

THE EFFECT OF PUBLIC EXPENDITURE COMPOSITION ON ECONOMIC DEVELOPMENT IN ETHIOPIA

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THE EFFECT OF PUBLIC EXPENDITURE COMPOSITION ON ECONOMIC DEVELOPMENT IN ETHIOPIA

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APPROVAL SHEET

This is to certify that this thesis prepared by Hawi Tolu, entitled : *"The effect of public expenditure composition on economic development in Ethiopia"* and submitted in partial fulfillment of the requirement for the Degree of Master of Science (Development Economics) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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DECLARATION

I, the undersigned, Hawi Tolu, declare that this thesis titled "*The effect of public expenditure composition on economic development in Ethiopia*" and the work presented herein are entirely my original work. It is submitted in partial fulfillment of the requirements for the Master of Science in Development Economics. I confirm that no part of this thesis has been submitted for the award of any other degree at any other university or institution.

Hawi Tolu

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Student name	**Signature**	**Date**

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ACRONYMS AND ABBREVIATIONS

ADF Augmented Dickey Fuller

AIC Akaike Information Criterion

ARDL Autoregressive Distributed Lag

ECM Error Correction Model

FAO Food and Agriculture Organization

GDP Gross Domestic Product

HDI Human Development Index

PP Phillips-Perron

UNDP United Nations Development Programme

VAR Vector Autoregression

VIF Variance Inflation Factor

WDI World Development Indicators

WHO World health organization

ABSTRACT

This study explores the effect of public expenditure on economic development in Ethiopia from 1990 to 2023 by sector. In particular, it examines how the government spending in agriculture, education, health and infrastructure contributes to economic development. Both the long run and the short run dynamics are analyzed using the Autoregressive Distributed Lag (ARDL) approach, and the Granger causality approach is used to identify the direction of causality between variables. The findings are consistent with the presence of a long run cointegrating relationship between public expenditure components and economics development. The health dimension was excluded from the final analysis due to severe multicollinearity, and the findings are therefore based on the remaining dimensions. Education and agriculture spending have statistically significant positive effects, and infrastructure expenditure has a statistically significant negative effect on economic development in the long run. The short-term effects of education and agriculture on economic development are negative, while that of infrastructure is positive, indicating that both education and agriculture have adjustment delays with respect to their effect on economic development. The error correction term is negative and statistically significant, thus supporting the stability of the long-run equilibrium, which is approached relatively quickly. The results of Granger causality test show that there is bi-directional causality between education expenditure and economic development, unidirectional causality from infrastructure to economic development, and reverse causality from economic development to agricultural expenditure. The model is also well specified, stable and free from significant econometric issues, further confirmed by diagnostic tests. Adopting a broader perspective the results indicate that the level of response of public spending to economic development is likely to be influenced by the allocation of spending across sectors, with Education being the most significant long-run determinant of economic development in Ethiopia.

Keywords: Human Development Index, Public Expenditure, ARDL, VAR, Cointegration

1. INTRODUCTION

1.1 Background of the Study

The issue of poverty alleviation remains a major agenda that defines policy regulations in the global arena. According to the available literature, such as studies by Ali and Bibi (2017) and Ali (2015), sustainable and inclusive development is based on the principle of persistent improvements in human well-being. Notably, this issue does not concern only the developing nations; developed economies are also focused on eradicating poverty and ensuring a stable economic growth, which is evidenced by such macroeconomic studies as Hussain (2018) and Manzoor and Agha (2018). In any nation, it is the role of the government to make quality education, medical services, power, and infrastructure available to people to enhance the quality of life, which is also shared by the socio-economic arguments of Audi and Ali (2017) and Ali and Ahmed (2014).

Government intervention especially in low income countries such as Ethiopia is even more important in fostering faster economic growth. In spite of the fact that monetary policy is also an important instrument, the fiscal policy, such as taxation, government spending, correcting market failures, and supplying government services has become a more useful and potent means of economic growth. This has been mostly due to the fact that financial dualism and the fact that the economy is to a large extent non-monetized; this makes the instruments of the monetary policy less effective in comparison with the fiscal policy. Furthermore, the scarcity of social services and poor infrastructure also play significant limiting roles to the involvement of private sector in development processes. This means that the government should mobilize to develop social and economic infrastructure thus stimulating the individual investment and enhancing the effective exploitation of the limited entrepreneur potential (Tanzi, 1994).

The classical and endogenous theories of growth focus on how the government can play the role of rectifying market failures, enhancing human capital accumulation and economic growth in the long term (Musgrave and Musgrave, 1989; Romer, 1990). Public spending, especially in developing economies where the means of the private sector are frequently insufficient, is

especially important in funding basic sectors of the economy, including education, health, infrastructure, and social security.

This study is based on fiscal instruments among them being government expenditures that are essential tools in economic growth in the hands of policy makers of the less developed countries. Nevertheless, there is no general agreement, as well as consistent evidence, that there is a significant correlation between government expenditures and economic growth. It is much more agreeable that any serious economic development initiative needs to give priority to sustainable growth in living standards, including an increase in per capita income, improved living standards in terms of access to education and healthcare, and environmental protection an argument also corroborated by the socio-economic study of Ali et al. (2016) and Ali and Zulfiqar (2018).

Other economists have maintained that expansion in government expenditure may be a powerful instrument to wake up aggregate expenditure in a stagnant economy as well as jump starting crowed-in impacts on the private sector. Keynesian perspective holds that government was able to reverse economic recessions by borrowing and providing the money to the private sector and consequently giving the money back to the private sector via numerous spending programs. When government consumption is high the effects are expected to be more employment, profitability and investment through the multiplier effects on the aggregate demand. Therefore, a recurrent government spending can be used to strengthen economic growth. Conversely, endogenous growth models like Barro (1990), will predict that only productive government spending will positively influence growth rate in the long run.

The distribution of productive government expenditure can cause changes in the incentives of investing in both human and physical capital in the neoclassical growth model first proposed by Solow (1956). However, these effects are limited in the long run to changing ratios of equilibrium factors and do not change the basic rate of growth, when transitional changes can produce a short term change in growth. It has been argued by scholars that the so-called positive impacts of higher government spending may not necessarily be realized in the developing economies, mainly because of the continuously elevated and unstable rates of government debt. In such cases, fiscal stimulus is usually ineffective in bringing about the required development.

The fiscal spending of the government on consumption can trigger the crowding-out effect of the private sector investment and thus, hinder economic activity in the short-run and reduce capital accumulation in the longer-term. Vedder and Gallaway (1998) argue that the law of diminishing returns is eventually triggered by uncontrolled increase in government spending and at some point extra government expenditure can lead to economic stagnation and decreases.

Economic development has become a central focus for policymakers and researchers, emphasizing the need to improve human welfare without compromising future generations' opportunities. Public expenditure particularly in education, health, and infrastructure plays a vital role in shaping social and economic outcomes (Barro, 1991; Gupta et al., 2002), yet the composition of government spending across education, health, infrastructure, and general consumption may have differential impacts on economic development.

While the Human Development Index (HDI) provides a comprehensive measure of health, education, and income, limited research exists on how sectorial public expenditure affects HDI. Most existing studies focus on the impact of public expenditure on economic growth (Gebreyesus, 2022; Hasnul, 2015; Muluget, 2023; Maingi, 2017; Ahuja & Pandit, 2020) or examine social spending in broad terms, without connecting specific expenditure categories to HDI. To illustrate, Kefyalew (2021) investigated the influence of government spending on the results of economic development, but the research was limited to aggregate spending on health and education, thus, omitting such vital areas as agriculture and infrastructure. As a result, one can observe a certain gap in the understanding of the effects of government spending that are specific to sectors.

Ethiopia highly depends on agriculture and infrastructures to develop; agriculture is the biggest source of employment and a major provider of food security and rural income, and infrastructure enhances the efficiency of the sector in both the private and the government (FAO, 2019; World Bank, 2020). A study of the composition and structure of the state spending that includes such sectors will help in a more detailed analysis of their long-term implications to economic growth, human development and poverty reduction. The incorporation of these variables is also a way of addressing the limitations of previous studies and providing actionable information which can be used by policy makers in developing even better and focused fiscal interventions.

1.2 Problem of the Statement

In spite of significant changes in the public spending in recent decade, Ethiopia remains under the troubles of chronic poverty, inequality and unemployment, which begs the question of whether spending by the government is effective in encouraging sustainable and inclusive development (UNDP, 2022). Total government expenditure as a share of GDP declined to approximately 5.5% in 2024, compared with about 11% in 2010. Similarly, education expenditure has fallen substantially from its peak in the early 2010s(~5.6% of GDP in 2012) to approximately 2.3% of GDP in 2024, while agricultural expenditure averaged about 10.3% between 2009 and 2021, remaining below the recommended target levels (World Bank, n.d.; FAO, n.d.).

These trends propose that, as much as government expenditure is a major driver of economic growth and human development, the composition and allocation of the sector may not be adequate and focused to guarantee multidimensional economic development. In addition the literature available focuses a lot on the correlation between aggregate fiscal spending and the macroeconomic variables such as GDP growth or HDI, but seldom looks at the economic, social, and sectorial aspects of sustainability in general, including the development of human capital, the provision of infrastructure, and the productivity of agriculture, among others (Guerrero and Castaneda, 2022). As such, to examine the effectiveness and composition of sectorial public expenditure would be important in evaluation of patterns in which government spending could contribute to the achievement of balanced, inclusive, and economic development outcomes in Ethiopia.

Modern research has mostly been focused on the investment in education and health and their positive effects on human development and economic growth (Singh et al., 2025; Nurvita et al., 2012; Hasnul, 2015; Ferede et al., 2023). But this concentration does not give much attention to other sectors of liveliness particularly infrastructure and agriculture.

The association between government aggregate spending and economic growth or development has been empirically studied, where the total government spending has generally been used as a proxy of fiscal input and indicators of macroeconomic performance based on GDP (IMF, 2025; Nyasha et al., 2019). In developing country, the available literature has also paid minimal

attention to the disparate role of the individual sector towards the overall developmental outcomes, but has been keen on aggregate government spending versus economic growth (Maingi, 2017; Mulugeta, 2023; Degefa and Daba, 2025). As such, these researches offer limited suggestions as to how the distribution of available public funds among sectors should be done to increase human wellbeing.

Human Development Index (HDI) is a combination of the health, education and income measures, and the investment made by the masses in infrastructural and agricultural facilities is interpreted to boost the background dimensions that determine these measures. According to the theoretical perspective, the Human Development theory states that the development of people in terms of their health, education, and living standards plays the leading role in development (Sen, 1999; UNDP, 1990). The endogenous growth theory (Barro, 1990) and structural transformation theory (Lewis, 1954) support the use of infrastructure investment and agricultural investment respectively on the basis of increasing productivity and access to the essential services and food security, income and employment respectively. Also the infrastructure expenditure facilitates access to schools, health amenities, water supply, electricity and markets thus improving health, education and income levels. Similarly, the agricultural investment strengthens food security, nutrition, employment, and rural incomes that strengthen health and income and, indirectly, education. These channels emphasize a logical as well as a theoretical connection between sectoral fiscal investments in infrastructure and the agricultural sector and economic development as reflected through the HDI.

The current research has two ways of contribution. First, it changes the analytical emphasis on aggregate government spending to that of sector specific government spending on education, health, infrastructure and agriculture. Second, it makes an analytical horizon on economic development rather than economic growth. The general hypothesis is an argument that diversification of the public expenditure is consequential to economic growth and that an optimal development oriented distribution of the government budget to sectors which directly and indirectly increase human capital and income lead to better human development results. By finding which spending contributes more for economic development improvement, the research

provides even more accurate and policy relevant evidence than what is accessible in aggregate or growth-based expenditure analyses.

1.3 Objectives of the Research

1.3.1 General Objectives

To examine how the allocation of public expenditure across different sectors affects economic development in Ethiopia.

1.3.2 Specific Objectives

- ✓ To investigate the effect of sectorial public spending on the overall economic development in Ethiopia.
- ✓ To determine the short and long-term effect of different types of government spending on the economic development outcomes.
- ✓ To outline the patterns in the public spending structure of Ethiopia in the above key sectors in the span of the research

1.4 Research Questions

- What are the effects of sectorial public expenditure on economic development in Ethiopia?
- What are the short and long term effects of government spending on economic development?
- What are the patterns in the public expenditure on major sectors (education, health, infrastructure and agriculture) in Ethiopia during the period of the study?

1.5 Research Hypotheses

H1: Public expenditure on education has a significant positive effect on economic development in Ethiopia.

H2: Public expenditure on infrastructure has a significant positive effect on economic development in Ethiopia.

H3: Public expenditure on agriculture has a significant positive effect on economic development in Ethiopia.

H4: Public expenditure on health has a significant positive effect on economic development in Ethiopia.

1.6 Significance of the Study

This study complements the knowledge of the effect of the composition of the public expenditure on the economic development in Ethiopia. The study, by placing emphasis on sectorial public spending as opposed to aggregate expenditure, leaves gaps in the literature and provides a more detailed view of the consequences of development. The results are also relevant to the policy and fiscal decision-making of the population, as it gives evidence of what areas of expenditure are most suitable to achieve an economic development, which is important in the situation of limited sources of funds of the population and competing priorities in development. Also, the study is a worthwhile source of research in the future as it represents a sector-specific, multidimensional analytical perspective which can be implemented to other third world countries that face similar economic and environmental issues.

1.7 Scope and Limitation of the Study

This paper examines how the composition of federal government spending, that is, allocation of spending on education, health, infrastructure and agriculture, impacts on the achievement of economic development in Ethiopia. The paper is largely quantitative in nature in that it uses secondary, country level aggregated time series data to assess the effects of fiscal policy on economic development indicators. The Human Development Index (HDI) and the curated list of social indicators are the main indicators of economic development; the expenditures on environmental protection are not considered because of the lack of data. The analyses are also limited to federal-level budgetary data, which leaves out regional budgetary differences and institutional factors and any causal implications are made with clear reservations.

1.8 Organization of the Paper

The study is organized into 5 chapters. The first chapter is introduction, in which background of study, statement of problem, research question, objective, significance, scope and limitations are presented. The second chapter is the review of both theoretical and empirical literature. This is followed by methodology part, which is chapter three of the paper. Chapter fourth has two sections which is the descriptive analysis and econometrics analysis. The last chapter presents conclusions and recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Definition of Economic Development

Economic development is a multidimensional and wide process that is not just a growth in national income. It is the enhancement of the overall economic situation, living conditions and general wellbeing of a population of a country. Although economic growth is usually conceived as a quantitative increase in production or Gross Domestic Product (GDP), which denotes an increase in the productive potential or capacity of an economy (Kuznets, 1971), economic development can include not just an increase in the income growth, but also improvement in the quality of life in terms of health, education, equity and equitable distribution of income (Sen, 1999).

Basically, economic development is the continual improvement in material standards of living, alleviation of poverty, growth of employment opportunities and improvement of political and social institutions (Todaro and Smith, 2020). It is a measure of structural change in an economy as well as enhancement of human potential and social wellbeing.

The classical economists of old provided primordial explanations of development. Adam Smith (1777) saw economic development as growth of national wealth by specialization, division of labor and free trade. David Ricardo (1817) related development with comparative advantage with the idea that nations can develop by specialization in areas where they have relative cost efficiency and thus maximize resources allocation and gain benefits of international trade.

The concept of dynamic view was introduced by Joseph Schumpeter (1911) and it focused on innovation and entrepreneurship as the driving forces of change. He explained development as creative destruction that occurs when the obsolete technologies and the business practices are substituted with newer ones that trigger structural changes and long term growth.

Amartya Sen (1995) redefined development as the increase of human potentials and liberties. To Sen, the increase in income is not enough but development should improve the access of people to education, health care and opportunities that would allow them to live meaningful lives. In contrast, Walt Rostow (1960) conceptualized development as a series of phases that included the

traditional societies and the economy of mass consumption, in which industrialization, modernization, investment in infrastructures and human capital were major requirements of development.

2.1.2 Classical Economic Developmental Theories

The development of classical economic theory developed during the late eighteenth and early nineteenth century, under the influence of the Industrial Revolution, population growth, agricultural and industrial production changes. Key figures were Adam Smith, David Ricardo and Thomas Malthus.

A) Adam Smith and The Theory of Absolute Advantage

Adam Smith believed that the economy flourishes when there is free competition that is guided by natural economic laws. His theory of absolute advantage stressed on specialization in the production of goods that countries can produce more effectively than other countries can. His main argument had the principle of division of labor that increases productivity in that workers do specialized jobs (Smith, 1776).

Smith argued that free markets were efficient in distributing resources without the need to overuse government and promoted creativity and competition. He also emphasized capital accumulation which was created by saving and replying as an important factor in the sustained economic growth. To development, Smith was of the opinion that the key to long term growth is expansion of markets, secure property rights and supportive institutions.

B) Competitive Advantage and David Ricardo

Ricardo advanced the theory of trade by coining the comparative advantage, which states that nations are supposed to specialize in the production of goods that have fewer opportunity costs when compared to others (Ricardo, 1817). A country may not have absolute advantage but specialization on relative efficiency improves the total world production and benefits of each other through trade.

Another aspect that Ricardo looked into was in the domain of income distribution, especially the increased rents with the increase in demand of agricultural land through population increase. He claimed that increase in land rent would limit industrial growth. Moreover, he perceived labor as

the major origin of value in product and services. As a development theorist, Ricardo has focused on trade as a source of growth but accepted disequilibrium between agricultural and industrial sectors.

C) Malthusian Theory

Thomas Malthus suggested that the population increases geometrically as compared to arithmetic increase in food production (Malthus, 1798). This unbalance, according to his argument, would ultimately lead to scarcity of resources, poverty, and stagnation- a state of affairs, which is commonly referred to as the Malthusian trap.

Malthus believed that population growth would stifle the economic growth in the long-term. His recommendations included preventive checks (delayed marriage and less fertility), positive checks (famine and disease), which would naturally control the level of population. The way forward out of this trap, thus, is through an improvement in the agricultural production and population control mechanisms.

D) Jean-Baptiste Say and the Law of Say

Jean-Baptiste Say advanced the concept of supply creating its demand by stating that the production of goods was sufficient to buy the goods produced. According to this perspective, markets self-correct, and economic crisis only become temporary in case of freely floating prices and wages. To be developed, the framework created by Say advocates the policies favoring production, entrepreneurship, and minimal government intervention.

E) Marxian Economic Development Theory

Karl Marx also provided a critical analysis of capitalism which to him was a regime of class struggle between the bourgeoisie (those who own factors of production) and the proletariats (workers) (Marx, 1867). He believed that building capital required surplus value to be collected through labor, which is a source of inequality and systemical instability.

Marx felt that, as much as industrialization enhances productivity it intensifies the lines between the classes and brings economic crises upon themselves. His vision was a revolution leading to the end of capitalism to socialism, which would be achieved by the proletariats overthrowing the

capitalists and then the production would belong to the people and there would be a fairer distribution of resources (Marx and Engels, 1848).

Core Features of Classical Theory

The classical theory highly emphasizes capital accumulation as the means of growth, which is based on savings as well as reinvestment. It states that free markets are efficient to allocate resources and says trade liberalization will increase productivity and innovation. The economic progress was considered to begin with agriculture, and the development needed to be sustained with industrialization.

Nevertheless, the classical economists understood diminishing marginal returns especially in land based agriculture where population strain may decrease productivity enhancement. They further examined income distribution between the landowners, capitalists and laborers, threatening unequal allocation such as increasing rents, could prevent the growth of industries.

Criticisms of Classical Development Theory

Although the classical theory is basic, it has a number of criticisms. It underestimated the revolutionary effort of technological innovation in overcoming diminishing returns. The population theory developed by Malthus was not able to predict the population transition that comes with industrialization, education and development of contraceptives. The classical model also focused more on the basis of agriculture and disregarded the preeminent role of services and advanced industries in the contemporary economies. Also, it practically overlooked the presence of government in the correction of market failures and inclusive growth. Perfect factor mobility and free trade are some of the assumptions that Ricardo made, which does not take practical considerations like trade barriers, resource endowments, and income inequality.

Even though some of its classical beliefs have become obsolete, its principles have an implication. The argument of free markets and trade developed by Smith still shapes the global economic policy. The modern trade agreements are influenced by the theory of comparative advantage of Ricardo. The focus on saving and investment is still central in the development strategies. Modern economists combine the classical knowledge with the Keynesian as well as

endogenous growth theories in order to solve the problems of inequality, environmental sustainability, and globalization.

2.1.3 Theories of Development Structuralists

W. Arthur Lewis Dual-Sector Model

Arthur Lewis gave a dual sector model of development which attributed development to the transfer of surplus labor in a traditional agricultural sector to a modern industrial sector (Lewis, 1954). The industrial sector provides higher productivity and wages than the agricultural sector which is marked with low productivity and surplus labor. Economic growth is achieved because labor is diverted to more productive activities.

Dependency Theory

Dependency theorists like Raul Prebisch and Andre Gunder Frank held that the causes of underdevelopment were due to exploitative relations in the global economy system. The third world countries are incorporated into the global economy as peripheral providers of raw material thereby increasing structural inequalities. The theory supports the import substitution, less dependence on foreign capital and increased economic self-reliance.

The Structural Transformation Theory

Chenery and Syrquin (1975) develop the concept of development as a process of systematic redistribution of both labor and resources out of the areas of low productivity, with agriculture leading the list, to more productive areas of industrial and service production. The theory explains how economic growth can be driven by productivity gains, urbanization, as well as changes in sectors, which are often supported by planned government spending on infrastructure, agriculture, and education.

World Systems Theory

The World Systems Theory by Immanuel Wallerstein divides countries into core, semi-periphery and periphery. The core nations control the world production and use the peripheral countries as labor and raw materials suppliers, continuing to use it to create unequal development modes.

Critiques of Structural Theories

The structural theories are faulted on the fact that they overemphasize external constraints and underestimate domestic governance failures. The assumption of unlimited agricultural labor contained in the Lewis model is not always realistic. Moreover, the theories occasionally assume the developing countries to be homogeneous and they do not consider individual institutional, cultural, and geographical distinctions.

Relevance of Structural Approaches in the Present

The structuralist views still can determine the policy debate on inequality, poverty alleviation, climate change and sustainable industrialization. The present discussions regarding the green development and inclusive growth tend to rely on the structuralist background and take into consideration the contemporary economic knowledge.

2.1.4 Modern Economic Development Theories

Endogenous Growth Theory - Robert Lucas (1980s) and Paul Romer

According to endogenous growth theory, the economy produces the bulk of the long-term economic growth as opposed to the external factors that dictate economic growth. Though, the importance of innovation, technological advances, and human capital investment became the focus of such scholars as Paul Romer (1986) and Robert Lucas (1988). In contrast to neoclassical models of the past, which identified technological progress as an exogenous factor, the endogenous growth theory views the knowledge generation and the acquisition of skills as a part of the economic decision-making process.

Ongoing research and development (R&D) is a way of spurring innovation which boosts productivity and creates beneficial knowledge spillovers. Such spillovers generate cumulative

and self-reinforcing growth processes that enable economies to always experience long-run growth processes and not to undergo lessening returns to capital. Consequently, education promotion policies, research centers, and innovation ecosystems are considered as core to development.

Stages of Economic Growth by Rostow

Walt Rostow (1960) suggested a linear model according to which development can be viewed as a series of five phases, namely, traditional society, preconditions of take-off, take-off, drive to maturity and the age of high mass consumption. Rostow further argues that economies pass through stages of industrialization, capital investment and technological modernization till they reach high standards of consumption and income.

Nevertheless, critics argue that development does not always take a consistent or straight path. The uneven, interrupted, or non-sequential trends in the development of countries are likely to be observed in a globalized and interdependent world. The course to take as dictated by the Rostow model can be greatly changed by historical, institutional, and geopolitical forces.

The Institutional Theory - Douglass North and Daron Acemoglu

The institutional theory highlights the fact that institutions are the main determinants of the performance of the economy. According to Douglass North, (1990), uncertainty in the economy is minimized by well-articulated property rights, law and order and a sound government, which favors productive economic behavior.

It is based on this premise that Acemoglu and Robinson (2012) identified the two types of institutions: inclusive and extractive institutions. Inclusive institutions allow the development of innovation, entrepreneurship and participation in economic activities by many hence contributing to sustenance development. Instead, extractive institutions are those institutions that accumulate power and resources among elites, preventing growth and perpetuating inequality.

The institutional theorists emphasise that sustainable development requires transparent, accountable and participatory systems of governance. Best policy reforms should hence focus on institutional fortification as well as economic growth.

Theory of Sustainable Development - Amartya Sen and Jeffrey Sachs

Sustainable development combines economic development and environmental conservation as well as social equity. Development is defined by the concept, which is expressed in the Brundtland Report (WCED, 1987) as fulfilling the current needs without undermining the capacities of the following generations to satisfy their needs.

This model emphasizes the need to strike a balance between the economic development and environmental sustainability. A shift toward the sustainability means investment in renewable energy, the use of green technologies, carbon emission reduction, and circulation economic systems. According to the works of such researchers as Jeffrey Sachs, the development policies should coincide with the environmental restrictions and promote the poverty alleviation and international collaboration.

Human Development Theory

Human development theory, which was furthered by Amartya Sen and institutionalized by the United Nations Development Programme (UNDP), transforms what the development is all about, especially in terms of income growth, into the spread of human capabilities and freedoms. By this thinking, development is supposed to make people able to live healthy, educated, and meaningful life.

The Human Development Index (HDI) is an indicator of progress that is measured by life expectancy, education, and income (UNDP, 2016). The theory supports inclusive growth and as such, economic growth is converted into equal access to opportunities among gender groups, income groups and regions. The focus of this approach revolves around policies that empower women, increase education and put in place specific poverty reduction initiatives.

Fiscal and Financial Strategies and their role in Development

The fiscal policy has a key role in determining the development outcome. Government policies about expenditure and taxation can boost the aggregate demand, redistribution of income, and funding of the costs of the government (IMF, 2021). Through strategic fiscal management, governments can invest in human capital, development of technology and sustainable infrastructure. Inclusive and long-term development is also aided by the financial strategies such

as capital market development, investment in innovation and funding of environmentally sustainable projects. Coupled with effective institutional structures, fiscal and financial policies can be great tools of attaining fair and sustainable economic change.

2.1.5 Economic Development Measurement

Economic development is a multidimensional notion, which goes beyond the economic growth in improving human welfare, health, education and living standards. Scholars and international organizations have over the decades devised different measures to encompass these different aspects of development. These measures have developed in a chronological sequence and each of them deals with the drawbacks of the predecessors.

Gross Domestic Product (GDP) per Capita

One of the oldest and most popular measures of economic development is the Gross Domestic Product (GDP) per capita. Based on national income accounting frameworks proposed by Kuznets (1934) and formalized in macroeconomic systems after the World War II, GDP per capita is the amount of goods and services generated in a country divided by its population. Over the decades, the development was mostly synonymous with economic growth, and an increase in GDP per capita was perceived to be equal to better living standards (World Bank, 2020).

The GDP per capita measure of the development is theoretically justified using the modernization theory and neoclassical growth models, which presuppose that growth in output, will increase the income, savings, investment, and ultimately welfare (Solow, 1956). The increased per capita income would provide jobs, accessibility to services, and alleviate poverty due to trickle-down effects. Therefore, international organizations like World Bank and IMF were dependent on the rate of GDP growth and per capita income to classify nations and prescribe policies.

Nevertheless, the shortcomings of GDP per capita were more pronounced. To start with, it gauges the output of the economy, but not human well-being. It fails to consider the income distribution thus growth can be experienced with increasing inequality (Sen, 1985). Second, GDP does not consider non-market transactions like household work and informal economic transactions, which are even more prominent in developing nations. Third, it omits environmental degradation and resource depletion which may exaggerate sustainable welfare

(Stiglitz, Sen and Fitoussi, 2009). Fourth, GDP does not tell us anything direct about health, education or even quality of life. These deficits made scholars say that economic growth is not enough to explain the multidimensional nature of development.

Physical Quality of life Index (PQLI)

Morris (1979) created the Physical Quality of Life Index (PQLI) to substitute the dissatisfaction with the mere income-based measures. This index was one of the earliest serious initiatives to change the orientation of development gauging to social achievement. PQLI is an indicator that incorporates three variables namely life expectancy at the age of one, infant mortality rate and adult literacy rate. All the components are rated out of 100 and the mean of three form the final index score.

The argument of PQLI is based on intellectual grounds that development is to be measured based on the improvements in basic human conditions and not the income level. PQLI tried to consider direct measures of welfare instead of indirect monetary proxies by concentrating on the outcomes of health and literacy. It showed that even similar countries in terms of income might vary greatly in terms of social achievements and this undermined the use of GDP as the only measure of development.

However, PQLI was very weak in terms of methodology. It did not consider income as a factor thus disregarding the material capacity that is needed to perpetuate social progress. The index also did not give strong theoretical justification to all the three indicators as far as assigning equal weight is concerned. Moreover, it did not consider such dimensions as access to clean water, employment, and inequality. Although PQLI signified a significant conceptual change toward the human-centered development, its scope was too limited to be comprehensive and policy relevant.

Human Development Index (HDI)

In 1990, the United Nations Development Programme (UNDP) introduced a new development index, the Human Development Index (HDI) under the intellectual guidance of Mahbub ul Haq and Amartya Sen, which was a significant breakthrough in the measurement of development. Based on the capability approach of Sen (Sen, 1999), HDI views development as the increase in the freedoms and capabilities of people instead of income increase.

HDI is an integration of three aspects, which are life expectancy (health), education (mean and expected years of schooling), and Gross National Income per capita (standard of living). HPD mitigated the weaknesses of both GDP and PQLI by adding income and social indicators. It has brought back income but considered it as one of the dimensions of development and not the only factor that determines development (UNDP, 1990; UNDP, 2020).

The advantages of HDI are that it is simple, has international comparability and is multidimensional. It changed the world discourse by replacing the idea of economic growth with the idea of human development and impacted policy choices across the globe. Nevertheless, HDI does not lack limitations either. It records mediocre performances and fails to consider the inequality within nations (Anand and Sen, 2000). The original HDI continues to conceal inequalities even though it has been replaced by the Inequality-adjusted HDI (IHDI) later. Additionally, HDI uses only three broad dimensions and excludes such factors as political freedom, environmental sustainability, gender inequality, and poverty intensity. Critics state that its equal weighting system is still to some extent arbitrary.

Multidimensional Poverty Index (MPI)

Another further development in the measurement of development is the Multidimensional Poverty Index (MPI) created by Alkire and Foster (2011) and adopted by UNDP in 2010. In contrast to HDI that is used to measure average achievements, MPI is more specific and is concerned with household-level deprivations. It determines poverty as a multidimensional concept and measures dissimilarity of disadvantages in health, education, and living standards.

MPI comprises ten indicators in three categories, namely, health (nutrition and child mortality), education (years of schooling and school attendance), and living standards (electricity, sanitation, water, housing, cooking fuel, and assets). The Alkire-Foster approach can be used to identify (who is poor) and also to aggregate (how poor they are) the incidence and intensity of poverty.

There are a number of HDI shortcomings defeated by MPI. It goes beyond the national averages to micro-level deprivation analysis and is therefore more policy-relevant to specific intervention. It also brings out latent poverty that can be missed by income measures. Nonetheless, MPI is not out of criticism. Its outcomes are based on the choice of indicators, cut-off levels, and given weights, which might not be the same in different countries. Household surveys are weak due to

data requirements which restrict comparability. Moreover, MPI is a good measure of poverty, but not an all-inclusive measure of development.

The transformation between GDP per capita to PQLI, HDI and MPI is the product of an obvious intellectual development: the output-based method of measuring growth changed into the multidimensional human-based method. GDP per capita focused on the production at the expense of welfare allocation and quality of life. PQLI was more interested in social deliverables but not in economic context. HDI combined income, health and education to give a balanced but average measure. MPI further developed to imprint multidimensional and household-based deprivations, which provide a more accurate diagnosis of poverty. Economic development is too complex of a concept to be measured through one measure. All of them were better than the previous measure but presented a new methodological controversy. In terms of academic interests, the measurement option is determined by the goals of research: GDP to compare the development of countries, HDI to compare the development of the whole human population, and MPI in order to measure the multidimensional poverty.

2.1.6 Public expenditure

Public expenditure is an essential tool of promoting development especially in the developing economies where market forces are just not sufficient in providing much needed social services. Government spending has been identified in economic theory as one of the major regulatory tools in correction of market failure, inequality and social welfare. Inclusive development is achieved through expenditure in productive and social sectors including agriculture, education, health, and infrastructure which increase access to basic services and expands economic opportunities (Keynes, 1937; Stiglitz, 2012).

Keynes Public Expenditure Theory

The Keynesian theory of the economy emphasizes the role of government expenditure in the activation of the economy and the under-investment. In emerging markets, the scarcity of the population in terms of its wealth and income leads to poor delivery of the basic services. In such areas as agriculture, education, and health, the state expenditure is demand boosting an income-

generating initiative and enhancing the availability of basic services. In these channels, government expenditure indirectly increases the results of human development (Keynes, 1937).

Wagner's Law of Public Expenditure

The Law by Wagner describes how the growth of public expenditure is experienced in the long run as economies grow and people demand more and more services provided by the government. With an increase in the level of income, the governments are increasing expenditures on education, healthcare and infrastructure to fulfill the needs of the increasing social requirements. Despite being income-oriented incentive to spend on government, Wagners Law emphasizes on the relationship between economic development, government spending and social wellbeing. This offers theoretical ground to the use of GDP per capita in the analysis of the expenditure of the populace and human development (Wagner, 1893).

Peacock and Wiseman's Theory of Expenditure

The study by Peacock and Wiseman is often mentioned as one of the most sophisticated studies of the temporal dynamics of the public expenditures. The theory of political determination is based on their inquiry that took into consideration a political theory that most governments are more inclined to spend large sums of financial resources, and citizens generally do not like paying taxes. As a result, governments have to take into consideration the needs of their constituents. Taxation was conceptualized by the authors as a fiscal constraint in the government spending. The resulting effect of the economic growth and the corresponding levels of income is that the tax revenues given a constant tax rate would gradually increase and consequently the level of spending of the public would also start rising, although the desirable level of expenditure of the population and the desirable level of taxation may diverge. However, in times of social unrest, this slow increase in the amount of public expenditure might be broken. These shocks usually go hand in hand with war, famine or massive social catastrophes that require massive expansion in government spending thus forcing governments to increase taxation levels.

During the times of crisis, the increase of the taxation is usually acceptable to the populace, a phenomenon that the authors introduced as the so-called displacement effect. By this impact, the public expenditure is displaced upwards and in the course of the crisis, the displacement of the private expenditure towards the public expenditure fails to go back to its pre-crisis levels.

Taxation cannot be used in full in funding war expenditures; no country has the necessary taxable capacity to cause war expenditures fully. As a result, states end up borrowing whereby they are charged some debt that is paid later after the event. The other impact found by the authors the so-called imperfection effect, is a result of increased consciousness of social issues during upheavals. Governments in turn increase their list of services to alleviate these conditions. As the tolerance of citizens to taxation is not restored to its initial value, the state is able to continue operating at an increased level of spending based on an increased area of governance and relative debt service.

2.2. Empirical Literature

It has always been shown in the field of international studies that government spending towards the social sector- including education, health, and infrastructure- has a positive impact on the outcome of human development. According to Baldacci et al.(2008), social expenditure that is targeted boosts the quality of human capital and welfare in the developing economies and Singh et al. (2025) note that the investment in education and healthcare predicts high values of Human Development Index (HDI) in a sample of 65 countries. These studies also emphasize the fact that sectorial allocation is more important than aggregate expenditure, and that long-run effects are often more important than short-term ones, and thus models that could be used to capture both aspects of the dynamics are preferable, especially Autoregressive Distributed Lag Error Correction Model (ARDL-ECM) (Pesaran et al., 2001).

The pro-market position that a growing public sector can limit aggregate growth was supported by Landau (1983), who had shown that high government consumption in the gross domestic product (GDP) is co-existent with lower economic growth. The findings were mostly related to growth in per capita output and did not necessarily presuppose a corresponding increase in aggregate welfare. In addition, the research determined that there is a positive relationship between economic growth and total investment in education. Landau (1986) has later viewed the theoretical framework in terms of human and physical capital, political and international determinants, and three-year lagged government expenditure as a share of GDP. Disaggregation of expenditure on government spending was done in terms of investment, transfers, education and defense, as well as other consumption items. The statistical results indicated the same trend with previous one: total government consumption was statistically significant and with a

negative correlation with growth, but educational expenditure had a positive and statistically non-significant effect. The explanation of the inclusion lagged variables was not fully articulated especially in the light of the existing mechanisms contemporary to theories on the effects of the public spending on the growth.

Seymour et al. (1997) used the disaggregated approach to the determination of the effect of government spending on economic development in the OECD. The same relationship was analyzed with regard to Tanzania, 1965-1996 using a model of Ram (1986) of time-series data (32 years) and a parsimonious growth-accounting model. In this model, overall government spending is broken down into physical investment, consumption spending and investment into human capital. Their study showed that a rise in productive expenditure (physical investment) had a negative impact on growth, but consumption expenditure had a positive relationship with growth which is seemingly attributed to its correlation with increased consumption of the privates. Human-capital investment, however, was statistically insignificant, which supported the conclusion that the productivity of the public investment in Tanzania was not high at the moment of the research.

In a similar disaggregated approach, Bose et al. (2007) examined the impacts of government spending on a group of thirty developing economies, such as Nigeria, during the 1970s and 1980s, and sectoral allocations in particular. The main results were that the proportion of government capital expenditure in GDP was positively and significantly related to the economic growth, but current expenditure was statistically insignificant. At the sectorial level, government investment and total education outlays were the only two that did not leave any meaningful positive connections with growth during the analysis. Though there were initial signs of strong association between expenditures in other sectors, which included transport, communication as well as defence, they faded away following the introduction of government budget constraints as well as other expenditures in other sectors. Also, the ratio of private investment of GDP was significantly positively correlated with growth. Junko and Vitali (IMF, 2008) investigated the effect of government spending on economic growth in Azerbaijan under the transitory oil-production boom of 2005 2007, which was a period with an expectant spurt in investment in asset improvement and wage improvement.

Growing literature uses HDI as significant aspect that portrays education and health attainment in a country. However, the association between HDI and government expenditure remains unclear. Studies of Ali et al. (2012), Reddy & Narsi (2019), Das et al. (2021) concluded that government expenditure has positive and significant effect on HDI, while studies of Gupta et al. (2002) and Prasetyo (2013) found that government expenditure is inefficient and has negative effect on HDI.

Gupta et al. (2002) analyses cross sectional data of 50 developing and transition countries and found that increased public expenditure on health and education may improve school attainment and reduce mortality rates. Ali et al. (2012) employs time series analysis that studies the association between HDI and government expenditure in Pakistan during 1972-2010. The empirical results of the study concluded that government expenditure has insignificant and negative impact, while income per capita has significant and positive impact on HDI. This implies that income per capita is considered as the major determinant of HDI.

Danielle et al. (2023) investigated the relationship between the Human Development Index (HDI) and government expenditure on health and education in some ASEAN countries. The authors used regression analysis (the panel Least Squares method) and panel unit root tests. Government spending on education and health were the independent variables and HDI was the dependent variable in the research. The results indicated that education expenditure positively and significantly impacts human development. On the other hand, while government health expenditure also had a positive impact, it was found to be statistically insignificant. This implies that government expenditure on education is more efficient in enhancing human development than government expenditure on health.

Islam (2022) studied the impact of government consumption expenditure in Saudi Arabia for the period 1985-2019 and applied the Granger causality test and the ARDL model to test the relationship in the short and long run. The results revealed that government consumption expenditure positively impacts economic growth in the short term, but there is no significant association in the long run. It also found a two-way causality relationship between government consumption expenditure and economic growth. The study concluded that decreasing the size of government expenditure would help boost private investment and support real GDP growth in Saudi Arabia.

Likewise, Alam (2022) examined the effects of sectoral government spending on health and education on economic growth over the period 1985-2018. With the ARDL method, it included investment, imports and exports to evaluate the short and long term impacts. The findings confirmed the presence of long-run relationships between the variables. In particular, government expenditure on education, investment and exports were found to have a significant positive effect on long-term economic growth, while government spending on health and other sectors, and imports, were found to have a significant negative effect. There were no short-run relationships, however. Unidirectional causality was also found from government spending on health and education to economic growth. It has therefore suggested the need for optimal allocation of public expenditure to improve economic growth in Saudi Arabia.

Eneisik (2021) examined the impact of government spending on human capital development in Nigeria for the period 1960-2019. The researcher used the Ordinary Least Squares (OLS) technique to examine the effect of public expenditure on health and education using the Human Development Index (HDI) as a measure. The findings suggest that health and education spending positively but insignificantly influence human capital development. The study concluded that staff welfare should be prioritised to improve the quality of human capital development.

Onabote et al. (2023) examined the effect of government sectoral spending on human development in Nigeria using annual data from 1986-2021. The research built on previous studies that have examined the impact of government expenditure on human development, using sectoral expenditure and a broad-based Human Development Index to measure development, which considers the education, life expectancy, and per capita income of a nation. This is in contrast to previous research, which primarily focused on total government expenditure and employed GDP as an indicator of development. But the findings from the Autoregressive Distributed Lag (ARDL) model found that there is no long- or short-term relationship between government sectoral expenditure and human development. However, the result from the Error Correction Model (ECM) suggests that government sectoral spending may affect human development in the long run in Nigeria.

Ruzima & Veerachamy (2023) employed the ARDL model and data for 1990-2018 to assess the impacts of government expenditure on health and education on human development. They found that in the long run, human development significantly responds to an increase in the health

expenditure, but negatively to the education expenditure. But, in the short run, human development is not significantly affected by the explanatory variables. The study concluded that there is a need to increase expenditure on the health and education sectors.

Empirical studies have gained momentum in the past years in regard to the effects of the role of public expenditure in the development levels in Ethiopia; however, there are limited direct research studies that concentrate solely on the HDI. Gebrehiwo (2016) utilized an ARDL model to evaluate the contribution of human capital development to economic growth and found out that investment in education and health has a statistically significant long run effect on the performance indicators that are strongly linked to human development. The implication of this finding is that sectorial public spending has a positive influence on the components of HDI, despite using economic growth as the dependent variable in the analyses rather than HDI itself. On the same note, Abera and Beshir (2021) tested the impact of government expenditure on growth using ARDL and unrestricted error correction models, and they found that capital investment has a considerable positive effect in the long-term but that effects of government expenditure are varied in the short-term by category. The findings indicate that the State expenditure has the potential to promote socio-economic growth that supports the human development.

A recent time-series study by Beyene and Yesigat (2022) revealed that in Ethiopia, long-run cointegration between total government spending and economic growth was evident thus highlighting the role of fiscal policy in development. Although the research virtually solely focuses on economic growth rather than Human Development Index (HDI), the methodology of the study and the results using empirical evidence show that the long-term effects of government expenditures might be infiltrated into broader aspects of the human well-being.

Despite these findings, there are limited empirical studies on Ethiopia conducted regarding the measurement of aggregate effect of sectoral government spending on a holistic development index such as the HDI.

2.3. Conceptual Framework of the Study

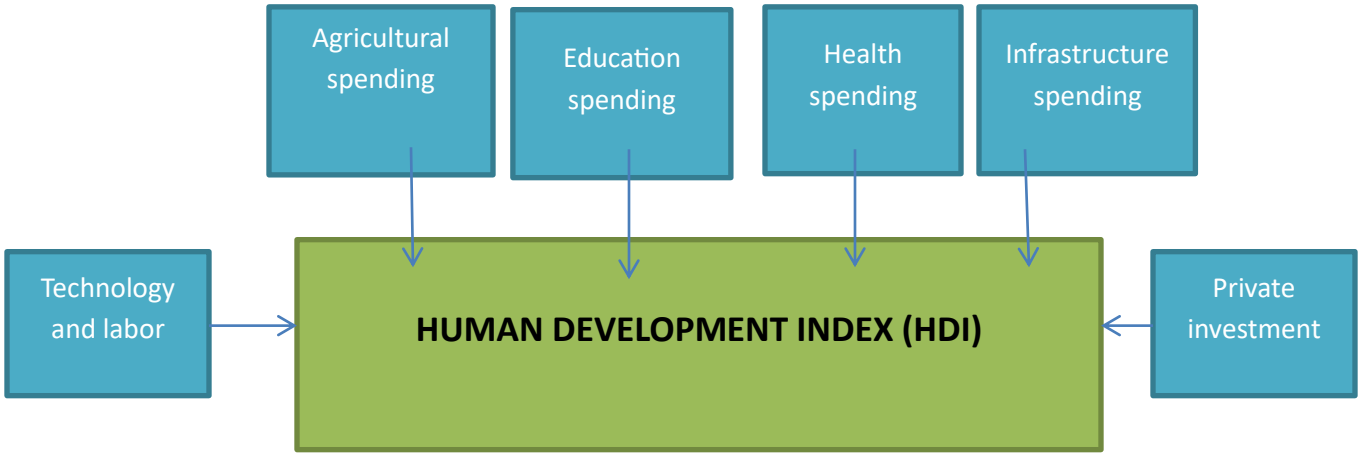


Figure 1 Conceptual framework of the study

The conceptual framework (Figure 1) helps to understand how the sectoral government expenditure relates to economic factors and to the Human Development Index (HDI) in Ethiopia. It is based on the Human Development and Capability Approach which proposes that development should be measured not by the increase in income but by the increased capability or capacity of people, including their education, health and standards of living (Sen, 1999; UNDP, 2016). In this context, HDI is used as the primary measure of development; representing health, education, and income.

The Dual Sector Model and Structural Transformation Theory support the idea of agricultural spending which will boost productivity, rural income and food security, therefore human development in the agricultural sector (Lewis, 1954). The Human Capital Theory underlies the importance of education investment because it is believed that education will lead to higher skills, productivity and income, which in turn will result in higher human development outcomes (Becker, 1964; Schultz, 1961). The Health Capital theory by Grossman states that greater health leads to better life expectancy and labour productivity, thus directly improving HDI (Grossman, 1972). The Endogenous Growth Theory and Barro's public capital theory demonstrate that investment in infrastructure enhances market access, service provision and economic efficiency, and consequently human development (Barro, 1990; Romer, 1986).

The framework is complemented by the Endogenous Growth Theory which highlights the importance of human capital, technology and knowledge spillovers in long-run growth (Romer,

1986; Lucas, 1988). Private investments and labour force development come in as well from the theories of Neoclassical Growth Theory and labour productivity theory indicating that increased capital accumulation and an efficient labour force result in increased income and welfare benefit (Solow, 1956).

Overall, the framework brings together these theories to account for the complementary effects of both sectorality and economic factors on human development in Ethiopia, both through increases in productivity and also through access to services and increases in welfare outcomes.

3. METHODOLOGY

This chapter looks at the methods that are adopted to achieve the objective of this study. The chapter basically focuses on how the entire study is done. Issues such as model specification, data sources, and definitions of variables, measurements and hypothesis are covered by this chapter.

3.1 Research Design

For this study, quantitative research is preferred. Quantitative approaches are most commonly used in "explanatory research investigating causal relationships, associations, and correlations" (Leavy, 2022). The design is as a result seen as appropriate since the research looks to investigate the effect of public expenditure composition on economic development in Ethiopia

3.2. Data Types and Sources

For this study, the type of data used is quantitative secondary data. The study uses annual time series data covered the period 1990-2023 to achieve the objectives of the study. The empirical data that used in this investigation is obtained in the secondary repositories. The sectors that are part of the sample in extraction of sector-specific figures of public expenditure is the expenditure on education, expenditure on health and expenditure on agriculture from NBE while expenditure on infrastructure is from the Ministry of Finance. The Human Development Index (HDI) is the dependent variable, which is obtained through the United Nations Development Programme (UNDP) Human Development Reports. The control variables labor force, private investment and technology's data are collected from world development indicators of the World Bank (WDI).

3.3 Model Specification

3.3.1 Theoretical Framework

The research is based on the Human Development Theory (HDT) according to which the economic development must be conceived as the growth of human capacities instead of only the income growth (Sen, 1999). HDT reports that the access to schools, health, and basic services through policies that the government implements enhances the capacity of people to lead good

productive, healthy, and meaningful lives. Thus, the investment by the state in education and health has direct impacts on human capital, which is among the most vital factors of development.

Besides this, the paper relies on the experiences of Human Capital Theory (Schultz, 1961; Becker, 1964) that holds that the enhanced productivity of labor, innovation, and income generation capacity are found in investments in education and health. The Structural Transformation Theory (Lewis, 1954) offers an additional rationale of how agriculture and infrastructure expenditure have to be incorporated and why resources produced by means of low-productivity agricultural goods must be diverted to high productivity activities by means of selective investment by the government.

The theory of public finance also offers justification of government spending and it implies that government allocation of resources enhances social welfare, corrects market failures and also leads to a macroeconomic stability (Musgrave and Musgrave, 1973). These theoretical principles have been operationalized empirically through sectorial government spending as explanatory variables of development outcomes, and have found that focused spending in productive and social sectors can greatly influence development outcomes and growth and human development indicators (Kneller et al., 1999; Guerrero and Castañeda, 2022).

The endogenous growth model by Barro (1990, 1991) augments these theories by showing under what conditions productive government spending, namely government expenditure on education, health, agriculture, and infrastructure can increase the long-run level of output and productivity. Though the model of Barro is mostly a growth model, it gives the mechanism of relationship between the public expenditure and the development: The benefits of sectoral public expenditure (education, health, agriculture, and infrastructure) enhance human capital, labour productivity, as well as public capacity (Barro, 1990; Sen, 1999). The Human Development Theory (Sen, 1999) will also make sure that increase in output will lead to increased capabilities and better HDI.

In general, including education, health, agriculture, and infrastructure spending as important variables in the driving force in economic development in Ethiopia will be justified by this theoretical framework.

3.3.2 Empirical Framework / Model Specification

The empirical model that will be used in the study is based on the Human Capital Theory, Structural Transformation Theory, endogenous growth theory, and the public finance theory which underline the importance of government expenditure in influencing outcomes of economic development. Endogenous growth theory emphasizes that government investment especially in the agricultural sector, education, health and infrastructure may have a long term impact on growth through improvement of human capital, productivity and technological capability (Barro, 1990).

In order to employ the theoretical framework to formulate empirical specifications, this paper uses the framework by Barro (1990, 1991). Barro type endogenous growth model augmented with government expenditure as its empirical specification benchmark. Under this, output is generated with the help of the use of own capital, labor and productive government spending:

$$Y_t = A_t K_t^{\alpha} H_t^{\beta} L_t^{1-\alpha-\beta} G_t^{\gamma}$$

Where: Yt is output (factor of economic development). Kt, Lt, At, Ht and Gt representes is private capital, labor, technology, human capital, and effective spending by the government respectively(Barro, 1990)

In endogenous growth model of Robert J. Barro (1990), effective government spending is productive public spending that directly goes into the production equation and increases productivity of the private capital. It consists of investment of infrastructure and other public services that increase the marginal product of capital. To make it comparative, empirically, it is normally calculated as productive government spending in the form of a ratio to GDP (G/GDP). The effect of the growth is determined by the productive or distortionary spending (Barro, 1990; 1991).

In the case of technology, the research and development (R&D) expenditure is an indicator used in this study, which refers to total spending on actions aimed at the product or process innovation or improvement (OECD, 2018). R&D investment as a share of GDP is also a very popular proxy of technological effort and knowledge production in the endogenous growth literature since it is

a direct measure of investments made in an attempt to improve productivity (Grossman and Helpman, 1991). In most developing economies, the available data on R&D can be small; however, the theoretical connection with the process of knowledge accumulation and innovation makes its application with other forms of physical capital in the context of determining long run economic performance.

In these research papers on the effect of the composition of public expenditure on economic development through the Barro-augmented model, the measure of the private capital will be the gross fixed capital formation (GFCF) without the inclusion of the government investment as a percentage of the GDP and will be averaged over the sample period. This proxy is calculated by taking the difference between government investment and the total GFCF as a way of capturing the investment flows that are made by the private sector to build capital.

The economically active population contributing to production is often used as a measure of labor in the Barro growth model as it can be measured as the total labor force or total employment. This is taken to measure the amount of human resource available in the economy, and it is popular among empirical growth studies because it is easily available and consistent across countries and over time (Barro, 1991; Mankiw, Romer, and Weil, 1992).

Although this model by Barro seems more of a growth model, this model offers a reasonable linkage to economic development since productivity as used by humans in productive expenditure improves human capital, labor productivity, and income per capita, which are fundamental to the results of development (Sen, 1999). Human Development Theory goes a step further to justify the inclusion of education and health expenditure because its ultimate objective of a public policy is on expansion of capabilities. The Structural Transformation Theory and Public Capital Theory support agriculture and infrastructure expenditure (Aschauer, 1989; Lewis, 1954).

Accordingly, the empirical model can be said to be theoretically founded and operationally justified in investigating the role of the composition of the public expenditure on the economic development in Ethiopia.

Following the ideas of Barro (1990) of productive government expenditure and Human Development Theory (Sen, 1999) the government expenditure (Gt) is disaggregated into sectoral

expenditure which is perhaps likely to promote economic development. In this regard, the public expenditure is represented as a function of the education, health and agriculture, and infrastructure expenditures:

Government expenditure=f (EDt,HEt,AGR,INF)

According to this theoretical and empirical premise the proposed study defines the following linear empirical model to discuss the influence of sector- government expenditure on economic development

$$HDI_t = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1} lnED_t + \boldsymbol{\alpha_2} lnHE_t + \boldsymbol{\alpha_4} lnAGR_t + \boldsymbol{\alpha_3} lnINF_t + \boldsymbol{\alpha_5} lnK_t + \boldsymbol{\alpha_6} lnL_t + \boldsymbol{\alpha_{7l}} lnA_t + \boldsymbol{\epsilon_t}$$

Where: HDI is Human development index. ED, HE, INF, AGR represents government expenditure on education, health, infrastructure and agriculture, While K, L, A represents the control variables private capital, labor and technology respectively. The constant term is denoted as a_0, and the stochastic disturbance is denoted as e_t.

3.3.3. Description of Variables, Measurements and Hypothesis

Human Development Index (HDI): - The dependent variable which is a composite index that measures the average performance of a country in the health, education, and living standards (UNDP, 2020). It is operationalized along a continuum of 0 to 1 where the higher the values of a specific item the better the outcomes of human development.

The key independent variables include sectorial government spending on agriculture, education, health and infrastructure. These spending amounts are indicated as **share % of GDP** and hence the allocation of the government to key development sectors. All the expenditures expected to have positive effect on the dependent variable.

Government expenditures on agriculture: - include government spending on agricultural development- irrigation, extension services, rural development and farmer support programs. It is assumed that such spending will contribute to the food security, increase rural revenues, and enhance nutrition, which in turn will play a role in human development indicators (FAO, 2019). It's included due to the assumption that address to investments in this industry contributes to

increasing productivity, rural incomes, and food security, which are the major domains of human wellbeing (Gebrehiwot, 2015)

Educational expenditure (ED): - is a fiscal investment in formal education at the primary, secondary and tertiary levels. It represents an investment in the development of human capital in the form of schooling and training and development of skills that would be crucial in improving productivity and future developmental results (UNESCO, 2021). It's expected to have a positive effect on HDI in terms of human capital improvement through access to better schooling and acquiring skills, which was confirmed by the results of ARDL on human capital and growth in Ethiopia (Gebrehiwot, 2015; Yadete et al., 2023).

Health expenditure (HE): -refers to government expenditure on health services, disease prevention and health-infrastructure development. High health expenditure was also linked to the increased accessibility of healthcare services and longer life span, directly affecting the health aspect of Human Development Index (WHO, 2020). It's also postulated to enhance HDI through life expectancy and health outcomes as pointed out in ARDL analysis of human capital factors in Ethiopia (Gebrehiwot, 2015).

Infrastructure spending (INF): - entails government spending on physical infrastructures like roads, energy and water supply, and telecommunication. Infrastructure investments help to access social services and economic opportunities, which, in turn, indirectly contribute to improvement in the human development (World Bank, 2020).

Labor (L) - is the human manpower that is engaged in the making of products and services. It is a key to economic growth as a greater and more efficient workforce enhances production, productivity, and growth potential, which directly leads to the growth of economic processes (Samuelson and Nordhaus, 2010; Solow, 1956; Todaro and Smith, 2020). In this paper, labor is quantified in terms of **total labor force**.

Technology (A) - is the knowledge, techniques, and inventions of technology used to enhance efficiency production. It plays a dominant role in the economic development because it allows economies to produce a larger output using the same resources, increases productivity, and

enhances innovation in the sectors (Mankiw, 2019; Solow, 1956). Technology use **Individuals using the Internet (% of population)** as a proxy.

Private Investment (K) - It is an expenditure on productive assets by firms or individuals, which are classified as capital and includes machinery, equipment and infrastructure. It also enhances economic growth through growth of capital stock, growth of productive power, job creation, and boosting economic activities (Mankiw, 2019; Solow, 1956). In the analysis, the measure of privacy investment is **the amount of private sector investment in birr,** which shows the degree of capital invested by the private organizations in productive uses.

The control variables include technology, labor, and private investment since they can have an impact on the results of human development, as well as government spending. Increased productivity and efficiency of service delivery is improved by technological development and labor as is in line with the Endogenous Growth Theory (Romer, 1986; Lucas, 1988) and Human Capital Theory (Becker, 1964). The capital accumulation, generation of income, and creation of employment is caused by the private investment, which is in line with the Neoclassical Growth Theory (Solow, 1956). Adjusting these factors will make sure the effect of government spending on HDI is confined.

3.4. Method of Data Analysis

The study uses both descriptive and econometric analysis to achieve the objectives of the study. In order to conduct this analysis STATA software Version 16 is used.

3.4.1. Descriptive Analysis

The data are analyzed using descriptive statistics to provide an overview of the variables under study. This includes summarizing the data through visual tools such as line plots, scatter plots, and histograms. These methods help to illustrate the distribution and trends between population growth and welfare indicators.

3.4.2. Econometric Analysis

In an attempt to determine how the short-run and long-run effects of sectoral public expenditures, namely agriculture, education, health, and infrastructure, and control variables (inflation and real

exchange rate) on human development (HDI) in Ethiopia between 1990 and 2023. This paper considers the Autoregressive Distributed Lag (ARDL) bounds testing method of cointegration. The ARDL model, which was introduced by Pesaran and Shin (1995), does not require the first-difference or stationary elements to be of the same order of integration; thus making it adaptive to short annual time-series data (Pesaran et al., 2001; Narayan, 2004).

The overall ARDL (p, q) model may be formulated as:

$$\mathbf{HDI_t} = \boldsymbol{\alpha_{0+}} \sum_{i=1}^{p} \alpha_i \boldsymbol{HDI}_{\{t-i\}} + \sum_{j=0}^{q} \beta_0 \mathbf{lnED}_{\{t-j\}} + \sum_{j=0}^{q} \beta_1 \mathbf{lnHE}_{\{t-j\}} + \sum_{j=0}^{q} \beta_2 \mathbf{lnINF}_{\{t-j\}} + \sum_{j=0}^{q} \beta_3 \mathbf{lnAGR}_{\{t-j\}} + \sum_{j=0}^{q} \beta_4 \boldsymbol{ln}\mathbf{K}_{\{t-j\}} + \sum_{j=0}^{q} \beta_5 \boldsymbol{ln}\mathbf{L}_{\{t-j\}} + \sum_{j=0}^{q} \beta_6 \mathbf{lnA}_{\{t-j\}} + \boldsymbol{\varepsilon_t}$$

The variable HDIt represents dependent variable at time t, ED, HE, INF, AGR, K, L and A represents independent variables agriculture, education, health, infrastructure expenditures, private investment, labor and internet user expenditure respectively, Where p and q are the lag lengths of the dependent and independent variables, respectively, $\alpha_0$is the intercept, is a short-run coefficient, and et is the stochastic error.

3.5. Estimation Procedure

3.5.1. Pre-estimation Diagnostic Test

Through the pre-estimation analysis, the time series characteristics of variables are examined correctly to avoid the spurious regression results, to check the correctness of the model specification and to determine the short run and long run relationship between variables. Rejection of the null hypotheses of the Augmented Dickey-Fuller (ADF) test means that variables are stationary and this test is already performed. The lag lengths are chosen to achieve optimal bias and efficiency, based on the Akaike Information Criterion (AIC), as too many lag lengths will decrease the degrees of freedom while too few will lead to omitted variable bias. Finally, the ARDL bounds testing approach is employed for checking cointegration between variables; if F-statistic is higher than the upper bound, then there is a long run relationship, if F-statistic is lower than the lower bound, then there is no long run relationship and if F-statistic is in between the bounds, then the result is inconclusive.

3.5.2 Post-Estimation Tests

The Breusch-Godfrey test is applied to test for the presence of serial correlation (across time) of the error terms, which implies model misspecification and inefficient estimates and standard errors. The Breusch-Pagan test is used to see if the variance of the error terms is constant because heteroskedasticity does not affect coefficient estimates, but renders standard errors unreliable and complicates hypothesis testing. The Jarque-Bera test is used for checking the normality of the residuals; t- and F-statistics are valid if the residuals are normally distributed, especially in small samples. We employ the CUSUM and CUSUM of Squares tests to test for stability of the model as a whole across the sample time period and whether there is a structural break affecting the estimated coefficients. All variables are endogenous variables and a Vector Error Correction Model (VECM) is employed to capture the short-run dynamics and long-run relationship between variables and Granger causality tests are employed to analyze the direction of causality.

The overall VECM model may be formulated as:

$$\Delta \mathbf{HDI}_t = \boldsymbol{\alpha}_0 + \boldsymbol{\Gamma}_1 \Delta \mathbf{HDI}_{t-1} + \boldsymbol{\Gamma}_2 \Delta \mathbf{ED}_{t-1} + \boldsymbol{\Gamma}_3 \Delta \mathbf{HE}_{t-1} \boldsymbol{\Gamma}_4 \Delta \mathbf{AGR}_{t-1} + \boldsymbol{\Gamma}_5 \Delta \mathbf{INF}_{t-1} + \boldsymbol{\Gamma}_6 \Delta \mathbf{K}_{t-1} + \boldsymbol{\Gamma}_7 \Delta \mathbf{L}_{t-1} + \boldsymbol{\Gamma}_8 \boldsymbol{A}_{t-1} + \boldsymbol{\lambda} \mathbf{ECT}_{t-1} + \boldsymbol{\varepsilon}_t$$

Where $\boldsymbol{\Gamma}_1 - \boldsymbol{\Gamma}_8$ are the short-run dynamic coefficients of the model's adjustment to long run equilibrium; ECT t−1 is the error correction term resulting from the long run equilibrium relationship; and λ is a parameter denoting the speed of adjustment to the equilibrium level after a shock.

This research design has been widely used in Ethiopian studies. As an example, Abera and Beshir (2021) used ARDL and ECM to investigate the role of government spending in improving the economic growth, and Gebrehiwot (2015) used the method to determine the effect of human capital development on growth. Other ARDL tools were also applied to find out the short-term and long-term impacts on fiscal and macroeconomic policies in Ethiopia (Ayal et al., 2024; Atota, 2018; Gizaw, 2022).

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

The methodology suggested in the previous chapter is summarized in this chapter and the findings are described. The section on descriptive analysis discusses the trends and summary statistics of the variables over the study period. The expenditure changes the figures shows below are in nominal not in real values.

4.1.1 Trend of Human development index (HDI)

The graph indicates that the Human Development Index (HDI) has been trending upward since 1990 and will continue to do so until 2023. HDI rose slowly from 0.28 in 1990 to 0.30 in the early 2000s.During this time, human development improved slowly, with HDI rising from 0.28 in 1990 to 0.30 in the early 2000s. Following 2004, the increase was greater, and between 2005 and 2008, HDI has been increasing rapidly. Growth after 2010 was still good but less than before. In 2023, HDI has almost peaked, standing at 0.497. The overall shape of the graph suggests that human development has improved in a steady manner over the period of study, which could reflect improvements in various areas including education, health, and living standards.

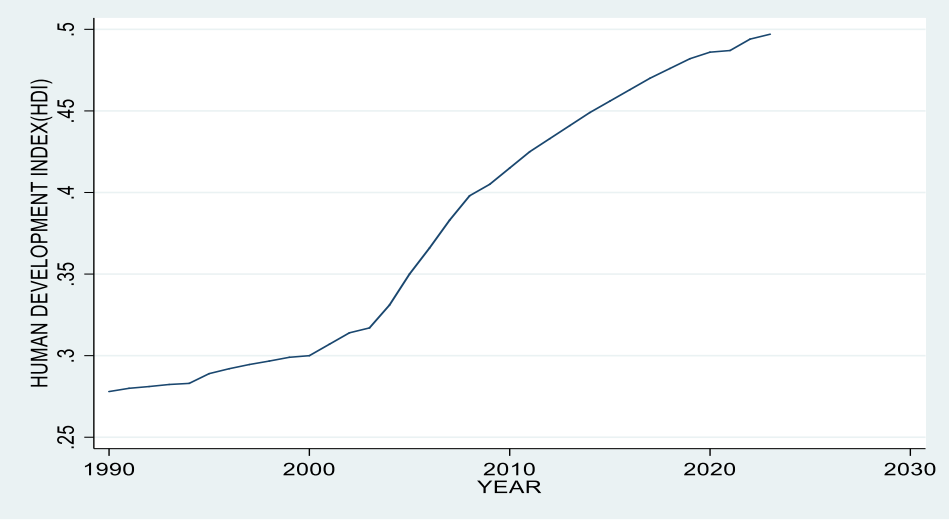


Figure 2 Human Development Index trend in Ethiopia, 1990-2023

4.1.2 Trend of Agricultural Expenditure

Overall, the agricultural expenditure exhibits significant fluctuations but an increasing trend. Starting around mid-2000s it increases gradually however highest pick happen after 2010 and peaking at more than 37 billion in 2023.

The trend shows a rising importance of agriculture in government policy and agenda, but also certain sensitivity to policy adjustments and shocks. These differences could have implications for income stability and rural development, and consequently impact human development outcomes, especially in a context where agriculture is a key component of the Ethiopian economy.

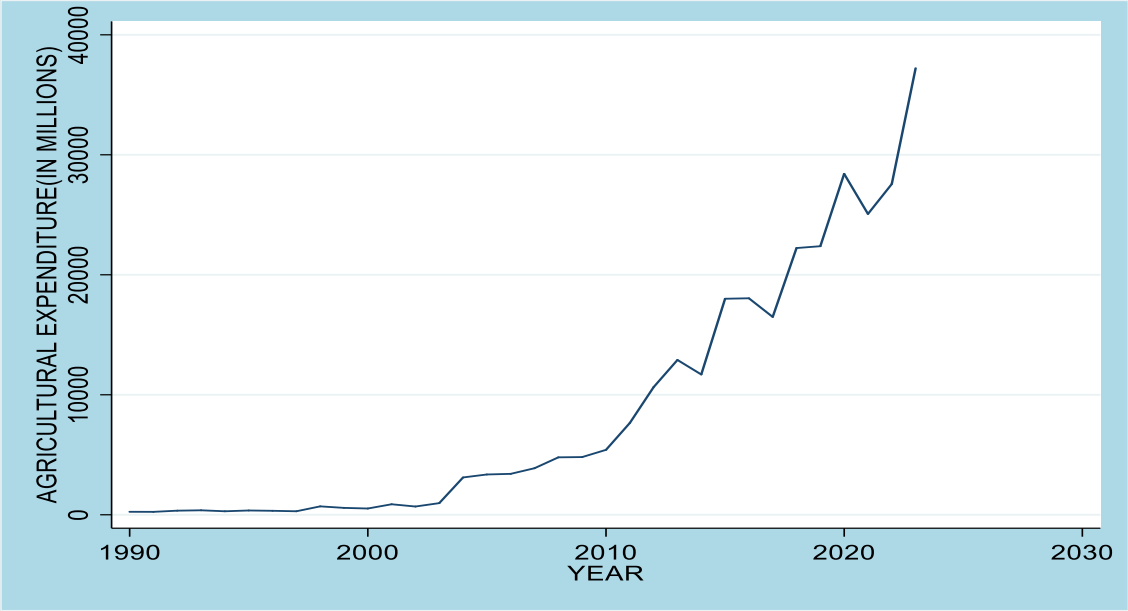


Figure 3, Agricultural expenditure in Ethiopia (nominal value), 1990-2023

4.1.3 Trend of Education Expenditure

The trend of education spending is strong and consistently increasing, particularly since 2000. It increases dramatically from 42.6 million in 1990 to 58.6 billion in 2023. This steep increase is a clear sign of a significant increase in Government investment in human capital development. The growth is especially fast after 2005, indicating increased attention to education access and quality

in policies. This is a continuous rise which is likely to be positively reflected on the HDI – through enhanced skills, literacy and productivity.

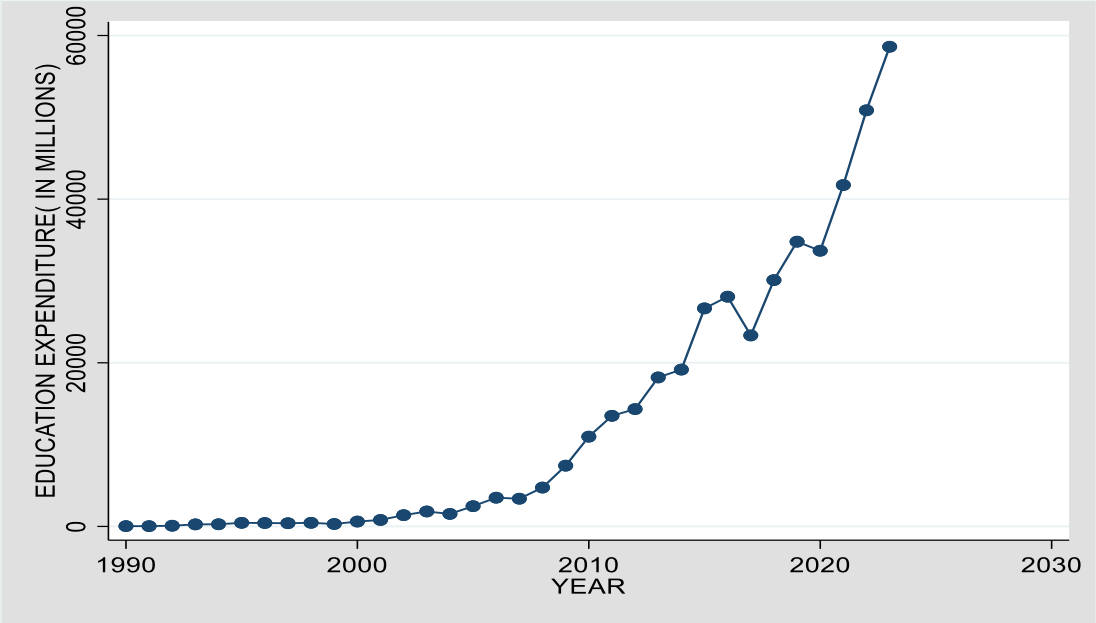


Figure 4, Education expenditure in Ethiopia (nominal value), 1990-2023

4.1.4 Trend of Health Expenditure

Health expenditure is also trending upwards from 32 million in 1990 to 26.5 billion in 2023 increasing significantly since 2005. In 2020 there is a major increment around 6.3 million due to covid-19 While there is some fluctuation (such as small drops in 2021-2022), the trend is an increasing government investment in healthcare services. This growth will enhance life expectancy and well-being and, as a result, have a positive effect on human development outcomes.

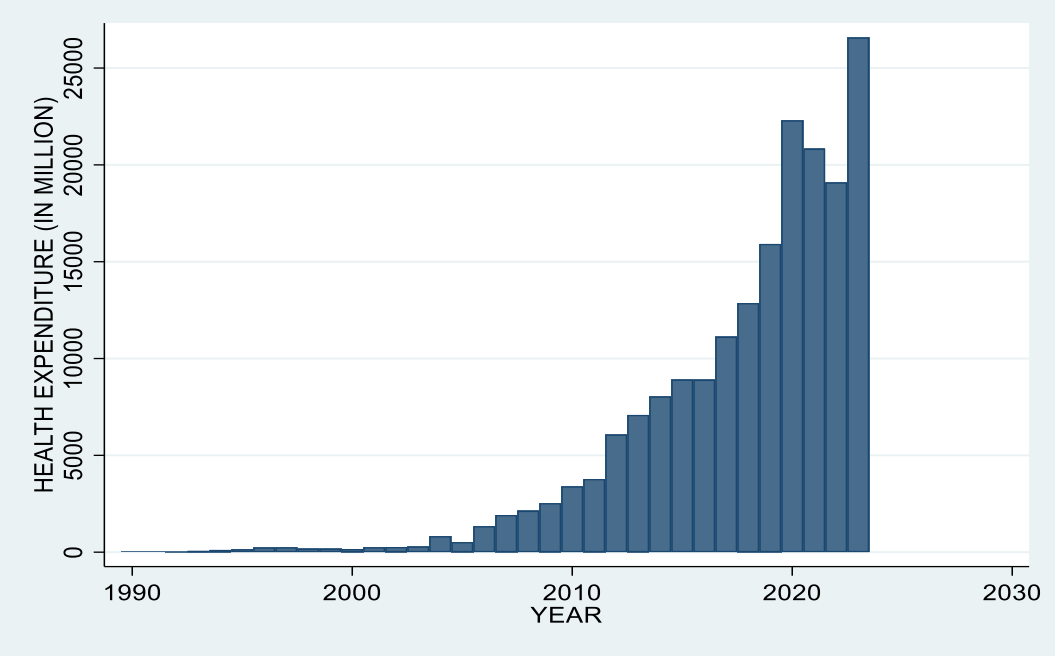


Figure 5, Health expenditure in Ethiopia (nominal value), 1990-2023

4.1.5 Trend of Infrastructure Expenditure

The spending on infrastructure had a significant increase during the entire period increasing from 474.6 million in 1990 to 68 billion in 2023. After 2005, the growth is most noticeable; suggesting that large-scale public investment in infrastructure development has taken place. This growth is part of an effort to strengthen the structural transformation that will lead to greater connectivity, productivity, and service delivery, some of which will be indirect on human development, via improved access to economic and social services.

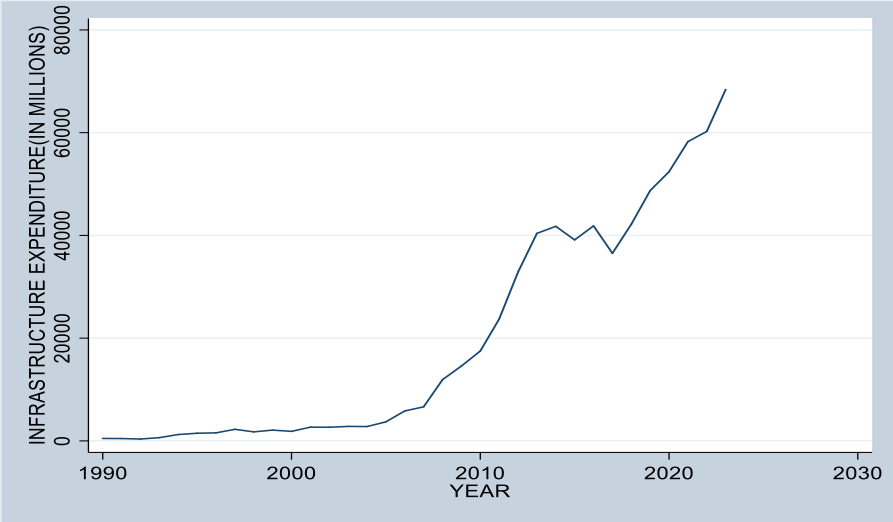


Figure 6, Infrastructural expenditure in Ethiopia (nominal value), 1990-2023

4.1.6 Trend of Private investment

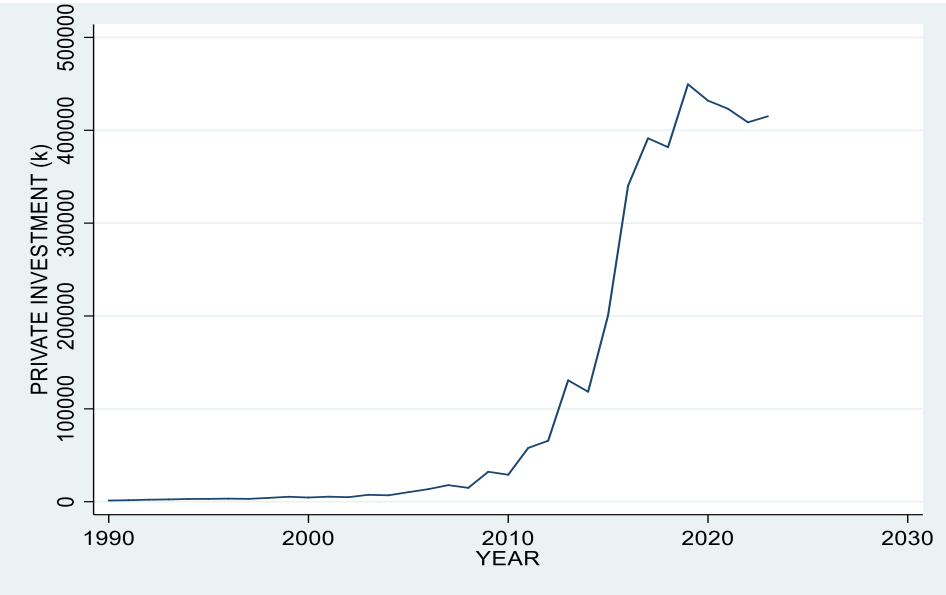


Figure 8, trend of private investment in Ethiopia, 1990-2023

4.1.6 Sectorial Allocation of Public Expenditure

The line graph below shows the share (%) of major sectorial expenditures in the economy such as agricultural, education, health and infrastructure expenditures. Infrastructure spending is the biggest category of spending, and shows that the government has a significant budget for roads, energy infrastructure, and other infrastructure to support economic and social development. Infrastructure was consistently the largest variable, but over time generally decreased, though with some variations.

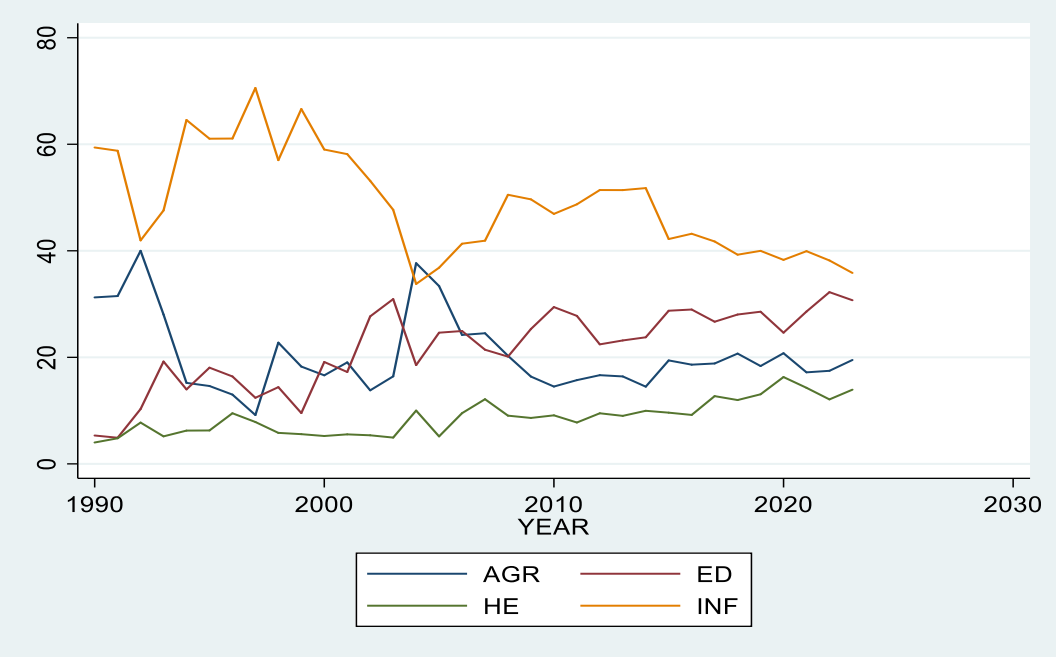


Figure 7, Sectorial allocation of public expenditure in Ethiopia, 1990-2023

Also there was a gradual increase in the amount that was spent on education, even though there were some fluctuations. Likewise, health spending grew at a consistent rate from a relatively low level in the early years to its highest level in recent years. Agricultural spending fluctuated significantly during the period, increasing and decreasing at certain times, but fairly steady during the later years. The overall pattern of the graph suggests that the variables have different trends: Education and health spending have generally upward trends; inflation has generally downward trends; and agricultural expenditure has fluctuating trends during the studied period.

4.2. Econometric Analysis Results

4.2.1. Pre-estimation Diagnostic Test Result

Multicollinearity was checked between the explanatory variables prior to estimating the model. The preliminary results showed that variables used as explanatory variables were highly correlated with health expenditure, technology and labour (control variables). For this reason, these variables were not included in the final model specification as multicollinearity could result in an incorrect estimation of coefficients and an overestimate of the standard errors. The Variance Inflation Factor (VIF) was used to re-test for multicollinearity after adjusting the model. The remaining variables were checked, and their VIF values were obtained as follows: All the other variables had a VIF value below 10, which is the cut-off value (Gujarati, 2015). This indicates that there are no serious multicollinearity issues with the final model.

4.2.2 Unit Root Test

To ensure the stationarity of the variables Augmented Dickey-Fuller (ADF) test conducted. The null hypothesis is the time series we observe is Non-stationary (i.e. has a unit root) while the alternative is that the process is stationary.

Table 1 Augmented Dickey-Fuller (ADF) test result at their level I (0)

Variables	At level I(0)		At first difference I(1)		Results
	Test statistics	MacKinnon approximate p-value	Test statistics	MacKinnon approximate p-value	
HDI	0.718	0.9902	-3.577	0.0062	Stationary at I(1)
lnAGR	-1.277	0.6396	-6.593	0.0000	Stationary at I(1)
lnED	-2.368	0.1510	-4.782	0.0001	Stationary at I(1)
lnHE	-1.486	0.5402	-7.370	0.0000	Stationary at I(1)
lnINF	-1.585	0.4909	-5.795	0.0000	Stationary at I(1)
lnK	-0.963	0.7665	-7.565	0.0000	Stationary at I(1)
lnL	-3.623	0.0053	-2.267	0.1827	Stationary at I(0)
lnA	-3.960	0.0016	-4.231	0.0006	Stationary at I(0) &I(1)

Source: Author's computation using STATA

The stationary test result using Augmented Dickey-Fuller test shows all the variables except L and A are non-stationary at level, I (0). And the remaining non stationary variables became stationary after taking their first difference. Since stationary is ensured it is possible to make further investigation on the relationship between the variables.

4.2.3 Co-integration Test

Since we have six variables that are stationery at their first difference form and two variables which are stationary at its level we need to run co-integration test to find out if there is a tendency for the variables to converge in the log-run. Before running the co-integration test it is important to determine the optimal lag period for each variables.

Optimal Lag Selection

Pursuing the unit root test, the optimal lag length for the ARDL model was determined using the Akaike Information Criterion (AIC), as outlined in the methodology. The selection of the optimal lag is necessary to produce reliable, efficient, and unbiased model estimates.

Table 2 Optimal lags selection based on AIC

Lag	AIC
0	-1.08237
1	-7.65986
2	-7.80088
3	-8.79401
4	-11.7133*

Source: Author's computation using STATA

Note: * denotes the optimal lag

The lag order that results in the lowest AIC value is considered the optimal model order. From Table 2 It can be observed that the AIC criterion suggests that the optimal lag length is 4, as it yields the lowest AIC value (-11.7133). So, the ARDL model was then estimated using a maximum lag order of 4 for the variables.

4.2.4 Bound Test for Co-integration

Having selected the optimum lag length, the next phase of the empirical exercise was to test for a long run relationship between the variables by the ARDL bounds testing procedure suggested by Pesaran et al. (2001). In this case, the null hypothesis is that there is no cointegration and is

tested through an F-statistic from a joint significance test (Wald test) of the coefficients of the lagged level terms in the unrestricted error correction model form of the ARDL model. If the calculated F-statistic is less than the lower critical value, the null of no cointegration is accepted and there is no evidence of a long-run relationship; if it exceeds the upper critical value, the null is rejected and variables are said to be cointegrated. If the F-statistic is within the lower and upper bounds, the result of the test is inconclusive, and there is no conclusive inference on cointegration.

Table 3 Bound test result for co-integration

ARDL Bounds Test		Level of significance	Bound critical value	
			Lower bound(I0)	upper bound(I1)
observations	30	10 %	3.74	5.06
		5 %	2.86	4.01
F-statistics	F =15.298	1 %	2.45	3.52

Source: Author's computation using STATA

ARDL bounds test showed F=15.298 for 7 variables and 30 observations with Kripfganz and Schneider (2020) finite-sample critical values and exceeded I(0) bounds of 2.45, 2.86 and 3.74 at all levels of significance, and also exceed I(1) upper bounds of 3.52, 4.01 and 5.06, respectively. This confirms the existence of a long-run cointegrating relationship among the variables. This implies that the variables move together over time, justifying the estimation of a long-run ARDL model. As such, the Error Correction Model (ECM) was also specified to analyze both the short-run dynamics and the adjustment process toward long-run equilibrium.

4.2.4. Long-Run Model Results

Following the confirmation of cointegration in the model, the long-run coefficients were estimated using the ARDL approach. Table 4 presents the long-run estimation results, which indicate the direction and significance of the relationship between human development index and the independent variables over the long run.

Table 4 long run model results

Dependent variable : HDI **R-squared = 0.9639**				
Variable	**Coefficient**	**Std.Error**	**t-Statistic**	**P-value**
lnAGR	.0489721	.0057559	8.51	0.000
lnED	.0747097	.0053405	13.99	0.000
lnINF	-.0415089	.0041177	-10.08	0.000
Constant	.3367024	.0402383	8.37	0.000

Source: Author's computation using STATA

The overall fit and statistical validity of the ARDL model are outstanding. The R-squared of 0.9639 indicates that 96.39% (n=30 observations) of the variation in growth of HDI is systematic, meaning that it is explained by the systematic variation in growth of public spending, and that 3.61% is unexplained by the systematic variation, or is unpredictable from a residual.

The results are the long run estimation results of the model. In the long run, every 1% increase in AGR leads to a 0.0004897 unit increase in HDI, after controlling for other variables, which gives the coefficient of agricultural expenditure (AGR) the value of 0.0489721. Likewise, the coefficient of education expenditure (ED) is 0.0747097 which means that in the long run, a 1% increase in education expenditure as a proportion of GDP is accompanied by a 0.0007471 increase in HDI, ceteris paribus. The positive signs of education and agricultural expenditures indicate that public resource allocation in these areas benefits human development in human capital formation, productivity and welfare. Conversely, infrastructure expenditure (INF), which has a coefficient of -0.0415089, indicates that, in the long run, an increase in the share of infrastructure in GDP by one unit is related to the decrease of HDI by 0.0004151 unit, while other factors remain unchanged. This negative relationship could be a result of the inefficiencies in public investment, delays in the realization of infrastructure benefits or investment in infrastructure projects that are not directly expected to improve the human development outcomes during the course of the study. The overall results indicate that the education sector is the most positive long run coefficient in terms of human development, with agriculture being the

next. The results suggest that the effect of public spending differ from one sector to another and that the human capital related sectors are more immediate and direct of their effect on HDI than other sectors. The constant term is 0.3367024, which corresponds to the value of the HDI at the reference values, when all the explanatory variables are equal to their reference values.

4.2.5. Short-Run Dynamics

The short-run dynamics were also captured using the ARDL approach. Short-run estimates presented in Table 5. Capture the immediate effects and adjustments of the independent variables on human development Index (HDI).

Table 5 ARDL estimation result

Dependent variable : HDI				
Variable	coefficient	**Std. Error**	**t-Statistic**	**P-value**
Δ HDI_{t-1}	-.4919125	.1272807	-3.86	0.003
Δ HDI_{t-2}	-.4355507	. 1203217	-3.62	0.004
Δ lnAGR	-.031988	.0050403	-6.35	0.000
Δ $lnAGR_{t-1}$	-.0261318	.0044499	-5.87	0.000
Δ $lnAGR_{t-2}$	-.0179084	.0030589	-5.85	0.000
Δ $lnAGR_{t-3}$	-.0072431	.0026523	-2.73	0.020
Δ lnED	-.0373961	.0064421	-5.80	0.000
Δ $lnED_{t-1}$	-.0242442	.0038757	-6.26	0.000
Δ $lnED_{t-2}$	-.0112339	.0026351	-4.26	0.001
Δ $lnED_{t-3}$	-.0051173	.0021745	-2.35	0.038
Δ lnINF	.0304508	.0043948	6.93	0.000
Δ $lnINF_{t-1}$	.0179796	.003858	4.66	0.001
Δ $lnINF_{t-2}$	.0082659	.002432	3.40	0.006
ECM_{t-1}	-.690179	.0856103	-8.06	0.000

Source: Author's computation using STATA

From the short-run estimation results, it is found that the lagged values of HDI have negative, and statistically significant, coefficient of -0.4919 and -0.4356 respectively with their p-values

being 0.003 and 0.004 respectively. This means that the changes in HDI that have occurred previously have a corrective effect on the current level of HDI, an adjustment towards long-term equilibrium. The coefficient for agricultural expenditure (AGR) is negative and statistically significant in all the lags. The range of the coefficient varies from -0.0320 to -0.0072 and the values of the p-values are all less than 0.05. The results show that the short-term elasticities of HDI with respect to total agricultural expenditure as a proportion of GDP are of the order of 0.00032, 0.00026, 0.00018 and 0.00007, respectively, for the four lag periods. The negative correlations could indicate that the returns of agricultural investments take time to be realized and thus do not appear to be immediately correlated with better human development outcomes.

In the same way, education expenditure (ED) shows negative and statistically significant regression at all the lags ranging from -0.0374 to -0.0051. The figures suggest that a 1% rise in the share of GDP spent on education will negatively affect the HDI by about 0.00037, 0.00024, 0.00011, and 0.00005 units in the short term. The negative short-run coefficients can be explained by the fact that educational investments usually have a time lag, meaning that the benefits of education and human capital accumulation on human development are realized over a period of time.

Infrastructure expenditure (INF) has statistically significant and positive coefficients of 0.0305, 0.0180 and 0.0083, with p-values less than 0.01. The results show that a 1% rise in the level of infrastructure spending as a share of GDP is associated with a short-term rise in the HDI of around 0.00030, 0.00018 and 0.00008 units respectively. The positive correlation implies that the provision of infrastructure could bring more immediate benefits through enhancing access to transportation, public services, communication, and other infrastructure amenities that have direct impacts on living standards.

The Error Correction Term (ECM) is statistically significant at 1% level and has a negative sign of -0.6902. A negative and significant coefficient is a confirmation that there is a stable long-run relationship between the variables. The size of the coefficient suggests that about 69.02% of the short run disequilibrium is cured in one period, suggesting a fairly quick approach to the long run equilibrium path after a shock.

The overall effects of the short run results are that agricultural and education expenditure have a negative effect on HDI while infrastructure expenditure has a positive effect. All the coefficients are significant indicating that these relationships are statistically significant in the study period. While some expenditure categories show contrasting short- and long-run effects, this could reflect differences in the time needed to have an impact on human development outcomes from public spending in various sectors.

4.2.6 VEC Granger Causality/ Wald Tests

Table 6 VAR Estimation Results

Causal Relationship	**Chi-square**	**P-value**	**Decision**
ln_AGR → HDI	1.639	0.441	Not Significant
HDI → ln_AGR	7.377	0.025	Significant
ln_ED → HDI	17.174	0.000	Significant
HDI → ln_ED	16.236	0.000	Significant
ln_INF → HDI	15.105	0.001	Significant
HDI → ln_INF	0.322	0.851	Not Significant

Source: Author's computation using STATA

The Granger causality test outcomes show the bi-directional causality between education expenditure and human development index, which means that human development is affected by education expenditure and in turn, education expenditure is affected by human development. There is a unidirectional causal relationship from infrastructure expenditure to HDI, indicating that infrastructure expenditure is useful to predict human development outcomes. The causality direction for the agricultural expenditure-HDI relationship is different from the aforementioned; the relationship is in the opposite direction, from human development to agricultural expenditure, meaning that the agricultural expenditure changes lag behind the human development changes in the study period.

4.2.7. Post-estimation Diagnostic Tests Results

Several diagnostic tests were conducted following estimations to ensure the robustness of the model. The results are presented in Table 7 below.

Table 7 Post estimation Diagnostic Test Results

Test	Test Statistic	P-value	Decision Criteria	Decision
Breusch-Godfrey Test	0.284	0.5944	P-value > 0.05: No autocorrelation	No autocorrelation
Jarque-Bera Test	0.82	0.6626	P-value > 0.05: Normal distribution	Normal distribution
Ramsey reset test	1.38	0.3162	P-value > 0.05: No omitted variables	Model is well specified
Breush-pagan test	0.14	0.7070	P-value > 0.05: Homoscedastic	Homoscedastic

Source: Author's computation using STATA

The post-estimation diagnostic tests show that the model meets key assumptions of Ordinary Least Squares regression. Residuals are normally distributed and there is no autocorrelation, nor is the data homoscedastic. Missing variables are not a concern as the model is well-specified. All the tests have no significant problems with the model. In addition, to check for stability of the model parameter over time, the time series nature of the data results in the use of the Cumulative Sum test and the Cumulative Sum of Squares test. The results are presented in Table 4.9 below.

Table 8 Cumulative Sum test for parameter stability

Test statistic	1% Critical Value	5% Critical Value	10% Critical Value
0.5297	**1.1430**	**0.9479**	**0.850**

Source: Author's computation using STATA

The test statistic of **0.5297** is smaller than the 1%, 5% and 10% critical values, indicating that the parameters are stable. The Cumulative Sum of Squares plot also does not show any structural breaks during the study period, thus providing reason for the evidence of no structural breaks (see Appendix). Therefore, the results of the ARDL model can be considered reliable and robust.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study explored the effect of Sectorial Public expenditure on economic development in Ethiopia during 1990-2023. The primary goal was to explore the relationship between government expenditure on education, agriculture, infrastructure and Human Development Index (HDI) and to analyze the short and long effects of government spending. The ARDL bounds test result indicates that there is a stable long-run relationship between public expenditure components and HDI, which is confirmed by the econometric result. Moreover, all the diagnostic and stability tests indicated that the model is well-specified, does not have significant econometric issues and can be interpreted with confidence.

Descriptive analysis reveals that the HDI is on a steady upward trend over time, whereas the sectorial expenditure is highly volatile indicating uneven allocations of fiscal resources over time across sectors. Infrastructure has the highest mean spending, followed by education and agriculture.

The long-run results show a strong variability in the effect of public expenditure by sector. Education expenditure has a strong and statistically significant positive association with HDI, and the agricultural expenditure also has a positive association with human development to a relatively lesser extent. The results indicate that investments in education and agriculture are among the most important factors in improving human development outcomes in Ethiopia, in terms of enhancing human capital formation, productivity, income generation and overall welfare. Conversely, infrastructure spending exhibits a statistically significant negative long run connection to HDI, which could indicate inefficiencies in public investment, lag times in the benefits of investment and/or poor correlation between investments in infrastructure spending and direct human development outcomes within the study period.

The short run results do not follow the pattern of the long run results. This is because infrastructure expenditure has a positive and significant short run effect on HDI, meaning that the benefits of investment in infrastructure are more immediate than the other sectors. The effects of education and agricultural spending, however, are negative in the short-run, indicating that these

positive effects take time to become apparent and are not captured in human development indicators. The error correction term is negative and statistically significant as was expected to show that there is a stable long-run equilibrium and that deviations from it are corrected at relatively fast rate in the short run.

The causality results also show that there are some mixed direction results between the variables. The education expenditure-HDI relationship is bidirectional, meaning that there is a reinforcing effect between the two. There is unidirectional effect of infrastructure expenditure on HDI, which is found to be an exogenous factor to human development and vice-versa is not found with agricultural expenditure. Overall, results establish that the proportion of public spending influences human development outcomes in Ethiopia strongly, and especially in the long-run where education proves to be the most important sector.

5.2 Recommendations

- Government should focus on education spending in the budget, and it has the most long-run positive effect on economic development and it has reinforcing causal relationship with economic development. Improved investment in the quality of education, access to education and infrastructure will lead to better long-term human capital development and welfare.
- Investments in agriculture should be reinforced and more precisely directed, because of the favorable effect of such investment in the long term on economic development. Policies should be aimed at improving the agricultural productivity using modern farming technologies, irrigation systems, extension services and rural development programmes which will increase income generation and food security, which are essential pillars of HDI.
- Attention should be paid to efficiency in infrastructure spending, given its negative long-run effect, which may reflect infrastructure inefficiencies or a lack of developmental linkages. Strengthening the planning, monitoring and evaluation of infrastructure projects will lead to sustainable improvements in human development outcomes through public investment in this sector.

- Policy makers need to look to the long run to assess the effect of public expenditure, including in the fields of education and agriculture, since the payoff from such expenditures is not immediate. Such short term evaluations can thus overestimate the value of their contribution to development outcomes.
- Evidence-based allocation strategies for public expenditure should be used, prioritizing sectors that have higher human development return. Adopting tax discipline and applying policy judgment based on evidence will enhance the effectiveness of Ethiopian government spending and help achieve sustainable development outcomes.

5.3 The Limitations of this Thesis and Future Research

There were some limitations to this study, which need to be taken into account. Small annual time series sample may make estimates less robust and may not be as representative of short run dynamics. Multicollinearity may also cause omitted variable bias as several important variables were not included in the model, e.g. health expenditure, technology, and labour. This also hides the regional variations in public expenditure effects in Ethiopia.

Additional variables like health, institutional quality and technology should be added in the future research for a comprehensive study. It is also suggested to use regional or panel data to account for the spatial heterogeneity and to use nonlinear or threshold models. Longer data sets or a more frequent data set may also enhance the accuracy and depth of future studies.

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APPENDICES

Appendix A : Unit root test

. dfuller ln_AGR

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-1.277	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.6396

. dfuller ln_ED

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-2.368	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.1510

. dfuller ln_K

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-0.963	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.7665

. dfuller ln_A

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-3.960	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.0016

. dfuller ln_HE

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-1.486	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.5402

. dfuller ln_INF

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-1.585	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.4909

. dfuller ln_L

Dickey-Fuller test for unit root — Number of obs = 33

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-3.623	-3.696	-2.978	-2.620

MacKinnon approximate p-value for Z(t) = 0.0053

```
. dfuller d_HDI

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -3.577       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0062

. dfuller d_AGR

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -6.593       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller d_INF

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -5.795       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller d_K

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -7.565       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller d_ED

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -4.782       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0001

. dfuller d_HE

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -7.370       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller d_A

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -4.231       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0006

. dfuller d_L

Dickey-Fuller test for unit root                   Number of obs   =        32

                         ---------- Interpolated Dickey-Fuller ---------
                 Test    1% Critical    5% Critical    10% Critical
               Statistic     Value          Value          Value
------------------------------------------------------------------------------
 Z(t)           -2.267       -3.702         -2.980         -2.622
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.1827
```

Appendix B: ARDL Model Estimation Results

```
. varsoc hdi ln_AGR ln_ED ln_INF ln_K

   Selection-order criteria
   Sample:  1994 - 2023                        Number of obs      =        30
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	21.2355				2.3e-07	-1.08237	-1.00766	-.848834
1	144.898	247.32	25	0.000	3.3e-10	-7.65986	-7.21161	-6.25866
2	172.013	54.23	25	0.001	3.4e-10	-7.80088	-6.97908	-5.23201
3	211.91	79.794	25	0.000	1.9e-10	-8.79401	-7.59867	-5.05749
4	280.7	137.58*	25	0.000	3.0e-11*	-11.7133*	-10.1444*	-6.80912*

```
   Endogenous:  hdi ln_AGR ln_ED ln_INF ln_K
    Exogenous:  _cons
```

```
. ardl hdi ln_AGR ln_ED ln_INF ln_K, maxlags(4) ec btest

ARDL(3,4,4,3,0) regression

Sample:     1994 -     2023                 Number of obs     =         30
                                            R-squared         =     0.9639
                                            Adj R-squared     =     0.9049
Log likelihood =  160.10564                 Root MSE          =     0.0019
```

D.hdi	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
hdi						
L1.	-.690179	.0856103	-8.06	0.000	-.8786059	-.5017521
LR						
ln_AGR	.0489721	.0057559	8.51	0.000	.0363034	.0616407
ln_ED	.0747097	.0053405	13.99	0.000	.0629554	.0864639
ln_INF	-.0415089	.0041177	-10.08	0.000	-.0505718	-.0324459
ln_K	-.002379	.0020809	-1.14	0.277	-.006959	.0022009
SR						
hdi						
LD.	-.4919125	.1272807	-3.86	0.003	-.7720555	-.2117695
L2D.	-.4355507	.1203217	-3.62	0.004	-.700377	-.1707244

ln_AGR						
D1.	-.031988	.0050403	-6.35	0.000	-.0430817	-.0208944
LD.	-.0261318	.0044499	-5.87	0.000	-.0359259	-.0163377
L2D.	-.0179084	.0030589	-5.85	0.000	-.0246411	-.0111757
L3D.	-.0072431	.0026523	-2.73	0.020	-.0130807	-.0014055
ln_ED						
D1.	-.0373961	.0064421	-5.80	0.000	-.0515751	-.0232172
LD.	-.0242442	.0038757	-6.26	0.000	-.0327745	-.0157139
L2D.	-.0112339	.0026351	-4.26	0.001	-.0170338	-.0054341
L3D.	-.0051173	.0021745	-2.35	0.038	-.0099033	-.0003314
ln_INF						
D1.	.0304508	.0043948	6.93	0.000	.0207779	.0401236
LD.	.0179796	.003858	4.66	0.001	.0094882	.026471
L2D.	.0082659	.002432	3.40	0.006	.0029131	.0136187
_cons	.3367024	.0402383	8.37	0.000	.2481384	.4252664

Pesaran/Shin/Smith (2001) ARDL Bounds Test
H0: no levels relationship F = 15.298
t = -8.062

Critical Values (0.1-0.01), **F-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_4	2.45	3.52	2.86	4.01	3.25	4.49	3.74	5.06

accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), **t-statistic**, Case 3

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_4	-2.57	-3.66	-2.86	-3.99	-3.13	-4.26	-3.43	-4.60

accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship
Critical values from Pesaran/Shin/Smith (2001)

Appendix C: VEC Granger Causality

```
. vargranger
```

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
hdi	ln_AGR	1.6389	2	0.441
hdi	ln_ED	17.174	2	0.000
hdi	ln_INF	15.105	2	0.001
hdi	ALL	20.785	6	0.002
ln_AGR	hdi	7.3773	2	0.025
ln_AGR	ln_ED	2.9203	2	0.232
ln_AGR	ln_INF	2.8064	2	0.246
ln_AGR	ALL	16.554	6	0.011
ln_ED	hdi	16.236	2	0.000
ln_ED	ln_AGR	1.3066	2	0.520
ln_ED	ln_INF	.65889	2	0.719
ln_ED	ALL	28.843	6	0.000
ln_INF	hdi	.32166	2	0.851
ln_INF	ln_AGR	.64305	2	0.725
ln_INF	ln_ED	11.771	2	0.003
ln_INF	ALL	18.778	6	0.005

Appendix D: Diagnostic Tests

After removing health

```
. vif
```

Variable	VIF	1/VIF
ln_ED	8.91	0.112231
ln_INF	7.65	0.130636
ln_AGR	6.00	0.166729
ln_K	5.64	0.177377
Mean VIF	7.05	

before removing health

```
. vif
```

Variable	VIF	1/VIF
ln_he	24.71	0.040474
ln_ed	10.64	0.094015
ln_inf	10.37	0.096439
ln_ag	8.03	0.124594
ln_pr	6.17	0.161975
Mean VIF	11.98	

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of D.hdi

         chi2(1)      =     0.14
         Prob > chi2  =   0.7070
```

```
. estat bgodfrey

Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
1	0.284	1	0.5944

H0: no serial correlation

```
. sktest resid

                    Skewness/Kurtosis tests for Normality
                                                              ------ joint ------
    Variable |        Obs  Pr(Skewness)  Pr(Kurtosis) adj chi2(2)    Prob>chi2
-------------+-------------------------------------------------------------------
       resid |         30      0.3792        0.9306        0.82          0.6626
```

```
. estat dwatson

Durbin-Watson d-statistic( 19,    30) =  2.027705

. estat sbcusum

Cumulative sum test for parameter stability

Sample: 5 - 34                                  Number of obs =         30
Ho: No structural break
```

Statistic	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
recursive	0.5297	1.1430	0.9479	0.850

```
. estat imtest

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	30.00	29	0.4140
Skewness	21.77	18	0.2423
Kurtosis	0.25	1	0.6163
Total	52.02	48	0.3202

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of D.hdi
       Ho:  model has no omitted variables
                  F(3, 8) =      1.38
                Prob > F =      0.3162
```

