THE EFFECT OF FINANCIAL INCLUSION ON POVERTY REDUCTION IN ETHIOPIA

By

FIKRE KURA GIZAW

ABSTRACT

This study attempted to explain the short-run and long-run effect of financial inclusion on poverty reduction in Ethiopia over the period 2004-2018, on quarterly basis. This study applied ARDL approach with an optimal ARDL model (4, 4, 4, 4, 4, 4) to formulate and estimate the effect of financial inclusion on poverty. The results of ARDL bounds test for co-integration show that the poverty headcount index in Ethiopia is co-integrated hence has long-run relationship with financial inclusion. However, the results of long-run estimation indicated that the variables of financial inclusion have no significant effect on poverty reduction in the long run. The study also revealed that, unlike the long-run effect, Commercial Bank branch per 100000 adults; Depositors in commercial bank branches per 1000 adults; Borrowers from commercial bank branches per 1000 adults; and saving in microfinance institutions positively and significantly affect poverty reduction in Ethiopia. On the other hand, Loan provided by micro finance, institutions have a negative and significant effect on the poverty index which is unexpected sign. The Error correction (ECM) test also revealed that about 6.2% of the previous quarter's deviation from the equilibrium path is corrected every quarter. The test for bidirectional causality has also depicted that there is a bidirectional relationship between the Poverty index and Commercial bank branches per 100000 adults and Loan provided by Microfinance institutions, saving in microfinance institutions. But there is only a unidirectional relationship between poverty and commercial bank branches and depositors in commercial bank branches per 100000 adults. The results of this study imply that poverty can be reduced, particularly in short-run, by extensively ensuring the ease of access, availability, and usage of the formal financial system.

Key words: Ethiopia, Financial inclusion, Poverty reduction, ARDL

1. INTRODUCTION

Nowadays, there is a general consensus that the lack of financial inclusion of disadvantaged people and the poor in any jurisdiction is the major reason for the rising level of poverty and unemployment among underprivileged communities (Anthony et al, 2018). According to Martinez (2011) financial inclusion is an important policy tool employed by the government in fighting poverty and stimulating growth given its ability to facilitate efficient allocation of productive resources, thus reducing the cost of capital. As a global development agent, the World Bank Group (WBG) has set an ambitious target to achieve Universal Financial Access (UFA) by 2020. The WBG has committed to

enabling one billion people to gain access to a transaction account through targeted interventions (WB, 2018). Financial inclusion is also positioned prominently as an enabler of other developmental goals in the 2030 Sustainable Development Goals, where it is featured as a target in eight of the seventeen goals (UNDP, 2015). It is also taken as one key component of inclusive development is financial inclusion in which Africa (AFDB, 2013).

Financial inclusion is on the rise globally. The 2017 Global Findex report shows that 1.2 billion adults have obtained an account since 2011, including 515 million since 2014. The report indicates that between 2014 and 2017, the share of adults who have an account with a financial institution or through a mobile money service rose globally from 62 percent to 69 percent. In developing economies, the share rose from 54 percent to 63 percent. Yet, an estimated 1.7 billion adults (or 31% of adults) have been excluded from the formal financial system; and out of the total worldwide financially excluded people 73% are live in 25 developing countries (Global Findex, 2017).

Given the increasing global consideration of financial inclusion in development policies over the past two decades, the literature on financial development and growth has received a lot of attention (Ibrahim et al, 2019). However, much consideration has not been given to the effect of financial inclusion on poverty reduction (Ficawoyi and Kevin, 2016). Even the existing studies focus on the microfinance-poverty nexus, which fails to capture the broader financial inclusion-poverty nexus (Zhang & Posso, 2019). Moreover, the existing empirical studies are come up with mixed and contentious results about the financial inclusion poverty nexus (Alessandra et al, 2016; Seng, 2019).

Some studies empirically found that financial inclusion has a positive effect on poverty reduction. For example Beck et al (2007); Jalilian and Kirkpatrick, (2005); Kaboski and Townsend, (2012); and Akotey & Adjasi, (2016) empirically found that financial sector growth contributes to poverty reduction through the growth-enhancing effect. However, some other empirical studies found that financial inclusion worsens poverty than tackling it. For example, Seng, (2018) found that households, whether extremely poor, relatively poor or non-poor, which take out microcredit, get worse off in terms of household food consumption per capita. According to Afriyie & Segbefia, (2015) microcredit offered by microfinance institutions (MFIs) is likely to trap needy borrowers into a vicious cycle of

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poverty and has even weakened rather than empowered women. Hence, it is very essential to conduct empirical studies to narrow this controversy.

Ethiopia, like other developing countries, has given due consideration for financial sector development as an essential strategy in reducing poverty and attaining inclusive economic growth (Geda et al, 2006, Getnet, 2014). The International development partners are also supporting Ethiopia's effort to financial inclusion. Accordingly, Ethiopia is one of the 25 priority countries for its Universal Financial Access (UFA) an initiative of the World Bank Group (WBG) (WB, 2018). Moreover, the government of Ethiopia, with the support of the World Bank has launched a National Financial Inclusion Strategy (NFIS). The strategy aims to further improve access to finance and financial inclusion for a greater proportion of the society which is currently outside the reach of modern financial services (NBE, 2017).

Consequently, development of the financial sector and also financial inclusion is in progress in Ethiopia (Aderaw and Singh, 2016; Zewedu, 2014). The 2018 annual report of National Bank of Ethiopia shows that in 2017/18 the total number of commercial bank branches has reached 4,757; banks have significantly increased their deposit mobilization, loan collection, and loan disbursement. Similarly, insurance companies and microfinance institutions have scaled up their services by expanding their network and product diversification (NBE, 2017/18). The Global Findex report of the year (2017), revealed that there is an improvement in the financial inclusion in Ethiopia. According to the report, Ethiopia still lags behind other Sub-Saharan African countries, in 2017 the percentage of Ethiopian adults with an account rose to 35%, up from 22% in 2014; 26% of adults save at financial institutions (as compared to 14% in 2014) and 11% borrow from financial institutions (as compared to 7% in 2014). On the other hand, Ethiopia has been registering robust economic growth over the past two decades (WB, 2017). Given this growth, poverty has shown a substantial decline in the country. Trends in national poverty show that the headcount poverty rate declined, from 29.6% in 2010/11 to 23.5% in 2015/16 (NPC, 2017).

Ethiopia is in progress both in financial inclusion and poverty reduction. However, the relation between financial inclusion and poverty reduction has been disregarded both by development and academic community in Ethiopia, Most of the existing studies

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concerning Ethiopia, focus on the state of financial sector development i.e. Alemayehu et al, (2017); Aderaw and Singh, (2016); Zewedu, (2014). Others focus on the role of microfinance i.e. Ahmed & Batra, (2018); Berhane & Gardebroek, (2011); Berhanu, & Thomas, (2000). This also indicates that the existing studies on Ethiopia suffers from either thematic gap by not relating financial inclusion and poverty or not adequately capturing financial inclusion by focusing on microfinance development which is only one component of financial inclusion. Though a piece of research has been done in other developing countries concerning to the topic under discussion, it is difficult to make an inference to Ethiopia, given the locally specific nature of both poverty dynamics and financial inclusion. Hence, this study seeks to explain the effect of financial inclusion on poverty in Ethiopia.

Objective of the Study

The general objective of this study is to analyze the effect of financial inclusion on poverty reduction in Ethiopia over the period 2004-2018.

The specific objectives the study includes:

i. To overview the state of financial inclusion and poverty in Ethiopia;
ii. To empirically evaluate the short-run and in the long-run effect financial inclusion on poverty reduction in Ethiopia; and
iii. To derive policy implications from the empirical analysis of financial inclusion on poverty reduction in Ethiopia.

2. LITERATURE REVIEW

2.1 Conceptualizing Financial Inclusion

Different peoples and different organization define the term financial inclusion differently but they all seem to convey the same meaning (Ibrahim, 2019). Definition of financial inclusion can vary depending on the national context and on the stakeholders involved (FATF, 2017).

The World Bank (2014) defines financial inclusion as follows:

> *Financial inclusion means that individuals and businesses have access to*
> *useful and affordable financial products and services that meet their needs*

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> *transactions, payments, savings, credit and insurance delivered in a responsible and sustainable way (WB, 2014:15).*

According to Nirvikar (2017) this definition highlights the different aspects of financial services that are ultimately what make finance an important part of the economy. Accordingly access to a transaction account is the first step toward broader financial inclusion since it allows people to store money, and send and receive payments, and also serve as a gateway to other financial services.

The African Development Bank (AFDB) comprehensively defines financial inclusion as 'all initiatives that make formal financial services Available, Accessible and Affordable to all segments of the population' (AFDB, 2013).The Bank articulates that there should be:

> *particular attention to specific portions of the population that have been historically excluded from the formal financial sector either because of their income level and volatility, gender, location, type of activity, or level of financial literacy. In so doing, there is a need to harness the untapped potential of those individuals and businesses currently excluded from the formal financial sector or underserved, and enable them to develop their capacity, strengthen their human and physical capital, engage in income-generating activities, and manage risks associated with their livelihoods (AFDB, 2013:25).*

The Banks conceptualization of financial inclusion implicates that financial inclusion goes beyond improved access to credit and savings; rather it encompasses a well-functioning financial infrastructure that allows individuals and companies to engage more actively in the economy (ibid). Given differences in their financial inclusion strategy, different countries give a contextual definition of financial inclusion. In this regard, the National Financial Inclusion Strategy of Ethiopia defines Financial inclusion as '*the delivery of financial services at an affordable cost to a section of disadvantage and low-income segments of society*' (NBE, 2017).

Sarma (2008) defines financial inclusion as the process that ensures the ease of access, availability, and usage of the formal financial system. Mohan (2006), also be described financial inclusion as a situation where a certain segment of the populace access who

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hitherto lacked access to the financial system is gradually integrated into it through the provision of low-cost, safe, and fair financial products and services from mainstream providers.

Financial inclusion can also be conceptualized in another way as financial exclusion. According to Mohan (2006), financial exclusion refers to the parts of the social circle that do not have access to safe, fair, and affordable financial products and services from formal financial service providers. Financial exclusion can also be voluntary and involuntary (World Bank, 2004). Accordingly, voluntary financial exclusion is a condition where the segment of the population or firms chooses not to use financial services for different reasons. Involuntary exclusion is a condition where the segment of the population or firms excluded from financial service due to insufficient income and high-risk profile or due to discrimination, market failures and imperfection. According to Gardeva and Rhyne, (2011) financial exclusion may arise from the unfriendly business environment, lack of sustainable growth; insufficient infrastructure; geographical location e.g. rural area limiting physical access; psychological fear of financial institution's staff, structures, complicated financial products, lack of knowledge regarding products and procedures; low income and poor financial discipline; and poor business practices and awareness.

2.2 Measuring financial inclusion

The Alliance for Financial Inclusion Data Working Group (2011) and also the G20 Financial Inclusion Indicators (2016) identified three main dimensions to measure financial inclusion. These are (i) access to financial services; (ii) usage of financial services; and (iii) the quality of the products and the service delivery.

Access indicators reflect the depth of outreach of financial services, such as the penetration of bank branches or point of sale (POS) devices in rural areas, or demand-side barriers that customers face to access financial institutions, such as cost or information(AFIDWG, 2011). The commonly used are measures of access to financial services that have the following indicators: (1) number of branches per 100,000adults (2) number of ATMs per 100,000 adults (3) number of agents of payment service providers per 100,000adults (4) number of prepaid cards per 100,000 adults (5) number of POS terminals per 100,000 adults (6) percentage of adults with access to mobile phone or

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devices or internet access in home (7) number of debit cards per 1000 adults (8) interoperability of ATMs (GPFI, 2016).

Usage measures refer to how clients use financial services, such as the regularity and duration of the financial product/service over time (e.g. average savings balances, number of transactions per account, number of electronic payments made) (AFIDWG, 2011). The Usage of financial services has eight indicators and four sub-indicators these are: (1) percentage of adults who reported having an account at formal financial institution either by their own or together with other person (2) deposit accounts per 1000 adults (3) number of mobile money transactions per 100,000 adults (4) percentage of adults with at least one loan outstanding from bank or other financial institution (5) outstanding loan per 1000 adults (6) Percentage of adults using transaction account with formal financial institution to make or receive digital payment (6.1) sub-indicator: percentage of adults using a mobile phone to pay bills, make purchases, send or receive money from an account at formal financial institutions (6.2) sub-indicator: percentage of adults using the internet to pay bills, make purchases, send money online (6.3) sub-indicator: percentage of adults using debit card to directly make payment from an account at formal financial institution (6.4) sub-indicator: percentage of adults who received wages or government transfers into an account with formal financial institution (7) percentage of adults with high frequency use of accounts (8) percentage of adults that saved at bank or other financial institution in the past year (GPFI, 2016). Quality measures describe whether financial products and services match clients' needs, the range of options available to customers, and clients' awareness and understanding of financial products (AFIDWG, 2011).

Researchers and policymakers measure and monitor financial inclusion by accessing data generated from supply-side and demand-side surveys. According to the World Bank (2015), supply-side data surveys provide information about regulated financial institutions or through reporting to financial regulators, including geographical access (branch location), pricing of products and services, and penetration or usage of products and services. Whereas, demand-side data surveys provide information about users of financial services (individuals, households and firms) gathered through household and firms surveys. This data helps understand users' financial needs (included and excluded), barriers encountered when seeking formal financial services and products, and users'

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socio-economic and demographic characteristics (e.g., degree of financial inclusion by income, occupation, age or gender groups) (ibid).

2.3 Conceptualizing poverty

As poverty is a unique, complex and multidimensional phenomenon by nature is susceptible to diverse definitions and conceptualizations (Sanya & Olumide, 2017; Sen, 1997). As noted by Aboyade (1975), some people see poverty as an expression while others see it as a condition of the state of mind of an individual or the way in which an individual sees himself in relation to others. For example, according to Fields (1998), the poor is the proportion of the population whose incomes are insufficient to meet their basic needs to satisfy a certain minimum standard of living. Whereas according to Ani (1987) a person is poor if the person thinks he/she is poor regardless of the total amount of money he earns. Chambers (2006), stresses that what poverty is taken to mean depends on who asks the question, how it is understood, and who responds. Hence there is no universally accepted objective definition of poverty.

The Merriam-webster dictionary defines the term poverty as the state of one who lacks a usual or socially acceptable amount of money or material possessions. United Nations (May 1998), in the Statement on poverty, signed by the heads of all UN agencies defines Poverty as follows:

> *Fundamentally, poverty is a denial of choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land on which to grow one's food or a job to earn one's living, not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation (UN, 20 May 1998: Press Release ECOSOC/5759).*

The world Bank conceptualizes poverty as hunger, lack of shelter, sickness and inability to attend school, inability to read and write, joblessness, fear for the future, high infant and child mortality (World Bank, 1997); and as the inability to attain a minimum standard of living (World Bank, 2001). Chambers (2006: 3) identified five clusters of meanings for poverty. Accordingly, the first is income-poverty or consumption-poverty. The second cluster of meanings is material lack or want that includes, lack of or little wealth and lack

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or low quality of other assets such as shelter, clothing, furniture, personal means of transport, radios or television, and so on. The third cluster of meanings is expressed as capability deprivation, referring to what we can or cannot do, can or cannot be which includes but goes beyond material lack or want to include human capabilities, for example, skills and physical abilities, and also self-respect in society. The fourth cluster takes a yet more broadly multi-dimensional view of deprivation, with material lack or wants as only one of several mutually reinforcing dimensions. Whereas the fifth cluster is the multiplicity of these meanings.

Poverty is also conceptualized in either relative or in absolute terms. According to Todaro and Smith (2015) absolute poverty is defined as the situation of being unable or only barely able to meet the subsistence essentials of food, clothing, and shelter. While Relative poverty is defined in relation to the economic status of other members of society. In relative terms, people are poor if they fall below prevailing standards of living in a given societal context.

Despite the multidimensional nature of poverty, in most cases, definitions, concepts, policy discussions, and even easily accessible data for academic research are concerned to express poverty in terms of income and consumption. Hence for convenience of quantitative analysis and also as income is an important dimension of poverty.

2.4 Measuring poverty

There various measures to the extent and magnitude of poverty. However, the most widely used measures of poverty are income Poverty measures and Multidimensional Poverty Measures (Todaro and Smith, 2015).

I.   Income poverty

The widely used income poverty is measured by HeadCount Index (or Poverty Index), the poverty Gap (Depth of poverty), and Poverty severity (squared poverty gap).

According to Todaro and Smith (2015), the HeadCount Index (or Poverty Index) measures the share of the population whose income or consumption is below the poverty line, that is, the share of the population that cannot afford to buy a basic basket of goods. Poverty Index can be easily understood and communicated, but it is insensitive to differences in the depth of poverty (P: 227). In an attempt to fill this gap, the Depth of

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poverty (poverty gap index) measures provides information regarding how far households are from the poverty line. This measure captures the mean aggregate income or consumption shortfall relative to the poverty line across the whole population. It is obtained by adding up all the shortfalls of the poor (assuming that the non-poor have a shortfall of zero) and dividing the total by the population. In other words, it estimates the total resources needed to bring all the poor to the level of the poverty line. However, the measure does not capture the differences in the severity of poverty among the poor. Poverty severity (squared poverty gap) measures not only the distance separating the poor from the poverty line (the poverty gap) but also the inequality among the poor, that is, a higher weight is placed on those households further away from the poverty line (P: 229).

The above three measures of poverty are widely used in developing countries' poverty analysis. In Ethiopia, these three methods have been applied in the context in the national Poverty Analysis Reports of 1995/96, 1999/00 and 2004/05, 2010/11 and 2015/16 (Geda et al, 2006, NPC, 2017).

II. Multidimensional Poverty Measurement

Amartya Sen, the 1998 Nobel laureate in economics, argues that poverty cannot be properly measured by income or even by the utility as conventionally understood; what matters fundamentally is not the things a person has or the feelings these provide what a person is, or can be, and does, or can do (Sen, 1999). It is to address the non-income dimension of poverty that the multi-dimensional poverty measurement came into being. According to Todaro and Smith (2015) Multidimensional Poverty Index (MPI) 'measure is:

> *… that identifies the poor using dual cutoffs for levels and numbers of deprivations, and then multiplies the percentage of people living in poverty times the percent of weighted indicators for which poor households are deprived on average'* (P: 244).

It takes into account that there are negative interaction effects when people have multiple deprivations worse poverty than can be seen by simply adding up separate deprivations for the whole country, then taking averages, and only then combining them.

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Todaro and Smith (2015) argue that the multidimensional poverty approach, the first step in measuring poverty is to know which people are poor through what is called the 'dual cutoff method'. In this regard first, the cutoff levels within each of the dimensions (analogous to falling below a poverty line such as $1.25 per day if income poverty were being addressed), and second, the cutoff of the number of dimensions in which a person must be deprived (below the line) to be deemed multidimensionally poor (p: 230). The multi-dimensional index uses d three dimensions: health, education and standard of living with their corresponding indicators.

2.5 The Nexus of Financial Inclusion and Poverty: Theoretical Explanations

The knowledge of the link between financial development and economic growth has a long history. However, the earlier theories of economic development/growth recognized labor, capital, institutions, etc., as the factors for economic growth, while the importance of finance for economic growth has been frequently ignored by earlier economists (Kablana& Chhikara, 2013).

The earlier well-documented theoretical explanation on the finance growth nexus traced back to the work of Bagehot during the 1870s (Stolbov, 2012). Bagehot's theory demonstrated how the financial spheres are linked with the real economy; by explaining how the financial market in Britain affected capital spillover in the search of profitable ways of application. Taking assumptions including perfect information, frictionless economy and mobile resources, Bagehot's theory, predicts that that "capital will run as surely and instantly where it wanted, and where there is most to be made of it, as water runs to find its level' (Stolbov,2012).

After Bagehot, there were other scholars who tried to explain the finance-economic growth/ poverty nexus. Schumpeter is a good example in this regard. Schumpeter's approach explains that the services provided by financial intermediaries-mobilizing savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions-are essential for technological innovation and economic development (King and Levine, 1993). Schumpeter (1912) as cited in Kablana& Chhikara, (2013) noticed the banks and other financial institutions as an intermediary between innovators and owners of capital. Schumpeter (1912) as cited in Stolbov, (2012), also argued that once the bank issues loans, it authorizes the implementation of the new combination of innovative ideas

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which in turn will spur economic growth and benefit the entire society. Thus Schumpeter's theoretical approach indicates that the financial development of an economy is as cited as able to mobilize funds to entrepreneurs, which leads to accelerated economic growth hence reduction of poverty within a given economy.

After Schumpeter, other development thinkers' i.e. Robinson and other followers of Keynesian theory argued that the financial system plays important role in economic growth but, not the primary role (Stolbov, 2012). Hence their view diverged from Bagehot and Schumpeter by arguing that finance does not lead to growth, rather growth leads to finance.

The post wars modern theories of development strongly advocate that financial development is a must because it creates enabling conditions for economic growth through either a 'supply-leading' (financial development spurs growth) or a 'demand-following' (growth generates demand for financial products) channel (Kablana& Chhikara, 2013). For example, Stiglitz, (1993) shows that the lack of access to finance is a significant factor responsible for persistent income inequality as well as a slower rate of economic growth. Levine, (1997) points out that finance provides important functions through which it stimulates resource allocation and hence economic growth. He also argues that the main "function of any financial system is to facilitate the allocation and deployment of economic resources, both across borders and across time in an uncertain environment" by reducing transaction and information costs.

2.6 Empirical literature on the financial inclusion-poverty nexus

In recent times, global and national policymakers have increasingly embraced financial inclusion as an important development priority. On the other research scholars, development experts and economists have also been making vigorous attempts to establish the relationship between financial inclusion and poverty level especially in the developing and emerging economies (Cull et al 2014). In this regard, Stieglitz (1993) argues that financial market failure is the fundamental cause of poverty in developing countries. Similarly, Banerjee and Newman (1993) argue that due to capital market imperfection, individuals' borrowing capacity would be limited by the level of their initial wealth. This would, in effect, rule out the poor from investing in high return investment ventures.

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According to Levine, (1997), the main function of any financial system is to facilitate the allocation and deployment of economic resources, both across borders and across time in an uncertain environment by reducing transaction and information costs. By this, Levine indicates that the financial systems serve in: facilitating exchange, mobilizing savings, information about investment and allocating resources, monitoring managers, and exerting corporate control and facilitating risk amelioration. These functions intern serve to reduce poverty by facilitating economic growth through Capital accumulation, Financing of technological innovation and positive externalities.

Cull, Ehrbeck and Holle (2014) analyzed the macro-and micro-level impacts of financial inclusion on poor households globally and found that financial inclusion is positively correlated with employment and has positive impacts on poverty reduction. Mondal, (2015) argues that a well-developed financial system can effectively reduce poverty. For Mondal, through financial inclusion, microfinance banks increase the economic opportunities for the poor and low-income people, which leads towards a positive result in social progress, economic development, economic empowerment and social/ political/legal empowerment. Similarly, Jaiswal & Bhasin, (2015) argued that financial inclusion through cooperative banks is the key to empowerment of poor, underprivileged and low-skilled rural households. Avais, (2014) argues that Access to financial services enables the poor to fight the various dimensions of poverty and make improvements in their lives and provides momentum for growth and development. Umar, (2013), also argues high rate of financial inclusion is often associated with a high rate of investment, employment, high income and low poverty rate and that economic growth can only be sustained if a significant number of the population have great access to formal financial services.

Beck et al (2007) found that financial inclusion reduces income inequality and poverty. Jalilian and Kirkpatrick (2005) found that financial sector growth contributes to poverty reduction through the growth-enhancing effect. Kaboski and Townsend, 2012; and Akotey & Adjasi, 2016 also found that financial inclusion contributes to fighting poverty. On the other hand, there are some empirical studies that found that financial inclusion worsens poverty than talking it. For example, Seng, (2018) found that households, whether extremely poor, relatively poor, or non-poor, which take out microcredit, get worse off in terms of household food consumption per capita. Afriyie & Segbefia, (2015)

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Microcredit offered by microfinance institutions (MFIs) are likely to trap needy borrowers into a vicious cycle of poverty and has even weakened rather than empowered women.

Most of the existing studies in Ethiopian case focus on the state of financial sector development i.e. Alemayehu et al, 2017; Aderaw and Singh, 2016; Zwedu, 2014. Others focus on the role of microfinance i.e. Ahmed & Batra, 2018; Berhane & Gardebroek, 2011; Berhanu, & Thomas, 2000. Hence, these empirical studies hardly analyzed the effect of financial inclusion on poverty reduction.

3   Research Methods

3.1 Model Specification

Given the theoretical and scholarly works on the causal relationship of financial inclusion and poverty reduction discussed in chapter two; the econometric model of this study is prepared to base on the econometric model of Anthony et'al (2018). Anthony et'al (2018) econometric model in is turn modified after the work of Abraham (2015) which formalized identities of financial inclusion strategies as follows:

$$FI\varepsilon\ U_{CCA}:\ FI= [FA_{CL},\ CI,\ AFC]\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ (1)$$

Where FI = financial inclusion and subset of community financial access, CI = crop insurance, FACL = group-lending framework, and AFC = access to formal credit (Anthony et'al, 2018:25). A similar model specification has undertaken by Mbutor & Uba, (2013) and Onaolapo (2015) Based on the model in equation (1), Anthony et'al, (2018), modified it considering peculiar environment and purpose of illustrating the causal relationship of financial inclusion and poverty. Their modified model is represented as follows:

$$PI_t = \beta_0 + \beta_1 lnATMV_t + \beta_2 lnINTB_t + \beta_3 lnRLA_t + \beta_4 lnMLA_t + \varepsilon_t\ldots\ldots\ldots..\ (2)$$

Where PIt is poverty index at time t, β0 is constant, 1 – 4 are coefficients. and In is logarithm operator for the respective variables, ATMV is the value of financial transactions via automated teller machines (ATMs), INTBV is the value of transactions through internet banking channels, RLA is rural loans and advances granted by deposit

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money banks, MLA is loans and advances extended by microfinance institutions, and εt = error term (Anthony et'al, 2018:26).

To analyze the effect of financial inclusion on poverty reduction, the indicators of financial inclusion were selected using the two widely used dimensions: a measure of access to and usage of financial services that are categorized into two. The commonly used are measures of access to financial services that has the following main indicators: number of branches per 100,000 adults; the number of ATMs per 100,000 adults; the number of agents of payment service providers per 100,000 adults; the number of prepaid cards per 100,000 adults; the number of POS terminals per 100,000 adults; the percentage of adults with access to mobile phone or devices or internet access in a home; the number of debit cards per 1000 adults; and interoperability of ATMs (GPFI, 2016).

Similarly, the Usage of financial services has the following indicators: percentage of adults who reported having an account at formal financial institution either on their own or together with another person; deposit accounts per 1000 adults; the number of mobile money transactions per 100,000 adults; the percentage of adults with at least one loan outstanding from the bank or other financial institution; outstanding loan per 1000 adults; and Percentage of adults using transaction account with the formal financial institution to make or receive digital payment; the percentage of adults with high-frequency use of accounts; and percentage of adults that saved at a bank or other financial institution in the past year (GPFI, 2016).

On the other hand, though there are several proxies of financial inclusion: both access and usage, the researcher has selected some important variables that more could express the nature of financial inclusion in Ethiopia. Thus the explanatory variables or proxies for financial inclusion of this study was delimited to Commercial bank branches per 100,000 adults; Depositors with commercial banks per 1,000 adults; Borrowers from commercial banks per 1,000 adults; saving/Deposit in Microfinance and loan and Advances provided by in Microfinance institutions (MFIs). Similarly, though there are different measures of poverty, this study used the poverty index (headcount ratio) as the proxy for poverty.

Hence, based on the selected variables and the above econometric model (equation (2) has been modified as follows comprising important proxies of dependent and independent variables of this study.

Hence the econometric model of the study:

PI= f (CBBA, DCBA, BCBA, SMF, and LMF)……. (3)

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Where PI = Poverty Index,

CBBA = Commercial bank branches per 100,000 adults,

DCBA = Depositors with commercial banks per 1,000 adults

BCBA = Borrowers from commercial banks per 1,000 adults and

SMF= Saving in Microfinance

LMF = loan and Advances provided by MFIs,

Hence the modified econometric model in linear form is represented as follows:

$$PI_t = \beta_0 + \beta_1 lnCBBA_t + \beta_2 lnDCBA_t + \beta_3 lnBCBA_t + \beta_4 lnSMF_t + \beta_5 lnLMF_t$$

$$_+ + \varepsilon_t \ldots \ldots \ldots \text{ (4)}$$

Where PI_t is poverty index at time t, β_0 is constant, $\beta_1 - \beta_5$ are coefficients. And ln is logarithm operator for the respective variables, and ε is error term.

3.2 Data and data sources and Measurement of Variables

This study is concerned with analyzing the effect of financial inclusion on poverty reduction in Ethiopia. In terms of period, this study was delimited with the availability of data on key variables of financial inclusion and poverty indices, on which the study depends entirely on the secondary data and covered a time span from 2004 to 2018. The period of 2004 to 2018 is selected because of the challenges in sourcing data for other periods for many proxies: financial inclusion and poverty and in order to use an equal number of samples for the variables of the study for the data available. To make the data appropriate for time series analysis the annual data has been converted to quarterly data through the use of E-Views (10) Statistical Package. Hence the study has used sixty (60) observations comprising quarterly financial inclusion and poverty data from 2004 to 2018 (2004Q1:2018Q4). The financial inclusion data of selected proxies: data on Commercial bank branches per 100,000 adults; Depositors with commercial banks per 1,000 adults; Borrowers from commercial banks per 1,000 adults; saving/Deposit in Microfinance and loan and Advances provided by in Microfinance institutions (MFIs) were collected from National Bank of Ethiopian statistical bulletins. On the other hand, the poverty index was collected from the Ethiopian Central Statistical Agency.

The choice of model and proxies for dependent and independent variables in this study has been based on the availability of data and technique of analysis. Though there are 16

several proxies of financial inclusion: both access and usage, the researcher has selected some important variables that more could express the nature of financial inclusion in Ethiopia. Thus the explanatory variables or proxies for financial inclusion of this study include: Commercial bank branches per 100,000 adults; Depositors with commercial banks per 1,000 adults; Borrowers from commercial banks per 1,000 adults; saving/Deposit in Microfinance and loan and Advances provided by in Microfinance institutions (MFIs). Though microfinance institutions are good components of financial inclusion many empirical studies ignore them while analyzing the effect of financial inclusion on poverty. Mondal, (2015) argues through financial inclusion, microfinance banks increase the economic opportunities for the poor and low-income people. More-over Anthony et'al (2018) has included loans and advances extended by microfinance institutions (MLA) as an important proxy of financial inclusion on poverty reduction. Hence the proxies for saving/Deposit in Microfinance and loan and Advances provided by Microfinance institutions (MFIs) has been included in this study as a proxy for financial inclusion. On the other hand, though many empirical studies on the subject under discussion include indicators of digital payments, in this study they are not included as the penetration of digital payment is insignificant in the Ethiopian financial sector (Getnet, 2014). The proxy for poverty is the poverty indices (headcount), which is the dependent variable of the study.

3.3 Methodology of the Study

3.3.1 Test for Stationarity

Due to the fact that the study uses time-series data, the stationarity of the data collected has been tested using the Augmented Dickey-Fuller (ADF) unit root test. According to Gujarati, (2004), time-series data is stationary if its mean and variance are constant over time. Gujarati, argues that, if the variable is stationary without a difference, then it is integrated of order zero, I(0). A variable is said to be integrated of order one, or I (1), if it is stationary after differencing once, or of order two, I (2) if differenced twice. A unit root testing through the Augmented Dicky-Fuller (ADF) test is the most used test in order to determine the degree of stationarity will be carried through the Augmented Dicky-Fuller (ADF) test. In the ADF test, the lags of the first difference dependent variables are added in the regression equation until the autocorrelation problem will be resolved.

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The ADF statistic is based on the following model:

$$\Delta Yt = \Phi Yt - 1 + \beta \sum_{i=1}^{P} \Delta Yt - t + \mu t \ldots\ldots\ldots\ldots (5)$$

Since a random walk process may have no drift, or it may have drift or it may have both deterministic and stochastic trend, let us include an intercept β1 as well as a time trend t in the model.

$$\Delta Yt = \beta 1 + \beta 2t + \Phi Yt - 1 + \beta \sum_{i=1}^{P} \Delta Yt - t + \mu t \ldots\ldots\ldots\ldots (6)$$

Where t is linear time trend; β1= constant; Δ is differencing operator, μ is the error term, β2 the coefficient on a time trend series; Φ is the coefficient of Yt−1; p is the lag order of the autoregressive process, ΔYt = Yt - Yt−1; Yt−1 is lagged values of order one of Yt; ΔY t−i are changes in lagged values.

The parameter of interest in the ADF model is Φ and the null and alternative hypothesis that will be tested are as follows:

<div align="center">

Ho: Φ = 0

Ha: Φ < 0

</div>

The decision to reject or not to reject the null hypothesis we compare the calculated test statistic in equation with the critical value from ADF table.

3.3.2 Cointegration Analysis and Estimation Model

Based on the unit root test results, the appropriate econometric model selected to examine effect of financial inclusion on poverty reduction in Ethiopia is Autoregressive-Distributed Lag (ARDL) model. An ARDL (Autoregressive-distributed lag) is a parsimonious infinite lag distributed model. The term "autoregressive" shows that along with getting explained by the xt', yt also gets explained by its own lag also. ARDL Model provides useful, unbiased valid information on long-run and short-run elasticities. It is also shown if the expected sign of every variable is consistent with the theory or not; it can be applied irrespective of whether the regressors are I (1) and I (0); it provides statistically significant results in small samples (Pesaranet al., 2001).

The ARDL approach involves two steps for estimating the long-run relationship. The first step is to examine the existence of a long-run relationship among all variables in an equation and the second step is to estimate the long-run and short-run coefficients of the

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model. We run the second step only if we find a co-integration relationship in the first step (Pesaran, Shin, and Smith, 2001).

The generalized equation of ARDL (m, n) is as follows:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \dots + \beta_p y_{t-m} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \dots + \alpha_q x_{t-n} + \varepsilon_t \dots \dots (7)$$

Here, m and n are the number of years for lag, εt is the disturbance terms and βi's are coefficients for short-run and αi's are coefficients for long-run relationship.

The study also used the autoregressive distributed lag (ARDL) bounds testing procedure to examine possible cointegration (long-run) relationships among dependent and independent variables. The bound test is has computed based on a predestined error correction version of the autoregressive distributed lag (ARDL) model, by the Ordinary Least Square (OLS) method of estimation. The bounds testing approach is convenient for small sample data, unlike the other cointegration approach (Pesaran, Shin, & Smith, 2001).

For further illustration of the cointegration test and long term and error correction model is developed based on the following procedures, taking ARDL (1, 1) for simplicity.

$$Yt = \beta 0Xt + \beta 1Xt - 1 + \mu \dots \dots (8)$$

By subtracting Yt-1 from both sides of we get the following equation:

$$\Delta Yt = \beta 0Xt + \beta 1Xt - 1 + (\rho - 1)Yt - 1 + \mu t \dots \dots (9)$$

Let $(\rho-1) = \sigma$, then we will get the following equation:

$$\Delta Yt = \beta 0Xt + \beta 1Xt - 1 + \sigma Yt - 1 + \mu t \dots \dots (10)$$

$\Delta Xt= Xt-Xt-1$; hence, $Xt= \Delta Xt- Xt-1$, then equation (10) can be rewrite as follow:

$$\Delta Yt = \beta 0\Delta Xt + (\beta 0 + \beta 1)Xt - 1 + \sigma Yt - 1 + \mu t \dots \dots (11)$$

Let $\beta 0+\beta 1= \Phi$, then equation (11) can be rewrite as

$$\Delta Yt = \beta 0\Delta Xt + \Phi Xt - 1 + \sigma Yt - 1 + \mu t$$

$$\Delta Yt = \beta 0\Delta Xt + [\Phi Xt - 1 + \sigma Yt - 1] + \mu t \dots \dots (12)$$

Then we multiply $[\Phi Xt-1+\sigma Yt-1]$ by σ/σ, and we get, equation (13)

$$\Delta Yt = \beta 0\Delta Xt + [\Phi/\sigma Xt - 1 + Yt - 1] + \mu t \dots \dots (14)$$

Thus, the error correction model can be written as:

$$\Delta Yt = \beta 0\Delta Xt + \sigma[\gamma Xt - 1 + Yt - 1] + \mu t \dots \dots (15)$$

Let $\gamma = -\Phi/\sigma= - (\beta 0+\beta 1)/ \sigma$, then equation 15 can be rewrite as:

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$$\Delta Yt = \beta0\Delta Xt + (\rho - 1)[-\beta0 + \beta1)/\rho - 1\, Xt - 1 + Yt - 1] + \mu t \dots\dots\dots\dots\dots\dots (16)$$

From this equation we extract

$$\Delta Yt = \beta0\Delta Xt + \sigma ECTt - 1 + +\mu t \dots\dots\dots\dots\dots\dots (17)$$

Where $\sigma = \rho-1$ is the error correction parameter that measures the speed of adjustment; and $[-\beta0+\beta1)/\sigma\, Xt-1+Yt-1]$ = ECTt-1 is error correction term lagged by one period.

Then by adding an intercept, time trend and dummy variables (if any), we can rewrite our ECM model in the following general form:

$$\Delta Yt = c + \omega + \beta0\Delta Xt + \sigma ECTt - 1 + \Lambda Dn + \mu t \dots\dots\dots\dots\dots\dots.. (18)$$

Hence, to test for co-integration among the variables of this study, following the ARDL approach proposed Pesaran, Shin, and Smith (2001), the ARDL has been expressed as unrestricted error correction model (UECM) as follow:

$$\Delta PIt = \beta o + \sum_{n=1}^{P}\beta1\Delta Pi - t + \sum_{n=1}^{P}\beta2\Delta lnCBBAi \cdot t - i + \sum_{n=1}^{P}\beta3\Delta \ln DCBA.t - i +$$
$$\sum_{n=1}^{P}\beta4\Delta \ln BCBA.t - i + \sum_{n=1}^{P}\beta5\Delta \ln SMF.t - i + \sum_{n=1}^{P}\beta6\Delta \ln LMF.t - i + \beta7lnPI.t -$$
$$1\beta8\ln CBBA.t - 1 + \beta9\ln DCBA.t - 1 + \beta10\ln BCBA.t - 1 + \beta11\ln DMF.t - 1 +$$
$$\beta12lnLMF.t1i +$$
$$\mu t\dots\dots\dots (19)$$

Where PIt is poverty index at time t; CBBA is Commercial bank branches per 100,000 adults; DCBA is Depositors with commercial banks per 1,000 adults; BCBA is Borrowers from commercial banks per 1,000 adults; SMF is saving in Microfinance; and LMF is loan and Advances provided by MFIs. Whereas $\beta0$ is constant, $\beta1 - \beta6$ are coefficients that measure short-run relationships; while $\beta7 - \beta12$ means, there is no long-run relationship among the variables. And ln is the logarithm operator for the respective variables; Δ is the first difference operator and μt error term. To test whether there is a long-run equilibrium relationship between the variables; bounds test for co-integration is carried out as proposed by Pesaran, Shin, and Smith (2001). The hypotheses are: Ho: = means there is no long-run relationship among the variables; and Ha: means there is a long-run relationship among the variables.

The non-standard F-statistics are used to test the above hypothesis. The critical values of the statistics for this test are available in Pesaran, Shin, and Smith (2001). They provide two sets of critical values namely the upper bound values and the lower bound values. If the computed F-statistics is higher than the appropriate upper bound of the critical value,

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the null hypothesis of no cointegration will be rejected. If it is below the appropriate lower bound, the null hypothesis cannot be rejected, and if it lies within the lower and upper bounds, the result would be inconclusive. On the other hand, Narayan (2005) also estimated his own critical values by arguing that the critical values provided by Pesaran, Shin, and Smith (2001) are appropriate for relatively large sample sizes. He said that using such critical values for a small sample size may produce misleading results. As a result, Narayan (2005) has generated a new set of critical values for small sample sizes ranging from 30 to 80 observations. Hence, in this paper, the computed F-statistics is compared with both critical values provided by Narayan (2005) as the sample size of this study 60 observation which ranges from 30 to 80 observations.

Based on the cointegration result, the long-run relationship between variables of interest is by the ARDL model specified as:

$$pit = \beta0 + \beta1 PI.t - 1\beta2\ln CBBA.t - 1 + \beta3\ln DCBA.t - 1 + \beta4\ln BCBA.t - 1 + \beta5\ln DMF.t - 1 + \beta6 lnLMF.t - 1 + \mu t$$
.... (20)

On the other hand the short-run dynamic relationship is estimated by error correction model (ECM) specified as:

$$\Delta PIt = \beta o + \sum_{n=1}^{P} \beta1\Delta Pi - t + \sum_{n=1}^{P} \beta2\Delta\ln CBBAi \cdot t - i + \sum_{n=1}^{P} \beta3\Delta lnDCBA.t - i + \sum_{n=1}^{P} \beta4\Delta lnBCBA.t - i + \sum_{n=1}^{P} \beta5\Delta lnSMF.t - i + \sum_{n=1}^{P} \beta6\Delta lnLMF.t - i + \delta ECM\ t - 1 + \mu t$$
.... (21).

Where PIt is poverty index at time t; CBBA is Commercial bank branches per 100,000 adults; DCBA is Depositors with commercial banks per 1,000 adults; BCBA is Borrowers from commercial banks per 1,000 adults; SMF is saving in Microfinance; and LMF is loan and Advances provided by MFIs. Whereas $\beta0$ is constant, $\beta1 - \beta6$ are coefficients of short-run dynamics of the model And ln is logarithm operator for the respective variables, ε is error term, ECMt-1is the error correction term lagged for one period; δ is the speed of adjustment, and Δ is first difference operator. After estimating the long-run and short-run model, normality test, serial correlation test, heteroscedasticity test and cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test for stability of the model has been undertaken to check the robustness of the model. The optimal lag Periods of the model

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were determined according to the Akaike Information Criterion (AIC). All econometric analysis has been done using views, version 10.

4   result and discussion

4.1 The state of financial inclusion and poverty in Ethiopia

4.1.1 The development of financial sector in Ethiopia

The Ethiopian financial sector/policies have evolved through three stylized stages: first, financial repression and fostering state-led industrial and agricultural development through preferential credit (in the socialist regime); second, market-led development through liberalization and deregulation (post-1991); and third, financial inclusion through allowing private banks and MFIs (since second half of 1990s) (Getnet, 2014).

In 1905, the foreign-owned Bank of Abyssinia, an affiliate of the National Bank of Egypt, was established and this marked the start of modern banking in Ethiopia. Ten years later, in 1915, the bank began issuing banknotes with five different denominations: five thalers, ten thalers, fifty thalers, a hundred thalers and five hundred thalers. However, the bank-notes took time to be accepted by the population at large (Pankhurst, 2097). After its long time domination of the Ethiopian financial sector, the Ethiopian government purchased the Bank of Abyssinia in 1931 and renamed it as 'Bank of Ethiopia, which became the first nationally owned bank on the African continent (Befekadu, 1995).

After the Italian occupation, in 1943 the State Bank of Ethiopia was founded. The State Bank of Ethiopia was established as the Central Bank of Ethiopia. As an agent of the Ministry of Finance and s the principal commercial bank in the country, the Central Bank also engaged in all banking activities (NBE, 2019). Against the British colonial ambition to control the financial sector of Ethiopia, the Ethiopian government proclaimed, banking Proclamation No 206 of 1963. The proclamation stipulated that a banking license was granted only to partnerships with Ethiopian ownership of at least 51% of the capital. Accordingly, foreign banks, which had already started their operations in the country re-applied for a license. The banking law of 1963 had also determined the separation of commercial and central banking and created two separate entities, the National Bank of

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Ethiopia (NBE) as the Central Bank and the Commercial Bank of Ethiopia (CBE) (Bane, 2002; Befekadu, 1995; NBE, 2019). A number of public and private financial institutions were established during the 1960s. Until nationalized on 1 January 1975, the privately-owned financial institutions include three commercial banks, thirteen insurance companies and two non-bank financial intermediaries (Befekadu, 1995). The structure of Ethiopia's financial system during the 1960s and mid-1970s has resembled that of other African countries (Alemayehu, et al, 2017).

Under the socialist government, in 1974 all privately owned banks operating in the country were nationalized. The financial sector the socialist government left behind constituted only of four banks, each enjoying a monopoly in its respective market, namely the NBE, the CBE, the Construction and Business Bank and the Agricultural and Industrial Development Bank (Getnet, 2014). The NBE continued its functions as a central bank, although the directives of the planning system now circumscribed its activities. According to Alemayehu, et al, (2017), the NBE was empowered to: fix both deposit and loan rates, administered the allocation of foreign exchange, and directly financed the fiscal deficit, allocating credit and foreign exchange in-favor of the state sector, NBE constituted a powerful tool for imposing state-led development.

Following the fall of the Derg in 1991, the regime led by EPRDF followed market-friendly economic reform programs. The economic reform process started soon after the new government took power. The new government has reorganized these financial institutions to operate based on a market-oriented policy framework. Financial sector reform has aimed to raise revenue and to reduce the fiscal deficit (Alemayehu 2005). The Monetary and Banking Proclamation of 1994 established the NBE as a judicial entity separate from the government and outlined its main functions. Monetary and Banking Proclamation No 83/1994 and the Licensing and Supervision of Banking Business No 84/1994 laid down the legal basis for investment in the banking sector. Consequently, shortly after the proclamation, the first private bank: Awash International Bank, was established in 1994, followed by Dashen Bank (1995) and Bank of Abysinia (1996), Wegagen Bank (1997), United Bank (1998), NIB International Bank (1999) and Cooperative Bank of Oromiya in 2004 (Getnet, 2014, NBE, 2018).

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Today the major financial institutions operating in the country are banks, insurance companies and micro-finance institutions (NBE, 2019). The financial sector has witnessed a notable change from the single state-owned bank that functioned in 1990 and just 7 banks that were operating as recently as the year 2000 (CEPHEUS, 2019). Foreign banks are not permitted to provide financial services in Ethiopia, but the sector may open up in the medium term as the government of the new Prime Minister Abiy Ahmed pursues broad economic reforms. Currently, Ethiopia has allowed a small number of foreign banks to open liaison offices in Addis Ababa to facilitate credit to companies from their countries of origin. Chinese, German, Kenyan, Turkish, and South African banks have opened liaison offices in Ethiopia. The following two figures illustrate the growth of financial institutions, both in number and their branch out rich.
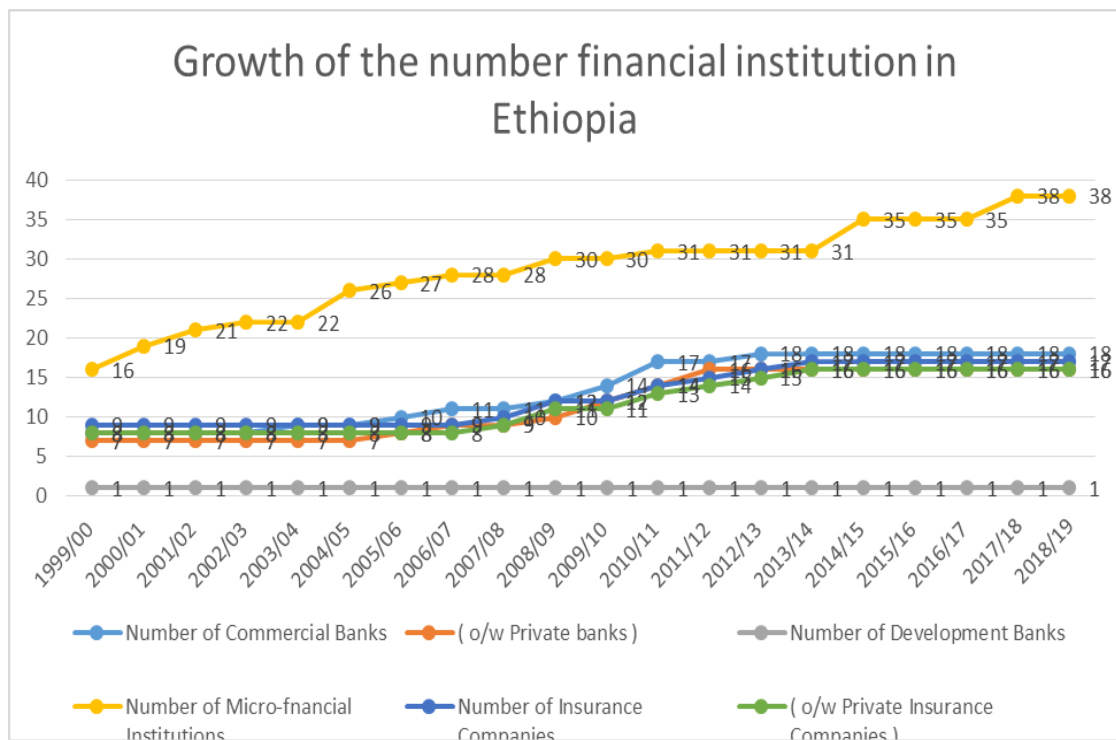

Figure 1 Growth number of financial institution in Ethiopia

Source: Author's Computation based on NBE, Annual Report (2018/2019)

The above figures depict that the financial sector has been growing significantly in Ethiopia, nearly all sectors have been doubled within 20 years (1999/2000-2018/19). The number of banks operating in the country by the end of 2019 reached a total of 18, of which 16 are private commercial banks and 2 state-owned: one state-owned development bank, a government-owned commercial bank. In this regard, the number of private banks has increased by 10 from 6 in 1999/2000. This shows the growth of the private banking

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sector has been promising in the country, following the issuance of Monetary and Banking Proclamation No 83/1994 and the Licensing and Supervision of Banking Business No 84/1994 laid down the legal basis for investment in the banking sector. According to Alemayehu et al (2018), the growth of the private banking sector is related to governments' financial sector policy which permitted the domestic private sector was to enter the banking and insurance business while foreign financial institutions are not yet permitted to invest. However, the number of development banks has remained to be 1 throughout the time frame under discussion. On the other hand, the figures indicate that the number of insurance companies stood at 17 in 2019, from 9 in 1999/2000.

The other important figure in the growth of the financial sector in Ethiopia is the growth of microfinance institutions (MFIs). The first microfinance service in Ethiopia was introduced as an experiment in 1994 when the Relief Society of Tigray (REST) attempted to rehabilitate drought and war-affected people through the rural credit scheme. It was inspired by other countries' experiences and adapted to the conditions of the Tigray region (the northern part of Ethiopia). In the second half of the 1990s, as a result of its success, the microfinance service was gradually replicated in other regions. MFIs institutions provide financial services, mainly credit and saving and, in some cases, loan insurance and poverty alleviation as an objective (Berhanu and Thomas; 2000, Ahmed, 2018). Today, as indicated in the above figure, the number that of microfinance institutions in Ethiopia has reached 38 in 2018/2019 from 16 in 1999/2000.
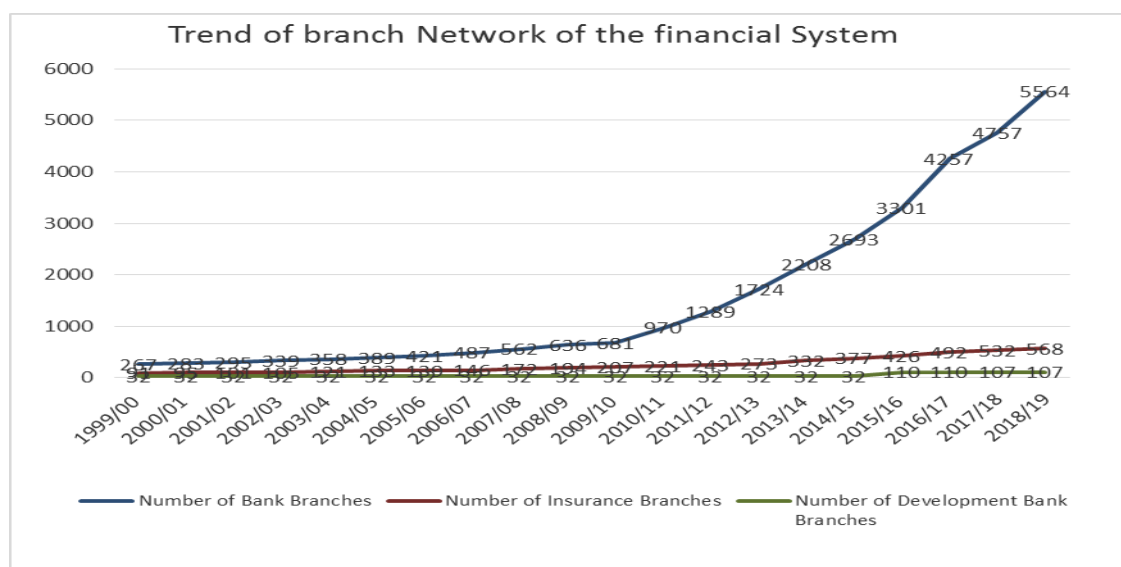

Figure 2 Branch Network of the financial System in Ethiopia

Source: Author's Computation based on NBE, Annual Report (2004/2005-2018/2019)
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The number of bank branch networks and hence the physical reach of the sector is increasing very fast. By 2018/2019, In 2018/19, banks opened 807 new branches thereby raising the total number of branches to 5564 from 4757 a year earlier and 207 in 1999/2000. Hence, Commercial banks have increased their branches by more than 2687percent increase within 20 years. In 2018/2019, Major branch expansion was undertaken by Commercial Bank of Ethiopia (203 branches), followed by Cooperative Bank of Oromia (73 branches), Abyssinia Bank (69 branches), Wegagen Bank (63 braches), United Bank (61 branches), Nib International Bank (52 branches), Berhan International Bank (49 branches), Awash Bank (41 branches), Dashen Bank (40 branches), Abay Bank (38 branches) and Lion International Bank (25 branches). The share of private banks in the total branch network rose to 69.7 percent from 68.9 percent last year (NBE, 2018/2019). According to the annual report of the National Bank of Ethiopia (2018/19), one bank branch serves about 17 thousand people and about 34.6 percent of bank branches were located in Addis Ababa.

Similarly, the figures indicate that, though the number of insurance companies stood at 17 whose branches rose to 568. According to the annual report of the National Bank of Ethiopia (2018/19), about 53.7 percent of the branches were located in Addis Ababa and 84.5 percent of the total branches were private. On the other hand, the figure (2) illustrates the microfinance sector has been growing more rapidly.
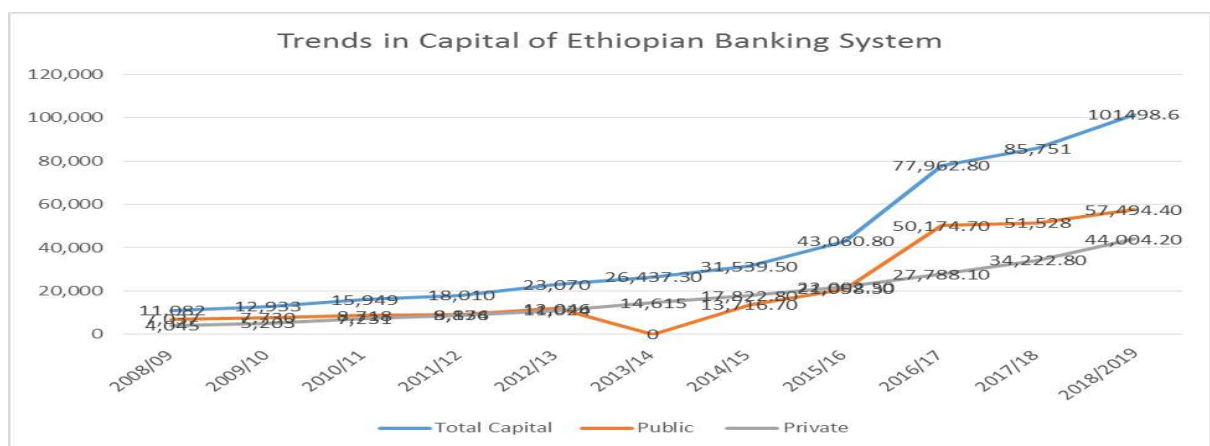

Figure 3 Trends in Capital Growth of Ethiopian Banking System (in million birr)

Source: Author's Computation based on NBE, Annual Report (2004/2005-2018/2019)

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The above figure illustrates the growth of the financial sector in Ethiopia in terms of capital over the past two decades. The total capital of the banking industry reached Birr 101.5 billion by the end of June 2019 from 11.082 billion in 1999/2000. The figure also indicates that except for the fiscal year 2013/14 and 2014/15 the share of the public sector is higher than the private sector. this was Following a significant capital injection by private banks mainly Dashen Bank, Bank of Abyssinia, United Bank, Awash International Bank, Nib International Bank, Wegagen Bank and Cooperative Bank of Oromiya in 2014 and 2015 (NBE, 2013/14; NBE 2014/15).

According to the annual report of the National Bank of Ethiopia (2018/19), the overall performance of microfinance institutions was encouraging as their total capital and total asset increased significantly by 20.3 and 24.1 percent and reached Birr 16.6 billion and Birr 83.5 billion, respectively. The five largest MFIs, namely Amhara, Dedebit, Oromia, Omo, Addis Credit and Savings institutions, accounted for 83.4 percent of the total capital, 91.4 percent of the savings, 87.7 percent of the credit and 88.1 percent of the total assets of MFIs at the end of 2018/19.

Table 1 Resource Mobilization & Disbursing Activities of Commercial Banks and DBE (Specialized Bank, In Million birr)

	2009/10	2012/13	2014/15	2016/17	2018/19
Total resources mobilized	48,146	98,074	138,755.0	233,586.6	308,342.7
Public banks share, %	51	63	58	53.4	47.7
Private banks share in, %	49	37	42	46.6	52.3
Loans and advances by lenders (by disbursement)	28,905	54,252	75,481.0	109,011.2	164,493.8
Public banks share, %	48	61	55.5	44.4	39.2
Private banks total share, %	51	39	44.5	55.6	59.8

Source: Author's Computation based on NBE, Annual Report (2013/ 2014-2018/19)

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As indicated in table 1 the total resources mobilized by the banking system in the form of deposit, borrowing and loan collection has reached Birr 308.3 billion at the end of 2018/19 from 48.146 billion in 2009/10. Hence it has grown is more than 640 percent within a decade. As indicated in Table 1 By 2018/19 public banks have accounted for 47.7 percent of the resources mobilized due to aggressive branch expansion and the government policy of providing loan for low-cost housing conditional on having some minimum saving at CBE explains this surge in deposit mobilization (Alemayehu et al, 2018; NBE,2018/19). Similarly, in terms of loans and advances, by2018/19, a total amount of Birr 164.5 billion has been disbursed to various economic sectors by all banks taken altogether. The public banks, the dominant being Commercial Bank of Ethiopia, had been dominated the disbursement of loans, accounting for about more than 50 percent until 2014/15. However, the share of the private sector disbursement has been increasingly overriding over the public sector and reached, 59.8 percent of the total in 2018/19.

4.1.2 The State of Financial inclusion in Ethiopia

I.   Policy frame work of Financial Inclusion in Ethiopia

Following the prominence of financial inclusion globally, it has become one of the major strategies in Ethiopia's growth and ending poverty in its transformation plans (NPC, 2016). Moreover, the government of Ethiopia, with the support of the World Bank has launched a National Financial Inclusion Strategy in 2016 (NBE, 2017/18).

The strategy is prepared based on an analysis of the current state of the financial sector and financial inclusion of the country. More-over it takes into consideration the development priorities and the country's vision of becoming a middle-income economy by 2025 (NPC, 2016). The strategy envisions Achieving universal access and use of a range of affordable high-quality financial products and services by the year 2025. the mission stated in the strategic document includes: Promote access and use of a range of suitable (quality and affordable) financial products and services provided by regulated financial institutions by all individuals and enterprises, through innovative and convenient channels, to promote economic growth, poverty reduction, and financial stability (NBE, 2017/18).

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The main strategies of financial inclusion as indicated in the strategic document includes Strengthen (financial and other) infrastructure; ensure the supply of an adequate range of suitable products, services, and access points; Build a strong financial consumer protection framework; and Improve financial capability levels.

The strategic document also states the supply and demand side target of financial inclusion in Ethiopia for the year 2020. Accordingly, supply-side targets include the number of transaction account per 100 adults aged 18 and above to reach 90 while active accounts as a percent of total deposit and transaction account to be 80 percent. Regarding access point per 100,000 adults (number of commercial bank branches 8.8, MFI branches 19.6, Insurance branches 1.5, ATM 120.4, and agents 229.4) and the number of saving and credit account per 100 adults 18+ are 70 and 40, respectively. Whereas the demand side targets include: 60 percent of adults 18+ reported that they own a transaction account; 80 Percent of adults report within 5km of a financial access point; 40 percent of adults reported saving at regulated financial institutions; 5 percent of adults reported they have used insurance products; 40 percent of adults used electronic payments and 80 percent of them reported that are aware of account opening (NBE, 2017/18).

II.   Access to and Usage of Financial Services by Individuals

Financial inclusion is on the rise globally. The following figures illustrates the account penetration in Ethiopia, analyzed based on the based on Global Findex database of 2014 and 2017.
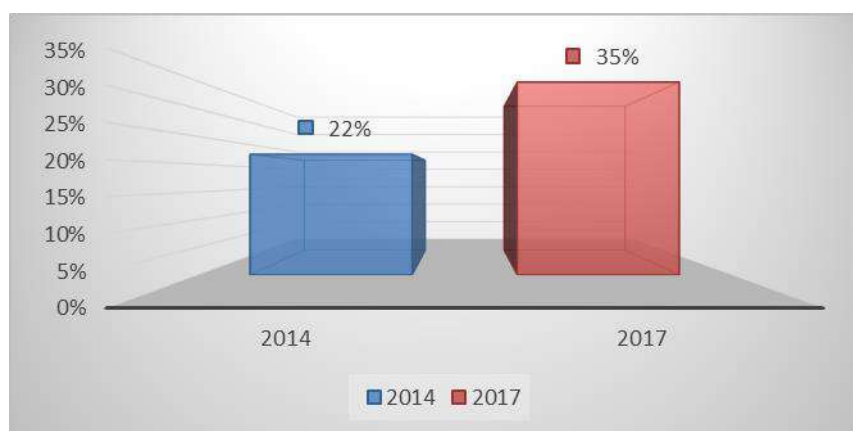
1.   Account penetration

Figure 4 Percentages of Adults with Financial account in Ethiopia

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Source: Author's computation based on Global Findex database, 2014 and 2017.

Figure 5 shows that 22 percent of adults aged 15 years and above had an account at financial institutions (an account book at the bank, microfinance institutions and saving and credit associations) and the remaining 78 percent are unbanked or are excluded from the formal financial sector. However it is low compared to other developing economies, account ownership at financial institutions has increased by 13 % and reached 35% in 2017.
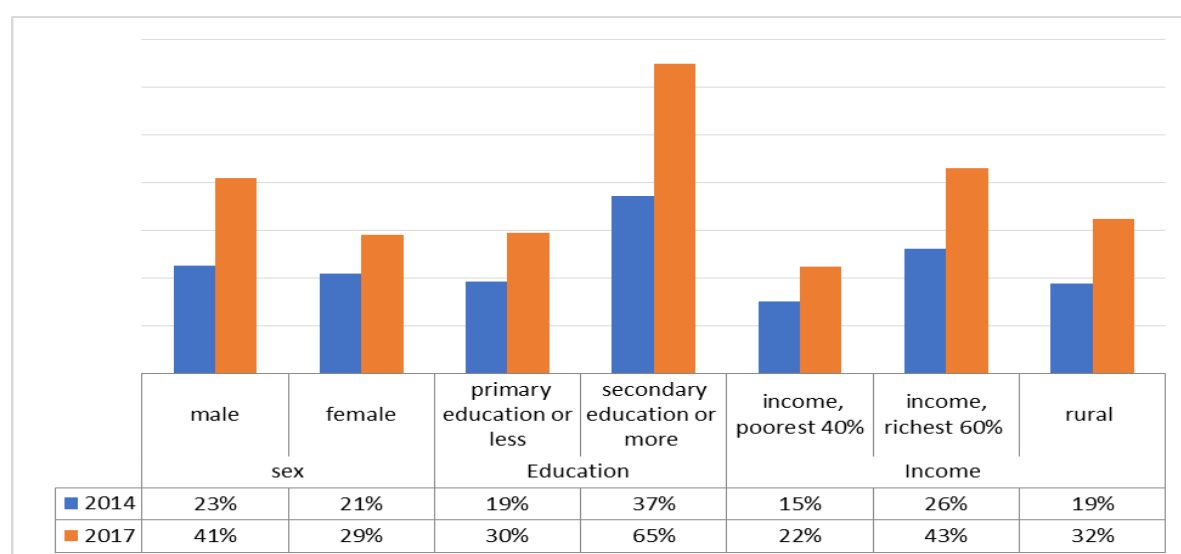

	male	female	primary education or less	secondary education or more	income, poorest 40%	income, richest 60%	rural
	sex		Education		Income		
2014	23%	21%	19%	37%	15%	26%	19%
2017	41%	29%	30%	65%	22%	43%	32%

Figure 5 Account ownership based on demographic and income characteristics

Source: Author's computation based on Global Findex database, 2017.

As indicated in figure 6 above, 23 percent of men reported having a financial account in 2014, while only 21 percent of women did, which shows a gender gap of 2 percentage points. In 2017, 41 percent of men and 29 percent of females reported having financial accounts in financial institutions. The evidence shows us that 18 percent increment in the percentage of males with accounts from 2014, but only an 8 percent increment in the percentage of females with accounts in the same year. This implies that though, a number of Ethiopians are becoming financially included, females are by far excluded yet. As indicated in the figure, 65 percent of adult Ethiopians with secondary education or more had had an account in financial institutions, which showed a 28 percentage point increase from 2014. On the other hand, 30 percent of Ethiopian adults with primary or less educational status had had an account in financial institutions, which increased by 11 percent from 2014. From the evidence, we can notice that the Ethiopian adults whose

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educational status is secondary education or more had had an account in a financial institution than those who are primary or less. The gap between the groups has widened from 18 percentage points in 2014 to 35 percentage points in 2017.

The evidence in figure 4.5 also illustrates that, in 2017, 22 percent of the poorest 40 percent of Ethiopian adults had an account in a financial institution, which is 7 percent higher than it was in 2014. On the other hand, in 2017, 43 percent of the richest 60 percent of Ethiopian adults had an account in a financial institution, which is 17 percent higher than it was in 2014. In this regard, in terms of having a financial account, there is a gap of 21 percentage points in 2017, which was 11 in 2014. Hence the gap is increasingly widening. The figure also shows us that in Ethiopia the unbanked live predominantly in rural areas. In 2017, 32 percent of rural residents have an account in a financial institutions, which was 19 percent in 2014. This shows that there is a 13 percentage point increase within the three years.

The 2017 Global Findex report shows that 1.2 billion adults have obtained an account since 2011, including 515 million since 2014. The report indicates that between 2014 and 2017, the share of adults who have an account with a financial institution or through a mobile money service rose globally from 62 percent to 69 percent. In developing economies, the share rose from 54 percent to 63 percent. Yet, an estimated 1.7 billion adults (or 31% of adults) have been excluded from the formal financial system; and out of the total worldwide financially excluded people 73% are live in 25 developing countries. In Ethiopia, in 2017, 61 percent of adults did not have an account. The following figure presents the main reason for not having an account in financial institutions from the viewpoint of those who do not have it (Global Findex, 2017).

As indicated in figure 5, 85 percent of Ethiopian adults with no financial institution account responded that 'they do not have an account, because they have no sufficient money to save. The other main factor for not having an account in financial institutions in Ethiopia is 'financial institutions are too far (20 percent). Other factors such as lack of necessary documentation (11 percent), family member already has an account (8 percent), expensiveness of financial services (5 percent). On the other hand religious reasons, lack of trust in financial institutions and no need for financial service has little effect in constraining financial account ownership in Ethiopia.
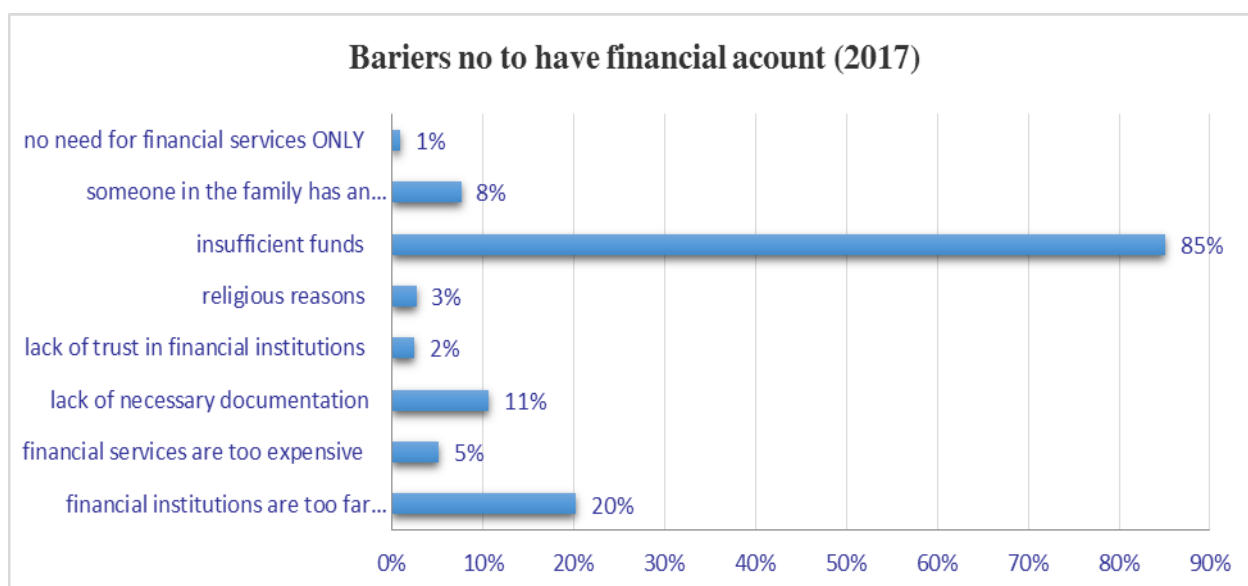
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Bariers no to have financial acount (2017)

Reason	Percentage
no need for financial services ONLY	1%
someone in the family has an…	8%
insufficient funds	85%
religious reasons	3%
lack of trust in financial institutions	2%
lack of necessary documentation	11%
financial services are too expensive	5%
financial institutions are too far…	20%

Figure 6 Reasons for not having financial account in Ethiopia (2017)

Source: Author's computation based on Global Findex database, 2017.

2. Access to and use of financial services in Ethiopia

The Global Findex report, (2017) reveals that there is an improvement in the financial inclusion in Ethiopia. According to the report in 2017, the percentage of Ethiopian adults with an account rose to 35%, up from 22% in 2014; 26% of adults save at financial institutions (as compared to 14% in 2014) and 11% borrow from financial institutions (as compared to 7% in 2014). Despite these developments, still Ethiopia lags behind other Sub-Saharan African countries including its neighboring countries. In Kenya, for example, 82% of adults have an account, while in Rwanda, account ownership stands at 50%. And in the region overall, 43% of adults have an account. In general, women, rural, less educated, unemployed, and poorer adults in Ethiopia are less likely to own an account (Global Findex, 2017).

Table 2 presents evidence of financial inclusion based on main indicators of access and usage of financial inclusion, in Ethiopia over the last fifteen years. The geographic and demographic penetration of commercial bank branch in Ethiopia has increased from 0.334Commercial bank branches per 1,000 km2, in 2004 to 4.31 in 2018; and from

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0.834Commercial bank branches per 100,000 adults to 7.82 in 2018 respectively. The evidence also shows that access to digital payment systems is growing rapidly. Accordingly, ATM per 100,000 adults has increased from 0.020 in 2004 to 5.14 in 2018; and the number of ATMs per 1,000 km2increased from 0.008 in 2004 to 2.8 in 2018.

Table 2 Access to and use of financial services in Ethiopia

key Indicators	2004	2006	2010	2012	2015	2018
Commercial bank branches per 1,000 km2	0.334	0.399	0.663	1.532	2.44	4.31
Commercial bank branches per 100,000 adults	0.834	0.936	1.361	2.926	4.91	7.82
ATM per 100,000 adults	0.020	0.031	0.298	0.460	2.25	5.14
Number of ATMs per 1,000 km2	0.008	0.013	0.145	0.241	1.117	2.835
depositors with commercial banks per 1,000 adults	65.9	65.9	102.5	135.9	301.5	550.8
borrowers from commercial banks per 1,000 adults	1.20	1.20	1.77	2.09	3.09	4.19
Outstanding deposits with commercial banks(% of GDP)	34.8	22.3	34.8	22.3	48.6	39.8
Outstanding loans from commercial banks(% of GDP)	16.7	16.3	12.2	13.3	28.8	21.9
saving in microfinance institutions (in mil)	509585.5	715953.3	3779089	7611397	18432837	41897180
Loan and advances by microfinance institutions (in mil)	1482154	1960469	6991986	12781817	25203763	58722261

Source: author's computation based on data from NBE (2018/19)

The evidence also shows us that there is an increase in deposits with commercial banks and loans from commercial banks, over the last fifteen years. Accordingly, the number of depositors with commercial banks per 1,000 adults has reached 550.8 in 2018, from 65.9 in 2004. Similarly, the number of borrowers from commercial banks per 1,000 adults has reached 4.19 in 2018, from 1.20 in 2004. From this, we can understand that though the number of Ethiopians who save and take loans from commercial banks, the increment is unequal. Where the number of depositors in commercial banks is by far greater than the number of loan takers. Similarly, the evidence shows that outstanding deposits with commercial banks (% of GDP) have reached 39.8 in 2018, from 34.8 in 2004 (with a 5 percentage change increment). Whereas, Outstanding loans from commercial banks (% of

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GDP) have reached 21.9 in 2018, from 16.7 in 2004. The evidence also indicates that the saving/ deposit in microfinance institutions has increased from 509585.5 in 2004 to 41897180 million in 2018. On the other hand, the loan and advances provided by microfinance institutions has reached 58722261 in 2018 from 1482154 million in 2004.

4.1.3 Poverty in Ethiopia

Poverty reduction has been the overriding development agenda of the government of Ethiopia. Recognizing poverty as a core problem of the country, the Government of Ethiopia has been implementing a series of poverty-focused development strategies and programs for the last three decades. Accordingly, the government of Ethiopia has been implementing a series of poverty-focused development strategies, beginning with the Sustainable Development and Poverty Reduction Program (SDPRP) which was executed during the years 2002/03-2004/05. This was followed by the five-year plan: the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) between 2005/06 and2009/10 and the Growth and Transformation Plan (GTP) which covered the period 2010/11-2014/15. Currently, the government is implementing the second Growth and Transformation Plan (GTPII) which covers, 2015/16-2019/20) (NPC, 2016).

Ethiopia has been registering economic growth and social and human development over the past two decades. Given this growth, poverty has shown a substantial decline in the country. Trends in national poverty show that the poverty headcount poverty rate declined, from 29.6% in 2010/11 to 23.5% in 2015/16. Conversely, between 2010/11 and 2015/16 about 5.3 million people have been lifted out of poverty. Hence not only poverty incidence declined, but also the number of poor people declined (NPC, 2017). However, Ethiopia is still one of the poorest, with a per capita income of $783 and ranked 164 out of 187 countries (World Bank 2017).

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2.6.1.1 Trends of national poverty in Ethiopia

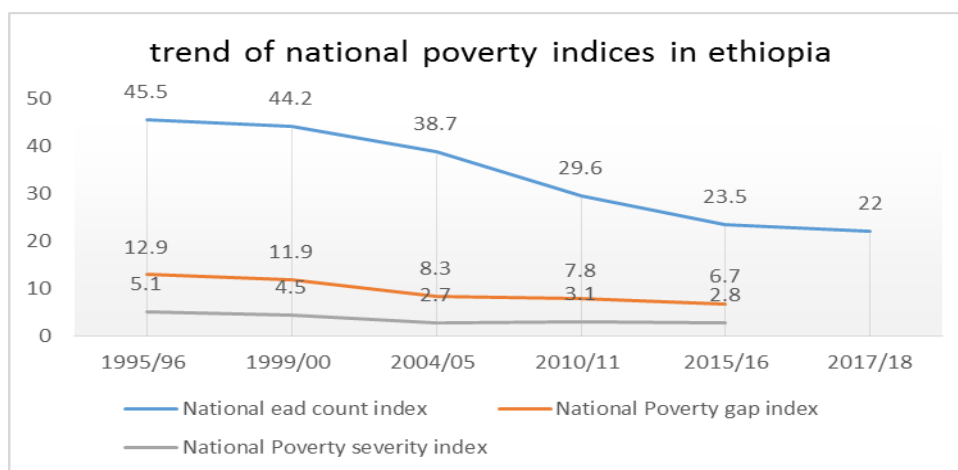The levels of total, indices for 1995/1996, 1999/00, 2004/2005, 2010/11 and2015/16 are provided in figure

Figure 7 Trends of national poverty indices in Ethiopia

Source: author's computation based on data from CSA, HICE survey of 1995/96, 1999/00, 2004/05, 2010/11 and 2015/16 and NBE (2017/18)

The evidence in figure 8 illustrates that the national poverty level measured by the headcount index has declined considerably over the last two decades. Accordingly, the poverty headcount index and poverty gap have declined to 23.5 percent and 6.7 percent in 2015/16, from 45.5 percent and 12.9 percent in 19950/96 respectively. the evidence also shows us that the 2015/16 poverty headcount index is lower than the index for 2010/11 by 21% while the poverty gap is lower by 14% indicating a substantial decline in poverty during the five-year period ending in 2015/16. In addition, the Poverty headcount has declined to 22percent in 2017/18. The decline in poverty headcount index and poverty gap index is statistically significant (NPC, 2018). Moreover, the decline in poverty is also much higher after 2004/05(PASDEP period) than before 2004/05 (the SDPRP period).

As presented in the figure, though, there is a substantial decrease in poverty level in Ethiopia; the decline is limited to the headcount and poverty gap indices. The decrease in the severity of poverty is lower as compared to the two indexes. The severity of poverty

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has decreased to 2.8 percent in 2015/16, from 5.1 percent in 1995/96. Between 2004/05 and 2010/11, the severity of poverty increased by 14.4%. This increase was statistically significant indicating that growth had failed to adequately reach the poorest of the poor during that period (NPC, 2018). However, between 2010/11 and 2015/16 this severity poverty index has substantially declined by 9.68% which imply a significant uplift for the poorest section of the society.

Table 3 Trends of rural and urban poverty in Ethiopia

		1995/96	1999/00	2004/05	2010/11	2015/16
RURAL	Head count index	47.5	45.4	39.3	30.4	25.6
	Poverty gap index	13.4	12.2	8.5	8	7.4
	Poverty severity index	5.3	4.6	2.7	3.2	3.1
URBAN	Head count index	33.2	36.9	35.1	25.7	14.8
	Poverty gap index	9.9	10.1	7.7	6.9	3.7
	Poverty severity index	4.1	3.9	2.6	2.7	1.4

Source: author's computation based on data from CSA, HICE survey of 1995/96, 1999/00, 2004/05, 2010/11 and 2015/16.

As presented in table 3, the decline in both rural and urban poverty incidences considerable throughout the past two decades. Like the national poverty trend, the poverty trend in rural Ethiopia has shown a substantial decrease in terms of headcount and poverty gap indices. Accordingly, poverty headcount and poverty gap indices in rural Ethiopia have decreased to 25.6percent and 7.4 percent in 2015/16, from 47.5 percent and 13.4 percent in 1995/96 respectively. The2015/16 rural poverty headcount and poverty gap are lower than that of 2010/11 by 15.8%and 7.5%, respectively, with statistically significant for both indexes of poverty. On the other hand, the rural severity of poverty declined at a lower rate than the two indices, which declined to 3.1 percent in 2015/16, from 5.3 percent in 1995/96. In 2010/11 poverty severity index was higher than that of 2004/05 by 17%. This trend was curbed after 2010/11, where this severity of poverty reduced by about 3.13%between 2010/11 and 2015/16. This indicates that, in

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recent times, inequality in rural areas started to decline as the government implemented wide-ranging and multi-faceted pro-poor programs to address the poorest of the poor. Such programs include: extension of improved agricultural technologies and farming practices, commercialization of smallholder farming agriculture, rural infrastructural development and a range of food security programs (productive safety net programs, provision of credit etc.) however, the evidence on the poverty gap and severity yet reveals there is uneven the distribution of income among the rural poor. In addition, the pro-poor programs enabled increases in the incomes of those close to the poverty line only, but not those who are far below the poverty line (NPC, 2018).

The poverty headcount index and poverty gap index have also poverty declined substantially in urban areas over the past two decades. The headcount index of urban poverty has decreased to 14.8 percent in 2015/16 from 33.2 percent in 1995/96. Similarly, the poverty gap index has declined to 3.7 percent in 2015/16 from 9.9 in 1995/1996. The decline in poverty headcount index and poverty gap is increasing over the past decade. The 2015/16 urban poverty headcount and poverty gap are lower than that of 2010/11 by 42% and 46%, respectively. On the other hand, poverty severity declined to 1.4 percent in 2015/16 from 4.1 percent in 1995/96. The poverty severity of 2015/16 was lower than that of 2010/11 by 1.3 percent. Though the decline in urban poverty is considerable, like the rural area economic growth and the pro-poor programs implanted by the government, fails to significantly reach the poorest of the poor in urban areas of Ethiopia. In figure 9 it has indicated that, in 2015/15, the poverty headcount index is the highest in Tigray (27%) followed by Beneshangul Gumuz (26.5%), Amhara (26.1%), Oromia (23.9%), Afar (23.3%), Gambela (23%), Somali (22.4%) and SNNPR (20.7%). whereas poverty index Harar is lowest (7.1 %) followed by Dire Dawa (15.4 %) and Addis Ababa (16.8 %).
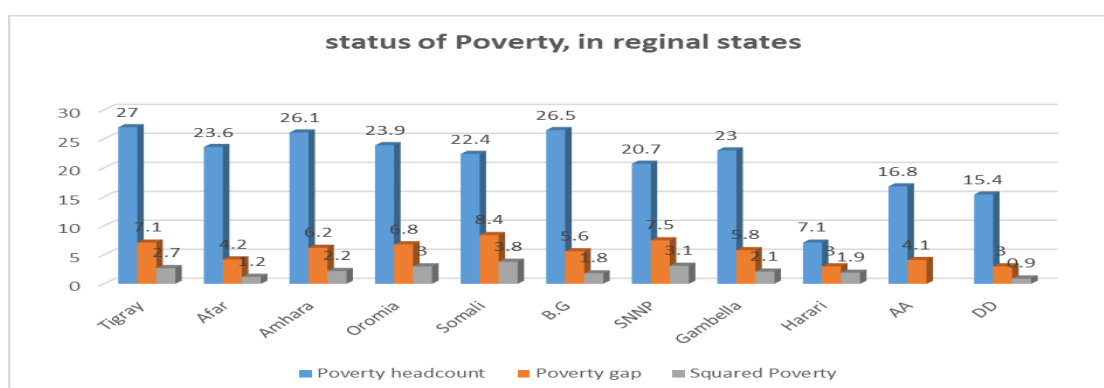

status of Poverty, in reginal states

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Figure 8 Status of Regional Poverty (2015/16)

Source: author's computation based on data from HICE survey of 1995/96, 1999/00, 2004/05, 2010/11 and 2015/16

4.2 Econometric Results Effect Financial Inclusion on Poverty Reduction in Ethiopia

4.2.1 Descriptive Statistics

The descriptive statistics: mean, median, maximum value, minimum value, standard deviation, skewness, kurtosis, Jarque-Bera and probability of Jarque-Bera of data set collected has presented in the following table.

Table 4 Table summary of descriptive statistics

COLUMN1	PI	CBBA	DCBA	BCBA	LMF	SMFI
Mean	29.03	3.05	193.34	2.23	16093637.00	11795512.00
Median	28.38	1.90	110.30	1.80	9289643.00	5450594.00
Maximum	38.70	7.82	550.80	4.19	58722261.00	41897180.00
Minimum	22.00	0.83	65.90	1.05	1482154.00	509585.50
Std. Dev.	5.52	2.35	152.40	1.06	16567005.00	13366581.00
Skewness	0.28	0.82	1.10	0.57	1.33	1.09
Kurtosis	1.77	2.29	2.96	1.93	3.86	2.80
Jarque-bera	4.58	7.94	12.16	6.08	19.58	12.04
Probability	0.10	0.02	0.00	0.05	0.00	0.00

Source: author's computation using Eviews (10)

From descriptive statistics result presented in table 4 poverty indexes averaged 29.03 percent, median 28.38 and was highest at 38.7 and least at 22. In addition, the data shows that the standard deviation of poverty indices, which measures how concentrated the data are around the mean is 5.52. The mean value of the Commercial bank branches per 100000 adults averaged 3.05. Similarly, the number of depositors per 100000 adults and borrowers per 100000 adults averaged 193.34 and 2.23 respectively. This implies on average the number of Ethiopian adults who save money in commercial banks is greater by far than the number of Ethiopian adults who borrow from commercial banks. On the

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other hand, as pro-poor financial institutions, the Loan distributed by Microfinance institutions averaged birr 16093637 and saving in microfinance institutions averaged birr 11795512. Here it implies that unlike commercial banks micro-finance institutions give more loans than they collect deposits/savings.

The table also presents Skewness which measures the symmetry of the distribution, and kurtosis which determines the normality of the distribution. Accordingly, all the variables were positively skewed. This implies that the distribution of observations is concentrated on the right of normal skewness and has a higher mean value over the median value. Similarly, the variable LMF presented in the table has Leptokurtic, which has a positive excess kurtosis value (or more peaked than normal). The rest have Platykurtic with negative excess kurtosis values or less peaked than a normal distribution. From the Jarque-Bera test it can also be observed that variable PI is normally distributed (p>5%), whereas other variables are not (p<5%). Hence, further econometric analysis has been done after converting the data not normally distributed into normal distribution using the log variables of the data.

4.2.2 Augmented Dicky-Fuller Unit Root Test

The representation in Table 5 presents the test stationarity and the Durbin-Watson stat for traits of autocorrelation test. The standard Augmented Dicky-Fuller (ADF) test unit root test used to determine the degree of stationarity and hence to check the order of integration of the variables under discussion. The unit root was tested with intercept and trend alternative. Moreover, the rejection of the null hypothesis is based on MacKinnon (1996) critical values. Akaike information criterion (AIC) is used to determine the lag length while testing the stationarity of all variables.

Table 5 Augmented Dickey-Fuller test results

VARIABLE	ADF – TEST	5% CRITICAL VALUE	P - VALUE	DURBIN-WATSON STAT.	ORDER OF INTEGRATION
ΔPI	-69.14226	-3.493692	0.0001	2.178351	I(1)
ΔLNCBBA)	-18.13828	-3.493692	0.0000	2.057738	I(1)
ΔLNDCBA	-22.94340	-3.493692	0.0001	2.050732	I(1)
ΔLNBCBA	-6.431879	-3.508508	0.0000	2.221323	I(1)
LNLMF	-3.159651	-2.915522	0.0280	1.884071	I(0)
LNSMF	-3.265655	-2.915522	0.0214	1.873366	I(0)

Source: Author's computation using Eviews (10)

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The representation in table 5 shows at with intercept and trend 5% level of significance some of the variables: PI, lnCBBA, lnDCBA, and lnBCBA, attained stationarity at the first difference (I (1)); whereas the variable of lnLMF and lnSMF attained stationarity at level (I (0)). From this, we can understand that the 5% level of significance of the dependent variable is stationary at the first difference, while some independent variables are stationary at the level and others at the first difference 5% level of significance. But, none are stationary at the second difference. As indicated in Table 5, given the number of observations (N=60), we found that the Durbin-Watson test statistic value of all variables found to be greater than the tabulated upper bound value 1.771 in Savin and White tables. The null hypothesis of non-auto correlated errors at the 1% level of significance has not been rejected. Hence, the Durbin-Watson stat indicates that the data has no traits of autocorrelation problem.

4.2.3 ARDL Bounds Tests for Co-integration

Having seen the above normality tests, Autoregressive Distributed Lag Model (ARDL) model has been selected for the econometric regression analysis. From the tests we conducted and adjustments undertaken above, the perquisites of the ARDL model have been fulfilled. Accordingly, there is no autocorrelation between error terms; there is no threat of heteroscedasticity in the data where the variance and the mean remain constant; the data follow a normal distribution and the data of variables under discussion have stationary either on I(1) and I(0).

As discussed in chapter four, to test for bounds test for co-integration among the dependent and independent variables, first the ARDL model that has been expressed as unrestricted error correction model (UECM) in (equation 19) is estimated. To do so the optimal lag length has been determined to be a maximum lag order of 4 based on Akaike information (AIC), Schwarz information (SC) and Hannan-Quinn information (HQ) criteria at sequential modified LR test statistic (each test at 5% level) (see annex 1).

Then F-test through the Wald-test (bound test) is performed to check the joint significance of the coefficients specified in equation (19). The Wald test is conducted by imposing restrictions on the estimated long-run coefficients of the Poverty index, lnCBBA, lnDCBA, lnBCBA, lnLMF and lnSMF. The computed F-statistic value is compared with the lower bound and upper bound critical values tabulated in Appendix-A5 case 3 of Narayan (2005). Narayan (2005) critical values (for K=5) Lower bound I (0)

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= 3.783 and Upper bound I (1) = 5.338 at 1% significance level; and Lower bound I (0) = 2.817 and Upper bound I (1) = 4.097 at 5% significance level.

The null hypothesis for the ARDL Long-run Form and Bounds Test is the non-existence of a long-run relationship (H0: $\beta7 = \beta8 = \beta9 = \beta10 = \beta11 = \beta12 = 0$; from equation 19); while the alternative hypothesis (H1: $\beta7 \neq \beta8 \neq \beta9 \neq \beta10 \neq \beta11 \neq \beta12 \neq 0$; from equation 19) hypothesized the existence of a co-integrating relationship. The following table presents the results of the ARDL bounds test.

Table 6 Results of ARDL bounds test

Test Statistic	Value
F-statistic	33.78852
K	5

Source: Author's computation using Eviews (10)

As presented in table (6), with an intercept and trend, the calculated F statistics is 33.78852 and it is greater than the upper bounds of Narayan (2005) critical values (for K=5) at 1%, (5.338) and 5% (4.097) significance levels. Hence we reject the null hypothesis of non-existence of a long-run relationship (H0: $\beta7 = \beta8 = \beta9 = \beta10 = \beta11 = \beta12 = 0$; from equation 19). From the result, we conclude that there exists a long-run relationship between the poverty index and the variables of financial inclusion (CBBA, DCBA, BCBA, LMF and SMF).

4.2.4 Long-run Estimation model and diagnostic tests

After confirming the existence of a long-run co-integration relationship among the variables, the stable long-run relationship between the variables is estimated based on the ARDL model specified in equation, 20.The following table presents the long-run coefficients using the Autoregressive Distributed Lag Approach: ARDL (4, 4, 4, 4, 4, 4) selected based on Akaike Information Criterion.

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Table 7 long-run estimation

Dependent variable=PI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LnSMF(-1)	-0.096643	0.867398	-0.111417	0.9117
LnLMF(-1)	-0.126663	0.997579	-0.126970	0.8995
LnDCBA(-1)	-0.547659	1.683473	-0.325315	0.7463
LnCBBA(-1)	-0.135938	1.455054	-0.093424	0.9259
LnBCBA(-1)	0.122266	1.623378	0.075316	0.9403
C	0.374182	0.084155	4.446357	0.0000
R-squared	0.582026	Mean dependent var		-0.287931
Adjusted R-squared	0.625917	S.D. dependent var		0.555044
S.E. of regression	0.562206	Akaike info criterion		1.798864
Sum squared resid	16.11983	Schwarz criterion		2.047538
Log likelihood	-45.16705	Hannan-Quinn criter.		1.895727
F-statistic	0.759517	Durbin-Watson stat		2.232243
Prob (F-statistic)	0.604986			

Source: Author's computation using Eviews (10).

As indicated in table 9, all variables of financial inclusion have no significant effect on poverty reduction in the long-run. Additionally, the R-Squared of about 58% shows that there is no strong relationship. This non-significant long-run causal relationship between financial inclusion and poverty reduction is against governments due to consideration of the financial sector as a strategy to tackle poverty. Though the further empirical investigation is needed, the researcher of this study believes that this insignificant long-run relationship appeared, due to the non-pro-poor development of the finical sector in Ethiopia.

Though not significant, there is a positive effect (the negative signs interpreted as positive effect poverty or reduction on poverty headcount ratio) running from the independent variables Depositors in Commercial Bank branches per 100000 adults and saving in and Loan provided by Microfinance institutions, and Commercial Bank branches per 100000 adults towards poverty index in the long-run. On the other hand, there is a negative effect running from Borrowers from Commercial Bank branches per 100000 adults towards the poverty index in the long-run. This is which imply, other things remain constant, as Borrowers from Commercial Bank branches per 100000 increases, the poverty level would raise. The unexpected sign of these variables is in contradiction to most of the theoretical justifications (i.e. Stolbov, (2012); Levine,

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(1993); Stieglitz (1993)) and empirical results (i.e. Levine, (1997); Avais, (2014)). On the other hand, there are some empirical studies that support the unexpected sign of these variables and found that financial inclusion worsens poverty than talking it. For example, Seng, (2018) found that households, whether extremely poor, relatively poor, or non-poor, which take out microcredit, get worse off in terms of household food consumption per capita. In the researcher's opinion, the unexpected sign of the variables' long-run effect may be data or valuation problem, or it might be the headcount index as a proxy for poverty, unlike most studies that use per capita income instead. Hence, further detailed research should be done to identify the reason behind such a result.

After estimating the long-run, serial correlation test, heteroscedasticity test and cumulative sum of recursive residuals (CUSUM) test for stability and cumulative sum of squares of recursive residuals test for stability of the model has been undertaken to check the robustness of the model.

Table 8 Test for serial correlation and Heteroskedasticity

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	66.75628	Prob. F(4,47)	0.2052
Obs*R-squared	49.31917	Prob. Chi-Square(4)	0.2051
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.439206	Prob. F(6,51)	0.2181
Obs*R-squared	8.398451	Prob. Chi-Square(6)	0.2103
Scaled explained SS	6.486899	Prob. Chi-Square(6)	0.3709

Source: Author's computation using Eviews 10

From the above table (8) the Breusch-Godfrey Serial Correlation LM Test, there is no serial correlation and also there is the threat of Heteroskedasticity. Moreover as indicated in the figures below the model is stable as the CUSUM test (blue line) lies between 5% significance levels (red lines). A similar result found for the cumulative sum of squares of recursive residuals. Hence the results of the estimated model are reliable and efficient.
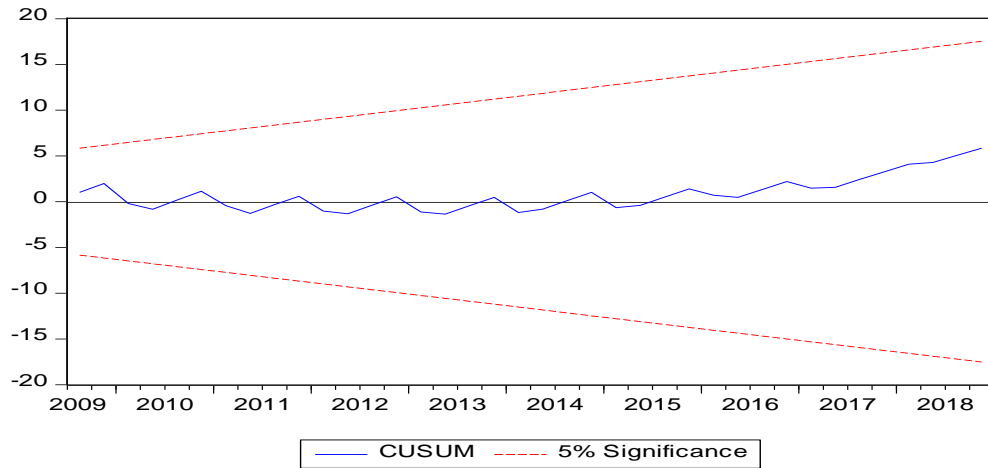
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Figure 9 cumulative sum of recursive residuals test for stability
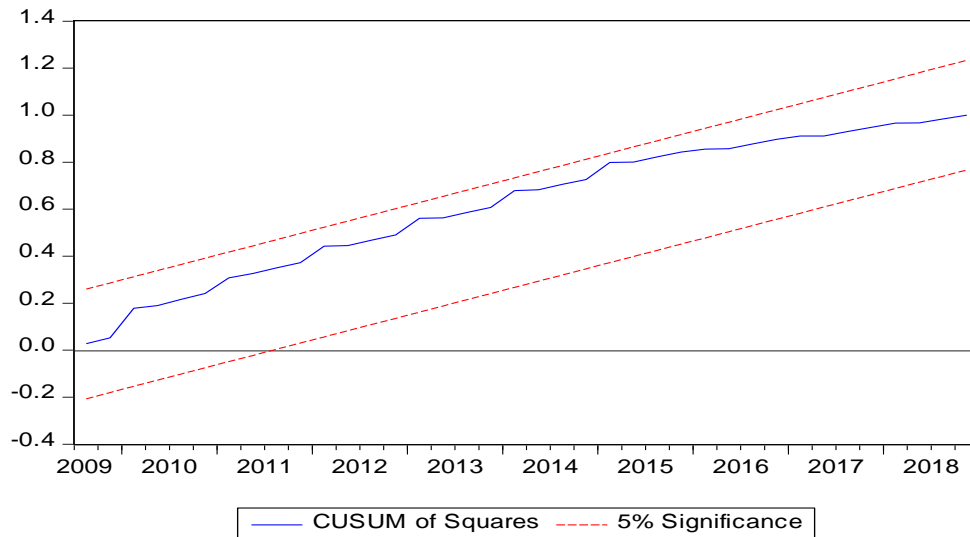
Source: Author's computation using Eviews 10

Figure 10: Cumulative sum of squares of recursive residuals test for stability

Source: Author's computation using Eviews 10

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4.2.5 Short-run Error Correction Estimates and diagnostic tests

In this sub-section, the short-run Error Correction is estimated to reach a balance in the long term and to clarify the speed of adjustment of any deviation towards the long-run equilibrium. The short-run error correction model is estimated based on the model specified in equation 22.

Table 9 ARDL Error Correction Regression Result

Dependent Variable: D(PI)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.025142	0.005192	4.842601	0.0001
D(lnBCBA)	-4.160165	0.297062	-14.00439	0.0000
D(lnBCBA(-1))	-0.722455	0.143123	-5.047782	0.0000
D(lnBCBA(-2))	-0.730670	0.143989	-5.074472	0.0000
D(lnBCBA(-3))	-0.738886	0.133516	-5.534048	0.0000
D(lnCBBA)	-2.145095	0.149277	-14.36988	0.0000
D(lnCBBA(-1))	-7.365859	0.457096	-16.11447	0.0000
D(lnCBBA(-2))	-7.356725	0.460825	-15.96425	0.0000
D(lnCBBA(-3))	-7.347591	0.461733	-15.91306	0.0000
D(lnDCBA)	-6.847766	0.469084	-14.59818	0.0000
D(lnDCBA(-1))	-0.488120	0.180921	-2.697965	0.0123
D(lnDCBA(-2))	-0.451321	0.167893	-2.688149	0.0126
D(lnDCBA(-3))	-0.414523	0.144259	-2.873459	0.0082
D(lnLMF)	1.423572	0.123481	-11.52863	0.0000
D(lnLMF(-1))	0.795012	0.082307	9.659090	0.0000
D(lnLMF(-2))	0.803523	0.078225	10.27201	0.0000
D(lnLMF(-3))	0.812034	0.063980	12.69191	0.0000
D(lnSMF)	-0.203178	0.070050	-2.900488	0.0077
D(lnSMF(-1))	-3.879684	0.232720	-16.67102	0.0000
D(lnSMF(-2))	-3.873190	0.229374	-16.88594	0.0000
D(lnSMF(-3))	-3.866697	0.224988	-17.18625	0.0000
CointEq (-1)*	-0.062210	0.003989	-15.59735	0.0000
R-squared	0.748974	Mean dependent var		0.027576
Adjusted R-squared	0.748154	S.D. dependent var		0.886057
S.E. of regression	0.038071	Akaike info criterion		-3.395790
Sum squared resid	0.043481	Schwarz criterion		-2.483366
Log likelihood	118.3842	Hannan-Quinn criter.		-3.042948
F-statistic	1217.528	Durbin-Watson stat		2.090252
Prob(F-statistic)	0.00000			
* P-value incompatible with t-Bounds distribution. Source: Author's computation using Eviews 10				

As presented in the table the coefficient of determination (R-squared) is 0.748154; which implies that about 74.8% of the variation in the poverty index is attributed to variations in the explanatory variables of financial inclusion. This high coefficient of determination

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(R-squared) implies the regression equation good enough to be used, and the independent variable is chosen in order to determine the dependent variable is chosen properly. However, as the study did not control for other determinants (other than financial inclusion) of poverty in the model the high value of R2 and Adjusted R2, does not suggest that poverty level (headcount index) is almost fully explained by variations in financial inclusion, not by other factors. Moreover, in addition, the Durbin-Watson stat (2.090252) avoids any doubts as to the existence of autocorrelation in the estimated model. The evidence also shows that the value of ECT (-0.062210) and is significant; hence it indicates that about 6.2% of the variation (the disequilibrium) from the previous period's shock is corrected (converges back) to the long-run equilibrium in every quarter. This is a relatively smaller speed of adjustment; hence indicated the nonexistence of a stable long-run relationship among the variables.

As indicated in table 9, unlike the long-run effect, there is a significant effect running from independent variables of financial inclusion towards the dependent variable of poverty index in different directions. Accordingly is the main contributor to Poverty index reduction is commercial bank branch per 100000 adults, where a 1 percentage increase in the one, two and three period lagged values of CBBA, results in 7.37, 7.36 and 7.35 units reduction in poverty rate respectively. The other explanatory variable that highly affects the poverty index in the short-run is depositors in commercial bank branches per 1000 adults; where a percentage increase results in a 6.8 unit reduction in the rate of poverty. Similarly, a percentage increase in Borrowers from commercial bank branches per 1000 adults results in a 4.16 unit reduction in the poverty index. Next, the one, two and three periods lagged values of saving in microfinance institutions respectively contribute to poverty reduction. Accordingly, a percentage increase in one, two and three periods lagged values in SMF results in 3.87, 3.87 and 3.86 unit reduction in poverty index, respectively. These results are consistent with of the theoretical and empirical justifications of the positive effect of financial inclusion with poverty reduction (i.e. Stolbov, (2012); Levine, (1993); Stieglitz (1993)) and empirical results (i.e. Levine, (1997); Avais, (2014)).

On the other hand, the result shows that Loan provided by microfinance institutions has a negative effect (the positive sign imply negative relation) on the poverty index. Accordingly, a percent increase in LMF would result in a 1.42 unit increase in the

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poverty index. Similarly, a percentage increase in the one, two, and three periods lagged values of MLF, results in 0.79, 0.80, and 0.81 unit increase in poverty index. Hence the effect of loans provided by microfinance institutions on poverty reduction has resulted in an unexpected sign, in the short-run. This is in contradiction with empirical findings. Though further research is needed, the researcher of this study believes that this might be for that the loan provided by microfinance institutions is either their interest is high as compared to the return that borrowers get or the loans are provided by microfinance is based on political decisions than guided by economic principles. As a result, loans provided by microfinance institutions are not spending on productive sectors and also are making the rural poorest of the poor (women, rural residents) to get more impoverished than improving livelihood. On the other hand, there are empirical findings that revealed such unexpected findings. I.e Afriyie & Segbefia, (2015), which they argued microcredit offered by microfinance institutions (MFIs) is likely to trap needy borrowers into a vicious cycle of poverty and has even weakened rather than empowered women.

To check the verifiability of the estimated short-run model, some diagnostic test is undertaken. The residual diagnostic tests for the null hypothesis of no heteroskedasticity in the disturbance term at a 5% level of significance and no serial correlation in the residuals has presented in the following table.

Table 10 Test for serial correlation and Heteroskedasticity

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	67.67471	Prob. F(4,48)	0.3491
Obs*R-squared	49.26448	Prob. Chi-Square(4)	0.3422
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.497190	Prob. F(5,52)	0.2068
Obs*R-squared	7.298951	Prob. Chi-Square(5)	0.1993
Scaled explained SS	5.944536	Prob. Chi-Square(5)	0.3117

Source: Author's computation using Eviews 10

From the above table the Breusch-Godfrey Serial Correlation LM Test, there is no serial correlation and threat of Heteroskedasticity, as the value of f-statistics is greater than the upper bound of critical value. .Hence, the relationship between the variables is verifiable or valid. The following graph illustrates the stability test for the model. More over as indicated in the figure blow the model is stable as the CUSUM test (blue line) lies between 5% significance levels (red lines).
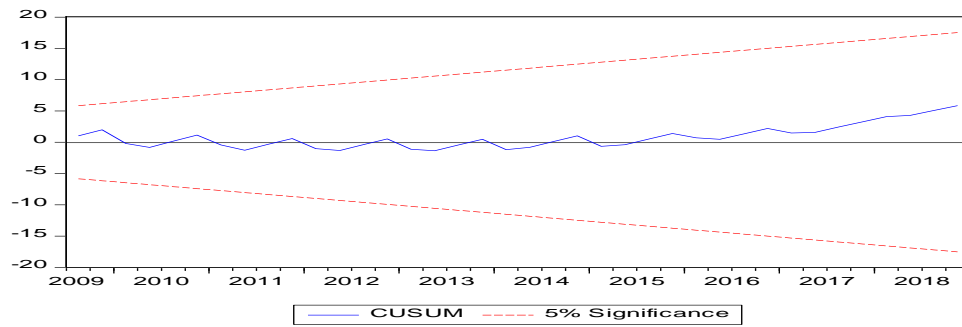
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Figure 11 CUSUM test for stability

Source: Author's computation using Eviews 10

4.3 Test for bidirectional causality

Having completed the estimation of ARDL model, the test for bidirectional causality between variables has been tested as illustrated in the following table.

Table 11 Pair wise Granger Causality Tests

Null Hypothesis:	F-Statistic	Prob.
*ln*BCBA does not Granger Cause PI	0.10663	0.0296
PI does not Granger Cause *ln*BCBA	2.35266	0.0678
*ln*CBBA does not Granger Cause PI	0.29017	0.0282
PI does not Granger Cause *ln*CBBA	2.87426	0.0331
*ln*DCBA does not Granger Cause PI	1.82020	0.0411
PI does not Granger Cause *ln*DCBA	2.14834	0.0899
*ln*SMF does not Granger Cause PI	1.10839	0.0340
PI does not Granger Cause *ln*SMF	6.2032	0.0022
*ln*LMF does not Granger Cause PI	6.90611	0.0283
PI does not Granger Cause *ln*LMF	2.08392	0.0002

Source: Author's computation using Eviews 10

The table above depicts that poverty index does Granger Cause on Commercial bank branches per 100000 adults and Loan provided by Microfinance institutions, saving in microfinance institutions and vice-versa, at 5% significance level. This indicates that there is a bidirectional relationship between these variables. But it doesn't granger cause borrowers from commercial bank branches and depositors in commercial bank branches per 100000 adults. Hence there is only a unidirectional causal relationship running from dependent variables towards the independent variables.

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5 CONCLUSION AND POLICY RECOMMENDATION

5.1 Conclusions

Given the increasingly global and country-level consideration of financial inclusion in poverty reduction policies; and the scanty of empirical literature, this study was initiated to explain the effect of financial inclusion in the reduction of poverty in Ethiopia both in the short-run and long-run. To achieve the research objective, hence to test the research hypothesis, the study used secondary time series data covering from 2004 to 2008 on a quarterly basis; using Eviews 10. The study applied the ARDL approach with an optimal ARDL model (4, 4, 4, 4, 4, 4) to formulate and estimate the relationship between financial inclusion and poverty. The results of the ARDL bounds test for co-integration shows that there is a long-run relationship between poverty headcount index and a number of commercial bank branches per 100000 adults, borrowers from commercial banks branches per 100000 adults, depositors in commercial bank branches per 100000 adults, saving in microfinance institutions and loan and advances provided by microfinance institutions.

The results of long-run estimation indicate that all variables of financial inclusion have no long-run significant effect on poverty reduction in Ethiopia. Though the further empirical investigation is needed, this insignificant long-run relationship appeared due to the non-pro-poor development of the finical sector in Ethiopia. On the other hand, the finding revealed that, unlike the long-run effect, there is a significant effect running from independent variables of financial inclusion towards the dependent variable of the poverty index. The result also revealed that the main contributor to change in Poverty index is Commercial Bank branch per 100000 adults; Followed by Depositors in commercial bank branches per 1000 adults; Borrowers from commercial bank branches per 1000 adults; and saving in microfinance institutions respectively. Moreover, these variables positively and significantly affect poverty reduction in Ethiopia. On the other hand, the result shows that Loan provided by microfinance institutions has a negative effect on poverty index which imply loan offered by microfinance institutions (MFIs) is likely to trap destitute borrowers into a vicious cycle of poverty.

The study also found that the Error correction value is -0.062 and it is significant; hence it indicates that about 6.2% of the previous period's deviation in poverty level is corrected

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(converges back) to the long-run equilibrium in every quarter. This is a relatively smaller speed of adjustment; that also suggests the nonexistence of a stable long-run relationship among the variables. The test for bidirectional causality depicted that there is a bidirectional causal relationship between the Poverty index and Commercial bank branches per 100000 adults and a Loan provided by Microfinance institutions, saving in microfinance institutions. But there is only a unidirectional causal relationship running from borrowers from commercial bank branches and depositors in commercial bank branches per 100000 adults towards poverty level.

5.2 Policy Recommendation

The results of the study have important policy implications. Based on the findings of the study it is recommended that poverty can be reduced, by extensively ensuring the ease of access, availability and usage of the formal financial system in Ethiopia. Therefore, it is essential to foster the outreach of financial institutions throughout the country to reach more poor people. For that the necessary infrastructures for financial service such as road electricity and telecom networks should be provided particularly in rural areas where the majority of finically excluded Ethiopians exist due to 'financial institutions are too far' and poverty is deep-rooted.

Moreover, financial institutions should encourage their clients to use loans for investments purpose and promote saving. To that end, financial institutions and other stakeholders (i.e government and civil society organizations, the media) should provide training and knowledge in order to equip their clients to better utilize financial services effectively. Furthermore, the government should pay attention to the protection of customers to build their trust in financial services and financial institutions by building their financial capability to promote responsible, sustainable financial services.

To maximize the benefit of financial inclusion towards poverty reduction, it requires a strong, forward-looking policy favoring pro-poor financial inclusion; and promotion of innovations to deepen financial inclusion in Ethiopia. It is promising that financial inclusion has become one of the major strategies in Ethiopia's growth and reducing poverty in its transformation plans. To effectuate the government's efforts this national strategic approach to financial inclusion should bring together diverse stakeholders including financial regulators, telecommunications, and competition and education

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ministries. The government should also subsidize that financial institution that operates to reach the financially excluded section of the society found the rural areas and the urban poor. On top of this, the government should give due attention to technological innovations in the financial sectors (Fintech) as Fintech provides an opportunity to promote the financial inclusion of low-income households in developing countries.

The result of this study also implicates that loan provided by micro-finance (which were expected to significantly decrease the poverty level in Ethiopian) is worsening poverty in Ethiopia. Hence it is recommended that microfinance institutions should operate in a pro-poor manner by reducing their interest rate; so that a large number of poor can be able to access their loan facilities and be profitable than being losers due to high-interest rates. Moreover, the government should work so that loans provided by microfinance institutions are spending on productive sectors (sectors that increase the income of the poor) and also are making the poor (women, rural residents) to improve lively-hood.

It is suggested that other studies should be conducted to empirically evaluate the financial inclusion-poverty nexus using a wider range of parameters and divers econometric models.

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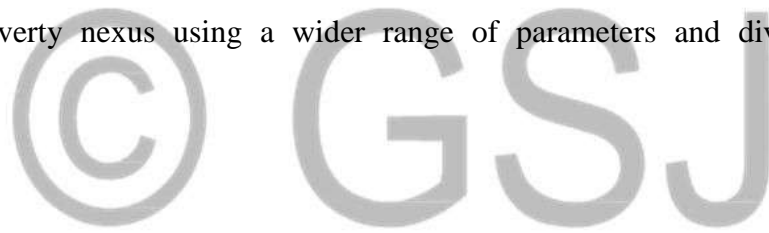
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