax rate structure examined in this study was found progressive. The analysis shows that, as measured with the Suits Index, the rate is significantly progressive, ranging between 0.272 and 0.494 at different organisations. This was also demonstrated by the fact that the Marginal Tax Rate is greater than the Average Tax Rate ( $MTR > ATR$ ) at a statistically significant level, which confirms that the tax rate structure is progressive. Accordingly, the average tax rate increases in line with the increases in taxable income. However, this progressivity decreases in the last bracket, as the difference between these two rates also declines. Likewise, 33% to 40% of the respondents disapproved the horizontal and vertical equity of the rate and suggested that it needed to be revised. Moreover, more than 50% of the respondents disapproved the width of the brackets and the exemption thresholds, as they lag behind market conditions and they need to be updated.

As regards the income inequality among employees, the research indicated that employees suffer from an unfair distribution of income. About 70% of the employees reported that their monthly income – which is subject to indirect taxes and compulsory contributions – could not cover the consumption of their families. As a result, a substantial part of the respondents sought economic support from relatives and friends even to ensure the basic needs of their families. According to the

respondents concerned, the employment payment structure is essentially unfair and inequitable among employees both vertically and horizontally as compared to other lucrative sources of income. Furthermore, the indicators and indices derived from the quantitative data revealed higher income inequalities in both before-tax and after-tax salaries with the exception of a few organisations. The Gini coefficient computed for income before taxes shows that the labour market offers unfair wage rates for different reasons that were not explicitly assessed within the scope of this research. On the other hand, the larger disparity observed in after-tax earnings can be directly linked to the effectiveness of the redistributive capacity of the tax system. Similarly, inflation has intensified inequality in different ways. Firstly, the width between tax brackets and exemption thresholds has eroded in real terms as a result of rising prices in the goods and services markets. Secondly, some increase and salary scale adjustments eventually shifted payments into higher tax brackets. Finally, it appears that the payroll income is unfair vertically due to the reduction of the value of exemptions, and it is inequitable across different sources of income. At the same time, it appears that employment generated low incomes as the labour market is not as competitive as the product or services markets. In addition, the tax system poses a higher burden on payroll income than on other sources of income. Evidently, the tax regime hindered the expansion and development of labour intensive industries which, in turn, impaired the job creation strategy as well.

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#### NOTE

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