Addis Ababa University, Ethiopian Journal of Business and Economics, EJBE Vol.7, No. 1
Doi: http://dx.doi.org/10.4314/ejbe.v7i1.3 p-**ISSN**: **2311-9772** **e-ISSN**: **2410-2393**
Available online: http://ejol.aau.edu.et/index.php/ejbe and https://www.ajol.info/index.php/ejbe

The Impact of Tax Incentives on Sectoral Economic Growth in Ethiopia

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Abstract

In order to stimulate economic growth, tax concessions have been used as the main strategy for attracting both domestic and foreign investment resources in Ethiopia. On the other hand, tax incentives offered by governments reflected negative results or a loss of government revenue and were persistently criticized as economically inefficient and leading to the misallocation of public funds. This study, therefore, examines the impact of tax incentives on economic growth performance in Ethiopia. The study employs a robust panel data model for 10 subsectors over the period 2004–2015. To control cross-sectional dependence, heteroskedasticity, and autocorrelation, the study also adopts a cross-sectional time-series Feasible General Least Square estimator and the cross-sectional dependence-consistent Driscoll-Kraay estimator. The main findings of the study indicate that an increase in tax incentives is a statistically significant variable and fosters the growth performance of the country. The study, therefore, suggests that the government of Ethiopia has to strengthen the provision of tax incentives for economic activities. But they must be carefully designed and well administered so as to avoid side effects that diminish productivity by distorting resource allocation, sustaining inefficient or unsustainable activities, and losing revenue needed for other components of the productivity packages. The study also suggests that the government of Ethiopia has to devise a mechanism for enhancing the effectiveness and efficiency of foreign resources, otherwise it will aggravate capital outflow and increase the cost of the domestic economy.

***Keywords*:** Tax incentives, foreign direct investment, revenue loss, panel data.

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Introduction

No matter where they are in the development process, most nations use a range of incentives to achieve their investment goals. Tax concessions for investments, expedited depreciation, and favorable tax treatment for R&D expenses are common forms of tax incentives in developed nations. Developed countries have also adopted tax regimes that favor export activities and seek to afford their resident corporations a competitive advantage in the global marketplace. Many transitional and developing countries have an additional focus; in this context, tax incentives are used to encourage domestic industries and attract foreign investment. Here, the tools of choice are always tax holidays, regional investment incentives, special enterprise zones, and reinvestment incentives (Easson and Zolt, 2002). However, developed countries more frequently employ financial incentives such as grants, subsidized loans, or loan guarantees. It is generally recognized that financial incentives drain the government budget, and as such, they are not generally offered by developing countries. Instead, these countries tend to use fiscal incentives that do not require the upfront use of government funds (United Nations, 2002).

Despite the fact that tax incentives are one of the fiscal incentives used by many nations to entice investors and boost investment, less attention is paid to the impact of tax incentives, particularly their detrimental effects on the economy, because they don't require a direct outlay of funds like other government expenditures do, which frequently necessitate the sacrifice of a nation's limited resources (OECD, 2014). Several nations, both established and developing, provide various incentives in an effort to entice investors and promote economic growth (OECD, 2013). Contrarily, tax incentives, particularly those for foreign direct investment, are both terrible historically and problematic today, claim Easson and Zolt (2002). In theory, tax incentives are negative since they influence how investors make decisions. In actuality, tax incentives are harmful because they are frequently ineffectual, wasteful, and vulnerable to corruption and misuse.

The conventional wisdom that investment boosts growth has led governments to make efforts to reduce the cost of investment and to encourage businesses to invest more. Sometimes, in a highly competitive economy, it is needed from the governments of the host nations to give some fiscal incentives to attract investment and create stable macroeconomic (Simret, 2013). Any incentive program's primary goal is to persuade investors to make an investment by lowering risks or directly altering the revenue streams that would result from that potential investment (IMF, 2001).

Ethiopia is one of the emerging nations that requires rapid and long-term investment growth. The average domestic saving rate as a percentage of GDP was 17.70 in 2012/13, which was the highest it has been in decades, but it is insufficient to meet the country's desire for investment funds (NBE, 2013). In order to attract investments from both domestic and international sources, develop full employment opportunities, transfer sophisticated technology & managerial skills, and stimulate export, Ethiopia has been implementing several tax reforms and shifting incentives. The Ethiopian government has been offering a variety of fiscal incentives with the goal of fostering an environment that is favorable to business and drawing foreign direct investment (ERCA, 2015).

Despite constant criticism that they are economically unproductive and cause the misallocation of public funds, incentives are frequently utilized by governments as a policy tool to encourage investment. The tax incentive system of a nation is crucial to the functioning of its society and its overall development, but their sheer existence does not ensure the nation's rapid economic development. In other words, providing tax incentives has advantages including boosting FDI inflow, generating job opportunities, and having a positive technical spillover impact on domestic companies. Investment incentive programs should be more closely integrated with the Sustainable Development Goals (SDGs) to allay these worries (UNCTAD, 2014). Tax incentives do, however, come with associated costs for investors and business communities, including distortions between investments granted incentives and those without incentives, revenue lost, necessary administrative costs, and the social cost of corruption/rent-seeking activities (Zee et al., 2002). Developing nations, notably Ethiopia, have continued to provide tax incentives to both indigenous and foreign investors notwithstanding the debates outlined above. On the other hand, Ethiopia did poorly in the relative term even if FDI inflows to the nation and domestic investment expanded in absolute numbers since 1992. Therefore, the general objective of this study is to examine the impact of tax incentives (investment incentives) on sectoral economic growth in Ethiopia, with the following specific objectives: to investigate the trend, performance, and significance of tax incentives on economic activities within the given periods. The main research questions are: What is the practice and performance of tax incentives in the Ethiopian economy under the reviewed period? Is the lost government revenue through the given tax incentives mitigated or compensated by economic benefits like growth, investment, and employment opportunities? Is the adopted tax concession significantly affecting economic growth by affecting the real GDP of the entitled sectors?

Literature Review

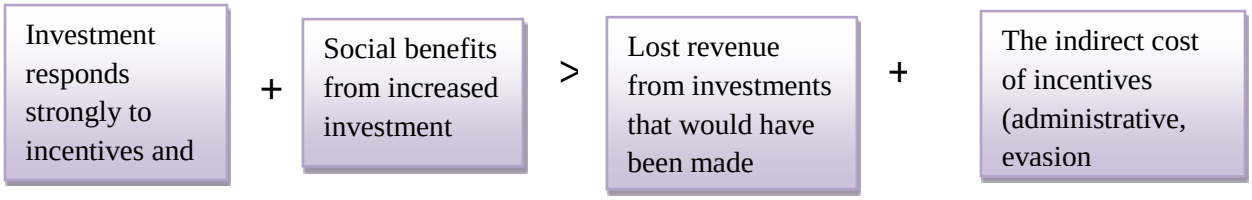
Theoretical Literature Review

The SADC MOU on taxation (2002) defines "tax incentives" as "fiscal measures that are used to attract local or foreign investment capital to certain economic activities or particular areas in a country". Zee et al., (2002) adopt a similar definition in their review of this topic. Tax concessions, defined as preferential tax treatment for certain types of firms or entities, are commonplace in both developed and developing countries. Concessions are granted to promote investment; in this case, they may be termed "tax incentives" or "investment incentives" or to achieve defined social objectives. For example, a corporate income tax (CIT) holiday for five to ten years may be granted to firms that export goods and services or that locate in designated areas or regions, as stated in Chai and Goyal (2008).

Tax burdens on income received by relatively wealthy investors are directly reduced by investment incentives. As a result, additional taxpayers can face higher tax obligations. For instance, if investment incentives decrease corporation tax collection, the government may rely more heavily on indirect taxes, which place a heavier burden on the weaker portions of society. Also, the majority of programs are created to give some taxpayers an advantage over others who are in comparable financial circumstances. The creation of jobs and equitable growth must be clearly expected as a result of the tax incentives in order to make up for these disparities.

Different incentive programs have different costs and advantages for the government. The government must weigh prospective benefits against expected costs when selecting incentive schemes. Higher revenue from (potentially) increased investment, social benefits (jobs), positive externality, signaling effect from increased investment, revenue loss from investments that would have been made without incentives, and indirect costs of incentives are among the factors to consider, according to James (2013).

Figure1. For tax incentive, an investment incentive is beneficial if:



To put it another way, cutting taxes for a particular industry might encourage capital investment, which boosts sector revenue and creates social benefits, but it also lowers government revenue and imposes indirect costs on the economy. So, these incentive programs are successful to the full extent that the increased revenue and social gain from the greater investment more than offset the lost revenue and indirect expenses (James, 2013).

It can be challenging to distinguish between the portion of new investment that is related to tax benefits and the portion that relates to other pro-investor reforms because the government frequently adopts tax incentives in a package with other reforms intended to improve the climate for investment. With these restrictions, it is sometimes simple to draw the conclusion that a specific tax incentive program has led to little new investment at a significant expense to the government. Tax incentives, however, have undoubtedly played a significant influence in luring new investment in other instances, which has significantly increased growth and development (Zolt, 2015).

Tax incentives, in the opinion of their proponents, clearly increase returns on investment, may be justified by favorable externalities resulting from investments, are relatively simple to target and fine-tune, signal openness to private investment, are helpful in a globalized economy where capital mobility is common, are required to counteract tax competition from other jurisdictions, and compensate for other shortcomings in the investment climate. Another prevalent claim is that by encouraging investments that produce extra taxable revenues through employment and linking effects, incentives can actually increase revenue. In addition, tax incentives have a political benefit over direct spending plans to encourage investment. Last but not least, proponents note that well-known instances like Malaysia, Ireland, and Mauritius, as stated by Bolnick (2004) as cited by (Samuel, 2015) are effective examples of where tax incentives have been applied.

Revenue loss, indirect revenue costs (which arise when tax-favored activities reduce the profitability of other producers who do pay taxes), revenue leakage through avoidance and evasion (since tax incentives frequently give people and businesses opportunities to engage in "aggressive tax planning" — a pilot term for tax avoidance), and impact on tax administration (because incentive programs burden tax administration) are all arguments against investment incentives. In order to close the budget shortfall caused by the extent of these tax losses, extra fiscal adjustments are required. They are crucial in deciding whether investment tax incentives promote growth and development but are poorly understood by most stakeholders.

Tax incentives typically don't work, according to experience! It is more rare than common to be successful in employing tax incentives to promote effective investment and quick development. With mixed success, the majority of developing nations have sought for many years to encourage investment through tax incentives. According to Bolnick (2004), the development of export processing zones (EPZs) has failed more frequently than it has succeeded (Samuel, 2015).

Empirical Literature Review

The widely held belief that investment boosts growth has led governments to make efforts to reduce the cost of investment and to encourage businesses to invest more. Sometimes, in a highly competitive climate, it is expected from the governments of the host countries to give some fiscal incentives to lure investment. This is in addition to creating a stable macroeconomic and political environment (Simret, 2013). How to match a certain form of incentive to the specified purpose or target, however, has not received much consideration. Almost all tax incentives distort the market and, in some way, affect consumer and business behavior.

The trend of using tax concession to attract foreign direct investment (FDI) has continued, and some countries have granted increasingly generous concessions, for instance, by extending the duration of the existing tax holidays. However, realizing that concessions can be very costly as a tool to promote investment, many countries have begun taking legal and administrative steps to restrict eligibility criteria and enforce compliance (UNCTAD, 1996; Easson, 2004) as cited by (Chai and Goyal, 2008). So, it would seem logical to try to choose those incentive types that affect the decision in a way that is compatible with the goals that the incentives are meant to promote (Easson, 2004).

The empirical data on whether utilizing tax incentives to boost investment is cost-effective is equivocal. According to some empirical research, the tax incentives provided by governments had a negative impact. Tax incentive proponents contend that fiscal incentives are required to boost investment, which in turn has a positive economic and social impact by supporting local businesses, fostering domestic production, and enhancing local capabilities.

State development officials continue to provide large tax and other financial incentives to new, moving, and growing businesses despite the fact that economists have a variety of options for incentive-based solutions (Bartik 1992; Dabney 1991; Friedman et al., 1992). For a tax incentive

to be advantageous to the host country, the decrease in government revenue caused by the incentive would have to be more than offset by the increase in tax revenue caused by increased foreign investment flow, according to (United Nations, 2000) a global survey on "Tax incentives and Foreign Direct Investment". Tax concessions were not among the top 15 of the 40 areas that companies judged essential for their investment in a recent poll of 159 multinational corporations operating in the Caribbean (Foreign investment advisory service, 2004; World Bank, 2005).

Some empirical studies showed that government tax incentives had a negative impact (Government revenue loss). According to a 2012 report by the Tax Justice Network-Africa and Action Aid International, the government of Uganda offers a variety of tax advantages to companies in an effort to increase foreign direct investment (FDI) into the nation. Yet, such tax benefits are causing very significant revenue losses and are not necessary to draw Investment. According to a report on tax competitiveness in east Africa conducted jointly by justice network Africa and Action Aid International, Kenya, Uganda, Tanzania, and Rwanda are losing up to USD 2.8 billion year as a result of the tax incentives they provide to FDI corporations.

Similar to this, there are arguments made against tax incentives as a way to draw foreign direct investment. According to IMF reports, these incentives have numerous associated costs, such as a loss of current and future revenue, a distortion between subsidized and unsubsidized activities, and high administrative costs that outweigh the benefit. Mosioma (2009) agreed that using tax incentives to attract or retain mobile capital does not provide a sustainable base for creating jobs or achieving any sustainable economic development in his study on the role of tax incentives in encouraging harmful tax competition in the East African flower industry. Multinational corporations are the main benefactors of such policies, yet the costs far outweigh the advantages. According to a joint research by JNT-A and AAI (2012), the government of Kenya offers a variety of tax advantages to firms in order to increase the amount of foreign direct investment the nation receives. The study shown that these tax incentives are ineffective in attracting customers and actually cause significant revenue losses. According to a joint study (JNT-A and AAI, 2012) on Tanzania, the government has long offered a variety of tax benefits with the goal of luring and keeping more foreign direct investment in the nation. These tax incentives have made it possible for mining businesses to completely avoid paying taxes.

Tax Incentives and Investment in Ethiopia

Ethiopia has also been making several tax reforms and incentive changes to attract both domestic and foreign investment, develop full employment opportunities, transfer cutting-edge technology & managerial skills, and stimulate export. The Ethiopian government has been offering a variety of fiscal incentives in order to foster an environment that is favorable to business and draw foreign direct investment (ERCA, 2015).

Since 1992/93, Ethiopia has been upgrading tax and customs administration through the implementation of the Economic Reform Program (ERP), which aims to promote trade, investment, and subsequently development. On May 25, 1992, the Transitional Government of Ethiopia (TGE) published Proclamation No. 15/1992, the first investment code, with the intention of promoting private investment. Under this code, the only sectors eligible for investment incentives were the manufacturing and agricultural sectors. According to the type and location of the investment, incentives included a tax holiday lasting between 1 and 8 years and a 100% exemption from customs duty on the entry of capital goods. Proclamation No. 37/1996, which took its place in June after this one had been in effect for four years, The revised Investment Code of 1996 extended areas eligible to incentives to Education, health, tourism, and construction sectors.

Proclamation No. 116/1998, which was issued in June 1998, replaced Proclamation No. 37/1996 and made improvements. Defense industries and telecommunication services, which were previously only available to the government, were made available to the private sector to participate in jointly with the government under this decree. The investment regime was further liberalized and the majority of the remaining limitations were abolished by amendments to the investment code that were made in July 2002 (Proclamation No. 280/2002) and September 2012 (Proclamation No. 769/2012).

Investment incentives included in Ethiopia's investment codes include free repatriation of capital, duty-free importation of goods and vehicles related to the investment, tax holidays up to nine years, opening and operating foreign currency accounts, owning immovable property for the purpose of the investment, Loss carry for investment losses, and more as of Investment Incentives and Investment Areas Reserved for Domestic Investors Council of Ministers Regulation No. 270/2012 (29th November 2012). Customs duty exemption and income tax exemption are two of the most

frequently used fiscal incentives (tax holiday). Depending on the specific industry and the investor's location, investors involved in manufacturing, agribusiness, the generation, transmission, and supply of electrical energy, as well as ICT, are entitled to income tax exemption for a period ranging from 1 to 9 years.

Table 1a

Area of Investment Eligible for Exemption of Income Tax in Manufacturing Sector

	Area of Investment eligible for exemption of Income tax		
	Area of Investment	Addis Ababa and surrounding	Other Area
1	**Manufacturing**		
1.1	Food industry	1 up to 5 years	2 up to 6 years
1.2.	Beverage industry	1 up to 3 years	2 up to 4 years
1.3.	Textile and textile products industry	2 up to 5 years	3 up to 6 years
1.4.	Leather and leather products industry (Except tanning of hides and skins below the finished level)	2 up to 5 years	3 up to 6 years
1.5.	Wood products industry	2 years	3 years
1.6.	Paper and paper products industry	1 up to 5 years	2 up to 6 years
1.7.	Chemical and chemical products industry	2 up to 5 years	3 up to 6 years
1.8.	Basic pharmaceutical products and pharmaceutical preparations	4 and 5 years	5 and 6 years
1.9.	Rubber and plastics products industry	1 and 4 years	2 and 5 years
1.1	Another non-metallic mineral products industry)	1 and 4 years	2 up to 5 years
1.11	Basic metal industry (excluding mining of minerals)	3 up to 5 years	4 up to 6 years
1.12	Fabricated metal products industry (excluding machinery and equipment)	1 and 3 years	2 and 4 years
1.13	Computer, electronic and optical products industry	2 up to 4 years	3 up to 5 years
1.14	Electrical products industry	2 and 4 years	4 and 5 years
1.15	Machinery and equipment industry	5 years	6 years
1.16	Vehicles, trailers, and semi-trailer industry	2 up to 5 years	3 up to 6 years
1.17	Manufacturing of office and household furniture (excluding those made of ceramic)	1 and 4 years	2 and 5 years
1.18	Manufacturing of other equipment (jewelers and related articles, musical instruments, sports equipment, games and toys, and similar products)	1 year	2 years
1.19	Integrated manufacturing with agriculture	4 years	5 years

Source: Ethiopian Investment Commission

Table 1b

Area of Investment Eligible for Exemption of Income Tax in Agriculture, ICT and Energy

2	**Agriculture**		
2.1	Crop production (Except growing of fiber crops, medium-term spices, aromatic or medicinal crops, perennial fruits, beverage crops, and other perennial crops in Addis Ababa and its surroundings)	2 and 3 years	3 up to 6 years
2.2	Animal production (Except farming of wild animals and production of milk, eggs, and similar products in Addis Ababa and its surroundings)	2 and 3 years	3 and 4 years
2.3	Mixed (crop and animal) farming	3 years	4 years
2.4	Forestry	8 years	9 years
3	**ICT**	4 years	5 years
4	Generation, transmission and supply of electrical energy	4 years	5 years

Source: Ethiopian Investment Commission

Both domestic and foreign investors who are working on legitimate new business ventures or business expansion projects in the following industries are eligible: agriculture, agro-industries, information and communication technology development (ICT), tourism, construction contracting, education and training, stare designated hotels, specialty restaurants, architectural and engineering consultancy work, technical testing and analysis, capital goods leasing, and imp (road surfacing material).

- 100% exemption from the payment of customs duties and other taxes levied on imports is granted to all capital goods, such as plant, machinery and equipment, and construction materials.
- Spare parts are worth up to 15% of the total value of the imported investment capital goods, provided that the goods are also exempt from the payment of customs duties.

- An investor granted a customs duty exemption will be allowed to import capital goods duty-free indefinitely if his investment is in manufacturing and agriculture, and for five years if his investment is in other eligible areas.
- An investor entitled to a duty-free privilege who buys capital goods or construction materials from local manufacturing industries shall be refunded the customs duty paid for raw materials or components used as inputs for the production of such goods.
- Investment capital goods imported without the payment of customs duties and other taxes levied on imports may be transferred to another investor enjoying similar privileges.
- With the exception of a few products (e.g. semi-processed hide and skins-150%), no export tax is levied on export products of Ethiopia.

Three incentive programs are additionally accessible to exporters. These are the Bonded Warehouse System, the Duty Draw-Back Program, and the Voucher Scheme. When finished goods are exported, taxes and duties paid on the raw materials are refunded. The duty drawback program is applicable to both taxes paid locally and at the time of importation. The following incentives are also provided to investors in order to encourage private investment, in addition to the more well-known ones listed above.

- Business enterprises encountering losses during the tax holiday period can carry forward such losses following the expiry of the exemption period for 3 to 5 years.
- Free repatriation of profits and dividends
- Expenditures for training and research are tax-deductible

From birr 35.7 billion in 2009/2010 to birr 128.3 billion in 2014/15, the government's tax revenue collection has increased. Moreover, the amount of revenue lost due to taxes and tax exemptions on imported items increased from birr 19.9 billion in 2009/10 to birr 65.5 billion in 2014/15. Although revenue lost as a result of tax holidays has dramatically decreased from birr 219.3 million in 2009–2010 to birr 37.3 million in 2013–2014, this is not due to a reduction in the privileges granted to business entities (tax holidays), but rather to the entities' failure to disclose their income and the absence of a controlling system.

Research Method of the Study

On the basis of eleven chosen economic activities (sectors), the study looked at the effects of the government's tax exemption policy on the growth performance of the nation from 2005 to 2015. Its primary source of information is secondary data, which was compiled from summaries of pertinent research papers, annual reports from the Ethiopian Revenue and Customs Authority, Ethiopian Investment Commission, Ministry of Finance and Economic Development Office, International Monetary Fund, ERCA Database, UNCTAD website, Ethiopian Tax Proclamations, Ethiopian Investment Proclamations, and World Bank Database.

To ascertain the effects of tax incentives (tax holidays and custom duty exemption) on economic growth (GDP) at the sector level in Ethiopia, the research used the panel data analysis technique. The neo-classical growth model, which is stated as follows, serves as the foundation for developing the models for this study.

$Y = f(K, L, A)$ ---------- (1)

Y = Output, K = Capital input, L= Labor input, and A= index of technology or efficiency index.

Apart from the traditional variables captured in the model above, other growth-enhancing determinants such as tax revenue, domestic investment, foreign direct investment, and labor input are included in the model. The neo-classical growth model in the expanded form can be expressed:

GDP = (LAB, DINVT, FDI, TAXREV) ---------- (2)

GDP= Gross domestic product, measuring economic growth, LAB = Labor input, FDI = Foreign direct investment, DINVT = Domestic investment and TAXREV = Tax revenue

The econometric form of the model can be written as:

$GDP = \beta_0 + \beta_1 LAB + \beta_2 DINVT + \beta_3 FDI + \beta_4 TAXREVE + U$ ---------- (3)

The estimated linear form of the model when expressed in its log form can be expressed as:

$\log(GDP) = \beta_0 + \beta_1 \log(LAB) + \beta_2 \log(DINVT) + \beta_3 \log(FDI) + \beta_4 \log(TAXREVE) + U$ --- (4)

For this study purpose, Tax Revenue (TAXREVE) substituted by Tax Revenue Forgone (TAXREVEFN).

For the panel model, this can be written as:

$$\mathrm{Log}(\mathrm{GDP}_{it}) = \beta_0 + \beta_1 \log(\mathrm{LAB}_{it}) + \beta_2 \log(\mathrm{DINVT}_{it}) + \beta_3 \log(\mathrm{FDI}_{it}) + \beta_4 \log(\mathrm{TAXREVEFN}_{it}) + \eta_i + U_{it} \quad \ldots (5)$$

Log (GDP_{it}) is log gross domestic product in sector i at time t

β_0 = is intercept of the model and β_1 to β_5 = Coefficients to be determined

Log (LAB_{it}) is log of labor in sector i at time t

Log ($DINVT_{it}$) is log of domestic investment in sector i at time t

Log (FDI_{it}**)** is log of FDI in sector i at time t

Log ($TAXREVEFN_{it}$) islog of tax revenue loss in sector i at time t (revenue forgone)

$\eta_i$is sector specific effect, and U_{it} is an error term

The theoretical expectations about the sign of the coefficients are as follow:

Table2

Expected Sign of Variables

Type of variables	Measurement (proxy)	Expected Sign
Labor	log of labor in each sector	+
Domestic Investment	log of domestic investment in each sector	+
Foreign Direct Investment	log of FDI in each sector	+/-
Tax incentives (Tax holiday and custom duty exemptions	Log of revenue loss (Revenue forgone)	+/-

Source: Authors' Hypothesis based on Literature

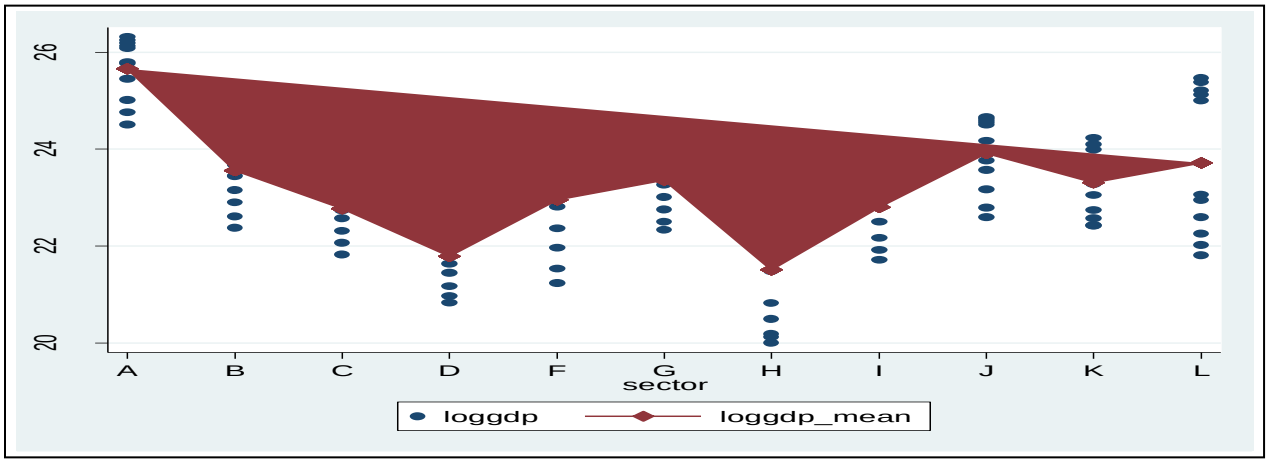
Either the fixed effect estimator (FE) or the random effect estimator (RE) can be used to estimate the production function in the estimation procedure (Green, 2003). The decision is based on the test that Housman created in 1978. In general, there are three ways to estimate basic linear panel data models: (a) by utilizing a common constant, (b) by allowing for fixed effects, and (c) by allowing for random effects. The common constant method of estimation, which is also known as the pooled OLS method, operates under the fundamental supposition that there are no differences between the data matrices of the cross-sectional dimension (N), implying that there are no differences between the estimated cross-sections. This method is useful when the data set is presumptively homogeneous, but this use-case is quite limited.

Econometrics Results, Discussion, and Analysis

Figure 2 below shows specifically, the heterogeneity (variability in the intervention effects) of real GDP varies across the sector. Agriculture in this regard has the highest variation against the log mean value of real GDP while mining and quarrying have the lowest variation of real GDP in log value that moves around the log of the mean (Figure 2).

Figure 2

Heterogeneity for Eleven Sectors

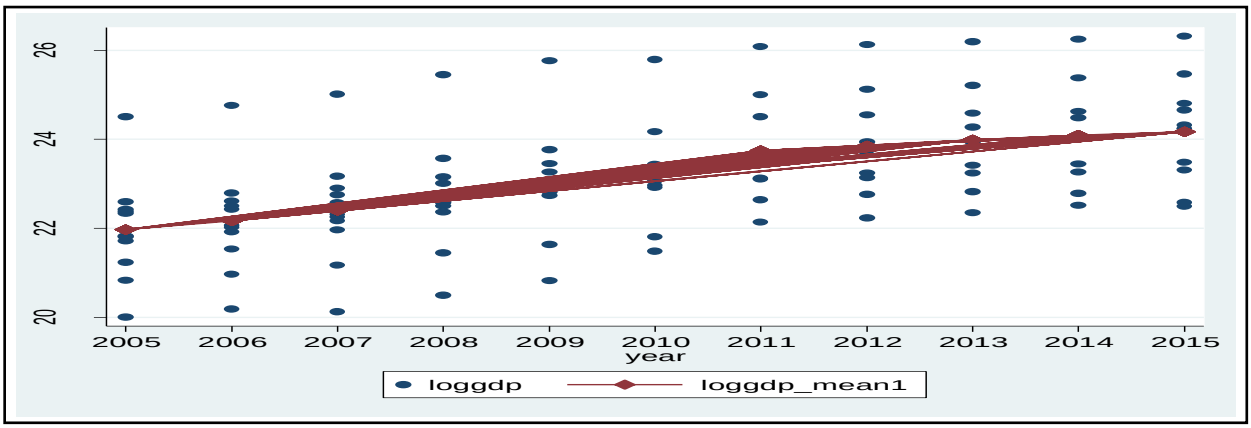


Source: Author's Computation using STATA

Note that, A (1) is Agriculture, fishery, hunting, and forestry, B (2) is Construction, C (3) is Education, D (4) is Health and Social works, F (5) is Hotel and Restaurant G (6) is Manufacturing, H (7) is Mining and Quarrying, I (8) is Another Community, Social and personal works, J (9) is Real Estate, Renting, and Business activities, K (10) is Transport, Communication and Storage and L (11) is Others, Wholesale and Retail Trade.

Figure 3

Heterogeneity Across Year



Source: Author's Computation using STATA

The pooled OLS estimate, fixed effect (LSDV) model estimation, and random effect model estimation are all outputs of this econometric panel model. The between method for the fixed effect model is not included because it did not adequately fit the data at the 0.05 level of significance, but the within effect model for the fixed effect model is included here. Several panel models suffer greatly from heterogeneity and autocorrelation; as a result, the study employs and offers the robust FGLS model after adjusting for heteroscedasticity, contemporaneous cross-sectional correlation, and autocorrelation.

Common Constant (Pooled OLS) Method

It assumes a constant intercept and slop regardless of group and time period. If individual effect u_i (cross-Sectional or time effect) does not exist (u_i=0), OLS produces efficient and consistent parameter estimates.

Table 3

Pooled OLS Estimation

Source	SS	df	MS		
Model	89.6913557	4	22.4228389	Number of obs	= 95
Residual	73.3957952	90	.815508836	F(4, 90)	= 27.50
Total	163.087151	94	1.73496969	Prob > F	= 0.0000
				R-squared	= 0.5500
				Adj R-squared	= 0.5300
				Root MSE	= .90306

loggdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
loglabor	.1968594	.0909295	2.16	0.033	.0162121	.3775067
logdinvt	-.1490902	.0846491	-1.76	0.082	-.3172605	.0190801
logfdi	-.1452669	.0579238	-2.51	0.014	-.2603427	-.0301911
logrevenuefn	.6791848	.0708711	9.58	0.000	.5383871	.8199826
_cons	11.66883	1.335208	8.74	0.000	9.016207	14.32145

Source: Author's computation Using STATA

We may deduce from the outcome that all explanatory factors are statistically significant when combined at the 0.05 significance level and are sufficient to account for the percentage change in GDP. All explanatory variables, with the exception of log domestic investment, are statistically significant at the 0.05 level of significance and are able to explain percentage changes in economic growth across all economic sectors. Foreign direct investment (FDI) has a negative impact on real

GDP because of its diminished competition and crowding-out of domestic firms and lower employment. On top of this, the sign of local investment is also negative, attributing to the fact that investment at early stage of development puts negative effect as no or less return at in short period. Labor obtained from both domestic investment and foreign direct investment has positive contribution to real GDP and it is statistically significant at the 0.05 significance level (Table 3).

Fixed Effect Methods

If individual effect ui is not zero in longitudinal data, heterogeneity (individual-specific characteristics that are not captured in regressors) may influence the assumption of exogeneity and homoscedasticity. Hence, if unobserved heterogeneity is correlated with one or more explanatory variables, OLS parameter estimators are biased and inconsistent. There are several strategies for estimating a fixed-effect model. The least-square dummy (LSDV) uses dummy variables, whereas, the "within" estimation does not. These strategies, of course, produce identical parameter estimates for regressors (no dummy independent variables). The "between" estimation fits a model using individual or time means of dependent and independent variables without dummies.

LSDV with a Set of Dummy Variables

By introducing group (sector) dummy variables, let's evaluate the fixed group effect in this instance (Table 4). Similarly, the variable sector2 is coded as 1 for the construction sector and zero for other sectors, and so on. The dummy variable sector1 is set to 1 for the agriculture sector and zero for other sectors.

Table 4

Least Square Dummy Variable Model (LSDV) Estimation

Source	SS	df	MS		
Model	150.453809	14	10.7467007	Number of obs =	95
Residual	12.6333417	80	.157916771	F(14, 80) =	68.05
				Prob > F =	0.0000
Total	163.087151	94	1.73496969	R-squared =	0.9225
				Adj R-squared =	0.9090
				Root MSE =	.39739

loggdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
loglabor	-.0754009	.0746298	-1.01	0.315	-.2239189	.0731171
logdinvt	-.1476068	.0515368	-2.86	0.005	-.2501682	-.0450454
logfdi	-.1898846	.0403866	-4.70	0.000	-.2702565	-.1095126
logrevenuefn	.5067318	.0392312	12.92	0.000	.4286593	.5848044
_Isector_2	-1.730175	.199393	-8.68	0.000	-2.126979	-1.33337
_Isector_3	-2.772591	.2394471	-11.58	0.000	-3.249106	-2.296077
_Isector_4	-4.037094	.2862271	-14.10	0.000	-4.606704	-3.467484
_Isector_5	-2.978069	.2295612	-12.97	0.000	-3.43491	-2.521228
_Isector_6	-2.014099	.2036489	-9.89	0.000	-2.419373	-1.608825
_Isector_7	-4.123394	.3953308	-10.43	0.000	-4.910128	-3.336661
_Isector_8	-2.852325	.3891651	-7.33	0.000	-3.626788	-2.077862
_Isector_9	-1.939288	.1980402	-9.79	0.000	-2.3334	-1.545175
_Isector_10	-2.771904	.2800608	-9.90	0.000	-3.329243	-2.214565
_Isector_11	-2.269096	.312257	-7.27	0.000	-2.890508	-1.647685
_cons	22.49047	1.408157	15.97	0.000	19.68814	25.29279

Source: Author's computation Using STATA

Notes: *Root MSE (root mean square error) shows the average distance of the estimator from the mean, in this case, 0.397 points in estimating loggdp. Root MSE the closer to zero, the better the fit.*

There are some significant differences between the pooled OLS estimation and LSDV. LSDV improved all goodness-of-fit measure significantly like F-test, SSE, root MSE, and (adjusted) R^2 but loss 10 degrees of freedom by adding 10 groups of dummies. Therefore, LSDV seems better than pooled OLS.

Within Estimation

The within-effect model is advantageous because it does not include dummies and employs modified variables. It employs departure from the mean for the group (or time period). In other words, "The inside" estimation relies on variance within each person or entity rather than a sizable group of dummies. We must modify these statistics since the "Inside" estimation does not employ dummy variables and as a result has more degrees of freedom, a lower MSE, and fewer standard errors than the LSDV. Results of regression with fixed effect (inside) are shown in Table 5.

Table 5

Regression Result of Within Effect Model

```
Fixed-effects (within) regression               Number of obs      =        95
Group variable: sector                          Number of groups   =        11

R-sq:  within  = 0.7714                         Obs per group: min =         2
       between = 0.1754                                        avg =       8.6
       overall = 0.2744                                        max =        11

                                                F(4,80)            =     67.48
corr(u_i, Xb)  = -0.0311                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      loggdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    loglabor |  -.0754009   .0746298    -1.01   0.315    -.2239189    .0731171
    logdinvt |  -.1476068   .0515368    -2.86   0.005    -.2501682   -.0450454
      logfdi |  -.1898846   .0403866    -4.70   0.000    -.2702565   -.1095126
logrevenuefn |   .5067318   .0392312    12.92   0.000     .4286593    .5848044
       _cons |   20.16928   1.308617    15.41   0.000     17.56505    22.77351
-------------+----------------------------------------------------------------
     sigma_u |  1.1377795
     sigma_e |  .39738743
         rho |  .89127625   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(10, 80) =    38.48                 Prob > F = 0.0000
```

Source: regression result based on within effect method

Note: *rho=* $\frac{(sigma\_u)^2}{(sigma\_u)^2+(Sigma\_e)^2}$ *Where: sigma_ u = standard deviation of residuals within groups* u_i*,andsigma_ e = standard deviation of residuals (overall error term)* e_i

rho is known as the interclass correlation. In this regression, it shows 89.1% of the variance is due to the difference across panel. All of the estimations of the Within Effect model and LSDV model produce the same SSE and parameter estimates but report a bit different standard errors and goodness-of-fit measures. So, which estimate is better? LSDV is generally preferred because of correct estimation, goodness-of-fit, and group/time-specific intercept. From the result, we can learn that the R2 for within, between and overall effect models is 77 percent, 17.5 percent, and 27 percent respectively. As R2 for the within effect is highest among them, it tells that individual sector and short-run effect is more important than time and long-run effect in real GDP.

Random Effect Model

In other words, a random effect model studies changes in the components of error variance among individuals or time periods and looks at how group and/or time influence error variances. In order to anticipate change over time and explain sector differences, including both within- and between-individual effects, the coefficients are utilized. This suggests that the information shows how the independent factors' average effects compare to the dependent variable (real gross domestic product). A random effect model estimates the group-specific error variance on the presumption that individual effect (heterogeneity) is not associated with any regressors (or time). The individual's regressors have the same intercept and slopes. The difference across individuals (or time periods) lies in their individual specific errors, not in their intercepts. Table 8 gives the regression results of the random effect model.

Table 6

Regression Result of Random Effect Model

```
. xtreg loggdp loglabor logdinvt logfdi logrevenuefn, re robust

Random-effects GLS regression                   Number of obs      =         95
Group variable: sector                          Number of groups   =         11

R-sq:  within  = 0.7692                         Obs per group: min =          2
       between = 0.3452                                        avg =        8.6
       overall = 0.3407                                        max =         11

                                                Wald chi2(4)       =     329.66
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =     0.0000

                                 (Std. Err. adjusted for 11 clusters in sector)
------------------------------------------------------------------------------
             |               Robust
      loggdp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    loglabor |  -.0470822   .0790289    -0.60   0.551     -.201976    .1078115
    logdinvt |  -.1432382   .0287993    -4.97   0.000    -.1996838   -.0867926
      logfdi |  -.1817096   .0810075    -2.24   0.025    -.3404814   -.0229378
logrevenuefn |   .5288184   .0444877    11.89   0.000      .441624    .6160128
       _cons |   18.90566   1.731744    10.92   0.000      15.5115    22.29982
-------------+----------------------------------------------------------------
     sigma_u |  .93118626
     sigma_e |  .39738743
         rho |  .84593856   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: Regression Result Based on Random Effect Estimators

Notes:*Sigma_u and sigma_e are the square-root of the variance components for groups and errors respectively*.

The label `rho` represents the ratio of individual specific error variance to the composite (entire) error variance; that is .8459=.9311^2/(.9311^2 +.3974^2). A larger ratio means that individual-specific errors account for the larger portion of the composite error variance; in this random effect model, the individual-specific error can explain 85 percent of the entire composite error variance. Accordingly, the ratio may be interpreted as the goodness-of-fit of the random effect model. The residual variable is assumed to be uncorrelated with explanatory variables, indicating difference across units is uncorrelated with explanatory variables. The Wald Chi2=329.66 with a probability of zero shows to test whether all coefficients in the model are different from zero. Accordingly, it is greater than the tabulated F-test value; we reject the null hypothesis that states the entire coefficients together equal to zero. This test confirms that all explanatory variables are able to jointly and statistically explain the real GDP.

Since this model uses aggregate group means of variables, it is often called as group mean regression. In this regard, the average effects of tax exemptions (revenue forgone) are statistically significant and positively contribute to economic growth, whereas both domestic and foreign direct investment statistically significant and negatively affect economic growth. From table 8result, we can learn that the R^2 for within, between and overall effect model is 77 percent, 35 percent and 34 percent respectively. As R^2 for the within effect is highest among them, it tells that individual sector and short-run effect is more important than time and long-run effect in contributing GDP.

Which one do we choose? Fixed or Random

To decide between fixed or random effects, we run a Hausman test where the null hypothesis is that the preferred model is Random Effects versus the alternative the Fixed Effects. It is basically testing whether the unique errors are correlated with the regressors; the null hypothesis is they are not. The random effect coefficients simultaneously explain change over time and the cross-sectional differences among units. The implicit assumption is that both types of effects are the same. The Hausman test checks a more efficient model against a less efficient one. If the prob.>Chi^2 is less than 0.05, it is statistically significant so we need to use the Fixed Effect Model. Thus, we reject the null hypothesis states that the fixed effect and the random effects coefficients are statistically the same. Table 9 shows prob.>Chi^2 =0.0904 greater than 0.05, therefore, we failed reject the null hypothesis that the random effect is consistent and efficient. In this model, the Hausman test implies that the random effect estimator is more appropriate.

Table 7

Hausman Test

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
    loglabor |   -.0754009    -.0470822       -.0283187         .007653
    logdinvt |   -.1476068    -.1432382       -.0043686               .
      logfdi |   -.1898846    -.1817096       -.0081749               .
logrevenuefn |    .5067318     .5288184       -.0220866        .0031596
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        8.03
                Prob>chi2 =      0.0904
                (V_b-V_B is not positive definite)
```

Source:- Hausman test reasult

Other Diagnostics Tests

The diagnostics Test assists to detect the inadequacy of the model and identify the strength and weakness of the model. A range of diagnostics tests are considered for checking heteroscedasticity, autocorrelation, normality, goodness-to-fit, and the like. They also reduce the probability of wrongly rejecting or accepting the null hypothesis. One here considered a diagnostics test is whether the time fixed effects are required or not. The null hypothesis testing in this regard states that time fixed effect is not needed if the dummies for all years are jointly equal to zero. For this analysis, we failed to reject the null hypothesis as the probability of the F-test is 0.6813 greater than 0.05. That means, we failed to reject the null that the coefficients for all years are jointly equal to zero, therefore no time fixed effects are needed in this case. Second, I consider testing for a random effect, the Breusch-Pagan Lagrange multiplier (LM). It helps to decide between a random effect regression and a simple OLS regression. The null hypothesis in the LM test is that the variance across entities (sector) is zero, this is, no significant difference across units (no panel effect). Here we accept the null and conclude the random effects is appropriate.

Therefore, we are interested to compare random effect model with a simple OLS regression using Breusch-Pagan Lagrange multiplier. The other interesting point of the diagnostic test is to check the availability of heteroscedasticity. The null is homoscedasticity (or constant variance). Here in this model, we reject the null and conclude the presence of heteroscedasticity as chi2 (11) =5.3e+26is greater than prob.>chi2 = 0.000.

Robust Standard Errors for Panel Regressions with Cross-Sectional Dependency

Compared with purely cross-sectional data, panels are attractive since they often contain far more information than single cross-sections and thus allow for increase precision in estimation. Unfortunately, however, actual information of micro econometric panel is often overstated since micro econometric data are likely to exhibit all sorts of cross-sectional and temporal dependencies. Therefore, erroneously ignoring possible correlation of regression disturbance over time and between subjects can lead to biased statistical inference.

To control erroneously ignoring cross-sectional correlation in the estimation of panel models that can lead to severely biased statistical results, I produce two robust standard error estimates such as cross-sectional time-series Feasible General Least Square (FGLS) with the command xtgls, Panels() corr() and the cross-sectional dependence-consistent Driscoll-Kraay estimator xtscc program respectively. FGLS estimator controls heteroskedastic, contemporaneously cross-sectionally correlated and autocorrelated type AR (1), and the Driscoll-Kraay estimator xtscc program controls heteroskedastic, autocorrelated with MA (q) and cross-sectionally dependent. The result indicates that Driscoll-Kraay standard errors are well calibrated when cross-sectional dependence is present (Hoechle, 2007).

Table 8

Cross-Sectional Time- Series FGLS Regression

```
Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        homoskedastic
Correlation:   no autocorrelation

Estimated covariances      =         1          Number of obs      =        95
Estimated autocorrelations =         0          Number of groups   =        11
Estimated coefficients     =         5          Obs per group: min =         2
                                                               avg =  8.636364
                                                               max =        11
                                                Wald chi2(4)       =    116.09
Log likelihood             = -122.5437          Prob > chi2        =    0.0000
```

loggdp	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
loglabor	.1968594	.0885042	2.22	0.026	.0233943	.3703245
logdinvt	-.1490902	.0823914	-1.81	0.070	-.3105744	.012394
logfdi	-.1452669	.0563789	-2.58	0.010	-.2557676	-.0347662
logrevenuefn	.6791848	.0689808	9.85	0.000	.5439849	.8143848
_cons	11.66883	1.299596	8.98	0.000	9.121669	14.21599

Source: Regression Result Cross-Sectional Time Series FGLS Estimator

Table 9

Regression with Driscoll-Kraay Standard Errors

```
. xtscc loggdp loglabor logdinvt logfdi logrevenuefn

Regression with Driscoll-Kraay standard errors   Number of obs     =        95
Method: Pooled OLS                               Number of groups  =        11
Group variable (i): sector                       F(  4,    10)     =     65.75
maximum lag: 2                                   Prob > F          =    0.0000
                                                 R-squared         =    0.5500
                                                 Root MSE          =    0.9031
```

loggdp	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
loglabor	.1968594	.0816084	2.41	0.037	.0150246	.3786942
logdinvt	-.1490902	.0563552	-2.65	0.024	-.2746573	-.0235231
logfdi	-.1452669	.0396199	-3.67	0.004	-.2335455	-.0569883
logrevenuefn	.6791848	.046165	14.71	0.000	.5763227	.7820469
_cons	11.66883	1.092451	10.68	0.000	9.234699	14.10296

Source: Regression Result with Driscoll-Kraay Estimator

These robust Driscoll-Kraay pooled OLS and cross-sectional time-series FGLS models both fit the data well at the 0.05 significance level (F statistics=65.75 and prob.> F = 0.000, and Wald Chi2=116.09 and prob.>chi2 = 0.000 respectively) shows to test whether all coefficients in the model are different from zero (table 10 and 11). Accordingly, it is greater than the tabulated F-test value; we reject the null hypothesis that states the entire coefficients together equal to zero. This test confirms that all explanatory variables are able to jointly and statistically explain the real GDP. All for the estimation of feasible general least square and Driscoll-Kraay standard errors produce the same parameter estimates. In the cross-sectional time-series FGLS regression result, average effects of all variables are statistically significant at 0.05 significance level except domestic investment. In this regression tax incentives and labor has a positive average effect on real GDP (growth) and statistically significant, whereas FDI has a negative average effect and is statistically significant at 0.05 significance level. With Driscoll-Kraay estimation controlling cross-sectional dependency at maximum lag length (2), all coefficients describe the model and are statistically significant. Alike FGLS, tax incentives and labor have a positive average effect, however, FDI and domestic investment has a negative average effect and are statistically significant. Here all explanatory variables, except domestic investment, have their correct signs as theoretically expected in this regression result.

Conclusion and Policy Implication

Several low-income nations deploy scarce resources from both local and international sources in order to promote economic growth through pricey tax holidays, custom duty incentives, and income tax exemptions. A country's ability to innovate, the availability of venture capital, the amount and type of investment, the degree of entrepreneurship, the level of skills and mobility of the workforce, the flexibility of the labor market, the degree to which people have an incentive as well as an opportunity to participate in the labor market, and the labor cost of employees are just a few of the variables that affect a country's economic growth.

Since that many of these characteristics are likely to be impacted by the tax system, it is essential. The country's rate of economic growth may be impacted by the amount of new taxes imposed, the mix of taxes, the effectiveness of the administration, the complexity of the tax code and the cost of tax compliance, the availability of tax incentives, and the size of the various tax bases. Tax

money is used by governments to pay for spending, to impact how income is distributed in a society, and to influence behavior.

Taxes, on the other hand, have a negative impact on consumption expenditure, import and export levels, and returns to capital and labor. The Ethiopian government has been offering a variety of fiscal incentives in an effort to foster an environment that is favorable to business and draw foreign direct investment. Duties and tax exemptions on imported goods have increased as a result, rising from birr 19.9 billion in 2009/10 to birr 65.5 billion in 2014/15. Nonetheless, the country's budget deficit exceeds 16.7 billion birrs in 2012/13, depriving it of resources crucial for reducing poverty and enhancing the welfare of the populace as a whole.

As a result, this article aims to investigate how tax incentives affected sectoral economic growth in Ethiopia from 2004–2005 to 2014–2015. The study uses a strong panel model based on data for the periods under view to examine the crucial impact of tax incentives on rate of economic growth. The robust panel model produces very conclusive results in identifying the statistically significant factors after controlling heteroskedastic, contemporaneously cross-sectionally correlated, auto-correlated type AR (1), autocorrelated with MA(q), and cross-sectionally dependent variables.

Conclusions about the effect of a revenue-neutral switch from one tax instrument to another on long-term GDP are possible thanks to this study. By providing incentives, the government is able to reduce its revenue while also boosting the economy and the tax base of the nation. Tax policy is frequently the art of the possible rather than the pursuit of the ideal in emerging nations. So, it is not unexpected that economic theory, particularly the literature on optimal taxation, has had relatively little influence on the creation of the tax system in developing nations (Tanzi and H.Zee, 2000).

Real GDP will rise by 0.68 percentage points for every percentage point increase in tax incentives. This means that tax incentives may be acceptable for the purpose of fostering "infant industries" and protecting them. Consequently, tax incentives should be targeted towards small and expanding businesses if they are to be effective. The results show that tax incentives improve a sector's performance in terms of value added in a way that is both positive and statistically significant (real GDP). The study also found a link between worker participation in operational projects funded by both FDI and domestic investment and the health of the economy.

The conclusion is that tax incentives play a key role in improving sector performance, creating additional employment possibilities while also raising the GDP and overall tax base of the nation. Yet in order to prevent side effects that reduce productivity by skewing resource allocation, perpetuating inefficient or unsustainable operations, and losing money necessary for other parts of the productivity packages, they must be carefully planned and implemented.

The interesting thing is that tax incentives for investments actually lower the tax burden on income received by relatively rich investors. In addition, most programs are created to give certain taxpayers a break over others who are facing comparable economic challenges. Some taxpayers can end up paying more in taxes as a result. For instance, if investment incentives lower corporation tax collection, the government may be forced to rely more largely on indirect taxes, which hit the weaker sectors of society more heavily (this needs further study). There must be a clear expectation that the tax incentives would really and significantly promote equitable growth and job creation in order to make up for these discrepancies. The Ethiopian government must also look into methods to use fiscal policy to promote inclusive growth. In other words, while maintaining growth is a major goal of fiscal policy, increasing inclusiveness of maintained growth should be a significant additional factor.

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