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Foreign Finance, FDI-Climate Interaction and Economic Development in Ethiopia: A Time Series Analysis

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ABSTRACT: Developing countries such as Ethiopia, over the years particularly after the cold war, starting from early 1990s have adopted neoliberal policies through reforms to attract foreign finance for development needs in view of inadequacy of domestic capital for public and private investment. However, despite the inflow of foreign capital into the economy, it is still grappling with major development challenges. It is in view of this that this study examines the impact of foreign finance on the economy, and whether FDI-climate interaction limits the potential impact of foreign direct investment (FDI) as an important component of foreign capital, on economic development in Ethiopia. The study further reveals the implications of post-cold war adoption of market-oriented policies in Ethiopia. The study uses autoregressive distributed lag (ARDL) model with data spanning from 1981 to 2020. It is found that FDI has positive and significant impact on economic development in the long run, but the positive effect is revealed to be insignificant in the short run. On the other hand, foreign debt is revealed to have long term negative though insignificant impact on economic development of the country. Furthermore, it is revealed that FDI-climate interaction has negative implication on the economy in both the long run and short run. Therefore, the effectiveness and efficiency of foreign finance on growth and development outcome in Ethiopia is conditional on whether it produces long run sustainable environmental outcome. Also, the adoption of neoliberal policies has not resulted in development of Ethiopia. Hence, the study recommends among others, the need for consideration of absorptive capacity of the country as a recipient economy and in its reforms, as well as the need for the government and development partners to ensure assessment of the long run potential environmental impact of foreign capital before they are deployed on the economy.

KEYWORDS: Foreign Finance, FDI-Climate Interaction, Economic Development

INTRODUCTION

Developing countries' prime area of policy objective has been the attainment of high and sustainable economic growth and development. Yet, to achieve this, policy makers have had to grapple with understanding the drivers of economic prosperity part of which has been identified to be foreign finance (Terefe, 2018). Thus, development thinking from the mid-twentieth century has prescribed foreign capital as a panacea for driving economic growth of developing countries in view of their inherent challenge of insufficient domestic capital to finance development needs (Wako, 2017; Girma and Tilahun, 2022; Tadesse, 2011). Therefore, external capital has been recognized as one of the avenues through which low-income economies can enhance growth and development (Adedokun, 2017). This has necessitated reforms in the developing world especially after the cold war and adoption of neoliberal policies part of which is opening up of the economies in order to attract foreign capital.

Ethiopia in particular, which was much tilted towards socialism in its early years as a country started having neoliberal leaning, and embracing of free market economic system particularly in the early 1990s after the implosion of the socialist military government. This was championed by Ethiopian People's Revolutionary Democratic Front (EPRDF). It adopted market-oriented structural and institutional reforms as a precondition for inflow of external capital and credit to engender recovery of the Ethiopian economy which was stagnated in the 1970s and 1980s (Demissie, 2008). This is not to rule out the fact that there has been interventionist economic model to stabilize the new ideological disposition of the economy, but the market system became a more visible trajectory of economic management system in the country. However, scholars have argued that neo-liberalism has not helped in solving socio-economic and geo-political problems of Ethiopia, because in particular, the structural adjustment

program (SAP), a pro-market policy that was adopted in the country, was designed by industrialized countries having neo-liberalism perspectives without appreciation of the uniqueness of the economy of Ethiopia and the inherent cultural idiosyncrasy of the people (Demissie, 2008; Mekuria, 2021). This has had implications on the gains from foreign finance.

Deriving from the foregoing, Adebayo and Kalmaz (2020), Duresa (2022) and Terefe (2018) have explained the obvious realities of most developing economies that necessitates the need for foreign finance in terms of challenges of three resource gaps faced by them. First, there is saving gap which hampers the realization of desired investment and appears in the form of excess supply of labour constrained by limited capital. Second, there is foreign exchange gap thus earnings from foreign exchange through exports are not enough to fund the importation of capital goods for investment purposes. Duresa (2022) explained that Ethiopia's dependence on export of limited primary agricultural products such as coffee makes it to be exposed to the challenge of foreign exchange gap. Third, developing countries suffer from fiscal gap as their government revenue is not adequate to finance domestic projects and achieve targeted investment and growth. Therefore, foreign finance becomes important to fill these gaps in order to foster economic growth and development. In countries like Ethiopia where there is considerable resource gap, the flow of foreign capital must fill the aforementioned gaps (Terefe, 2018).

However, what appears not to have been captured in the literature and that requires urgent attention is the environmental sustainability gap (the fourth gap). The inclusion of environmental gap is germane in view of the current experiences of climate change in the developing world and its attendant consequences. Foreign finance is needed to close the gap between the current realities of African environmental challenges (climate change) and what is required as sustainable environment. On the contrary, apart from industrial activities in developed countries, the literatures have pointed out that foreign capital inflow, especially foreign direct investment (FDI) has proven to pose environmental threats due to their greenhouse gasses (GHGs) emission resulting in climate change and associated developmental challenges in the continent (see Opoku and Boachie, 2020; Ahmed et al., 2022; and Ali, 2022). Foreign capital could have exacerbated the magnitude of GHGs and particularly carbon (CO_2) emission in the continent and indeed Ethiopia, judging from the fact that Africa has not evolved considerably in the areas of climate policies hence it could be that the continent (and Ethiopia in particular) is attractive to foreign finance inflow from companies that seek to avoid the identified competitive disadvantages related to stringent environmental regulations in their locality. Considering Ethiopia, being dominated by rural society with more than 70 percent of the total population living in rural areas; with high incidence of poverty and being one of the poorest countries in the globe; with an economy that is very subsistence relying on agriculture, which depends on and is vulnerable to climate conditions (Duresa, 2022), foreign finance should enhance environmental sustainability by mitigating its degradation, and improving on adaptation to, instead of exacerbating climate change through GHGs, and in particular, carbon emissions.

Nonetheless, the need for external capital in developing economies is very important and explains why policies are being made to attract it into these economies, and different development partners are embracing policies that will increase the level of foreign capital, particularly aid inflow to less developed countries (LDCs). For instance, in 1970s, developed countries came to agreement to dedicate 0.7 percent of their gross national income (GNI) annually for official international development, though they rarely meet up with it. However, countries in sub-Saharan Africa (SSA) have been recipients of foreign development finance for decades, and other forms of foreign capital, but still remain as one of the poor regions of the world (Adedokun, 2017). Thus, foreign finance has been blamed to be one of the factors responsible for Africa's underdevelopment – it is explained to be the malady to which it pretends to be the cure (Moyo, 2009). This is because the expectation is that if external capital should be the panacea for development, SSA should have recorded significant advancement over the years given the magnitude of foreign finance inflow into the economies (Adedokun, 2017). The non-performance of foreign finance as witnessed in the economic realities of developing nations that have received a substantial amount of it has led to questions about whether it is a valuable and effective strategy for triggering GDP growth and development in the beneficiary nations (Adebayo and Kalmaz, 2020). In particular, despite Ethiopia's abundant human and material resources, and its receipt of foreign capital over the years, it is still classified as a developing economy. The country has received a reasonable level of foreign capital/aid yet it still ranks among the poor countries of the world. The debate has been that the negative or limited effectiveness of foreign capital on growth in developing countries has been due to governance challenges, weak institutions and insufficiency of human capital. This study adds environmental challenges posed by foreign finance (FDI in particular) as one of the reasons for the limited effectiveness of foreign capital on development.

Although economic theory suggests that foreign capital flows should enhance economic growth and development as it contributes to host country's capital accumulation, result in technological diffusion, and brings about improvement in techniques of management and productivity spillovers (Agbloyor et al., 2016). However, in spite of this theoretical backing for foreign finance, the empirical literatures have produced largely mixed and inconclusive findings. The explanations for this have been attributed to the peculiar characteristics of recipient economies. Agbloyor et al. (2016) explained that it is evident that foreign capital flows

promote growth and development only under certain conditions which include sufficiency of human capital, trade liberalization, stable economy, adequate infrastructure, strong institutions, level of financial development, and good governance. All these determine the extent of realization of benefits from foreign capital inflows. The realizable benefits depend on the recipient economy's absorptive capacity. Nevertheless, a number of studies have revealed widespread failure of foreign capital in developing countries particularly in sub-Saharan Africa (SSA). These studies include Agbloyor et al. (2016), Adedokun (2017), and Wako (2017). However, there are also works that have revealed external finance inflow to have positive impact, for instance, Zuniga (2011), Tadesse (2011), and Girma and Tilahun (2022). Studies that revealed negative impact of external capital (particular aid) on economic growth have blamed some factors to be responsible for the failure of external finance. Some researchers have hinged the failure of foreign finance on policy and institutions (Zuniga, 2011; Agbloyor et al., 2016; Wako, 2017; and Terefe, 2018). Others have blamed limited human capital in recipient countries (Su and Nguyen, 2020; and Mohd and Muse, 2021). The research conducted by Adedokun (2017) explained that governance and foreign finance complementarity have implications on growth enhancement of foreign capital.

On the whole, researchers that found external capital (especially foreign aid) to be growth and development enhancing are of the opinion that it augments savings, finances investments and increases productivity. In contrast, a general consensus of the studies that found external finance to have negative implications on growth and development advanced some reasons to be responsible. The reasons given among others include misuse of aid (aid fungibility), corruption, maladministration, tying up of aid with precious resources in recipient countries, crowding out effect of external finance on the private sector, discouragement of savings, weak institutions and policy environment, insufficient level of human capital and aid disbursement volatility (Adedokun, 2017).

Apart from the foregoing factors established in the existing literature to have contributed to failure or limited socioeconomic effectiveness of external capital, this study argues that the potential impact of foreign finance on economic growth in sub-Saharan Africa and particularly in Ethiopia is likely to be undermined by the impact of foreign capital (FDI in particular) on environment/climate change. This is in view of the fact that foreign finance (FDI) is established to result in the emission of greenhouse gasses that pose threats to the environment thereby further having negative implications on livelihoods (Ahmed et al., 2022; and Ali, 2022; Opoku and Boachie, 2020). The livelihood is affected by climate change particularly in African countries due to the dependence of the nations in the continent on economic activities that are closely linked to nature hence are vulnerable to climatic changes, and the fact that Africa has limited adaptive capacity. Therefore, foreign finance (FDI) inflow interaction with the Ethiopia's environment/climate and the resultant negative implications on nature and livelihoods could undermine its economic growth effectiveness.

From the foregoing, it is evidenced that attention has shifted from mainly examining the foreign finance and economic growth nexus which puts aside certain potential factors that limit efficient growth enhancement potentials of foreign capital. Recent studies examine issues around conditionality, the policy environment of the recipient country, human capital, macroeconomic and political stability, governance and institutions, and exogenous economic shocks and structural economic vulnerability as well as external influence (Terefe, 2018; Mercieca, 2010; Guillaumont, 2008; Zuniga, 2011; Agbloyor et al., 2016; Adedokun, 2017; Wako, 2017; Su and Nguyen, 2020; and Mohd and Muse, 2021).

Apart from the aforementioned factors, this study shifts attention to the environment. The key question therefore, is whether foreign finance has resulted in economic prosperity in Ethiopia measured by her per capita GDP growth rate; and what has happened to the environment in Ethiopia given the influx of foreign capital (FDI); and thus, could it be concluded that the interaction of foreign capital with the environment has negative implications on its economic development enhancing potentials? This is because the effectiveness and efficiency of foreign finance on growth and development outcome is conditional particularly in the sense of whether it produces sustainable environmental outcome. Thus, according to Terefe (2018), the interpretations of foreign finance-growth nexus basically fall into two different classifications namely; unconditional and conditional effects of foreign capital. The focus of this study is that the optimality in foreign finance-development relationship in Ethiopia is conditional upon the implications of external finance on the environment or its interactions with the environment through its carbon emissions in the country. In addition, the study also puts forward an empirical assessment of the post-cold war development impact on Ethiopia, the adoption of neoliberal policies in order to attract foreign finance into the economy.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

In view of the nature of the topic, three key concepts have been reviewed. These are foreign finance, climate change and FDI-climate interaction, and the concept of development.

2.1.1 Foreign Finance

Foreign finance is the inflow of public and private resources or capital from outside an economy in order to close the gaps in domestic savings, foreign exchange earnings or current account imbalance and fiscal deficit. Foreign capital is necessitated by the need for investment in targeted sectors to improve wellbeing of the people in developing countries. The inflow of international resources could be in the form of (a) foreign direct investment by multinational corporations (MNCs) that set up businesses in foreign lands with headquarters in a given country particularly a developed or high-income and upper-middle income countries in America, Europe or Asia; (b) private portfolio investment which takes place through having stake in stocks, bonds, etc. in developing countries' financial markets; (c) remittances of earnings by citizens abroad; and (d) foreign aid/development assistance from private or public sources which could be in the form of loans, grants or donations from foreign governments, multinational institutions/donors, and international nongovernmental organizations (INGOs) (Todaro and Smith, 2014). The study focusses on foreign direct investment and foreign aid in the form of foreign debt to measure foreign finance as these two constitute the highest components of foreign capital.

2.1.2 Climate Change and FDI-Climate Interaction

Climate change means persistent variation in the weather pattern caused by anthropogenic activities mostly connected to industrialization. It manifests itself as a long-term alteration in the average statistics of the weather over time and this could be in the form of variations in expected average values for temperature and precipitation for a given place and time of year, from one decade to the next (Chigbo, Chidozie & Chekwubechukwu, 2016). Climate change has been driven mainly by man's interaction with nature through socioeconomic activities. The interaction with the natural environment by human activities result in the emission of greenhouse gasses (GHGs) especially carbon (CO_2). According to Kempe (2009), climate change is attributed to greenhouse gases (GHGs) like carbon, methane, nitrous oxide and others, produced by human activities - burning of fossil fuels (coal, oil and natural gas) for industrial production, cutting down rainforests etc.- which change the atmosphere's composition by increasing the amount of greenhouse gases, which, in turn, traps more heat in the atmosphere and thereby facilitating climatic change. Carbon (CO_2) accounts for the overwhelming majority of the greenhouse effect that leads to climatic change. Anthropogenic emissions of carbon dioxide accounts for about 63% of the greenhouse gas warming effects in the long term and for 91% in the short term (May and Caron 2009). The advanced countries are quicker enough to realize the adverse environmental consequences of climate change and its resulting negative implications on wellbeing. This prompted strict environmental guidelines in those countries. Hence, with the strict environmental regulations in advanced countries and weak environmental guidelines at home in particularly developing countries, developed countries multinational corporations (MNCs) and other firms relocate their environmentally unsafe industrial activities to less developed countries (LDCs) making the developing countries to become pollution haven. In effect, FDI has brought environmental degradation in LDCs through its interaction with the environment thereby posing threat to sustainable development (Ahmed, et al., 2022; Neequaye & Oladi, 2015; Tang & Tan, 2015; and Al-mulali & Tang, 2013).

2.1.3 Economic Development

Economic growth and economic development have been used interchangeably but they do not necessarily refer to the same thing. Growth refers to the increase, overtime, of an economy's output of goods and services. It does not include the desirable structural changes in the society's socioeconomic arrangement. It only compares output in the current year with that of a previous and overlooks the nature of distribution and wellbeing of the citizens in the economy. The concept of development is more embracing as it is not only concerned with issues of growth but also focuses on the distribution of proceeds from growth. Thus, economic development is generally defined to include improvements in material welfare of people with lowest income, the eradication of mass poverty and illiteracy, reduction in unemployment and inequality, disease and early death, changes in the composition of inputs and outputs that generally include shift in the underlying structure of production away from agricultural towards industrial activities, and environmental sustainability. Therefore, the concept of economic development connotes entire transformation of an economy from a less desirable to a more desirable one, bringing overall improvement in the wellbeing of the entire citizenry or the human conditions (Jhingan, 2007; Todaro and Smith, 2014). In view of this conceptual clarification of development, one is confronted with complexity of indices that could be used in to measure development, hence difficulty in its measurement. The study adopts one of the traditional measurements of the concept in terms of growth in real per capita income which implies expansion in income per head and the output of an economy at a rate faster than the growth rate of its population and improvement in the capacity of the people to acquire more goods and services (Todaro and Smith, 2014).

2.2 Theoretical Framework

The study rests on a tripod of theories namely: The Harrod-Domar growth theory, the exogeneous growth model, and the pollution haven hypothesis (PHH). According to Harrods - Domar growth model, the main objective of foreign capital is filling the saving gap

in order to enhance the level of investment then improve productivity and economic growth. Hence, it implies that the main purpose of aid is to enhance investment. Generally, the Harrod-Domar growth model also known as the AK model explains that an economy's growth depends directly on the national net savings rate(s) and inversely on the national capital-output ratio. It means that for every economy to grow, it must save a certain proportion of its national income, and must ensure that there is new investment representing net addition to capital stock with lower capital-output ratio. The capital-output ratio means how much and quality of resources needed to produce a certain output or that output growth depends on the efficiency of investment (Todaro and Smith, 2014; Ali, 2020). The conclusion of the H-D model is expressed in the following equation:

$$\frac{\Delta Y}{Y} = \frac{s}{c}$$

The left-hand side of the equation above represents the rate of growth of GDP. On the right-hand side, s is the net national savings ratio and c is the capital-output ratio. The policy implication of the H-D model is that the growth rate of the economy can be influenced by policy makers by designing policies to reduce the capital-output ratio such as investment in human capital and ensuring application of better technology, while influencing increase in the rates of savings and investment. The Harrod –Domar model conclude that the constraints of saving poses limitation to economic growth. Hence, given the realities of developing economies such as Ethiopia, domestic saving alone is not enough for the needed investment level that can attain the necessary growth level, implying that growth is limited by saving gap. Hence, the need for foreign capital to fill this gap and boost domestic saving to achieve the desired rate of growth becomes necessary (Duresa, 2022). However, the major shortcomings of the H-D model are its assumption of fixed capital-labour proportion and the fact that it does not provide for flexibility in factor substitution.
The exogenous or traditional neoclassical growth theory developed by Solow and Swan (1956) is also used to investigate the nexus between foreign capital and economic growth. The Solow growth model was originally developed to explain how growths in the capital stock, labor force, and technological advancement interact in an economy to improve a nation's total output of goods and services (Todaro and Smith, 2014; Anyanwu and Oaikhenan, 1995; Mankiw, 1992). Jhingan (1997) asserts that the neoclassical assumption of substitution of labour and capital makes the growth process adjustable and more realistic. In other words, the traditional neoclassical growth model explains that growth comes from one or more of three factors; increase in labour quantity and quality (through population growth and education), increases in capital (through saving and investment), and improvement in technology (Ali, 2020). The growth function takes the following form:

Y = f(K, L,T)

Where Y = output; K = stock of physical capital; L = Labor force, and T **=** technological change. The Solow growth model assumes physical capital stock as the main determinant of economy's output, changes in it influences changes in economic growth. Among the different factors that influence capital stock in an economy are both private and public investment (Girma and Tilahun, 2022). They increase the physical capital stock of an economy which in turn result in positive contribution to gross national output. But public investment could be financed from different sources such as tax and foreign capital (Girma and Tilahun, 2022)**.** However, the criticism of the theory is hinged on its assumption that technology and human capital are exogenously determined outside the model, and the theory seems to make developing economies to be dependent on the outside for the attainment of their development aspirations.

With respect to the PHH hypothesis, it is posited that opening up of the economies of developing countries for the inflow of international trade and FDI is likely to result to the degradation of the environment as the activities of the foreign firms is likely to constitute negative externalities such as pollution or emissions of GHGs in the host economy. The PHH in this regard rests on the assertion that the openness of the developing economies will attracts the influx of international trade and FDI of multinational corporations from developed countries with stringent environmental control policies. These multinational corporations by implication will move the production of their pollution intensive products to developing economies where there are poor environmental control policies (Eskeland & Harrison, 2003; Copeland, 2005).

2.3 Empirical Review

2.3.1 Review of Empirical Studies on Foreign Finance and Economic Development Nexus

A number of studies have examined the nexus between foreign finance and some measures of development. Girma and Tilahun (2022) examined the nature and extent of foreign aid and the macroeconomic policy environment contribution to economic growth in Ethiopia over the period 1985 to 2019 employing an autoregressive distributed lag (ARDL) approach. The empirical finding showed that foreign aid has a positive role in economic growth in the long run but its short run effect is found to be insignificant. On the whole, it revealed that both in the short run and long run the predictability of foreign aid has a positive effect both on economic growth. Also, macroeconomic policy index was found to have positive effect in the long run, but its short run effect was shown to be negative.

Tadesse (2011) investigated the unresolved question of aid effectiveness (measured usually in terms of its impact on economic growth) in Ethiopia with data from 1970 to 2009. The study employed a multivariate cointegration technique. Foreign aid as entered alone revealed positive effect on growth. However, the aid-policy interaction term showed significant negative effect on growth which implies that bad policies have constrained aid effectiveness. Bad policies make aid not to be effective.

Mohd and Muse (2021) analysed the effect of foreign direct investment (FDI) on Ethiopia's economic growth in the years 1981 to 2017. The study used Vector Autoregressions (VARs) model. The empirical finding showed that FDI had positive and significant impact on Ethiopia's economic growth in both the long run and short run. Also, FDI impact on growth was found to be enhanced by human capital and stable macroeconomic environment. Gross fixed capital formation and government consumption had significantly negative impact on economic growth. Furthermore, the study showed that there is no causal relationship between FDI and economic growth.

Duresa (2022) investigated how foreign aid has influenced economic growth and investment in Ethiopia from time 1974 to 2014. The study employed both vector autoregressive model (VAR) and (Vector error Correction model (VECM) to capture short run dynamics. The study found that foreign aid has a significant positive effect on economic progress in both lengthy run and squat run. On other hands, aid has irrelevant and positive effect on gross domestic investment in both extensive time and short run. Foreign direct investment was revealed to be negatively but not significantly related to economic growth. Furthermore, unidirectional causality among foreign aid to economic growth and foreign aid to gross domestic investment was found.

Terefe (2018) examined the drivers of economic growth with focus on interaction between aid and policy and the resulting effect on economic growth of Ethiopia using time series data spanning from 1970 to 2016. It was revealed that foreign aid inflow entered alone is positively and significantly related to economic growth. Also, aid when complemented with policy have a positive contribution to economic growth of the economy.

Agbloyor et al. (2016) investigated the relationship among foreign direct investment (FDI), institutions and economic growth in sub-Saharan Africa. The study used a two-step generalized methods of moments technique. From the whole sample of countries examined, FDI was found not to promote growth; institutions and economic growth had no significant relationship; and institutions do not favourably modify the effect of FDI on economic growth. Excluding countries with developed financial market in the subsample, the study does not find a significant relation between FDI and economic growth. However, it was found that institutions play a direct role in spurring economic growth. Further, the quality of institutions seems to favourably modify the relationship between FDI and economic growth. Also, excluding countries with abundant natural resources in another subsample, evidence of a direct and positive relationship between FDI and economic growth was revealed. In addition, it was found that there exists a direct relationship between institutions and economic growth. However, the growth-enhancing effects of FDI reduced as the quality of institutions improves.

Zuniga (2011) examined the effect of remittances on macroeconomic growth of developing countries employing panel vector autoregression (panel VAR). It was found that remittances have a positive, although small, impact on economic growth with and without considering the role of institutions. However, a distinction by geographical region showed that Eastern European economies obtain more benefit from the flow, followed by the Americas and Asia. African economies do not appear to be significantly affected by remittances.

Adedokun (2017) investigated the differential relationship among foreign aid, governance and economic growth in sub-Saharan Africa (SSA) with data from 1996 to 2012 thus, examining heterogeneity issues in aid recipient countries with further focus on whether governance and size of aid matter, employing the system generalized methods of moments (system GMM) technique. Thus, differences in geographical location, economic status, level of governance, resource endowments and aid size/intensity (the percentage of foreign aid in gross national income, GNI) was considered. Hence, SSA were classified into ten groups to take care of heterogeneity in aid-growth investigation. The findings revealed that foreign aid is negatively and insignificant related to economic growth in aggregate SSA. However, heterogeneity existence across aid recipient economies has implications for aid effectiveness. Moreover, there is complementarity of governance and size of aid in improvement of growth in SSA.

Su and Nguyen (2020) assessed the relationship between the flow of foreign finance (i.e., FDI inflows, ODA, and remittances), human capital, and economic growth in Africa with data from 2002 to 2017, and employing two-step system GMM estimator and fixed effect panel quantile regression techniques. Foreign direct investment (FDI) inflows revealed different effects on economic growth, with negative and positive impacts at low and high levels, respectively. The effects are moderated by the human capital of hosting countries. In addition, ODA and remittances were found to have negative effects on economic growth but human capital of recipient countries reduces these negative impacts. On the whole, the results implications point to the conclusion that foreign financial flows have varying relationship with human capital in their influence on economic growth of recipient countries in Africa, hence pointing to the need for more attention on human capital in these countries, along with other measures to improve absorption of foreign finance.

Wako (2017) used panel data from 43 sub-Saharan African countries spanning 1980 to 2013 to make contribution to aid-effectiveness debate. The study employed autoregressive distributed lag (ARDL) approach, and also examined roles of institutions, and recipient and donor heterogeneity. The results revealed that aid from traditional donors is negatively related to economic growth. It also revealed donor heterogeneity after disaggregation. Aid from China was found to perform better on economic growth than aid from traditional donors. However, it has a negative institutional effect. Aid effectiveness on growth based on heterogeneity of recipient is also established in the both the short run and long run.

2.3.2 Review of Empirical Studies on Foreign Direct Investment and Climate Change Nexus

Similarly, studies have specifically examined foreign capital (FDI) and climate change nexus. Among these studies is the one conducted by Ahmed et al. (2022) in a panel study of 55 Asian countries. It found that FDI has a negative impact on the environment. The study's finding aligns with the pollution haven hypothesis (PHH), which predicts that FDI inflow increases environmental degradation in developing countries (including Africa) that mostly do not strict regulation against carbon emission. In another study, Huang et al. (2021) examined the impact of FDI inflows on carbon emission in G20 economies using data from 1996 to 2018. It found that FDI inflows increase the emission of carbon. Though, they argued that while emission increases, mitigation of carbon emissions in developed economies increases.

Other empirical studies which results are in line with the PHH are Al-mulali & Tang (2013), Neequaye & Oladi (2015), Tang & Tan (2015). On the other hand, studies like Ren et al., (2014), Seker et al. (2015), Sapkota and Bastola (2017), and Vitenu-Sackey, 2020) produced results that are in contrast with the propositions of the PHH.

From the foregoing, it is obvious that there is inconclusive finding regarding studies that have been conducted on the impact of foreign finance on economic growth in developing countries. Studies have examined the conditions militating against the realization of efficiency in the impact of foreign capital on growth. They hinged the failure of external capital on among others, factors such as weak institutions, policy weakness, poor human capital, and macroeconomic instability. The argument here is that apart from the identified factors in previous empirical findings, the interaction of external capital with the environment in the form of greenhouse gas (GHGs) emissions have negative implications on economic growth influence of foreign capital. The findings from this study could point to the necessity of the need for careful designing of policies to reexamine foreign capital inflow implications on the environment and rethink its acceptability depending on its level of GHGs emissions, environmental compliance and indeed implications on climate change.

3.0 METHODOLOGY

3.1. Data and variables

In order to conduct a time series econometric analysis, the study used annual secondary data over the period 1981 to 2020. The data were sourced from the World Bank online database known as World Development Indicators (WDI), and the Food and Agricultural Organization (FAO) online data base. The 40-year period is selected to meet the requirement of the Central Limit Theorem that a sample size must not be less than thirty years for normality purpose, and that the larger the sample, the greater the reliability or validity of time series research findings (Gujarati, 2005).

3.2 Variables

GDP per capita is used as the dependent variable as it best reveals the extent of development in terms of income per head and it is one of the major indices used in classifying whether a country is developed or not. The independent variables used to capture foreign capital are those considered to be the major sources of foreign finance, and they are foreign direct investment (FDI), and the value of foreign debt. The variables used to measure climate change is carbon emission as a ratio of GDP. This was multiplied by the growth of FDI to derive the variable that measures FDI-climate interaction (FDICO). Thus, climate change (caron emission) is used as a moderating variable that restrains the potential impact of FDI on economic development in Ethiopia. This measurement of the FDI-climate interaction variable follows from Agbloyor et al. (2016) whose study, in a bid to capture FDI-institutional quality interaction and the resultant impact on per capita GDP in sub-Saharan Africa, derived and included the product of FDI and the institutional indicators to capture the interactive effect between FDI and institutions. The control variables captured are gross fixed capital formation, human development, and openness. The variables selected were from adaptation of the studies of Duresa (2022), Girma and Tilahun (2022), Huang et al. (2021), Mohd and Muse (2021), Su and Nguyen (2020), and Agbloyor et al. (2016).

3.3 Model Specification

The econometric model used for the study is adapted from Agbloyor et al. (2016) and is specified as follows:

$$PCI_t = \beta_o + \beta_1 FDI_t + \beta_2 FD_t + \beta_3 FDICO_t + \beta_4 GFCF_t + \beta_5 HD_t + \beta_6 OP_t + \beta_7 DUM_t + U_t \ldots\ldots\ldots\ldots (1)$$

Where, PCI_t = Growth of GDP per capita

β_o = Constant parameter
β_i = Coefficients of the explanatory variables
FDI_t = Foreign direct investment
FD_t = Foreign debt
$FDICO_t$= FDI-climate interaction i.e. FDI growth multiplied by carbon emission (CO2) with CO2 emission measured as CO2 emissions (kg per 2015 US$ of GDP)
$GFCF_t$ = Gross fixed capital formation
HD_t = Human development
OP_t = Openness
DUM_t = A dummy variable, with zero (0) representing period of socialist leaning of the country, (i.e period before 1991), and one (1) representing period of adoption of neoliberal policies (1991 and beyond).
U_t = Stochastic disturbance term
t = Time subscript

Equations 1 is employed as models for this research.

3.4 Technique of Analysis

The model for this research was estimated using Autoregressive Distributed Lag (ARDL) model along with error correction model. The ARDL model is used in the estimation of time series econometrics and it was developed by Pesaran and Shin (1996); Pesaran and Pesaran (2001); for testing the existence of co-integration among variables. The ARDL approach as a cointegration technique has the advantage of allowing for inclusion of variables irrespective of whether they are purely I(0) or I(1), or a mixture of both (Khosravi and Karimi, 2010). However, it cannot accommodate I(2) variables as the computed F-statistics provided by Pesaran, Shin and Smith (2001) will become invalid. This necessitates testing for unit root in the variables of model to be subjected to the ARDL approach to ensure that none of the variables is integrated of order I(2) or beyond. The unit root test was conducted using the Augmented Dickey-Fuller (ADF) technique based on the model expressed below:

$$\triangle Y_t = \beta_0 + \beta_1 Y_{t-1} + \alpha_i \sum Y_{t-i} + \triangle_t \quad \text{.....(2)}$$

Where: $\triangle$ = Differenced value of a given time series variable
β_0 = Constant Parameter
β_1 = Coefficient of the first lag value of the series variable
Y_{t-1} = First lag value of a series variable
α_i = Coefficient of the lag values of the differenced time series variable
$\triangle Y_{t-i}$ = Lag values of the differenced series variable
u_t = Error term.

The Autoregressive Distributed Lag (ARDL) model used in this study is expressed as follows:

$$\triangle PCI_t = \delta_0 + \delta_1 PCI_{t-1} + \delta_2 FDI_{t-1} + \delta_3 FD_{t-1} + \delta_4 FDICO_{t-1} + \delta_5 GFCF_{t-1} + \delta_6 HD_{t-1} + \delta_7 OP_{t-1} + \delta_8 DUM_{t-1} + \sum \lambda_1 \Delta PCI_{t-i} + \sum \lambda_2 \Delta FDI_{t-i} + \sum \lambda_3 \Delta FD_{t-i} + \sum \lambda_4 \Delta FDICO_{t-i} + \sum \lambda_5 \Delta GFCF_{t-l} + \sum \lambda_6 \Delta HD_{t-l} + \sum \lambda_7 \Delta OP_{t-i} + \sum \lambda_8 \Delta DUM_{t-i} + \lambda_8 ECM_{t-1} + u_t \quad \text{.....(3)}$$

Where δ_0 = Constant Parameter
Δ = First difference operator
δ_i, λ_i = Vector of the parameter of the lagged values of the explanatory variables.
ECM_{t-1} = Error correction term
u_t = Error term

The error correction dynamics of the model is represented by the parts with terms that have the summation signs ($\sum$) in the above equation while the second part of the equation with δ_i correspond to the long-run relationship. The null hypothesis in the ARDL equations is $H_0 = a_1 = a_2 = a_3 = 0$. This denotes the absence of long-run relationship while the alternative hypothesis is H_1: $a_1 \neq a_2 \neq a_3 = 0$. The calculated F-statistic is compared with two sets of critical values. One set assumes that all the variables are I(0) and the other assumes they are I(1). If the calculated F – statistic exceed the lower and upper critical value, the null hypothesis of no co-integration will be rejected irrespective of whether the variables are I(0) or I(1). If it is below the upper value bound, there is no cointegration. Once a co-integration relationship has been ascertained the long-run and short run parameters of the relationship are then estimated.

4.0 PRESENTATION AND ANALYSIS OF RESULTS

The findings of the study are presented as follows.

4.1 Trend of FDI and Carbon Emission in Ethiopia

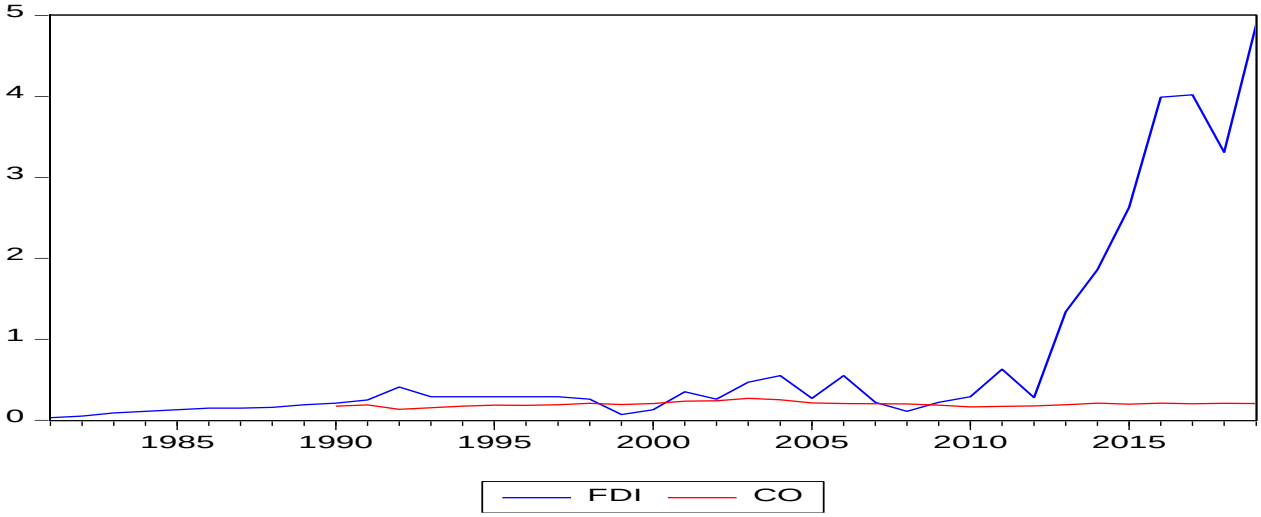

Fig 1: Trend of FDI and Carbon Emission in Ethiopia

Fig 1 presents the trend of FDI and carbon emission in Ethiopia. It could be observed that starting from 1990, CO2 emission as percentage of GDP has remained relatively stable and did not reduce even in the years of reduction in FDI inflow. Also, increase in FDI inflow into the country is not matched with reduction in carbon (CO2) emissions in Ethiopia. Thus, the country could have been a pollution haven for foreign companies that bring in FDI.

4.2 Unit Root Test Results

Table 4.1: Unit Root Tests Results

		ADF Unit Root Test		
Variables	Critical Values	At level I(0)	Critical Values	At First Difference I(1)
PCI	-2.941145	-3.517244**		
FDI			-4.226815	-5.954990***
FD			-4.226815	-5.047204***
FDICO			-3.626784	-9.677495***
CO			-3.689194	5.293716***
GFCF			-3.202445	-3.364282***
HD			-4.226815	-10.94836***
OP			-4.226815	-7.338187***

Source: Authors' estimation using E-views 10

Note: *** Denotes statistical significance at 1% level;

** statistical significance at 5%; and

* Statistical significance at 10%

The outcome of the unit root tests using the Augmented Dickey Fuller (ADF) test presented in Table 4.1 reveals that all the variables satisfy the condition for inclusion in the ARDL model. Table 4.1 shows that per capita income growth (PCI) was found to be stationary at level I(0), while FDI, foreign debt (FD), carbon emission (CO), FDI-climate interaction (FDIGCO), gross fixed capital formation (GFCF), human development (HD) and openness (OP) were all stationary at first difference i.e. I(1). This is because in absolute term, the t-test statistic values of the variables examined were found to be significantly greater than their critical values. Thus, the test statistic values of the variables were either significant at 1% or 5% as the case may be. This implies that none of the series is I(2). Therefore, all the variables were included in the ARDL estimation.

4.3 ARDL Bound Test for Cointegration

Table 4.2: ARDL Bounds Test for Cointegration (ARDL 2,1,2,1,0,1,1,2 Model)

Dependent Variable: ΔPCI	
F-Statistics	8.989313***

Critical Value		Lower Bound		Upper Bound
10%	1.92		2.89	
5%	2.17		3.21	
1%	2.73		3.90	

Note: *** Statistical significance at 1% level; ** statistical significance at 5%;

* Statistical significance at 10%.

Critical values could also be obtained from Pesaran, shin and Smith (2001).

Source: Authors' computation using E-views 10

The empirical findings of the ARDL bound test results as reported in Table 4.2 implies the existence of cointegration and thus, a long-run relationship between foreign finance, its climate change interaction and economic development in Ethiopia. The F-statistic, 8.989313 is greater than the critical value, 3.90, at the upper bound at 1% level. In view of this, the estimated long-run coefficients are as follows.

4.4 Results of Estimated Long Run Impact of Foreign Finance and FDI-Climate Interaction on Economic Development in Ethiopia

Table 4.3: Estimated Long run and Short Run Coefficients of the Selected ARDL (2, 1, 2, 1, 0, 1, 1, 2) Model

Dependent Variable: D(PCI)			
Independent Variables	Coefficients		P-values
C	163.8132**	0.0123	
PCI(-1)	-0.468731****	0.0020	
FDI(-1)	385.1698***	0.0059	
FD(-1)	-0.282485*	0.0775	
FDICO(-1)	-1659.633***		0.0065
GFCF(-1)	10.09293***		0.0002
HD(-1)	-10.58296**	0.0298	
OP(-1)	8.650002***	0.0027	
DUM(-1)	-65.08281**	0.0312	
D(PCI(-1)	0.408973 **	0.0108	
D(FDI)	40.05337	0.2751	
D(FD)	0.171503	0.5269	
D(FD(-1))	0.326634*	0.0618	
D(FDICO)	-206.7309	0.2413	
D(HD)	1.295582	0.6123	
D(OP)	2.375932**	0.0217	
D(DUM)	62.04199***	0.0008	
D(DUM(-1))	34.29730*	0.0574	
ECM(-1)	-0.468731***	0.0000	
R^2 = 0.854499: Adjusted R^2 = 0.805998			
F-Statistic = 296.2038 (0.000000)			
Durbin-Watson Statistic = 2.517607			

Note: *** Denotes statistical significance at 1% level; ** statistical significance at 5%; and,

* Statistical significance at 10%.

Source: Authors' computation using E-views 10.

Table 4.3 reports the findings on the long run and short run impact of foreign capital, FDI-climate interaction on economic development in Ethiopia. Starting with the lag value of per capita income, the findings reveal that it has negative and significant impact on economic development in Ethiopia. This could be because Ethiopia is a developing economy with low per capita income hence its negative and significant impact on economic development in the country. The general low per capita income is not enough to result in more savings and investment that could bring about the needed development in the long term. However, in the short run, the lag value of per capita income results in positive and significant impact on development in Ethiopia. This could be because the variable could serve as funds needed to take care of current consumption needs thereby boosting aggregate demand which could spur investment in the short run.

Foreign direct investment (FDI), which is a component of foreign capital in the model is found to have positive and significant impact on economic development in Ethiopia in the long run. This aligns with the argument by Adedokun (2017), Duresa (2022), and Terefe (2018), that external finance in view of the resource gap in developing economies like Ethiopia which impedes the realization of desired investment and prosperity, is needed to fill the savings gap, foreign exchange gap and fiscal gap which then results in positive contribution to economic development. It also conforms with the propositions of the Harrod-Domar growth and neoclassical growth theories that explain the need for saving and growth of capital to enhance economic growth. Therefore, FDI closes the savings gap and serve as capital to boost economic development. The long run empirical finding on FDI is in agreement with the work of Mohd and Muse (2021) that found that FDI had positive impact on economic growth in Ethiopia in the years 1981 to 2017. However, the result is not in conformity with the empirical findings of Duresa (2022) and Agbloyor et al. (2016) that revealed FDI to have negative impact on economic growth in Ethiopia and sub-Saharan Africa respectively. Conversely, the short run impact of FDI on development was found to be though positive but it is not significant. The non-significant positive short run impact could have emanated from challenges of absorptive capacity which could be very worse in the short term before some long run adjustment.

On the other hand, foreign debt was revealed to have long run negative and significant impact on economic development in Ethiopia. This could have resulted from the fact that governance and internal policies and other factors that relate to the absorptive capacity of the economy do not provide enabling ground for positive impact of foreign debt on economic development in the long run. Also, the terms or conditionalities of the debt could have hampered its desired impact on the economy. The result is in line with the works of Wako (2017), Adedokun (2017) but negates the findings of Terefe (2018) and Mohd and Muse (2021). However, external debt could have positive and significant contribution to development in the short run. This could be because in the short run, debt could help in boosting aggregate demand which could enhance growth and development. But in the long run, the impact of debt on economic development becomes negative due to the needed resources to be committed to debt servicing considering the possible unfavourable debt to revenue ratio, as the servicing constitute leakage which goes outside the economy and it could have been used to finance other development projects.

FDI-climate interaction term was found to have long run negative and significant effect on economic development in Ethiopia. This implies that though FDI on its own could have positive contribution to development but the moment it tinkers with the climate through carbon emission, it results in negative implication on economic development of Ethiopia. This is because climate change could be exacerbated by FDI inflows as revealed in studies by Ahmed et al. (2022), Huang et al. (2021), Al-mulali & Tang (2013), Neequaye & Oladi (2015), and Tang & Tan (2015). The intensification of environmental problems by FDI brings about loss of livelihoods as it affects agriculture and other climate-sensitive sectors, result in health challenges, and loss of biodiversity due to ecosystem disruption. These erode or constrains the positive impact which FDI could have potentially had on the economic development of recipient countries such as Ethiopia. As could be seen from Table 4.3, the negative coefficient of FDI-climate interaction term is more than the positive coefficient of FDI, implying the complete eroding of FDI's potential impact on development. The non-significant negative short run impact of the variable on economic development could have resulted from the fact that climate change, and indeed the one that could have emanated from FDI inflow and its interaction with the environment manifests its much negative impact on the economy in the long run.

Gross fixed capital formation was revealed to have significant and positive impact on economic development in Ethiopia. In addition, human capital was found to be negatively associated with economic development in Ethiopia the long term, and the short term impact of the variable which was though found to be positive is insignificant. This could be due to low human development or inadequate investment on human capital development in the country which have negative implications on the earnings of the people that could translate in their better living hence entire development of the economy. However, the finding is not in line with the work of Su and Nguyen (2020) that found positive and significant impact of human capital on economic growth in Africa. On the other hand, openness was found to result in positive and significant impact on economic development of the country in both the long run and short run. The positive coefficient of the variable could be because trade liberalization result in better access to commodities which could not be produced locally and also facilitate technological diffusion hence translates in better living/welfare, more investment, and general development in the long run. However, the dummy variable representing years of adoption of neoliberal policies revealed negative impact on economic development in Ethiopia, which implies that neoliberal policies as adopted by the country in order to boost foreign capital inflow has not resulted in economic prosperity of the Ethiopian economy. The error correction term has the expected negative sign and it is significant, implying that the model reverts back to long run equilibrium after disturbance hence it is a stable model.

4.5 Robustness Test

Table 4.4: Robustness Test (Post-Esstimation Test)

Diagnostic Test	F-Statistics	DF	Probaility
Serial Correlation (B-G)	3.536097	2,8	0.0507
Heteroscedasticity	1.102735	16,20	0.4127
Jaque-Bera Normality Test	1.757143		0.4154
Ramsey RESET Test	0.060332		0.8066

Source: Authors' computation using E-views 10.

From the Linear ARDL model, the post estimation tests of serial correlation, heteroscedasticity and normality are insignificant at 5 percent level of significance which means that their null hypotheses are not rejected. That is, the model is well specified, free from serial correlation, heteroscedasticity and normally distributed respectively. The Rasmsey RESET test also reveals that the model is stable. The value of the normality test is further revealed in the histogram and table below, and they show that the model follows normal distribution assumption.

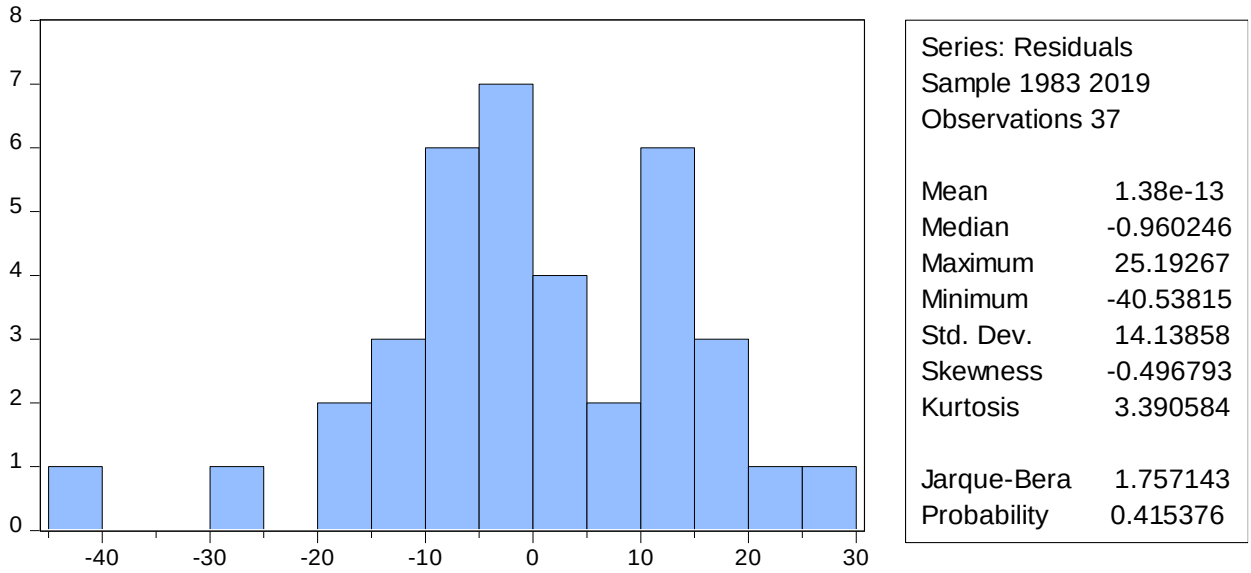

Figure 2: Normality Test for the ARDL Model

5.0 CONCLUSION, POLICY IMPLICATIONS AND RECOMMENDATIONS

The study has revealed the long run and short run impact of foreign finance on economic development in Ethiopia. It has also explained that the economy has tilted its macroeconomic management strategy along the path of neoliberalism and that this had resulted in more inflow of foreign capital. However, it could be concluded from the empirical findings that foreign capital constituents have mix of positive and negative development outcome depending on the component, and whether it is examined from the short-term and long-term impacts. While FDI was found to have long run positive impact, foreign debt revealed long run negative effect on Ethiopia's prosperity measured by per capita income. It could be concluded also that any study on foreign capital and development nexus would be better conducted if certain potential factors which limit its growth and development outcome are incorporated into the research in the area. Therefore, apart from issues around conditionality, the policy environment of the recipient country, human capital, macroeconomic and political stability, governance and institutions, and exogenous economic shocks and structural economic vulnerability as well as external influence examined in existing studies (Terefe, 2018; Mercieca, 2010; Guillaumont, 2008; Zuniga, 2011; Agbloyor et al., 2016; Adedokun, 2017; Wako, 2017; Su and Nguyen, 2020; and Mohd and Muse, 2021), the environmental/climate impact of foreign capital which further limit its impact on development should also be the focus of empirical studies.

The further conclusion here is that foreign finance especially FDI could positively influence development and it is an important component of the economy of Ethiopia but its ensuing interaction with the environment/climate could result in its limited and even negative implication on economic prosperity in the economy. Therefore, the effectiveness and efficiency of foreign finance on growth and development outcome in Ethiopia and the gains from its adoption of neoliberal policies is conditional particularly in the sense of whether it produces long run sustainable environmental outcome, and upon the absorptive capacity of the

economy particularly in terms of infrastructure and institutional quality. In addition, the study also reveals that the adoption of market-oriented policies starting from 1991 and jettisoning of socialist orientation of the country to attract foreign capital into the economy of Ethiopia has not resulted in its economic development. Based on the empirical findings, the study provides policy implication to the government of Ethiopia as well as development partners in the area of assessment of the long run potential environmental impact of foreign capital before they are deployed on the economy. There is need for adoption of debt-for-climate swap as currently being advocated, where bilateral and multilateral debts of Ethiopia and other developing countries are forgiven in exchange for a commitment by the debtor to use outstanding debt service payments for national climate change mitigation and adaptation programs.

The government of Ethiopia should ensure stable macroeconomic environment, proper negotiation, and optimal allocation of foreign capital to sustainable development projects (or to growth and development enhancing sectors) and reducing wastage rather than spending it on overheads that have no meaningful bearing on long term sustainable economic development. Furthermore, there is need for consideration of, and building the absorptive capacity and ensuring proper mechanism for monitoring and evaluation in order to bring about better effectiveness of foreign capital and reforms. Finally, government should be inward-looking through enhancement of the tax base and tax revenue to reduce dependency on foreign finance.

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