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PROCEEDINGS OF THE SECOND REGIONAL CONFERENCE ON THE OROMIA REGIONAL STATE ECONOMIC DEVELOPMENT

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Saving and Investment Dynamics in Oromia Region

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Abstract

Saving and investment are vital to economic growth and development, and this study examines their dynamics in Oromia, Ethiopia, using both macro and microeconomic data. Time series data from 1999/00 to 2020/21, alongside qualitative insights from 43 key informant interviews and seven focus group discussions, reveal that Oromia's gross domestic saving rate (22.13% of GDP) is higher than the national average (15.3%), though its gross domestic investment rate (13.5%) remains below the national level. The ARDL-Bounds Cointegration Test shows a weak relationship between savings and investment, suggesting capital mobility in line with the Feldstein-Horioka hypothesis. While banks are crucial financial intermediaries in Oromia, the region's deposit-to-loan ratio is lower than national averages, indicating potential for increased investment from domestic resources. Challenges include high lending rates, lengthy loan processing, corruption, liquidity shortages, and unpredictable policies from the National Bank of Ethiopia. Of the 20,873 licensed investors in Oromia since 1992, only 43% are operational, with lower rates for domestic investors (41.8%) compared to foreign direct investment projects (54.7%). Adjusting for underutilized capacity, the operational rate drops to 27%. The study highlights issues like political instability, poor infrastructure, foreign currency shortages, and corruption as key barriers, but also notes the region's investment potential due to government reforms, locational advantages, and resource availability. Policy recommendations are provided to address these challenges and enhance the investment climate in Oromia.

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1. INTRODUCTION

1.1. Background

Savings and investment has been emphasized as precondition for the growth and development of economies. Both economic theorists and practitioners concur that the higher domestic saving, the faster the rate of investment, and rate of capital formation, which ultimately promote growth and development (Ribaj and Mexhuani, 2021). Moreover, savings and investment have been considered as two critical macro-economic variables with micro-economic foundations for achieving price stability and promoting employment opportunities.

Economic theory suggests that investment must be funded either from domestic savings, credit extension or foreign capital inflows. However, inadequate savings and investment are common problem in developing countries. For instance, Ethiopian average gross domestic savings to GDP ratio has been lower than that of the SSA average in real terms (NBE, 2021). The average GDS to GDP ratio in real terms for the Ethiopia had been the highest in 2019 (24%) and it declined to 18.95% in 2022 which is still less than the average of SSA. Poor performance of the economy, high unemployment level, engagement of a large proportion of the population in the informal sector and low wages are factors responsible for low domestic savings in small developing states.

Saving may be defined as the portion of disposable income not spent on consumption of consumer goods but accumulated or invested directly in capital equipment. It may be referred to or assumed suspend consumption, being income left over for future consumption on capital investment or precautionary and speculative motives (Romer, 2018). In short, saving is disposable income less consumption. In Ethiopia, it is known that both public and private savings are the main sources of capital accumulation for investment purposes. As of theoretical viewpoint total savings of households, entrepreneurs, and corporate unit in an economy has positive correlation with per capita income. In most of the time, it is known that saving is the main source of capital for investment. Higher level of national saving can lead to higher investment and hence higher growth (Tasar, 2017). This indicates that the level of national saving affects the level of output per capita growth rate which is one of the indicators of macroeconomic situation of the country.

Savings and investment gap is among the major problems constraining optimal utilization of resources to improve welfare of societies in many developing countries. Likewise, limited source of funding to finance various development projects and private sector investment is a peculiar characteristic of Ethiopia in general and Oromia region in particular. Though saving and investment are macroeconomic variables dependent national policies and strategies, regional governments are also entitled to design their own investment policies and strategies. In this sense, investment in the region depends not only the saving within the region but also the quality of these policies and strategies and implementing institutions.

Oromia regional state of Ethiopia is endowed with natural resources, diversified agroecology, suitable to various forms of investment opportunities. The region consists of 34% of the land in Ethiopia and is home to over 40 million people (ESS projection, 2022). The region also plays a significant role in the Ethiopian economy. For instance, the region accounts for 51.2% of the crop production, 45.1% of the area cultivated for cereal production and 44% of the total livestock population of Ethiopia (ESS 2021). In addition, it is a major contributor to Ethiopia's main exports such as: gold, coffee, khat and cattle. However, most of the population in the region remain agrarian with several complicated economic and social impediments. With these diversified natural resources and productions potentials, sustainable investment that changes the livelihood of the society at large is scarce. Hence, an empirical investigation of this dilemma is unequivocally important to design appropriate investment policy and make informed decision. This study is therefore instigated to investigate saving and investment dynamics and impeding factors of investment in Oromia region. The study mainly focuses on regional level aggregate information and to some extent provides zone level information based on four zones sampled for this study. In most cases, the private investment is given due emphasis.

Quantitative data ranging from 1999/00 to date have been utilized to estimate the ARDL model and the bound tests for cointegration from which the long-runs and short-run relationship between saving and investment is gauged. The study also explored the investment financing and saving patterns in the Oromia in comparisons with the national average and other regions. The profile of investment in the region, the challenges and opportunities have been identified using our qualitative information collected from various stakeholders by conducting about 50

KII and FGDs. Finally, the study has forwarded important policy implications for the betterment of saving and investment in Oromia.

1.2. Objectives

The research has the following specific objective.
Analyze the association of saving and investment in Oromia region
Identify the source of investment finance
Examine the state of various forms of savings , their trends, and initiatives to promote savings in Oromia as compared to the national average and other regions
Investigate trends, peculiarities, and structure of private investment in the region
Analyze strength, weakness, treats and opportunities of investment in Oromia region

1.3. Organization of the report

The remaining part of the report is organized into 6 chapters. The second chapter describes the methodology we followed in this study. The third chapter starts presenting the findings. It presents regional and macro level overviews of investment and saving and also reports the econometric mode results regarding their association. In the fourth chapter, we present the analysis on the feature of saving and investment financing in Oromia in comparison with the national average and other regions. The fifth chapter deals with the profile and trends of investment in Oromia. In this chapter we also discuss the success and failures in promoting, hosting, and managing investment from different perspectives. The SWOT analysis regarding private investment in Oromia is addressed in the sixth chapter. The seventh chapters closes the report by concluding and forwarding policy implications of the study.

2. METHODOLOGY

2.1. Data Source and Collection Methods

This study used both qualitative and quantitative research design. Given the nature of the study, we had to collect and utilized macro, meso, and micro level quantitative and qualitative information associated with the saving and investment issues in Oromia. Macro and meso level data were gathered from relevant federal and regional offices information. Our sources of consists of 5 major groups: Government institutions (federal, regional, zonal), investors in Oromia, financial institutions, local community members, and employees of investment projects operating in Oromia.

In order to understand the states of saving and investment at grass root level, we selected four zones of Oromia, namely, East Shoa, Jimma, Bale, and Shaggar City administration (the former Oromia Special Zone surrounding Finfinne)[6] These administrative zones were purposively selected in consultation with the Oromia planning commission as they are believed to host all kinds of investment activities from sector, concentration, accessibility, and other perspectives. Once we determine this, primary and secondary data collection were conducted starting from the macro or federal level to the zone.

Secondary data: a large set of quantitative data related to investment and saving in Oromia was collected from federal, regional and zonal offices. The sources of data at federal level were National Bank of Ethiopia (NBE), Ethiopian Investment Commission (EIC), Ministry of Trade and regional Integration (MoTRI), and Ministry of planning and development (MPD). Oromia planning commission, Oromia investment bureau, and their respective offices at selected zones were also the regional and zonal level sources of data for this study. In addition, selected financial institutions operating at all levels were another sources of the secondary data.

From these sources time series data on national and regional level aggregates/accounts (GDP, gross domestic saving, and gross capita formation/investment), FDI inflows to the nation as well as Oromia, overall investment profiles, variables related to saving and project financing (deposits,

[6] Shaggar City administration replaced the former Oromia Special Zone surrounding Finfinne after the design and early stage data collection of this study.

loan disbursement, external sources of project financing, branch networks, etc…), and others were gathered. While most of the time series data are available since 1991/92 (establishment of the region), the Oromia aggregate saving and investment data are available since 1999/00, which is a great step in understanding the economic dynamics of the region. This data collection was implemented using a pre-defined secondary data collection book/format.

Primary data: Qualitative information was gathered from our primary sources of data which includes MoTRI, EIC, relevant regional bureaus and zone offices of Oromia mentioned below, Ethiopian chamber of commerce, selected investors and their employees, community members, 6 financial institutions DBE, NBE, Oromia Bank, CBO, Awash Bank, and Sinqee Bank[7], and community leaders of in the selected zones.

The primary data was collected using Key informant interviews (KII) and Focus group discussions (FGD) with higher officials and representatives of the target source. A total about 50 KIIs and FGDs were conducted to collect the required qualitative data at all levels. The detail break downs of the primary data collection is summarized in Table 2.1.

To implement the survey 5 different KII and FGD guides were prepared for the 5 general target groups, namely, Government institutions, investors, FIs, local community members, and employees of investment projects. Once the preparation of survey instruments and report formats are done a survey team consisted of 10 experts were recruited from universities and research institutes with a minimum of master's degree in economics. A one day training was provided for the survey team on the tools, report formats, and protocols of the data collection. The data collection was fielded mainly in February and March 2023 with a close supervisions sometimes direct involvement of the researchers. Each qualitative survey was transcribed by the qualitative survey experts and utilized for analysis.

[7] These institutions were purposively selected on the basis of their level of operation in Oromia. Sinqee bank (the former Oromia credit and saving institution) was selected to be also a good information source for micro financing as well.

Table 2.1: Summary of target respondents of the KII and FGD

Data collection methods	Target group	Specific respondents	Number of KII/FGD
KII	Federal level government	Ethiopian Investment Commission (EIC), Ministry of trade and regional Integration (MoTRI), Chamber of commerce	3
	Regional bureaus of Oromia	Oromia Investment bureau, Oromia land administration bureau, Oromia trade and market promotion bureau, Oromia revenue authority, Oromia environmental authority	5
	Zone gov't offices	Investment and industry offices and planning commission of selected zones	6
	Investors	Domestic and foreign investors in manufacturing, agriculture, mining, service, and related sector in selected zones	22
	Financial institutions	Development Bank of Ethiopia (DBE), National Bank of Ethiopia (NBE), Oromia bank(OB), Cooperative Bank of Oromia (CBO), Awash bank, Siinqee Bank	7
	Total numbers of KII		**42**
FDG	Community leaders	Community representative of selected zones	3
	Employees	Employees of companies in various sector	3
	Senior staff of Oromia regional office	Senior employees of Oromia Investment and environmental protection bureaus	1
	Total numbers of FGD		**7**
Grand total of KII and FGD			**50**

Source: Own compilation

2.2. Analytical Frameworks and Specification of the Model

The main purpose of this sub-section is to outline the conceptual framework that is used to establish the link between saving and investment. This

relationship can be highlighted by comparing the aggregate demand(AD) and its financing sources (Pavelescu, 2009).

Consider any open economy (could be a country or a region) whose aggregate demand in one hand is represented as

$$Y=C+I+G+X \quad \textbf{(2.1)}$$

The finance source of AD, on the other hand, is

$$Y=C+S+T+M \quad \textbf{(2.2)}$$

Where,

C represents consumer spending, I represents investment spending, G represents government spending, and X and stands for export and imports. Consumer spending (C) is the total amount spent by households on goods and services. Investment spending (I) is the amount spent by businesses on capital goods such as machinery and equipment. Government spending (G) is the total amount spent by government on goods and services.

The theoretical relationship where saving equals investment is valid in the absence of government and foreign trade deficit. However, when there is a state budget and foreign trade balance disequilibria, the savings are not automatically equal to the investments. Following Pavelescu (2009) the discrepancy between savings and investments (S-I) may be represented as:

$$S - I = (X - M) - (T - G) \quad \textbf{(2.3)}$$

Where, S-I = saving –investment gap ; X-M = foreign trade (current account) balance stock or just net export; T-G = state budget stock.

We can rearrange Eq(2.3) and can be also re-written as:

$$S + (T - G) = I + (X - M) \quad \textbf{(2.4)}$$

This expression implies that the sum of private and public savings, equals the sum of private investments and net exports (Akbostank &.Tunc, 2002). This underscores in the open economy model domestic investment does not have a one-to-one relationship with domestic saving.

Savings and investments correlation can be analyzed using the Feldstein and Horioka (1980) model specified as:

$$\left(\frac{I}{Y}\right) = \beta_0 + \beta_1\left(\frac{S}{Y}\right) + \varepsilon \qquad \textbf{(2.5)}$$

Where I/Y= Gross domestic investment to GDP ratio; S/Y = Gross domestic saving to GDP ratio.

For a macro level analysis, eq.(2.5) can be easily estimated using appropriate time series econometric model and the parameter of interest β_1 shows degree of capital mobility. However, our interest is to estimate this model for Oromia, a region within Ethiopia, so that the interpretation of the parameter (capital mobility) should be made by intertwining it with the national context. This is because region in Ethiopia cannot be considered as a completely dependent open economy as many things including the international capital mobility is exogenous to the region as it is mainly the federal government's decision.

Therefore, since regional data for 22 years is available for Oromia, we can tackle this empirical problem in by estimating the regional model which is specified as:

$$\left(\frac{I}{Y}\right)_r = \gamma_0 + \gamma_1\left(\frac{S}{Y}\right)_r + \varepsilon \qquad \textbf{(2.6)}$$

where, γ_1 is the causal parameter which measures the capital flow from(to) the region.

Once we estimate the national and regional mode specified in eq.(5) and eq.(6) using the same period data and model selection, we can make interesting conclusions from the comparison of β_1 and γ_1.

- If both β_1 and γ_1 are individually significant, capital is immobile both at national and regional level
- If both β_1 and γ_1 are individually insignificant, capital is mobile both at national and regional level
- If β_1>0 while $\gamma_1 = 0$, implies the inter-region capital mobility but not cross-country mobility
- If β_1=0 while $\gamma_1 > 0$, implies the capital is mobile at national level (between the external world) but it is immobility within the country between Oromia and other regions.
- In this hypothesis testing negative and significant coefficients are not interpretable (Mamingi, 1997).

Given our data is time series data, the next question is how we can estimate these coefficients. As noted in Gundlach & Sinn (1992) since the saving-investment nexus is primarily a long-term relationship, the cointegration method is a more appropriate approach to estimate our equations. The Autoregressive Distributed Lag (ARDL) model and the Vector Error Correction (VEC) model are widely used in econometric analysis for such empirical issue.

Following Narayan (2005), we used the bounds test for cointegration under ARDL framework to determine the long-run relationship between saving and investment and their short run dynamics. There are several advantages to using the ARDL model over the VEC model. One of the main advantages of the ARDL model is its ability to estimate models with mixed stationary and non-stationary variables. The ARDL model can handle cases where some of the variables are stationary while others are not. In contrast, the VEC model requires that all variables be cointegrated, which can be a limitation when dealing with economic data that may not exhibit cointegration. Another advantage of the ARDL model over the VEC model is its flexibility in terms of lag selection. The ARDL model allows for different lag structures to be used for each variable, while the VEC model assumes that all variables have the same lag structure. Furthermore, the ARDL model does not require pretesting for cointegration before estimation, while the VEC model requires such testing. This means that the ARDL model can be used in situations where it is unclear whether cointegration exists (Narayan, 2005; Pesaran et al., 2001; Kripfganz & Schneider, 2022). The validity of the ARDL model will be weakened if the any of the serial correlation, heteroskedasticity, and normality tests are violated. In addition, ARDL model cannot be applied if any of the variables in the model are integration of order 2. We conducted the necessary tests and our ARDL model satisfies all these assumptions

Therefore, taking saving as long-run forcing variable and for just simplifying notations let's assume that I and S denote the aggregate saving and investment, respectively, measured as a percent of GDP. The ARDL (p,q) model of can be specified as:

$$I_t = c_0 + c_1 t + \sum_{i=1}^{p} \phi_i I_{t-i} + \sum_{i=0}^{q} \beta' S_{t-i} + u_t. \qquad \textbf{(2.7)}$$

Where model is with intercept c_0, linear trend $c_1 t$, and lag orders $p \in [1, p^*]$ and $q \in [1, q^*]$ where p^* and q^* are maximum admissible lag order p and q. u_t is the normally distributed error term.

However, the implementation of the bounds cointegration test requires the reparameterization of the ARDL model in conditional error correction form (Hassler & Wolters, 2006), which is:

$$I_t = c_0 + c_1 t - \alpha(I_{t-1} - \theta S_t) + \sum_{i=1}^{p-1} \psi_{I_i} \Delta I_{t-i} + \sum_{i=0}^{q-1} \psi_{S_i} \Delta S_{t-i} + u_t \qquad \textbf{(2.8)}$$

As this equation is the reparameterization of eq.(2.7), the coefficients between the two equations can be mapped in a straightforward algebraic way to as follows.

$\alpha = 1 - \sum_{i=1}^{p} \phi_i$ is the speed of adjustment parameter.

$\theta = \frac{\sum_{j=0}^{q} \beta_j}{\alpha}$ is the long-run parameter.

$\psi_{I_i} = -\sum_{j=i+1}^{p} \phi_j$ and $\psi_{S_i} = \sum_{j=1+i}^{q} \beta_j$

Using this framework, the bounds cointegraion test of Pesaran et al. (2001) have been made and the long-term and short-term relationship between saving and investment are identified. We can further augment the model by including a set of stationary covariates whenever necessary.

3. OVERVIEW OF INVESTMENT AND SAVING IN OROMIA AND THEIR ASSOCIATION: THE MACRO VERSUS MESO PICTURE

This section starts presenting the findings of the study. The results are organized from a macro and regional level aggregate measures of saving and investment to a micro level information pertaining to the issues under investigation. The first two chapters of the findings deal with former part while the remaining three chapters discuss the later one.

3.1. Level of Aggregate Regional Saving and Investment

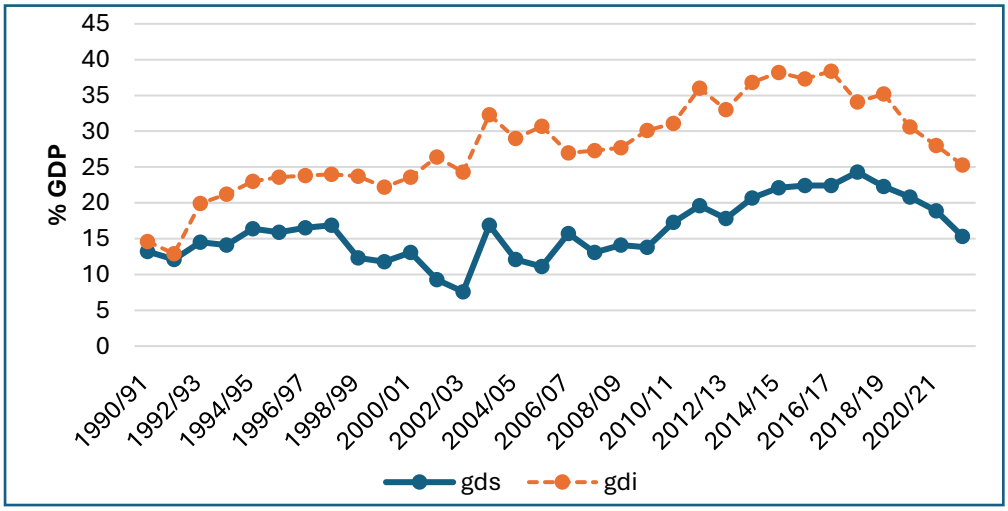
Gross Domestic Investment (GDI) and Gross Domestic Saving (GDS) are used to measure level of saving and investment at national or sub-national level like Oromia. As a percentage of GDP, they provide insight into the overall health of an economy's investment and savings behaviors. GDI, also known as gross capital

formation, represents the total amount of investment made in an economy during a given period. This includes investments made in fixed assets such as buildings, machinery, and equipment, as well as changes in inventories. On the other hand, GDS refers to the total amount of savings within an economy during a given period. This includes the savings made by households, businesses, and governments. Both gross domestic investment and gross domestic saving are important measures of an economy's level of investment and saving. A high percentage of gross domestic investment indicates that an economy is investing heavily in fixed assets, while a high percentage of gross domestic saving suggests that an economy is saving a significant amount of its income.

In line with this view, in this section, we assessed the trends Gross Domestic Saving and Investment in Oromia (OGDS and OGDI, hereafter) in comparison with the national level averages (denoted as GDS and GDI). Since data on the regional GDP and related aggregates for Oromia is available since 1999/00, our trend analysis for the region starts at this period while the national one extends back to early 1990s.

Figure 3.1 presents the GDS and GDI, both measured as a percentage of GDP, for Ethiopia over the last three decades. The GDS and GDI slowly increased overtime from their level of 13.2% and 14.6% in 1990/91 to 15.3% and 25.3% in 2020/22, respectively. Zooming in the trends of these figures over the past five years indicates a slight decline in both saving and investment, down by 3.5 percentage points for saving and 10 percentage points for investment.

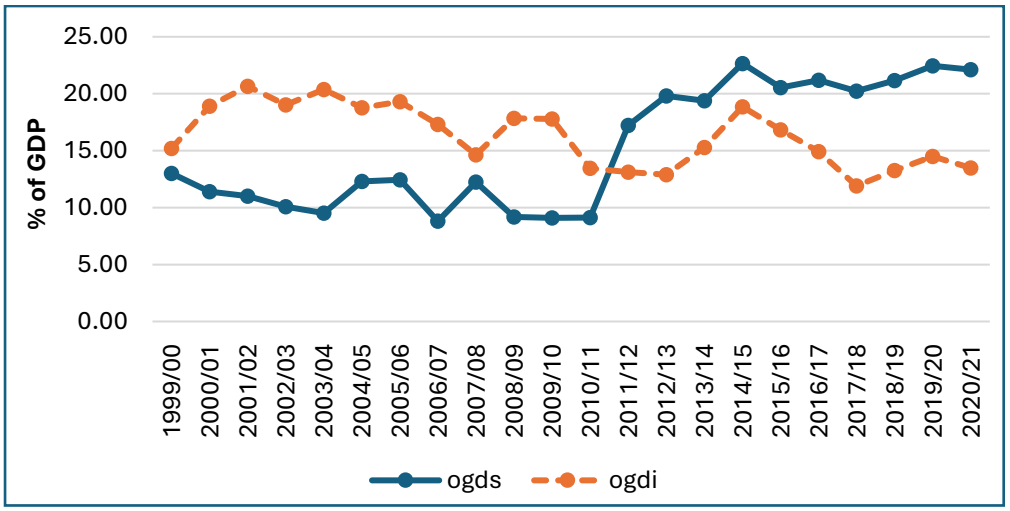
Figure 3.1: Trends of Ethiopian saving and investment as a percentage of GDP over time



Source: Own representation from NBE/MPED data

The trends of regional saving and investment measured as a percentage of regional GDP for Oromia are depicted in Figure 3.2. The current level of aggregate saving in Oromia is 22.13% which is higher than the national average and up by about 9 percentage points since 1999/00. On the other hand, the gross domestic investment of the region has been relatively almost in the same pattern (level), with a small reduction to 13.5% in 2020/21 from its level of 15.2% at the start of the period.

Figure 3.2: Saving and investment as percentage of GDP in Oromia

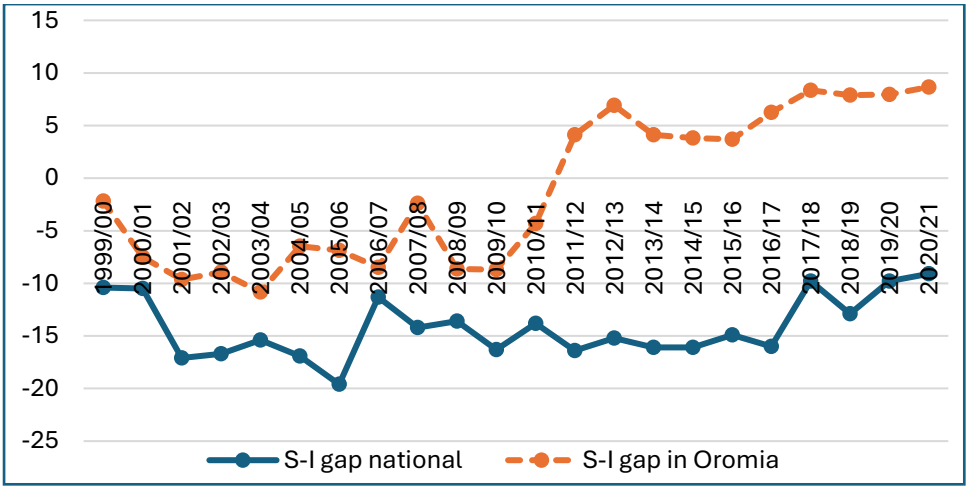


Source: Own representation from OPDC data

Comparing Oromia's status with the national average in this respect, the trends of saving in both cases has been comparable with marginally higher rates for the country in most periods until recently. Nonetheless, the regional level investment of investment has been consistently lower than the national average over the entire period.

The difference between investment and saving aggregates are called saving-investment gap (S-I gap, after this). This shows the short fall of domestic saving to finance the investment demand in the economy as whole or in the region. The Ethiopian S-I gap has been always negative but it is slightly getting narrow in recent periods with -9.1% in 2020/21, which is the lowest gap in 20 years (Figure 3.3). The S-I gap in Oromia has been always narrower than the national average. It had a similar trend with the national figure until 2010/11.

Figure 3.3: Trends of saving-investment gap in Oromia in comparison with the national average



Source: Own representation from OPDC and MPD data

However, in 2011/12, the saving rate of Oromia has suddenly shot to 17.2% from its level of 9.1% in the previous year. At that point, the region's saving crosses the region's investment curve and since then the S-I gap becomes positive. It is vague as to what causes the dramatic change of Oromia's saving rate in 2011/12 while the national figure remained smooth. The start rise in compulsory saving associated with the introduction of pension for employees of private organizations and high mobilization of and bond saving for the construction of Ethiopian Great Renascence Dam both started around 2011 could have contributed for the rise in regional saving rate since then.8 At this moment, the S-I gap of Oromia is at its highest ever positive level (about 8.7%) while it its lowest record was observed in 2003/4 (-10.8%).

What does it imply?

When an economy has a negative saving-investment gap, it means that the country is investing more than it is saving. This results in a shortage of savings to fund investment projects, which can lead to several potential implications for the economy. First, a negative saving-investment gap can lead to slower economic

[8] It would be also great to look into the computation of regional accounts for any possible errors or methodological deviation from that of the national income accounting methods, particularly since 2011/12.

growth in the long run, as there is less money available to invest in projects that would otherwise promote economic development. Second, with insufficient savings, countries have to rely on external borrowing to finance investments. This increases the national debt, making it harder for the country to manage its finances and leading to potential future financial instability. In addition, if the government has excessive external debt burden, it could also weaken private investment through high tax expectations by rational investors. Third, the increased borrowing can also cause interest rates to rise, making it more expensive for households and businesses to borrow money and invest, which ultimately stifles growth.

On the other hand, a positive saving-investment gap, like the case of Oromia, can help promote economic growth and stability by reducing debt, interest rate, and capital flight, which in turn increases investment.

However, having a sufficient domestic saving is a necessary but not sufficient condition for investment for an economy or region. Higher saving may not necessarily translated to higher private investment under the following conditions.

i. The financial sector is inefficient to perform their intermediary roles in allocating saving to productive investment projects
ii. Smaller proportion of funds are made available for the private sector and government uses the considerable portion of resources in a way that crowd-out private investment
iii. There is capital outflow to other areas or regions.
iv. When investors lack complimentary resources such as entrepreneurial capital and foreign exchange to effectively convert domestic savings to productive investments
v. The business environment is not enabling to effectively run and grow business in that particular environment. For instance, in a situation where there is high political instability and associated business risks, the investors' confidence will be eroded to make either new investment decisions or expand the existing ones.

These factors partly explain the positive S-I gap in Oromia, as supported by data and further analyses in the subsequent chapters of this study.

3.2. The association between saving and investment: The ARDL Cointegration method

3.2.1. The Model Description

One of the objectives of this study is to evaluate the association between saving and investment in Oromia. As described in the methodology section, we will employ the ARDL model with its error correction (EC) representation to address this objective. This would also provide additional insights about the capital mobility in the region. The use of the autoregressive distributed lag (ARDL) model to evaluate the cointegration between saving and investment under the Feldstein and Horioka (1980) hypothesis has been a popular research topic in macroeconomics. Numerous studies have employed the ARDL approach to analyze this hypothesis in various countries and time periods. For instance, Ozturk and Acaravci (2011) used the ARDL model to investigate the relationship between saving and investment in Turkey, while Calderon et al. (2004) analyzed this relationship in Latin American countries. Narayan (2005) is also another popular study with a significant contribution in this area. Overall, some of the previous studies utilizing the ARDL model have provided evidence of a positive correlation between saving and investment, which supports the Feldstein and Horioka hypothesis. However, some studies have also found that this relationship varies across countries and time periods, suggesting that there may be other factors influencing the saving-investment link. In conclusion, the use of the ARDL model has provided valuable insights into the cointegration between saving and investment under the Feldstein and Horioka hypothesis, contributing to a better understanding of the dynamics of national savings and investment behaviors.

3.2.2. Unit Root Test

As time series variable may be trending together and generate spurious regression, checking for stationary is important. However, one of the main advantages of the ARDL model is its ability to estimate models with mixed stationary and non-stationary variables. The ARDL model can handle cases where some of the variables are stationary while others are not. That means ARDL model can handle variables with I(0) and I(1). But, it is still important to check if any of the

variables are I(2) for which the ARDL model will not be valid (Kripfganz & Schneider, 2022). That is what the next sub-section tries to address.

Table 3.1: Stationary test saving and investment variables

Variable	Level		First difference		Order
	With constant	With constant and trend	With constant	With constant and trend	
National					
lergdp	0.9980	0.3262	0.0000	0.0000	I(1)
lgdi	0.0012	0.1108.	0.0000	0.0000	I(1)
lgds	0.1397	0.2171	0.0000	0.0000	I(1)
Oromia					
lorgdp	0.9688	0.4745	0.0000	0.0001	I(1)
logdif	0.1360	0.2786	0.0000	0.0003	I(1)
logdsf	0.7031	0.4843	0.0000	0.0000	I(1)

Using data from 1999/00-2020/21, we conducted the unit root test for both national level and regional level data using Augmented Dickey Fuller (ADF) test. The null hypothesis of the series has a unit root (or non-stationary) is tested against the alternative with and without trend. As shown in Table 3.1, we fail to reject the null hypothesis when we test variables' stationary at their level. This is true for all variables particularly in the second model (with trend). However, we reject the null of non-stationary variables when we conduct the test at their first difference. This implies that all variables are integration of order one. As there is no any variable with I(2), we can safely proceed with the ARDL model.

3.2.3. Model Results and the ARDL-Bounds Cointegration Test

The long-run relationship between saving and investment as well as their short-run dynamics are estimated from the EC reparameterization of the ARDL model which has been specified in eq. (2.8). It is reasonable to assume that saving is a long-run forcing (and weakly exogenous) variable for investment at both country and region level (Narayan, 2005). To facilitate comparison between the national and regional model parameters, we limit both data to the same period, based on maximum availability for Oromia aggregates. Following Kripfganz & Schneider

(2022) we recovered the EC representation of the model as a post estimation task of the ARDL model estimates.

For both national and Oromia case, the model was estimated with and without the time trend variable through the constant term was included in both cases. Akake information criteria (AIC) and Bayesian information criteria (BIC) were used to determine the optimum lag length combination and both of them picked (3, 0) for national data with and without trend as well as Oromia with trend; whereas lag length of (2, 0) was selected for Oromia without trend.

Unlike the VEC model, the ARDL model does not require pretesting for cointegration before estimation. Therefore, we estimated the EC parameterization of the model and presented the results in Table 3.2 for national data and Table 3.3 for Oromia region using log of saving and investment from 1999/00-2021/22. In both Column 1 to column 3 are results of each model without time trend while the last three columns are estimates with time trend. The three columns are associated with the three parameters of interest in the error correction model: the adjustment parameter (ADJ), the long-run coefficient (LR), and the short-run coefficients (SR).

Table 3.2: Error Correction representation of the ARDL model result for national data since 1999/00

Variables	(1) ADJ	(2) LR	(3) SR	(4) ADJ	(5) LR	(6) SR
LD.lgdi			0.375			0.395
			(0.248)			(0.339)
L2D.lgdi			0.649***			0.660**
			(0.212)			(0.248)
L.lgdi	-0.757***			-0.780**		
	(0.200)			(0.327)		
lgds		0.435***			0.420**	
		(0.0710)			(0.171)	
t						0.000688
						(0.00762)
Constant			1.663***			1.731*
			(0.456)			(0.881)
Observations	22	22	22	22	22	22
R-squared	0.578	0.578	0.578	0.578	0.578	0.578

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Consistent with the theoretical prediction, the adjustment parameter is negative and significant in all the 4 models presented in Table 3.2 and Table 3.3. However, in the ARDL framework, we cannot take the LR coefficient in its face value as evidence of long-run association without checking for the presence of cointegration between saving and investment. We used the ARDL-Bounds Cointegration test developed by (Pesaran et al. 2001). This test is conducted in three steps, as noted in Kripfganz & Schneider (2018).

- **Step1:** Conduct F-test for the joint hypothesis that

  $H_0^F: (\alpha = 0) \cap \left(\sum_{j=0}^{q} \beta_j = 0\right)$ against the alternative hypothesis

  $$H_1^F: (\alpha \neq 0) \cup \left(\sum_{j=0}^{q} \beta_j \neq 0\right)$$

- **Step 2:** If the null in step 1 is rejected, then conduct t-test for a single hypothesis with a null that $H_0^t: \alpha = 0$ against the alternative $H_1^t: \alpha \neq 0$
- **Step3:** If H_1^F is rejected, use conventional z-tests (or Wald tests) to test whether the elements the long-run coefficients are individually (or jointly) statistically significantly different from zero.

Since the test statistics in step 1 and 2 do not follow the standard distribution, we need to compare them with a critical values of Kripfganz & Schneider (2020).

Table 3.3: Error Correction representation of the ARDL model result for Oromia data since 1999/00

Variables	(1) ADJ	(2) LR	(3) SR	(4) ADJ	(5) LR	(6) SR
L.logdif	-0.708***			-0.754***		
	(0.240)			(0.215)		
logdsf		-0.234**			0.0290	
		(0.107)			(0.162)	
LD.logdif			0.394*			0.405*
			(0.222)			(0.198)
t						-0.0142**
						(0.00598)
Constant			2.408**			2.326***
			(0.866)			(0.773)
Observations	22	22	22	22	22	22
R-squared	0.332	0.332	0.332	0.498	0.498	0.498

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 3.4 for national data and Table 3.5 for Oromia data summarize this bound test results for both model indicated in two panels (Panel A and Panel B). In the national model, the null of step 1 test is rejected at 5 % and 10% but not at 1% for the first model. Therefore, we need to proceed to the next two steps of the test. In both individual test of the adjustment parameter and the long-run coefficient, we reject the nulls. This suggests some evidence that the two variables are cointegrated. In the model estimated without trend, however, we fail to reject the null in the first step implying that there is no long run relationship between saving and investment in Ethiopia.

Table 3.4: Pesaran, Shin, and Smith (2001) bounds test result for national data, since 1999/00

Panel A: without trend								
Ho: No level Relationship			F = 7.167					
Case: 3			t = -3.779					
	10%		**5%**		**1%**		**P-value**	
	I(0)	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
F	4.396	5.338	5.641	6.762	8.859	10.425	0.023	0.041
t	-2.607	-2.976	-2.994	-3.391	-3.821	-4.278	0.011	0.025
Panel B: With trend								
Ho: No level Relationship			F = 5.225					
Case: 3			t = -3.385					
	10%		**5%**		**1%**		**P-value**	
	I(0)	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
F	6.190	7.146	7.753	8.896	11.797	13.412	0.156	0.221
t	-3.206	-3.507	-3.616	-3.946	-4.510	-4.898	0.329	0.421

Similarly, the Pesaran, Shin, and Smith (2001) bounds test have been conducted for Oromia data (Table 3.5). The combination of the three step tests unequivocally indicate that saving and investment in Oromia are not cointegrated. In both national and Oromia data there is a suggestive evidence that correlation between saving and investment is weak. Taking the H-F hypothesis in mind, our finding implies that there is a capital mobility both at cross nationals and cross-regions.[9] This is consistent with the I-S gap we witnessed in the descriptive analysis

[9] The direction of capital mobility for Oromia is implied by our descriptive analysis in the next section.

of the previous sub-section where part of investment has been financed by foreign saving. It should be clear that the weak linkage between saving and investment does not imply that domestic saving is important. It is still important to mobilized more domestic resources to reduce reliance on foreign capital and modernize institutions that channels savings to productive investments.

Table 3.5: Pesaran, Shin, and Smith (2001) bounds test result for Oromia data, since 1999/00

Panel A: without trend								
Ho: No level Relationship	F = 4.423							
	t = -2.951							
	10%		**5%**		**1%**		**P-value**	
	I(0)	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
F	4.411	5.315	5.637	6.706	8.767	10.240	0.099	0.158
t	-2.621	-2.981	-3.000	-3.388	-3.806	-4.251	0.55	0.105
Panel B: With trend								
Ho: No level Relationship	F = 7.905							
	t = -3.507							
	10%		**5%**		**1%**		**P-value**	
	I(0)	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
F	6.215	7.116	7.742	8.812	11.636	13.130	0.047	0.072
t	-3.223	-3.515	-3.624	-3.943	-4.491	-4.865	0.061	0.101

3.2.4. Robustness Checks

We have conducted a number of robustness tests to ensure reliability of our result regarding the saving-investment nexus. The main tests one should check for in using the ARDL model as suggested by Kripfganz & Schneider (2022) have been conducted for both national and Oromia data. Whenever possible, we try to report the results from Oromia data to keep the readability of the document.

3.2.4.1. Expanding the Time Series for the Region

Most time series models needs a long time data for the asymptotic properties of the models to be valid. Though the ARDL is relatively robust in short time series, the fact that data for Oromia is available only 1999/00-2020/21and our models estimated so far are based on this limited observations could affect our

result. Whenever possible, having a long time series is always desirable. In the absence of the low frequency data how can we achieve a long term series? We tackle this empirical question using backcasting and nowcasting techniques (Chow & Lin, 1971; de la Fuente, 2014; United Nations, 2018).

The idea is that we have GDP and related data for Ethiopia for a long enough period. But Oromia start estimating regional GDP in 1999/00. That mean Oromia's GDP data is missing before this period while both the national data and Oromia's data are available since from 1999/00 onwards. Using the overlapping period data, we can use a regression technique to estimate the parameters linking the national GDP with Oromia GDP. Using these parameter estimates we backcast Oromia's GDP from 1998/99 to 1991/92. Since the Oromia region itself was established in 1992 by the transitional government of Ethiopia, it is inconceivable to backcast beyond this period.

Table 3.6: EC representation of the national data with full data with and without trend, since 1991/92

Variables	(1) ADJ	(2) LR	(3) SR	(4) ADJ	(5) LR	(6) SR
LD.lgdi			-0.237			-0.0293
			(0.201)			(0.304)
L2D.lgdi			0.362**			0.495**
			(0.167)			(0.222)
D.lgds			0.235**			0.242***
			(0.0829)			(0.0837)
LD.lgds			0.165*			0.169*
			(0.0824)			(0.0829)
L.lgdi	-0.144			-0.351		
	(0.128)			(0.260)		
lgds		-0.292			-0.102	
		(0.836)			(0.299)	
t						0.00504
						(0.00551)
Constant			0.601*			1.181
			(0.294)			(0.699)
Observations	27	27	27	27	27	27
R-squared	0.563	0.563	0.563	0.581	0.581	0.581

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In addition, the 2021/22 data for Oromia was not released at the time of the data collection of this study while the national one was out. Again, we had to nowcast the current period data for Oromia using its one period lag value. Once we had the estimated GDP data for missing periods, we easily estimated the missing gds and gdi data for the region using the same method as above.

By doing so, we are able to extend the data for 31 years and used this relatively longer period data to re-estimate the models for Oromia as well as the entire economy. This is one of the serious robustness checks we did in this study. We estimated all the models again and examine the existence of cointegration in which Oromia model includes the dummy for structural breaks. At this time the optimum lag length of the model is (3, 2) for the national data and (1, 0) for Oromia data. Table 3.7 presents the estimates of the EC parameterization of the model for the national data while Table 3.8 depicts the results of Oromia EC model with the full data. Based on these new estimates, the bound tests for cointegration have been conducted. In all specifications for both national and Oromia, saving and investment are not cointegrated. This implies that our model result is less likely to be affected by the short time span we have.

Table 3.7: EC representation of model estimates for Oromia full data with and without trend

Variables	(1) ADJ	(2) LR	(3) SR	(4) ADJ	(5) LR	(6) SR
L.logdif	-0.483**			-0.454**		
	(0.193)			(0.201)		
logdsf		0.152			0.0737	
		(0.450)			(0.494)	
post2011_12			-0.127			-0.0429
			(0.144)			(0.197)
t						-0.00391
						(0.00619)
Constant			1.192			1.258
			(0.801)			(0.818)
Observations	27	27	27	27	27	27
R-squared	0.229	0.229	0.229	0.243	0.243	0.243

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

3.2.5. The ARDL Model and Short-Run Dynamics

In all the efforts made so far, it is evident that saving and investment do not have a strong connection in the long-run. In this situation, we need to end-up on estimating the ARDL model to learn about their correlation in the short-run (Kripfganz & Schneider, 2022). As a result, our final estimations boils down to the usual single equation ARDL model. We estimated this model using the full data with lag length of (3,2) and (1,0) for national data and Oromia, respectively. In both cases and all specifications, the lag of investment is positive and significant. As far as saving, our variable of interest, is concerned, it has a transitory positive and significant effect on investment in the national data while its association with investment in Oromia is negligible.

Table 3.8: ARDL model result for national and Oromia full data

Variables	National		Oromia	
	without trend	with trend	without trend	with trend
	(1)	(2)	(3)	(4)
L.lgdi	0.6191***	0.6197***		
	(0.1914)	(0.1922)		
L2.lgdi	0.5988**	0.5241**		
	(0.2163)	(0.2320)		
L3.lgdi	-0.3620**	-0.4949**		
	(0.1666)	(0.2216)		
lgds	0.1928**	0.2065**		
	(0.0786)	(0.0804)		
L.lgds	-0.0704	-0.0736		
	(0.0883)	(0.0887)		
L2.lgds	-0.1645*	-0.1686*		
	(0.0824)	(0.0829)		
t		0.0050		-0.0039
		(0.0055)		(0.0062)
L.logdif			0.5168**	0.5457**
			(0.1933)	(0.2012)
logdsf			0.0733	0.0335
			(0.2110)	(0.2229)
post2011_12			-0.1267	-0.0429
			(0.1435)	(0.1969)
Constant	0.6011*	1.1808	1.1918	1.2576
	(0.2938)	(0.6993)	(0.8008)	(0.8181)
Observations	27	27	27	27
R-squared	0.860	0.866	0.476	0.486
Adjusted R-squared	0.818	0.817	0.408	0.392

Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

This result implies that capital is generally mobile both in Ethiopia in general and in Oromia region though the result does not tell us the direction of the capital flow. That would be explore in the next section using qualitative information. As a last remark, readers should aware that the absence of long-term correlation between saving and investment does not mean that saving is not important for boosting investment. Needless to say, promoting saving has a multidimensional effect besides financing investment. Reducing fiscal deficit, lessening external debt burden, ensuring sustainability are among the benefits of increasing aggregate saving.

4. SAVING AND INVESTMENT FINANCING

This section explores the investment finance and the key sources of loanable fund, mainly domestic saving, in Oromia in comparison with other regions and the national average. We start by highlighting the some of the investment financing mechanism at macro level.

4.1. The Investment Financing Mechanisms at National Level

In the previous section, we underline that there has been a considerable S-I gap at national level. It is clear that the economy needs to inject additional resources to fill the domestic S-I gap. This resource is a foreign saving which is challenged to investment on different ways. It had been argued that the investment financing in Ethiopia has been gradually shifted towards foreign direct investment (FDI), net income transfers, and external borrowings (World Bank, 2013).

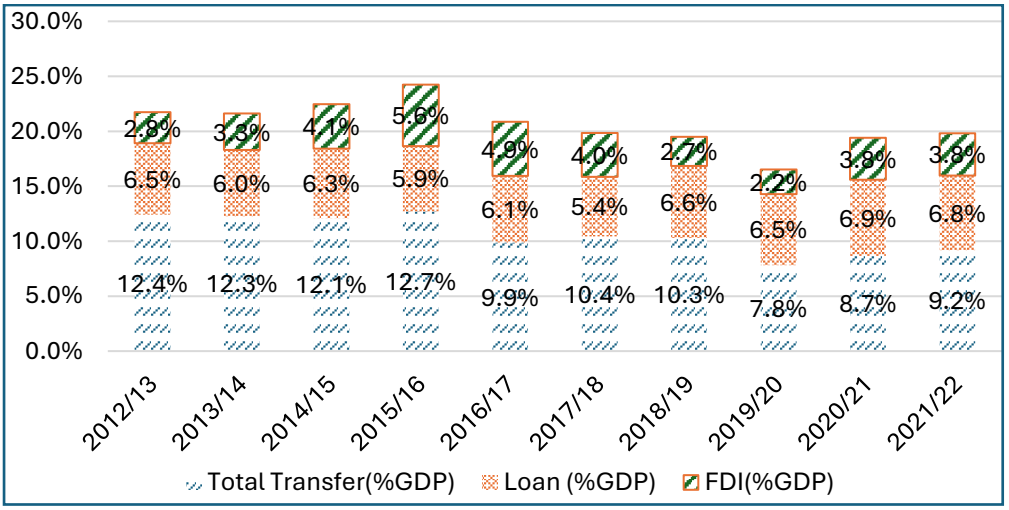
Figure 4.1 shows the relative importance of these sources of finance in comparison with the domestic annual loan total disbursement at national level.[10] Accordingly, the net income transfer such as remittance takes the lion's share over the past ten years, with 9.2% of GDP in 2021/22, for instance.[11] The net income transfer could be either private or public transfer. This source has been increasing since the last decade with a huge jump of the private transfer in 2021/22 due to the

[10] We would like to highlight this issue at the national level since data disaggregated by regions is missing in most cases.

[11] In fact, the category of private transfers', as employed by the NBE, incorporates three sub-categories: 'cash (official)', 'in kind' and 'underground private transfers (estimated)'.

increased in formal and informal remittance and huge volume of food aid inflows associated with the war in Northern Ethiopia and Covid-19 pandemic (Figure 4.2)[12].

Figure 4.1: Sources of investment finance by major components overtime (national)

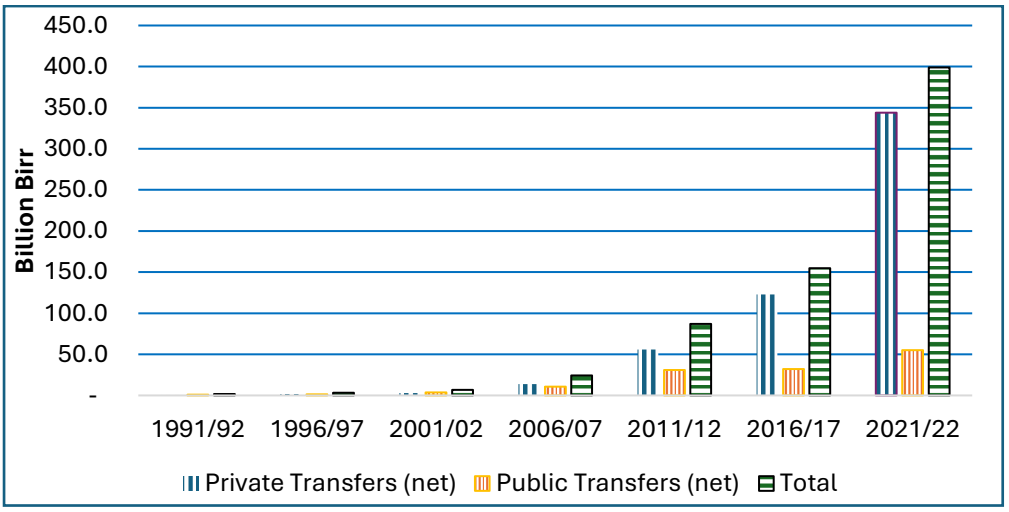


Source: Own computation from NBE data

FDI capital inflow is also considerable with a decade's maximum value of 5.6% that Ethiopia attracted in 2015/16. Further, the domestic loan disbursement has been smooth over time with 6%-7% of GDP. This finding reaffirms the view that the inflow of foreign capital is imperative to finance the domestic investment in Ethiopia.

[12] In-kind food aids provided by international aid organizations and donors are registered under private transfers, as confirmed by experts in NBE during our data collection.

Figure 4.2: Net transfers in billions of Birr (National)



Source: Own computation from NBE data

4.2. The state of Saving and Banks' Deposit Mobilization

4.3.1. Banks' Deposit as Main Source of Formal Saving

Savings fuel investments which in turn drive economic growth. Higher savings rates increase the amount of funds available for investment, which leads to increased business activity and job creation. However, insufficient investment can lead to lower productivity and slow economic growth. Financial intermediaries are the key actors to facilitate the demand and supply of investment finance.

The financial sectors play key role in lubricating the real sector of the economy. It is instrumental in the process of economic transformation. It is with finance that investment can be accelerated, production can be boosted and thus employment is generated. Financial sectors contribute to the efficient allocation of resources in the economy through channeling funds from less productive sector to productive investment. Finance is considered as blood cell to the real sector of the economy. In economies like Ethiopia where supply for financial low and the market is imperfect, the role of financial sectors to the economy is crucial.

Banks are the main financial intermediaries as far as the Ethiopian investment ecosystem is concerned. They provides deposit, credit, international banking, international trade service, money transfer and foreign exchange service, electronic payment services, and interest free banking services. Data from the national bank of Ethiopia shows that as of June 30, 2022, there were 23 commercial

banks (22 private and 1 public; leaving DBE aside) that mobilize deposits. These banks collectively managed to mobilize a total deposit of about 1.75 trillion birr to as of the end of last fiscal year, increased from 235.9 billion birr in 2012/13 (Table 4.1). About 48% of banks' deposit in 2021/22 was collected by the private banks while the remaining 52% was collected by public banks (Figure 4.3).

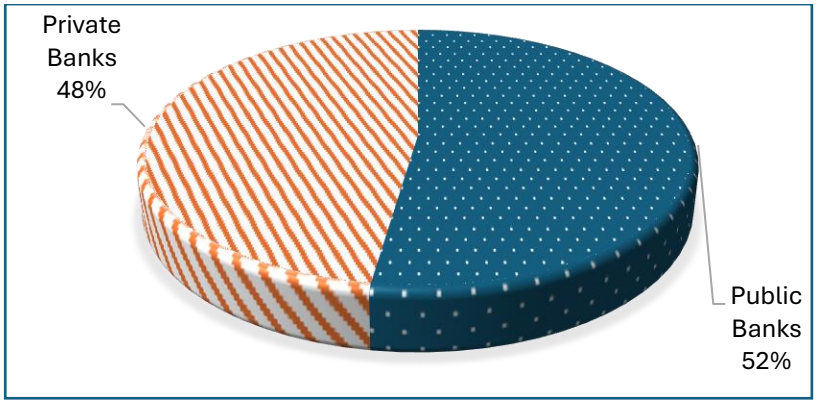
Looking into the regional distribution of this deposit, in the year 2021/22, banks' deposit in Oromia raised near to 255 billion birr from 26.6 billion birr in 2012/13. This mean banks' deposit in Oromia increased by 858.6% over the last ten years. Currently, the share of banks' deposit in Oromia accounts about 14.6% of the same deposit in the country. This share has shown a modest increment over time, 3.3 percentage points up in a decade (Table 4.1).

Table 4.1: Deposit mobilized by the banking sector in billions of Birr and Oromia's Share in %, 2012/13-2021/22

S.no	Year	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
1	Oromia	26.61	34.58	45.51	53.62	70.91	92.33	120.83	148.86	212.82	254.95
2	Addis Ababa	155.01	189.11	232.97	266.98	348.55	455.85	556.59	655.69	823.08	1026.86
3	Afar	1.23	1.55	1.60	2.67	3.54	4.27	4.84	6.09	8.20	9.68
4	Amhara	20.16	26.95	35.37	45.97	57.72	71.79	87.02	109.11	160.18	221.26
5	Benishangul	0.97	1.32	1.90	2.38	2.41	2.88	3.26	3.92	6.16	7.07
6	Dire Dawa	2.85	3.78	4.39	5.55	6.31	8.05	10.39	13.02	18.86	21.40
7	Gambella	1.08	0.65	0.98	1.09	1.37	1.69	2.44	3.04	3.78	5.29
8	Harar	0.73	1.78	2.30	2.65	2.96	3.68	5.22	6.36	8.22	9.22
9	SNNP	12.59	14.71	18.56	23.55	30.07	37.96	44.82	55.45	79.35	56.59
10	Somali	2.03	2.47	3.32	4.81	7.89	8.81	10.16	14.24	19.66	17.88
11	Tigray	12.68	14.53	19.40	26.11	34.83	42.75	54.40	67.31	76.88	78.34
12	Sidama	0.00	0.00	0	0	0	0	0	0	0	26.37
13	SWERS	0.00	0.00	0	0	0	0	0	0	0	10.53
Total		235.93	291.42	366.28	435.36	566.57	730.06	899.97	1083.08	1417.18	1745.43
Oromia's Share (%)		11.28	11.87	12.42	12.32	12.52	12.65	13.43	13.74	15.02	14.61

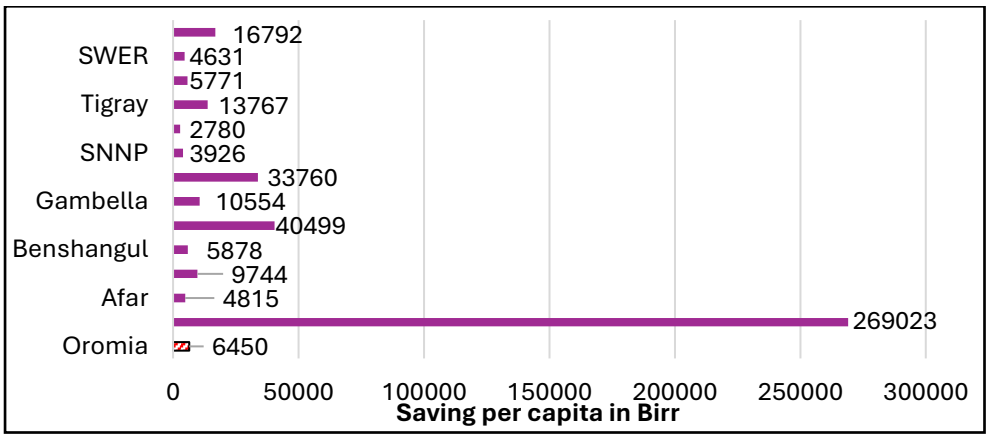
Source: Own computation from NBE data

Figure 4.3: Deposit share between public and private banks in 2021/22, national



Nonetheless, this absolute figure is not a good measure of saving performance comparison among regions as region vary by their scale. Therefore, we have computed the per capita deposit of Oromia as compared to other regions and the national average using mid-years population data calculated from (CSA, 2013). As depicted in Figure 4.4, the bank deposit per capita of Oromia in 2021/22 was just Birr 6450 which is much lower than the national average (16,792), and many regions like Tigray (13767) and Amhara (9744), for instance. As expected, the highest deposit per capita is observed for Addis Ababa (269,023) since deposits from various types of organizations, businesses, government, and wealthy individuals are situated in the capital. This implies that there is still a potential to further improve saving in Oromia.

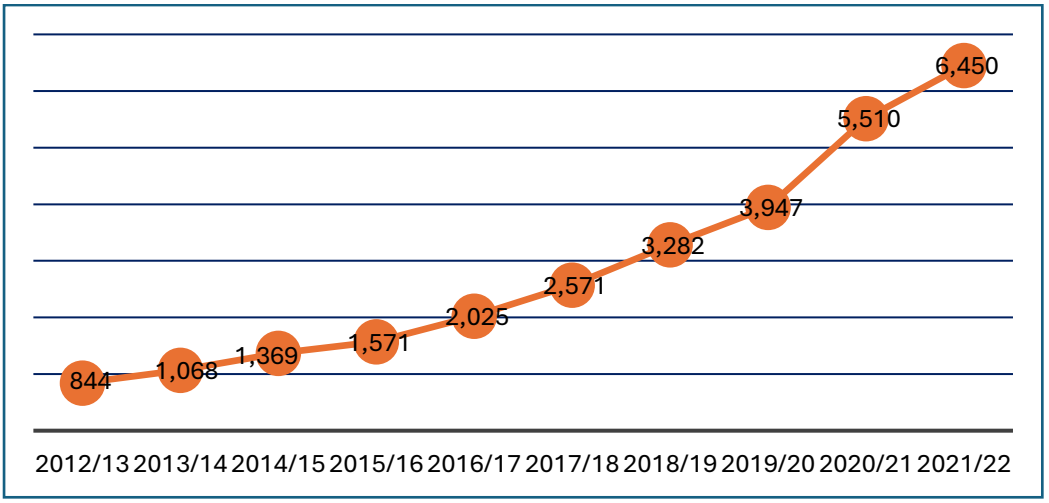
Figure 4.4: Banks deposit per capita by regions, 2021/22



Source: Own computation from NBE and CSA data

When we see the trends of banks' deposit per capita in Oromia over the last decade, however, it has been increasing impressively. It has increased by more than 6 folds within ten years, from Birr 844 in 2012/13 to 6450 in 2021/22 (Figure 4.5).

Figure 4.5: Banks' deposit per capita in Oromia over the last ten years



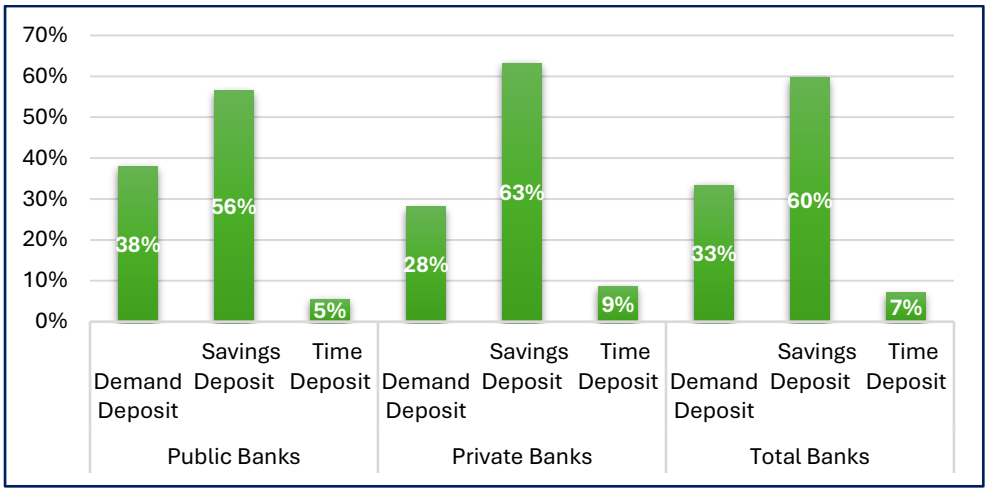
Source: Own computation from NBE data

4.3.2. Structure of Banks' Deposit

Saving in Ethiopia is generated from different economic agents. Major actors of the bank's deposit mobilization are households (rural and urban), individual savers, government, state owned enterprises, local companies, FDI firms, and NGOs. Micro, Small and Medium enterprises, corporate customers, formal and informal associations, borrowers, foreign and local investors, and large business (wholesale and corporate customers).

The distribution of deposit by demand deposit, saving deposit and time deposit disaggregated by bank ownership are depicted in Figure 4.6. Accordingly, saving deposit are the major types of banks' deposit liability (60%) followed by demand deposit (33%). This types of deposit structure shows that banks in Ethiopia need to remain liquid enough to fulfill the cash requirements of depositors.

Figure 4.6: Structure of deposit by banks in 2021/22



Source: Own representation from NBE data

4.3. Investment Financing: Loan Disbursement

4.4.1. Trends of Loan Disbursement by Banks

According to our interview with investors', bank loan is the second largest source of finance at initial stage of the projects next to personal saving and the first source for their financial demand for expansion followed by personal saving and retained earing. In general, internal investment financing policy in the form of retained earnings is poor in some projects (30%), while others reported 70-100% percent of investment profit could be used to expand investment. This implies that bank finance is a key for investment.

Access to loan is considered as the backbone of investment in any country either through directly financing the investment expenditure (investment loan) and enhancing consumption demand (consumer loan). In Ethiopia, the financial sector provides working capital loans and lease financing (machineries, tools, and combiners, tractors, etc.) to help borrowers expand existing business or facilitate both local and international trade activities. Saving deposit, and loan collections from customers, retained earnings, capital, and government transfers are main source of loanable funds, according to our survey.

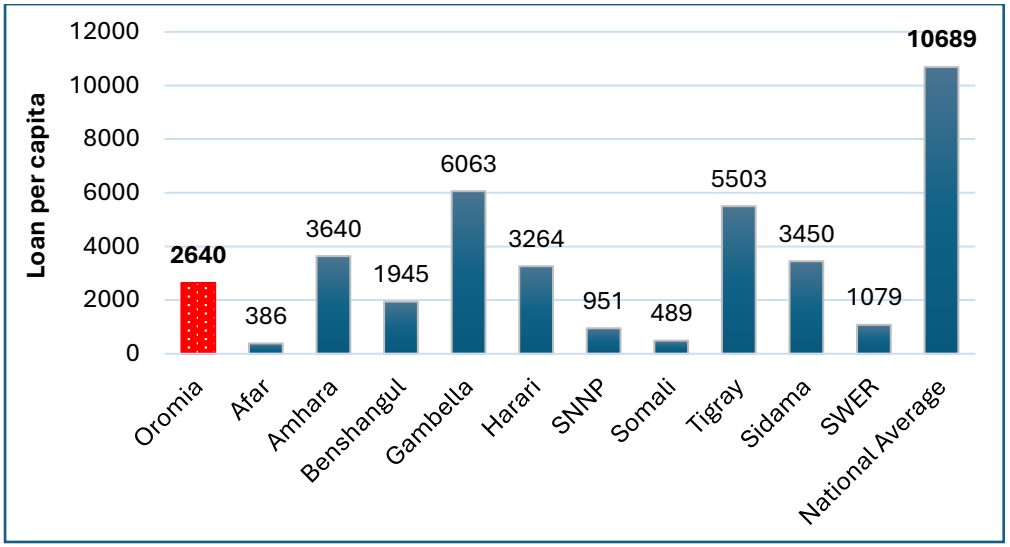
Table 4.2: Loan disbursement by banks in billions of birr overtime by regions and share of Oromia

Year	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Oromia	7.3	10.2	15.7	17.7	22.6	28.4	39.8	49.4	71.8	104.4
Addis Ababa	104.1	135.9	173.0	213.3	258.3	326.1	411.9	507.5	660.4	834.9
Afar	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.8	0.8
Amhara	7.8	8.5	9.5	10.3	11.4	14.0	19.0	27.0	40.0	82.7
Benshangul	0.1	0.1	0.2	0.3	0.5	0.9	1.0	1.4	1.4	2.3
Dire Dawa	0.9	1.3	1.8	2.5	3.2	3.4	5.0	6.9	13.8	15.7
Gambela	0.1	0.1	0.1	0.1	1.9	2.2	2.6	2.8	2.8	3.0
Harar	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.8	0.9
SNNP	6.2	7.0	9.7	10.6	13.4	14.5	18.3	19.2	30.6	13.7
Somali	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	1.0	3.1
Tigray	4.3	5.1	6.7	7.9	10.4	12.0	17.2	25.0	32.5	31.3
Sidama	-	-	-	-	-	-	-	-	-	15.8
SWERS	-	-	-	-	-	-	-	-	-	2.5
Total	131.0	168.4	217.2	263.3	322.3	402.4	515.9	640.5	856.0	1,111.1
Oromia's share	5.6%	6.0%	7.2%	6.7%	7.0%	7.1%	7.7%	7.7%	8.4%	9.4%
AA Share	79.4%	80.7%	79.7%	81.0%	80.1%	81.0%	79.8%	79.2%	77.2%	75.1%

Banks' loan disbursement in Ethiopia over the last ten years disaggregated by regions are presented in Table 4.2. In the last fiscal year banks in Ethiopia disbursed about 1.1 trillion birr, increased by 750% since 2012/13. The loan disbursed to Oromia region in 2021/22 was 104.4 billion birr which accounts 9.4% of the total loan disbursement of the year. The amount of loan disbursed to the region has been increasing over time. More than 3/4th of the banks' loan has been given to borrowers in Addis Ababa. Alike Oromia, other regions of the country take a small fractions of banks' loan. This could be due to the fact that most investment projects of the country are concentrated in and around Addis Ababa.

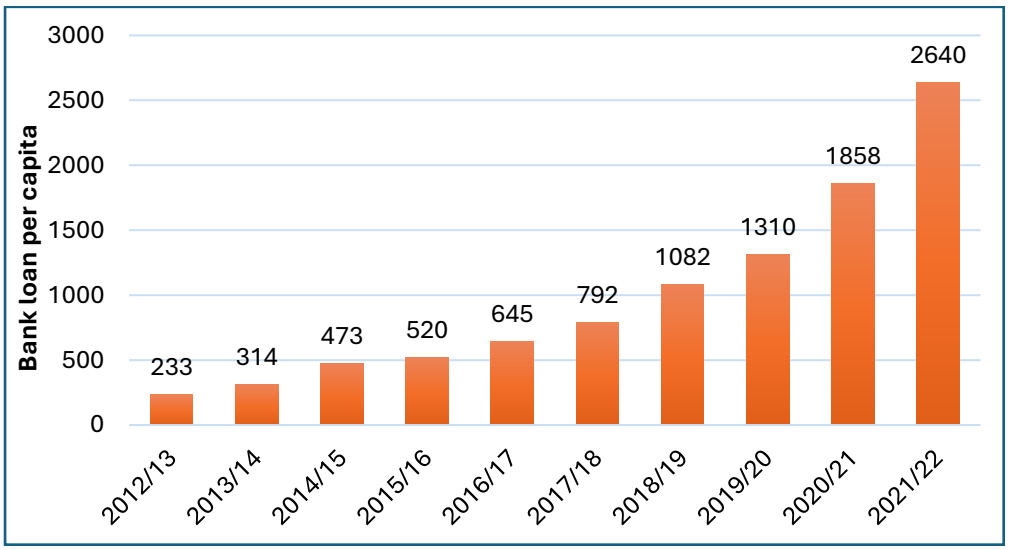
As a more precise measure of loan penetration in Oromia in comparison with other regions, Figure 4.7 presents the loan disbursement per capita in most recent period. Accordingly, the loan disbursement per capita in 2021/22 was nationally averaged at Birr 10,689 while it was about Birr 2640 for Oromia. Like that of the deposit case, Oromia is behind many of the major regions in loan disbursement per capita at this time though it has been improving overtime (Figure 4.7 and Figure 4.8).

Figure 4.7: Loan disbursement per capita for Oromia and other regions in 2021/22.



Notes: The loan disbursement per capita for Addis Ababa (218,727) and Dire Dawa (29,799) are excluded from the graph since these are outside of the graph's scale and not typical regions to compare with Oromia.

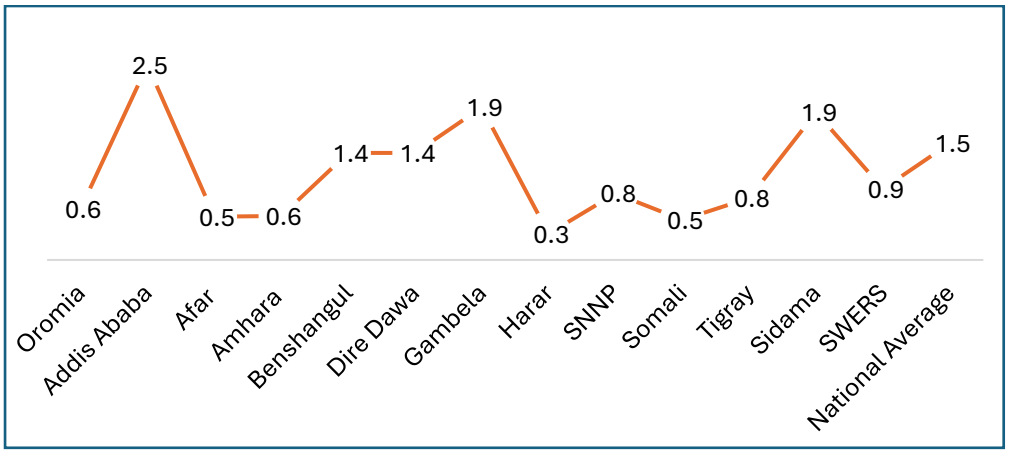
Figure 4.8. Trends of banks' loan disbursement per capita in Oromia, 2012/13-2021/22



One of the challenges for investors to expand investment is insufficient funds which is partly due to the small size of loan they manage to get from formal

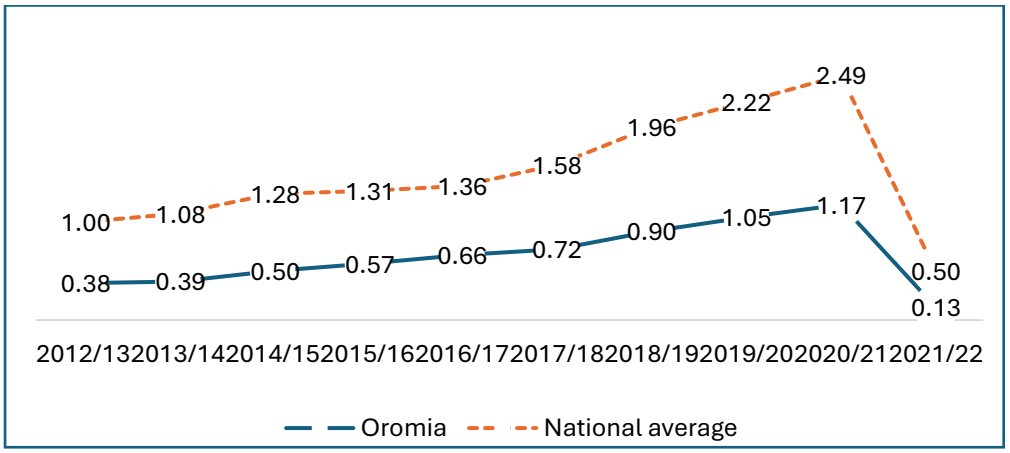
financial institutions. In this regard, we have examined the average size of loan in Birr lent to a borrower over the past ten years. On average the loan size for a borrower from the banking sector has been 1.5 million birr as a country and 600,000 Birr for Oromia, which generally low (Figure 4.9). Addis Ababa, Gambella, and Sidama have had a relatively larger loan size. When we see the trends of loan size in Oromia in comparison with the national average overtime, it was modestly increasing until 2020/21. Despite the rise in total amount of loan disbursed in Oromia, the average loan size sharply declined in 2021/22 due to a dramatic increase in the number of borrowers (Figure 4.10).

Figure 4.9: Loan size per borrower in millions of Birr, Past 10 years' average



Note: Sidama and SWERS regions data is only for 2021/22

Figure 4.10: Trends of loan size per borrower in millions Birr



In conclusion, there is a regional disparity in both deposits mobilized and loan disbursed by the banking sector. Table 4.3 summarizes the gap between Oromia and other regions as well as the national average in terms of both deposit per capita and loan disbursement per capita in 2021/22. Accordingly, the national average deposit per capita and loan per capita exceeds from that of Oromia by Birr 10342 and 8049, respectively. Another example on how to interpret numbers in Table 4.3, for instance, as compared to Oromia, deposit per capita in Sidama region was less by Birr 679 in 2021/22 while its loan per capita was higher by Birr 810.

Table 4.3: Summary of regional gaps in deposit and loan per capita (Oromia Vs Others), 2021/22

Region	Gaps in deposit per capita	Gaps in loan per capita
Addis Ababa	262574	216087
Afar	-1635	-2254
Amhara	3294	1000
Benishangul	-572	-695
DD	34050	27159
Gambella	4104	3423
Harari	27310	624
SNNP	-2524	-1689
SWER	-1819	-1561
Sidama	-679	810
Somali	-3670	-2151
Tigray	7318	2863
National Average	10342	8049

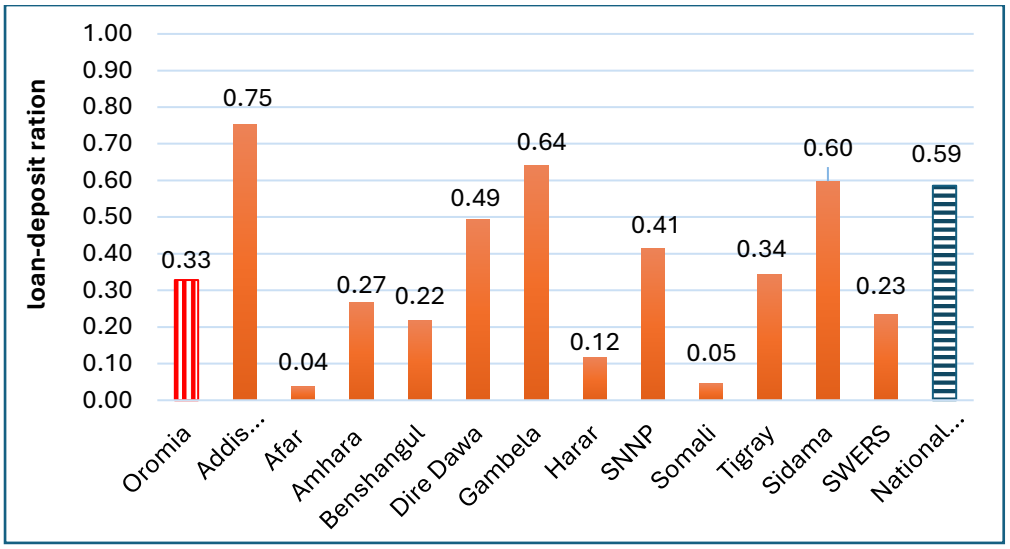
Note: Oromia is the base category in this gap analysis.

The propensity to Invest locally Mobilized Resource: The banks' Experience One of the research question we intend to answer is that how much of the savings of a regions is channeled to investment within the region. This gives some insights about the inter-region capital mobility in the country.[1] This question could be relevant from the distributional perspective though it contradicts with the principle

[1] This question was motivated by the interest of the client reflected during the inception workshop.

of efficient allocation of resource that financial intermediaries are supposed to improve it.

Figure 4.11: Loan-deposit ratio by regions, Average 2012/13-2021/22



Source: Own computation

To this end, we have developed index called loan-deposit ratio using the 10-years average deposit and loan data of each region. This ratio enables us to measure how much money is pumped back to the region for a one birr deposit the region makes in commercial banks of the country. The propensity to invest locally mobilized resources in the same regional state is analyzed using this index. As shown in Figure 4.11, on average, banks in Ethiopia disburse 59 cents in the form of various types of loan for each Birr they collect as deposit. In this regard, Oromia gets 33 cents for each Birr it deposit in the banks operated in the region. That mean 1/3rd of the banks deposit in Oromia pumped back to the regional economy in the form of loan. Regions with loan-deposit ratio above the national average are Addis Ababa (0.75), Gambella (0.64), and Sidama (0.6). When we restrict the period to 2021/22, Oromia's loan-deposit ration raises to 0.41while the national average is about 0.64.

However, it should also be noted that bank's annual loan disbursement is not solely dependent on the loan mobilized in the same period. Collection of previous loans and other incomes sources of the bank are also imperative in the loan disbursement capacity of banks at a given year.

Overall, the result implies that regional disparity in loan disbursement in comparison with the savings mobilized in the same area is prevalent. Our key informants argue that one major reasons for this disparity is the fact that loan decisions of banks are mainly done at central level and districts and branches role in investment decisions are either nil or minimal. There are some initiatives by banks to decentralize the loan decision to districts, but it's too restrictive with a maximum limit of 30-40 Million birr.

In addition, a national average of 0.59 deposit-loan ratio also partly indicates that there has been various requirements for banks to keep more reserve than the legal reserve requirement which usually varies 5 to 15 percent, depending on the period. Our qualitative survey confirmed that banks required to purchase government bonds for the proportion of each loan they disburse (about 20% at this time). This unfavorable requirement coupled with the liquidity needs to banks and other factors weakens the banks' lending capacity to the private sector.

4.4.3. Loan Products and Beneficiaries

As compiled from the qualitative survey we had with the selected commercial banks, the banking sector in Ethiopia mainly provides the following major loan products to their customers.

- Overdraft Credit Facility
- Merchandise Loan Facility
- Warehouse Receipt Financing
- Pre-shipment Export Credit Facility
- Agricultural Output Financing for Cooperatives/Unions Against a Forward Delivery Contract with World Food Program (WFP)
- Import Letter of Credit Financing and Back to Back Letters of Credit Financing
- Letter of Guarantee Facility
- Collateralized commodity financing (CCF)
- Term loan (short –up to 2 years, medium term -2 to 5 years, long term loan- mature for more than 5 years)
- Agricultural machinery loan
- Diaspora/Mortgage loan

The sector also extends term loans that mature in three years, seven years and more than seven years. Loans could be extended for investment or consumption purposes. Some other products available on most banks also include:

- Motor Vehicle Loan
- Construction Machinery Loan , and special Construction Machinery and Dump Truck Loan
- Infrastructure construction term Loan
- Investment Financing for Enterprises Operating in Industrial Parks
- Partial Financing Term Loan
- Agricultural term loan
- Idea financing

Information obtained from the bank's KII revealed that, in sector wise, agriculture, manufacturing and foreign trade services, domestic trade service, exports, and construction/building projects were main financed sectors over the past 3 years. Large firms, priority sectors (manufacturing, agriculture, hotel and tourism) and exporters mostly succeed in accessing bank loans. Lack of collateral, project non-feasibility and incomplete application documents has been identified as main reasons for rejection of loan applications.

5. TRENDS, PECULIARITIES, AND STRUCTURE OF PRIVATE INVESTMENT IN OROMIA REGION

5.1. Profile of Investment Projects in Oromia

5.1.1. Overall Projects and their Status

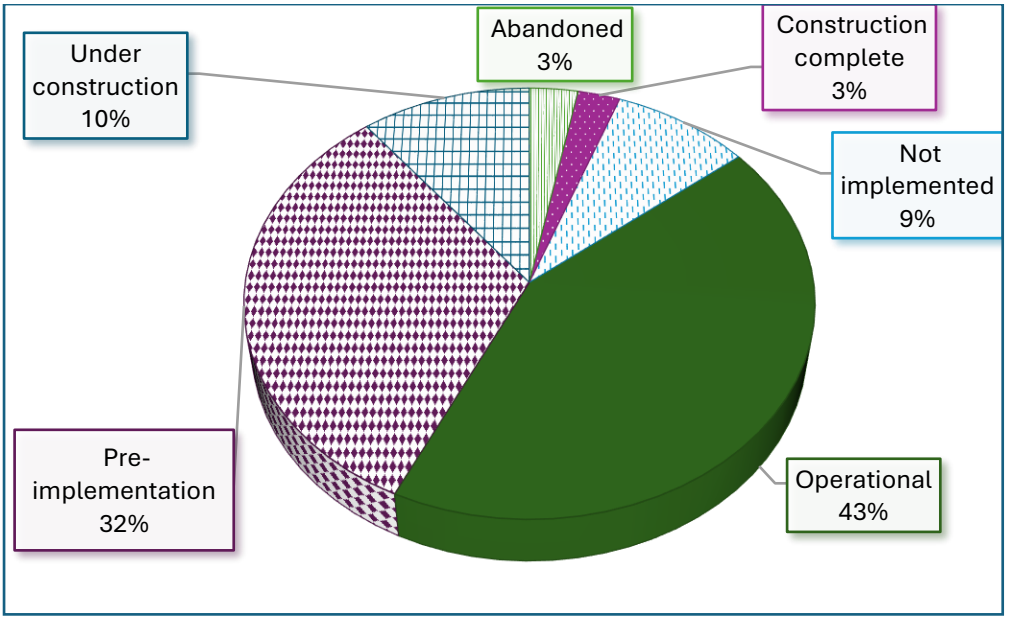
According to information obtained from Oromia investment bureau, about 20873 projects have been licensed for domestic and foreign investors since the establishment of the region in 1992. Of these projects, only 8926 are operational which implies that conversion rate of proposed projects into operational businesses (operational rate) is near to 43% (Figure 5.1). About 12% of the projects are either abandoned or not implemented at all. The remaining are in pre-implementation (32%), under construction (10.5%), and construction complete

(3%) status for which their final fate is unknown. Accordingly, from the operational projects in the region, about 93% of them are owned by domestic investors and about 46% are in service sector.

By compiling Oromia's investment data from the region's investment bureau and the Ethiopian investment commission (EIC), we are able to disaggregate the project operational rate by domestic versus FDI. According to our estimation from the data, operational rate for domestic investors is 41.8% while it is 54.7% for FDI. Even, all operational projects are not operating at their full capacity for various reasons. For instance, data from the CSA shows that the capacity utilization rate of large and medium manufacturing firms in Oromia in the year 2015/16, latest available data, was about 63.6%. Assuming this capacity utilization rate for all sectors, the full capacity equivalent operation rate of projects in Oromia is about 27%. We can call it the capacity utilization-adjusted operational rates of projects in the region, which is a little bit higher than a quarter of the planned economic gains for which various incentives are provided. This implies that considerably large numbers of approved projects in Oromia have not been operational to bring about the intended economic benefits.

From the total projects licensed by the region, about 46% of them were licensed since 2019/20 (47% since the reform, 2017/18) showing that there is a growing investment demands in the region. Data from Oromia investment bureau shows that service (39%), agriculture (20%), agro-processing (20%), and manufacturing (15%) are the sectorial composition of the entire project licensed in the region. Further disaggregating implementation status by sector shows that operational rate is relatively higher for service sector with about 51% conversion rate, followed by agro-processing (44%) and manufacturing (38%), while the least in this respect is agriculture (33%). Since the recent reform, Oromia region pays due attention for domestic investors, mainly to promote farmer to investors. As a result, a-third of the licensed projects in the region are farmer-owned and almost all of them have been licensed over the last three years. So far, about 17% of the farmer-owned projects are operational while the majority (65%) of them are on pre-implementation stage.

Figure 5.1: Distribution of projects in Oromia by their implementation status, 1992-2022



Source: Own computation using data from Oromia investment bureau

Table 5.1: Sectorial distribution of investment projects in Oromia by implementation status (%

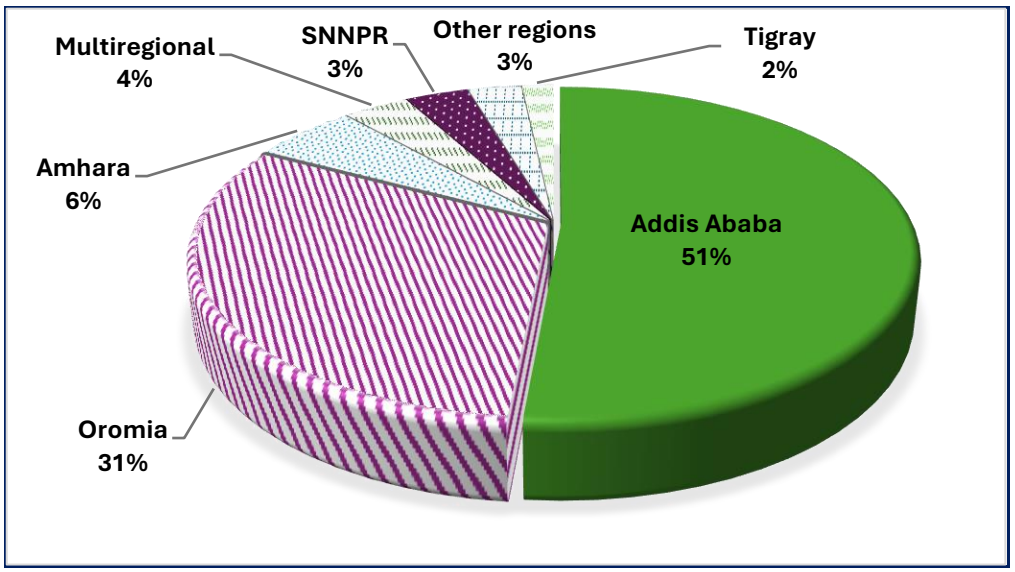
Main sector	Project status						
	Abandoned	Construction complete	Not Implemented	Operational	Pre implementation	Under Construction	Total
Agriculture	3.0	0.3	8.3	32.7	53.9	1.8	100
Agro Processing	3.0	3.7	11.1	43.8	32.1	6.4	100
Manufacturing	3.7	8.7	6.8	38.2	31.1	11.5	100
Service	2.8	1.8	8.2	50.9	18.0	18.4	100
Total	3.0	2.8	8.6	42.8	32.2	10.6	100

Source: Own computation using data from Oromia investment bureau

5.1.2. FDI projects in Oromia

Data from the EIC shows that from 22 August 1992 to 11 January 2023 nationally about 6141 FDI projects have been licensed; of which 3568 are operational. As expected, Oromia hosts the second largest number (31%) of FDI projects next to Addis Ababa (51%) (Figure 5.2).

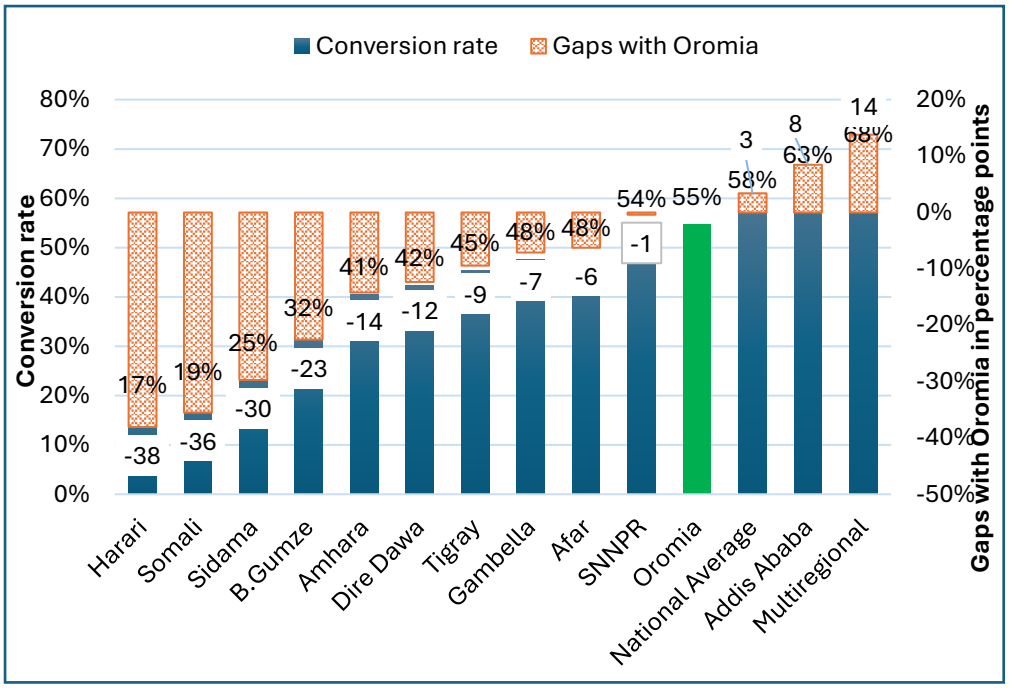
Figure 5.2: Distribution of FDI projects by regions in Ethiopia and Oromia's share



Source: Own computation using data from EIC

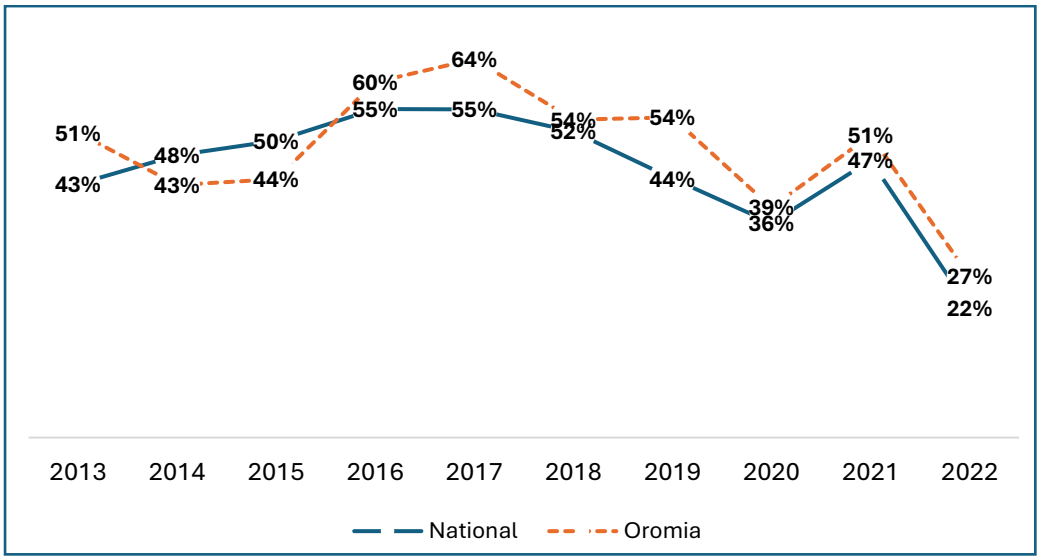
Figure 5.3 presents the conversion rate of FDI projects into operational firms for all regions (the primary axis) and the gaps of Oromia with other regions as well as the national average (secondary axis). As can be seen in the figure, operational rate of FDI projects in Ethiopia over the last three decades has been 58.1% while it is at 54.7% for Oromia, with a gap of 3 percentage points (Figure 5.3). FDI projects operating in multiple regions (multiregional) and Addis Ababa have higher success rate than that of Oromia with 68.5% and 63.2% operational rates, respectively. All other regions are weaker than Oromia as implied by the negative gaps in percentage points. Data from EIC indicated that operational FDI projects have been engaged in various sectors mainly in manufacturing (51%), real estate, machinery and equipment rental and consultancy service (19.8%), and agriculture (9.6%)

Figure 5.3: Conversion rate by region, average of 1992-2022



Source: Own computation using data from EIC

Figure 5.4: Trends of FDI conversion rate over the last 10 years (National Vs Oromia)



Source: Own computation from EIC data

To further understand the macroeconomic picture in comparison with Oromia in this regard, in Figure 5.4 we analyzed the proportion of operational FDI projects focusing on the last 10 years. The performance of the economy as a whole as well as the region in converting the licensed FDI projects into operational firms has declined over the past five years with a record low rate of about 22% for the country and 27% for Oromia in 2022. The last year's very low performance could be associated with the revoking of the country from AGOA initiative and deteriorations in local peace and security conditions.

The status of the FDI projects in Oromia is presented in Table 5.1. As can be seen in the table, about 1922 FDI projects have been registered in Oromia. As indicated earlier, 1052, 397, and 473 of them are in operational (54.7%), implementation (20.6%), and pre-implementation (24.6%) phases. The operational FDI projects in Oromia has registered about 67-billion-birr capital and created more than 231,000 permanent and temporary employment opportunities. On average, each operational FDI project in the region creates more than 116 permanent jobs in the region.

Table 5.2: Status of FDI projects in Oromia region

Indicator	Freq.
Total Projects approved since 1992	1,922
Pre-Implementation	473
Implementation	397
Operational	1,052
Capital in million Birr	66,923
Permanent Employment	122,323
Temporary Employment	109,322
Permanent Employment per Operational FDI	116.3

Source: Own compilation from EIC data

As far as the origin of investors are concerned, the records of the EIC indicates that Ethiopia has hosted investors coming from more than 100 countries around the globe. Based on the level of capital invested, China, India, USA, Sudan, and Turkey are the top five countries of origin for FDI in the country.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

This study was designed to examine the feature of saving and investment particularly the nexus between saving and investment, trends and structures of saving and private investment, investment financing, challenges and opportunities of investment in Oromia. Both qualitative and quantitative data collected at macro, meso, and micro levels have been collected and used to address these objectives.

Aggregate saving in Oromia (measured by gross domestic saving as a percent of GDP) exceeds gross domestic investment particularly since 2011/12 and it has been rising overtime. In 2021/22, the regional aggregates saving and investment measured as a percentage of GDP were 13.5% and 22.1%, respectively. This implies that there is a potential to further increase investment in the region even using domestic resources. However, in a situation that lacks enabling business environment, efficient financial intermediaries, and complementary capital such as entrepreneurial capital and foreign currency for importing parts and row material lacks, higher saving may not be accompanied by higher investments. Therefore, having a good source of loanable fund (saving) is a necessary but not sufficient condition for investment to boom.

The appropriate econometrics model (and even a simple scatter plot) results show that there is no strong relationship between saving and investment in Oromia which just implies the existence of capital mobility within and outside of the country following the Feldstein and Horioka (1980) hypothesis. We employed a backcasting technique to estimate the regional accounts (like GDP) of Oromia before 1999/00, which is missing, from the relationship with the national account from the overlapping periods and extended the time span of our analysis. We again confirmed our original finding about the saving-investment nexus, suggesting that our conclusion is not driven by short time data. However, weak correlation between saving and investment does not mean that domestic saving is not important for investment; rather it is still important to mobilize domestic resources and reduce reliance of foreign resources to ensure sustainability of investment.

Both personal saving and banks' credit has been considered as importance sources of investment for the private sector. About 14.6% of the banks' deposit mobilization and 9.4% of loan disbursement goes to Oromia at this moment (last fiscal year) and the shares have been increasing overtime. However, when scales

of the region is taken into account, Oromia has a lower banks' deposit per capita (Birr 6,450) and loan disbursement per capita (Birr 2,640) than that of the national averages (which are 16,792 Birr for deposit and 10,689 for loan per capita). Both nationally and as region, considerable amount of resources mobilized locally are not made available for the private investment. Regional disparity is also prevalent in reinvesting savings mobilized in a given region partly due to centralized loan decisions of commercial banks. For instance, over the past ten years, on average, Oromia was able to get a banks' loan of Birr 1 for every 3 Birr it deposited in banks, which is lower than the national average (0.59). While many regional states are in a similar situation, there is some inflow capital to Addis Ababa and financing government projects. High nominal lending rate, long processing time and corruption in loan decision process, liquidity crunch, and unprecedented policy changes by the NBE are among the challenge of investment financing by banks.

With this business environment Oromia have licensed near to 21,000 domestic and FDI projects since its existence and majority (39%) of them are in service sector while manufacturing has the smallest share (15%). That does not seem to be in line with the ambition of structural transformation the region aims to achieve. More importantly, it is about 43% of the licensed projects in Oromia are operational, with a slightly higher operational rate for FDI projects (54.7%) than their domestic counterparts (41.8%). Operational rate also varies by sector. Even all operational projects do not operate at their full capacity. The Capacity-adjusted operational rate of projects in Oromia is estimated to be about 27%. This is a series problem in the region's investment landscape. Macro-economic instability (foreign currency shortage and inflation), political unrest, infrastructural problem notably electricity, corruption, atrocious bureaucracy in government systems, lack of clarity on business ideas and implementation strategies by the investors, and rent seeking behavior by investors and other actors are among the major reasons behind this failure. Limited participation of local community in project appraisal and the risk of environmental pollutions in some projects are also among the issues worth mentioning.

Over the past few years (since the reform), there has been a number of steps taken by the government to relax regulatory bottlenecks and improve the business environment, with a tendency for the regional government to focus on domestic investors and promote farmers to engage in investment activities. With a good commitment of the regional government, capitalizing on the existing opportunities Oromia has as region including its geographical location/proximity to

the markets, good climate conditions, abundant labor force and land, large population as source of big market, a relatively good infrastructure, and clear investment incentives will help tackle the challenges and make it an investable region.

6.2. Recommendations

Based on the finding of this study, we forward some recommendations specific to the key stakeholders: federal or regional government, investors, and financial institutions.

For the Government

- **Ensure macroeconomic stability:** Government should implement appropriate fiscal and monetary policies to ensure macroeconomic stability including controlling inflation and improve foreign exchange availability. Refraining from short-sighted policies like surrendering 70% of foreign exchange earnings from exporter and rather working to solve the structural problems could be helpful. It is advisable to diversify export and apply preferential rate and other incentives for foreign private money transfers to use legal channels. Speeding up the liberalization of the financial market could be one potential solution to solve the root causes of for foreign exchange problem.
- **Ensure the supply of adequate finance for private investment:** It is essential to ensure the supply of adequate finance for private investment by keep promoting saving at all levels and introducing innovating saving instruments. It is evident that considerable amount of domestic and foreign resources are channeled to the government via compulsory bond purchase by banks and other means while investors are complaining about poor infrastructure. It is advisable for the government to invest the limited resources on building of infrastructure like electricity, road, water, and other pro-poor sectors that will help crowd in private investments in the region so that more resources would be left for the private sector. Given the galloping inflation in the economy, setting a minimum deposit rate to be higher that the prevailing one could be important step. The cooperation of the local government with financial institutions in their saving campaign and loan repayment could be another area of intervention.

- **Build investors' confidence and ensure sustainability of investment:** investors' confidence on the business environment to recover their investment and make profit is important for them to make investment decisions. Related to this, three actions are suggested. First, maintaining peace and order by consolidating the peaceful negotiations with different parties should be the first and foremost task of the government for the proper functioning of the market in general and boosting investment in particular. Restoring political stability is crucial to safeguard people and investment project in the region, build investors' confidence for further expansion, and external images. Second, investor blame that the local administrators ask money formally or informally from investors for various reasons, apart from the formal tax. It could be through an attempt to raise funds for social activity, some events of the local government or the political party or just for officials' personal reasons or use. It is necessary to avoid such kind of practices as it escalates transaction costs and poses uncertainty from the investors' perspective. Clearly communication with investors beforehand is crucial for local charges and fees that has legal ground. Third, it is advisable to find out productive employment opportunities for the youth rather than allowing them to engage in unproductive employment that escalate the transaction cost of investors. Such malpractices could potentially drive investors away from the region.
- **Capacity building and stable leadership:** The regional government should reconsider mechanisms to capacitate offices that are mandated to govern investments (like investment bureau) so that they can promote, support, and regulate investment effectively. Recruit, incubate, incentivize, and empower long-serving leaders for the sector, revising the structure to have a competitive benefit package, and providing skill enhancing training opportunities for the staff, assigning the right person with relevant education are some of the suggested actions to be considered. It is also essential to assign staff with good foreign language skills like English, Arabic, and Chinese so that they can properly support foreign investors.
- Fight corruption, ensure accountability, and bolster reforms to ease up the lengthy bureaucracies: Fight corruption at all levels and ensure accountability is a key to improve competitiveness of the region in investment and other sectors. Commitment of the federal and regional government to leverage the existing legal framework to ensure accountability could be a good start to tackle the problem. Ensuring transparency in tax revenue calculations and

other administrative procedures is imperative. Digitalize major services and reduce human-interaction, digital-based customer rating for service providers, and consolidate one-stop shops are important steps to reduce corruption. Further, the government should strengthen its organizational reforms at all levels to ease up its lengthy bureaucracies and expedite important decisions like construction permit, provision of land, and properly handing of tax and other complaints.

- **Monitoring the implementation of incentives:** The government at all level should ensure that the investment incentives are implemented in such a way that benefits the genuine investors and these are not abused by corrupted investors. Ensuring the effectiveness of the investment incentive and its timeliness, designing and implementing targeted incentives for some sectors and areas within the region are desirable. The investment incentive packages should also be attractive enough for investors to engage in priority sectors like manufacturing to meet regional and national objectives.
- **Ensure the safety of local community and the environment:** The regulatory agencies should ensure the participation of local community before approving projects so that the locals can own and benefit from the project. In addition, in a situation where land is transferred from individuals to investors, the compensation paid for the land owners should be sufficient enough to be offered with resettlement plans that ensures sustainable livelihood of the community. Compensation could be paid in terms of shares of businesses operating on the land in question or any other safe investments from which displaced people could earn a stream of stable income. The government should monitor and enforce the safety measures that firms should follow to ensure the safety of the environment and their workers. Revising the laws for the regional environmental authority to have mandates to monitor all projects operating in the regions is also important.

For the Investors

- Investors are advised to have a feasible business idea from proper research with a clear implementation strategy.
- They are advised to try to base on the available domestic resources and less dependent on imported raw materials while proposing businesses.

- Investors should have an entrepreneurial mind set who are committed to walk the talk in realizing their project idea and engage in value addition. They should refrain from rent seeking behaviors like selling of land, abuse the incentives, diverting resources, and exploiting the local community and employees.
- Discharging corporate social responsibility to contribute for the development of the hosting community is crucial for investors to be welcomed by the locals and run sustainable businesses. Having a clear discussion and engagement of the local community since the very stage of the project is vital for the community to own and protect it.
- It is also necessary for the domestic and foreign investors to comply with local and national rules and regulations as well as community standards while running businesses.

For Financial Institutions

- Should come up with more innovative saving and loan products
- Should leverage technologies to screen loan applicants as well as appraise, support and monitor projects so that they can reduce cost which will, in turn, to reduce lending rates
- Should ensure transparency in the approval process of loan and foreign exchange requests.
- Should develop a policy that promotes the loan disbursement to regions which is linked, if not proportional, to the saving mobilized. Decentralizing loan decisions to districts and branches would be helpful to reinvest resources where it is raised. That would be helpful close gaps in the sector and geographical distribution of loan disbursements and then investments.
- Keep their saving promotion strategies in domestic resource mobilization

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Dynamics and Impact of Rural Out-Migration on Welfare of Migrant-Sending Households in Oromia Region of Ethiopia

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Abstract

There has been extensive research on the impact of migration on migrant receiving urban areas. However, there is a gap in understanding its impact on the poverty levels of people left behind in rural areas. This study specifically examines the economic impact of migration on households in Ethiopia's Oromia region. The research uses the new economics of labor migration theory as its foundation and employs a multinomial endogenous switching regression for data analysis. It combines both secondary and primary sources of data. Secondary data comes from national labor force and migration surveys, while primary data is collected through surveys of 384 rural households chosen through a specific sampling method. The study found a significant shift in migration patterns in Ethiopia. Between 1984 and 2021, there was a decrease in people moving from rural-to-rural areas, while migration from rural to urban areas increased. Additionally, the proportion of migrants in Oromia's urban areas rose sharply from 1999 to 2021.Interestingly, the study also identified factors that influence whether someone migrates. Those with larger landholdings, access to irrigation, more livestock, and higher education levels are less likely to leave. Conversely, larger families, households headed by females, and older household heads are more

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Disclosure statement

The authors report no potential conflict of interest.

Data availability

The data used in this study will be made available up on reasonable request.

likely to see members migrate. The most important finding of the study is the positive impact of migration on household well-being. Households with family members who migrated internationally experienced significant increases in food spending, assets per person, and daily calorie intake. Similar positive effects, though to a lesser extent, were observed for households with members who migrated to urban areas within Ethiopia. These findings support the idea that remittances sent back by migrants help reduce poverty in their home communities. The study suggests that several strategies can be implemented to further reduce poverty in Oromia's rural areas. These include expanding access to financial resources, irrigation, and public services. Encouraging off-farm employment opportunities and promoting safe migration with pre-departure training for potential migrants are also important steps. By focusing on these areas, Ethiopia can maximize the benefits of rural out-migration for both migrants and their families back home.

Keywords: Migration, Poverty, Switching Regression, New Economics Labor Migration, Oromia

1. INTRODUCTION

More people are migrants today than at any other time in human history, and they are living abroad or in cities in greater numbers than ever before (World Bank, 2021). However, recent migrants travel from the rural agricultural sector to urban non-agricultural sectors and from poor and lagging countries to rich and leading countries (FAO, 2019). The massive rural out-migration during the industrial revolution in the 18th century was primarily caused by pull factors in the urban industrial sector while the wave of rural out-migration in developing countries since the second half of the 19th century has been caused mainly by push factors such as poverty, lack of land, large family size, conflict, lack of employment, and drought in migrant-sending rural areas (WFP, 2015).

Empirical evidence show that between 2000 and 2020, the total number of international migrants increased from 173 million to 281 million (UNDESA, 2020). Similarly, the total amount of remittances from international migrants increased globally from 128 billion to 751 billion US dollars while the percentage of remittances from international migrants to developing countries increased from 57% to 79% between 2000 and 2020 (UNCTAD, 2020). Besides, the number of internal migrants in developing countries has rapidly increased and reached 1.3 billion in 2016 (FAO, 2020).

Rural out-migration has become a development problem in developing countries since the second half of the 19th century for at least three reasons, and these include the composition, the rate and the direction of migration (Beylee et al, 1996). First, most of the rural out-migrants are youth, better educated, better informed and unmarried. This could be a loss of human capital to rural agricultural sector. Second, the current rate of rural out-migration is higher compared to the rate of migration during the industrial revolution in western countries. Third, the direction of migration is from rural area where job creation is easy and unemployment rate is lower to urban area where job creation is difficult and unemployment rate is higher. For instance, job creation in industrial sector is 8.3 times costly compared to job creation in rural agricultural sector (ILO, 1999). This is because job creation in agricultural sector requires lower capital compared to job creation in non-agricultural sectors.

Rural out-migration involves the movement of labor from rural agricultural sector to urban non-agricultural sectors, and the transfer of capital in the form of remittances from urban non-agricultural sectors to rural agricultural sectors. The implication is that migration does not occur in vacuum, it affects the migrant-sending rural areas through two channels: the labor channel and the remittance or capital channel. The first channel is the flow of money, or remittances, sent back from urban areas to families in the countryside. These remittances act as a sort of financial lifeline. They help families overcome limitations in rural credit markets and reduce their risk aversion. This allows them to invest more in food, agriculture, and building assets for the future. The second channel is the movement of labor itself. When people migrate, they take their skills and knowledge with them. This can lead to a loss of valuable human capital in rural areas. If the money sent back isn't reinvested in agriculture, and if the skills of those who left are high-value, agricultural production in these areas can actually suffer. In essence, rural out-migration is a double-edged sword. The benefits from remittances depend on how effectively they are used to counteract the loss of labor. Research suggests that migration can indeed alleviate poverty and increase investment in agriculture, but it all hinges on how these two channels interact (Lucas, 1987; Rozelle et al. 1999). From this perspective, migration can be seen as a way to address current poverty and vulnerability, while also laying the groundwork for a more prosperous future in rural Ethiopia (Islam, 1991; Zahonogo, 2011).

Ethiopia, Africa's second most populous nation, has a long history of migration (World Bank, 2021). In fact, Ethiopians are known for their mobility in the

East Africa. However, the patterns of this migration have shifted dramatically under different political regimes, impacting rural areas in complex ways. During the Imperial period, both internal and international migration remained very low (Lyons, 2009). Only a small number, around 20,000 Ethiopians, primarily sought education abroad, leading to minimal impact on rural communities (Terrazas, 2007). It was during the Derg regime that saw a rise in international migration due to political repression and civil war. However, the government-imposed restrictions on movement within Ethiopia, limiting rural-urban migration and its potential effects on rural areas (FDRE, 2005). The post 1991 is characterized by a significant transformation in migration patterns. The new government lifted restrictions on internal movement, allowing for greater livelihood diversification opportunities. Additionally, Ethiopians gained easier access to passports, facilitating a surge in international migration.

To improve the livelihood of both rural and urban residents, the Ethiopian government has put in place migration policy and implemented various programs. These programs are aimed at reducing poverty and transform the economy from agricultural sector to industrial sector. However, despite these efforts, the incidences of both one-dimensional poverty and multidimensional poverty have remained high in Ethiopia. For instance, the incidences of income poverty in rural and urban areas were 25.6 and 14.8% respectively while the incidences of multidimensional poverty in rural and urban areas were 91.8 and 36.8%, respectively in Ethiopia (ESS, 2018). This disparity in well-being between rural and urban areas has resulted in a recent wave of rural-urban and international migration in Ethiopia.

Over the last three decades, both rural-urban migration and international migration have increased in Ethiopia. For example, the number of Ethiopian international migrants increased from 611,000 to 1.1 million between 2000 and 2020 while the amount of remittance from international migrants increased from 53 million to 404 million US dollars (World Bank, 2021). Similarly, between 1999 and 2021, the share of rural-rural migrants decreased from 35.6 to 23.4 percent while the share of rural-urban migrants increased from 21.6 to 32.2 percent in Ethiopia (ESS, 2021). While Oromia is the leading source for international migrants in Ethiopia, Amhara region is the first source of rural-urban migrants (ESS, 2021). The major destinations of Ethiopian migrants are Saudi Arabia (30.7%), South Africa (12.4%), the United Arab Emirate (8.9%), and the United State of America (8.3%) (ESS,2021).

Despite the current high rate of rural out-migration in Ethiopia in general and Oromia region in particular (Bundervoet, 2018), previous studies on the impact of rural out-migration on the welfare of migrant-sending households are scarce. Few studies have looked at the impact of migration on welfare of households and found mixed results (Lagakos et al, 2018 Egger, 2019; Brown, 2020; Ajefu and Ogebe 2021; Nuez and Osorio-Caballero 2021). But studies on the impact of rural-urban and international migration on welfare of migrant-sending households in origin area are scarce. This study specifically aimed to explore the trends of rural out-migration, identify the push and pull factors of rural out-migration, and quantify the impact of out-migration on welfare of migrant-sending rural households in Oromia Region of Ethiopia. The remaining sections of the research are organized as follow. The second section contains a review of the relevant literature, the third section discusses the research methods, the fourth section presents the results and discussion, and the last section contains a conclusion.

2. LITERATURE REVIEW

2.1. Theoretical Review

Migration is described as a shift in one's regular place of residence, whether temporary or permanent (UNESCO, 2005). Although there are many other forms of migration, this study focuses on rural-urban movement and international migration. In this study, rural out-migration is defined as the movement of individuals from rural regions to urban areas inside their country's borders or to other nations by crossing their country's borders. Furthermore, a household is deemed to have a migrant member if at least one household member left the household within the past 10 years prior to the survey date for at least three months and is still away.

There are several migration theories that explain the reasons for migration as well as how it affects the receiving and sending regions of migrants. The new economics labor migration theory (Stark, 1985) focuses primarily on the effects of migration on the production and welfare of migrant-sending origin areas, in contrast to the gravity theory of migration (Ravenstien,1885), the two-sectors theory of migration (Lewis, 1954), the push and pull theory of migration (Lee, 1966), the

human capital theory of migration (Harris and Todaro, 1966), and the network theory of migration (Tylor, 1990).

The gravity theory of migration (Ravenstein, 1885) explained the 'laws' of migration. This theory predicts that labor moves from areas limited economic activities to areas with better economic activities. Ravenstein (1885) argued that the direction of migration is from rural agricultural sector to urban non-agricultural sectors. The theory also assumes that physical and economic distances between migrant-sending rural areas and migrant-receiving urban areas are the primary causes of rural out-migration (Ravenstein, 1885). Besides, the Lewis's (1954) two-sectors migration theory insists that the withdrawal of labor from the rural agricultural sector to the urban industrial sector improves the productivity of both, and will lead to economic development. This theory assumes that there is a surplus of labor in the rural agricultural sector and a shortage of labor in the urban industrial sector. This theory claims that the transfer of labor from the agricultural sector to the urban industrial sector would improve production in receiving urban and sending rural areas (Ranis, 2003).

According to the push and pull factors hypothesis of migration (Lee, 1966), there are four types of variables that influence rural out-migration: push factors, pull factors, personal characteristics, and intervening factors. While family size, crop failure, and drought are pushing factors in migration, the major pulling factors in urban areas are employment opportunities, public services, and education. Furthermore, according to the human capital theory of migration (Harris and Todaro, 1970), the economic distance or anticipated pay disparity between migrant-receiving and migrant-sending locations in developing nations is the main reason for out-migration. In addition, according to the human capital theory of migration, everyone must decide whether to move (Todaro, 1969). To put it another way, this theory contends that the flaws in the rural labor market are the primary drivers of rural-urban mobility (Todaro & Smith, 2006).

The decision-making units in migration analysis have changed from individuals to households because of the new economics labor migration theory (Stark, 1985). According to this view, the imperfections in the rural capital and insurance markets are the primary reasons for rural outmigration. This theory contends that individuals cooperate not just to maximize income but also to reduce risks and defects in the insurance and credit markets. By diversifying their income sources, migrants give rural households access to cash and a method of lowering risk. According to this view, migration has an impact on the welfare and economic output of rural communities that send migrants through both the remittance

channel and the lost labor channel. Rural families may use migrant remittances to ease credit restrictions and self-insure against perceived risks (Stark, 1985). In addition, the new economics theory of labor migration has moved the focus of migration policy from intervention in rural and urban labor markets to intervention in rural capital and insurance markets. The network migration hypothesis (Taylor and Wyatt, 1996) links social networks to the factors that contribute to rural out-migration. According to this idea, relationships between migrants, return migrants, and non-migrants in developing countries promote rural outmigration. This study used the new economics labor migration theory as theoretical framework to measure the impact of out-migration on poverty of migrant-sending rural households.

2.2. Empirical Review and Conceptual Framework

Tegegne & Penker (2016) examined the drivers of rural-migration and found that age and education of household are directly and significantly related to rural-urban migration. Similarly, a study conducted by Wondimagegnhu & Zeleke (2017) on determinants of rural-urban migration in Ethiopia found that family and rural out-migration are positively and significantly associated. Besides, Sauer et al. (2019) conducted a study on determinants of rural-urban migration in Kosovo, and showed income and age of household head are positively and significantly associated with the propensity of rural out-migration. Lack of viable farm and non-farm employment for rural youth in origin is considered as driver of rural out-migration (Lyu et al., 2019). A study conducted by Naz (2021) found positive and significant effect of age, education and being male-headed households on probability of out-migration in China. Further, a study conducted by Md. Zakir Hossain (2016) on determinants of rural-urban migration in Bangladesh found that the number of male family member, landholding, and highest education in the family are positively and significantly related to rural-urban migration.

Ajefu and Ogebe (2021) conducted a study on the impact of international migration in five African countries using secondary data and instrumental variable quantile regression. The result showed that international migration increases expenditures on food, durables, education, and health. But this study does not account for self-selection biases due to unobserved factors or characteristics. Likewise, Nuñez and Osorio-Caballero (2021) conducted a study on the impact of migration on poverty in Mexico and Central America using secondary data and OLS. The study found that a 10 percent increase in migration leads to an 8.6 percent

reduction in the incidence of poverty in migrant-sending areas. Ebadi, et al. (2018) also examined the link between migration and food security using primary data from 60 countries, 68463 sample households, and a logistic regression model. The study found a positive and significant association between migration and the consumption of migrant-sending households. However, this study does not account for the potential endogeneity between migration and consumption of households.

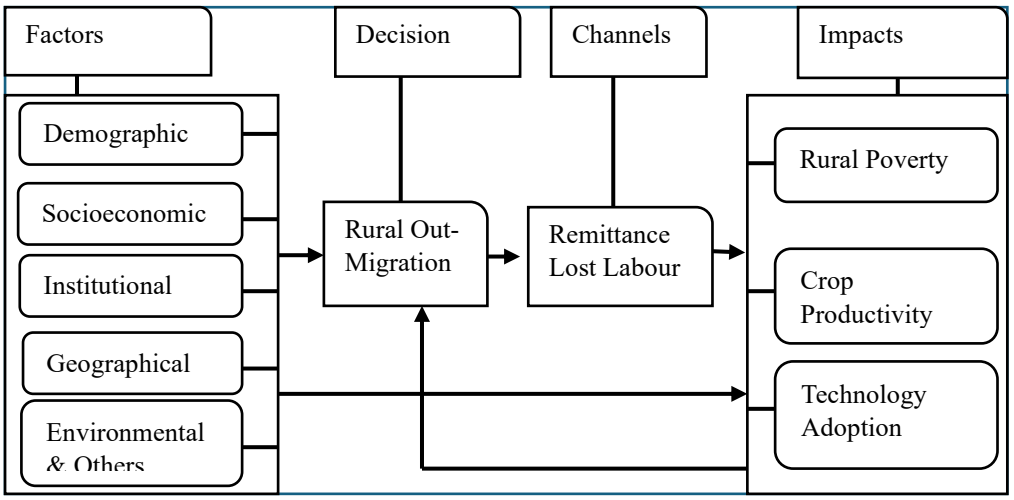
Moreover, Moniruzzaman (2020) conducted a study on the impact of remittance on the food security of households using cross-sectional data and the two-stage least square instrumental variable method in Bangladesh. The result showed that remittance improves the food security status of rural households. Stampini and Robles (2021) examined the impact of international migration on the welfare of households using secondary data and instrumental variable (IV) estimation techniques in Venezuela. The finding indicated that participation in international migration increases households' kilocalories per person. Besides, studies conducted by Mora-Rivera and van Gameren (2021), Seetha (2012) and Odekon (2015) on the effect of out-migration on welfare of households found a positive and significant associations.

Yet, Abdi (2021) conducted a study on the effect of remittance on poverty using secondary data and propensity score matching in Somalia and found that the consumption of remittance-receiving households is higher compared to households without remittance. In the same vein, Yoshino et al. (2019) examined the effect of remittance on the poverty of households using secondary data and OLS in ten Asian countries, and the result showed that remittance significantly reduces the incidence of poverty. In Nepal, a study conducted by Thapa and Acharya (2017) on the effect of remittance on the expenditure of households using secondary data and the propensity score matching found that remittance-receiving households spent more on food, education, and health compared to remittance non-receiving households. Similarly, Raihan and Ahmmed (2021), Obiakor et al. (2021) and Musakwa and Odhiambo (2019) explored the link between migration and welfare of migrant-sending households they found a positive and significant association. A study conducted by Mukhtar et al. (2018) on the effect of remittance on the income of households using cross-sectional data and propensity score matching in Pakistan indicated that migration improves the income of households.

On the contrary, some previous studies found a negative impact of participation in rural out-migration on the welfare of migrant-sending households. For instance, Alleluyanatha et al. (2021) conducted a study on the effect of youth migration and remittances on rural households' livelihoods in south eastern Nigeria

using primary data from 714 households and found the households without migrants were better off compared to households with migrants. Bryan et al. (2014) conducted a study on migration costs and observational returns to migration in the developing world using survey data and found that participation in migration has welfare-decreasing effects. Likewise, Lagakos et al. (2018) conducted a study on the effect of migration on welfare in developing countries using cross-sectional data and the result showed that rural-urban migration significantly lowers the welfare of migrant-sending households. Muyambo and Ranga (2019) assessed the socio-economic impact of labor migration from Zimbabwe to South Africa using primary data from 48 sample households and found that remittances are inadequate to meet all the needs of remittance-receiving households.

Figure 1: Conceptual Framework of the Study



Source: Authors compilation based on literature review, 2023

The conceptual framework of the study is developed and shown in Figure 1 based on the theoretical and empirical reviews. Rural out-migration is generally influenced by demographic, socioeconomic, institutional, geographic, and other factors, which can be classified as push factors, pull factors, personal factors, and intervening factors (Lee, 1966). On the one hand, the push factors in migrant-sending areas include a limited access to land, road, markets, education, credit and the like. Family size, occurrence of drought and land degradation also trigger out-migration from rural areas. The pull factors, on the other hand, include better access to job opportunities, education, road, electricity, housing and other public services in migrant-receiving urban areas. Rural out-migration has an impact on the

welfare and production of migrant-sending rural areas via two channels: remittances and lost labor. Put differently, the impact of migration on the welfare of migrant-sending rural households depends on the use of remittances by remittance-receiving households, and the opportunity costs of those family labor who participated in rural out-migration.

3. MATERIALS AND METHODS

3.1. The Study Area

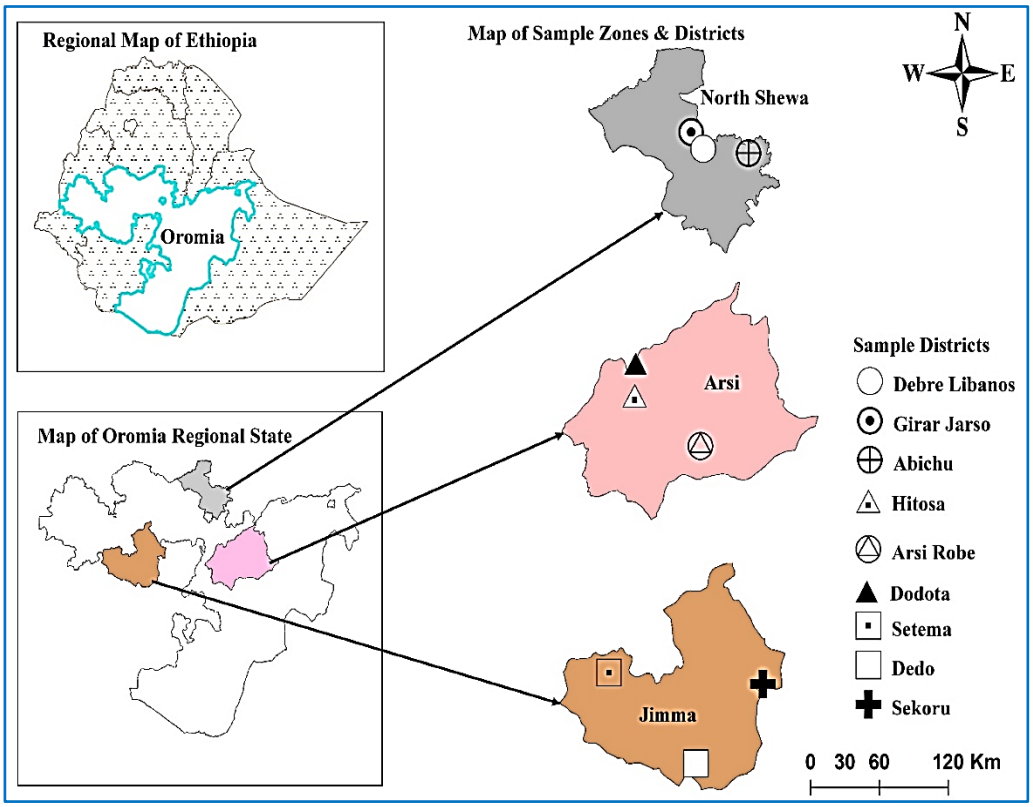
This study was conducted in three selected zones of Oromia regional state of Ethiopia in 2023.Oromia is the largest region in Ethiopia both in terms of population size and land area. The region shares borders with all regions of Ethiopia except Tigray region. The 2022 projected population of the region was 42,647,632 (RPDC, 2022) of which 35,453,080 or 83 percent of the population live in rural areas. The total area of the region is 363,375 square kilometres, and administratively, the region is divided in to 21 administrative zones, 23 town administrations, 294 rural districts/woredas and 29 towns. From the total of 21 zones[6] in Oromia National Regional State, three major rural-urban and international migrant sending zones namely; Arsi, Jimma, and North Shewa were covered by this research.

Majority of the population of the region are Muslims (48%) followed by Orthodox Christians (30%) and protestants (18%) (ESS, 2007). While the majority of the region's resident are Oromo (88%), there are also Amhara (7%) and other ethnic background that accounts about 5% of the region's population (ESS, 2007). According to the 2007 population and housing survey, the total population of Jimma zone was 3,486,155; Arsi zone was 2,637,657and North Shewa zone was 1,431,305 (ESS, 2007). Jimma zone has 20 woredas, while Arsi and North Shawa have 24 and 11 woredas, respectively. From each zone, 3 woredas were selected for the purpose of this study namely; Setema, Sekoru, and Dedo woredas from Jimma zone; Dodota, Arsi Robe, and Hitosa woredas from Arsi zone; and Girar-Jarso, Abichu and Debre Libanos woredas from North Shewa zone were purposively selected for this study.

[6] Zones in Oromia include Arsi, Bale, Bedele, Borena, East Haraghe, East Shewa, East Welega, Guji, West Guji, Horo Gudru Welega, Illubabor, Jimma, Kelem Welega, North Shewa, Southwest Shewa, West Arsi, West Hararghe, West Shewa, West Welega, Adama Special Zone, Jimma Special Zone and Oromia-Finfinnes Special Zone.

Coffee and khat are the major cash crops produced in Oromia, and it is the leading contributor to Ethiopian exports. Besides, gold and cattle are the major exports from Oromia. The region has also more livestock than any other regions of Ethiopia, and it is also the largest producer of cereal crops in Ethiopia. People in pastoral and agro-pastoral areas primarily depend on livestock and livestock products as sources of food and income. On average, a rural household in Oromia region has 1.14 hectares of land compared to the national average of 1.01 hectares. Moreover, 24 percent of the population in Oromia work in non-farm related jobs compared to the national average of 25 percent (CSA, 2007).

Figure 2: Map of Sample Zones, and Districts of Oromia Regional State



Regarding the ecological zones in Oromia region, the climate types are grouped in three major categories namely, the dry climate, the hot semi-arid climate and temperate rainy climate. First, the dry climate type is characterized by poor and scattered vegetation with annual mean temperature of 27°C to 39°C and the mean amount of rainfall reaches less than 450mm. Second, the mean annual

temperature of the hot semi-arid climate type varies between 18°C and 27°C. Besides, the hot semi-arid climate has a mean annual rainfall of 410-820 mm. Third, the highland climate type of Oromia region experiences temperate climate of moderate temperature with mean annual temperature of less than 18°C and the mean annual rainfall of 1,200–2,000mm (CSA, 2007).

3.2. Data Sources and Data Collection Instruments

This study primarily employed a quantitative dominated mixed research design to generate better understanding on the causes, and impacts of rural out-migration on the economy of migrant-sending rural areas of Oromia region. Structured questionnaire, key informant interview, focus group discussion and case study were used to gather primary data. Primary data on demographic characteristics, sources of rural out-migration, use of remittances, agricultural production, and welfare of rural sample households were gathered from 384 households between January 20 to February 20/2023 from nine sample districts in the region. Besides, secondary data on the trends of rural out-migration, unemployment, major sources and destinations of rural-urban and international migrants were obtained from Central Statistical Service. To supplement the quantitative data, 32 key informant interviews were conducted in this study. The participants in key informant interview were selected purposively based on their expertise and professional contributions to the study from different offices such as women and children, labour and social affairs, job creation and policy commission. Moreover, 8 focus group discussions were held, and 5-8 participants were included in each FGD. The participants in the FGDs also include elders, development agents, religious leaders, cultural leaders, youth and women group leaders, school principals, community representatives and return migrants.

3.3. Sampling Procedures and Sample Size

A multistage sampling technique was employed to select sample households for this study. First, three sample zones namely Jima, Arsi, and North Shewa were selected for this study purposively from 20 zones[7] in the Oromia

[7] There are (21) zones in Oromia region and they include Arsi, Bale, Bedele, Borena, East Haraghe, East Shew, East Welega, Guji, West Guji, Horo Gudru Welega, Illubabor, Jimma,

region. This is because the three zones are the primary sources of both rural-urban and international migrants in Oromia region. Second, nine major migrant-sending sample woredas were chosen from the three sample zones. As a result, Setema, Dedo and Sekoru woredas were selected from Jimma zone while Dodota, Arsi Robe and Hitosa woredas were chosen from Arsi zone. Likewise, Girar Jarso, Debre Libanos and Abichu woredas were selected from North Shewa zone. Third, two kebeles from each of the woredas in Jimma and Arsi Zones while one kebele from each of the woredas in the North Shewa zone were selected. That means a total of 15 major migrant-sending sample Kebeles[8] were selected for this study. Fourth, the sample households were allocated among the three zones using Probability Proportional to Size (PPS). The samples were further allocated for migrant sending and non-migrant sending households with 2/3 allocated for migrant-sending households from each woreda and kebele while 1/3 is allocated for non-migrant sending household. The overall sample size is determined using Cochran (1963) sample determination formula as follows:

$$\boldsymbol{n = \frac{Z^2 pqN}{e^2(N-1) + Z^2 pq}}$$

where e, p, q, n, N, and Z are the measure of precision, the assumed level of variability in the population, one minus the level of variability in the population, the sample size of the study, the total population and the value of standard normal distribution, respectively. The total households (N) in the three sample zones, degree of variability, and level of precision in this study are 1249711, 0.5, and 0.05 respectively. Based on the above formula, a sample size of 384 is determined for this study. Hence, quantitative data were collected from 384 rural households on causes, and impact of rural out-migration in the region using survey questionnaire in the year 2023. Participants in this study were divided in to three groups namely: households without migrants, households with international migrants, and

Kelem Welega, North Shewa, Southwest Shewa, West Arsi, West Hararghe, West Shewa, West Welega, Adama Special Zone, Jimma Special Zone and Oromia-Finfinnes Special Zone.

[8] The sample Kebeles include Asandabo & Habe Dangazela (Arsi Robe), Dirre Kiltu & Dodota Alem (Dodota), Jawi Chilalo & Sero Ankato (Hitosa), Seo Sidisa & Karti Wosorbi (Dedo), Yera Docha & Chafeta (Setema), Yabbu & Haro Kake (Sekoru), Ano Akabdo (Abichu), Wartu (Girar Jarso) and Wakene (Debre Libanos).

households with rural-urban migrants. However, households with both international and rural-urban migrants were grouped under households with international migrants due to their few numbers (9).

3.4. Method of Data Analysis

Both descriptive and inferential methods of data analysis were applied in this study. The descriptive methods include percentages, frequencies, means, standard deviations, and scatter plots. The inferential analysis such as mean difference test, analysis of variance (ANOVA), and multinomial endogenous switching model were employed to answer the research objectives. Since the problem of self-selection biases due to observed and unobserved factors is a common problem in migration analysis, this study employed a multinomial endogenous switching regression model to evaluate the impact of participation in rural-urban and international migration on welfare of migrant-sending rural households in origin areas. The information gathered via the KII and the FGDs were narrated to substantiate the findings of quantitative analysis and draw relevant policy recommendations. The quantitative data were analysed using STATA 17, and SPSS 23 Statistical Software.

3.4.1. Model Specification

This study aimed to quantify the impact of rural out-migration on welfare of migrant-sending households in Oromia region of Ethiopia. Annual food consumption per Adult Equivalent (AE), kilocalorie per AE, and asset per adult equivalent were used as outcome variables. The treatment variable is rural out-migration which is a nominal variable with three categories namely; households without migrants ($j = 0$), with rural-urban migrants ($j = 1$), and international migrants ($j = 2$). To account for self-selection biases due to observed and unobserved factors, the study applied the multinomial endogenous switching model. Put differently, participation in migration is not random, and households with similar characteristics may participate in rural-urban migration or international migration. The multinomial endogenous switching model was developed by Deb and Trivedi (2006) to control for endogeneity due to observed and unobserved factors. Based on the concept of expected utility maximization, rural households may participate in rural out-migration if the expected utility from rural

out-migration is higher than the expected utility without participation. Following Deb and Trivedi (2006), the latent variable model which describes the behaviour of rural households in choosing one alternative among the three alternatives to maximize its expected utility is given by:

$$Y_{ij}^{*} = \beta_i Z_i + U_{ij} \quad \textbf{(1)}$$

Where Y_{ij}^{*} is the latent variable that measures the expected utility of the ith household from choosing among jth alternative, $i = 1,2,3 \ldots 384,\ j = 0,1,2$, Z_i is a vector of exogenous covariates, β_i is a vector of parameters to be estimated and U_{ij} is an error term. In the multinomial endogenous switching model, a household has j choices and the latent outcome variable is given by:

$$Y_{ij} = \begin{cases} 1 \ \ iff\ Y_{i1}^{*} > \max\limits_{k \neq 1}(Y_{i1}^{*}), & U_{i1} < 0 \\ . \quad\quad . & . \\ . \quad\quad . & . \\ . \quad\quad . & . \\ M \ \ iff\ Y_{iM}^{*} > \max\limits_{k \neq M}(Y_{i1}^{*}), & U_{iM} < 0 \end{cases} \quad \textbf{(2)}$$

where Y_{ij} is the observed value of the outcome variable for the ith household of choosing alternative j, $U_{i1}, U_{i2} \ldots U_{iM}$ are error terms of the outcome equation, $i = 1,2,3 \ldots 384$, $j = 0,1,2$ and Y_{i1}^{*} is the latent variable. Given the assumption that U_{ij} is independently and identically distributed or the independence of the irrelevant alternatives (IIA) assumption, the selection model of migration leads to the following multinomial logit model where the likelihood of choosing alternative j:

$$P_{ij} = \Pr\left(U_{ij} < 0 / Z_j\right) = \frac{e^{\beta_i Z_i}}{\sum_{k=1}^{M} e^{\beta_i Z_i}} \quad \textbf{(3)}$$

The first stage regression of the multinomial endogenous switching model examines the determinants of rural out-migration while the second stage regression quantifies the impact of rural out-migration on welfare of migrant-sending rural households. Rural households without a migrant family member, $j = 0$ is used as a base category in this study. Hence, the annual food expenditure, asset or kilocalorie per adult equivalent (W_i) of household is defined as m regime:

$$\text{Regime } 0: W_{i0} = X_i \gamma_0 + \varepsilon_{i0}\ ,\ \text{if}\ j = 0 \quad \textbf{(4)}$$

$$\text{Regime 1: } W_{i1} = X_i\gamma_1 + \varepsilon_{i1}\ ,\ \text{if } j = 1 \qquad \textbf{(5)}$$

$$\text{Regime 2: } W_{i2} = X_i\gamma_2 + \varepsilon_{i2},\ \text{if } j = 2 \qquad \textbf{(6)}$$

where W_{ij} is the annual food expenditure, asset or kilocalories per adult equivalent of the ith household in regime $j, i = 1,2,3 \ldots 384, j = 0,1,2, X_i$ is vector of covariates, & ε_{ij} is the error term. Based on equations (4), (5), & (6), the selection bias-corrected outcome equations are given:

$$\text{Regime 0: } \mathrm{W}_{i0} = X_i\beta_0 + \delta_0\left[\rho_0 m(P_{i0}) + \sum_j \rho_j\, m\left(P_{ij}\right)\left(\frac{P_{ij}}{P_{ij}-1}\right)\right] + \varepsilon_{i0}\ ,\ \ if\ \ j = 0 \ (\mathbf{7})$$

$$\text{Regime 1: } W_{i1} = X_i\beta_1 + \delta_1\left[\rho_1 m(P_{i1}) + \sum_j \rho_j\, m\left(P_{ij}\right)\left(\frac{P_{ij}}{P_{ij}-1}\right)\right] + \varepsilon_{i1}\ \ if\ \ j = 1\ \ (\mathbf{8})$$

$$\text{Regime 2: } W_{i2} = X_i\beta_2 + \delta_2\left[\rho_2 m(P_{i2}) + \sum_j \rho_j\, m\left(P_{ij}\right)\left(\frac{P_{ij}}{P_{ij}-1}\right)\right] + \varepsilon_{i2}\ \ if\ \ j = 2\ \ (\mathbf{9})$$

where P_{ij} is the probability that the ith rural household chooses the jth alternative, ρ_j is the degree of correlation between the error term of the participation equation, U_{ij} and the error term of the outcome equation, ε_{ij} and $m\left(P_{ij}\right)$ is the inverse transformation for the normal distribution function. To estimate the average treatment effects on treated (ATT), the multinomial endogenous switching model predicts the selection-corrected counterfactual data of annual food expenditure, asset and kilocalorie per AE per day of sample households. Following the work of Bourguignon et al. (2007) and assuming households without migrants, $j = 0$ as the base category, the mean value of the outcome variable for households with migrants are given by:

$$E\left(\frac{W_{i1}}{j} = 1\right) = X_i\beta_1 + \delta_1\left[\rho_1 m(P_{i1}) + \textstyle\sum_{k=1}^{M} \rho_k m(P_{ik})\left(\frac{P_{ik}}{P_{ik}-1}\right)\right] \qquad \textbf{(10)}$$

$$E(W_{i2}/j = 2) = X_i\beta_2 + \delta_2\left[\rho_2 m(P_{i2}) + \textstyle\sum_{k=1}^{M} \rho_k m(P_{ik})\left(\frac{P_{ik}}{P_{ik}-1}\right)\right] \qquad \textbf{(11)}$$

After computing the actual mean values of the outcome variables using equations (10) & (11), the counterfactual mean values of the outcome variables are determined using the following equations.

$$(W_{i0}/j=1) = X_i\beta_0 + \delta_0\left[\rho_0 m(P_{i1}) + \rho_1 m(P_{i0})\left(\frac{P_{i1}}{P_{i1}-1}\right) + \rho_1 m(P_{i1})\left(\frac{P_{i3}}{P_{i3}-1}\right)\right] \quad \textbf{(12)}$$

$$\left(\frac{W_{i0}}{j}=2\right) = X_i\beta_0 + \delta_0\left[\rho_0 m(P_{i2}) + \rho_2 m(P_{i1})\left(\frac{P_{i1}}{P_{i1}-1}\right) + \rho_1 m(P_{i0})\left(\frac{P_{i3}}{P_{i3}-1}\right)\right] \quad \textbf{(13)}$$

Finally, the conditional average treatment effects on treated (ATT) is computed by subtracting equations (12) and (13) from equations (10) and (11) respectively. The positive and significant values of ATT imply that participation in rural out-migration promotes the welfare of migrant-sending rural households via the remittance channel.

3.4.2. Description of Variables and Hypotheses

The dependent variable in the first stage regression of the multinomial endogenous switching model is rural out-migration which is a nominal variable with three categories namely; households without migrants ($j = 0$), households with rural-urban migrants ($j = 1$), and households with international migrants ($j = 2$).The occurrence of drought may induce rural out-migration by reducing the income of rural farm households. Studies conducted by Ma et al. (2019) and Abeje (2021) on determinants of rural-urban migration in northern Ethiopia found that the occurrence of drought is positively and significantly related to the propensity of rural out-migration but the land size and rural-urban migration are negatively and significantly associated. In economic literature, family size is considered as pushing factor for labour out-migration from rural areas. For instance, studies conducted by Alarima (2019) and Ma et al. (2019) on factors affecting rural-urban migration using cross-sectional data found that family size and years of schooling of household heads are positively and significantly related to the likelihood of rural out-migration. Besides, a study conducted by Kefelegn (2020) found that family size, years of schooling of household head, being female-headed households and drought are positively and significantly related to rural out-migration. This study also hypothesizes that family size, education, being a female-headed household, and occurrence of drought are positively associated with rural out-migration. Added to these, a study conducted by Tegegne and Penker (2016) also found that

age, education level of household heads, and being female-headed households are positively and significantly related to the likelihood of rural-urban migration.

However, Wondimagegnhu and Zeleke(2017) examined the determinants of rural-urban migration in Ethiopia and found a negative and significant association between tropical livestock units and rural-urban migration. Further, a study conducted by Ajaero et al. (2018) on determinants of rural out-migration found that being male-headed households, family size, and age of household head is positively and significantly related to participation in migration. Similarly, Khatir and Rezaei-Moghaddam (2014) conducted a study on predictors of rural out-migration of youth in Iraq and indicated that family size, age of household head, being male-headed household, number of active male family members, and the occurrence of drought are positively and significantly related to the likelihood of rural out-migration while the land size and frequency of extension visits are negatively and significantly associated with rural out-migration.

Table 1: Description, Measurement, and Expected Signs of Covariates in the Model

Variables	Description	Measurement	Sign
AGE	Age of household head	Continuous	+
EDUC	Years of schooling of household head	Continuous	+
FS	Family size	Discrete	+
LS	Land size in hectares	Continuous	-
TLU	Tropical livestock unit	Continuous	-
Male	Sex of household head	Male =1 & Female =0	±
IRR	Use of irrigation	Users=1 & non-users=0	-
DPR	Dependency Ratio	Continuous	+
Plots	Number of Plots	Continuous	+
NFP	Non-Farm Participation	Participant =1 & 0 Otherwise	-
DR	Drought in the last five years	Occurrence=1 & 0 otherwise	+
LR	Participation in land renting out	Renting =1 & 0 otherwise	+
EXTN	Frequency of extension visits	Discrete	-
PSNP	Productive Safety Net Program	Users =1 & 0 otherwise	±
Oromo	Dummy for Ethnicity of Household	Oromo=1 & 0 otherwise	+
Arsi	Place dummy for zone	Arsi=1 & 0 otherwise	+
Jimma	Place dummy for zone	Jimma =1 & 0 otherwise	±
Muslim	Dummy for religion of the household	Muslim =1 & 0 otherwise	+

The outcome variables in the second stage regression of multinomial endogenous switching model are food expenditure, asset and kilocalorie per adult equivalent of households. The independent variables in the second stage regression include all independent variables in the first stage regression less three instrumental variables such as dummy for religion, and return migrants. The treatment variable in the second stage regression of the multinomial endogenous switching model is rural out-migration which is a nominal variable with three categories. Regarding the impact of participation in rural out-migration on the welfare of migrant-sending households, there are dichotomous results. While some authors (Seetha, 2012; De Brauw and Giles, 2018; Mukhtar et al., 2018; Musakwa and Odhiambo, 2019; Marta et al., 2020) found a positive and significant association between participation in migration and welfare of migrant-sending households, other authors (Bryan et al., 2014; Lagakos et al., 2018; Alleluyanatha et al., 2021) found a negative and significant association between migration and welfare of migrant-sending households.

4. RESULTS AND DISCUSSION

This section dives into the results of our data analysis. First, we looked closely at how people move from rural to urban areas in Oromia, Ethiopia. We examined who the migrants are and why they decide to leave their rural homes. Then, we used more advanced statistical methods to see how these migration patterns affect the well-being of families back in the migrants' home villages.

4.1. Dynamics of Rural Out-Migration in Oromia Region

In Oromia, the proportion of migrants in cities grew significantly from 1999 to 2021. According to Table 2, it rose from 27.2 percent to 49.2 percent, a higher increase compared to other regions. On the other hand, the portion of migrants in rural Oromia declined slightly, falling from 15.5 percent to 12.5 percent during the same period. This suggests that Oromia's urban and rural areas are both major destinations for migrants, compared to other regions.

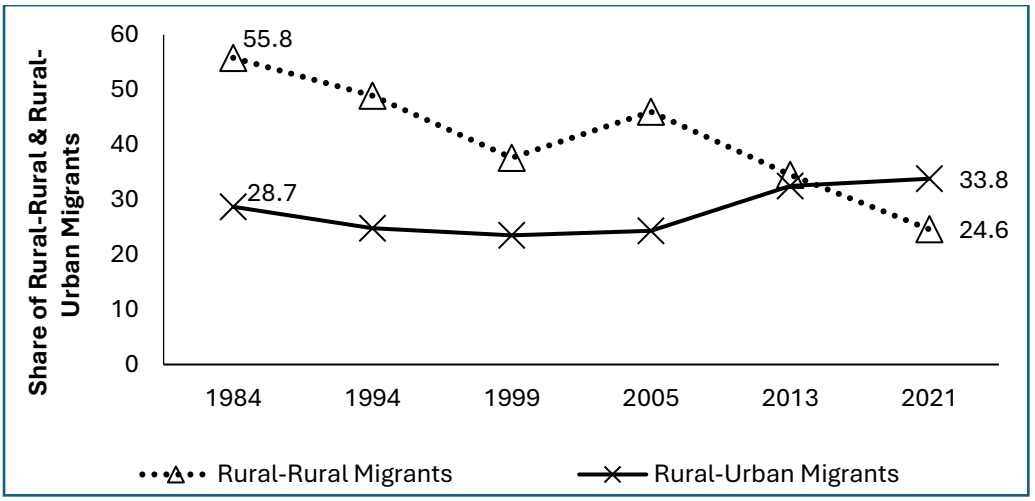
Table 2: Trend of the Proportion of Migrants in Urban Areas of Oromia, Amhara and SNNP[9]

Year	Urban				Rural			
	1999	2005	2013	2021	1999	2005	2013	2021
Ethiopia	49.3	39.4	44.4	39.9	15.0	12.5	8.5	10.1
Oromia	27.2	27.8	46.6	49.2	15.5	15.2	9.1	12.5
Amhara	25.1	38.5	50.0	42.9	13.8	9.5	8.0	8.3
SNNP	20.6	30.6	42.1	31.6	13.6	10.4	7.9	11.8

Source: Authors' Computation from ESS,1999; 2005; 2013 & 2021 National Labour Force Surveys

Despite the large share of migrants in the total urban population, the rate of urbanization, or the ratio of urban population to total population, is lower in Ethiopia in general and in the Oromia region in particular. For example, between 1999 and 2021, the rate of urbanization in Ethiopia increased from 13.5 to 21.4%, whereas the rate of urbanization in the Oromia region increased from 10.3 to 16.7% (ESS, 2021). However, this rate of urbanization is lower than in Africa (40%), Sub-Saharan Africa (38%), North Africa (52%), Central Africa (44%), Western Africa (45%), Southern Africa (62%), and Eastern Africa (26%). This highlights the need of supporting the development of secondary and tertiary rural small towns in Ethiopia in general, and Oromia region in particular, by providing public services and employment opportunities in rural small towns.

Figure 3: Trends of Rural-Urban and Rural-Rural Migration in Ethiopia



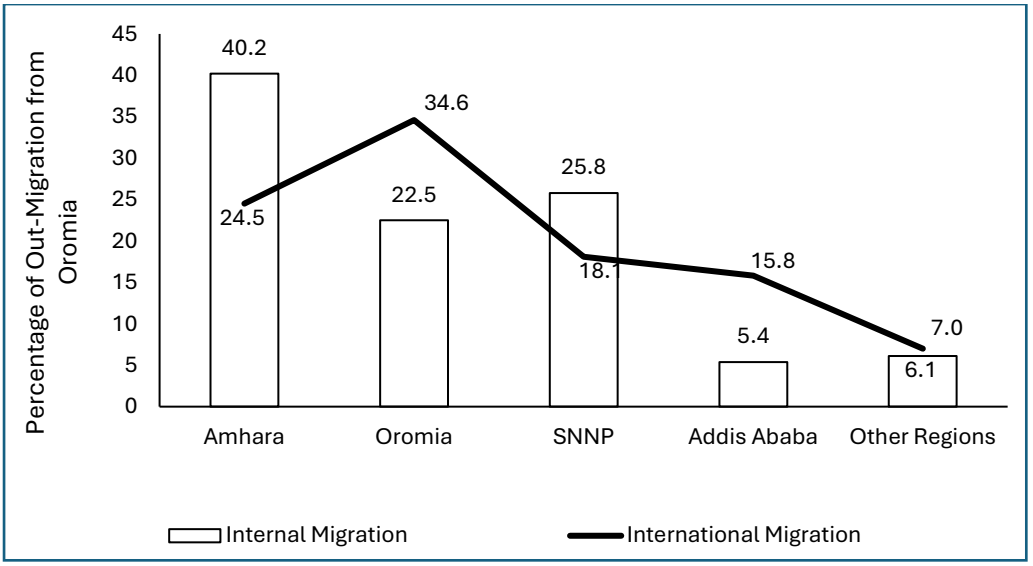
Source: Authors' Computation from different rounds of NLFs and Population Census, 2023

[9] Oromia, Amhara and SNNP are the first, 1st, 2nd and 3rd largest regions in Ethiopia.

The high share of migrants in the total urban population is primarily contributed by the current high wave of rural-urban migration. Of all types of internal migration, rural-urban migration has recently become the most dominant type of internal migration in Ethiopia in general and Oromia region in particular. As indicated in Figure 3, the rate of rural-rural migration decreased from 55.8 to 24.6 percent while the rate of rural-urban migration increased from 28.7 to 33.8 percent between 1984 and 2021. The implication is that rural-urban migration involves the transfer of labour from a place where job creation is easy, rural areas, to a place where job creation is difficult, urban area. That means job creation in rural areas requires less capital compared to job creation in urban areas (Todaro, 1969).

Furthermore, the Oromia region is Ethiopia's primary source of international migrants, followed by Amhara and the SNNP regional states. According to the 2021 Labor and Migration Survey, about 35 percent of Ethiopian international migrants are from Oromia followed by Amhara (24.5%), and SNNP (18.1%) (ESS, 2021). This suggests that Oromia is the leading remittance-receiving region in Ethiopia. The same survey shows that the Amhara region is the leading source of internal migrants (40.2%) while the Oromia region is a primary destination for internal migrants in Ethiopia. This descriptive analysis revealed that participation in both rural-urban migration and international migration has increased in the Oromia regional state in recent years.

Figure 4: Sources of Internal and International Migrants in Ethiopia by Regions in 2021



Source: Computed from NLFM Survey, 2023

Furthermore, data on the total number of migrants in the Oromia region, as well as the reasons for migration, were gathered from Ethiopia's last four national labour force surveys. As reported in Table 3, the main reasons for out-migration in the Oromia region are lack of jobs in origin areas, the presence of family members or relatives in destination areas, and marriage-related factors. The presence of a relative or family member in the destination area is the main pulling factor of migration in the study area, while a lack of job opportunities in the migrant-sending origin area is the main pushing factor of migration. This is consistent with the network theory of rural out-migration, which predicts that the presence of family members or relatives at destination areas reduces the cost of migration by providing migrants with information about destination areas prior to migration and supports after migration.

Table 3: Total Migrants, and the Distribution of Reasons for Migration in Oromia Region

Years	**1999**	**2005**	**2013**	**2021**
Migrants in Oromia Region	897,429	1,338,864	1,464,194	1,833,481
Reasons for Migration				
Search for Work	15.4	8.8	26.3	29.4
Job Transfer	4.5	4.2	5.5	7.8
Land Shortage	2.4	19.1	1.8	2.0
Education	8.8	10.3	7.9	9.9
Marriage Related Factors	16.2	7.5	10.9	13.6
Conflict & Drought	1.4	6.8	1.6	3.2
Join Family or Relatives	37.6	35.4	29.2	29.4
Health	0.5	1.3	2.1	1.1
Others	13.0	6.6	14.7	3.6

Source: Authors' Computed from the 1999, 2005, 2013 and 2021 NLFS

The percentage of migrants migrating due to marriage-related reasons has been increasing in the Oromia region. This trend suggests that creating better job opportunities, both in agriculture and other sectors, in rural areas could be key to slowing the current outflow of people. Focusing development solely on urban areas would likely worsen the situation, leading to more rural out-migration and higher urban unemployment. In essence, both the attractiveness of cities (pull factors) and the lack of opportunities in rural areas (push factors) are the main forces

behind this migration trend in Oromia. This is further supported by the survey finding that over 75% of migrants left due to a lack of jobs in their rural communities.

4.2. Drivers of Rural Out Migration in Oromia Region

In this section, the result estimated using multinomial endogenous switching regression model specified in Section 3 is presented. The multinomial endogenous switching model estimates two equations simultaneously: the participation equation and the outcome equation. The first stage regression uses the multinomial logistic model and employed to identify the drivers of rural out-migration in Oromia regional state. The dependent variable in the first stage regression of the multinomial endogenous switching model is a nominal variable with three categories: non-migrant households ($J = 0$), rural-urban migrants ($J = 1$), and international migrants ($J = 2$). The base category is non-migrant households. The Wald test result is statistically significant at 1% implying that the survey data fit the model well.

The estimated coefficient of age of household head is negative and it is significantly related to rural-urban and international migration while the coefficient of age square is positively and significantly associated to rural-urban migration and international migration as indicated in Table 4. This means after certain age, as the age of household head increases, adult family members are more likely to participate in migration. Table 4 shows that the coefficient of head's years of schooling is positive and statistically significant in affecting participation in rural out-migration. In other words, the education level of the household head increases the likelihood of family members migrating from rural to urban areas in the study area. This could be because education may change the preference of household head in favour of public goods that are found in urban areas over the rural based traditional ways of life, and promote rural out-migration. Participation in migration also varies between female and male headed households. More specifically, female-headed rural households are more likely to participate in migration than male-headed rural households. This could probably explain that female-headed households have limited access to secondary sources of income, agricultural land, livestock, education, and trainings. They also spend more of their time on unpaid house-works. This makes female-headed households more vulnerable to rural poverty than male-headed households, and they are more likely to participate in rural out-migration. A study conducted by Tegegne and Penker (2016) on determinants of rural-urban migration in Ethiopia also found that age, education,

and being female-headed households are all positively and significantly related to the likelihood of rural-urban migration.

Table 4: Estimation Results of the Drivers of Rural Out-Migration in Oromia Region

Multinomial Logistic Regression	Pseudo R square =33.2
Log Pseudolikelihood= -233.8592	Wald chi2 (48) =132.181
Number of observations: 384	Prob>chi2=0.000

Independent Variables	Rural-Urban Migration			International Migration		
	Coefficient (Std. Error)	t-value	p-value	Coefficient (Std. Error)	t-value	p-value
Male	-1.273 (0.65)	-1.94	0.052	-1.607 (0.702)	-2.29	0.022
Age	-0.215 (0.128)	-1.69	0.092	-.323 (0.112)	-2.88	0.004
Age Square	0.003 (0.001)	2.24	0.025	0.003 (0.001)	3.15	0.002
Dependency Ratio	-0.785 (0.384)	-2.04	0.041	-1.522 (0.313)	-4.86	0.000
Education	0.26 (0.177)	1.46	0.143	.368 (0.134)	2.74	0.006
Education Square	-0.053 (0.019)	-2.76	0.006	-0.031 (0.012)	-2.59	0.010
Muslim	-0.807 (0.462)	-1.75	0.080	1.088 (0.481)	2.26	0.024
Family Size	0.264 (0.099)	2.67	0.008	0.497 (0.089)	5.58	0.000
Oromo	0.209 (0.674)	0.31	0.757	1.432 (0.831)	1.72	0.085
Land Size	-0.381 (0.121)	-3.15	0.002	-0.363 (0.148)	-2.46	0.014
Extension Visits	0.009 (0.006)	1.54	0.122	0.003 (0.006)	0.44	0.657
NFP	-0.716 (1.064)	-0.67	0.501	0.789 (0.798)	0.99	0.323
TLU	-0.017 (0.054)	-0.31	0.760	-0.12 (0.058)	-2.07	0.039
Drought	-0.615 (0.403)	-1.52	0.128	0.166 (0.352)	0.47	0.638
PSNP	-1.381 (0.78)	-1.77	0.077	-1.063 (0.547)	-1.94	0.052
Arsi	-0.279 (0.58)	-0.48	0.633	2.77 (0.565)	4.91	0.000
Jimma	1.155 (0.453)	2.55	0.011	1.697(0.551)	3.08	0.002
Irrigation Use	-1.418 (0.62)	-2.30	0.022	-0.959 (0.558)	-1.72	0.086
Plots	0.182 (0.096)	1.90	0.057	0.20(0.093)	2.15	0.032
Land Renting	0.923 (0.526)	1.76	0.079	0.163 (0.449)	0.36	0.717
Constant	3.915 (3.447)	1.14	0.256	2.571 (2.939)	0.88	0.382

Source: Own survey, 2023

Note: values in the parenthesis are standard errors

The irrigation dummy coefficient is negative and statistically significant at a 5 percent level of significance. This could be because use of irrigation by rural households increases their farm income, build resilience to poverty and

vulnerability, and which could reduce their likelihood of participating in rural out-migration. The study also revealed that family size increases the likelihood of participation in rural-out migration. Similar study is that of Wondimagegnhu and Zeleke (2017) who found that the probability of a household to engage in rural-out migration increases with family size. This suggests that family with large size may be forced to share resources like land and other agricultural assets which may not be enough to make their livelihood. Asa result, members of the family engage in rural-urban or international migration. Therefore, a large family size is one pushing factor of rural-urban and international migration in Oromia.

The result in Table 4 also revealed that being followers of Muslim religion reduces participation in rural-urban migration while it increases participation in international migration. Putting it differently, followers of Muslim religion are more likely to participate in international migration compared to followers of other religions. This indicates that religion is both a push and a pull factor in migration. More importantly, it shows that Muslim migrants are more likely to be pulled by Muslim countries in migrant-receiving destination areas (Ahsan, 2022). Agricultural assets like rural land size and number of tropical livestock units reduce household participation in migration in the study area.

Similar finding was that of Wondimagegnhu and Zeleke (2017) who found number of tropical livestock unit that the household own reduce the probability of a household to participate in rural-urban migration in Ethiopia. Abdullah (2022) has also found that land size negatively affects rural out-migration in Bangladesh. This suggests that better access to agricultural assets such as land, livestock, and capital in rural areas have the potential to reduce the rural out-migration in Oromia region. Besides, the number of plots that the rural households own is positively and significantly related with both rural-urban and international migration, and statistically significant at 5 percent level of significance, citrus paribus. The implication is that since the livelihood of rural households primarily depends on agricultural land, limited access to agricultural land due to population pressure increase the likelihood of participation in rural-urban and international migration. Comparing the variation across zones, sample households from Jimma and Arsi are more likely to participate in international migration compared to those from North Shewa zone as indicated in Table 4. The existence of dependents in a family (indicated by DPR) reduces participation in migration in the study area. That means families with unproductive member are less likely to participate in rural out-migration mainly because of the extra responsibility that the dependents pose to

the family. This finding is in agreement with a study conducted by Md.Zakir(2016) who found a negative and significant relation between dependency ratio and rural-urban migration of households.

Likewise, participation in productive safety net program also reduces participation in migration. This may be because participation in productive safety net program might build the resilience of users to poverty and food insecurity and reduce their participation in rural out-migration. More so, the findings from the KIIs and FGDs showed that limited access to agricultural land, large family size, lack of employment, and credit constraints by rural youth are the major pushing factors of rural out-migration in the study area. They added that peer pressure, brokers, presence of return migrants in the village, under age marriage, conflicts in the family, and divorce are also contributing to rural out-migration. Further, the participants in KIIs and FGDs also reported that rural youth are not interested in agricultural activities, and rural traditional life, and they rather attracted by public services in urban areas.

4.3. Welfare Impact of Rural Out Migration in Oromia Region

4.3.1. Mean Comparison of Food Expenditure and Kilocalories by Migration Status

The third objective of this research is to quantify the impact of rural outmigration on the welfare of migrant-sending households. According to the new economics labour migration theory, rural out-migration has an impact on migrant-sending origin areas through both the lost labour channel and the remittance channel. The welfare of migrant-sending households in the origin areas is expected to improve through the remittance channel. However, the lost labour channel may reduce the welfare of households that send migrants by lowering human capital and agricultural output in the areas of origin.

Analysis of existing migration literature revealed that migration has an impact on the welfare and agricultural activities of migrant-sending areas via the remittance channel and the lost labour channel. Due to the downward pressure on the quality and quantity of human capital in the rural agricultural sector, the lost labour channel tends to reduce agricultural productivity. The remittance channel, on the other hand, tends to increase both short-term and long-term welfare because households spend remittances from migrants on consumption and long-

term investment, such as food, clothing, education, health, housing, agricultural investment, and house equipment.

The result of mean difference test on annual food expenditure per AE and kilocalorie per AE per day among household with no migrants, rural-urban migrants, and international migrants is reported in Table 5. Since there are more than two categories of rural out-migration, the analysis of variance (ANOVA) is employed to determine the statistical significance of the mean differences for annual food expenditure and kilocalories per AE per day among the three categories. The mean annual food expenditure per AE of households with no migrants is higher than the mean annual food expenditure per AE of households with rural-urban migrants by Birr 2395.56 and the difference is found to be significant at the 1% level. In the same vein, the mean annual food expenditure per AE of households with no migrants is Birr 1218.42 higher compared to the mean annual food expenditure per AE of households with international migrants and the difference is significant at 1% level.

Table 5: Comparison of Food Expenditure & KCAL Per AE by Status of Migration using ANOVA

Mean		Food Expenditure Per AE (Birr)			Kilocalorie per AE		
Mean (A)	Mean (B)	Mean Difference (A-B)	Std. Error	P-value	Mean Difference (A-B)	Std. Error	P-value
Rural-Urban	No Migrants	-2395.56	683.09	0.00	-1017.98	232.00	0.00
International	No Migrants	-1218.42	574.46	0.09	-445.17	195.10	0.06
International	Rural-Urban	1177.14	686.28	0.20	572.80	233.08	0.04

Source: Authors' Computation, 2023

However, there is no significant mean difference between the mean annual food expenditure per AE of households with rural-urban migrants, and households with international migrants. The household consumption in kilocalorie per AE per day for household with no migrants is significantly higher than that of households with rural-urban migrants, and international migrants. From this descriptive result, it is difficult to attribute the lower household food consumption and kilocalorie per AE of migrant sending households to their participation in migration. This could be because poor households may participate in rural out-migration and, therefore, the direction and significance of the impact of participation in migration on the welfare of migrant-sending households can only be determined by controlling for other co-

variates that effect welfare of households. This is mainly because of self-selection biases in migration where households with similar characteristics may participate in rural out-migration and this can be controlled by using switching regression model.

Building on the mean difference test, a multinomial endogenous switching model was employed to capture the nuanced effects of rural-urban and international migration on the well-being of sending households. This model estimates how participation in these migration types (no migration, rural-to-urban, or international) influences food expenditure, non-food expenditure, household assets, and kilocalories per adult equivalent. The results are presented in Table 6.

The model utilizes the new economics of labor migration theory as its foundation. It treats migration as a household decision, not solely an individual one. A categorical variable with three levels (no migrants, rural-urban migrants, and international migrants) serves as the treatment variable. This allows us to compare the actual outcomes (food spending, etc.) of households with migrants to what their outcomes would have been if no migration had occurred (counterfactual scenario).

Participation in international migration has a positive and significant impact on households' food expenditure, non-food expenditure, asset and kilocalorie per adult equivalent. The mean annual food expenditure per adult equivalent of households with international migrants is Birr 7,549 while the counterfactual mean annual food expenditure per adult equivalent is Birr 6,029. Moreover, the average treatment effect on treated (ATT) of food expenditure per AE is positive and significant at a 1 percent level of significance. This suggests that, on average, participation in international migration increases food expenditure of households by Birr 1520 in the study area. Regarding non-food expenditure per AE, the average treatment effects on treated (ATT) for households with rural-urban migrants and international migrants are Birr 971 and 1527 respectively, and this difference is statistically significant.

Likewise, the average treatment effects on treated (ATT) of kilocalorie and asset per adult equivalent (AE) for households with international migrants are 323 and Birr 4415, respectively. This could be because migrant-sending households may use remittances to pay for food, clothing, health care, and education. This finding implies that migration improves the well-being of migrant-sending households in rural areas of Oromia. Moreover, this finding supports the new economics labor migration theory which assumes that participation in migration

promotes the welfare of migrant-sending households via the remittance channel. This theory assumes that rural households may spend remittances from migrants on food, clothing, education, health, purchases or construction of houses, purchase of agricultural inputs, and purchase of livestock. The finding of this study is in line with the findings of Brown (2020), Ajefu and Ogebe (2021), (Abdi, 2021), Thapa and Acharya (2017), Nuez and Osorio-Caballero (2021 and Addai et al. (2021) while it contradicts the findings of Bryan et al. (2014), Lagakos et al. (2018), & Alleluyanatha et al. (2021). Transitional heterogeneity is positive and significant for food expenditure, non-food expenditure, and asset per AE as indicated in Table 6. This suggests that the welfare improving effect of participation in rural-urban and international migration is higher for participant households compared to non-participant households.

Table 6: Estimation Results of the Impact of Migration on Welfare of Rural Households

Outcomes	Choices	Decision to Participate in Migration		Average Treatment Effect on Treated (ATT)
		Participation	Non-participation	
		Actual	Counterfactual	
Food Expenditure	Rural-urban	6246.24	5345.59	900.65 (1137.56)
	International	7548.98	6029.12	1519.87(463.59)a
Non-Food Expenditure	Rural-urban	4051.47	3080.70	970.77 (527.74)c
	International	3926.85	2399.96	1526.89(278.65)a
Kilocalorie per AE	Rural-urban	3307.94	2471.01	177.31 (293.29)
	International	52.47	2984.58	323.35(177.02)b
Asset per AE	Rural-urban	4490.54	-1657.10	6147.64(2980.03)c
	International	7563.01	3148.29	4414.73 (1574.6)a
Heterogeneity Effects		BH_1	BH_0	TH
Food Expenditure	Rural-urban	-1299.88 (415.2)a	-3438.78 (902.42)a	2138.90 (871.66)b
	International	-1930.23 (308.1)a	-2755.26 (501.06)a	825.03 (321.24)b
Non-Food Expenditure	Rural-urban	813.30(303.98) a	-1237.483 (493.79)	2050.78 (527.67)a
	International	-680.37 (295.6)b	-1918.22 (329.50)a	1237.85 (298.07)a
Kilocalorie per AE	Rural-urban	-406.87(158.4)a	-680.17 (184.68)a	-1264.36 (242.43)a
	International	241.88 (148.4)a	-669.31(137.20)a	-750.78 (185.12)a
Asset per AE	Rural-urban	697.94(972.2)	-12491.2(3776.98)	13189.09(4125.1)a
	International	-4316.87(875.1) a	-7685.77(2743.9)a	3368.89 (2526.84)
Falsification Test Result:		F -statistics =1.34		Probability >F = 0.265

Source: Authors' Computation, 2023

Standard errors are in parentheses. a, b, and c denote significance level at 1%, 5%, and 10% level.

In sum, the human capital theory of migration considers the expected wage differential between rural areas and urban areas as the primary cause of rural out-migration while the new economics labor migration theory insists that rural out-migration is mainly caused by the inefficiency in capital and insurance markets in rural areas. Besides, the new economics labor migration theory also assumes that migration affects the welfare of migrant-sending areas via two channels: the lost labor channel and the remittance channel. Hence, rural outmigration is a two-handed transaction, and it gives with one hand and takes with the other hand. The impact of migration on welfare of migrant-sending households, therefore, depends on the relative strength of the remittance effect and the lost labor effect. However, the findings support the new economics labor migration theory which assumes that participation in migration increases welfare of migrant-sending households. Finally, a falsification test was conducted to assess the suitability of the instruments, and the test result indicated that the selected instruments are valid. Religion, and return migrants were used as exclusion restriction variables in this study.

5. CONCLUSIONS AND POLICY IMPLICATIONS

Rural out-migration involves both the transfer of capital in the form of remittances from migrant-receiving urban areas to migrant-sending rural areas as well as the movement of labour from rural agricultural sector to urban non-agricultural sectors. Put differently, rural outmigration is a two-handed transaction. Though many previous studies have examined the drivers of rural out-migration, and the impact of rural out-migration on migrant-receiving urban areas, studies on the impact of out-migration on the welfare of migrant-sending rural areas are quite scant. This study assessed the dynamics of rural out-migration, identified the determinants of rural out-migration, and quantified the impact of rural out-migration on the welfare of migrant-sending households in Oromia region of Ethiopia using cross-sectional data from a random sample of 384 households in the year 2023. The new economics labor migration theory is used as a theoretical framework whereas the multinomial endogenous switching model is employed as an analytical model.

The descriptive analysis showed that the rate of rural-rural migration decreased from 55.8 to 24.6% whereas the rate of rural-urban migration increased

from 28.7 to 33.8% between 1984 and 2021 in Ethiopia. The proportion of migrants in the total urban population increased from 17.2 to 49.2% in the Oromia region of Ethiopia between 1999 and 2021. The study revealed that the Oromia region is the leading sources of international migrants whereas Amhara region is the major source of rural-urban migrants in Ethiopia. The study revealed that remittances from rural-urban migrants are primarily used for short-term welfare improvement or rural households' consumption expenditure while remittances from international migrants mainly used for long-term welfare improvement via asset building and agricultural investment.

The first stage regression results of the multinomial endogenous switching model indicated that land size, irrigation use, tropical livestock unit, dependency ratio, participation in productive safety net program and education level are migration reducing factors while family size, being female-headed households, and age of household head are migration promoting factors in Oromia Region of Ethiopia. Furthermore, households in the Jimma and Arsi zones are more likely to participate in international migration than households in the North Shewa zone. Likewise, households belonging to the Oromo ethnic group and following Muslim religion are more likely to migrate compared to other ethnic groups and non-Muslim households.

Moreover, international migration significantly increases the annual food expenditure, non-food expenditure, and kilocalories per adult equivalent per day of rural households in the study area. For instance, the average treatment effects on treated (ATT) of food expenditure and asset per adult equivalent (AE) for households with international migrants are Birr 1520, and 4415, respectively, and significant at 1% level. More so, the ATT of kilocalorie per adult equivalent per day for households with international migrants is 323 and significant at 1% level. The study also revealed that the ATT of asset and non-food expenditure are positive and significant for households with rural-urban migrants. This finding supports the remittance hypothesis of the new economics labour migration theory which predicts that participation in rural out-migration improves the welfare of migrant-sending households by increasing income, and reducing the liquidity constraints of households. The implication is that the substitution of capital (in the form of remittances) for labor by rural households promotes the welfare of migrant-sending households in Oromia region of Ethiopia.

Since the findings of the study support the remittance hypothesis of the new economics labor migration theory, the provision of access to capital or credit

markets for rural youth by the regional government will increase the welfare of rural households. The provision of pre-migration training for migrants on entrepreneurship, life skills and financial literacy by the regional government and other stakeholders will enhance the competitiveness of migrant workers in the destination countries, reduces the negative impact and boost the positive impact of participation in international migration. Government should follow the policies of diverting rural-urban migration from large primary cities to secondary and tertiary cities to reduce the congestion of regional and national city centers, and capitalize the benefit from migration. This involves the decentralization of infrastructure and economic activities with a view to create new centers of growth that will be able to absorb the rural population influx. Enhancing access to finance, agricultural land, irrigation, public services and off-farm employment for rural households will reduce poverty. Promoting save migration, and pre-migration training for migrants will increase the benefit from rural out-migration in Oromia Region of Ethiopia. The use of cross-sectional data and the dependency on quantitative research design are the limitation of this research. Besides, missed migrants, return migrants, cost of migration, challenges of migration, and effects of migration periods were not covered by this study. Future studies will concentrate on the effects of rural out-migration on income inequality, labor market, and land market in migrant-sending rural areas.

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Drivers and Costs of Inflation in Oromia Region of Ethiopia

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Abstract

This study focuses on the drivers and costs of inflation in Oromia, using both primary and secondary data. Oromia's economy is increasingly driven by the service sector, contributing to inflationary pressures, while food prices, particularly cereals, dominate inflation in the region. Food inflation, comprising 60% of general inflation, is driven by a supply-demand imbalance in agriculture, with per capita grain production struggling to keep pace with population growth. Additionally, non-food inflation is largely driven by housing and utilities. The study identifies several factors fueling inflation, including a mismatch between growing demand from the service and industrial sectors and limited agricultural output, rising private and public consumption, and market inefficiencies. Moreover, conflicts and instability have exacerbated inflation by disrupting production and supply chains, particularly for key commodities like wheat and fruits. Enhancing agricultural production, improving market efficiency, reducing transaction costs, managing transport expenses, and addressing conflicts to stabilize prices. Collaborative efforts at regional and national levels are essential to mitigate inflationary pressures and improve the resilience of Oromia's economy.

1. INTRODUCTION

In Ethiopia, inflation was not a critical issue until 2003 (Geda and Tafere, 2011), but afterwards the problem began to increase at an alarming rate. Currently, the country has become one of the most inflationary countries in the world. This calls an urgent need to design a comprehensive approach to control inflation, which requires identification of the underlying structural factors and their long-run patterns and relationships in causing inflation. In the earlier periods, inflation in

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Ethiopia was not a serious problem and had an immense association with agriculture and food supply shocks. The recurrent outbreak of conflicts and drought, which commonly affect the expenditure and production system of the country, and finally aggravate the recent inflation.

Possible factors for the worsening situation could be the Northern conflict, imbalance between supply and demand of merchandises, successive devaluation of the local currency, oil price rise, marketing problems, international prices, and international conflicts are some of the causes that worsen the situation (Tamru et al., 2022 and Ketema, 2022). With any integrated economy, these multiple disruptions can be playing a huge role in the current conditions of the Oromia region. Generally, from a macroeconomic perspective, a sustained rise in inflation in emerging markets and developing economies like Ethiopia would be especially affected by the resulting spill-over effects.

It is known that inflation raises prices, lowering your purchasing power. Inflation also lowers the values of pensions, savings, and treasury notes. Assets such as real estate and collectibles usually keep up with inflation. Variable interest rates on loans increase during inflation. Therefore, this research is designed to forward some possible polices and strategies which, might make economic growth target in line with a monetary policy target to boost economic growth and control the level of inflation. Several macro-economic stabilization measures and policies implemented over the past three or four years were deemed to have failed. Consequently, the economy has remained principally constrained by dual macroeconomic problems i.e. price inflation and low international reserves.

National Bank report revealed that the regional simple average food inflation was 13.8% at the end of June 2011 with Addis Ababa, Afar, Oromia, Harari, SNNP and Somali regions experiencing higher food price inflation than the regional simple average. In the fiscal year, the highest increase in food inflation was registered in Oromia (25.4 percentage points). Over the two-years (2009/10 to 2010/11), food price instability was high in Gambella, Benishangul Gumz, Amhara, Oromia and Tigray states. In 2015/16, regional simple average general inflation increased to 10.3 from 6.3% a year earlier where Afar, Tigray, Harari and Oromia regional states registered headline inflations rate greater than the regional average. However, the 2021/22 regional simple average headline inflation has increased to 34.9% in 2021/22 from 20.4% in the preceding year. In the fiscal year, Oromia had 38.1% general inflation, which comprised food and non-alcoholic beverages

inflation of 43.5% and non-food inflation of 29.8%. The region was the second inflationary region next to Benishangul-Gumuz, which had 39.5% general inflation.

Oromia region combined with Amhara accounts for about 70% of the general CPI decomposition at the national level. However, Oromia regional state had a significant share in determining the national level general and food price change within the country. In line with this, the price change in Addis Ababa has strong causation on price change in the Oromia region that may be because of the geographic proximity and strong market linkage. Possible factors for the worsening of the recent national and regional level inflation may be the Northern conflict, imbalance between supply and demand of merchandises, successive devaluation of foreign exchange rate, oil price rise, marketing problems, international prices upsurge, and national and international shocks. Thus, this study tried to identify **Drivers and Costs of Inflation in Oromia National Regional State**. The study had addressed the following objectives:

- Assess inflation trends and interrelated macroeconomic issues of the region;
- Identify the supply- and demand-side drivers of inflation;
- Decompose the potential drivers of food and non-food inflation;
- Investigate the welfare effect of inflation among the different groups of society;
- Identify inflationary effects of regional and national policy measures;
- Examine the market chain and price difference for selected items;
- Examine the inflationary pressure of national and international shocks; and
- Propose relevant policies and strategies relevant to control inflation in the regional state.

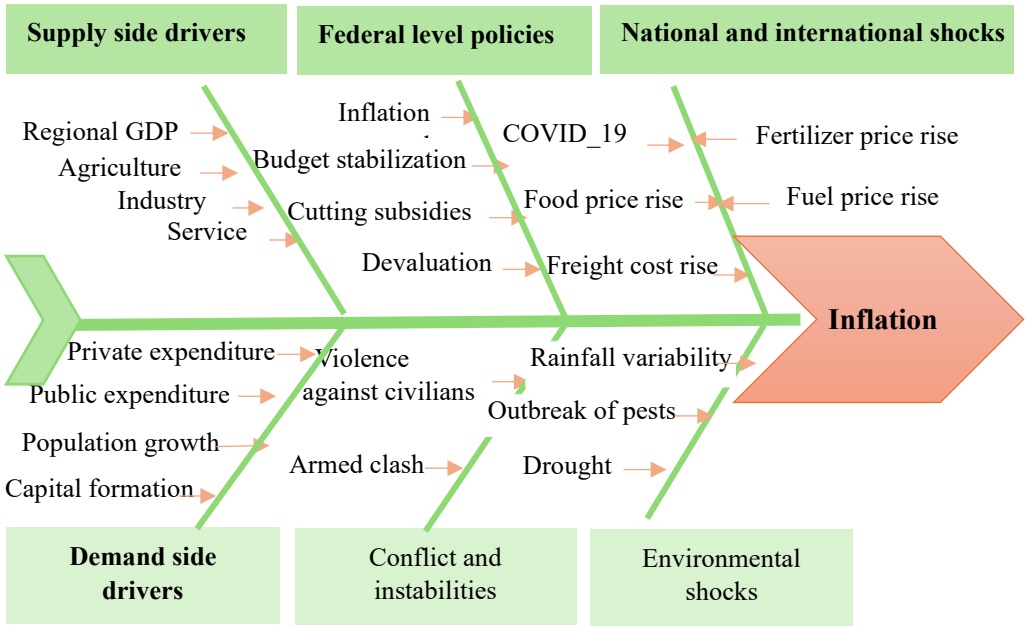
2. METHODOLOGY OF THE STUDY AREA

2.1. Conceptual Framework

Based on past works, variables that are core and critical sources of inflation can be divided into supply and demand side drivers. The supply-sided factors are mainly related to production, cost and availability of merchandises. Sometimes successive increment in the disposable income could result in demand-pull

inflation, which is caused by a continuous upsurge of demand. Moreover, a rise in market prices may be related to money supply increment, increased public spending, reduced taxes, and high prices in international markets. Cost-push inflation is caused if the supply reduced due to cost increment to produce the same level of output. The supply contraction from a higher level could directly pushes the price to a higher level, could result in cost-push inflation. Hence, cost-push inflation is generally caused by a reduction in aggregate supply arising from increased costs of production. In addition to the two prominent factors (demand and supply-side drivers), the conceptual framework of the study considered institutional factors, environmental and international shocks. Hence, the study broadly categorized the potential factors such as supply-side, demand-side, federal-level policies, conflict and instabilities, national and international, and environmental shocks (Figure 2.1).

Figure 2.1: Fishbone diagram of inflation in Oromia region



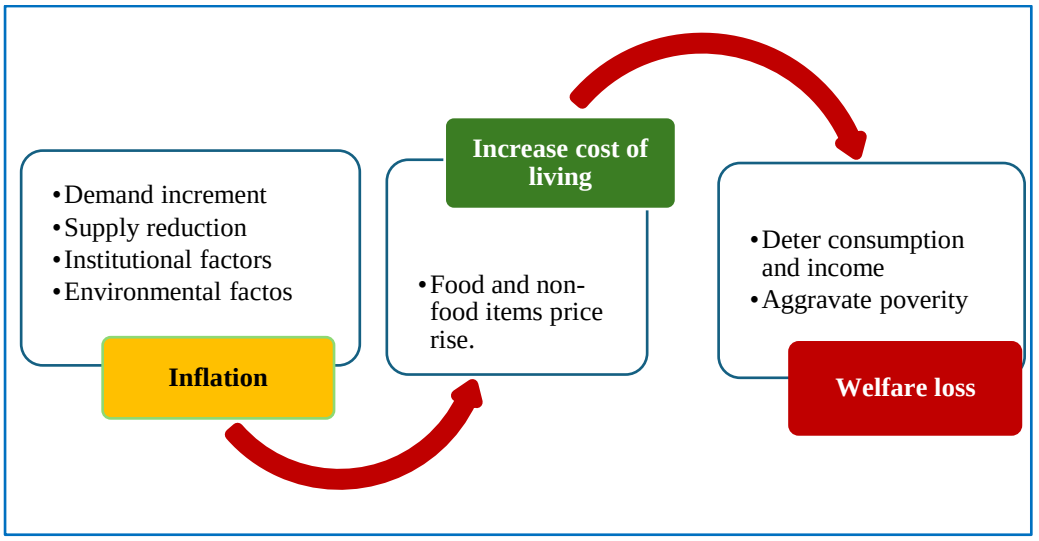
Source: Adopted from a book on Inflation and the Ethiopian Economy by EEA, 2022

2.2. Cost of inflation

The livelihoods of a society may be complicated by price variability, which could directly or indirectly affect the consumption and income. High inflation usually leads to volatile or unpredictable livelihood. Sustainably continuous or unpredictable inflation also signals to the incapability of the government to enact policies that curb the problem. An unpredictable economic system may be created if inflation sustains, which could also dis-incentivize investment, and deter national productivity and future prosperity. Moreover, successive inflation within an economic system could strongly discourage individuals to save. The problem could be worse for poorer households that have not cash in investments or in assets form Alem and Soderbom (2011). Due to the inability to save cash without depreciation, poor households would lose confidence in financial services and institutions. Richer households, on the other hand, might have safer livelihood, even better while there is high inflation. In such situations, banks might also raise the costs of borrowing to compensate for negative interest rates that dis-incentivize individuals from taking loans, starting businesses, or buying fixed assets.

Loening and Oseni's (2007) argued that differentiated welfare effects of inflation are highly dependent on a household's position in the food market (whether they net-sell or -buy). Households' behavior is crucial in determining whether inflation has a positive or negative effect on welfare. Scholars argued that net food buyer households were negatively impacted, especially the poorest ones, whereas net-sellers gained the most from selling food at higher prices. Ticci (2011) found that high inflation in urban areas could aggravate poverty. The scholar argued that the effect in rural areas is a mixed type. Coleman (2012) assessed the regional and sectorial differences in poverty rates in Ghana due to inflation and identified that the problem has the most detrimental effect. The author concluded that welfare implications and inflation persistency is determined not only by high or low inflation but also based on regional differences in consumption patterns and substitution. Chen et al. (2014) estimated the impacts of inflation on the welfare of the Chinese people and found that only a 0.1% increase in inflation leads to a welfare loss of around 70 to 140 Yuan. Regarding Ethiopia, the welfare impact of inflation differs across income levels; hence welfare of those in the higher income quintile is not affected compared to those in a lower income quintile (Degye et al., 2022).

Figure 2.2: Direction of welfare loss as of inflation



Source, Own construction based on literatures, 2023

2.3. Type and Sources of Data

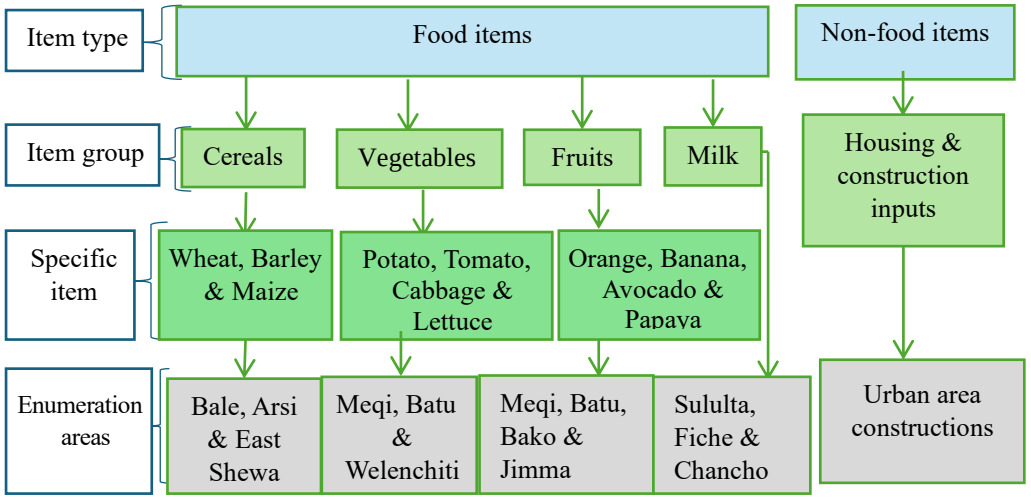
The study addressed the regional inflation from different perspectives. Hence, both primary and secondary data were used for addressing the predefined objectives. Secondary data were collected from the Regional Planning and Development Commission, National Bank of Ethiopia (NBE), Ethiopian Statistical Service (ESS), Food and Agriculture Organization (FAO) of the United Nations, Ministry of Finance and Economic Development (MOFED), Armed Conflict Location and Event Data Project (ACLED), and Ethiopian Peace Observatory (EPO).

Moreover, the study collected primary data from sample enumeration areas and individuals in the regional state to examine the market chain of selected food items. Individuals from producers and participants in the market chain were considered in the data collection. The data enabled the study to examine price differences and market margin sourced from marketing problems that may be a proxy for identifying artificial inflation. Differences between producers' and consumers' prices for selected food items were assessed using the primary data. Based on this data, the examine the price deviation between the farmgate and final consumers of the food items in the sample enumeration areas.

2.4. Sampling and Sample Size Determination

The national level inflation decomposition shows that 57.6% of the general inflation in Ethiopia is attributable to movement in the price of food and non-alcoholic beverages, while the remaining 43% arises from inflation of non-food items (Degye et al., 2022). Hence, the study considered primary data from sample enumeration areas with the potential of producing and marketing food items supposed to have a strong overall inflation effect in the regional state. Thus, the study considered Arsi, and Eastern Shewa zones for collecting primary data for examining the market chain of Wheat and Barley, which are the prominent cereals expected to have a strong effect on the overall inflation. Given this, Batu, Bako, Jimma and Wolenchit were considered as enumeration areas to collect primary data related to vegetables and fruits (Figure 2.3). Since the main aim of considering sample units in the market chain is to examine the price difference in each market level, the study considered a relatively small proportion of samples from each enumeration area.

Figure 2.3: Sampling design for primary data collection



2.5. Method of Data Analysis

The study used both parametric and non-parametric method of data analysis to address the predefined objectives. The non-parametric methods include simple descriptive, narratives, tabulations, graphics, differential diagnosis and benchmarking, decompositions, and ratios. The analysis based on the non-parametric methods was substantiated by employing the appropriate econometric models for a few of the specific objectives. The study employed regression-based inequality decomposition to check relative share of the food and non-food components in determining the general inflation within the regional state. In the regression-based inequality decomposition, aggregate variables were decomposed by their predicted sub-components. The method decomposed the general CPI as a function of the food and non-food components, the constant, and the residuals to the total variation. Based on Araar and Duclos (2008) if the general inflation is Π and the set of components are food (F) and non-food (NF), then the functional representation could be $\Pi = \{F, NF\}$. Using a linear model specification, the formulation could look:

$$\Pi = \theta_0 + \theta_1 F + \theta_2 NF + \varepsilon$$

Where θ_0, θ_1 and θ_2 respectively, denote the coefficients (contributions) estimated from the model. Moreover, the model considered the error term (ε) that could represent the unexplained part. Decomposing total variation with the analytical approach assumes that the aggregate variable is the horizontal sum of variations contributed by each source. Accordingly, the contributions of all the sources, the constant term, and the residual totally add up to one.

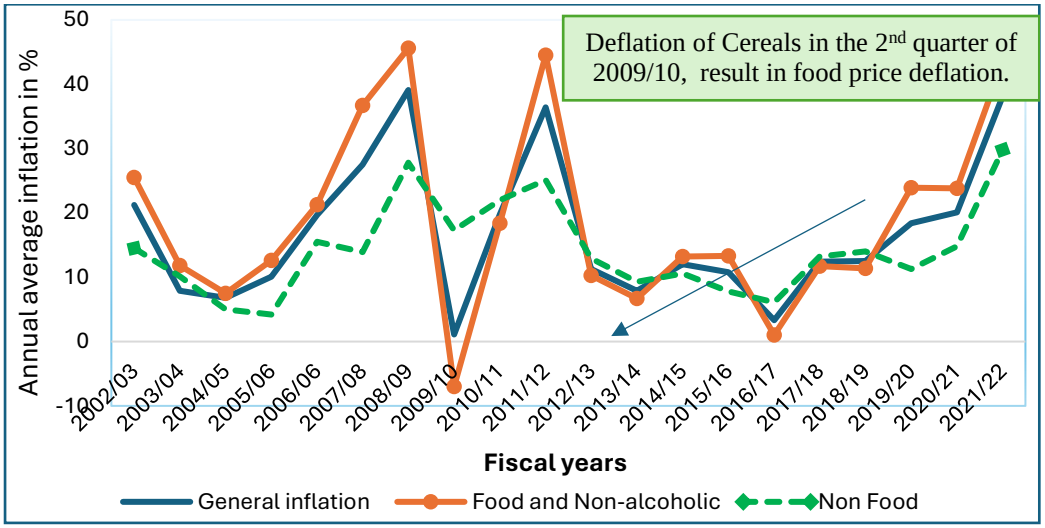
3. TREND AND DYNAMICS OF INFLATION

3.1. Trend of Inflation in Oromia Region

In last five years, since 2016/17 annual average inflation in the Oromia region shows continuous increment (Figure 3.1). Based on the figure, the continuous upsurge of the annual regional inflation, food and non-alcoholic inflation took the leading position. In line with this, the gap between food and non-food inflation becomes narrow in the previous decades (2012/13 to 2021/22), which implies that two of them had a continuous upsurge. However, in almost all

the fiscal years considered in the analysis food inflation of the region took the leading position in the general inflation. Figure 3.1 revealed that there was a significant and drastic reduction in the regional inflation of food and non-alcoholic beverages in 2009/10, which was due to the subsequent reduction in cereal prices. This drastic reduction was a national phenomenon, wherein food inflation had a 26.6% reduction (NBE, 2010) The Bank reported that the subdued global inflation coupled with prudent fiscal and monetary policy measures taken by the government have contributed to this effect. The report also verified that in 2009/10 there was strong food price deflation in the first quarter of the year, which was the result of reduction in the price of cereals, pulses, vegetables and fruits.

Figure 3.1: Trend of annual average inflation in Oromia region

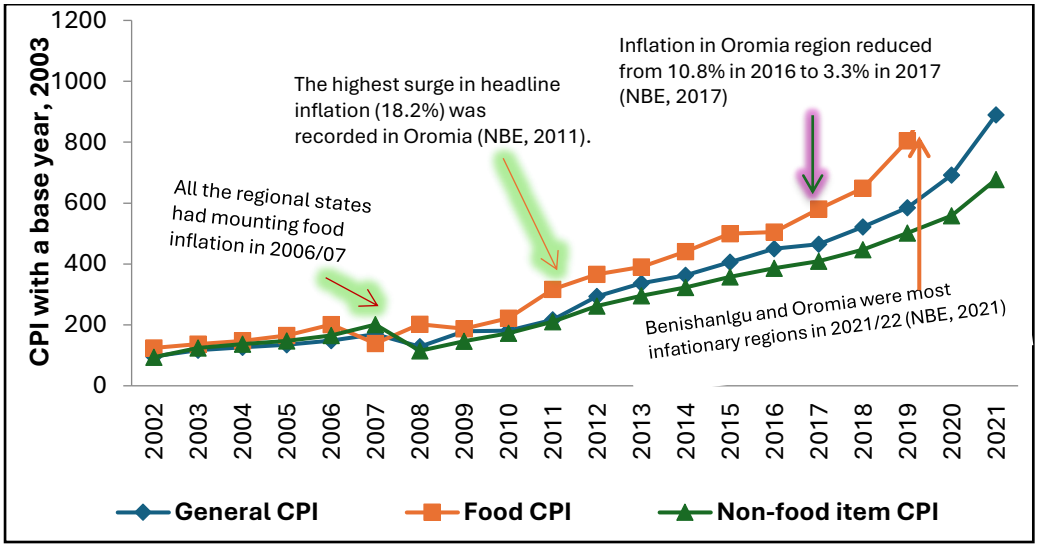


Source; Own computation from NBE and ESS, 2023

Figure 3.2 shows that both the general and food price index of the region had similar and equal movement until 2011, which implies that both the food and non-food items had similar price movement in the regional state. After 2011, the food price movement was steeper and higher than the general CPI, which implies that the gap between food and non-food CPI becomes wider, indicating that recently the food price rise is by-far larger than the non-food price increment. The steeper food price movement, starting from 2011, indicates that the pressure of inflation on society is becoming stronger since food items need day-to-day spending. The food price pressure on the general inflation of the region became stronger after 2017. Though the difference between food and non-food price is becoming larger, the trend was similar.

There was a smaller variability between food and non-food price indices in 2017, but they came to a similar trend of increment since 2018. After 2019 the two indices had quite different trends of increment, wherein the leading position was taken by the CPI of food items. Especially after mid of 2021 the gap between the two indices became wider, and non-food items had a relatively stable trend. In years, when there was a gap between food and non-food CPIs, the general CPI followed the trend for food CPI, which took the dominant share in the general consumer price index of the regional state. This indicates that if the regional state is able to curve down the inflation for a food item, it could significantly reduce the overall inflation within the regional state.

Figure 3.2: Trend of CPI in Oromia region



Source: Own computation from ESS, 2023

3.2. Regional Inflation Decomposition

The regression-based inequality decomposition result shows that the CPI of food items takes a prominent share of the general CPI of Oromia at different times. However, the share becomes larger in recent times, which implies that the pressure from the food inflation is becoming stronger. Between 2007 and 2021, the CPI of food and non-alcoholic drinks took about 60% of the relative share in determining the general CPI, which is by far larger than the national level share, which is 57% (Degye et al., 2022). This strong contribution implies that food price pressure is stronger in Oromia region in the process of determining the general

inflation. The higher food inflation contribution in the general inflation of the region indicates that the regional population is suffering from inflation compared to the national level.

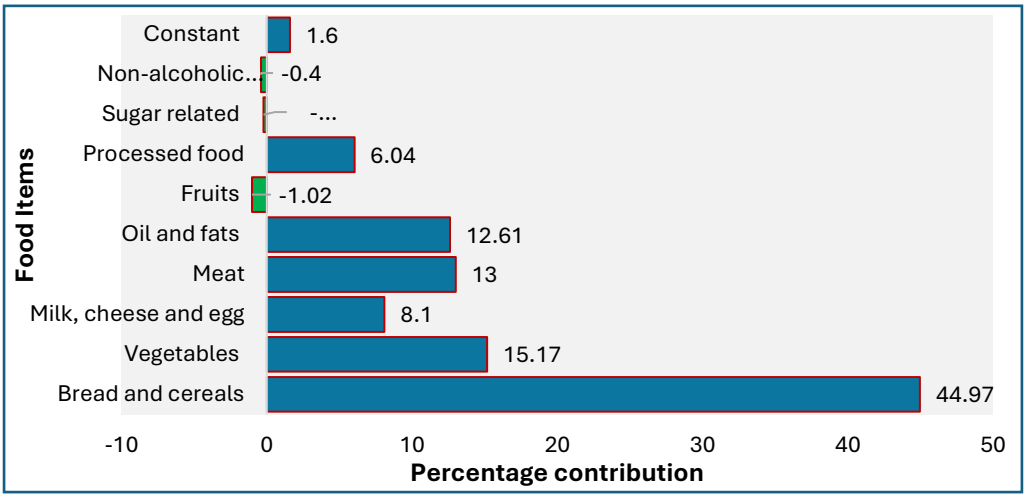
Table 3.1: Contribution of food and non-food components to the general inflation (2007-2021)

Food and non-food CPI	Quarterly CPI (2007-2021)	
	Inflation shares	Relative contribution
Food and non-alcoholic CPI	58.68	60.33
Non-food CPI	41.24	39.75
Constant	0.083	-0.08
Residual	0.00	0.01

Source; Own computation from NBE quarterly data, 2023.

The regression-based decomposition revealed that bread and cereals took about 45% of the relative share in determining the food inflation of the Oromia region (Figure 3.3). The second and third position of the relative contribution for food CPI of the region is taken by vegetables and meat. Given this, fruits, non-alcoholic beverages, and sugar related food items had a stabilization effect on the food inflation of the region. This regional-level finding partially corroborates the argument of Degye et al. (2022) who argued that fruits, milk, cheese and eggs, and non-alcoholic beverages have stabilization effects on the national level consumer prices of food.

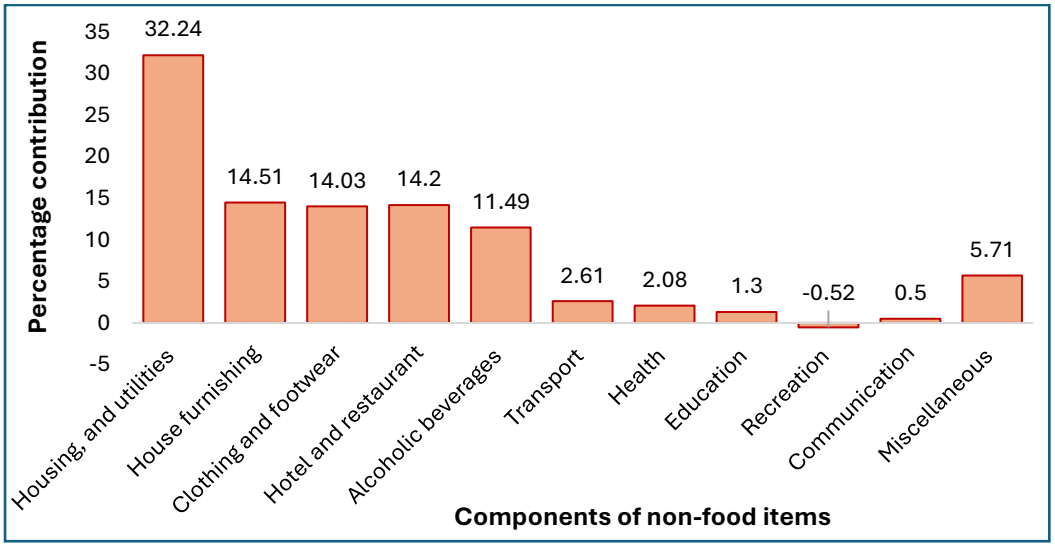
Figure 3.3: Contribution of food items in the food CPI of the region



Source: Own computation from data in NBE (2023)

Figure 3.4 shows that significant proportion of the variability in the non-food price variation is sourced from housing and related utilities, which took the right-hand contribution (32.24%) in determining the non-food price movement of the region between 2007 and 2021. This circumstance is strongly similar to the national level findings of Degye et al. (2022) who argued that 34.9% of the relative contribution in non-food inflation is sourced from the variation in the price of housing and related utilities. Moreover, house furnishing and clothing and footwear price movements took the second and third position in determining the non-food inflation in the Oromia region. Contrary to this, the price movement of recreational items had stabilizing effect on the non-food inflation in the region. Degye et al. (2022) argued that prices of education and communication have stabilization roles in the national economy.

Figure 3.4: Contribution of non-food items in the non-food CPI in Oromia region



Source: Own computation from data in NBE (2023)

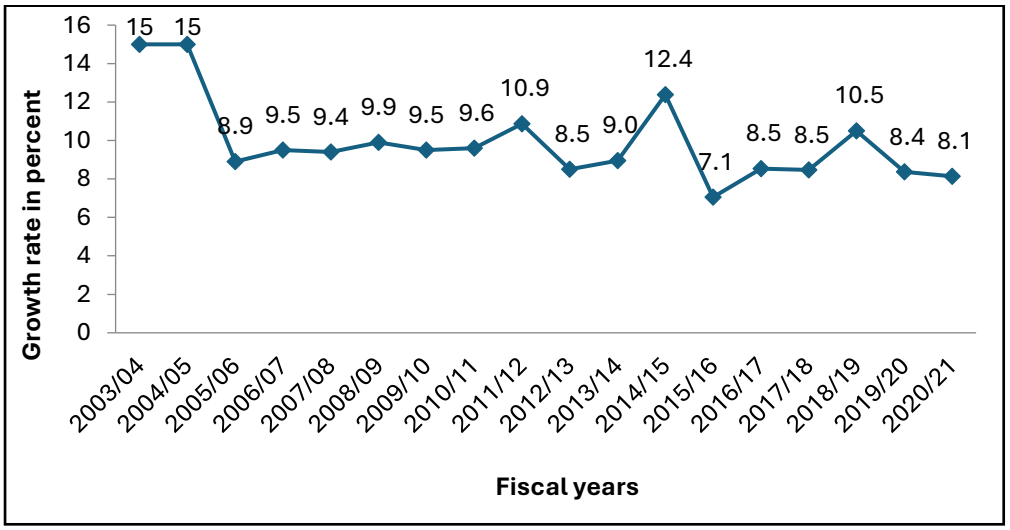
4. SUPPLY AND DEMAND-SIDE DRIVERS OF INFLATION

4.1. Supply Side Drivers of Inflation in Oromia Region

4.1.1. Economic growth and inflation

In the previous two decades, the overall GDP of Oromia region grew consistently; however, the rate of increment was quite different, which had increment at a decreasing rate (Figure 4.1). Growth rate of the GDP had a continuously decreasing trend, and in few of the fiscal years it had double digit, but recently it has a growth rate below 10%. Albeit, the rate of increment was decreasing, the continuous increment of the regional GDP implies that the region is trying to produce outputs and supply to the economy to narrow down the gap between demand and supply. This effort of the economy may try to stabilize the regional inflation through balancing demand and supply, though the effect may not be strong enough. Reduction in the agricultural sector (2013/14 to 2015/16) was the reason behind the lower performance of the regional GDP in 2015/16 (OPDC5, 2016). This implies that the sector, which has more 50% GDP share, strongly determine the overall growth rate of the regional economy.

Figure 4.1: Trend of regional real GDP growth rate



Source: Planning and Development Commission of Oromia regional state, 2022

[5] Annual report of Oromia Plan and Development Commission in 2016.

Significant proportion of the regional GDP growth is sourced from agriculture, which has about 80% of the relative growth contribution in the previous two decades (Table 4.1). The relative growth contribution of the regional service sector is a bit stronger than the actual average share in the total GDP. Based on the decomposition result presented in Table 4.1 the significant variability in the regional economic growth is sourced from the variation in the agricultural sector. Hence, every additional effort in agriculture could have a significant effect on the overall economic performance of the region.

Table 4.1: Sectoral decomposition of the regional GDP growth rate (from 2000/01 to 2020/21)

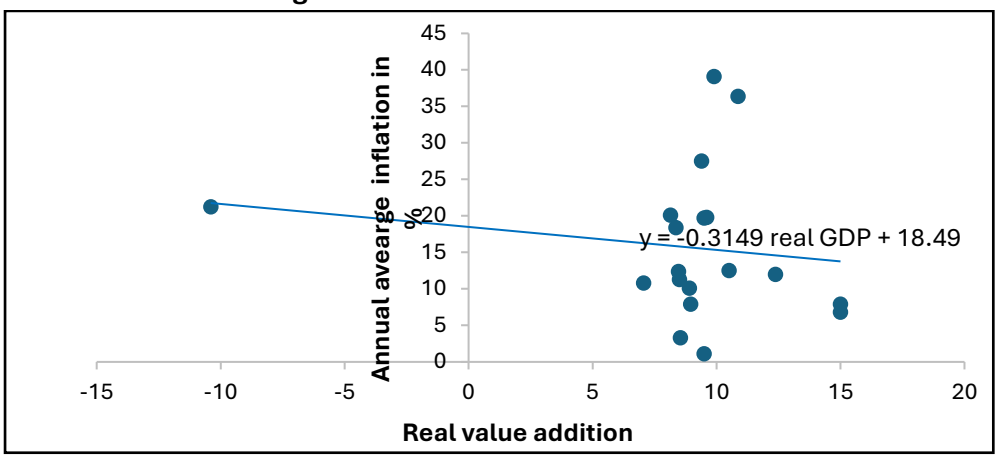
Sectors	Average GDP growth share	Relative share to GDP growth rate
Agriculture	53.73	79.52
Industry	11.77	6.81
Services	43.54	13.45

Source, Own computation from OPDC data, 2023

Figure 4.2. verified that the continuous growth of the regional economy has a stabilization effect on regional inflation, although it was not strong enough. The figure presents an inverse relationship between real GDP value addition and general inflation of the region, which indicates that an additional increment in the real GDP has an inflation stabilization effect. Successive value addition of the regional economy could try to balance the demand and supply, which could try to stabilize the continuously increasing regional inflation. The figure prevails that if the regional economic growth rate is strong and stable enough, then it may stabilize the regional inflation by consistently availing the demanded amount and creating market equilibrium.

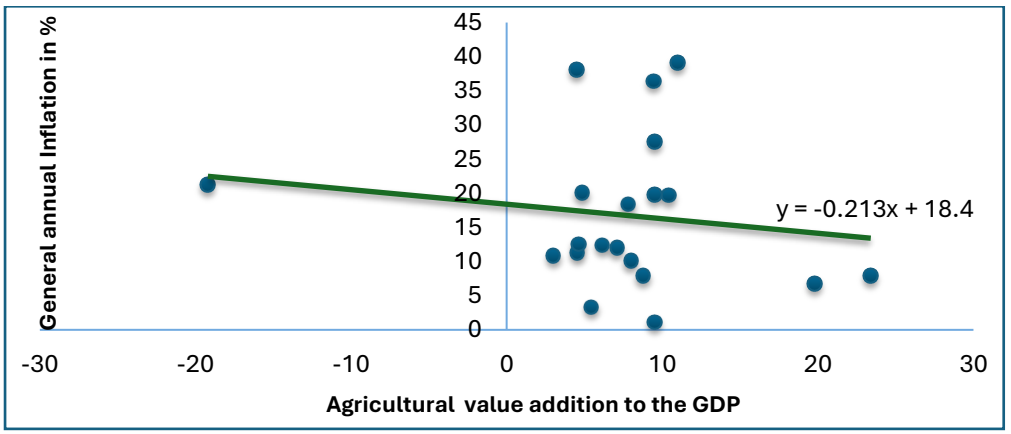
Figure 4.3 shows that agricultural value addition in Oromia region has a relative inflation stabilization effect, which implies that every increment in the sectoral value addition could try to pull-down the inflation by supplying outputs to the other sectors, especially the service sector. In line with this, value addition by the industrial sector of the region also has a positive effect in lowering inflation. However, the stabilization effect was not strong enough compared to the agriculture. As to figure 4.3, the value addition of agriculture is more powerful in stabilizing regional inflation than the contribution from the industrial sector of Oromia region.

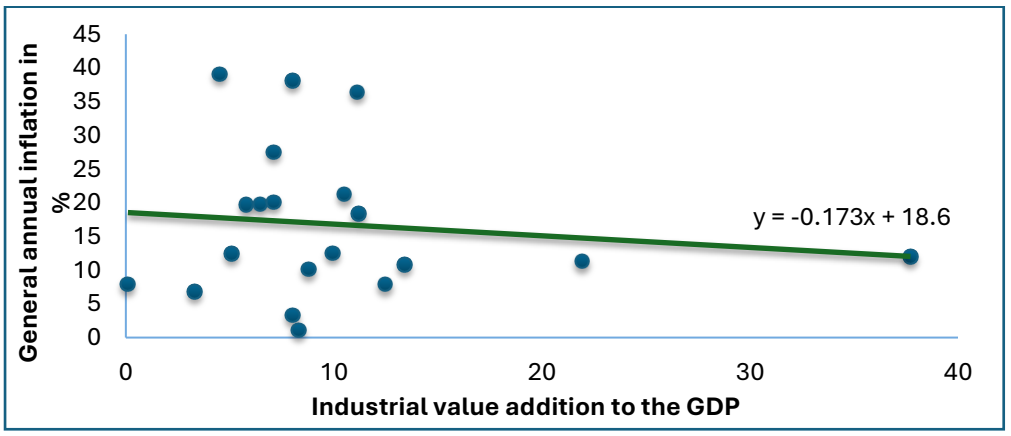
Figure 4.2: Interaction of regional GDP growth rate and annual inflation in Oromia region



Source: Computed from NBE and OPDC data, 2023

Figure 4.3: Interaction of inflation, and agricultural and sectorial value addition

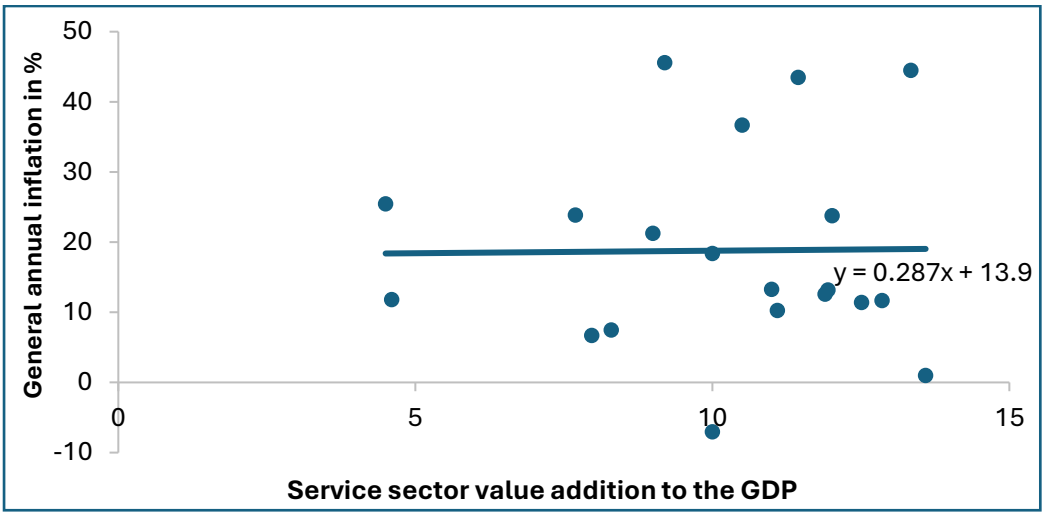




Source, own computation from NBE and OPDC data, 2023

Figure 4.4 shows that services sector value addition of the region positively contributed for the continuous inflation. Successive increment in the sectoral value addition to the regional GDP could aggravate the inflation through creating additional demand within the economic system. The problem could worth more if each additional demand from the service sector is not fulfilled. Hence, the regional economy may suffer from demand-pull inflation.

Figure 4.4: Interaction of service sector value addition and the inflation in Oromia region

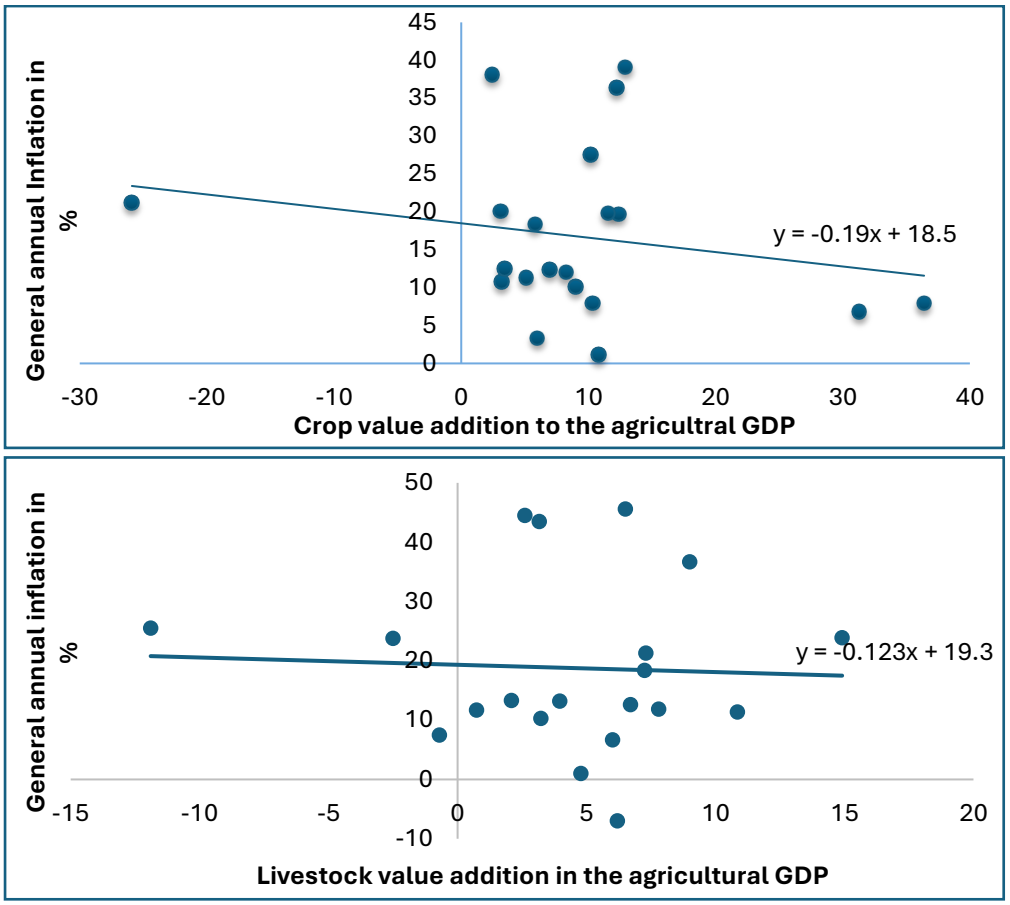


Source: Planning and Development Commission of Oromia regional state, 2022

4.1.2. Crop and livestock value addition

Crop production and livestock management of the region have inflation stabilization effect (Figure 4.7). However, the effect from the former sub-sector is stronger, which implies that each value addition from the sub-sector has significant inflation stabilization effect in Oromia regional economy. Thus, if there are continuous efforts to enhance value addition of the sub-sector, the inflation stabilization effect may be sustainable for the regional economy.

Figure 4.5: Interaction of inflation and crop and livestock value addition

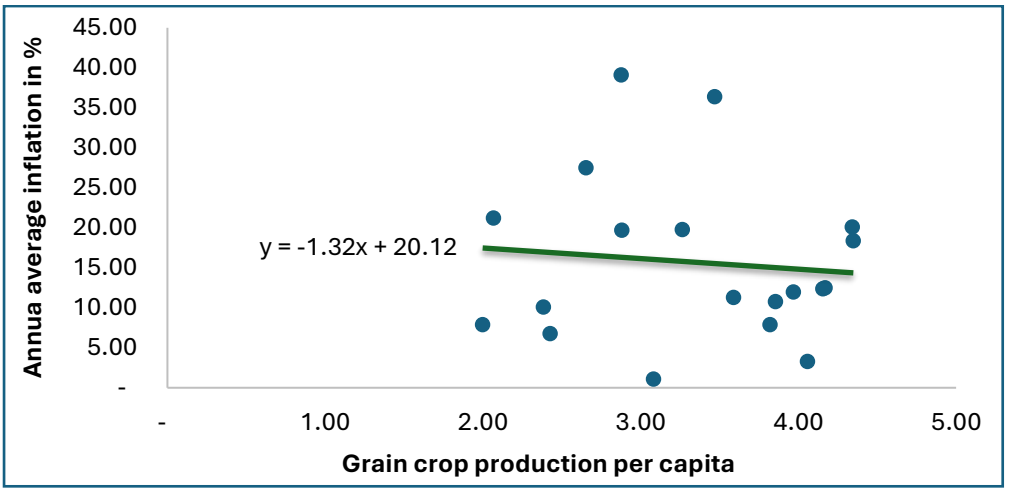


Source, Own computation from NBE and ESS, 2023

4.1.3. Grain crop production per capita

Figure 4.6 reveals that grain crop production has strong inflation stabilization effect within the regional economy. The figure reveals that improvement in grain production has a strong inflation stabilization effect, which indicates that every additional effort in the process of enhancing grain crop production could have meaningful implications to fight general inflation. Thus, it is easy to conclude that every increment in grain crop production has strong and positive stabilization effect on the overall inflation within the regional economy.

Figure 4.6: Grain crop production and inflation in Oromia region

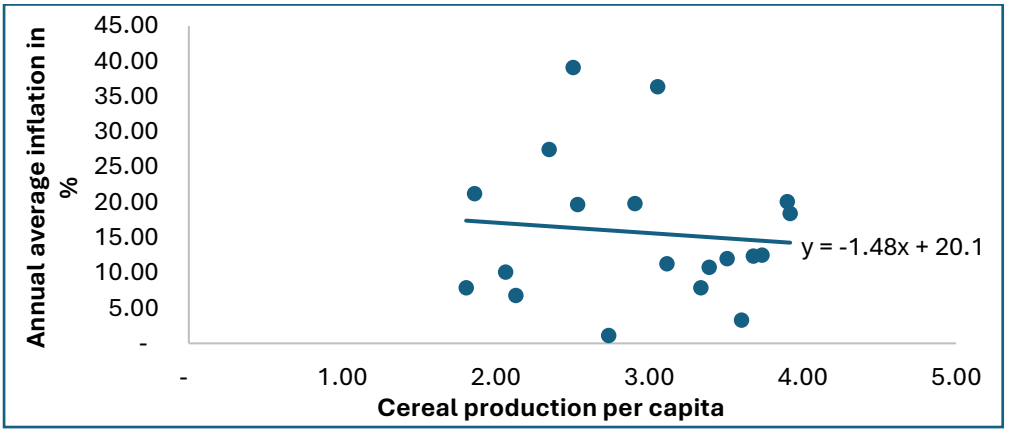


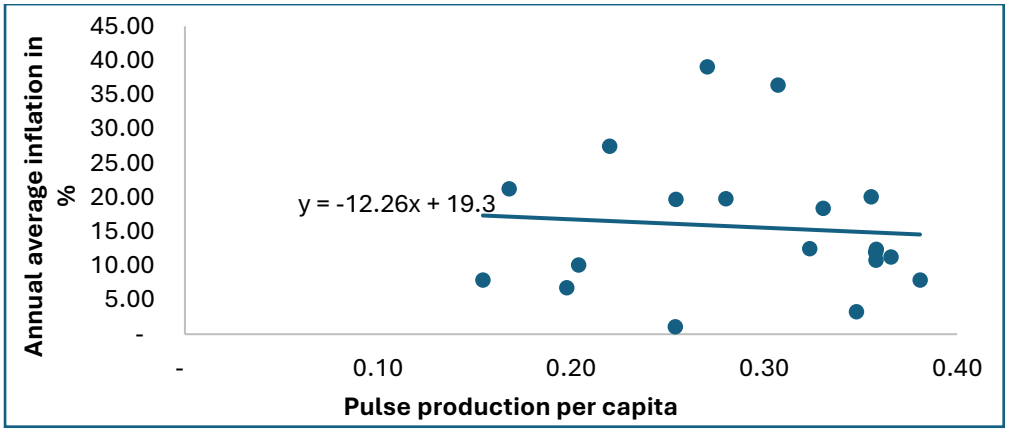
Source, Own computation from NBE and ESS, 2023

4.1.4. Cereals, pulses and oil seeds production per capita

Figure 4.7 show that the increment in cereal and pulse crops per capita production of the region has a strong inflation stabilization effect since they are the main source of consumable items. The figure conveyed that if the regional state can enhance the production and productivity of cereals, it could significantly curve down the inflation by clearing the market that is equalizing the demand and supply within the regional economy. If the regional crop production sustainably increased, the national level repercussion in fighting inflation could be strong enough.

Figure 4.7: Interaction of inflation, and cereal and pulse production per capita



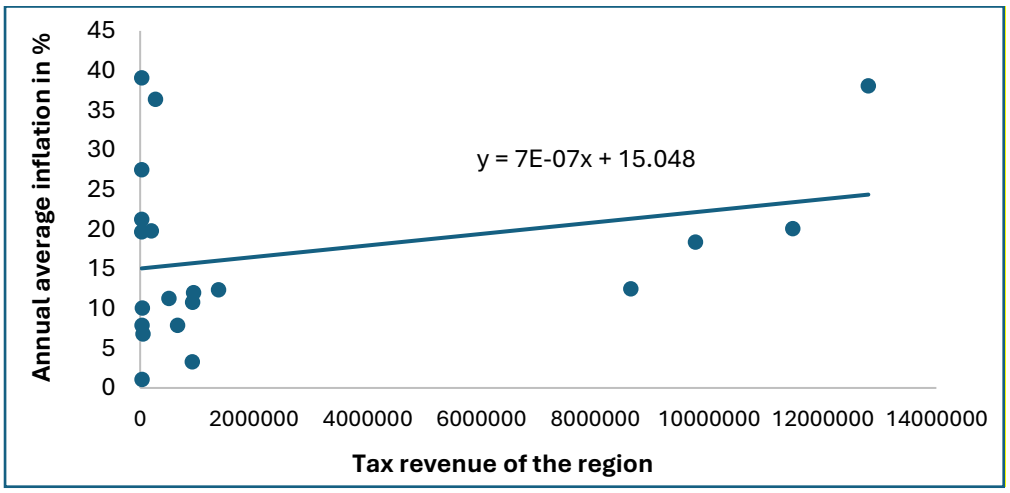


Source, Own computation from NBE and ESS, 2023

Trend of tax collection and inflation in the region

Figure 4.8 shows that continuous increment of tax revenue collection by the regional state has a fuelling effect on inflation. This indicates that every increment in tax collection may increase the inflation within the region, which may be called a cost-push inflation as of continuous transaction cost increment after each tax collection.

Figure 4.8: Tax revenue collection and inflation



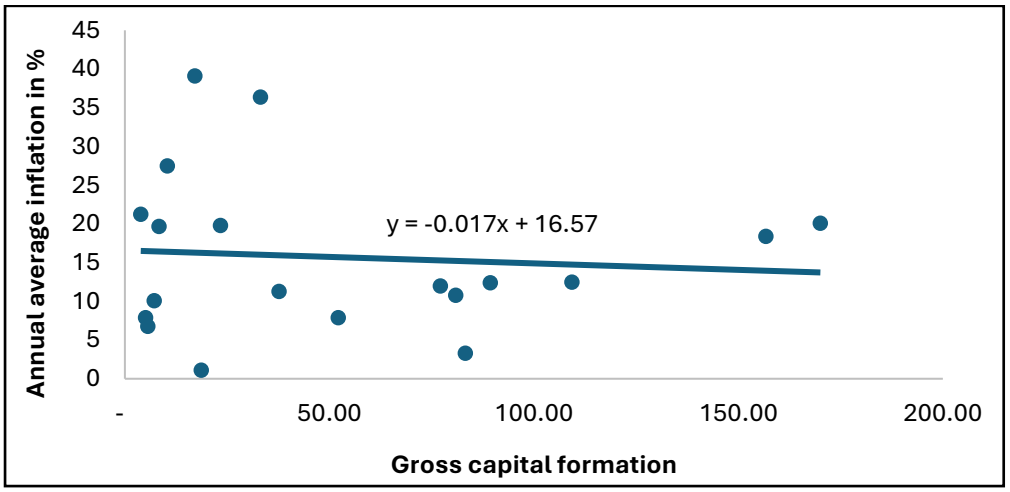
Source, Own computation from NBE and ESS, 2023

4.2. Demand Side Drivers of Inflation in Oromia Region

4.2.1. Gross Capital Formation

Geda and Tafere (2011) argued that income growth is one determinant of inflation since its increment could create demand for goods that may finally result in demand-pull inflation if there is lagging supply within the economy. Figure 4.9 reveals that the gross capital formation of the regional state had an inflation stabilization effect, though the interaction was not strong enough. The negative trended interaction indicates that every additional increment in the investment within the regional economy has positive contribution in the process of fighting inflation. This stabilization effect of capital formation may be because of improvement in the supply side of the economy (agriculture and/or industry) after every additional capital formation.

Figure 4.9: Capital formation and inflation in Oromia region



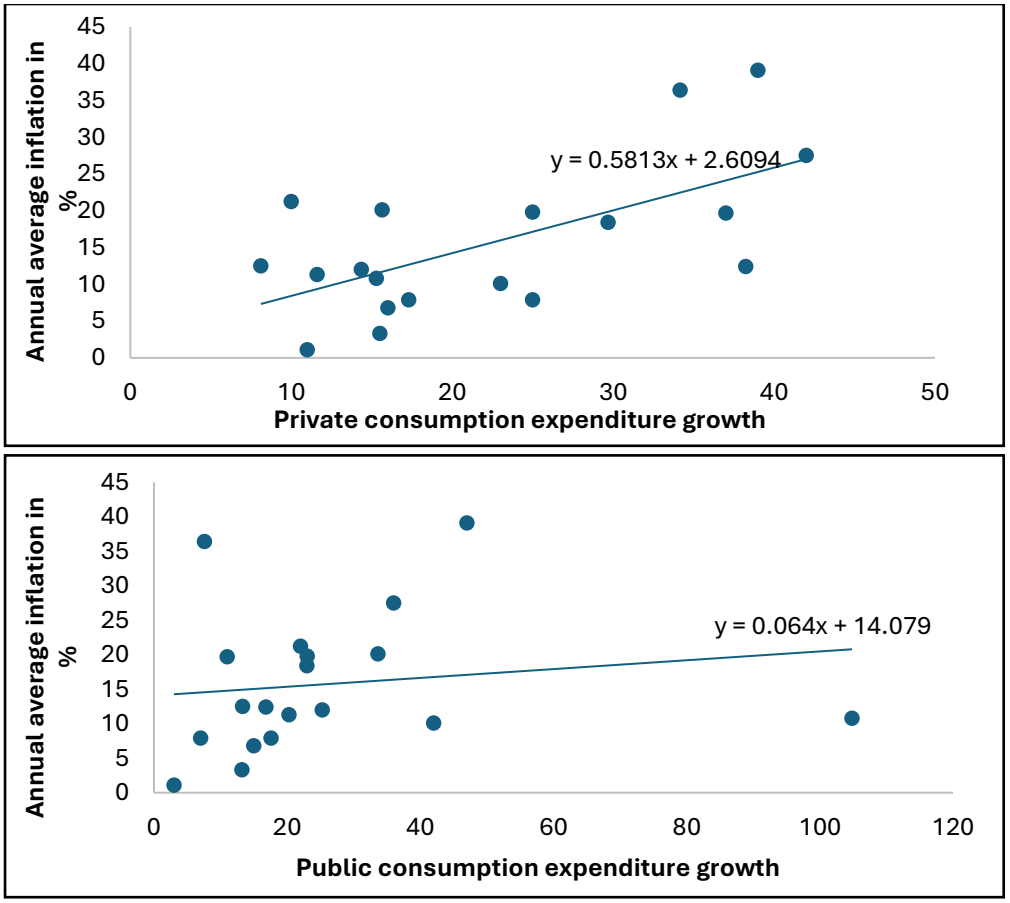
Source, Own computation from NBE and ESS, 2023

4.2.2. Dynamics of Public and Private Expenditure

Investment increments may improve employment and income, thereby creating more demand for goods and services, but there may be a time gap for the output to enter the market, which could lead to a price rise. Figure 4.10. shows that continuous increment of private and public consumption expenditure has a fueling effect on the inflation within the regional state, though, the former one has stronger

power. This strong fueling effect of private consumption expenditure increment revealed that significant proportion of the private consumption expenditure was not productive enough to produce additional outputs for the economy. Fueling effect of the private consumption expenditure reveals that the spending was on the direction of creating demand within the economy. Contrary to this, fueling effect of public consumption increment was partial, which may be because of the partial productive, through investment on capital formation practices, effect of this expenditure direction within the regional economy.

Figure 4.10: Inflation and consumption expenditure growth in Oromia region

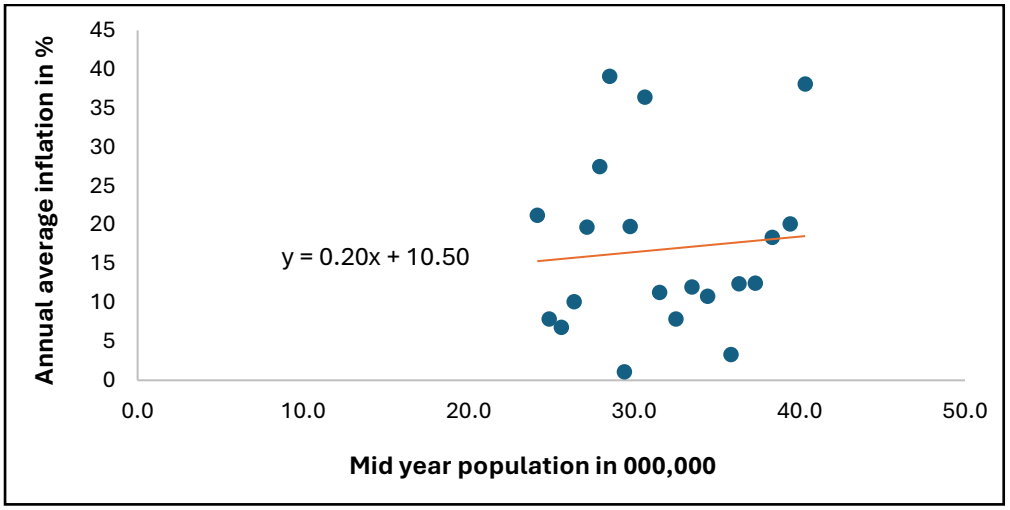


Source, Own computation from NBE and ESS, 2023

4.2.3. Population growth and inflation

Inflationary pressure of population growth and demographic change may arise depending on how fast and responsive is the supply to respond demand (Yihan and Niklas., 2017). The scholars argued that if the continuously increasing population has a strong effect in increasing consumption expenditure, then the population growth may be a source of pressure to aggravate inflation. This problem may be severe if the supply within the economy is not responsive enough to the demand immediately. Figure 4.11 reveals that successive population increment has inflation fueling effect in the regional state, which may be because of an imbalance between the demand and supply needed by the growing population. Hence, in the current situation, additional population increment may aggravate the inflation within the regional economy.

Figure 4.11: Interaction of inflation and population growth



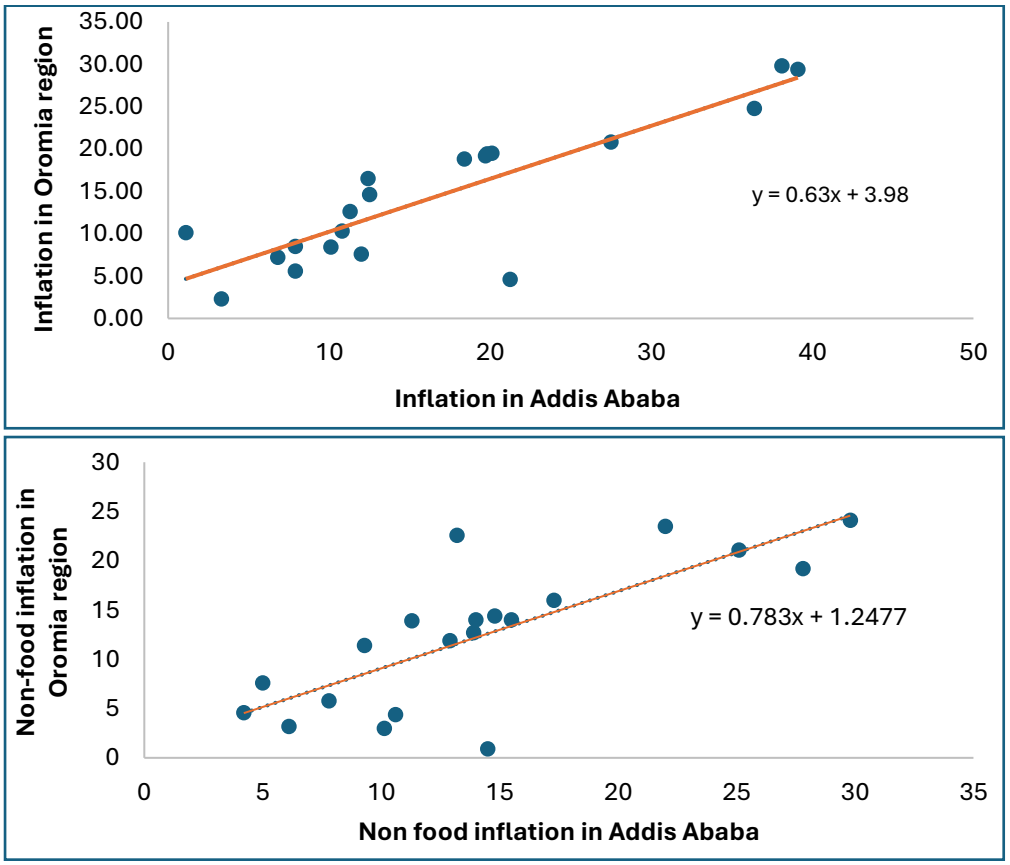
Source, Own computation from NBE and ESS, 2023

5. CROSSCUTTING ISSUES AND INFLATION IN OROMIA

5.1. Co-movement of Prices in Oromia and Addis Ababa

The scatter plot diagram on Figure 5.1 shows that the general inflation in Addis Ababa and Oromia region has strong interaction, which indicates that increment of the inflation in either of them may directly pull the inflation in the other. Successive increment of inflation in Oromia region has a fueling effect on the inflation in Addis Ababa, and the reverse may also be true. The non-food item inflation interaction of Addis Ababa and Oromia regional state was stronger compared to the general inflation interaction. The strong dependency of the regional state on merchandises sourced from Addis Ababa may be the reason for the stronger interaction between the non-food inflation.

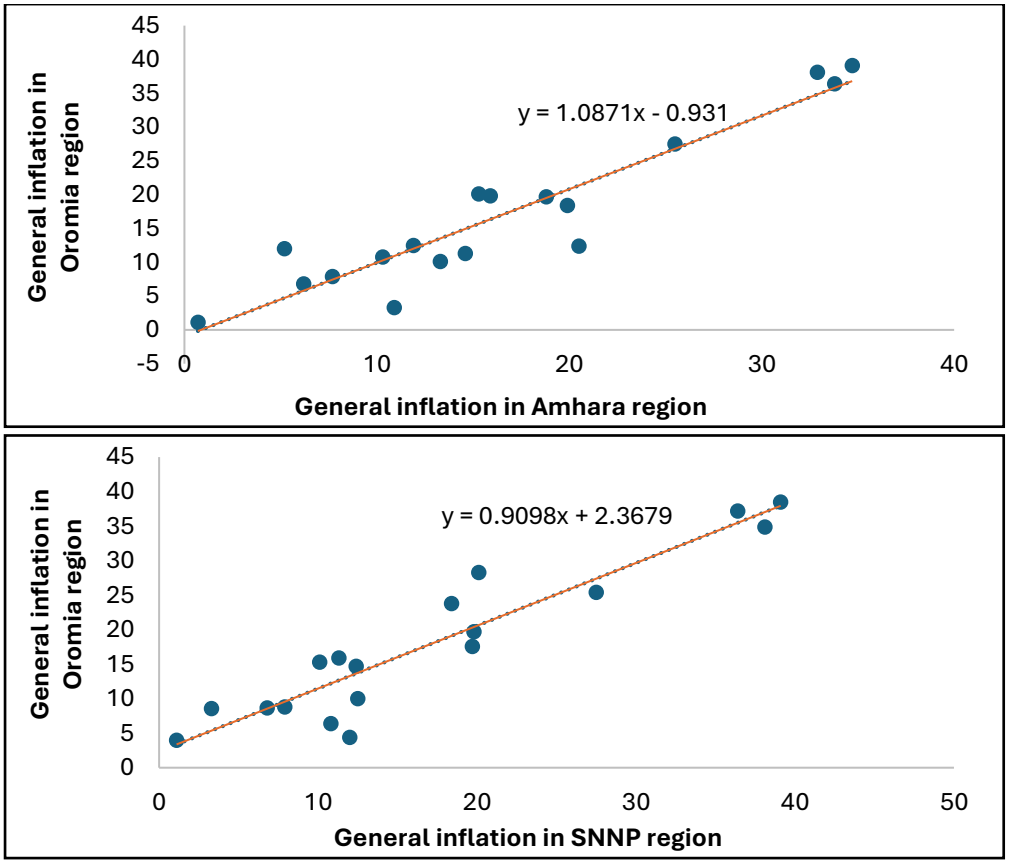
Figure 5.1. Interaction of inflation Oromia region and Addis Ababa



Source: Own computation from NBE and ESS, 2023

Figure 5.2 shows that the annual average general inflation in Oromia region has strong interaction with the inflation in Amhara and SNNP regions, wherein the interaction with the former region was by-far stronger. The geographic proximity, which may allow for easy transaction and market interaction and finally strong co-movement of inflation among regions.

Figure 5.2: Interaction of inflation in Oromia and other regions



Source: Ethiopian Statistical Service (ESS), 2022

5.2. Inflation Fueling Domestic Policy Measures

i. Lifting fuel subsidies

Inflation-targeted policy measures of the federal government were mostly impotent to stabilize the inflation in the country. On top of this, other policy measures taken recently at the federal-state level have rather fueled inflation in the

regional state. The most important one is the removal of fuel subsidies in 2021. On account of soaring prices of fuel in the world market and budgetary implications of fuel subsidy, in mid-February 2021, the government has been forced to revise retail prices of petroleum upwards with the Ethiopian Ministry of Trade and Regional Integration announcing a price increase and lifting subsidies except for public transport (Zewdie, 2022). The government decided to raise the price of fuel by 25% as part of a plan to gradually reduce subsidies to fuel prices. Following this measure, prices increased by up to ETB 3 per liter for main petroleum products.

Lifting fuel subsidies by the government are contributing to the rising food inflation levels (USDA, 2022). Evidence for the Oromia region also shows that lifting fuel subsidies entails a higher inflation rate in the region. According to Ethiopian Statistical Services data, the fuel and electricity CPI increased from 198.8 in February 2022, to 266.5 in January 2023. This suggests that the general prices of fuel, electricity, and related items grew by over 34%. During the same period, the CPI of transport also increased from 259.7 to 289.7, a growth of 11.5%. Moreover, food and non-alcoholic beverages CPI increased from 287.1 in February 2022 to 365.2 in January 2023, with prices up by 27.2%.

Rising fuel prices exerted additional upward pressures and increasingly exposing local populations to high living costs (Economist intelligence, 2022). **The report also asserted that fuel price increases** could raise transport costs, with a knock-on effect on general consumer prices where market supplies depend on road transport from and to urban centers as well as imports. Since agricultural products must be transported from rural areas to major markets, fuel price increment could contribute to the high transport costs of commodities along the supply chain, that could increase the final selling prices of goods. In this way, the rise in fuel prices ripples outward from the transportation sector and accelerates the already galloping inflation within the country and respective regions. Perhaps, with fuel and electricity accounting for about 10% of the CPI in Ethiopia, the inflationary effect of the policy measure in Oromia region is expected. Moreover, inflationary effect of fuel subsidies cut appears to be more severe as the measure is taken during the time of global fuel price hikes. To sum up, the removal of fuel subsidies increased the prices of petroleum products, costs of transportation and production, and food prices, which could finally exacerbate the inflation in the region. Respondents in the key informant interview (KII) asserted that many of the merchandises have a skyrocketing price increment immediately after the government had cut the price subsidy. The participants emphasized that there

should be evaluation of succeeding outcomes of policy measures in connection to inflation within the regional economy.

ii. Massive devaluation of the birr

Prices may sometimes engender by devaluation (Wilson, 1976). Daniel (1987) argued that the effect of devaluation on the price level is felt for at least three years. The author argued that the inflationary impact of devaluation is mild and it differs among countries. Haile (1999) argued that devaluation would help improve the current account balance but would be stagflationary. Devaluation was a policy measure taken by the government in hopes of addressing the forex shortage by reducing the gap between official and parallel exchange rates and increasing export revenue and foreign investments. Devaluation is a policy measure often promoted by international financiers, primarily the World Bank and IMF.

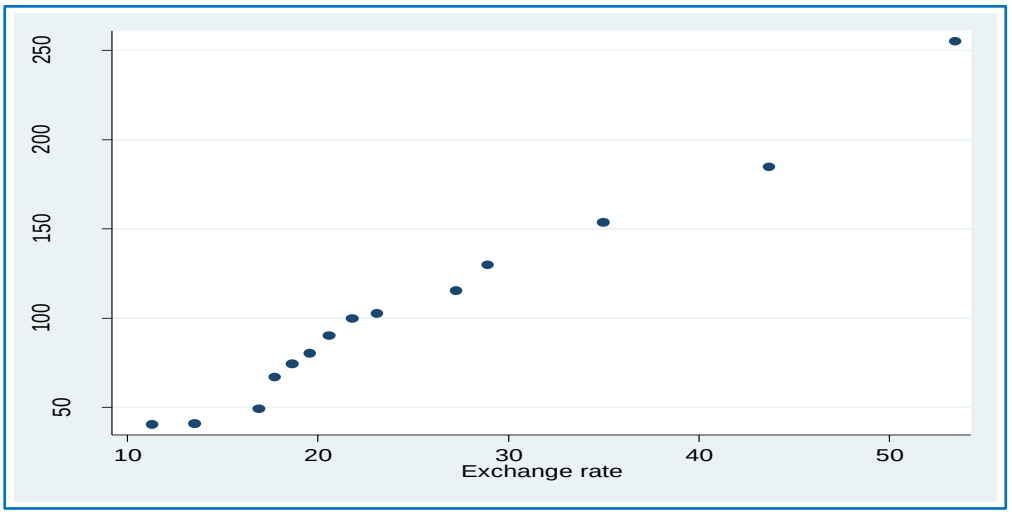
In 2010/11 National Bank of Ethiopia reported that devaluation of birr in September 2010 was one critical reason for the upsurge in non-food inflation in the first quarter of the fiscal year. World Bank research studying the causes of inflation in Ethiopia suggests in an economy facing foreign exchange constraints, a devaluation can miss its target and set off an inflationary spiral. Under tight foreign exchange reserve constraints and import dependency, inflation can indeed offset some of the intended benefits of devaluation. The World Bank in 2010 concluded that a key reason why the 17% devaluation of birr in 2010 did not yield the desired outcomes since "inflation 'ate up' most of the positive real exchange rate gains".

The devaluation of the Ethiopian birr is another domestic shock that has fueled inflation. Since 2018, the government has been undertaking a major devaluation to stimulate exports and address the critical foreign exchange shortage. The value of the Ethiopian Birr has fallen against a number of major currencies, notably the US dollar. In the past four years, the value of the birr has dwindled by 126% against the US dollar (Dadhi, 2022)6. As a small, open economy, Ethiopia is susceptible to devaluation, raising the prices of imported commodities. This has had a ripple effect on the prices of goods and services in the country, exacerbating inflationary pressures. Following the government's devaluation of the local currency, there have been upward inflationary trends. Evidence suggests that between 2018 and 2022, the inflation rate more than doubled in the country increasing by about 121%. Likewise, relative to the CPI in 2016/17 (pre-devaluation period), the regional CPI grew by a staggering 148.4% in 2021/22. This may appear to suggest that there is a co-movement between devaluation and inflation in the

[6]https://www.google.com/search?q=Hyperinflation+in+Ethiopia+is+the+product+of+cascading+missteps&sourceid=chrome&ie=UTF-8

regional state. The scatter plot in Figure 5.5 also demonstrates that inflation is strongly linked to the devaluation of the currency.

Figure 5.3: Scatter plot of inflation in Oromia region and exchange rate



Source, Own construction from NBE data 2023

Empirical investigations also confirm that devaluation is inflationary in Ethiopia. Using the CGE model, Woldie and Siddig (2019) reported that devaluation is found to have an inflationary impact over the long term in a developing country like Ethiopia. Using data from Ethiopia and Kenya, Durevall and Sjo (2012) found that inflation rates in both countries were driven by exchange rates and world food prices in the long run. In the short run, the supply and movement of exchange rates are one of the determinants of inflation in Ethiopia (Geda and Tafere, 2008). Moreover, in an economy facing foreign exchange constraints, it is indicated that a devaluation can set off an inflationary spiral whereby devaluation causes domestic prices to rise, causing an appreciation of the real exchange rate which discourages exports. Further devaluation aimed at preventing the deepening of the trade deficit can ignite other rounds of domestic price increases while raising expectations of further exchange rate devaluation (Ndikumana et al., 2021).

Evidence shows that devaluation has also impacted prices in the Oromia region. According to Ethiopian Statistical Services data, the rate of increment in the regional CPI was particularly higher since 2017/18. The regional CPI increased dramatically from 102.65 in 2016/17 to 184.6 in 2020/21 and to 255 in 2021/22. This reveals that overall prices in the region have been growing at an alarming rate in the

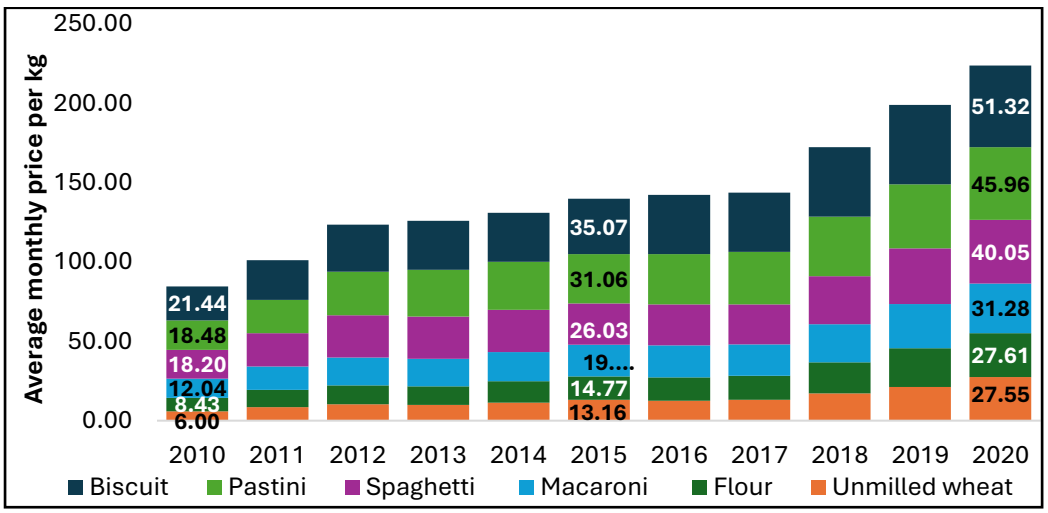
post-devaluation period, suggesting that the regional state is not immune from the country-level inflationary effects of devaluation. At a regional level, Ambachew et al. (2012) reported that a rise in exchange rates or devaluation is also found to impact food price inflation in the short run in Eastern Ethiopia. This suggests that devaluation, among others, has contributed to the inflationary trend in the region.

5.3. Market Chain and Food Price Difference in Oromia Region

5.3.1. Cereal market chain analysis

Brokers are typically knowledgeable individuals who have strong and high-quality information at the kebele level of farmers and the crops they have for sale as well as connections with wholesalers. Brokers use this information to connect farmers to wholesalers via cell phones. Brokers provide market information and advice to wholesalers and are key players in price discovery and setting. The wholesalers or buyers typically arranges for the transportation of the produce and pick up at the farm gate. The brokers collected up to 30% commission on each sale, which could increase the price of merchandises with no value addition. Brokers provide an easy way for farmers to market their produce, albeit at lower prices than the farmers can get at terminal markets. Brokers sometimes also play the role of financiers to farmers (Feed the Future, no date).

Figure 5.4: Price trend of wheat and factory processed wheat products in Oromia region

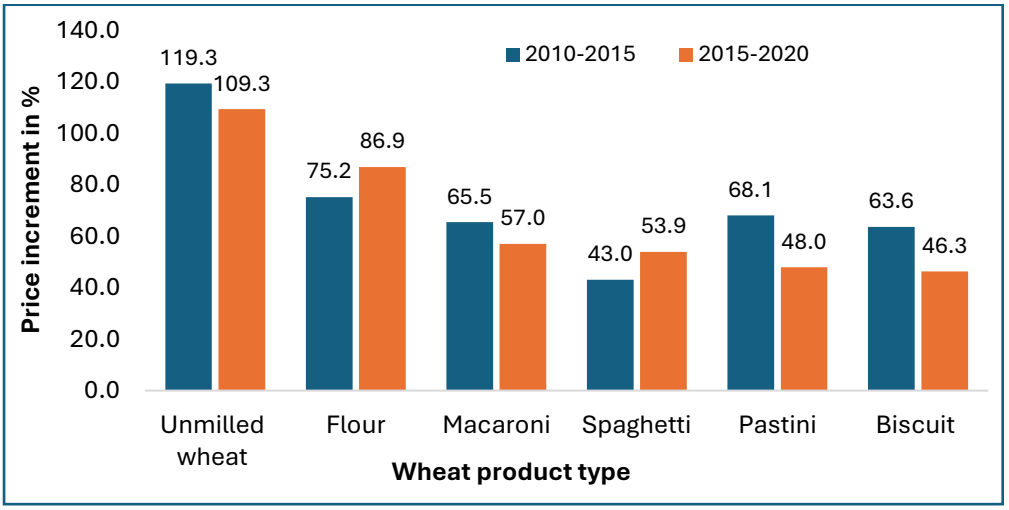


Source: Own computation from ESS data, 2023

Figure 5.4 shows that the price gap between unmilled wheat and flour was relatively consistent and constant with a minor increment after 2018. Moreover, the gap between the raw product (unmilled wheat) and the first value addition (processing the flour) was smaller compared to the price gap in the second level value addition (Macaroni, spaghetti, Pastini and Biscuit)). However, the price gap between the first (flour) and second level value addition was quite different in the different fiscal years of the analysis. The second level processors had a relatively larger share in the value addition and profit margin. The finest product (Pastini and Biscuit) producers had the largest share in the value addition and price margin of wheat in Oromia regional state. Figure 5.4 revealed that the value addition on wheat in the regional state had different final values depending on the product type. This indicates that the market share of the different agents takes a different share, which increases for the participants at higher levels that try to refine the wheat product.

Figure 5.5 shows that in the previous ten years (2010 to 2020) a significant proportion of price increments has been observed in unprocessed wheat. Contrary to this, processed products, especially refined ones, had relatively lower price increments in the aforementioned time interval. Thus, the overall price increment in wheat products is directly and strongly determined by the unprocessed wheat price increment. The overall price trend and direction of wheat products is strongly related to the price movement in unprocessed/unmilled wheat. Problems in the production and marketing of unprocessed wheat may be the critical problems that cause drastic price increments.

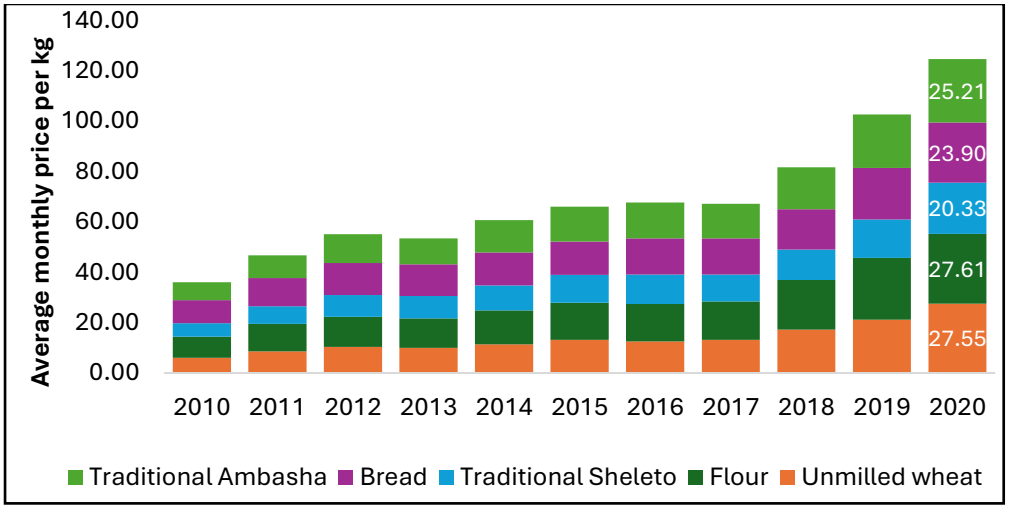
Figure 5.5: Price increment among wheat products in Oromia region



Source; Own computation from ESS data, 2023

The high price gap between factory processed and homemade products of wheat may be because of quality and the additional cost of production in processing the wheat products (Figure 5.6). However, the price gap in the two modalities revealed that consumers may have consumable products at a lower price if they are going to process items locally. Value7 addition of wheat and wheat-products when the products are processed at home the overall value of the products is lower compared to the factory processed ones (Figure 5.6). Recently, the supply of food items such as teff, vegetables, and dairy has not been keeping up with demand, thus increasing inflation (Tamru et al., 2022). Yet, the disequilibrium caused in the short-run also causes inflationary pressure from agricultural supply while long-term monetary implications are mixed (Durevall et al., 2013). In addition, since Ethiopia is heavily import dependent on grain, this also has to be taken into account as a possible short and long-run cause (Demeke and Tenaw, 2021).

Figure 5.6: Trend of average price of wheat and homemade wheat products in Oromia region



Source: Own computation from ESS data, 2023

The market chain and intermediaries play a crucial role in driving food prices. Perhaps, another major cause of high food prices in Ethiopia is the presence of market intermediaries in the supply chains. To assess the role of this supply-side

[7] It has been computed considering the average price of homemade products in 2020 in Oromia region

factor in driving inflation, this section looks at the price variations for select commodities along the supply/market chain. Moreover, we also analyze the share of farmers and intermediaries/middlemen in the final price of a commodity and highlight the role of intermediaries in the marketing process. Comparing prices at the farmgate to the prices paid by the consumers (i.e., retail prices) is instrumental to gauge the role of intermediaries in the price hike. Table 5.1 shows the price difference of cereals at different stages of the market chain. In the first three stages of the market chain, the rate of increase in the price of wheat was considerably lower. A price increase was seen particularly in the third-level collectors/wholesalers and retailing stages of the market. The stage of the market chain where barley's price increased most was discovered to be the first-level collectors' stage. It appears that these two intermediary markets have significantly impacted the increase in consumer prices of cereal.

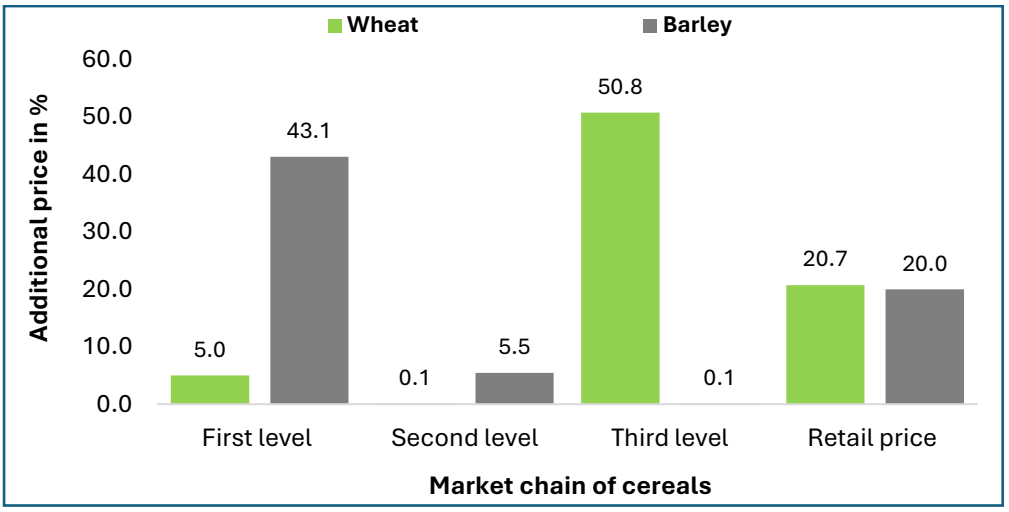
Table 5.1: Price of cereals (birr per quintal) along the market chain

Cereal type	Farmgate price	1st level collectors	2nd level collectors	3rd level collectors	Final consumer price
Wheat	3,129.50	3,285.50	3,290.00	4,960.36	5,989.30
Barley	2,485.30	3,556.25	3,750.00	--	4,500.00

Source: Own computation based on survey data, 2023

Wheat's average per quintal price rises from ETB 3,129.5 at the farmgate to ETB 5,989 in the retail markets, indicating that consumer prices are nearly double the farmgate price (Figure 5.7). In other words, compared to buying the product directly from the producers, consumers pay around 91% more in the retail market. The wheat market chain analysis reveals that around 82% of the urban retail prices went to third-level collectors. This demonstrates that among the wheat market intermediaries, processors are shown to have a substantial market share in the commodity's market chain, indicating that they have a significant influence on the market price of wheat.

Figure 5.7: Price increment along each stage of the market chain of cereals

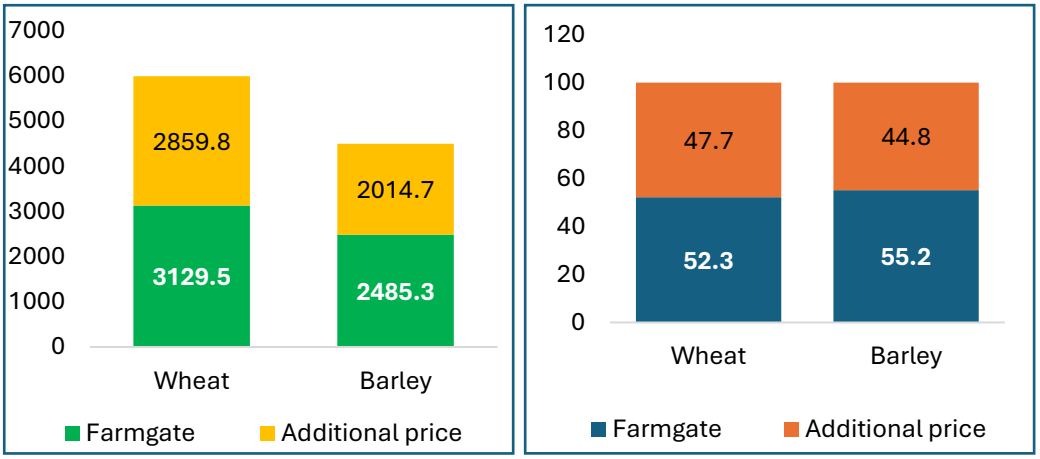


Source: Own computation based on survey data, 2023

Figure 5.8 displays the price increase (in %) for cereals at each stage in the market chain. The largest price increase for barley (43%) was observed at the first-level collectors' stage of the market chain at the district level. On the other side, the third level/stage of the market chain is where wheat prices increase at the highest rate. The third-level collectors/processors raised the price of the commodity by more than 50% relative to the wholesale price prevailing at the zonal level. This data reveals that the first and third-level collectors, who served as intermediaries, got the lion's share of the final urban cereal price. This may appear to suggest that the rising price of cereals and the resulting food price inflation in the region is partly driven by the inefficiency in the market chain, middlemen, and the considerable margin taken by intermediaries.

Figure 5.8 shows the price collected by the cereal producers as a farmgate and the additional price paid by the intermediaries and final consumers in the Oromia region at the time of the survey. During the survey, the average farmgate price of wheat was ETB 3,129.5 per quintal while the final retail price was ETB 5,989 per quintal. As a result, the farmgate price share of wheat was 52.25%, and the remaining 47.75% was collected by other participants (Figure 5.8). In relative terms, middlemen receive a small share of the final price for both wheat and barley.

Figure 5.8: Actual prices (in birr) and percentage share of producers and intermediaries



Source: Own computation based on survey data, 2023

Apart from the role played by middlemen/market intermediaries, the size of marketable surplus plays a key role in determining the pattern of commodity prices. The survey data show that the marketable surplus of wheat is only 33.6% while the remaining share of production is consumed by smallholders. For barley, the marketable surplus is also small, farmers supplied only 32.9% of their produce to the market. The marketable surplus of cereals in the Oromia region, albeit small, is higher than the national average. Nationally, in 2020, producers marketed 22% of their wheat produce, 16% of barley, 30% of teff, and 13% of maize. This indicates that the largest share of production is still auto-consumed by the smallholder producers that account for about 95% of overall grain production in Ethiopia (Tafesse et al., 2021).

What is more challenging is that the share of marketable surplus for the major staples has shown little change over time (Tafesse et al., 2021; Tamru et al., 2022). The limited volume and sluggish growth of marketable surplus have obviously contributed to the higher and rising prices of cereals and possibly intensified food inflation. It is due to this reason that the government has been importing cereals (notably wheat) to close the growing gap between domestic supply and demand. In summary, the higher and rising price of cereals, which in turn drove food price inflation in the region, can thus possibly indicate a lack of marketable surplus, the presence of a larger marketing margin, and the overall inefficiency in the market chain.

5.3.2. Market chain analysis of vegetables and fruits

Market intermediaries cause a wedge in price between the farm gate price and the price paid by the consumers (Hirvonen et al., 2021). Table 5-2 presents the price difference for some fruits and vegetables at different stages of the market chain. There is a considerable increment in the price of commodities along the market chain and intermediary markets are creating a wedge between the producer price and the consumer price.

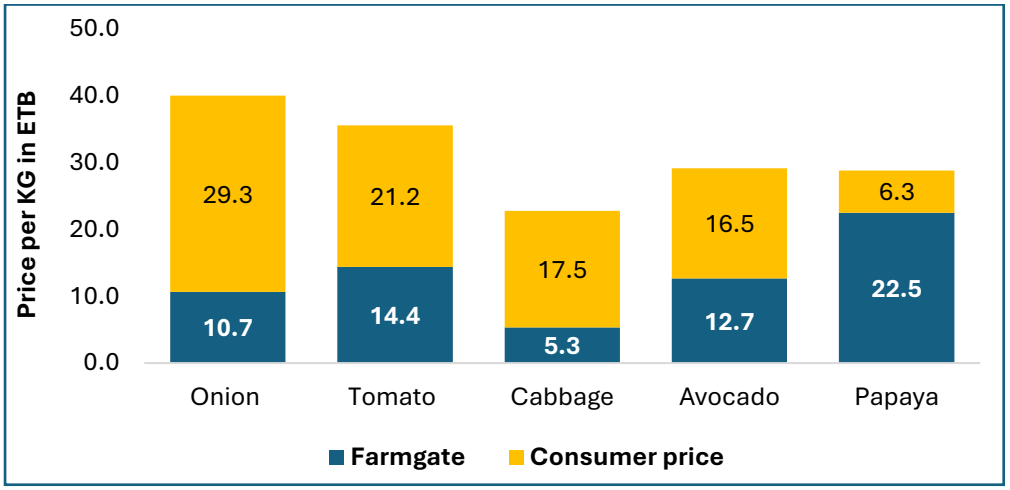
Table 5.2: Price of fruits and vegetables (birr per kg) along the market chain

Vegetables	Farm gate price	First-level collectors' price	Second-level collectors	Third-level collectors	Final consumer price
Onion	10.66	--	--	32	40
Cabbage	5.32	--	19.4	--	23.35
Tomato	14.4	24	--	--	35.6
Avocado	12.66	--	25	29	29.16
Papaya	22.5	--	--	28	28.83

Source: own computation based on the survey

During the survey, the average farmgate price of onion was 10.6 birr per kg while the consumer price was 40 birr per kg. The retail price of onion at 40 birr is about four times higher than the farm gate price. Likewise, for cabbage, the retail price of 23.4 birr per kg is more than four times relative to the farm gate price. The substantial increment in retail price compared to the farm gate value for both onion and cabbage is due principally to the presence of middlemen in the marketing of these commodities (Figure 5.9). As a result, the marketing share of onion and cabbage was 73.3 and 77.3%, respectively.

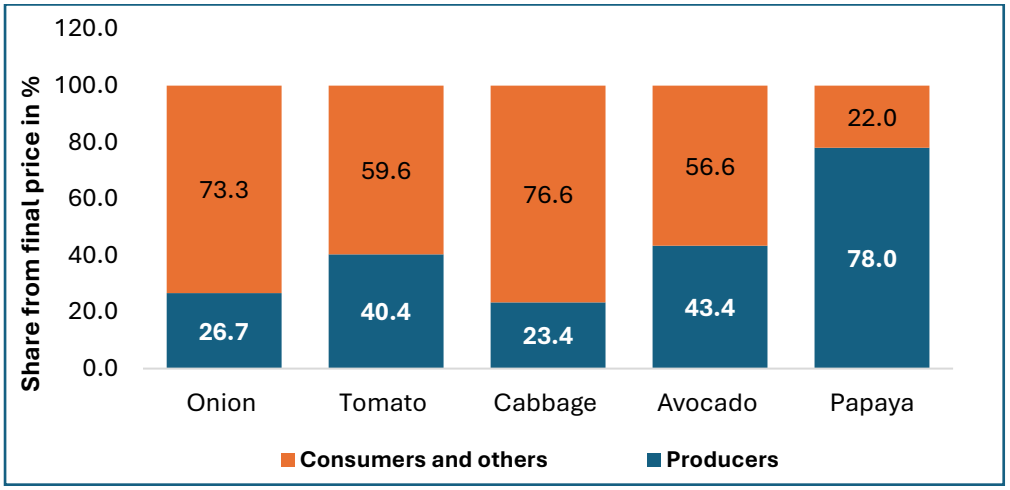
Figure 5.9: Farmgate and final consumer price in birr/kg for selected fruits and vegetables



Source: Own computation based on survey data,2023

The market chain analysis (Figure 5.10) reveals that the average farm share for fruits was 60.7% while the marketing share stood at 39.3%. Farm share, on average, is considerable for fruits. At 78%, the highest farm share is observed for papaya. This may suggest that the market chain of fruits is more efficient relative to vegetables. This is in line with Tamru et al. (2022) who suggest that food supply chains of some commodities are more efficient than anticipated, with farmers receiving a high share of the final prices.

Figure 5.10: Fruits and vegetable marketing margin from the final consumer price



Source: Own computation based on survey data, 2023

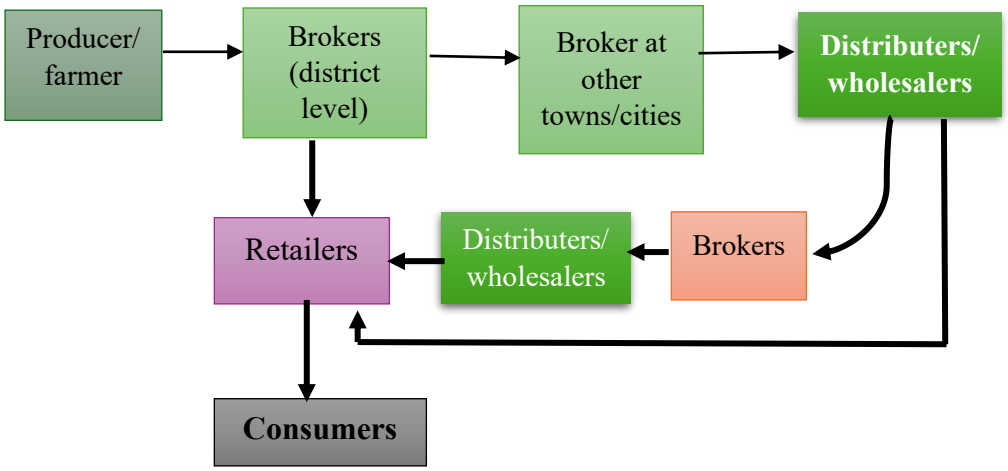
It should be noted that both farmgate prices and marketing shares are in gross terms and thus, they do not indicate net revenues received by the market chain actors. On the other hand, the market chain analysis of vegetables shows that farmers are receiving a relatively smaller share of final consumer prices. The average farm share was only 32.5% while the marketing share stood at 67.5% in the regional state (Figure 5.10). The marketing share for cabbage and onion is as high as 77 and 73%, respectively. The relatively larger marketing margin of such vegetables in the region suggests the prevalence of a less efficient market chain. The data show that the large marketing margin is driven principally by high retail cost margins, not by wholesale margins. The literature argues that, for vegetables, the retail margins can be quite high depending on the location of the wholesale markets relative to producing areas. For example, roughly three-quarters of vegetables are produced in the Rift Valley where the current Addis market is conveniently located. Moreover, high loading charges are also a factor, at times comparable to the total transport cost (Hirvonen et.al. 2021; Tafesse et al., 2021).

To explore whether farmers consider that middlemen have power in influencing prices in the market, we elicit the opinion of producers regarding the role played by middlemen in influencing prices. The data indicate that 67% of the farmers reported that middlemen influence the price of fruits and vegetables. It is such observations that led the government to resort to measures aiming at the reduction of market intermediaries. One of the measures was the expansion of Sunday markets by local authorities where major food products are available at discounted prices by linking producers and consumers directly. This measure targets removing intermediaries in the supply chain and lowering food prices to consumers by up to 30% (USDA, 2022).

Moreover, apart from middlemen, the practice of hoarding may drive prices up. However, the survey data indicate that none of the farmers growing vegetables and fruits practice hoarding with the expectation of higher prices in the future. The market chain analysis may appear to suggest that the high retail prices of commodities and the attendant food price inflation in the region can partly be attributed to intermediary markets, notably high retail margins. From this, it can be inferred that the presence of intermediaries/middlemen along the market chain and considerable marketing margin has definitely contributed to the rising prices of fruits and vegetables, with ramifications for food price inflation. The following figure reveals that there are both short and longer approaches of marketing of fruits and vegetables. However, either of the two are not free from intervention of brokers,

which hinder the transaction intended to be made between producers and consumers. It is known fact that the lengthy marketing process could directly.

Figure 5.11: Market channel of fruits and vegetables from producer-farmer to consumers

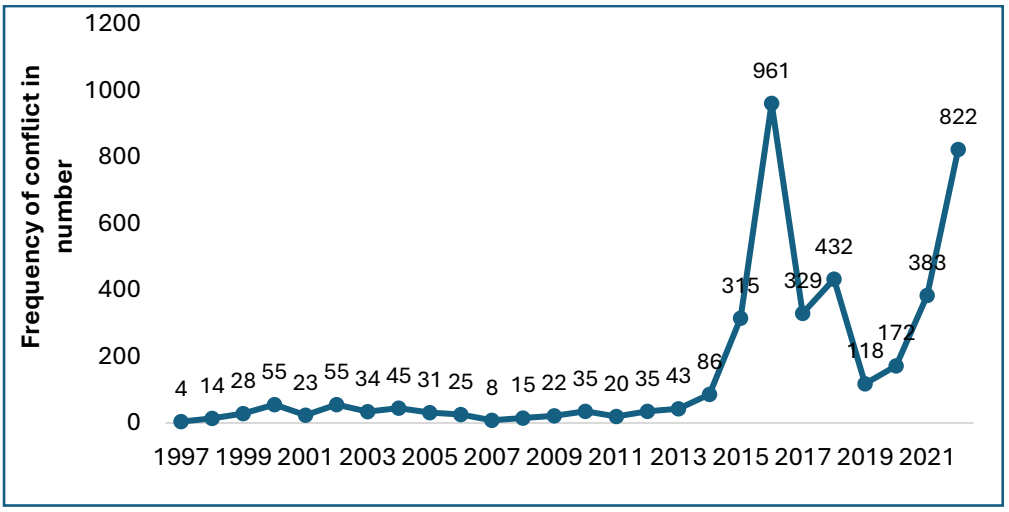


Source; Own construction based on survey data, 2023

5.4. Domestic Conflicts and Inflation in Oromia Region

About 44% of the conflicts, which have occurred in the previous two decades within the country, were in Oromia region. The Armed Conflict Location and Event Data Project (ACLED) (2021) ranked Ethiopia the 1st in the world in 2021 as of the recently aggravated conflicts and instabilities. Figure 5.12 reveals that the frequency of conflict and instability in the Oromia region was relatively similar between 1997 to 2013. However, the problem became more frequent after 2014 when peaceful protests were common in the regional state as to the report of ACLED. The frequency and area coverage of the problem reached a peak in 2016 in which 73% of the conflict and instabilities were related to peaceful protests. However, in recent times the common source of instability and conflict in the region are armed clashes and violence against civilians, which could have a strong fueling effect on inflation by deterring the production, transportation, and marketing of merchandises.

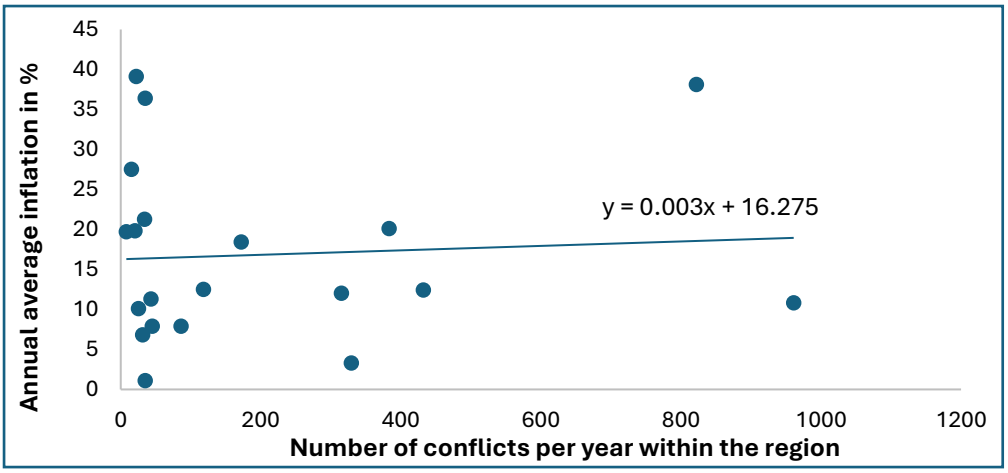
Figure 5.12: Frequency of conflict in Oromia region



Source: Own construction from ESS and ACLED, 2023

The on-going conflict, instability, and the full-scale war aggravated inflation by daunting the production, marketing, transporting, and altering the public and private expenditure. The conflict may force the country to drain billions for the non-productive expenditures that may be inflationary. The government attempted to finance many of the expenditures for conflicts and instabilities through domestic borrowing and budget reappropriation through cutting on capital projects. Figure 5.13 reveals that the recently aggravated conflicts and instabilities in the region have a fueling effect on the general inflation. Positive association have been observed between conflicts and general inflation in the Oromia region. This positive association indicates that the frequent outbreak of conflicts and instabilities within the region may create physical and administrative barriers that could directly or indirectly aggravate the already existing inflation. The frequent outbreak of conflicts and instabilities may result in additional transaction costs for the production and/or marketing of merchandises that could proportionately increase the general inflation.

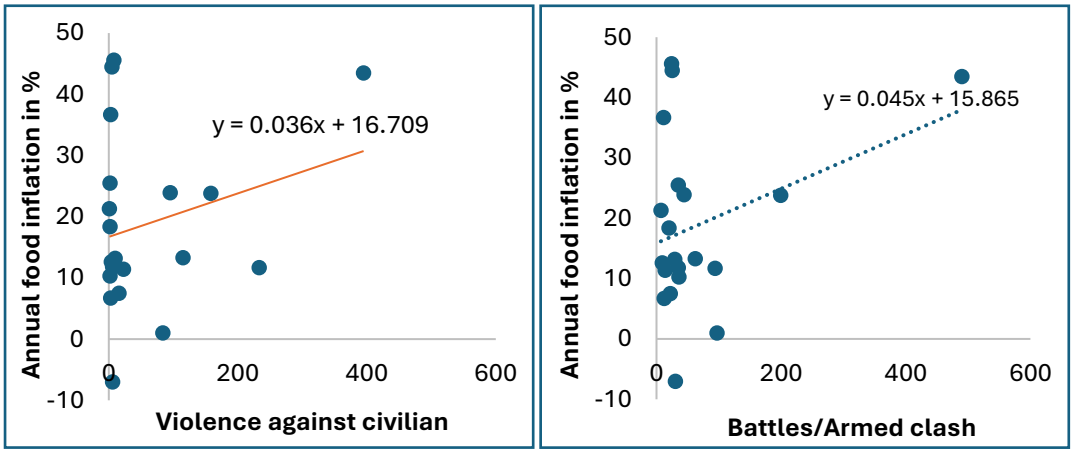
Figure 5.13: Interaction of general inflation and conflict in Oromia regional state



Source; Own computation from ESS and ACLED, 2023

Figure 5.14 shows that outbreak of violence against civilians and armed clashes within the region has a strong fueling effect on the regional food inflation. The association between armed clashes and food inflation is stronger than the interaction of food inflation with violence against civilians. This strong interaction indicates that the physical and administration related barriers and costs sourced from armed clashes are larger than violence against civilians. Moreover, the strong fueling effect indicates that the production and/or marketing processes of food items have been strongly interacted with and affected by violence against civilians and armed clashes within the regional state.

Figure 5.14: Interaction of inflation with violence against civilians and armed clashes



Source: Own computation from ESS and ACLED, 2023

5.5. Welfare Effect of Recurrent Inflation in Oromia Region

Degye et al. (2022) identified that inflation in Ethiopia has differentiated effects on consumption expenditure of households and regional states. The problem highly and adversely affected consumption of households in the major regional states, including SNNP (-20.3%), Oromia (-20%), Tigray (-19.9%), Amhara (-19.6%), and Afar (-15.7%). The authors identified that policy measures designed to control inflation should consider regional characteristics affecting prices. Unlike those in the higher two income quintiles, households in the lowest three income quintiles (1st, 2nd, and 3rd) were differently and adversely affected, and experienced a welfare loss ranging from 4 to 13.4%. Households in the highest two income quintiles (4th and 5th) have rather enjoyed 4 to 13% welfare gains. The analysis also showed that the inflation caused considerable redistribution of income and changes in the prevalence of relative poverty among households within the country. In this regard, relative poverty rates were increased in both rural and urban areas of the country. Over the period, changes in relative poverty rates were estimated to be higher in Gambella (23%), SNNPR and Afar (22%), Oromia (20%), and Tigray (14%). Elasticity of poverty to income growth arising from poverty alleviation measures has also been significantly reduced, thereby adversely affecting effectiveness of poverty alleviation measures within the country.

5.5.1. Consumption effects

Real expenditure of households in the lowest income quintile was reduced by about 13.4% as to the findings of the authors. On the other hand, households in the highest income quintiles benefited from the inflationary trend in the country. Real expenditure of households in the highest income quintiles was increased to 13.0 percentage points over the period. Figure 5.15 shows differential effect of inflation on consumers across regions in Ethiopia. In the third quarter of 2021, the top five regions with very high inflation were Tigray (213.8), Benishangul-Gumuz (203.7), SNNP (197.5), Addis Ababa (193.6), and Amhara (192). The CPI for these regions was higher than the national average (191.9). Regions in eastern Ethiopia (Somali, Afar, Dire Dawa and Harari) were rather relatively better off in coping up the effects of inflation. The results suggest the need for differentiated policy measures suitable to regional contexts.

Figure 5.15: Differential effects of inflation on consumers across regions (CPI in 2021)

Source: Computed from data in NBE (2020), Degye et al., 2022

Table 5.3 shows that the national level expenditure for total consumption reduced continuously in the previous years. The national level consumption expenditure reduced by 1.6% and 1.5% in the two respective groups of surveys 2013 to 3015 and 2015 to 2018. The inflationary trend has higher adverse effect on welfare of the society in the major regional states, including SNNP (-20.3%), Oromia (-20%), Tigray (-19.9%), Amhara (-19.6%), and Afar (-15.7%) in between 2015 and 2018. These figures imply that real consumption of households in the aforementioned regions had declined in between 2015 and 2018. Hence, policy measures designed to control inflation should consider regional characteristics affecting prices. Table 5.3 shows that in between 2015 and 2018 the society in Afar, Oromia, and Tigray regions suffered a lot from inflation. Moreover, the society from Amhara, Somali and SNNP had significant reduction in their consumption expenditure. The two urban administrations: Addis Ababa and Dire Dawa include Harari region had significant increment in their consumption expenditure. The overall, national level, welfare lose (1.5%) was also relatively larger in between 2015 and 2018.

Table 5.3: Changes in real consumption expenditure per capita across regions

Region and urban	Real expenditure per capita (ETB)		Percentage change between 2015 & 2018
	2015	2018	
Addis Ababa	6222	8629	38.7
Dire Dawa	5591	6439	15.2
Harari	5514	7349	33.3
Benishangul	3548	4730	33.3
Gambella	4562	4827	5.8
SNNP	5223	4161	-20.3
Somali	4563	4298	-5.8
Amhara	4928	3960	-19.6
Tigray	6037	4835	-19.9
Oromia	5722	4576	-20.0
Afar	5496	4632	-15.7
National	5337	5257	-1.5

Source: Computed from ESS in 2013, 2015 and 2018

The decomposition index presented in the following table shows that some of the regional states took the significant share in determining the national level general CPI. The two dominant regions, Oromia and Amhara, took about 70% of the general CPI decomposition at national level, however, Oromia region had stronger share in determining the national level general and food price change within the country. The region has stronger effect in determining the national level food price increment compared to the effect on the general CPI. The three regions (Oromia, Amhara and SNNPR) together took more than 83% and 86% of the power in determining the general and food item CPI of the country, respectively.

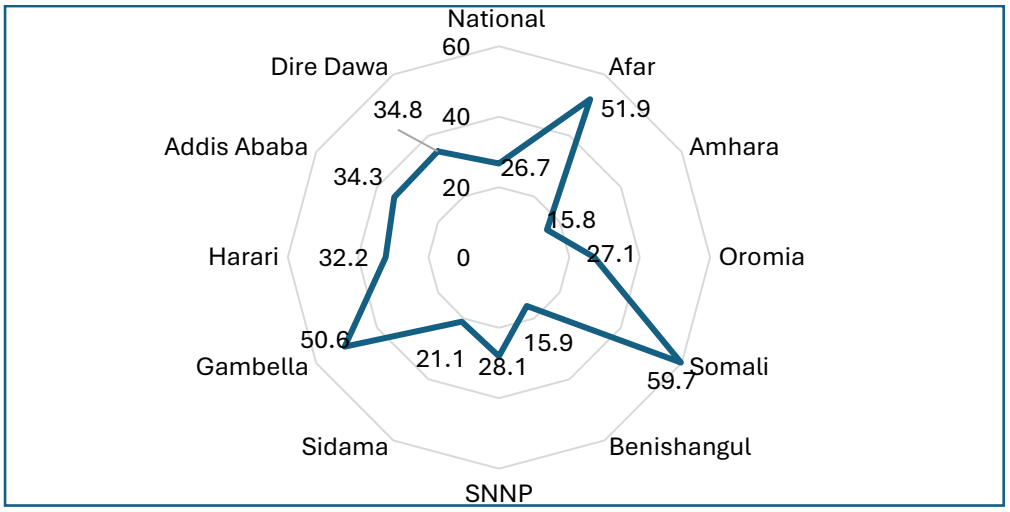
Table 5.4: Regression-based inequality decomposition of the national level CPI

Region	General CPI			Food item CPI		
	Coefficient	Contribution		Coefficient	Contribution	
		Absolute	Relative		Absolute	Relative
Oromia	0.3813	0.1579	0.4283	0.4041	0.2096	0.4382
Amhara	0.3102	0.1073	0.2911	0.2624	0.1195	0.2498
SNNPR	0.1439	0.0542	0.1470	0.1983	0.0918	0.1919
Addis Ababa	0.1016	0.0300	0.0813	0.0209	0.0081	0.0170
Tigray	0.0337	0.0113	0.0307	0.0325	0.0146	0.0304
Somali	0.0174	0.0049	0.0132	0.0348	0.0131	0.0273
Benishangul	0.0132	0.0060	0.0162	0.0025	0.0015	0.0032
Afar	0.0098	0.0023	0.0061	0.0277	0.0107	0.0223
Harari	0.0026	0.0008	0.0022	-0.0241	-0.0093	-0.0193
Gambella	-0.0131	-0.0059	-0.0159	0.0050	0.0026	0.0055
Dire Dawa	-0.0018	-0.0005	-0.0013	0.0371	0.0143	0.0299
Residual	0.0000	0.0004	0.0011	0.0000	0.00192	0.0040
Estimated inequality		0.3686			0.4785	

Source: Own computation from ESS data, 2023

The labour force and migration survey report of the Ministry of Planning and Development of Ethiopia shows that about 27% of the households in Oromia region had food shortage in 2021. The proportion was higher than the national average, but lower than some of the regional states such as Somali, Afar, Gambella, SNNP, and Harari (Figure 5.16). However, the percentage of households that suffer from the problem is quite larger compared to the actual potential of the region to produce diversified crops more than twice a year. The paradox becomes more confusing when we check the proportion of households with problem from the urban (24.8%) and rural (27.7%) areas of the region.

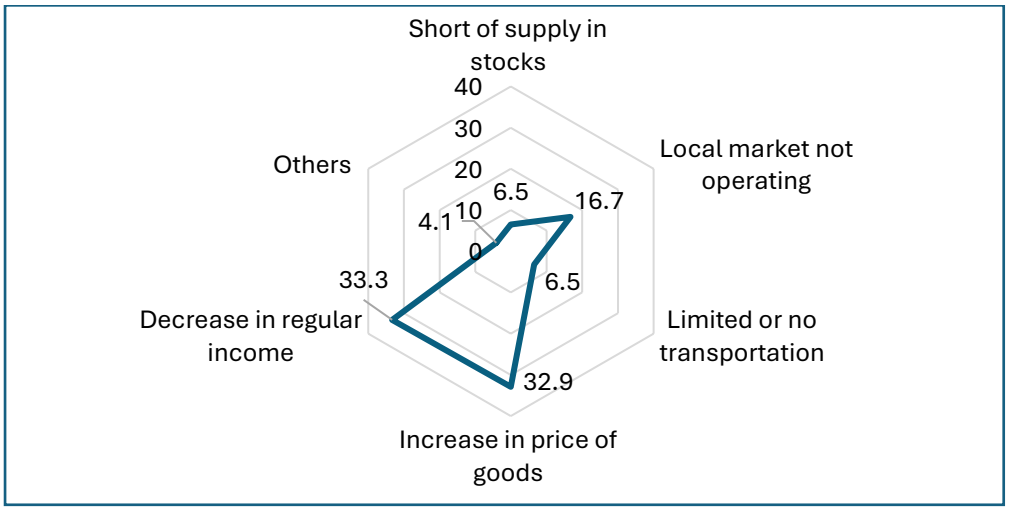
Figure 5.16: Percentage of households faced food shortage among regional states



Source: Labor force and migration survey of ESS, 2021

Figure 5.17 shows that more than 66% of the households replied that regular income reduction and successive price increment are the reasons behind food shortage. This proportion indicates that significant proportion of the households in the regional state are strongly suffering from the pressure from inflation, which could directly determine the consumption behavior. Improper operation of the local market is also one bottleneck that result in food shortage for households of the regional state.

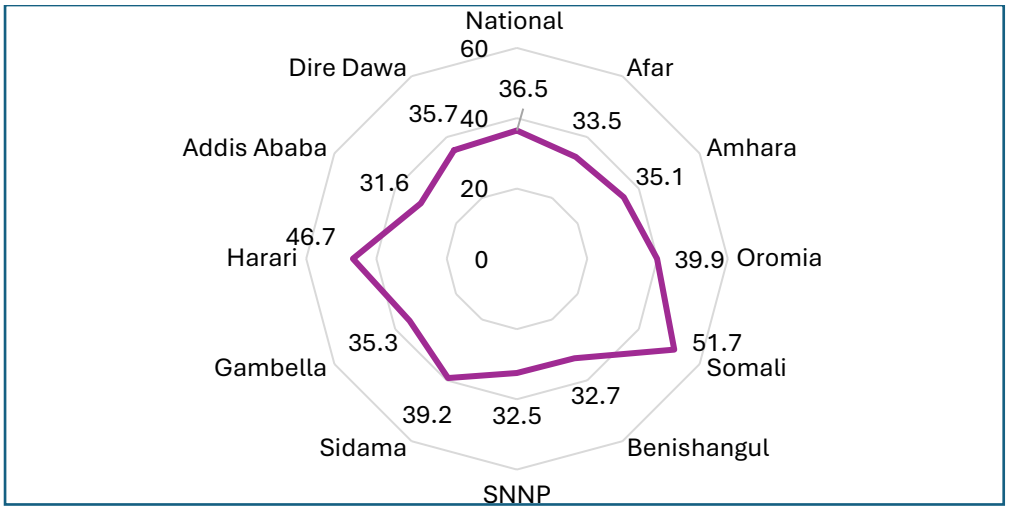
Figure 5.17: Core reasons for households' food shortage in Oromia region



Source: Labor force and migration survey of ESS, 2021

For few of the regional state continuous increment of food price was the critical reason for shortage of food items in urban areas of the country (Figure 5.18). The problem was critical for urban people of Somali, Harari and Oromia region as to the figure below.

Figure 5.18: Percentage of urban households suffer from food price increment



Source; Labor force and migration survey of ESS, 2021

Table 5.5 reports that both the urban and rural households suffer from price increment and reduction the regular income. However, relatively larger proportion of the households in the urban areas of the region had suffered from the problems, and they were main source of food shortage for significant proportion of households. Moreover, Table 5.5 reveals that about 20% of the households reported that the local markets did not operate properly as of different physical and administrative barriers.

Table 5.5: Reasons for shortage of food item Oromia in 2021

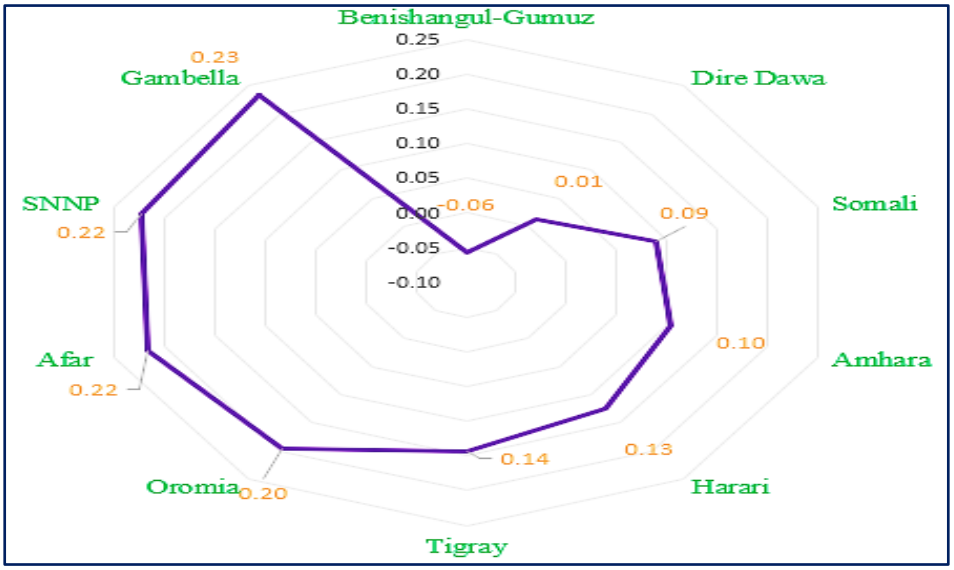
	Shops have run out of stocks	Market not operating	Limited or no transportation	Prices increment	Income reduction	Others
Total	6.5	16.7	6.5	32.9	33.3	4.1
Urban	5.5	3.6	5.5	39.9	43.9	1.6
Rural	6.8	19.8	6.8	31.3	30.7	4.7

Source: Labour force and migration survey report, ESS, 2021

5.5.2. Poverty effects of inflation

Analysis of real consumption expenditure of households revealed that inflation in Ethiopia has caused considerable redistribution of income and changes in the prevalence of relative poverty among households. Relative poverty rates were increased in both rural and urban areas of the country. Over the period, changes in relative poverty rates were estimated to be higher in Gambella (23%), SNNP and Afar (22%), Oromia (20%), and Tigray (14%). Elasticity of poverty to income growth arising from poverty alleviation measures has also been significantly reduced, thereby adversely affecting effectiveness of poverty alleviation measures. One of the major expected effects of inflation is income and wealth redistribution. This income and wealth redistribution is expected to differently affect households in different socioeconomic settings. Regional states in Ethiopia have also experienced the redistribution effects of inflation during the period (Figure 5.19). The top five regions with high relative poverty change due to income losses between 2011 and 2019 are Gambella (23%), SNNP and Afar (22%), Oromia (20%), and Tigray (14%).

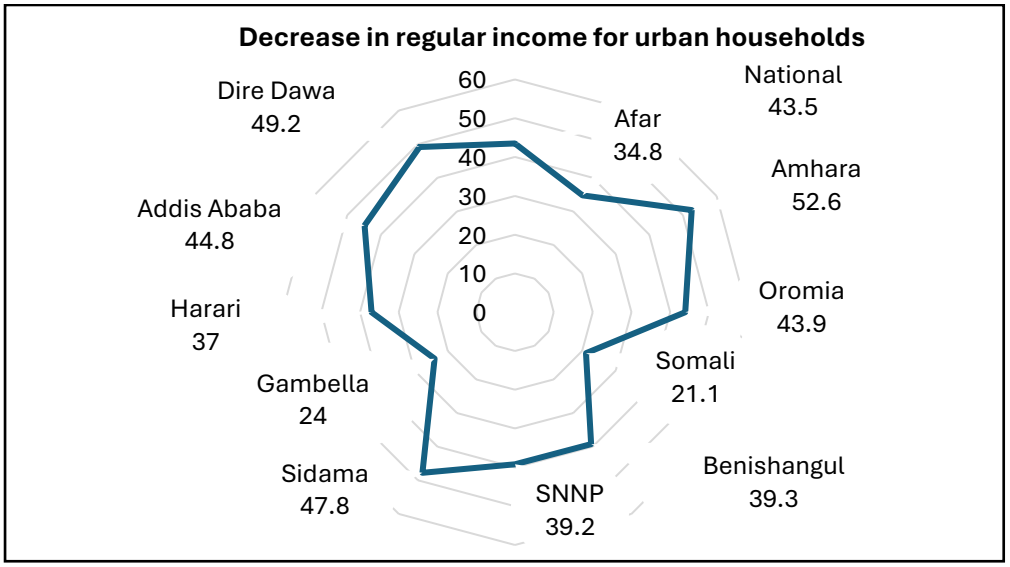
Figure 5.19: Changes in relative poverty rates across regions (between 2011 and 2019)



Source: Degye et al., 2022 computed from LSMS data in the World Bank

Figure 5.20 shows that significant proportion of urban households had suffered from regular income reduction, which was one critical reason for food shortage. This regular income reduction may be because of less performance in businesses in the urban areas of the country. Successive regular income reduction could reduce households' purchasing power to fulfill the demanded amount of merchandises. This problem was critical for urban households in Amhara, Oromia, and Sidama though they have immense potential to produce food items. This paradox may emerge as of improper functioning institutions and markets, which could not guarantee smooth flow of food items to avail for the urban people.

Figure 5.20: Food item shortage as of low purchasing power of households among regions



Source; Labor force and migration survey of ESS, 2021

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

Oromia and Amhara regional states took about 70% of the general consumer price movement of the country, however, Oromia regional state had stronger share in determining the national level food price.

In the regional state, the gap between food and non-food price movement is becoming wider in the previous decades. The food price movement took about 60% of the relative share in the general price variability, which indicates that the pressure from food price is stronger in determining the general inflation.

Variability in price of bread and cereals took about 45% of the relative share in determining food inflation of the region. Moreover, variation in the price of vegetables, and meat and meat-products had the second and third position regarding the relative contribution for food price change in the regional state.

Significant proportion of the price variability in the non-food items is sourced from housing and related utilities. House furnishing, and clothing as well as footwear price movements took the second and third position in determining the non-food inflation in Oromia region.

The recent successive increment in the service sector value addition to the regional GDP has inflation fueling effect through creating additional demand within the economic system. The problem could worth more if each additional demand from the service sector is not fulfilled from the agriculture.

Interaction of non-food item inflation in Addis Ababa and Oromia region was stronger compared to the interaction in general inflation. Strong dependency of the regional state on merchandises sourced from Addis Ababa may be the reason for the stronger interaction.

Recently, per capita grain production of the region is growing at about 3% per annum that was not far from the population growth rate (2.7% per year), which could result in a significant gap between demand and supply.

Though gross capital formation of the region continuously increases, the formation was not as to the potential, which implies that the regional economy is growing without investing as to its potential to do so.

Both private and public consumption expenditure increment have a fueling effect on the inflation in Oromia region, however, the former one has stronger power, which revealed that significant proportion of the private consumption expenditure is not productive to produce food and non-food items.

Improperly implemented national level policies such as continuous devaluation, cutting fuel subsidy, which had been practiced along with the soaring global price of fuel finally resulted in higher regional inflation sourced from transport and production cost increment.

The overall price increment in wheat value chain is directly sourced from farmgate prices. Problems in the production and marketing of wheat may be the critical problems that cause price rise.

In the region there is no marking of fruits and vegetables without direct enrollment of the middlemen, which implies that in every direction of marketing brokers are always there, and complicated the direct exchange between producers and consumers that is an intervention with a ramification effect on food price.

The recently aggravated instabilities in the regional state have fueling effect on the general inflation. The instabilities are creating physical and administrative barriers in the production and/or marketing of merchandises, which directly aggravate the already existing inflation.

Relatively larger percentage of the regional urban households suffer from food shortage, which was mainly sourced from successive food price rise and regular income reduction.

6.2. Recommendations for intervention

Despite the numerous measures of Ethiopian government to curtail inflation, but the problem is still a critical macroeconomic issue. The problem is putting the life of people in danger and eroding their future hope, especially those in low-income group. Reports and findings showed that efforts in the regional states have significant effect in the process of combating inflation. Hence, efforts and measures ought to be implemented in Oromia region could have significant effect to stabilize the national level inflation. Thus, the study come up with the following disaggregated recommendations.

6.2.1. Recommendation for the regional government

Marketing of Food and Non-Food Items

To promote direct marketing between producers and consumers, and reduce transaction costs the regional government should try to reduce the strong intervention of intermediaries/brokers in the marketing of food items such as cereal, fruits and vegetables. To do this, the regional government shall:

- Scale-up the existing trials such as Cooperatives, Sunday markets, Oro-fresh and related modalities of deliveries. These modalities should be expanded to

the different zonal- and district-level towns to have short and efficient marketing between producers and consumers.

- Establish specialized markets considering the different localities with the potential to produce food items in bulk. These markets should be managed by the government or wholesalers with strong government's supervision to avoid unreasonable price increments.
- Intervention of the regional government should be based on evidences and well-articulated strategies. Avoid inappropriate interventions in controlling intermediaries and managing the market chain, since some interventions are creating strong administrative barriers and problems. For instance, the trial of wheat exporting, controlling price and marketing of construction materials resulted in black market and illegality of within the regional state.
- Rapid graduation of house to home to have easy access of houses for the urban households. Moreover, allow entrepreneurs to import and use cost-effective and efficient construction technologies to easily construct residential houses and supply low-cost housing for urban households.

Transaction and Transport Costs Reduction

- Reduce the number of check points here and there, which are becoming administrative barriers in the marketing and transporting of merchandises.
- Adopt bulk transport systems and establish warehouses in the zonal towns to reduce transport costs and deliver food items to the wholesalers.
- Introduce and establish check and balance, as well as ensure rule of law and transparency, and strengthen government institutions to avoid bureaucracies and corruptions.

Peace and Security

Ensuring peace and security is critical to price stabilization. In this regard, the regional government shall:

- Guarantee free movement of goods and the communities through addressing frequent outbreak with a coordinated effort of the regional and federal level peace and security institutions.
- Practice peaceful negotiations and dialogues frequently to reduce significant socioeconomic loses and sufferings from instabilities such as armed clashes and violence against civilians.

- Enhance the preparedness and prevention capacity of the government offices to reduce the outbreak of conflicts.
- Establish an institution that proactively follow global, domestic and regional economic situations and design strategies to have resilient regional economy that reduce welfare loss of the society within the region.

Agricultural Output Supply Increment

The regional government should have a farsighted planning regarding the structural problem of the regional economy, which has huge demand compared to the supply. This can cause demand led inflation pressure on the economy. Hence, focus should be given to the agriculture and industrial sectors to reduce the demand-led inflation pressure in the region. Thus, to enhance production capacities and address the supply-side rigidity, the regional government shall;

- Enhance access to production inputs such as cropland, credit, fertilizers and chemicals for both smallholders and large-scale agricultural producers to improve the crop production.
- Strengthened the current trial of practicing irrigation and biannual production. However, government officers shall not decide the crop type to be produced by smallholders rather farmers shall be free to produce the crop of their interest.
- Initiate entrepreneurs and investors to produce organic fertilizers domestically and secure sustainable supply of the inputs for smallholders.
- Train smallholders to easily adopt new technologies and systems. To supplement and finally substitute the inorganic fertilizer, smallholders should be trained about utilization of organic fertilizer.
- Encourage and initiate businesses and producers with the motive of full package that comprise production to marketing of agricultural products.

Industrial Output Supply Increment

- Initiate industries that produce construction materials to increase supply of the materials needed for constructing urban houses.
- Reduce the administrative barriers and bureaucracies in the process of availing construction inputs such as urban land.
- There should be financial as well as institutional supports from the regional government offices to enhance the production and supply of construction

materials such as Cement and iron to boost construction of urban houses and facilities.

Planning and Institutional Strength

- The regional planning and development commission should be curious about the recurrent economic structure of the region. Strong focus and efforts should be given to the agriculture to sustain the production and supply of consumable and industrial inputs.
- The regional government should try to establish an institution with a duty of market intelligence and information dissemination for both crop producers (especially for vegetables and fruits) and consumers to have updated information about price and supply. This could reduce disturbing role of intermediaries in the marketing process.
- The public and private expenditures of the region should be directed towards productive sectors and activities to sustainably curve down the inflation pressure from unproductive expenditures. This could enable to reduce inflationary pressure of the successively increasing expenditures.
- Attract and initiate industries to produce and supply construction materials for sustainable supply of houses and utilities in the urban areas.

6.2.2. Recommendations for federal government intervention

Policies and regulations in combating the national-level problems have a direct effect on regional economies. Thus, every policy measure and strategy intended to employed by the federal government should be in consultation with regional governments.

- Regional level policy practitioners should be well-aware of the national-level macroeconomic policies and strategies to facilitate the effectiveness of the policies at the regional level.
- The federal government should give attention to untimely and improper interventions, which are creating massive direct and indirect effects on the overall marketing and price of merchandises. For instance, the price ceiling on wheat directly results in wheat black market and drastic teff price increments.
- Decisions regarding production and marketing of agricultural products should be made in consultation with regional governments. Regional governments

should be advised to produce based on their comparative advantage, 'one-size fit for all' policies and strategies may turn out ineffective.

- Region-specific policies and structural issues should not be ignored in fighting national macroeconomic problems. Hence, effective policies frameworks that target both national and regional issues must be developed to manage inflation
- To guarantee free movement of merchandises and people, armed conflicts and violence against civilians should get attention from the federal government security offices. The frequent and recurrent outbreak of conflicts should be managed with a coordinated effort of the regional and federal-level peace and security institutions.
- Land and credit policies should be checked to allow interested entrepreneurs to engage in the agriculture.
- Design and implement population policies and strategies that could create productive labour which could sustainably reduce the inflationary effect arising from rapid population growth.

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Technical Efficiency Difference between Model and Non-Model Smallholder Wheat Producer Farmers in Lode Hetosa Woreda of East Arsi Zone

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Abstract

Smallholder farming system in Ethiopia is largely dominated by staple food crops which are exposed to managerial inefficiency and factors beyond the control of the farmer. Accordingly, the study aims to analyze technical efficiency differences between model and non- model smallholder wheat producer farmers and inefficiency determinates in Hetosa Woreda of East Arsi Zone. Stochastic Production Frontier Cobb-Douglas functional form was used. To analyze cross-sectional data collected from 700(350 mode and 350 non- model) farmers for the production year of 2018/19, descriptive and econometrics data analysis techniques were used. The findings of the descriptive analysis showed that model and non- model farmers produced on average 32.82 and 29.36 quintal of wheat per hectare respectively. The value of discrepancy ratio (γ) which indicates technical inefficiency variability was 89%, 82%, 84% for model, non- model and overall farmers respectively. The mean technical efficiency score was 81%, 79% and 80% for model, non-model and overall farmers respectively. Land, fertilizer and labour were statistically significantly affects wheat output of model farmers, whereas, all input variables were statistically significantly affects wheat output of non- model farmers. In addition, model farmers' technical inefficiency in wheat farming was statistically significantly determined by mode of plowing, mode of harvesting, shock, training and marketing and that of non-models farmers' technical inefficiency was statistically significantly determined by mode of harvesting, level of education, land fragmentation and marketing. Thus, training, market, education and strategic plan to mitigate factors beyond the control of farmers need to be considered for improvement to make farmers more productive and technically efficient in the study area.

Keywords: Technical efficiency, stochastic production frontier, model and non- model farmers

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1. Introduction

Ethiopian Economy which is highly depends on agriculture is characterized by small scale, subsistence oriented, traditional and vulnerable to climate shocks. However, agricultural sector accounts for more than 44% of the GDP, 85% of the annual export earnings and 85% of the employment (World fact book, 2016). Ethiopian strategy to achieve overall economic growth largely depends on the performance of the agricultural sector. In order to sustain economic growth, reduce poverty and ensure food security, the sector needs substantial transformation. To this end, the government of Ethiopia made a series of economic reforms since 1991 onwards. Some of these reforms include the Structural Adjustment Programme (1991), Agricultural Development Led Industrialization (ADLI) Strategy (1993), Interim Poverty Reduction Strategy Paper (IPRSP) (2000), Sustainable Development and Poverty Reduction Program (SDPRP) (2002), Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005), and Growth and Transformation Plan (GTP) (2011) with an objective to bring fast economic growth through increased agricultural productivity.

To increase production and productivity of wheat producing smallholder farmers in Ethiopia, better use of modern agricultural technology and inputs are important which in turn able to enhance production efficiency of farmers (Shumet, 2012 and Endrias et al, 2010). Similarly, Ologbon and Yusuf, (2012) also confirms that weed controlling mechanism of the farmers could accounts for the variations in productivity and efficiency among cereal crop producers in Nigeria. But, provision of improved agricultural technology is a supply side issue for smallholder farmers, so that, understanding end users capacity and demand to adopt the technology will have immense contribution in the problem of productivity and technical efficiency of farmers.

Many researchers have proposed improvement in technical efficiency as a solution for optimal operation of cereal crop farming through provision of better information, credit provision, extension visit, disseminating improved technologies such as fertilizer and improved high yielding varieties and education (Shumet, 2012; Essa,211; Mussa et al., 2011; Alemayehu ,2010; Jema, 2008). If farmers' technical efficiency is low, the use of modern technology alone could not bring the expected shift of production frontier. But, smallholder farmers can still produce efficiently with a given fixed set of inputs and a given level of technology. Assefa et al (2019) and Moges (2019) found technical efficiency score for small holder wheat

producer farmers 72% and 82% respectively. To compare the technical efficiency differences between model and non- models farmers is the contribution of this study as many researchers do not group farmers in to model and non- model.

Wheat is the most staple crop food in Ethiopia in both urban and rural areas. Farmers of the Lode Hetosa Woreda cultivate wheat most commonly and tried their best to increase its production by the support obtained from development agents and agricultural experts through grouping farmers in to model and non-model farmers. Here model farmers are farmers that are role models for neighboring farmers chosen by local governmental institutions, and are successful farmers who are used as principal agent to accept and disseminates technologies and information to follower farmers (non- model), otherwise, they are called as non-model farmers (Stone, 2016). Model farmers are acting as nexus points in the flow of information, subsidies, and material inputs between extension agents and local community (Taylor, 2018). Based on these definitions, Lode Hetosa Woreda agricultural office has grouped farmers into model (4706 farmers) and non- model farmers (15601 farmers) (WAOR, 2019).Grouping of farmers was done yearly because there are farmers who are model a year before and may be non- model this year and the same fact holds true for non- model farmers.

Therefore, the researchers are motivated to conduct this research to estimate the level of technical efficiency and identifying factors contributing to inefficiency among model and non- model wheat producing farmers in the study area and ultimately contribute recent data and information to the knowledge in the field.

2. CONCEPTS AND THEORIES

2.1. Concepts and Definitions of Efficiency and Productivity

Productivity and efficiency are often used interchangeably but they are not precisely the same things. Productivity refers to an absolute concept and is measured by the ratio of outputs to inputs (Farrell, 1957). But efficiency is a relative concept and is measured by comparing the actual ratio of outputs to inputs with the optimal ratio of outputs to inputs. The efficiency of a firm is defined as the actual productivity of the firm relative to a maximal potential (also known as best practice frontier) productivity. Measurement of efficiency involves measurement of the

distance from observed data point to that frontier. Efficiency has two components: technical efficiency and allocative efficiency (Coelli et al., 1998). Technical efficiency is the ability of a firm to produce a maximal output from a given set of inputs or it is the ability of a firm to use as modest inputs as possible for a given level of output. The former is called input oriented measures and the latter is known as output-oriented measures of technical efficiency (Coelli et al., 1998).

2.2. Measurement of Efficiency

Efficiency measures have their roots in the works of Debreu (1951), Koopmans (1951), Farrell(1957), Charnes and Cooper (1957), and Shephard (1970). The estimation of efficiency is based on the estimation of a frontier, which indicates the maximum output from a set of inputs and fixed technology. But in actual practice this frontier function is not known, it will be estimated from a sample of observed production units and each firm‘s performance is compared with the estimated frontier to indicate the efficiency of the individual firm. There are two approaches input-oriented and output-oriented approaches (Coelli et al., 1998).The input oriented concept of efficiency which states “By how much a production unit can proportionally reduce the quantities of input used to produce a given amount of output?” (Coelli et al., 1998) and output- oriented concept of efficiency also states “By how much can output be increased without increasing the amount of inputs used?”(Coelli et al., 1998).

2.3. Methods of Estimating Efficiency

Frontier models are broadly categorized into two frontier models. These are parametric frontier model and non-parametric frontier model. The parametric frontier model may further be classified into deterministic frontier model and stochastic frontier model. The parametric models are basically estimated based on econometric methods and the non-parametric efficiency model, often referred to as data envelopment analysis (DEA), involves the use of linear programming method to construct a non-parametric 'piecewise' surface (or frontier) over the data. The parametric approach involves a specification of a functional form for the production technology and an assumption about the distribution of the error terms (Battese et al., 2005).

The idea of a deterministic frontier shared by all firms ignores the very real possibility that a firm's performance may be affected by factors that are entirely outside its control such as bad weather, input supply breakdowns etc as well as factors under its control (inefficiency). To include these effects of exogenous shocks, both fortunate and unfortunate, together with the effects of measurement error and inefficiency into a single one-sided error term, and to label the mixture inefficiency is questionable and is a major weakness of deterministic frontiers (Coelli et al., 1998).

It is on this basis that the stochastic frontier (composed error) models that Aigner et al. (1977) and Meeusen and van den Broeck (1977) independently develop the model. The vital idea behind the stochastic frontier model is that the error term is composed of two parts. A symmetric component permits random variation of the frontier across firms, and captures the effects of measurement error, other statistical noise, and random shocks outside the control of the firm. The Stochastic frontier function proposed by Aigner et al. (1977) and Meeusen and van den Broeck (1977) is depicted as follows;

$$\ln(y_i) = X'_i \beta + v_i - u_i, \qquad i = 1, 2, \ldots N \qquad \textbf{(2.1)}$$

Where: - i - is the number of farms in the study; $\varepsilon_i = v_i - u_i$,

ln(yi) - is the natural log of (scalar) output of the i th farm;

X'i - is a (K+1) - row vector whose first element is "1" and the remaining elements are

the logarithms of the K-input quantities used by the i th farm;

β =(β0, β, 1 β2, ... βk)' is a (K+1) – column vector of unknown parameters to be estimated;

vi - is random error term of the model which can be positive or negative

ui - is a non-negative random variable associated with technical inefficiency in production of farms in the industry involved.

Equn (2.3) can be relaxed as;

lnyi =β0 +β1 lnxi+vi-ui

Or yi = exp (β0+β1 lnxi+vi-ui)

$$\text{Or } y_i = \underbrace{\exp(\beta 0 + \beta 1 lnxi)}_{\substack{Deterministic \\ component}} \times \underbrace{\exp(vi)}_{noise} \; x \; \underbrace{\exp(-ui)}_{inefficiency} \qquad \textbf{(2.2)}$$

3. METHODOLOGY

3.1. Study Design

The study used explanatory research design because the main aim of the study is to estimate technical efficiency and identify inefficiency differential among model and non- model smallholder wheat producing farmers. And quantitative cross- sectional primary data for the production period of 2018/19 was collected from samples drawn from the population.

3.2. Sample size and Selection Technique

Lode Hetosa Woreda is chosen among all Woreda found in East Arsi Zone of Oromia National Regional State purposively, because the Woreda is more suitable for wheat production and more than 90% of arable land has been used for wheat production compared to other Woreda. Among 19 kebeles found in the Woreda, 12 of them are the most potential kebeles in wheat production. Then, from these 12 potential wheat producing kebeles, 8(eight) kebeles were chosen by simple random sampling techniques. Lists of 1980 model and 6568 non- model farmers are available at these 8 kebele farmer training centers (FTC) with different figures in each kebele. Therefore, systematic random sampling technique was applied to select sample from lists of farmers found in each kebele to qualify a sample size 700 with 350 model and 350 non- model farmers by probability proportional to size to each kebeles under study. To compare the mean score of efficiency among model and non-model farmers, equal sample size was taken. The primary data was collected by schedule method using structured questionnaire. The data was analyzed by descriptive and econometrics methods.

3.3. Econometric Analysis

3.3.1. Selection of functional form

Cobb-Douglas and trans-log functional forms are widely applicable in stochastic production frontier analysis. But, the Cobb-Douglas functional form is commonly used in estimating the stochastic production frontier. It is widely used in agricultural economics studies because of its ability to effectively estimate

technical efficiency while accounting for technical inefficiency factors that are farm specific and random factors that influence observed technical efficiency level which are beyond the control of the farmer (Coelli et al., 1998).

3.3.2. Estimation of input model.

The Stochastic production frontier model developed independently by Aigner et al. (1977) and Meeusen and Venden Broeck (1977) in which an additional random error, vi, is added to the non-negative random variable, ui. However, since the model assumes half normal distribution, Aigner, Lovell and Schmidt (1977) obtained maximum likelihood (ML) estimates under the assumption of vi- iid N (0, σv2), ui-iid N+ (0, σ2u), the model was specified as follows:

$$\ln(yi) = Xi\beta + vi - ui \;,\; i = 1, 2, \ldots N \qquad \textbf{(3.1)}$$

Where:

ln: represents the natural logarithm to the base" e"

yi: total wheat output in quintal for the ith farmer.

Xi: is a vector of input variables for the ith farmer

β: parameters to be estimated.

vi: is the disturbance error term, independently and identically distributed(iid) as N(0,σv2) intended to capture events beyond the control of farmers with mean value zero and constant variance(σv2)

ui: is a non-negative half normal random variable, independently and identically distributed(iid) as N+(0, σ2u) with mean value zero and constant variance(σv2) intended to capture technical inefficiency effects in wheat output.

That is to say; the output oriented technical efficiency of the ith farmer, denoted by TEi, can be estimated as the ratio of the observed output (yi) and maximum potential output (y*):

$$TEi = yi / y^* = \frac{\mathbf{f}(\mathbf{xij};\boldsymbol{\beta})\mathbf{x}\,\mathbf{exp}(\mathbf{vi}-\mathbf{ui})}{\mathbf{f}(\mathbf{xij};\boldsymbol{\beta})\,\mathbf{x}\,\mathbf{exp}(\mathbf{vi})} = \exp(-ui) \qquad \textbf{(3.2)}$$

Where:

i, j: denote the farm and input respectively.

TEi: technical efficiency of the ith farmer.

exp (-ui): expected value of -ui.

Output and input variables used in this model are:

Wheat Yield (Woutp): This is dependent variable used to measure amount of wheat produced in quintal for production period 2018/2019).
Land (land): Land cultivated for wheat production in the year 2018/19 and it was measured in hectare.
Fertilizer (Fert): UREA or DAP or both fertilizers used in quintal per hectare.
Improved Seed (Imp.seed): This is amount of improved wheat seed used by farmers per hectare of wheat land cultivated.
Local seed (LSeed): This is amount of local wheat seed used by farmers per hectare of wheat land cultivated.
Labour (labr): It can be hired or family labour involved in wheat farming. The family and hired labor used was measured on the bases of person day conversion, which is eight working hours considered as one person day.
Chemical (chem): Chemicals are used by farmers to control weed and pests. Therefore farmers were asked how much ml of chemical they applied in last cropping season for wheat farming.

The input model was written as:

ln(woutp) = βo + β1 ln(land) + β2 ln(Fert) + β3 ln(Impseed) + β4ln(labr) + β5 (chem)+ vi – ui, εi=vi-ui

3.3.3. Predicting farm specific efficiency

The best prediction of farm level efficiency, exp (-ui), can be obtained by

$$E[\exp(-ui) / ei] = \frac{1-\emptyset(\sigma_A+\gamma e_i/\sigma_A)}{1-\emptyset(\gamma e_i/\sigma_A)} \exp(\gamma ei + \sigma 2/2) \quad \textbf{(3.3)}$$

$$\sigma A = \sqrt{\gamma(1-\gamma)\sigma_S^2}\ ;\ ei = \ln(yi) - Xi\,\beta;\ \emptyset(.) \quad \textbf{(3.4)}$$

Where; $\emptyset(.)$ the density function of a standard normal random variable which can be estimated by maximum likelihood once the density function for ui is specified. The model, defined by Equations (3.1 and 3.2) is called the stochastic frontier production function because the output values are bounded by the stochastic (random) variable, vi. The random error, vi can be positive or negative and so the stochastic frontier outputs vary about the deterministic part of the frontier model (Coelli et al., 1998).

The maximum likelihood estimates of the parameters of the frontier model are estimated, such that the variance parameters are expressed in terms of the parameterization.

$$\sigma 2s = \sigma 2v + \sigma u2 \text{ and} \quad \textbf{(3.5)}$$

$$\gamma = \sigma u2 / \sigma 2s = \sigma u2 / \sigma v2 + \sigma u2 \quad \textbf{(3.6)}$$

Where: the γ parameter has a value between 0 and 1. A value of γ of zero indicates that the deviations from the frontier are due entirely to noise, while a value of one would indicate that all deviations are due to technical inefficiency.
σu2 - is the variance parameter that denotes deviation from the frontier due to inefficiency;
σ2v - is the variance parameter that denotes deviation from the frontier due to noise
σ2s - is the variance parameter that denotes the total deviation from the frontier.

3.3.4. Estimation of inefficiency effect model

A one step procedure estimate of all the parameters was applied. That is, both the production frontier and the inefficiency effect models are estimated simultaneously, because the inefficiencies are assumed to be independently and identically distributed (iid) in order to estimate their values (Coelli et al., 1998; Herrero and Pascoe, 2002).
Consequently, farm specific inefficiency effects, ui's, assuming for example, a half normal distribution N+ (0, σu2) is modeled as follows:

$$Ui = Zi\,\delta + wi \qquad i = 1,2,\ldots\ldots\ldots N \quad \textbf{(3.7)}$$

Where; Ui - is inefficiency effects
δ - is a 1xP vector of parameters to be estimated by maximum likelihood estimator, which would generally be expected to include an intercept parameter
Zi – is a Px1 vector of explanatory variables associated with farm specific inefficiency effects.
wi – is assumed to be normally distributed random variable with mean zero and variance δ2w or wi~ N(0, δ2w)

The following variables were used and estimated in the inefficiency effect model. These are:

Age (age): This refers age of the farmer measured in number of years.
Age2. This variable was be used to see the diminishing effect of age on efficiency.
Sex (sex): It is a dummy variable assumes "1" if a farmer is male headed and "0" otherwise
Education Level (educ): This refers educational level of the farmers. It is measured in years of formal schooling of the farmers and then grouped into categorical variables.
Family size (fmsz): This refers total number of family members in the household. It was converted in to Adult Equivalent (AE).
Extension Contact (extcont): This variable was measured by the number of visits made per week by development agents in relation to wheat production in the cropping year.
Credit (credt): It is a dummy variable assumes "1" if a farmer gets credit for wheat production and "0" otherwise in the cropping year from formal financial institution.
Training (training): This is a dummy variable which assumes "1" if a farmer gets training related to wheat production and "0" otherwise in the cropping year. A farmer can trained more than one in a cropping period.
Land fragmentation (land frag): This is number of plots of land a farmer plow for wheat production. It includes both own and rented plots.
Market (Markt): This variable was used to indicate whether a farmer faced any problem related to marketing of his wheat product. If framers do not have problem to market, it is more likely that farmers will produce more in response to the benefit they obtained from market and affect inefficiency negatively.
Harvesting (Harvest): This is a categorical variable that indicated mode of harvesting a farmer practice in the wheat farming and assume 1 if a farmer use only combiner, 2 is a farmer harvest only manually and 3 if a farmer used both combiner and manual.
Plowing (plow): This refers mode of plowing a farmer exercise in the cropping year. It is categorical variable and assumes 1 if a farmer used oxen only, 2 if a farmer used tractor only and 3 if a farmer used oxen and tractor.

Therefore, the inefficiency model is written as:

$$Ui= \delta 0+\delta 1(age) + \delta 2(age2) + \delta 3(sex)+ \delta 4(educ)+ \delta 5(training)+ + \delta 6(exts)+ \delta 7(shock)+\delta 8(markt)+\delta 9(harvest)+\delta 10(plow)+\omega i \quad \textbf{(3.8)}$$

Finally, both the input and inefficiency models were estimated simultaneously specified as:

$$\ln(woutp) = \beta o + \beta 1 \ln(land) + \beta 2 \ln(Fert) + \beta 3 \ln(Impseed) + \beta 4 \ln(labr) + \beta 5 (chem) - (\delta 0 + \delta 1(age) + \delta 2(age2) + \delta 3(sex) + \delta 4(educ) + \delta 5(training) + \delta 6(exts) + \delta 7(shock) + \delta 8(markt) + \delta 9(harvest) + \delta 10(plow) + \omega i \quad \textbf{(3.9)}$$

4. RESULTS AND DISCUSSION

4.1. Descriptive Results

The mean age of model and non- model respondents were 51.38 and 47.16 years respectively. The mean age difference between model and non- model farmers is statistically significant at 1% level (t= 4.9291, p=0.000). Regarding family size, on average, model farmers have slightly higher family size (5.2) compared to non- model farmers (4.6) and the difference is statistically significant at 1% level (t=4.6229, p= 0.000).This implies model farmers have better income than non-model farmers from agriculture and this push model farmers to have more family.

Educated farmers can easily accept and implement agricultural extension services to increase production and eases communicate with development agents. As result, the survey result in Table 4.1 showed that 90.43% of respondents were attended from basic education to grade 12 and 9.57% of them were illiterate (Never attended).Moreover, the descriptive result also indicates as the level of education increases, the average wheat output increases more for model farmers than non-model farmers. This implies model farmers produces more than non- model farmers as their level of education increases and this is more likely true that model farmers better adopt and practice modern technologies in agriculture, particularly wheat farming.

Table 4.1: Average wheat output by level of education and Groups of farmers

Level of Education	Model Farmer(N=350)			Non- Model farmer(N=350)		
	Freq.	%	Mean output	Freq.	%	Mean output
Never attended	32	9.14	40.5	35	10	18.54
Basic education	68	19.43	45.97	65	18.57	31.83
Attended grade 1-8	167	47.71	48.16	194	55.43	31.15
Attended grade 9-12	83	23.71	60.59	56	16	34.44

Source: Survey Result, 2019

4.1.1. Input variables

Land is one of the most important variables that affect output of farmers. As a result the descriptive analysis showed that model farmers had, on average, a total of 2.58 hectare of land used for agronomic practices and out of these, 1.52 hectare of land which was fragmented into 2.56 plots were used for wheat farming. Similarly non- model farmers had, on average 1.74 hectare of cultivated land and only 1.04 hectare of land which was fragmented in to 2.4 plots were used for wheat farming (Table 4.2). The t-test statistics shows that the mean land used for wheat farming difference between model and non-model farmers is statistically significant at 1% level (t= 8.6905, p= 0.0000).

Regarding selected seed model farmers, on average, used 1.95 quintal selected seed per hectare and non- model farmers have used 1.08 quintal selected seed per hectare (Table 4.2). The mean selected seed use difference between model and non- model farmers is statistically significant at 1 % level (t=8.2162, p=0.0000). This implies model farmers can afford more to purchase selected seed than non- model farmers. But the mean local seed use by model farmers per hectare is slightly lower compared to non- model farmers and the difference is statistically insignificant(t = -0.5825, p = 0.7198).

Fertilizer is another important input used by farmers to increase production and productivity. Accordingly, on average, 2.85 and 1.75 quintal of fertilizer per hectare was used by model and non- model farmers respectively and the mean difference is also statistically significant(t=10.3856, p= 0.000).

Labour (both family and hired labour) was another variable used in the production period. Farmers used labour for plowing, sowing, weeding, harvesting and threshing of wheat crop. All labor hours used for wheat farming were converted into man- days (8 working hours as one man- day).Consequently, on average, model farmers utilized 29.58 labour per hectare while non- model farmers utilized 20.33 labors per hectare. This implies model farmers used more labour per hectare since they used hired labour worked for longer hours per day compared to non-model farmers.

Table 4.2: Descriptive results of input variable

Variables	Model Farmer			Non-Model Farmer			Pooled		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Cultivated land (hec)	2.58	1	8.5	1.74	0.25	4.5	2.16	0.25	8.5
Land used for wheat farm (hec)	1.52	0.5	6	1.04	.25	3	1.28	0.25	6
Fragmented plots (No)	2.56	1	6	2.4	1	6	2.48	1	6
Improved seed (Quintal/hec)	1.95	0.01	12	1.08	.01	6	1.51	0.01	12
Local seed (Quintal/hec)	0.85	0.01	5	0.89	0.01	6	0.87	0.01	5
Fertilizer (Quintal/hec)	2.85	0.25	12	1.75	0.25	6.5	2.3	0.25	12
Chemicals (ml/hec)	1162.92	40	6240	421.05	1	2400	791.99	1	6240
Labour (No/hec)	29.58	5	140	20.33	5	60	24.95	5	140

Obs=700, Model farmers =350, Non- model farmers 350, Min=Minimum, Max= Maximum

4.1.2. Wheat output

The survey result in Table 4.3 showed that, model farmers produced, on average, 32.88 quintal per hectare and 49.98 quintal per farmer and non- model farmers produced, on average, 29.36 quintal per hectare and 30.54 quintal per farmer. The overall, mean, wheat output per hectare was 31.45 quintal. The t- test statistics showed that the mean difference in wheat output produced between model and non- model farmers (per farmer) is statistically significant at 1% level (t=9.2097 p=0.000).This implies model farmers produced more compared to non- model farmers and this is because of model farmers use more selected seed, fertilizer, labour and chemical to increase production compared to non-model farmers and better perform agricultural practices.

Table 4.3: Average Wheat output by groups of farmers

Groups	Obs	Mean	Min	Max	Total output	Total land(hec)	Output/ hec
Model farmers	350	49.98	6	288	17,493	532	32.88
Non-model farmers	350	30.54	3	108	10,689	364	29.36
Overall	700	40.26	3	288	28,182	896	31.45

Note: hec=hectare, Output/hec=Output per total land, Mean=output per farmer

4.2. Econometrics Result

4.2.1. Maximum likelihood estimation of stochastic production frontier model

The econometrics result showed that Lambda (λ) value was 2.82 and 2.15 for model and non- model farmers respectively and suggested that the greater variation in wheat output is contributed by technical inefficiency rather than factor outside the control of farmers, because λ is greater than one (1). Moreover, λ value greater than 1 also shows a good fit for the estimated model and the correctness of the distributional assumptions, half normal (Ojehomon et al., 2013)

The value of this discrepancy ratio (γ) was found to be 0.89 and 0.82 for model and non- model farmers respectively and 0.84 for pooled ones. This coefficient, γ, is interpreted as about 89% of the variability in wheat output among model farmers and 82% among non- model farmers within the production year was contributed to technical inefficiency effect (ui) which are under the control of farmers, while the remaining 11% and 18% variation in output was due to effects of random noise (vi) which are outside the control of farmers for model and non-model farmers.

Returns to scale is another important feature of Cobb-Douglas production function. The econometrics analysis indicated that model farmer's exhibits constant returns to scale, this means if model farmers increase all input by 1% output also increases by the same percent while non- model farmers' exhibits decreasing returns to scale, this implies if non-model farmers increases all input by 1% out will increase by less than 1% (Table 4.4)

Regarding interpretation of input variable coefficients for model farmers, land used for wheat farm (lnland), Fertilizer (lnFertiz) and both family and hired labour (lnlabour) statistically significantly affects wheat output. Therefore, the

econometrics result showed that coefficient of elasticity for lnland was 0.764 that is a 1% change in size of land in hectare will bring about a 0.764% change in wheat at output at 1% level of significant if all other covariate held constant. Similarly, 1% change in fertilizer usage resulted in 0.142% change in wheat output keeping all other covariate constant. Moreover, a percentage change in the use of more labour contributes to a change by 0.086% in wheat output.

Table 4.4: Maximum likelihood estimates of the Cobb-Douglas stochastic production frontier

Input Variables	Parameter	Model farmers			Non- Model farmers			Pooled		
		Coeff.	Z	P>|Z|	Coeff.	Z	P>|Z|	Coeff.	Z	P>|Z|
Cons	β0	3.20	24.83	0.000***	-2.93	31.93	0.000***	3.39	38.56	0.000***
lnland	β1	0.764	14.57	0.000***	0.77	15.14	0.000***	0.765	20.18	0.000***
lnimp_seed	β2	0.005	0.61	0.539	0.01	2.22	0.026**	0.014	2.76	0.006***
lnFertiz	β3	0.142	3.04	0.002***	0.23	4.83	0.000***	0.186	5.55	0.000***
lnchem	β4	0.022	1.57	0.115	-0.02	-1.84	0.066*	0.008	0.88	0.381
lnlabour	β5	0.086	3.11	0.002***	-0.05	-1.74	0.081*	0.030	1.42	0.156
Sigma v (σv)		0.175			0.19			0.195		
Sigma u (σu)		0.496			0.42			0.454		
γ		0.89			0.82			0.84		
Lambda(λ)		2.82			2.15			2.32		
Returns to scale	Σ Bs	1.02	31.8	0.000	0.93	28.8	0.000	1.00	41.5	0.000
Wald chi2(5)		984.4***			1086.8***			2510.4***		

*The dependent variable is in wheat output (lnwoutp_total), ***,** significant at 1% and 5% level

However, for non- model farmers all input variables, that is, land, improved seed, fertilizer, chemical and labour are statistically significant in affecting wheat output. Land has a coefficient of elasticity 0.77, meaning, a 1% increase in size of land will result in 0.77% in increase in wheat output, keeping all covariate constant and a 1% increase in the use of improved seed per hectare will bring about 0.013% change in wheat output as well as a percentage change in the use of fertilizer per hectare will result in 0.232% change in wheat output. But chemical and labour usage have negative coefficient of elasticity and interpreted as a 1% increase in the use of chemical and labour per hectare will bring about a decrease in wheat output by 1.84% and 1.74% respectively. This implies chemical and labour are under-utilized as land used for wheat farm is small compared to model farmers (1.52 hectare for model and 1.04 hectare for non-model farmers) and non-model farmers need to give due attention for other types of inputs and agronomic practices.

4.2.2. Estimating technical efficiency score

The mean level of technical efficiency for model farmers was 81% with minimum and maximum efficiency 32% and 96.5% respectively. This score implies there is a wider disparity in technical efficiency among wheat producing model farmers themselves. The mean score can be interpreted as farmers can increase wheat output by 19% without decreasing the existing input level but by only improving technical efficiency in the short run, but, in the long run, improving the existing level of technical efficiency of farmers alone may not lead to significant increase in wheat output, it needs best alternative agronomic farming practices and modern technologies (Table 4.5).

On the other hand, the mean level of technical efficiency for non- model farmers was 79% with minimum and maximum score 23% and 96.2% respectively. Here is also a significant difference in technical efficiency with in non-model farmers and there is also an opportunity for non-model farmers to increase output by 21% only by improving technical efficiency without reducing input. Despite small numerically mean difference in technical efficiency between model and non-model farmer, the t-test statistics revealed that there is significant difference in technical efficiency scores between model and non- model farmers at 10% level($t=1.5903$ $p=0.0561$). This implies that it is not much important to group farmers into model and non-model and provide differentiated extension service.

Similarly, pooled (combined) farmers have meant technical efficiency score of 80% with minimum and maximum score 23% and 96.5% respectively (Table 4.5).

Table 4.5: Mean technical Efficiency score by groups of farmers

Group of farmers	Obs	Mean TE	Std. Dev	Min	Max
Model farmer	350	0.81	0.146	0.32	0.965
Non-model farmer	350	0.79	0.148	0.23	0.962
Pooled	700	0.80	0.147	0.23	0.965

Source: Survey result, 2019

4.2.3. Determinants of technical inefficiency

Technical inefficiency of wheat production for model farmers is significantly affected by mode of plowing, mode of harvesting, shock, training and market. The econometrics result showed that plowing wheat land both by oxen and tractors reduces technical inefficiency by 0.878 compared to plowing land only by oxen at 1% level of significant or technical efficiency of farmers who plow their land by both oxen and tractor greater by 0.878 compared to those who plow their land only by oxen, but plowing land by only tractor has no effect on technical inefficiency compared to plowing only by oxen (Table 4.6).

Harvesting is another variable which affects technical inefficiency of wheat production of model farmers. The econometrics result showed that harvesting wheat manually increases technical inefficiency or decreases technical efficiency compared to harvesting by only combiner at 1% level of significant and technical inefficiency increases for farmers who harvest wheat crop both by combiner and manual compared to those harvesting by only combiner at 5% level of significant.

Model farmers, who did not experience shocks like disease, weed, frost etc had lower technical inefficiency compared to those who confronted shock at 1% significant level and model farmers who did not got training related to wheat production had higher technical inefficiency compared to those who were trained at 1% level of significant (Table 4.6).

Marketing is the other variable which affects technical inefficiency of wheat production and those model farmers who did not face marketing problem to wheat output had higher technical inefficiency (lower technical efficiency) in production compared to those who said “yes” to marketing problem. This is more likely true

that these model farmers who did not faced marketing problem, produced less and used their wheat output for personal consumption rather than supplying for sales.

Level of education affects technical inefficiency negatively and the econometrics result indicated that non- model farmers who attended basic education, grade 1-8 and grade 9-12 had less technical inefficiency(technically more efficient) compared to those who were illiterate at 5% and 10% level significant. This implies education improves technical and managerial abilities of non-model farmers in wheat production.

Land fragmentation hypothesized to affect technical inefficiency either positively or negatively. The econometrics result revealed that the coefficient of land fragmentation is negative which implies that if land fragmentation decreases by one plot, technical inefficiency of farmers also decreases and is significant at 5% level. Because the time taken to move from one plot to the other decrease. Furthermore, non- model farmers who harvested wheat by manually only, their technical inefficiency increases compared to those farmers harvesting by combiner only, but those non- model farmers who harvested by both combiner and manual, their technical inefficiency did not significantly different compared to those harvested by combiner only. This implies that to have better technical efficiency in wheat production non- model farmers should harvest their wheat by combiner only as this mode of harvesting reduces wastage resource.

Marketing has a positive sign coefficient implying that those farmers who respond “no” to marketing problem are technically inefficient compared to those replied “yes” to marketing problem at 1% level of significant. Empirically, the mean efficiency of model and non- model farmers who said “faced market problem or yes” is 85% and 83% respectively and the mean efficiency of model and non- model farmers who said “no” to market problem is 78% and 76% respectively (Table 4.5 and 4.6).

Table 4.6: Mean efficiency comparison by market and Group of farmers

Did you face Marketing problem?	Model Farmer			Non- Model Farmer			t-test
	Freq.	%	Mean Efficiency	Freq.	%	Mean Efficiency	
Yes	134	38.29	0.85	143	40.86	0.83	1.5375
No	216	61.71	0.78	207	59.14	0.76	1.3133

Table 4.7: Maximum-likelihood estimates of the inefficiency variables.

Ineff. Variables	Parameter	Model farmers			Non- Model farmers			Pooled		
		Coeff.	Z	P>|Z|	Coeff.	Z	P>|Z|	Coeff.	Z	P>|Z|
Cons	δ0	-2.610	-0.87	0.387	4.13	1.34	0.18	1.894	1.16	0.246
age	δ1	0.006	0.06	0.952	-0.164	-1.57	0.117	-0.105	-1.68	0.092*
Age2	δ2	0.002	0.22	0.827	0.001	1.41	0.160	0.001	1.79	0.073*
sex	δ3	-0.460	-0.90	0.37	0.966	-1.29	0.198	-0.605	-1.27	0.203
Education										
Basic education	δ4	-0.284	-0.57	0.572	-1.167	-1.71	0.087*	-0.783	-2.32	0.020**
Attended grade 1-8	δ5	-0.154	-0.32	0.749	-1.138	-2.49	0.013**	-0.780	-2.64	0.008***
Attended grade 9-12	δ6	-0.460	-0.85	0.394	-1.262	-1.78	0.079*	-1.059	-3.14	0.002***
Fragment	δ7	0.106	0.85	0.393	-0.416	-2.09	0.037**	-0.088	-0.97	0.332
Plow										
Tractor only	δ8	-1.107	-0.92	0.359	-0.270	-0.17	0.866	-0.722	-0.92	0.356
Both by ox and tractor	δ9	-0.878	-2.62	0.009***	-32.11	-0.02	0.987	-1.225	-4.49	0.000***
Harvest										
Manual only	δ10	2.32	4.74	0.000***	1.314	2.96	0.003***	1.398	5.34	0.000***
Both combiner and manual	δ11	0.996	2.31	0.021**	-0.709	-0.91	0.364	0.444	1.68	0.093*
Shock	δ12	-2.72	-4.70	0.000***	-0.552	-0.99	0.322	-1.753	-5.45	0.000***
Extension	δ13	-0.479	-1.10	0.269	-0.635	-0.66	0.510	-0.461	-1.43	0.154
training	δ14	1.268	2.61	0.009***	-0.413	-0.47	0.64	0.717	2.13	0.033**
market	δ15	0.706	1.96	0.050**	1.323	2.74	0.006***	0.768	2.77	0.006***

Source: Survey data 2019, ***, **, * significant at 1%, 5% and 10% Note: The reference category for sex is male, for education is never attended, for plow is plowing only by oxen, for harvest is harvesting only by tractor, for shock is “yes”, for training is “yes” extension “yes” and for market is “yes”.

5. CONCLUSION AND RECOMMENDATION

The descriptive result showed that model farmers used on average 1.52 hectare of land for wheat farming while non-model farmers used, on average, 1.04 hectare. This land was fragmented, on average, in to 2.56 and 2.4 hectare respectively for model and non- model farmers. Similarly, model and non- model farmers used, on average, 2.85 and 1.08 quintal of selected seed, 2.85 and 1.75 quintal of fertilizer and 29.58 and 20.33 labour in man day respectively. Using these and other inputs variables, model and non-model farmers obtained on average 32.82 and 29.36 quintal of wheat produce per hectare.

The econometrics result also showed that λ had 2.82 and 2.15 value for model and non- model farmers respectively which indicate that greater variation in wheat output is contributed by technical inefficiency rather than factor outside the control of farmers. The value of discrepancy ratio (γ) which indicates technical inefficiency variability was 0.89 and 0.82 for model and non- model farmers respectively and 0.84 for pooled ones.

Model farmers wheat output was statistically significantly influenced by land used for wheat farm, fertilizer and both family and hired labour with expected sign while all input variables statistically significantly affects wheat output of non-model farmers with expected coefficient sigh except chemical and labour.

Regarding the mean technical efficiency score, model farmers scored 81% and non-model farmers scored 79% and the overall farmers scored 80% suggesting that there is room to increase technical efficiency of wheat farming if farmers improve the overall use of scarce resources.

Similarly, model farmers' technical inefficiency in wheat farming was statistically significantly determined by mode of plowing, mode of harvesting, shock, training and marketing and that of non- models farmers' technical inefficiency in wheat farming was significantly determined by mode of harvesting, level of education, land fragmentation and marketing.

Thus, training, solving marketing problem, encourage farmers to plow land by both oxen and combiner and harvest with combiner to reduce wastage, and strategic plan to mitigate factors beyond the control of farmers. In addition, education, improvement of land fragmentation problems, use of improved seed and chemicals need to get better attention for non-model farmers.

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