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## **ESSAYS ON FISCAL FEDERALISM IN ETHIOPIA**

*By: Million Adafre Bushashe*

*June, 2024*

*Addis Ababa, Ethiopia*



## **ESSAYS ON FISCAL FEDERALISM IN ETHIOPIA**

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A Dissertation Submitted to the Department of Public Administration and Development Management of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Public Management and Policy

June, 2024

Addis Ababa, Ethiopia

**Addis Ababa University**  
**College of Business and Economics**  
**Department of Public Administration and Development Management**

This is to certify that the dissertation prepared by Million Adafre Bushashe entitled “**Essays on Fiscal Federalism in Ethiopia**”, which is submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy in Public Management and Policy, complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## DECLARATION

I, the undersigned hereby declare that this Ph.D. dissertation entitled “**Essays on Fiscal Federalism in Ethiopia**” is my original work and has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

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## **ABSTRACT**

*The dissertation comprises four essays focusing on empirical studies to uncover whether fiscal federalism (decentralization) promotes social public service provision, economic growth, economic development, and macroeconomic stability. Despite the efforts made by the government, rejoicing in the intended fruits of fiscal federalism has remained in vain and is becoming a prime policy issue in Ethiopia. Also, prior empirical studies exhibited inconclusive results. It put the plausibility of the studies into question. First, the study examined fiscal federalism's effect on public service provision in Ethiopia. The study adopted an explanatory research design. Considering ten Sub-National Governments (SNGs) from 2005 to 2018, it employed Partial Least Square Structural Equation Model (PLS-SEM). It also utilized Gaussian copula (GC) estimations since it helps to deal with potential endogeneity problems. The study showed that expenditure decentralization significantly fosters public service provision. However, revenue decentralization showed no significant role in enhancing public service provision. Besides, though expenditure decentralization has adversely affected SNGs' capacity, revenue decentralization positively contributes to SNGs' capacity. On the one hand, SNG's capacity plays a significant positive mediating role in the impact of revenue decentralization on public service provision. On the other hand, it negatively mediates the contribution of expenditure decentralization on public provision. secondly, the study examines the impact of fiscal decentralization on Ethiopia's SNG economic growth. The study followed a quantitative research procedure employing data from 2008 to 2021. The units of analysis in the study are SNGs. The study used the two-step System General Method of Moments (SYS-GMM) of dynamic panel estimation because it resolves concerns such as endogeneity and heteroscedasticity. The study's findings revealed that expenditure, revenue, and composite decentralization showed a significant negative effect on regional economic growth.*

*Moreover, among the control variables, inflation and government size revealed a detrimental effect on regional economic growth. Thirdly, the study aimed to scrutinize the association between fiscal federalism and economic development in Ethiopia. By employing ten SNGs' data over the period 2005–2018, the study used the PLS-SEM. The study found that revenue decentralization and Fiscal incentives significantly enhance economic development. Nevertheless, expenditure decentralization significantly deteriorated economic development. Besides, economic instability has an adverse moderating role on the contribution of revenue decentralization to economic development. Fourthly, the study aimed to investigate fiscal decentralization's effects on Ethiopia's SNGs macroeconomic stability. The study followed a causational research design employing data from 2005 to 2018. The units of analysis in the study are SNGs. The study utilized the two-step SYS-GMM model. The study findings revealed that revenue and composite decentralization significantly shielded macroeconomic instability. In contrast, expenditure and fiscal dependency are significantly aggravated macroeconomic instability. Besides, to grasp the shielding effect of revenue decentralization from macroeconomic instability, there should be incentive devices to boost SNG's tax collection efforts. Since capital and welfare expenditures exacerbate macroeconomic instability, the study urges the government to follow a contractionary fiscal policy by cutting its expenditures.*

**Keywords: Fiscal Federalism, Public Service Provision, SNG Capacity, Economic Development, Macroeconomics Instability, PLS-SEM, SYS- GMM**

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## **LIST OF ACRONYMS**

ADF: Augmented Dickey-Fuller

AR ( $\rho$ ): High-order autoregressive process

AR (1): First-order autoregressive process

AR (2): Second-order autoregressive process

BLUE: Best Linear Unbiased Estimates

CB-SEM: Covariance Based Structural Equation Model

CSA: Central Statistics Authorities

DW: Durbin–Watson

FDRE: Federal Democratic Republic of Ethiopia

EPRDF: Ethiopian People Revolutionary Democratic Front

FE: Fixed Effect

FG: First Generation Statistics

FGFF: First Generation Fiscal Federalism Theory

FGLS: Feasible Generalized Least Squares

FY: Fiscal Year (mid-July to mid-July of the next year)

GDP: Gross Domestic Product

GLS: Generalized Least Squares

GMM: General Method of Moment

HDI: Human Development Index

HoF: House of Federation

IGT: Inter Governmental Transfer

IMF: International Monetary Fund

IPS: Im-Pesaran-Shin

LLC: Levin-Lin-Chu:

LMT: Lagrange Multiplier Test

MI: Misery Index

MoFEC: Ministry of Finance and Economic Cooperation

MRR: Marginal Revenue of Retention Rate

NBE: National Bank of Ethiopia

NGO: Non-governmental Organizations

OLS: Ordinary Least Square

PCSE: Panel Corrected Standard Errors

PLS-SEM: Partial Least Square Structural Equation Model

RE: Random Effect

RGDP: Regional Gross Domestic Product

SEM: Structural Equation Model

SG: Second Generation Statistics

SGFF: Second Generation Fiscal Federalism theory

SNNPR: Southern Nations, Nationalities and Peoples Region

TGE: Transitional Government of Ethiopia

VAT: Value Added Tax

WB: World Bank

# **CHAPTER ONE**

## **1.1. Introduction**

Many nations have been experimenting with decentralization since the 1980s, giving lower-level governments more authority over political, administrative, and financial matters. Numerous elements and conditions in every nation have contributed to the worldwide trend toward decentralization. It is connected to the shift to a market economy and democracy in various countries. In others, it addresses the failure and dissatisfaction with development abstractions rotating around ethnic and regional conflicts.

Fiscal federalism advocates contend that by putting the people and government closer, decentralization will strengthen accountability and transparency in the management of public affairs by boosting public participation in local decision-making processes. Decentralized governments enhance service delivery because they possess a superior understanding of local conditions and preferences, which enables them to determine the type and extent of services that the local populace needs. Decentralization is also considered as bringing decision-making closer to the people, which should increase SNGs' responsiveness and efficiency.

Decentralization is defined as a devolving of the higher-level government functions into various tiers of government with necessary resources, decision-making power, and executing autonomy, and fiscal federalism is a process by which decentralization occurs under the framework of federalism (Smoke, 2003; Oates, 2005; Morozov, 2015). However, defining decentralization and fiscal federalism is challenging since the definition of the terms depends on the context of how the country designs them and the multi-faceted nature of the terms. Furthermore, to have a plausible

definition, it is necessary to define the decentralization experience of the country under consideration.

The historical establishment of fiscal federalism can be placed under two theoretical strands: first-generation fiscal federalism (conventional) theory and second-generation fiscal federalism. The 'first-generation' theory of fiscal federalism assumes SNGs politicians and bureaucrats are benevolent and always motivated to satisfy citizens' need rather than their personal and political motives and place the overall normative framework for the assignment of functions to different levels of government and the appropriate fiscal instruments for carrying out these functions' (Oates, 1972, 2005).

Rather than being divergent, the second-generation fiscal federalism theory is a protraction of the first-generation theory, which contends that politicians are not benevolent people. Because of their strong propensity for rent-seeking behavior, which may adversely influence SNGs' circumstances, it is vital to maintain a close relationship between revenue and expenses to hold SNGs responsible for their spending habits. In fiscal federalism theories, 'pure' decentralization as an ideal-type construct would refer to a system in which pure SNGs raise pure local taxes and undertake pure local expenditures without the benefit of central government transfers' (Prud'homme, 1995; Smoke, 2001, 2003; Boadway & Tremblay, 2012).

Fiscal federalism literature generally classifies decentralization into four categories, namely, administrative, political, fiscal, and market decentralization. Administrative decentralization comprises the set of policies that transfers the administration and delivery of social services such as education, health, social welfare, or housing to SNGs. On the other hand, political decentralization refers typically to situations where political power and authority have been

partially transferred to elect and empower SNGs, ranging from village councils to state-level bodies. It is a top-down process that aims to give citizens or their elected representatives more power in public decision-making. The third type is fiscal decentralization. It involves the authority raising revenues or accessing transfers and deciding on investment expenditures.

Furthermore, market decentralization, or the decentralization of government functions to private companies or businesses, is the fourth classification. When government planning, administrative duties, and other public functions are transferred to nonprofit, private, or voluntary enterprises, the public is benefited and involved. This type of transfer of government power and responsibilities is done in favor of non-public entities. It entails contracting out administrative or partial service provision, deregulation, or privatization. Typically, these actions are taken for services that were previously the exclusive domain of the federal government and are ideally intended to be divested to SNGs' entities where the local populace will benefit. The Ethiopian government launched a decentralization program in 1991 as a panacea for economic growth, enhancing quality public service, and ensuring balanced regional development.

Besides, the fiscal federalism theories link decentralization and economic growth by assuming the subsequent three arguments. First, decentralization may contribute to economic growth by increasing the efficiency of local public services provision since the SNG is much nearer to citizens than the central government. Consequently, they have more knowledge of local choices than the center. Therefore, utilizing this information advantage, they can improve economic growth through efficient public service delivery. Second, decentralization may bring competition among SNGs to match local public services provision with local tastes to attract mobile factors of production, which in turn leads to economic growth.

Third, decentralization may place a constraint on the rent-seeking behavior of local politicians and bureaucrats by creating undesirable consequences such as loss of mobile factors of productions or votes of citizens and instead force them to come up with better policy and effort that improves their efficiency and economic growth or development as well (e.g., Brennan & Buchanan, 1980; Weingast, 2009). Therefore, the third Chapter of the dissertation deals with the link between fiscal federalism (decentralization) and economic growth.

Moreover, unlike economic growth, which only reflects the growth of national or per capita income, economic development infers changes in income, savings, and investment in tandem with advanced progress in the nation's socioeconomic framework (institutional and technological changes). The previous empirical studies overlooked economic development and considered only economic growth. Alternatively, erroneously consider economic growth as a proxy measure of economic development.

As the theories of fiscal federalism articulated, the redistribute function is practical only if the federal government provides it. The decentralization of this function may widen inequality by treating households with similar income levels before launching a distributive program to different income levels after the distributive program's launch, making different treatments equal. Besides, the conception of poverty in the relatively better region is different from poverty in relatively worse regions, and SNG is only concerned about people living within their jurisdiction, which may further aggravate disparity. Therefore, if the redistributive function is carried out at the federal level, it reduces different conceptions of poverty and achieves equal treatment.

The stability functions of government aim to establish balanced growth through controlling the inflation rate; the conventional theory gives this function to the federal government, and one of the

reasons for devolving this function to the SNGs poses a problem is that the sub-national economy is considered open, it may be diffused to another jurisdiction.

## **1.2. Statement of the Problem and Motivation of the Study**

Though fiscal federalism is expected to improve social well-being, promote economic growth and development, and reduce macroeconomic instability, there is a mix of empirical evidence from studies conducted on the causal association between fiscal decentralization and economic growth. Researchers investigating the nexus between fiscal federalism and public service provision demonstrated contradicting findings. (e.g., Zhuravskaya, 2000, Robalino et al., 2001; Syamsul, 2003; Busemeyer, 2008, Diaz-Serrano & Rodríguez-Pose, 2012; Lozano-Espitia & Martínez, 2013; Henseler, 2014; Sow & Razafimahefa, 2015; Ferrante, 2016).

Furthermore, empirical evidence on studies conducted on the causal association between fiscal decentralization and economic growth and development is mixed. Some studies have shown that fiscal federalism positively affects economic growth (Zhang & Zou, 2001; Iimi, 2005; Siliverstovs & Thiessen, 2015; Liu, 2017). In contrast, some studies have revealed that fiscal federalism significantly worsens economic growth (Davoodi & Zou, 1998; Zhang & Zou, 1998; Naumets, 2003; Malik et al., 2006; Rodríguez-Pose & Ezcurra, 2011; Su et al., 2014; & Nguyen et al., 2019). Besides, some studies revealed contracting results among the employed indicators of fiscal federalism (Jin & Zou, 2005; Rodriguez-Pose & Kroijer, 2009; Philip & Isah, 2012; Iqbal et al., 2013; Su et al., 2014).

Similarly, scholars who investigated the nexus between fiscal federalism and macroeconomics stability also showed inconsistent findings (e.g., Thornton, 2007; Iqbal & Nawaz, 2010; Ali & Batool, 2017; Bojanic, 2018; Melnyk et al., 2018; Adindu & Ugondah, 2021; Rauf et al., 2021; Ahmad et al., 2022; Osmani & Tahiri, 2022; Mariani et al., 2022).

Unlike prior studies, essays in the present study used multiple fiscal federalism indicators and a methodological approach that gives robust results by mitigating econometric issues such as endogeneity, autocorrelation, and heteroscedasticity, making the study more thorough and closing the knowledge gap. Most importantly, the present study combined the two prominent fiscal federalism theories and widened public finance economics scholars commonly used theoretical lens.

Ethiopia's government has launched a decentralization program to attain the fruits of decentralization: to improve social well-being through adequate public service provisions. Also, it fosters economic growth (development) and reduces macroeconomic instability. In Ethiopia, expenditure assignments are highly decentralized; in contrast, revenue assignment is weakly decentralized; consequently, a large share of (more than 70%) regional states' public financing depends on an inter-governmental grant, which, in turn, constrains the autonomy of the SNGs.

Despite the efforts made to realize the objectives of the decentralization program, there is still a deeply rooted deprivation, starvation, and shortage of public services such as clean water, hospitals, schools, roads, sewerage services, and the like. Besides, the country has faced difficulty in achieving sustainable development, and there still needs to be a problem with infrastructure, SNG fiscal capacity, and macroeconomics instability, which are essential agendas of public policymakers and international donors. It makes room to question whether the decentralization program effectively enhances social well-being, economic growth (development) and macroeconomic stability.

### **1.3. Gaps and Research Questions**

Literature on fiscal decentralization's EFFECT on public service delivery suggests that fiscal federalism improves provision. It is due to the lower government's better understanding of local community preferences. Self-rule in the federal system assumes SNGs have legislative and administrative autonomy. Nevertheless, it is vital to SNGs' capacity to formulate and implement public provision strategies. This led to the dilemma of the "CHICKEN OR EGG" causality question. Which came first: the decentralization program or the administrative capacity of SNGs? Therefore, the present study bridges gaps in the existing knowledge since it embraced ignored variables (i.e. SNG capacity) essential in the debates of fiscal federalism theories. Therefore, the study raises and addresses the following research questions:

- 1. How does fiscal federalism affect SNG public service provision in Ethiopia?**
- 2. Does the SNG government capacity mediate the effect of fiscal federalism on SNG public service provision in Ethiopia?**

Fiscal federalism theory propagates the devolution of some functions of the central government to enhance efficiency. It emanates from the information advantage of SNG that led to economic growth. Economic development means raising the economic welfare of a given nation. Improving economic growth does not necessarily mean fostering economic development. Empirical studies have either linked fiscal federalism with economic growth or considered economic growth as development. A stable macroeconomic encourages the smooth transfer of funds, which brings economic development. However, the instability hinders resource allocation, effectiveness, and investment. The question of how macroeconomic instability moderates this link has remained unanswered. Therefore, the study proposed the subsequent research questions:

### **3. How does fiscal federalism affect Ethiopia's SNG economic growth (development)?**

Fiscal decentralization reduces fiscal resource competition between SNG and federal governments. Properly allocating government expenditures can enhance economic stability. Economists' publications have reflected empirical investigations of the impact of decentralization on macroeconomic stability (e.g., Treisman, 2000; King & Ma, 2001; Neyapti, 2004; Feltenstein & Iwata, 2002; Martinez-Vazquez & Macnab, 2006; Shah, 2006; Iqbal & Nawaz, 2010; Jalil et al., 2012; Makreshanska & Petrevski, 2015; Palienko et al., 2017; Bojanic, 2018; Melnyk et al., 2018; Osmani & Tahiri, 2022). Nevertheless, despite a significant amount of research, empirical evidence regarding the link between financial decentralization and macroeconomic stability needs to allow for drawing firm conclusions regarding the strength or direction of the relationship. This signals the need for further research. So, the study attempted to answer the following questions:

### **4. How does fiscal federalism affect SNG's macroeconomics stability in Ethiopia?**

#### **1.4. Scope and Significance of the Study**

Even though decentralization has four dimensions: Fiscal, administrative, political, and market, the study only embraced fiscal decentralization. Besides, it is also limited to the second tier of the government structure. Therefore, other than filling gaps in the empirical studies, the current study aims to address the problem of fiscal federalism.

Nowadays, countries worldwide have reached a consensus about the importance of decentralization and its pivotal role in enhancing SNG public service provision, economic growth and development, and reducing macroeconomic instability. Accordingly, it is essential for policymakers, scholars, practitioners, and other stakeholders in Ethiopia. Besides, unlike the previous study, which used a single indicator for each decentralization variable, this study enriches

the concepts of decentralization by employing multiple indicators for each variable and, as a result, attempts to hold holistic aspects of each variable in the study.

Most importantly, the quintessential contribution of this dissertation is a novel theoretical framework for the empirical measurement of fiscal federalism. Moreover, to grasp the fruits of its flexibility and exploratory nature, the study utilized PLS-SEM, and it paved the way to analyze and provide additional insight into the direct and indirect effect of fiscal federalism on public service provision and economic development.

## **1.5. Structure of the Dissertation**

This study is organized into six chapters. Chapter 1 discusses the introduction, statement of the problem and motivation of the study, gaps research questions, significance and scope of the study, and dissertation structure. Chapter 2 presents literature review, Chapter 3 presents Research Methodology, Chapter 4 empirically analyze the link between Fiscal Federalism and Public Service Provisions; Chapter 5 make an empirical analysis of the Effect of Fiscal Decentralization on Economic Growth in Sub-national Governments' of Ethiopia; Chapter 6 empirically analyze the nexus between Fiscal Federalism and Economic Development; Chapter 7 examined the Effect of Fiscal Decentralization on Macroeconomics Stability; lastly, Chapter 8 deals with the Overall conclusions, policy implications, and contribution to the knowledge.

## **CHAPTER TWO**

### **2. Literature Review**

#### **2.1. Introduction**

The theoretical discussion in this chapter is about fiscal federalism, economic growth, and the theoretical connections between fiscal federalism, economic growth, and regional disparities. In addition, it also aimed to make a brief presentation on relevant empirical studies that have so far attempted to explore the effects of fiscal federalism on social well-being, policy efforts, and economic growth. There has been a worldwide interest in government decentralization in all parts of the world over the last couple of decades. As both developed and developing countries have attempted to challenge the monopoly of decision-making power of central governments, the pursuit of decentralization is widespread.

The relation between decentralization and its presumed outcomes has been examined in theoretical and empirical literature, such as improving economic development, closing gaps, and efficient delivery of services. This may fall under two theoretical strands: the FGFF and SGFF theories. To develop strong plausible and enriched theoretical rationalizations, though the present study mostly utilizes the FGFF, to some extent, it also uses important ideas from the SGFF of which the researcher believed that may help to capture and explain under the context of Ethiopia fiscal federalism system.

## **2.2. Conceptualization of Fiscal Federalism**

Federalism is generally defined as an overall guideline for the establishment of financial, legal, political and administrative relations between all levels and units of government with varying degrees of authority and jurisdictional autonomy. Fiscal federalism can be described as the transfer to the government of the central public goods supply function that has different tiers such as federal, regional, provincial and local government or government that is under federal system arrangement and the necessary resources to effectively fulfill their responsibilities (Tibouts, 1956; Oates, 1972, 2005; Tanzi, 1996).

The term "decentralization" includes a number of concepts that must be carefully analyzed before determining whether the programs should support the reorganization of financial, administrative, or service delivery systems in any particular country (World Bank, 2002). The difference between the concepts of decentralization and federalism is that while federalism is a framework for the analysis of the public sector of a nation, decentralization is a process of allocating public sector activities to different levels of government, and therefore fiscal federalism is the reference system in which the decentralization process takes place (Morozov, 2015).

Contrary to "de-concentration," in which the responsibilities of the central government are decentralized without any devolution of any decision-making powers (Rondinelli, 1990), it assumes that decision-making powers are transferred to sub-national governments. It is an umbrella term for all different decentralization methods used for various purposes (Crook and Manor, 2000). According to Bird (1999, P.208) "Decentralization often seems to mean whatever the person using the term wants it to mean." It is therefore not easy to define decentralization, as it encompasses a wide range of institutional arrangements and institutional reforms. Various

characteristics that define it should be differentiated in order to provide a clear understanding of fiscal federalism since they have different features, policy consequences, and requirements for success. FF therefore has to do with the separation of government roles, the vertical and horizontal structure of public finance, and the design by which different government tiers communicate with each other.

### **2.3. Review of Fiscal Federalism Theories**

Tibout (1956), Musgrave (1959) and Tanzi (1996) and Oates (1972) first propagated the original definition of fiscal federalism. Musgrave's (1959) significant work presented the functions and the primary economic position of government by tripling it into three categories: allocation, distribution, and stabilization. Smoke (2001) tries to describe and address these three functions following the work of Musgrave, and the study presents a review of these below.

Given the allocation, the principle of fiscal federalism gives the central government a primary responsibility for distribution as only the central government is better at redistributing wealth from wealthier to poorer jurisdictions, and if development factors were mobile, differential local redistribution schemes will be expected to cause problems. Because of the following three important factors, the theory also put the stabilizing role to be the responsibility of the central government:

First, if a sub-national government entitled independent control over its own money supply, the problem could arise. Second, because the local economy is largely free, local fiscal policy has a knocking impact. Thirdly, at the local level, deficit financing is deemed unacceptable as repayment-related problems which entail substantial transfers of real income to creditors residing outside the jurisdictions of debtors. Fourthly, on the revenue side, the forms of revenue that seemed

acceptable to local government were inclined to be inelastic in revenue and thus restricted the ability of local government to adopt the correct fiscal policy.

The welfare benefits improve by decentralization as households in different places could prefer the bundle of goods and services. However, if the correct market and competitive pricing do not exist, a collective decision process (voting) can decide community-wide demand. Tibout (1956) made a significant contribution from which most of the conclusions were taken by the conventional theory of fiscal federalism. He encourages fiscal decentralization if and only if the advantage of local government knowledge about the community's local public goods preference is greater than the technological advantage and economies of scale advantage of the central government.

It is lost as a result of the handover to the local government of a public good supply of local public services. In this case, to achieve allocation effectiveness, it is better to provide local government with public goods, which could in turn bring optimum local social welfare in particular and local economic development in general.

In principle, since it considers household mobility, the Tibout (1956) model largely depends on the exit preference of households to other regions that provide a better mix of public goods provision relative to their incomes rather than the consumer voice. In order to transfer material from one location to another, household mobility has a financial cost. In addition, it also has non-pecuniary costs that build up over time, such as social capital and friendships. In addition, much of the federation is driven by tax harmonization, and centralized taxation on mobile factors often brings into question the plausibility of mobility of households. In fact, this checked the assumption of Tibout (1956) and household mobility is therefore hard to happen.

While it shared several similarities with Oates's (1972) decentralization theorem, it differed fundamentally in the following ways. First, he considered the presence of the upper level of government and, if two preconditions are fully met. First, consider whether there is a relatively higher heterogeneity of local goods preferences across the state. Second, if the inter-jurisdictional spillover effect is lost. However, if one of the above preconditions is unsatisfied, the paradigm of Oates (1972) strongly urged the centralized provision of public goods as the central government would internalize the spillover impact of inter-jurisdictions through the Pigouvian approach or equalization grants of the IGT framework. In addition, since the uniformity of inter-regional preferences is the case, the centralized provision of public goods will help to derive advantage from the economics of the scales produced by the centralized provision of public goods.

In short, Oates (2005) argued that fiscal federalism should concentrate primarily on comprehension, in order to solve the puzzles under the centralize-decentralize dichotomous provision of public services, which functions and instruments are better suited when provided by the central government and which functions are highly efficient if provided by the local or regional government. Nevertheless, fiscal federalism theorists of the second generation support the viewpoint of public choice (political-economy). Besley and Coate (2003) strongly opposed the uniformity of centralized public goods provision and expressed that local governments are unable to internalize uniform provision because they assumed that such provision tended to the local government's desire to have broad legislative representatives by legislators' majority rule.

Local governments increase their efficiency by providing better public services than other local governments in the presence of fiscal competitions, and can therefore attract households living in other jurisdictions and possibly increase their revenues from these newly arrived households in the jurisdiction. This assumption further encourages local government's innovative behaviors to seek

a better way of producing technology and therefore increases their productivity, which may in turn have to reduce the cost of local public goods production and distribution (Boadway and Tremblay, 2012).

In addition, this entrepreneurial motive and creativity can enable other jurisdictions to copy, or further enhance the technology. Then, such information dissemination may have a great opportunity to increase the production rate at regional and aggregate (macro) levels as well (Oates, 2005). Brennan and Buchanan (1980) come up with another dimension of viewing government bureaucrats and local government politicians not far from the viewpoint of the political economy.

The Leviathan approach, diverging from conventional views of fiscal federalism, considered public servants a clear inclination to increase their own gratification through their rent-seeking actions rather than being a benevolent policymaker statement of the traditional argument of fiscal federalism. It regarded decentralization as a way to minimize the size of the public sector and placed a limit on local government revenue-maximizing behaviors. This view firmly supports inter-jurisdictional fiscal competition and has taken this competition into account analogously with the company's competition in microeconomic theory within industries. Since it urged regional government self-sufficiency on their expenditure needs, and that is gathered from the principle of benefit.

Any incorrect move of the central government penalized by household mobility or others intervenes in the marketing system. However, because of the fear of penalty, such competition can force the local government to increase its revenue and also encourage them to reduce the tax to attract households in other jurisdictions. Thereby creating a race-to-the-bottom effect that reduces the quality and quantity of public goods supplied and therefore worsens the social welfare of the

community within the region. Weingast (2009) conceptual paper argued that local government does not always maximize its revenue solely for the sake of the intended objectives to be achieved.

Local government maximizes revenue to spend on productive public investment, such as road construction, which can help the region's private enterprises flourish. In addition, regional government fiscal capacity is once again increased by such business development within the region. But they specifically acknowledged the potential presence of local government rent-seeking activities that could increase their political and personal motivation instead of practicing political effort that could enhance the local community's economic and social conditions. This point of view promotes local government competition through successful policy efforts that can contribute to private sector growth.

## **2.4. Form of Decentralization**

Literature has put three categories under the umbrella of a type of decentralization: de-concentration, delegation, and devolution. De-concentration is a mechanism that only transfers responsibilities from central government officials in the capital city to those in regions, provinces or districts, or, under the control of central government ministries, may establish strong field administration or local administrative power (Turner and Hulme, 1997). Delegation is a more comprehensive form of decentralization, considering the fact that central governments delegate accountability to semi-autonomous bodies for decision-making and administration of public functions, not completely governed by the central government, but ultimately accountable to it (Schneider, 2003).

On the other hand, devolution arose when the center transferred responsibilities and powers to quasi-autonomous local government units for decision-making, financing, and management, and

thus, in a devolved structure, local governments have specific and legally recognized territorial boundaries within which they exercise jurisdiction and under which they conduct public functions (Turner & Hulme, 1997; Schneider, 2003).

## **2.5. Dimensions of Decentralization**

Since countries have distinct experiences and contexts, the dimensions of decentralization are a controversial issue in literature and should be defined and conceptualized in line with the country in question. In a broad sense, decentralization can be defined as the transfer to the different levels of governments of political, financial, and resource allocations and power to supply public goods. The decentralization dimension falls mostly under the umbrella of the four viewpoints discussed below.

### **2.5.1. Administrative Decentralization**

Despite a considerable body of writing on the distinction between de-concentration and devolution, decentralization debates and policies are often blurred and treated as mutually exclusive. From the point of view of administrative decentralization, the theories of public administration dealing with decentralization largely focus on how to achieve modern bureaucracies in an efficient, effective and rational manner (Weber, 1968). There is a major debate as to whether these features work in tandem or whether there is a trade-off. However, the combination is likely to depend on individual cases.

### **2.5.2. Political Decentralization**

By its presumption of benevolent government, the FGFF overlooks the political dimensions of decentralization, but this neglected dimension of decentralization was captured by the SGFF theory. Democratic decentralization seeks to enable people through their democratically elected

representatives to engage in decision-making in the political sphere, such as policy formulation. By providing people an opportunity for self-determination and participating in government issues that directly or indirectly impact their interests, this component of decentralization can be used as a peace-building and state reform mechanism.

From the point of view of democratic principles, it is characterized as the distribution of powers between elected authorities and the decision-making process by local representatives within the framework of policy guidelines and, possibly, the financing arrangements channeled and monitored by the center (Besley & Coate, 2003; Olowu & Wunsch, 2004). According to Mulugeta (2012, p.41) "If power and management authority are not transferred to elected officials, it will be meaningless." Moreover, in policy development problems and other aspects, it focuses on the motivations and actions of legislators and bureaucrats. In general, administrative decentralization is the transition of power and responsibility for managing the human capital, material and financial resources aimed at delivering public services between the different levels of government.

### **2.5.3. Market Decentralization**

Market decentralization or privatization is another element of decentralization that mainly emphasized the promotion of private sector involvement through deregulations and the cancellation of prevailing rules, regulations and procedures that had originally generated obstacles for improving private business activities (Halaskova and Halaskova, 2014). It also involves the transition and outsourcing to private companies of services which are monopolistically rendered by the government. It encourages public sector finance through the capital market, privatization and divestment of state-owned enterprises (Rondinelli and Nellis, 1986).

To put it differently, it paved the way for health competitions between private sectors by ruling out limitations and excessive government interference into the market, which in turn has made a

significant contribution to economic development. This could be mandatory for African nations with a high degree of exposure to catch and direct the country's key resources to their ethnic groups to get support from a politically powerful ethnic group.

#### **2.5.4. Fiscal Decentralization**

Fiscal decentralization is a method of transferring functions of public goods provision to various levels of government with resources required for the performance of the assigned functions and aimed at grasping the knowledge gain of local government created by their proximity to local community (Tibout, 1956; Oates, 1972). Unlike the SGFF, the FGFF theory advocates high expenditure decentralization and the centralization of revenue assignments, as discussed previously.

**2.5.4.1. Expenditure Assignment.** Fiscal decentralization budget distribution focuses on local government expenditure decision autonomy for provisions on public goods (Boadway and Tremblay, 2012). In the fiscal decentralization process, budget allocation is urged to come first. Since local government should know about their spending requirement to increase the required amount of revenue (Bahl, 1998). It has much of political cost than revenue assignment since the central government leaves regional government budget control which increases the reliance and loyalty of local government to the center at the expense of local community need and this in turn may put the efficiency of public spending in great danger.

**2.5.4.2. Revenue assignment.** It is a process to give local government autonomous right to local resources (various tax bases) to finance their budget (Boadway and Tremblay, 2012). The FGFF promotes the centralization of revenue relative to expenditure, since the central government is in charge of redistributive responsibility. To reduce the mobility of production factors, the theory called for centralized taxation of mobile inputs, such as income, payroll and sales taxes. This tax

base holds a large share of government revenues. The decentralization of the revenue system's tax bases ensures that local municipalities have various tax systems and tax rates, resulting in high costs of tax collection and enforcement.

The SGFF, however, strongly urged the self-sufficiency of local government spending needs through the concept of benefit, which showed that the benefit earned by households should be proportional to the cost of having it. And, until they reach the point where the marginal revenue of local public goods and the marginal cost of production of local public goods are equal, local governments should increase their production of public goods. In reality, the benefit principle is difficult to implement because the public goods (e.g. education and health) provided by the local government are quasi-private goods and are heavily affected by the redistribution programs of the central government.

**2.5.4.3. Inter-Governmental Transfer Design.** In order to achieve predetermined objectives, the IGT mechanism emphasizes grants or subsidies made by the central government to the regional government. The FGFF transfer system primarily emphasizes on the achievement of the following objectives.

1. Closing fiscal deficits resulted from the disparity in local government revenue allocations and spending needs.
2. To fund the central government-initiated programs.
3. Reduction of lateral fiscal imbalances and subsidization of spillover effects.

As can be easily understood from the three points mentioned above, the intergovernmental transfer system of the FGFF emphasized the gap-filling that gives greater equalization grants to the regional government that has experienced a higher fiscal deficiency and has no explicit way of addressing the inter-jurisdictional spillover effect. In addition, there is no explicit mechanism to

provide incentives for local governments to increase their revenue collection efforts. As a result, the regional government spends a lot more and competes for a common pool rather than increasing its revenue collection effort.

The SGFF authors like Weingast (2009) criticize the presence of soft budget constraints, local government politicians and bureaucrats are encouraged to externalize their weakness in collecting revenues to the common central government pool. In addition, the existence of the bailout principle further aggravated the leniency of local government revenue collection efforts. He also advocates against the avoidance of the principle of bailout because if the central government failed to bailout larger regions, it may have a major knock-effect to all over other regions and therefore some regions are inherently too big to fail.

In addition, similar to the prisoner dilemma, sometimes the regional government can see the logic of bailouts, no matter what the central government thinks about them and expects bailouts. Boadway and Tremblay (2012) suggest that, in order to increase the regional government's tax effort, the central government should first move towards the reduction of the equalization grant, which, in turn, makes the regional government collect revenue at least or more than the forgoing grants. A grant is a lump sum of money provided by the grantee to achieve the objectives in line with the grant policy and procedures (Bird and Smart, 2002). The grant may include the federal government, international institutions such as the International Monetary Fund (IMF), the World Bank (WB) or other sources.

A grant is a sum of money given for a specified purpose to organizations or individuals aimed at achieving goals consistent with the grantor's goals and policies. Grants to various government tiers are classified into two: unconditional grants (general purpose) and conditional grants (specific

purpose). Conditional grants are given as an incentive for a government to conduct a grantor-initiated program, according to Shah (2006), and can be conditioned either by input such as capital expenditure or performance such as the outcome of service delivery.

Input-based conditionality is potentially unproductive and intrusive, but it also helps to achieve the goals of grantors, and output-based conditionality offers greater local control compared to input-based conditionality (Shah, 2006). But an unconditional grant is a grant that allows the government full autonomy to spend wherever it wants to spend. The grants were also categorized as open-ended or close-ended. Transfers may be labeled matching if their size may be a proportion of local government spending on a particular category and if the size depends on local government spending without any upper limit, it is also called open-ended, and otherwise it is called close-ended (Winkler, 1994).

Depending on the nature and context of the decentralization of a given country, different approaches or modalities exist to design IGT. The types of modalities that a country may follow under the decentralization program are presented briefly below.

**2.5.4.3.1. Types Equalization Modalities.** Modality of equalization is an approach that is pursued in a decentralized government system to identify inter-governmental transfers to reduce inequalities and internalize externalities among regional states. Three potential types of equalization modalities were defined by Dafflon and Vaillancourt (2003): fiscal capacity, expenditure need, and equalization of fiscal gaps. The fiscal capacity modality focuses to a large extent on closing the gaps in potential fiscal capacity-raising differences across regions.

Since certain regions may be blessed with a natural resource or have a higher economic level, the government has therefore transferred equalization based on the tax collection potential of regions.

This view recognizes expenditure differential as arbitrary due to the need to increase the per capita of a specific public service and the cost disparity between regions and can be overcome by subsidizing disparities in sectorial expenditure or by special matching grant procedure (Shah, 2006).

Revenue equalization, in order to increase their share of the federal grant, may provide an incentive for sub-national governments to reduce their tax effort, as well as the tax bases included in the general equalization grant formula. However, the Representative Tax System (RTS) can solve this problem of tax under-collection by assessing sub-national capacity. In addition, by setting the ceiling and the floor tax rate, it is possible to control the sub-national strategic behavior of increasing grants.

The second equalizing approach, i.e. the expenditure need equalization approach, focuses primarily on filling differences in the need for inter-regional expenditure and includes various inability factors such as distance from the center, inter-regional cost of public goods production differences, and also considers that differences in the need arose as a result of inter-regional demographic differences (Boadway, 2005).

The third equalizing approach, that is, fiscal gaps equalization is aimed to fill the difference between revenue rising capacity and expenditure need and therefore it comprises both RTS and representative expenditure system (RES)—which is the expenditure categories that hold a lion's share of sub-national expenditure needs and equalizes differences between them. Based on the direction, the mode of equalization can also be categorized into three: vertical, horizontal, and hybrid. Vertical equalization occurs when the federal government provides the transfer to reduce inter-regional disparity and internalize spillover effects (e.g. India). On the other hand, horizontal

equalization is inter-governmental transfers among governments under the same level, that is, happen when richer sub-national governments provide equalization grants to poorer regions of sub-national governments (e.g. Germany).

Such kinds of transfer may have a disincentive to the poorer region to raise more revenue; it also discourages the richer regions to raise more revenue since it goes to the poorer region, rather they try to a not far from the national average standards (Vaillancourt and Bird, n.d.). This kind of equalization is absurd and almost impossible for a country like Ethiopia that has a high level of regionalism than national unity, under the deceptive propaganda of its ethnic entrepreneurs, may pose a possible danger of secession issues for rich regions (Gebrehiwet, 2015). Finally, hybrid equalization is an approach to equalization that involves a blend of both directions: horizontal and vertical (e.g. Switzerland).

**2.5.4.4. Sub-national Borrowing.** It is another mechanism for the sub-national government to finance its expenditure need. Both fiscal federalism theory support borrowing, FGFF theory is more restrictive for providing autonomy to subnational government. The inter-regional equity and efficiency need project investment that should be financed through borrowing rather than relying on transfer from the center (Litvack et al., 1998). According to Martinez-Vazquez and Vulovic, (n.d.) local government can raise their funds by borrowing from financial institutions or issuing government bonds and securities in the capital market (which includes loans more than one year). Therefore, borrowing autonomy offers a local government an ability to increase productivity by spending it on the basis of a local desire rather than being maneuvered by the central government's will.

## **2.6. Linking Fiscal Federalism and Public Service Provisions**

Tiebout (1956), Musgrave (1959), Tanzi (1996), and Oates (1972) first propagated the original definition of fiscal federalism. Musgrave's (1959, 1989) significant work presented the government's functions and primary economic position by tripling it into three categories: allocation, distribution, and stabilization.

Tiebout (1956) made a significant contribution from which most conclusions emanate from the conventional theory of fiscal federalism. He encourages fiscal decentralization if and only if the advantage of local government knowledge about the community's local public goods preference is more significant than the economies of scale advantage of the central government. In this case, to achieve allocation effectiveness, it is better to provide local government with public goods, which could, in turn, bring optimum local social welfare.

The presence of factor mobility makes local governments compete and make the utmost effort to keep them inside their jurisdiction and attract people from other jurisdictions by improving social welfare. Most importantly, People "choose by their feet," deciding where to reside based on their expectations regarding tax and public goods, as local councils strive to provide a combination of tax and public goods (Oates, 2005). This notion delivers a stance to argue that 'the amount of social security realized by unvarying delivery of public services by a national government is poorer than that accomplished through a decentralized provision.

The FGFF assumes that sub-national government politicians and bureaucrats are benevolent and are always motivated to satisfy the need of citizens rather than their personal and political motivations (Oates, 1972, 2005). It sets an overall regulatory framework for assigning responsibilities to various government layers and the suitable fiscal tools to perform the assigned

tasks. The basic principle in FGFF is that SNG must be capable of offering goods and services tailored to its constituents' specific requirements and situations. The fundamental premise is that the lowest tier of government should be responsible for providing public services, which encompasses the pertinent costs and benefits geographically. Efficiency and economic welfare were improved compared to a more uniform allocation system.

There is no question that explicit spending allocations are required to ensure stable institutions and effective service delivery. The primary challenges with the assignment of expenditure obligations are the absence of a clear expenditure assignment, the ambiguity of specific assignments, and the co-sharing assignment (McLure & Martinez-Vazquez, n.d.). The municipal governments rely on various local sources of earnings to pay for their expenses. Taxes, user fees, and the rent or sale of real estate owned by the SNG make up the SNG level's allotted revenues. The SNGs frequently need to have much discretion over regional revenues. Therefore, with limited power over resources, the SNGs rely significantly on central government transfers.

Brennan and Buchanan (1980) came up with another dimension of viewing government bureaucrats and local government politicians closely from the viewpoint of the political economy. The Leviathan approach, diverging from conventional views of fiscal federalism, considered public servants an apparent inclination to increase their gratification through their rent-seeking actions rather than being a benevolent policymaker statement of the conventional argument of fiscal federalism. It regarded decentralization as a move to minimize the size of the public sector. It limited local government revenue-maximizing behaviors since it urged regional government self-sufficiency in their expenditure needs, emanating from the benefit principle.

Any wrong move of the central government penalized by household mobility or others intervenes in the marketing system. However, because of the fear of penalties, such competition can force the

local government to increase its revenue and encourage it to reduce taxes to attract households in other jurisdictions. It creates a race-to-the-bottom effect that reduces the quality and quantity of public goods supplied and worsens the social welfare of the community within the region. Weingast's (2009) conceptual paper argued that local government only sometimes maximizes revenue solely to achieve the intended objectives.

Studies focusing on the influence of fiscal decentralization on public service delivery focus exclusively on the hypothesis of fiscal federalism: decentralizing public provisions to a lower level of government improves public service provisions because the lower tier of government knows local community preferences better than the higher level of government (e.g., Syamsul, 2003; Sow & Razafimahefa, 2015; Ferrante, 2016; Arends, 2017; Silas, 2017).

The results of scholars who have examined the effect of fiscal federalism on public service providers need to be more consistent. For example, some studies have found a negative contribution of fiscal federalism to social welfare (Syamsul, 2003; Grisorioa & Porta, 2013; Sow & Razafimahefa, 2015). In contrast, others claim a significant positive contribution of fiscal federalism on public service provision (Zhuravskaya, 2000; Robalino et al., 2001; Busemeyer, 2008; Diaz-Serranoand & Rodríguez-Pose, 2012; Lozano & Martínez, 2013; Ferrante, 2016). These contradictory findings suggest the need for more research. Besides, they use only one or two indicators to measure fiscal federalism and public provisions. Most importantly, they ignored the capacity of Subnational Governments (SNGs), which is crucial to determining whether decentralization efforts are successful or unsuccessful in any nation. The present study fills this gap since it uses multiple indicators for the constructs and answers how capacity mediates the effect of fiscal decentralization on public provisions, making the study more comprehensive.

## **2.7. Decentralization and Income Inequality (Disparity)**

Prud'homme (1995) argued that redistributive authority is given to the central government or centralized for two reasons. First, if it is decentralized to the sub-national government, the region with wealthy citizens will get better than the regions with poor people. Thus, instead of reducing the income gap, it will widen the regional disparity. Mainly because the regional government only considers the inequalities of citizens residing there and tries to close the income gaps between residents outside their territory. Second, either similar or different redistribution policies pursued by the regional government, citizens with similar incomes before a redistributive program may have different incomes after redistribution.

Fiscal responsibilities conferred to SNGs imply that SNGs must pursue competent tax and expenditure decisions (Canare et al., 2020). SNGs rely on transfers from the national government since they cannot collect their taxes. Such reliance leads to ineffectiveness because the transfers may need control and be prone to political motives (Bojanic, 2018). Additionally, SNGs have a greater understanding of their specific communities' demands, enabling them to provide public services with more knowledge (Canare et al., 2020). When choosing the decentralization mix, it is vital to consider a nation's current level of development and underlying institutional structure significantly when reducing economic inequality is a primary aim (Bojanic & Collins, 2021).

Moreover, the decentralization mix is essential for addressing income disparity. According to Bojanic (2018), decentralization may not result in greater or lesser degrees of income inequality; different areas' internal social and political systems play a more prominent role in determining disparity. Canare et al. (2020) empirical finding urges that when it comes to improving inequality, empowering local governments to generate revenues is a more important aspect of decentralization

than devolving spending responsibilities. Similarly, Bojanic and Collins's (2021) investigation validated that decentralization decreases income disparity, but the outcome lessens and ultimately converses as economic development rises.

## **2.8. Fiscal Federalism and Sub-National Government Capacity**

The theory of FGFF promotes centralizing revenue relative to expenditure; the central government is in charge of redistributive responsibility (Oates, 1972; 2005). The theory known urging to give all responsibilities to the national government regarding taxation of movable inputs, such as income, payroll, and sales taxes, to reduce production factors' movement; this tax base holds a large share of government revenues ((Boadway & Tremblay, 2012; Moges, 2008). However, the SGFF strongly urged the self-sufficiency of local government spending needs through the concept of benefit, which presented that the benefit earned by citizens would be proportionate to its cost (Wingiest, 2009). Moreover, until they reach the point where the marginal revenue of local public goods and the marginal cost of production of SNGs public goods are equal, SNGs should increase their production of public goods. In reality, the benefit principle is difficult to implement because the public goods (e.g., education and health) provided by the local government are quasi-private goods and are heavily affected by regional government capacity.

While discussing decentralization, considering "capacity" is necessary since it is an essential issue (Fiszbein, 1997, as cited in Ribot, 2002). Launching a decentralization program requires setting and considering whether SNGs have the minimum standard level of institutional capacity to implement and achieve decentralization goals (Tanzi, 1996; Prud'homme, 1995). In addition, a review of SNG's abilities considers financial costs, inefficient resource usage, and countermeasures for lack of financial restraint (Tanzi, 1996; Prudhomme, 1995). Eventually, the achievement of fiscal federalism policies pivots on institutional capacity-building. Besides, the

capacity of managing service provision depends on the central government's support of decentralization (Rondinelli, 1982).

Regional capacity can be discussed from different viewpoints: fiscal capacity, institutional capacity (mostly related to government quality), and physical and human infrastructural capacity. Public investment in infrastructures such as schools and hospitals may improve social welfare by providing access to public health and education services (Kis-Katos & Sjahrir, 2017). Besides, public investment in infrastructures such as roads, telecommunication, electricity, and energy may increase total production since it can facilitate market transactions. It may also enhance equity by giving access to infrastructure to people experiencing poverty that have not previously and by catalyzing local economic activity that increases household income (Rompuay, 2017).

However, there is a strong argument over the sequence that comes first (decentralization or capacity), which means there is a chicken-and-egg problem. Therefore, additional studies are required to examine the way capacity is connected to decentralization and the aims of decentralization. The study explores how SNG capacity mediates the effect of decentralization on public service provisions.

## **2.9. Linking Fiscal Federalism and Economic Growth**

Delegating power from the federal government to SNGs is part of fiscal federalism. Additionally, two related domains are involved. First, how public funds are allocated among the various levels of SNGs; second, how autonomous SNGs are in decision-making (Kesner-Kreb, 2009).

The fiscal federalism theory makes a nexus between decentralization and economic growth by adopting two assumptions. First, since subnational or local governments are considerably more in touch with consumers or voters than the central government, decentralization can enhance

economic growth by improving the efficiency of SNG public service provisions. As a result, they are more acquainted with local tastes than the national government (Boadway, 2005). Second, devolution may promote the rivalry between SNGs to establish a good fit between SNG public service provision and SNG wanting to attract mobile aspects of production, leading to economic growth (Tiebout, 1956; Boadway & Tremblay, 2012).

Economic development is raising the economic welfare of a given nation. More robust economic growth may pave the way for a broader range of welfare services to be provided, enhancing the well-being of a country. An undeveloped economy, for example, will be predominately centered on agriculture and offer minimal social services, such as healthcare and education. Besides, economic development depends on economic growth since the more goods and services produced, the greater the likelihood that living standards will rise.

Although many scholars have investigated the contribution of fiscal federalism on economic development or growth, they have exhibited implausible results. Studies showed that expenditure decentralization significantly hampered economic growth (e.g., Davoodi and Zou, 1998; Rodriguez-Pose & Kroijer, 2009; Rodríguez-Pose & Ezcurra, 2011; Philip & Isah, 2012; Nguyen et al., 2019; Hung & Thanh, 2022; Lechner et al., 2022; Bushashe & Bayiley, 2023a). Rodríguez-Pose and Ezcurra's (2011) study further considered decentralization of capital expenditure (regional capital expenditure- to total expenditure ratio) as a fiscal decentralization indicator and found a significant adverse influence on economic growth. Nevertheless, some studies claimed the opposite contribution of expenditure decentralization (e.g., Iimi, 2005; Malik et al., 2006; Su et al., 2014; Liu, 2017; Xiao et al., 2022).

Furthermore, concerning revenue decentralization, there are studies displayed that revenue decentralization adversely contributes to economic growth (e.g., Malik et al., 2006; Rodríguez-Pose & Ezcurra, 2011; Hung & Thanh, 2022; Bushashe & Bayiley, 2023a). On the contrary, other studies showed a positive influence of revenue decentralization on economic growth (Rodríguez-Pose & Kroijer, 2009; Philip & Isah, 2012; Su et al., 2014; Liu, 2017; Nguyen et al., 2019; Osmani & Tahiri, 2022; Xiao et al., 2022). Moreover, some studies found an insignificant contribution of expenditure decentralization (e.g., Syamsul, 2003; Blöchliger et al., 2013). Similarly, some studies demonstrated an insignificant contribution of revenue decentralization (e.g., Baskaran and Feld, 2012; Blöchliger et al., 2013).

### **2.9.1. Fiscal Incentive and Economic Development**

Fiscal incentives have recently caught the focus of public finance economics scholars and governments as a vital measure for enhancing economic growth and development. According to Jin et al. (2005), the association between the fiscal incentives of SNGs and development is determined as a function of the SNG's policies. The fiscal incentives technique explains how the fiscal incentives of subnational political authorities affect their policy choices and their jurisdiction's economic performance (Jin et al., 2005).

In the SGFF, authors like Wingiest (2009) argue that in the presence of soft budget limitations, local government politicians and bureaucrats are encouraged to externalize their weaknesses in collecting revenues to the shared central government pool. Local government maximizes revenue to spend on public investment, which can aid the regional economy to flourish. Therefore, SGFF stresses the benefits of fiscal incentives, the SNG's officials' motive, and the effort to collect taxes to make public investments for local economic prosperity.

In addition, regional government budgetary capacity is enhanced by such economic expansion. This view supports local government competitiveness through successful actions contributing to economic advancement. Economic and political pressure highly affects subnational government choice for expenditure and revenue items. However, the fiscal federalism study must often pay more attention to the mix of subnational expenditure by government and economic function. Public finance concerns highly recommend that policies intended for public service provisions, like infrastructure, health, and education, sensitive to SNG circumstances are more promising to foster economic development than policies decided and controlled at the center.

Despite its theoretically underpinning importance, scholars should have noticed fiscal incentive variables while studying the nexus between fiscal federalism and economic development. Therefore, there needs to be more research that scrutinizes the influence of fiscal incentives on economic growth. For example, Lin and Liu (2000) have found that fiscal incentive enhances economic growth. Besides, Siliverstovs and Thiessen (2015), utilizing revenue retention rate (a portion of a single extra unit of tax revenue that an area keeps for its government expenditures), considered fiscal incentive as a gauge of fiscal decentralization. The study result exhibited that fiscal incentives significantly fostered economic growth. Based on this rationale, the study presented the hypothesis as follows:

### **2.9.2. Moderating Role of Macroeconomics Instability**

The traditional role of the central government in stabilizing economies has mainly been overlooked due to concerns about SNG jurisdictions having autonomous regulation over their money supplies, open economies of SNG, and undesirable deficit finance policies (Smoke, 2001). The decentralized government may play a more prominent stability role in industrialized economies, and this is becoming more widely acknowledged. In developing nations, stabilization

is still a legitimate role for the national government. It is due to severe macroeconomic fluctuations, particularly in agricultural countries, and heavily dependent on external resources.

A stable macroeconomic environment encourages a solid financial system and markets, allowing for the smooth transfer of funds between investors and savers and promoting economic growth (Khalid, 2017). Consequently, macroeconomic stability is required to achieve sustained economic growth for a longer length of time. Siddik (2023) points out that social and physical infrastructure determines economic growth trajectory. High macroeconomic instability generally makes allocating resources effectively and lower investment rates difficult. (Siddik, 2023). Therefore, increased macroeconomic instability could be interpreted as an indication that the pertinent government is no longer in charge of overseeing the economy (Fischer, 1993).

The literature anticipates a possible direct connection between decentralization and economic development. Despite this, it is still being determined whether such a link may have empirical support in the model that considers and states the indirect influence of fiscal decentralization on economic development (Martinez-Vazquez & McNab, 2003; Aray & Pedauga, 2022). Scholars overlooked to determine if fiscal decentralization affects economic development directly or indirectly through the macroeconomics instability channel.

The MI, which represents the macroeconomic state of several nations or areas within a single nation, is a summation of the SNG unemployment rate and inflation rate. (Bushashe & Bayiley, 2023a). MI is, therefore, helping to gauge the nation's economic health. A rise in the MI demonstrates the prevalence of a nation's declining economic and social conditions. The MI is employed in this context to quantify the economy's health, demonstrating a nation's state

(Bushashe & Bayiley, 2023a). In line with the above contentions, the study proposed the subsequent three hypotheses:

## **2.10. Linking Fiscal Federalism and Macroeconomic Stability**

Macroeconomic stability refers to occurrences that increase the predictability of the domestic macroeconomic environment. According to theory, there will be less competition for fiscal resources between the state and federal governments as fiscal decentralization results in a defined revenue-sharing system. Moreover, this would improve macroeconomic stability because fiscal competition between different levels of government undermines national fiscal policy goals, notably by encouraging pro-cyclical fiscal policy (Thornton, 2007).

The government's stabilization function is carried out successfully and efficiently at the national level since the subnational government's attempts at stabilization policy are doomed to failure because locally sponsored fiscal policy is likely to benefit regions other than the one funding it. Therefore, the federal level of government is best for managing stabilization policies. Consequently, the claim is that only the central government should control macroeconomic policy (Musgrave, 1959; Oates, 1972).

According to Oates (2005), the limited borrowing alternatives available to subnational governments limit their ability to implement fiscal policy. Macroeconomic stability is jeopardized for two reasons: first, when subnational governments have overborrowed; second, central governments have taken on the responsibility of paying off the debt (Prud'homme, 1995; Tanzi & Ahmad, 2002). This theoretical argument is based on the presumption that economic shocks are symmetrically distributed (Martinez-Vazquez & McNab, 2003). Fiscal decentralization policies can produce conflicting effects on economic growth and macroeconomic stability. In addition,

many costs are incurred to finance the proper implementation of the decentralization policy (Agénor & Lim, 2018). However, properly allocating government expenditures will enhance stability in the economy.

Despite no comprehensive study, scholars have investigated the causal link between fiscal decentralization and macroeconomic stability. However, the misery index (sum of the inflation rate and unemployment rate) is the most important for measuring macroeconomic stability (Martinez & McNab, 2006); many studies employed the inflation rate as a proxy for macroeconomic stability. The present study summarized various empirical studies as follows.

A study by Treisman (2000) discovered that expenditure decentralization had a conducive impact on macroeconomic stability. It indicates that expenditure decentralization does dampen macroeconomic instability in developed countries more than in developing ones. In their study of emerging nations, King and Ma (2001) discovered that revenue decentralization negatively affects macroeconomic stability, indicating that it suppresses macroeconomic instability. Feltenstein & Iwata (2002) found that fiscal decentralization reduces the inflation rate, which fosters macroeconomic stability. Neyapti (2004) also discovered that revenue decentralization, as determined by the percentage of tax income going to sub-national governments, negatively affected macroeconomic stability.

On the other hand, Shaha (2005) and Thornton (2007) discovered that revenue decentralization has no significant effect on macroeconomic stability is insignificant. Furthermore, Iqbal and Nawaz (2010) found that revenue decentralization significantly negatively affects macroeconomic stability. Nevertheless, expenditure decentralization has no effect. The study also revealed that investment significantly negatively affects macroeconomic stability. However, the population has

no significant effect on the inflation rate. Jalil et al. (2012) showed that expenditure and revenue decentralization significantly negatively affect macroeconomic stability, indicating that it fosters macroeconomic stability.

Moreover, Okonkwo and Godslov (2015) provided strong evidence that revenue decentralization and investment significantly preserve macroeconomic stability. However, fiscal dependence positively affected macroeconomic stability, indicating escalating instability. Makreshanska and Petrevski (2015) reported that decentralizing revenue and expenditure has favorable contributions, indicating escalating instability. On the other hand, Palienko et al. (2017) study revealed that expenditure decentralization has a significant positive effect on macroeconomic stability, indicating a worsening the macroeconomic stability. However, revenue decentralization has no significant effect. Besides, the population has a significant positive effect on macroeconomic stability; but GDP exhibited no significant effect.

A study by Ali and Batool (2017) found that revenue and expenditure decentralization bring stability to the economic condition of Pakistan. The study also showed that the unemployment rate, investment, and GDP harm macroeconomic stability in Pakistan. Similarly, Melnyk et al. (2018) found that revenue and expenditure decentralization significantly negatively affect macroeconomic stability. Bojanic (2018) revealed that decentralization on the revenue side prevents inflation, while it seems to foster it on the expenditure side. Furthermore, GDP per capita and FDI uphold macroeconomic stability. Dadgar & Nazari (2018) analyzed the effect of economic growth on economic stability (Iran's misery index). The study demonstrated, employing a Vector Autoregressive method, that economic growth (GDP) negatively correlates with the misery index.

A study by Lago-Peñas, Martínez-Vázquez, & Sacchi (2019) employed general government primary balance (as a percentage of GDP) to proxy country stability and found that expenditure decentralization significantly enhances macroeconomic stability in OECD countries. On the other hand, Shah, Mazhar, Khan, and Javaid (2022) demonstrate that revenue and expenditure decentralization improves economic stability, encourages resource allocation, and promotes economic stability in Pakistan. Besides, Rauf, Khan, and Khan's (2021) study used fiscal transfer as a proxy for fiscal decentralization. They suggested that fiscal dependency and population growth adversely affect the stability of the economy of Pakistan.

Also, Osmani & Tahiri (2022) found that revenue decentralization, years of education, and population growth harm the unemployment rate in Kosovo. It means that they are escalating macroeconomic instability. Moreover, Sheikh, Chaudhry, Akhtar, & Ali's (2020) study revealed that expenditure decentralization is a successful tool for promoting employment activities; meanwhile, it discourages the rise in nominal wages, contributing to a higher inflation rate. Therefore, it can enhance macroeconomic stability. However, the study found a negative effect of revenue decentralization on employment activities.

A study by Maryanti, Handra, & Yonnedi (2022) revealed that fiscal decentralization proxied through the Regional Original Revenue budget, Special Allocation Fund, General Allocation Fund, and Capital Expenditure significantly reduces the unemployment rate in Indonesia. Since Misery Index is a summation of inflation and unemployment rate, reducing the unemployment rate brings macroeconomic stability. Similarly, Adindu and Ugondah (2021) showed that an increase in government capital expenditure reduced the misery index in Nigeria. It indicates providing the needed infrastructure to improve the business environment, increase investment, create jobs, and keep Nigeria's low misery index.

## **2.11. Overview of Fiscal Federalism in Ethiopia**

Under Emperor Haile Selassie, Ethiopia had a long history of substantial central control and a centrally planned economy under the Mengistu regime. Both revenue and expenditure have been intensely concentrated under the unitary state of Ethiopia. After the fall of the military regime in 1991, the Transitional Government of Ethiopia (TGE) installed a federal assembly by forming ethnic-based territorial states. The TGE initiated a far-reaching institutional and political transformation. It made an essential move towards the lounge decentralization program and restructuring along with the federal lines.

Ethiopia had four tiers of government until 2001: federal, provincial, woredas (municipal/city), and kebele (neighborhood level) (Meheret, 2007; Lee, 2013). In 2001, the revision of the Constitution of 1995 resulted in the recognition of an additional layer of local government, the zoning government. Intermediaries between regional states and woredas are zonal governments. An underlying theme of the TGE Proclamation No.7/1992 was the planning and management of socioeconomic institutions and guidance on how budgets should be prepared, approved, and implemented. It also offers guidelines on borrowing and levying necessary taxes and duties from domestic sources. Besides, expenditure allocations are decentralized, whereas revenue allocations are centralized, which essentially enhances the control of the central government over subnational spending (Paulos, 2007; Gebrehiwet, 2015).

The 1995 constitution entitled the House of Federation (HoF) to formulate and revise the grant allocation formula. The HoF (2009) grant allocation formula begins with estimating the relative fiscal deficit, including the regions' relative revenue and expenditure capacity—the formula considered balancing both vertical and horizontal imbalances. The Representative Tax System

(RTS) and the Representative Expenditure System (RES) methods determine the revenue capacity and expenditure needs of the regions (Gebrehiwet, 2015). Therefore, the basic procedures for setting each region's revenue potential and expenditure needs are computed based on these approaches.

### **2.11.1. The Aims of the Decentralization Program in Ethiopia**

One of the worst humanitarian crises of the twentieth century, the Ethiopian famine in the 1980s, stimulated interventions of people worldwide to halt widespread food shortages and rescue people. Nowadays, famine in Ethiopia is due to both the absence of development and rains. Transporting food crops from areas with excess food to those with a deficit is hampered by a lack of highways, storage, and marketing facilities (Paulos, 2007). A substantial dependence on rainfed agriculture makes the nation especially prone to the effects of changing climates (Meheret, 2007). Currently, the country has exhibited declines in economic growth, a substantial population increase, underdeveloped institutional capacity, and high levels of violence.

The impacts of climate change in Ethiopia are expected to worsen land degradation and biodiversity, negatively affecting the agricultural output (Gebrehiwot, 2015). Through decentralizing the agriculture sector, the country aimed to enhance agricultural outputs and reduce natural disasters such as floods and droughts through an effective natural resource conservation system.

Almost every area in the country has experienced ethnic-based conflict since the restructuring of the government in conjunction with ethnic lines (Bayu. 2022). In addition, ethnic federalism in Ethiopia rekindled armed-based ethno-nationalist and separatist groups in the nation (Bayu. 2022). Religious affiliation is nearly universal in Ethiopia. Most Ethiopians identify as Orthodox, Muslim,

or Protestant, with a minority following traditional religions. Religion can often provide significant political capital for peacebuilding.

Ethiopia's fiscal federalism aims to help national or regional state governments, based on their initiatives, improve their regions and narrow the prevailing gap between regions regarding economic growth and development (Geberehiwot, 2015). The government must assure regional equity and lessen the likelihood of food rights breaches, such as using food aid for political patronage, in Ethiopia's extremely delicate political and ethnic setting (Bayu, 2022). Since fiscal decentralization brings efficient public service delivery and economic growth, fills development gaps, and reduces income inequality, it can avoid the risk of civil war and instability in the country. Therefore, investigating the nexus between fiscal federalism and public service provision is essential, especially in a developing country like Ethiopia.

### **2.11.2. Federal and SNGs Budget Allocation in Ethiopia**

Ethiopia makes budget allocations to Ministerial offices based on sectorial categories. The money set aside for national defense has grown by 33%, growing its fraction of the overall government budget by 1%. However, despite rising nominal values for health and education, the percentages of the federal budget devoted to these two areas have somewhat decreased. Urban planning and building, education, and public debt finance receive the top three budget allocations (**See Table A 2-1 in the Appendix**).

Primary and secondary education, health care, rural transportation, agricultural services, and services about natural resources are all critical services SNGs in Ethiopia provide. According to a formula formulated by HoF, the national government distributes budget subsidies for SNGs each fiscal year. According to the current trend, between 2017 and 2021, the nominal value of the budget allotted to regions grew by 75% (NBE, 2021). It translates to ETB 204 billion for 2022, up 16%

from its value in 2021 (NBE, 2022). Nevertheless, the budget's worth has decreased by 4% in actual monetary value because of the high inflation rate.

### **2.11.3. Federal Government Debt and Borrowings**

The government has significantly invested in infrastructure, health, education, and other fields to promote economic growth and combat poverty over the past few decades. The government must borrow money for this spending, state-owned companies, and infrastructure projects. The most significant increase in external debt occurred during the fiscal year 2010/11-2014/15, i.e., Growth and Transformation Plan (GTP I), with an average yearly growth rate of 24%.

Ethiopia's external public debt increased from 2.3 billion dollars in fiscal year 2006/2007 to 28.6 billion dollars in 2020, an increase of 20% each year. Infrastructure expenditures, especially infrastructure, necessitate a sizable amount of financing from outside sources. As foreign debts for significant public projects come due, the government's budget for debt servicing has grown, raising the danger of debt difficulty. Between 2019/20 and 2021/22, the federal budget's debt financing share climbed from 10% to 13.1% (NBE, 2022).

Since borrowing is the only purview of the federal government, a system of intergovernmental transfers is set up to bridge the funding gap between SNGs' budgetary obligations and their sources of income. A significant vertical imbalance has been caused by the distribution of revenue sources, which is the sole responsibility of the national governments. In the 2019/20 fiscal year, SNGs collected only 27% of tax revenue, compared to the central government over 73% (NBE, 2020).

### **2.11.4. Sub-national Government Borrowing**

Existing rules constrain the borrowing power of the SNGs and are entirely regulated by the Federal Government regulates existing regulates and constrain the borrowing power of the SNGs.

FDRE Proclamation No 57/1996 specifies that MoFEC shall assess the amount borrowed from each SNG, considering national fiscal policy and the borrowing limits imposed by law or agreements. In addition, the disbursement of SNG borrowings is handled by the NBE (unless these borrowings are from entities other than the NBE).

Moreover, if the Regional Governments borrow from institutions other than NBE, the respective SNGs and MoFEC shall jointly agree on administrative arrangements relating to these borrowings. In practice, the critical originator of regional debt is the Commercial Bank of Ethiopia (CBE), which loans the regions at an annual subsidized rate of 7.25%. According to MoFEC and CBE, approximately 30% of SNG borrowing is used through agricultural cooperatives to provide their farmers with fertilizer credit. The remainder is used for various projects, including infrastructure projects.

### **2.11.5. Currency Stability and Trade Regulatory Framework**

The value of the domestic currency of Ethiopia (Birr) is not freely convertible. Following managed floating, the NBE gradually depreciated the Birr with sporadic, more substantial adjustments to reflect changes in the parallel market. The Birr has declined by almost 40% against the US dollar since January 2022. It has caused the country to suffer a severe currency depreciation worldwide.

Most developing nations have liberalized trade and worked to build supportive environments to draw foreign direct investment (FDI). Ethiopia took the road to liberalizing trade and macroeconomic management and introducing actions to improve the international trade regulatory framework that attracts and protects foreign investors. With the existing regulatory structure, foreign investors can invest by establishing subsidiaries or locally formed businesses. The hydropower sector is now accessible to both domestic and foreign investment due to the updated

Investment Proclamation No. 116/1998. Furthermore, the 1998 Investment Code permitted joint private-government investments in telecommunications and defense.

Manufacturing, agriculture, real estate development, education and health services, mining, engineering, and management consulting are the primary commercial sectors open to foreign investment. The investment proclamation stipulates domestic joint venture partners must maintain at least 27% equity ownership interest.

## **CHAPTER THREE**

### **3. Research Methodology**

#### **3.1. Introduction**

This chapter is going to make a brief discussion about the different research paradigms that may be used for designing the research strategy. Since the current study utilized two methodological strategies, it presented each of them by creating a separate section within the chapter. For the first section, it discussed about the different panel regression models, data sets, and various diagnosis such as normality, panel unit root tests, and multicollinearity. Besides, it presented various panel model specification tests that are helpful to select robust econometric model, and it also discussed how the researcher can deal with endogeneity problem.

On the other hand, this chapter discussed about the second-generation statistics: Covariance Based Structural Equation Model (CB-SEM) and Partial Least Square Structural Model (PLS-SEM). Moreover, it presented same size determination for PLS-SEM, and the procedures to be followed while conducting PLS-SEM method. Finally, it discusses the potential ethical issues of the present study.

#### **3.2. Research Paradigm and Approach**

Creswell (2014) broadly classified research paradigm into four categories: positivist (post-positivist), Social constructivist, Transformative, and pragmatist. I briefly present each of them as follows. Science is characterized by empirical research, and all phenomena may reduce to empirical indicators that represent the truth. The ontological position of the positivist paradigm is that there is only one truth and objective reality that exists independent of the human view of the world.

In other word, which are independent of the researcher and his or her instruments and therefore knowledge is objective and quantifiable. However, a modified objectivist perspective called post-positivism (Phillips, 1998) claims that, although the object of our inquiry exists outside and independent of the human mind, it cannot be perceived with total accuracy by our observations. To put it differently, complete objectivity is nearly impossible to achieve, but still pursues it as an ideal to regulate our search for knowledge. Post-positivism privileges quantitative methodologies as useful for establishing causal relationships, as they are concerned with developing explanatory and predictive models (Creswell, 2014). It follows empiricist epistemology that assumes the knowledge and the knower are totally separated and therefore it is suitable for quantitative research.

The other paradigm is social constructivism, and this paradigm relied on relativist ontological stance that claims the existence of multiple realities (Creswell, 2014). Besides, it follows interpretivist epistemology which assumes the research and the subject that researched are not separated. Thus, events are understood through the mental processes of interpretation that is influenced by interaction with social contexts. Scholars in this camp believe that individuals seek understanding of the world in which they live and work. This paradigm is typically seen as a suitable to qualitative research.

During the 1980s and 1990s another group of scholars come up with transformative paradigm. These scholars felt that the post-positivist assumptions imposed structural laws and theories that did not fit marginalized individuals in our society or issues of power and social justice, discrimination, and oppression that needed to be addressed (Creswell, 2014). Pragmatism is characterized by the relation of theory and praxis and specifically in the predetermined outcomes of an inquiry. Since pragmatist paradigm has no attachment on any philosophical stance, it paved

way for the mixed methods research. Therefore, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis.

The research paradigm chosen by individual researchers appears to be dependent on their perceptions of “what real world truth is” (ontology) and “how they know it to be real truth” (epistemology) (Patton, 2002). A researcher’s choice of research paradigm can also be determined by the kinds of questions that help them to investigate problems or issues they find intriguing (Patton, 2002). Besides, the nature of research problem and the type of research questions posed which largely determine nature of the data to be collected for analysis. Van de Ven (2007) identified two types of research questions: Variance based and process-based research questions. According to him, variance-based research questions, to check the existence of significant relational variations among variables under the study, asks relational or casual types of questions which by default force us to follow positivist paradigm and use quantitative research design.

On the other hand, he discussed that process-based research question posed to find an answer for “how, or why” aspects of variables under the study. Then, this leads us to choose Social constructive paradigm which follows qualitative research methods. If we do have both types of research questions, we can use pragmatist paradigms by employing mixed research methods.

The research problem of present study is concerned about Fiscal federalism, economic development, policy effort, and regional disparity which are well address if it is measured objectively than subjectively. Depending on the research problem the study raised variance-based research questions, and the study pursued positivist paradigm and therefore it supported the epistemological position which assumed the researcher and researched are independent entities,

i.e., the investigator is studying a phenomenon without influencing it or being influenced by it. Thus, to answer the research questions, the study employed quantitative methods.

### **3.3. Research Design**

Methodology is a research strategy that translates ontological and epistemological principles into guidelines that show how research is to be conducted. Quantitative research is a strategy to propose hypothetical relationships between the variables of objective theories, and test whether there is a significant relationship among these variables (Creswell, 2014). Having identified the variables in a problem situation and developed the theoretical framework, the next step is to design the research in a way that the requisite data can be gathered and analyzed to arrive at a solution. Since the purpose of the study is to explain the relationship among the dependent and independent variable, the study followed explanatory (causational) research design.

Explanatory research design is non-experimental quantitative research which aimed to investigate the casual link between dependent and independent variables (Creswell, 2014). This approach requires the applications of the statistical or econometric model (s) that are feasible and compatible with the research theoretical framework under consideration. In line with the nature of the research topics, the study utilized an appropriate econometric approach.

### **3.4. Data Type and Sample Determination**

The present study used only a secondary data; which means data that are already available at different sources. When the researcher or analyst utilizes secondary data, then it is necessary to explore several sources. Secondary data may either be published or unpublished and therefore the relevant secondary data are gathered through reviewing the various official documents of Ministry

of Finance and Economic Cooperation (MoFEC), NBE, Central Statistics Authority (CSA), and HoF.

A panel data set contains 'n' entities or subjects (e.g., firms, countries, and states), each of which includes 'T' observations measured at 1 through the t time-period. A short panel data set has many entities but few time-periods (small T), while a long panel has many time-periods (large T) but few entities (Cameron and Trivedi, 2005). The total number of observations is n multiplied by T.

The unit of analysis for the present study is regional state government and one city administration i.e., Tigray, Afar, Amhara, Oromia, Somalia, Benshangul/Gumuz, Southern Nations, Nationalities and Peoples (SNNP), Gambela, Harari, and Dire Dawa city administration. The study employed nine SNGs and one city administration from 2005 to 2018; the sample size is 140 observations.

### **3.5. Partial Least Square Structural Equation Modeling**

A robust study instrument for scholars, PLS-SEM is a second-generation data analysis procedure implemented to execute advanced modeling that includes mediation (Lowry & Gaskin, 2014; Hair, Hult, Ringle, and Sarstedt, 2017). Lastly, the PLS-SEM is evolving into a cutting-edge statistical technique due to extensive discussions regarding its advantages and disadvantages. Covariance-based (CB) SEM and PLS-SEM are the two forms of SEM (Lowry & Gaskin, 2014; Garson, 2016). PLS-SEM is a prediction-oriented technique for SEM. It is mainly employed for exploratory studies and is suitable for confirmatory research (Lowry & Gaskin, 2014; Hair, Hult, Ringle, Sarstedt, and Danks, 2021). Moreover, PLS-SEM accounts for variance like standard least squares regression (Lowry & Gaskin, 2014; Garson, 2016; Nitzl, 2016).

Henseler, Ringle, and Sarstedt (2014) and Hair et al. (2017) urge that the subsequent conditions make PLS-SEM a superior CB-SEM substitute: inadequate sample size, incomplete theory existing for usage, stress on predictive accuracy, and failure to ensure accurate model parameters. A flexible modeling method for SEM requires no requirement regarding the data distribution (Hair et al., 2017). Reflective and formative outer models are typically two distinct assessments of PLS-SEM indicators. Reviewing the indicator reliability of every single item, the reliability of every latent variable, internal consistency, construct validity, convergent validity, and discriminant validity form a component of the reflective outer model examination (Henseler, 2014; Latan & Ghozali, 2013; Hair et al., 2021).

Measures used in secondary data sources are not constructed and kept through a period for confirmatory studies (Bushashe, 2023). On the other hand, survey indicators are commonly constructed to back a full-fledged theory (Sarstedt & Mooi, 2019). Thus, it is questionable to establish a robust model utilizing indicators of secondary data if employing CB-SEM. Hair, Sarstedt, Hopkins, and Kuppelwieser (2014), the main benefit of PLS-SEM is that it allows unlimited use of single-item and formative variables. In exploratory research, it is typically employed to generate theories (Nitzl, 2016; Hair et al., 2021). The Gaussian copula method without instrumental variables (IV) is becoming increasingly popular among researchers in various domains (Becker et al., 2021).

Studies have employed this technique to detect and fix endogeneity when approximating regression models (Becker et al., 2021). Smartpls version 4 software enables the Gaussian copula method, bringing an additional ability to PLS-SEM that assists scholars in addressing endogeneity issues. Moreover, most importantly, first-generation statistics, such as panel regressions, forces construct (variable) that have two or more indicators to use average or to execute a separate

regression runs to each indicator. The second-generation statistics, i.e., PLS-SEM, alleviates this limitation by allowing concurrent use of indicators. The present study polled the data as a cross-section to cultivate these advantages, like a study by Bushashe (2023).

### **3.5.1. Measurement Model**

Measurement is an essential concept in conducting social science research. Measurement in this sense is much more challenging since the phenomenon that is supposed to be measured is abstract, complex, and not directly observable. There are two main different ways of operationalizing a latent variable: either in a reflective or in a formative measurement model (Lowrey and Gaskin, 2014). The formative construct needs to be theoretically (conceptually) united, and indicators completely determine the "latent" construct. The indicators are not interchangeable and should not be eliminated since get rid of an indicator will likely change the meaning of the latent construct, whereas reflective indicators are essentially interchangeable and therefore the removal of an item does not change the meaning of the underlying construct (Hair et al., 2014).

Measurement (outer) model evaluation consists various assessment of reflective measurement models: Cronbach alpha and composite reliability used to evaluate internal consistency; individual indicator reliability; average variance extracted (AVE) used to evaluate convergent validity; and the Fornell-Larcker criterion, cross-loadings and heterotrait-monotrait (HTMT) ratio of correlations can be used to examine discriminant validity. Besides, the outer model evaluation also assesses the convergent validity of the formative construct using correlation and Variance Inflation Factors (VIF).

**3.5.1.1. Internal Consistency Reliability.** The first step in PLS-SEM is a model development and check the PLS algorithms. The PLS algorithms is a technique than help to make

an important diagnosis of the measurement (outer) model. Internal Consistency reliability is used to check the consistency of the results across items of the same construct (Hair et al, 2014). The output of the PLS algorithm helps us to check the internal consistency of the model. PLS computes a composite reliability score similar to Cronbach's alpha in that they are both measures of internal consistency) as part of its integrated model analysis (Lowrey and Gaskin, 2014). The first criterion to be evaluated is typically internal consistency reliability.

The traditional criterion for internal consistency is Cronbach's alpha, which provides an estimate of the reliability based on the inter-correlations of the observed indicator variables. The composite reliability varies between 0 and 1, with higher values indicating higher levels of reliability; it is interpreted in a similar way as Cronbach's alpha. Specifically, composite reliability values of 0.60 to 0.70 are acceptable in exploratory research, while in more advanced stages of research, values between 0.70 and 0.90 can be regarded as satisfactory (Hair et al., 2017). Composite reliability values less than 0.60 shows a lack of internal consistency reliability; however, values above 0.90 (absolutely above 0.95) are not required since it points out that all the indicators of the construct measures the same concept and therefore are not expected to be a valid measure of the construct (Hair et al., 2017).

**3.5.1.2. Indicator Reliability.** Indicator reliability denotes how much of the variation in an item is explained by the variable (Hair et al., 2017). The output of the PLS algorithm helps to check the outer loading and outer weight robustness of reflective and formative indicators respectively. Indicator reliability examines each indicator's outer weight (relative importance) and outer loading (absolute importance) and uses bootstrapping to assess their significance for formative and reflective measures respectively.

The indicator's outer loadings should be higher than 0.70, and indicators with outer loadings between 0.40 and 0.70 should be considered for removal only if the deletion leads to an increase in composite reliability and AVE above the suggested threshold value (0.5) (Hair, Risher, Sarstedt and Ringle, 2019). The justification behind this rule can be understood in the context of the square of a standardized indicator's outer loading, indicates the communality of an item; the square of a standardized indicator's outer loading represents how much of the variation in an item is explained by the construct and is labeled as the variance extracted from the item (Hair et al., 2017).

When an indicator's outer weight is non-significant but its outer loading is high (i.e., above 0.50), the indicator should be interpreted as absolutely important rather than relatively important (Hair et al., 2019). In this case, the indicator should be kept, however, if an indicator has a non-significant weight and the outer loading is below 0.50, researcher(s) required to decide on whether to keep or remove the indicator by examining its theoretical significance and possible content commonality with other indicators of the same construct (Hair et al., 2019).

**3.5.1.3. Convergent Validity.** Convergent validity is the extent to which a measure correlates positively with alternative measures of the same construct (Hair et al, 2014). Using the domain sampling model, indicators of a reflective construct are treated as different (alternative) approaches to measure the same construct (Hair et al, 2014). Therefore, the items that are indicators (measures) of a specific reflective construct should converge or share a high proportion of variance. To evaluate the convergent validity of reflective constructs, researchers consider the outer loadings of the indicators and the AVE.

In the case of the formative construct, convergent validity is examined through correlation and collinearity. Unlike reflective indicators, which are essentially interchangeable, high correlations

are not expected between items in formative measurement models. High correlations between two formative indicators also referred to as collinearity, can prove problematic from a methodological and interpretational standpoint. Note that when more than two indicators are involved, this situation is called multicollinearity. High levels of collinearity between formative indicators are a crucial issue because they have an impact on the estimation of weights and their statistical significance. Most importantly, collinearity boosts the standard errors and therefore decreases the ability to show that the estimated weights are significantly different from zero (Hair et al., 2017).

**3.5.1.4. Discriminant Validity.** Discriminant validity is the extent to which a construct is truly distinct from other constructs by empirical standards, thus, establishing discriminant validity indicates that a construct is unique and captures phenomena not represented by other constructs in the model (Hair et al., 2017). Traditionally, researchers have relied on two measures of discriminant validity. The cross-loading is the first approach to assess the discriminant validity of the indicators, which assumes an indicator's outer loading on the associated construct to be higher than any of its cross-loadings (i.e., its correlation) on other constructs (Hair et al., 2017).

The Fornell-Larcker criterion is the second approach to assessing discriminant validity, and it compares the square root of the AVE values with the latent variable correlations. Explicitly, the square root of each construct's AVE should be greater than its highest correlation with any other construct (Garson, 2016). The logic of the Fornell-Larcker method is based on the idea that a construct shares more variance with its associated indicators than with any other construct (Hair et al, 2014).

Recent research that critically examined the performance of cross-loadings and the Fornell-Larcker criterion for discriminant validity assessment has found that neither approach reliably detects discriminant validity issues (Henseler, Ringle, and Sarstedt, 2014). Cross-loadings fail to

indicate a lack of discriminant validity when two constructs are perfectly correlated, which renders this criterion ineffective for empirical research (Hair et al., 2017). Similarly, they argued that Fornell-Larcker criterion performs very poorly, especially when indicator loadings of the constructs under consideration differ only slightly (e.g., all indicator loadings vary between 0.60 and 0.80). When indicator loadings vary more strongly, the Fornell-Larcker criterion's performance in detecting discriminant validity issues improves but it is still poor (Hair et al., 2017).

As a remedy, Henseler et al. (2014) propose assessing the heterotrait-monotrait ratio (HTMT) of the correlations. In short, HTMT is the ratio of the between-trait correlations to the within-trait correlations. HTMT is the mean of all correlations of indicators across constructs measuring different constructs relative to the (geometric) mean of the average correlations of indicators measuring the same construct (Henseler et al., 2014). They proposed that HTMT value above 0.90 suggests a lack of discriminant validity; when the constructs in the path model are conceptually more distinct, a lower and therefore more conservative threshold value of 0.85 seems rational (Henseler et al., 2014).

### **3.5.2. Structural Model**

The structural model is used to illustrate one or more dependence relationships linking the hypothesized model's construct. To assess the structural model Hair et al., (2019) proposed five-step structural model assessment procedure: i) Assess structural model for collinearity issue ii) Assess the path coefficient iii) Assess the level of  $R^2$  iv) Assess the effect size  $f^2$  v) Assess the predictive relevance  $Q^2$ .

**3.5.2.1. Collinearity Assessment.** Before measuring the structural relationships, collinearity must be examined to make sure that it does not bias the regression results. This process is similar

to assessing formative measurement models, but the latent variable scores of the predictor constructs in a partial regression are used to calculate the VIF values. VIF values above 5 are indicative of probable collinearity issues among the predictor constructs. But collinearity problems can also occur at lower VIF values of 3-5 (Hair et al., 2019). If collinearity is a problem, a frequently used option is to create higher-order models that can be supported by theory (Hair et al., 2017).

**3.5.2.2. Path Coefficient Assessment.** In assessing the PLS path modeling have to employ the bootstrapping technique for testing the significance of all the path coefficients because in PLS analysis, bootstrapping is the only mechanism for examining the significance of path coefficients (Chin, 2010). In bootstrapping, a large number of bootstrap samples are drawn from the original sample with replacement—each bootstrap sample has the same number of observations as the original sample (Hair et al, 2017).

To find the best result, 5,000 bootstrap samples are needed (Afthanorhan, Aimran, and Ahmad, 2015). The relations between all dependent and all independent latent variables build the so-called inner model or structural model, and the model shows the causal relations between the not directly measurable constructs, and the latent variables are operationalized by measurable indicators. The t-test is used for testing the significant level of causal links, since the present of bootstrapping technique in PLS-SEM is quite significant to convince the efficiency of t-test for testing significant level. Therefore, the scholars who implement PLS-SEM rely on t-test to capture the significant level for each model designed (Afthanorhan et al., 2015).

**3.5.2.3. Mediation Analysis.** Cause-effect relationships in PLS path models imply that exogenous constructs directly affect endogenous constructs without any systematic influences of

other variables. However, this assumption does not hold, and including the third variable in the analysis can change the understanding of the nature of the model relationships. Mediation occurs when a change in the exogenous construct results in a change of the mediator variable, which, in turn, changes the endogenous construct (Zhao, Lynch and Chen, 2010). In PLS-SEM, the bootstrapping approach is also suited for the mediation analysis because bootstrapping makes no assumptions about the sampling distribution of the statistics and can be applied to small sample sizes (Hair et al., 2017).

To carry out the mediation analysis in PLS-SEM, the first step is to assess the direct effect of exogenous variables on the endogenous variable. If the direct path is statistically significant, the next step is to comprise the mediator construct in the PLS path model and measure the significance of the indirect path, and therefore the significance of each individual path is a necessary requirement for this condition (Hair et al., 2017). The indirect effect examined by running the bootstrapping procedure and if the indirect effect is found significant then the mediator absorbs some of the direct effects. The bias-corrected bootstrap confidence interval is the best approach for examining mediating effects if a mediating effect exists, i.e., Type-II error or power (Hayes and Scharkow, 2013). On the other hand, the percentile bootstrap confidence interval (i.e., not bias-corrected) is better if a researcher is also concerned about Type-I errors (Hayes and Scharkow, 2013).

According to Hair et al. (2017), to measure how much of the direct path is absorbed by the indirect effect, variation accounted factor (VAF) may be utilized and it is calculated as a ratio of indirect effect- to- total effect (the summation of direct and indirect effect). As suggested by Hair, et al. (2017), if  $0 < \text{VAF} < 0.2$ , indicates no mediation; if  $0.2 < \text{VAF} < 0.8$ , indicates partial mediation; and if  $\text{VAF} > 0.8$ , indicates full mediation.

**3.5.2.4. Coefficient of Determination.** The coefficient of determination ( $R^2$ ) value was used to evaluate the structural model. This coefficient measures the predictive accuracy of the model and is computed as the squared correlation between actual and predicted values of a specified endogenous construct (Hair et al., 2017). The  $R^2$  value represents the exogenous variables' combined effects on the endogenous latent variable and it also characterizes the magnitude of variance in the endogenous constructs is determined by all of the exogenous constructs related to it (Hair et al., 2019). In PLS-SEM,  $R^2$  values of 0.75, 0.50, and 0.25 can be considered substantial, moderate and weak (Hair et al., 2019).

**3.5.2.5. Effect Size.** The effect size ( $f^2$ ) seeks to evaluate whether exogenous constructs have a substantive impact on endogenous constructs (Hair et al., 2019). Since the path coefficient cannot provide any information about the effect size of the exogenous latent variables on the endogenous construct, it is vital to determine the importance and the degree to which the analyzed path alters the explaining power of the endogenous construct (Cohen, 1988). The  $f^2$  can be calculated manually by taking  $(R^2 \text{ included} - R^2 \text{ excluded}) / (1 - R^2 \text{ included})$  (Cohen, 1988).

The researcher (s) can also assess how the removal of a certain predictor construct affects an endogenous construct's  $R^2$  value. This metric is the  $f^2$  and is somewhat redundant to the size of the path coefficients. More precisely, the rank order of the predictor constructs' relevance in explaining a dependent construct in the structural model is often the same when comparing the size of the path coefficients and the  $f^2$ . In such situations, the  $f^2$  should only be reported if requested by editors or reviewers. As a rule of thumb, values higher than 0.02, 0.15, and 0.35 depict small, medium, and large  $f^2$  (Cohen, 1988).

**3.5.2.6. Predictive Relevance.** PLS Predict procedure is an alternative way of measuring the predictive relevance of the PLS structural model, which developed aiming to solve the problem related to the blindfolding procedure. Shmueli et al. (2015) proposed a set of procedures for the out-of-sample prediction that involves estimating the model on an analysis (i.e. training) sample and evaluating its predictive performance on data other than the analysis sample, referred to as a holdout sample. The PLS predict procedure generates holdout sample-based predictions in PLS-SEM software (Hair et al., 2019).

For the PLS predict based assessment of a model's predictive power, researchers can draw on several prediction statistics that quantify the amount of prediction error, for instance, the mean absolute error (MAE)—measures the average magnitude of the errors in a set of predictions without considering their direction (over or under) (Hair et al, 2019). The MAE is the average absolute difference between the predictions and the actual observations, with all the individual differences having equal weight (Hair et al, 2019). Another prediction measure is the root mean squared error (RMSE), which is defined as the square root of the average of the squared differences between the predictions and the actual observations (Hair et al, 2019).

When examining predictive relevance, the following four rules suggested by Shmueli et al. (2019) as cited on Hair et al. (2019). (1) If the PLS-SEM analysis, compared to the naïve LM benchmark, gives larger prediction errors in terms of RMSE (or MAE) for all indicators, this indicates that the model lacks predictive power. (2) When the majority of the dependent construct indicators results from higher prediction errors compared to the naïve LM benchmark, this shows that the model has limited predictive power. (3) When the small number of indicators in gives higher prediction errors compared to the naïve LM benchmark, this shows a moderate predictive power. (4) When none of

the indicators has higher RMSE (or MAE) values compared to the naïve LM benchmark, the model has high predictive power.

### **3.6. Panel Data Regression Modeling**

Data sets that combine time series and cross-sections are called longitudinal or panel data sets. Panel data sets are more orientated towards cross-section analyses – they are wide but typically short (in terms of observations over time). A panel data set contains  $n$  entities or subjects, each of which includes  $T$  observations measured at 1 through the  $t$  time-period (Park, 2011). Thus, the total number of observations in the panel data is  $nT$ . Ideally, panel data are measured at regular time intervals (e.g., year, quarter, and month), otherwise, panel data should be analyzed with caution (Park, 2011).

A panel may be long or short, balanced or unbalanced, and fixed or rotating. A short panel has many entities (large  $n$ ) but few time-periods (small  $T$ ), and another way the round arrangement is a long panel (Cameron and Trivedi, 2009). Accordingly, a short panel data set is wide in width (cross-sectional) and short in length (time-series), whereas a long panel is narrow in width. Both too small  $N$  (Type I error) and too large  $N$  (Type II error) problems matter and therefore researchers should be cautious when they scrutinize either short or long panel (Park, 2011, pp. 3).

As park (2011) noted “In a balanced panel, all entities have measurements in all time periods; in a contingency table (or cross-table) of cross-sectional and time-series variables, each cell should have only one frequency and therefore the total number of observations is  $nT$ ” (pp. 3). Park (2011) also noted “if each entity in a data set has different numbers of observations, the panel data are not balanced; accordingly, the total number of observations is not  $nT$  in an unbalanced panel” (pp. 4).

Though the statistical software packages can manage both of the data sets, the unbalanced data need some computation and estimation issues to deal with.

There are several advantages to using panel data: First, they increase the sample size considerably; second, by studying repeated cross-section observations, panel data are better suited to study the dynamics of change; third, panel data enable us to study more complicated behavioral models (Gujirat, 2004). Despite their substantial advantages, panel data pose several estimation and inference problems. Since such data involve both cross-section and time dimensions, problems that plague cross-sectional data (e.g., heteroscedasticity) and time-series data (e.g., autocorrelation) need to be addressed (Gujirat, 2004).

### **3.7. Panel Regression assumptions diagnostics**

This part of the study puts light on the prerequisite assumptions of panel regression analysis that must be accomplished before applying the model of regression analysis. This part also converses about the methods and techniques applied to deal with the assumptions i.e. normality, Stationarity (Unit root), and multi-collinearity of regression analysis in breadth. Each of the prerequisite diagnostic tests are briefly presented below.

#### **3.7.1. Normality Test**

A probability distribution commonly used in statistics and econometrics for modeling a population. Its probability distribution function has a bell shape. The normality assumption also plays a crucial role in the validity of inference procedures, specification tests, and forecasting. Even though there is a large literature on testing for skewness and kurtosis in cross-sectional and time-series data, Galvao, Montes-Rojas, Sosa-Escudero, & Wang (2013) developed a test for skewness (lack of symmetry), kurtosis, and normality for panel data one-way error component models. These tests are important in practice because, in the panel data case, the standard Bera-Jarque test is not able

to disentangle the departures of the individual and remainder components from non-Gaussianity. The tests are constructed based on moment conditions of the within and between transformations of the OLS residuals.

### **3.7.2. Multicollinearity Test**

One of the important roles of correlations is collinearity diagnostics and situations when the regressors are highly correlated (Hansen, 2020). In regression, there could be an approximate relationship between independent variables, and high correlations between (linear combinations) of explanatory variables may result in multicollinearity problems. There are two types of multicollinearity problems: Perfect and less than perfect collinearity.

If multi-collinearity is perfect in the sense that the regression coefficients of the X variables are indeterminate and their standard errors are infinite, and if multi-collinearity is less than perfect, the regression coefficients, although determinate, possess large standard errors (with the coefficients themselves), which means the coefficients cannot be estimated with great precision or accuracy (Gujarat, 2004). However, it does not mean that the correlation between independent variables is not allowed, only perfect collinearity is not allowed, and to be included in the model the variable should have the absolute value of correlation less than 0.8 (Studenmund, 2011).

### **3.7.3. Panel Unit Root Test**

Panel unit root testing emerged from time series unit root testing. The major difference to time series testing of unit roots is that we have to consider the asymptotic behavior of the time-series dimension  $T$  and the cross-sectional dimension  $N$ . How  $N$  and  $T$  converge to infinity is critical if one wants to determine the asymptotic behavior of estimators and tests used for non-stationary

panels. Recent literature advocates that panel-based unit root tests have higher power than the unit root test based on individual time.

Panel unit root tests that are commonly used by researchers are Levin, Lin, and Chu (2002), Breitung (n.d.), Im, Pesaran, and Shin (2003) and Fisher-Type test. The next section recaps these panel unit root tests. I briefly present some of the panel unit root tests below.

**3.7.3.1. Levin-Lin-Chu Test.** Levin, Lin, and Chu (2002) established a Levin-Lin-Chu (LLC) test, which utilizes pooled  $t$ -statistic of the estimator to evaluate the hypothesis that each time series contains a unit root against the alternative hypothesis that each time series is stationary. The LLC test without panel-specific intercepts or time trends, requested by specifying the no-constant and with an option with `xtunitroot llc`, is justified asymptotically if  $\sqrt{N}/T \rightarrow 0$  permitting the time dimension  $T$  to grow more slowly than the cross-sectional dimension  $N$ ; this assumption is mostly relevant for panel datasets typically encountered in microeconomic applications—In the case of the trend, it assumes  $N/T \rightarrow 0$  (Levin et al., 2002).

**3.7.3.2. Breitung Test.** Unlike LLC tests, which use a technique of first fitting a regression model and then adjusting the autoregressive parameter or its  $t$  statistic to compensate for the bias induced by having a dynamic regressor and fixed effects in the model, Breitung (n.d.) test uses a different technique since it adjusts the data before fitting a regression model so that bias adjustments are not needed. It allows for a pre-whitening of the series before computing the test—`xtbreitung` unit root test assume, for both non-constant and trend,  $(T, N) \rightarrow \text{sequentially } \infty$ .

**3.7.3.3. Im- Pesaran and Shin Test.** The Im-Pesaran-Shin (IPS) test by mixing the evidence on the unit-root hypothesis from the  $N$  unit-root tests performed on the  $N$  cross-section units; IPS test is not as restrictive as the LLC test since it allows for heterogeneous coefficients—Monto

Carlo simulations reveal that the small sample performance of the IPS test is better than LLC test (Im, Pesaran and Shin, 2003). This test needs  $N/T \rightarrow 0$  for  $N \rightarrow \infty$ . If either  $N$  is small or if  $N$  is large relative to  $T$ , then both IPS and LLC show size distortions. Additionally, the tests have little power if deterministic terms are included in the analysis.

**3.7.3.4. Fisher-type Test.** The Fisher-type test uses  $p$ -values from unit root tests for each cross-section  $i$ . The test is asymptotically chi-square distributed with  $2N$  degrees of freedom ( $T_i \rightarrow \infty$  for finite  $N$ ). A big benefit is that the test can handle unbalanced panels. As suggested by Choi (2001), it mixes the  $p$ -values from the panel-specific unit-root tests applying the four techniques three of the techniques differ in whether they use the inverse chi-square, inverse-normal, or inverse-logit transformation of  $p$ -values, and the fourth is an adjustment of the inverse chi-square transformation that is suitable for when  $N$  tends to infinity.

### **3.8. Static Panel Regression methods**

The panel regression estimation techniques may be broadly classified as dynamic and static models. Dynamic panel occurs when lagged dependent variables are considered to determine the dependent variables, for example, if last year or lagged tax revenue explains this year's tax revenue. On the other hand, static panel regression models do not take a lagged dependent variable as an independent variable to determine the dependent variable. However, the concern of the current study is static panel regression rather than dynamic panel regression. A widely used panel data model is to assume that the effects of observed explanatory variables,  $x$ , are identical across cross-sectional units,  $i$ , and over time,  $t$ , while the effects of omitted variables can be decomposed into the individual-specific effects, time-specific effects and individual time-varying effects (Haiso, 2005, 2006).

### **3.8.1. Fixed Effects Regression Model**

Two methods for computing the estimates of the fixed effects model are the least squares dummy variable method (LSDV) and the within-groups method. Fixed effect (FE) meters the group differences in intercept for each by using an isolated dummy variable for each cluster on account of this reason it is also known as least squares dummy variable method (Verbeek, 2004). The odds in intercept for each dummy variable are measured by assuming stagnant slope (coefficients) for independent variables and static variance across the groups. It comprises an intercept for each individual to calculate individual-specific effects and coefficients estimates reflect within-individual variation (Verbeek, 2004).

If the dummies are taken as a part of the intercept for each individual to examine individual-specific effects and coefficients estimates reflect within-individual variation (Greene, 2002). It does not consider unit-specific residuals and considers them non-random and then it is known as a fixed model. While in the random-effects model dummies act as an error term; the least square dummy variable and within effect estimation methods are used with fixed-effect models (Verbeek, 2004).

### **3.8.2. Random Effect Regression Model**

In the random effect model (RE) variables are supposed to have not a mutual relationship or correlation with all the observed variables; this model strength the differences in the variance of the error term to models group collectively, assuming intercept and slopes (Verbeek, 2004; Wooldridge, 2013). The RE model is used for the analysis of sequential or panel data when one acknowledges that there is no fixed effect. In the RE model, the individual-specific component  $\alpha$  is not treated as a parameter and it is not being estimated. Instead, it is considered as a random variable with mean  $\mu$  and variance  $\sigma^2\alpha$  (Greene, 2002).

### **4.8.3. Pooled OLS Regression Model**

The pooled OLS estimator takes no account of the panel structure of the data and simply estimates  $\alpha$ -intercept and  $\beta$ -slope coefficients, and considers the cross-sectional entities or elements have equal intercept values and the slope of coefficients of the explanatory variables is indifferent across firms (Greene, 2002). This model has a single overall intercept term  $\alpha$  and coefficient estimates are depending on variation between firms and over time (Baltagi, 2005). In short, the panel data models are more 'efficient' than pooling cross-sections since the observation of one individual for several periods reduces the variance compared to repeated random selections of individuals. The pooled model does not differ from the common regression equation, and it regards each observation as unrelated to the others ignoring panels and time (Greene, 2002).

## **3.9. Dynamic Panel Data Regression**

For models based on dynamic panel data, Arellano and Bond (1991) and Arellano and Bover (1995) developed GMM model estimation. Following that, Blundell and Bond (2000) employed it for the first time to eliminate the issue of possible endogeneity in growth regression models. The technique's main benefit is that it can be used without additional instruments. Utilizing internal instruments to prevent simultaneity or reverse causation might help alleviate any endogeneity problems (Blundell & Bond, 2000). The estimating technique also accounts for the unobserved heterogeneity by considering year-fixed effects.

In an empirical sense, the validity of the instruments used in the present study GMM estimation is tested using the specification tests suggested by Arellano and Bover (1995). First, the Arellano-Bond test for serial correlation is modified to determine if the first-differenced residuals exhibit second-order serial correlation. The residuals' serial uncorrelation is the null hypothesis. If the null

hypothesis cannot be ruled out, this shows no second-order serial correlation and that the GMM estimator is reliable. Second, the Sargan test examines the respective null hypothesis of instrument validity.

The failure to reject the null hypothesis confirms the instruments' validity. Because the Sargan and Hansen tests for over-identification and the serial autocorrelation of the error term are provided directly, the analysis on Stata with `xtabond2` does not require the post-estimation of these tests (Roodman, 2009).

### **3.10. Potential Ethical Issues**

Ethical questions are apparent today in such issues as personal disclosure, authenticity, and credibility of the research report. The ethical considerations that need to be anticipated are extensive, and they are reflected through the research process; these issues apply to qualitative, quantitative, and mixed methods research and to all stages of research (Creswell, 2014).

Prior to conducting the Study, the researcher decided to use the American Psychological Association (APA) ethical principles of psychologists and code of conduct, including 2010 amendments. Earlier than data collection, we clearly presented the aim of the dissertation to institutions that provided me the necessary secondary data for the study and received their approval and permission. Moreover, no information was modified or changed, hence information gotten was presented as collected and all the literatures collected for the purpose of this study were appreciated in the reference list. Finally, as requested by APA (2010), we will provide copies of report to participants and stakeholders. Also, we will store the data and materials for 5 years.

## **CHAPTER FOUR**

### **4. Fiscal Federalism and Public Service Provisions: A Mediating Role of Sub-National Governments Capacity**

#### **4.1. Introduction**

The choice and allocation of fiscal authority for decision-making among various tiers of government are known as fiscal federalism; yet, because nations have had multiple experiences, it is necessary to allow for more clear abstraction (Moges, 2008; Morozov, 2015). Over a couple of decades, fiscal federalism has been a center of debate in public finance literature. An increasing number of nations are using fiscal decentralization to enhance the functionality of their public sectors; the procedure generally comprises determining the best allocation of duties and authority between the federal and sub-national governments (Moges, 2008; Morozov, 2015).

Fiscal federalism aims to hand over the public service delivery responsibilities to different tiers of government. However, the passing on public service provisions responsibilities is at the expense of the economic scale of the central government; it may be offset by efficiency gain due to local government information advantage of local preferences since they are close to the community (Boadway & Tremblay, 2012). The 'new fiscal federalism' (Oates, 2005), which adopts a public choice viewpoint, modified the FGFF. It argues that government officials and elected officials are more concerned with their utility than with maximizing the welfare of the electorate. On the other hand, SGFF proponents Brennan and Buchanan (1980) consider decentralization as a restrictive instrument for sub-national governments' unwanted actions by promoting competition to provide better public service and raise income through market-preserving goods. Following

decentralization reform, the actions of sub-national governments are accustomed to characterizing the needs of citizens and preserving markets (Zhuravskaya, 2000; Jin et al., 2005).

Moreover, the fiscal federalism of Ethiopia has taken place under a weak institutional capacity (Meheret, 2007; Paulos, 2007). This poor institutional capacity hinders SNG from exercising the devolved functions as intended. It also has a characteristic of a highly decentralized expenditure assignment and weakly decentralized revenue allocation. However, in practice, practically all the SNGs offer, at least in part, vital (redistributive) public services, including healthcare, education, and social assistance, all of which require sizable financial resources.

## **4.2. Conceptual Model and Research Hypotheses**

In an SEM analysis, various routes in a diagram show the cause-effect links between the variables. According to Bushahse (2023), analysis was carried out in steps, including (1) differentiating between reflective and formative construct; (2) utilizing the measurement model, which reveals the association between observable items and their constructs; (3) with the SEM, which embraces gauging the link between the constructs; and (4) employing PLS predict tool to measure the model's prediction power.

The study attempted to check the subsequent research hypotheses depicted in the conceptual model figure (See Fig. 1).

**H1:** Revenue decentralization has a statistically significant positive effect on public provision.

**H2:** Expenditure decentralization has a statistically significant positive effect on public provision.

**H3:** Revenue decentralization has a statistically significant positive effect on SNG capacity.

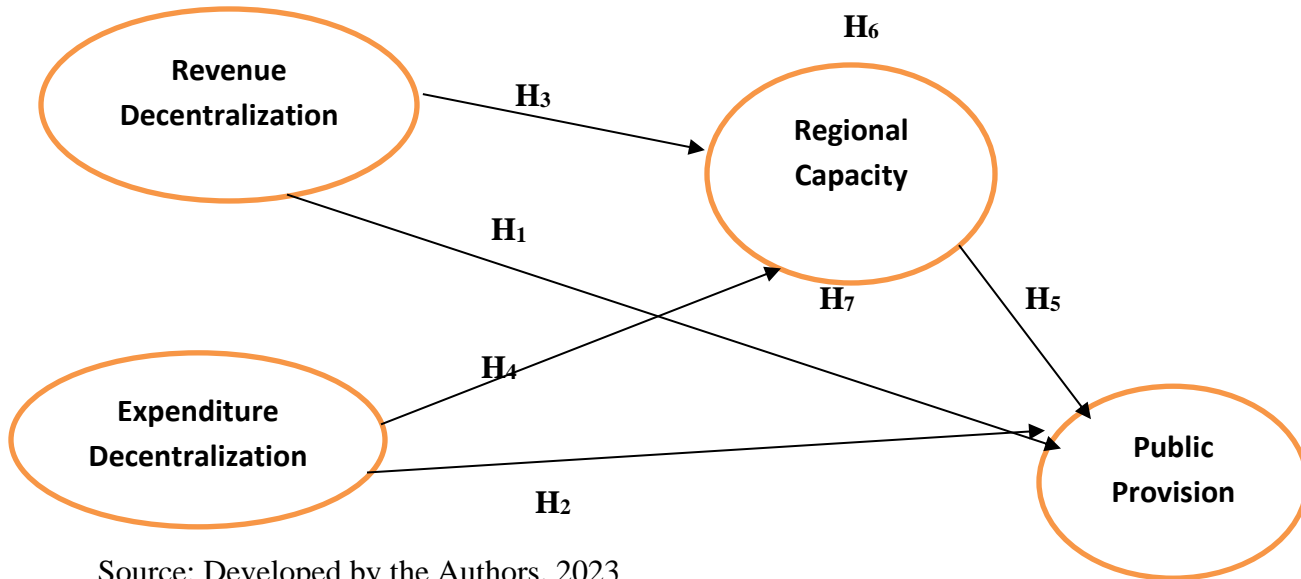
**H4:** Expenditure decentralization has a statistically significant positive effect on SNG capacity.

**H5:** SNG capacity has a statistically significant positive effect on public service provision.

**H6:** SNG capacity positively mediates the linkage between revenue decentralization and public service provisions.

**H7:** SNG capacity positively mediates the linkage between expenditure decentralization and public service provisions.

**Figure 4.1. Conceptual Model**



Source: Developed by the Authors, 2023

**Table 4.1. Variables Used in the Study**

Variables	Definition	Items	Source
<b>Dependent Variable</b>			
SNG public service provision	The regional government's (SNG) public service outcomes include health, education, and road.	It is computed: clean water, education access as % of the total population, and rural road per 1000km square.	WB, IMF
<b>Independent Variables</b>			
Expenditure decentralization	It is SNG's allowed spending from its income for the tasks it has been given. Since capital expenditure generates efficiency that can bring regional economic growth, we also include the expenditure composition to measure capital expenditure autonomy.	% Share of SNG compared to federal government expenditures (Exp _Dec), and SNG expenditure per capita (Expenditure per capita)	Schneider (2003); Bushashe & Bayiley (2023a, 2023b)

Revenue Decentralization	It indicates the extent of SNGs' financial independence from reliance on federal grants to pay for their expenses.	SNG own revenues as % of total revenues (Rev_share) and revenue as % of Regional Growth Domestic Product (RGDP)	Bushashe & Bayiley (2023, 2023b); Scheneider (2003); Liu (2017)
<b>Mediating Variable</b>			
SNG (Regional) Capacity	The composite of the regional government's income level, tax capacity, and fiscal dependency (administrative autonomy)	SNG (Regional) capacity is measured using three indicators. The first indicator is computed: SNG inter-governmental transfer (IGT) share as a percentage of total SNG expenditure (IGT share). The second indicator is computed: SNG's tax revenue per capita (Tax capacity). Finally, the third indicator is Real SNG (i.e., Regional) GDP per capita (GDP)	WB; IMF

Source: Developed by the researcher (2022)

### 4.3. Results

This chapter study aims to analyze fiscal federalism's effects on regional public service provision.

The study presents the result as follows.

#### 4.4. Assessment of Measurement Model

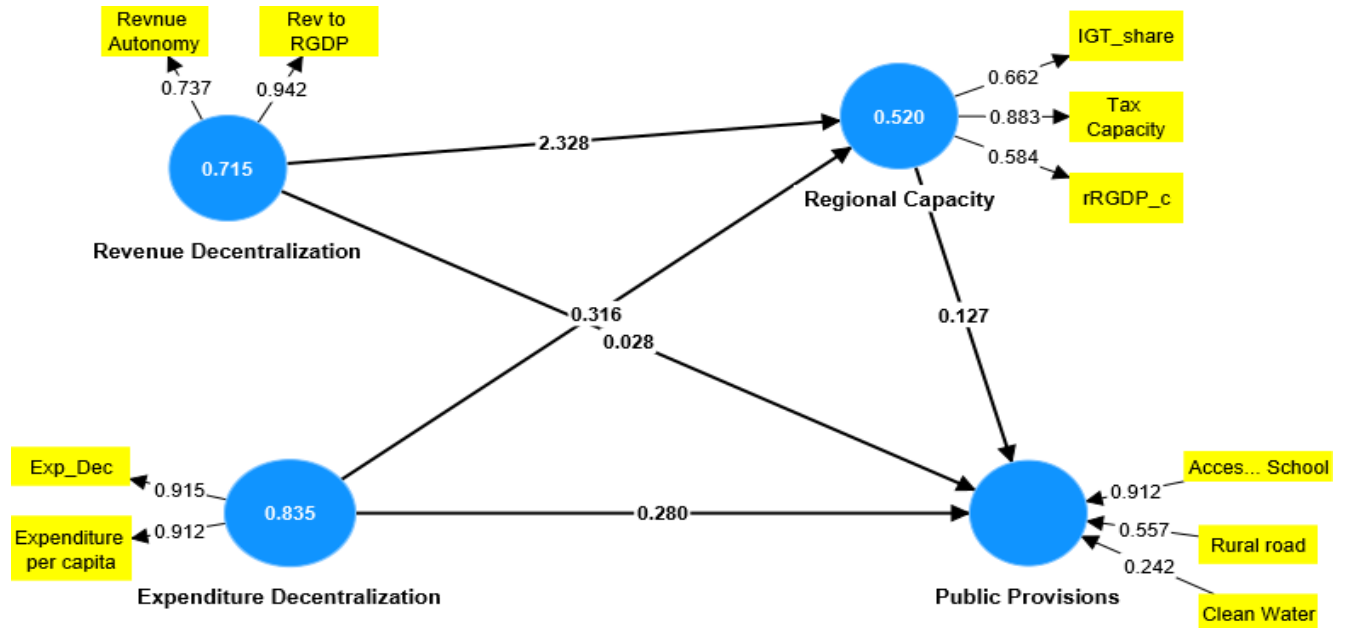
The estimation purposes are to gauge the consistency and validity of the manifest variables. Single manifest and construct reliability examinations evaluate consistency, whereas convergent and discriminant validity measure the construct's accuracy (Lowry & Gaskin, 2014; Garson, 2016; Hair et al., 2021). Additionally, individual manifest reliability estimates the standardized outer loadings of the manifest variables to explicate the variation of manifest respect to the latent variable (Hansler et al., 2014; Garson, 2016; Latan & Ghazali, 2013).

**Table 4.2. General Guideline for Measurement Model Evaluation**

<p>The strength of indicators is examined through the outer loading values. Besides, the variable reliability is measured using Composite and Cronbach’s alpha (Henseler et al., 2015).</p>	<p>Minimum Outer loading is 0.70 (or above 0.4 in exploratory research) (Lowry &amp; Gaskin, 2014; Hair et al., 2017, 2021).</p> <p>To ensure construct reliability, Cronbach's alpha and composite value must be above 0.7 (or above 0.6 in exploratory research).</p>
<p>Convergent validity gauges the magnitudes of constructs/variables that converge to their constructs.</p> <p>Discriminant validity gauges the magnitudes of variables that diverge from other variables in the model (Bushashe, 2023).</p>	<p>The construct with AVE <math>\geq 0.50</math> show convergence.</p> <p>Construct with, in a case of conceptually similar constructs, HTMT value less than 0.90 validate discriminant validity (Lowry &amp; Gaskin, 2014; Henseler et al., 2015). Construct with, in a case of conceptually different constructs, HTMT value <math>\leq 0.85</math> confirms discriminant validity (Lowry &amp; Gaskin, 2014).</p>
<p>The validity of <b>formative constructs</b> is an issue that needs to be checked.</p> <p>The strength of indicators can be examined through the significance of outer weights.</p> <p>Discriminant validity is evaluated through the inner VIF values.</p>	<p>Statistically significant Outer Weights are considered relevant and acceptable (Henseler et al., 2015; Hair et al., 2021).</p> <p>To attain the discriminant validity of formative constructs, the inner should be VIF <math>\leq 5</math> (Garrison, 2016; Hair et al., 2021).</p>

Source: Compiled by the researcher based on literature (2022)

**Figure 4.2. The Outer Model of the Study**



Source: Study Results (2023)

#### 4.4.1. Inspecting Indicators (Items) Reliability

Indicator reliability denotes the level of variation in an item explicated by the variable, and it is assessed using the outer loadings or outer weight contingent on the nature of the construct, i.e., reflective or formative (Lowry & Gaskin, 2014). The indicators with an outer loading value equal to or higher than 0.7 should be reserved. For the exploratory research, indicators showed that an outer loading value greater than 0.4 can be retained (Hair, Hult, Ringle, Sarstedt, Danks, & Ray, 2021).

A general guideline is that a variable should account for a sizable portion of every item's variance, commonly at least 50% (Garson, 2016). It also shows that the variance shared among the concept and the item it represents exceeds the measurement error variance. It implies that an indicator's outer loading needs to be over 0.708 because 0.708 squared equals 0.50 (Lowry & Gaskin, 2014; Garson, 2016).

**Table 4.2. Results of Construct Indicators**

<b>Outer Loadings</b>						
	Expenditure Decentralization	Public Provisions	Regional Capacity	Revenue Decentralization	VIF	P values
Exp_Dec	0.915				1.811	0.000
Expenditure per capita	0.912				1.811	0.000
IGT_share			0.662		1.204	0.000
Rev to RGDP				0.942	1.278	0.000
Revenue Autonomy				0.737	1.278	0.040
Tax Capacity			0.883		1.309	0.000
rRGDP_c			0.584		1.101	0.000
<b>Outer Weight</b>						
Access to School		0.860			1.082	0.000
Clean Water		-0.099			1.141	0.088
Rural road		0.431			1.104	0.020

Source: Study Results, 2023

Table 4.3 indicates that the reflective indicator, except for IGT share and rRGDP\_c, has outer loading >0.7. The study included them since the loading >0.4 is acceptable for exploratory research. (See general guideline of measurement model assessment in Table 4.2). However, there is no clear threshold for the outer weights of the formative construct; it is advisable to use the p-value, which is significant.

#### 4.4.2. Examining Reliability of the Constructs

Cronbach alpha and composite reliability, which measure reliability grounded on how the observed item variables interact, are well-known procedures to detect internal consistency (Garson, 2016). The range of PLS-SEM values is 0 to 1, and a value greater than 0.7 denotes a higher degree of dependability. Composite reliability ratings over 0.60 are acceptable in exploratory research (Hansler et al., 2014; Garson, 2016).

Internal consistency of the multi-item scale was scrutinized with Cronbach's alpha, and the accuracy with which the construct was measured by its indicators was measured with composite

reliability (Lowry & Gaskin, 2014). Cronbach alpha investigated the uni-dimensionality of the multi-item scale's internal consistency, and composite reliability evaluates how effectively the construct was measured by its indicators (Lowry & Gaskin, 2014).

Therefore, Garson (2016) suggested composite reliability over Cronbach's alpha, and all of the composite values of the construct (See Table 4.4) are above 0.7 and indicate the model established internal consistency.

**Table 4.3. Diagnosis of Constructs' Reliability and Validity**

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
Expenditure Decentralization	0.802	0.802	0.910	0.835
Regional Capacity	0.534	0.630	0.759	0.520
Revenue Decentralization	0.636	0.852	0.832	0.715

Source: Study Results, 2023

#### 4.4.3. Examining Discriminant Validity

The Fornell-Larcker criterion is among the procedures to check the occurrence of discriminant validity (Lowry & Gaskin, 2014). At the indicator level, this validity denotes the magnitude of a given construct distinguishing itself from other constructs in the model. The inter-construct correlation values should be below the Average Variance Extracted (AVE) square root (Garson, 2016).

**Table 4.4. Diagnosis of Discriminant Validity**

Fornell-Larcker criterion				
	Expenditure Decentralization	Public Provisions	Regional Capacity	Revenue Decentralization
Expenditure Decentralization	0.914			
Public Provisions	0.314			
Regional Capacity	-0.464	0.160	0.721	
Revenue Decentralization	-0.239	0.127	0.830	0.846

Heterotrait-monotrait ratio (HTMT) – Matrix				
Expenditure Decentralization				
Regional Capacity	0.826			
Revenue Decentralization	0.353		1.111	

Source: Study Results, 2023

As indicated in Table 4.5, the study results satisfied the discriminant validity requirement; therefore, the model established discriminant validity. Another tool to gauge this validity is the Heterotrait-Monotrait ratio (HTMT); the HTMT value should be 0.90 (Hair et al., 2014). For fundamentally different structures, the HTMT value should be 0.85. Table 4.5 illustrates that, except for regional capacity (1.11), all the values of the constructs fulfill the rule; the HTMT result also confirmed that the model established discriminant validity (See general guideline of measurement model assessment in Table 4.2).

#### **4.4.4. Convergent Validity**

Convergent validity is how items associate positively with alternate items of a similar variable (Hair et al., 2017, 2021). Therefore, AVE helps to assess this validity for reflective indicators. The AVE value needed to be equal to or greater than 0.50 (Hensler et al., 2014). Thus, as indicated in Table 4, the model fulfilled the convergent validity criteria (See general guideline of measurement model assessment in Table 4.2).

### **4.5. Diagnosis of Structural Model**

The structural model Starts with analyzing potential collinearity among predictor constructs in the model, coefficient of determination, effect size, and the significance of the path coefficients, respectively (Lowry & Gaskin, 2014; Nitzl, 2016). The model must first be free of the collinearity problem before checking additional requirements tests to accomplish the convergent validity for

formative variables in the routes. To achieve this goal, the Variance Inflation Factor (VIF) must have a value equal to or less than 5 (Kock & Lynn, 2012).

Tables 4.3 and 4.8 present the outer and inner values of VIF, respectively. These Tables showed that the model is free from the problem of collinearity; therefore, it established a convergent construct for the formative construct (see outer VIF in Table 4.3 and inner VIF in Table 4.8).

**Table 4.5. General Guideline for SEM (Inner) Model Evaluation**

<b>Criterion</b>	<b>Explanation</b>	<b>Rule of thumb for Decision</b>
<b>R<sup>2</sup> of the endogenous variable</b>	The R <sup>2</sup> helps to gauge variability in results explained by the explanatory variables (Hair et al., 2017).	The R <sup>2</sup> Values 0.67, 0.33, and 0.19 are significant, modest, and weak, correspondingly (Chin, 1998).
<b>Beta coefficient (β)</b>	It evaluates numerous coefficients of association among the dependent and dependent constructs.	The t value equals 2.58 (p<0.01), 1.96 (p<0.05), and 1.64 (p<0.10) can be considered significant (Latan & Ghozali, 2013).
<b>Effect size (f<sup>2</sup>)</b>	It checks whether the measure of the prediction enhancement (Cohen, 1988).	f <sup>2</sup> Values 0.02, 0.15, and 0.35 are considered to have feeble, mediocre, and significant effects, respectively (Cohen, 1988; Chin, 1998).
<b>Prediction relevance (Q<sup>2</sup>)</b>	It examines the model's predictive ability. It is calculated using $Q^2 = (F^2 \text{ included} - F^2 \text{ exclude}) / (1 - F^2 \text{ included})$ (Hair et al., 2021).	The values of Q <sup>2</sup> 0.02, 0.15, and 0.35 are feeble, mediocre, and substantial effects, respectively (Chin, 1998).

Source: Compiled by the researchers based on literature (2022)

#### **4.5.1. Endogeneity Test**

The GC method is utilized in research to identify and fix endogeneity problems in model estimation (Becker et al., 2021). The GC test verified that all routes are not statistically significant, indicating the model is free from endogeneity concerns (See Table A 4-2 in the appendix).

### 4.5.2. Coefficient of Determination ( $R^2$ )

The  $R^2$  denotes the magnitude of variance in the dependent variable explicated by the independent variables; a model with  $R^2$  values of 0.67, 0.33, and 0.19 is significant, mediocre, and feeble, respectively (Garson, 2016). Each path from one construct to another construct means the link between independent variables and dependent variables; therefore, as presented in Table 8,  $R^2$  of the path connection between expenditure decentralization and public service provision is 0.764, and the path connection between revenue decentralization and public service provision is also 0.764. Besides,  $R^2$  of the path association between expenditure decentralization and capacity is 0.239, and the path link between revenue decentralization and capacity is also 0.239. Therefore, the average  $R^2$  of independent variables on the predicted independent variable is  **$((0.764+0.764+0.239+0.239)/4) = 0.5015$** .

Consequently, the study model is more than moderate. Furthermore, it signifies the model has high forecasting accuracy (See general guideline of inner (path) model assessment in Table 4.6).

### 4.5.3. Effect Size

Effect size ( $f^2$ ) is a measure of whether a specified explanatory construct has a significant impact on the dependent constructs that is determined by the change in  $R^2$  value that results from its exclusion from the model (Henseler et al., 2014; Lowry & Gaskin, 2014). The formula for the  $f^2$  is:  **$= (R^2 \text{ included} - R^2 \text{ excluded}) / (1 - R^2 \text{ included})$** , whose values of 0.02, 0.15, and 0.35 represent feeble, mediocre, and significant effects, respectively (Chin, 1998). As presented in Table 4.8, All paths have  $f^2$  values exceeding a minimum threshold (0.02). Besides, except for the  $f^2$  of revenue decentralization on public service provision (i.e., 0.028), all other  $f^2$  values are above

0.15. Therefore, almost all paths have above medium effect size (See general guideline of inner (path) model assessment in Table 4.6).

#### 4.5.4. Evaluation of Predictive Relevance

The evaluation of PLS prediction helps to check the magnitude of the predictive relevance of the model (Shmueli et al., 2015; Shmueli et al., 2019). The predictive ability of their PLS path models for the observed items was determined through the mean absolute error (MAE) and the mean absolute percentage error (MAPE) (Shmueli et al., 2019). The disparities comparing PLS-SEM and LM need to be positive, an appraisal of the  $Q^2$  prediction ability across various PLS path models (Shumueli, 2010; Shmueli et al., 2015).

For all indicators of regional capacity and public service provision, the  $Q^2$  prediction values are above zero, and the RMSE and MAE values of the PLS-SEM predict lower than those of the linear model (LM) benchmark; therefore, the model fulfills predictive relevance (See general inner (path) model assessment guideline in Table 4.6 and Table 4.7).

**Table 4.6. PLS Predict Relevance Assessment**

<b>Result of Predict Relevance</b>	<b><math>Q^2</math></b>	<b>PLS-SEM_RMSE</b>	<b>PLS-SEM_MAE</b>	<b>LM_RMSE</b>	<b>LM_MAE</b>
Access to School	0.080	0.377	0.264	0.726	0.309
Clean Water	0.018	33.080	28.421	36.033	24.152
Rural road	0.068	2.280	1.839	8.260	2.507
IGT_share	0.121	0.209	0.144	1.453	0.257
Tax Capacity	0.638	0.021	0.013	0.021	0.006
rRGDP_c	0.183	0.000	0.000	0.000	0.000

Source: Study Results, 2023

#### 4.5.5. Significance of Path Coefficients

The evaluation of path coefficients shows the predictable change in the explained construct for a unit change in the explanatory constructs. Path analysis claimed to detect statistical significance, magnitude, and direction of path coefficients (Latan & Ghozali, 2013; Garson, 2016). The bootstrap

sample enables the estimated coefficients in PLS-SEM to be tested for significance (Latan & Ghozali, 2013).

**Table 4.7. Examining Path Coefficients**

Hypotheses	Path Directions	$\beta$ Coff.	Coff. of Determination	Effect Size	Inner VIF	t- statistics	Sig values	Report
H1	Revenue Decentralization -> Public Provisions	-0.275	0.239	0.028	3.529	0.915	0.360	Not Supported
H2	Expenditure Decentralization -> Public Provisions	0.546	0.239	0.280	1.396	4.572	0.000	Supported
H3	Revenue Decentralization -> Regional Capacity	0.763	0.764	2.328	1.060	14.360	0.000	Supported
H4	Expenditure Decentralization -> Regional Capacity	-0.281	0.764	0.316	1.060	5.245	0.000	Supported
H5	Regional capacity -> Public Provisions	0.641	0.239	0.127	4.239	2.118	0.034	Supported
H6	Revenue Decentralization -> Regional Capacity -> Public Provisions	0.489	NA	NA	NA	1.853	0.064	Supported
H7	Expenditure Decentralization -> Regional Capacity -> Public Provisions	-0.180	NA	NA	NA	1.761	0.078	Supported

Source: Study Results, 2023

*Notice: Since the study aimed to explore, the study used a 90% significance (Sig) level. Besides, it is challenging to calculate Coff Determination ( $R^2$ ), Effective Size ( $f^2$ ), and VIF for indirect effect; therefore, NA denotes Not Applicable.*

As presented in Table 4.8, except revenue, expenditure decentralization (**Sig= 1% level; Beta Coff = 0.546**) and regional capacity (**Sig= 5% level; Beta Coff= 0.641**) have a statistically significant positive contribution to public service provision. Except for hypothesis 1, the study supported hypotheses 2 and 5. In addition, revenue decentralization significantly positively affects regional

capacity (**Sig= 1% level; Beta Coff= 0.763**). Therefore, hypothesis 3 is supported. Nevertheless, expenditure decentralization (**Sig= 1% level; Beta Coff = -0.281**) adversely influences regional capacity. Therefore, the investigation oppositely validated hypothesis 4.

The analysis mediations examine the third variable mediating role on the linkage between independent and dependent variables (Preacher & Hayes, 2008; Hayes & Scharkow, 2013; Lowry & Gaskin, 2014). As shown in Table 4.6, regional capacity (**Sig= 10% level; Beta Coff = 0.489**) significantly mediates the cause-effect link between revenue decentralization and public service provision. Therefore, it supported **hypothesis 6**. However, regional capacity (**Sig= 10% level; Beta Coff = -0.180**) significantly influences the cause-effect link between expenditure decentralization and public service provision. Therefore, the result oppositely validated hypothesis 7. In general, except for hypothesis 1, all other six hypotheses are significantly significant (hypotheses 2 to 7),

## **4.6. Discussion**

Within the framework of ethnic federalism, Ethiopia has implemented a distinctive type of fiscal decentralization. The process is still ongoing, and the primary administrative division of the federal government still needs more financial decision-making authority. Within the increasing literature on fiscal federalism, a rigorous study of the influence of fiscal federalism on regional public service provision is an essential research subject. This study investigates the causal link between fiscal federalism variables, regional capacity, and public service provision.

The study findings agree with studies by Arends (2017) and Kis-Katos and Sjahrir (2014), who validated that expenditure decentralization significantly enhances public health services. However, it is consistent with Robalino (2002), Syamsul (2003), and Sow and Razafimahefa (2015), who

revealed that expenditure decentralization significantly hampers public provisions. It also contradicts Silas (2017), who corroborated that expenditure decentralization does not significantly contribute to health service outcomes.

On the other hand, the study supports Freinkman and Plekhanov (2009), Silas (2017), and Arends (2017), who confirmed that revenue decentralization has no significant contribution to public service provision. In addition, the study finding is inconsistent with Lozano and Martínez (2013) and Razafimahefa (2015), who verified that revenue decentralization significantly positively affects public education service outcomes.

Since the federal government still centralizes the financial means of carrying out fiscal responsibilities, revenue decentralization still needs to achieve the desired results. Instead, it shows that financial decision-making has effectively been centralized. Additionally, it illustrates the regionals' overwhelming reliance on federal grants to pay for even ongoing expenses within their domains. Furthermore, the study findings on regional capacity support the findings of Lozano and Martínez (2013), who revealed that regional GDP significantly improves school enrollment.

Concerning the mediating effect, the study showed that regional capacity enhances the effect of revenue decentralization on public service provision. Fostering the SNG capacity may enhance revenue autonomy by increasing the financial base of the regions, and the regional government can use the revenue to provide public service. Nevertheless, SNG capacity played a hampering mediating role in the influence of expenditure decentralization on public service provision.

This finding opposed the proposed hypothesis and fiscal federalism theory; it may be because of the regional government budget's weak links with the revenue side. The intergovernmental transfer covers the mismatch between the expenditure assignments and the SNG's revenue. Therefore, it

brings a weak incentive for the SNG to raise their revenue to cover their spending while providing public service, which harms regional capacity and its mediating function on the indirect influence of expenditure decentralization on public service provision.

## **4.7. Conclusion**

The selection and distribution of budgetary decision-making authority among many government levels is termed fiscal federalism. It aims to boost public services' variety, quality, and quantity. However, the experiences of reforming nations have been varied, making it challenging to comprehend and conclude. Therefore, the study aimed to analyze fiscal federalism's direct and indirect effects on public service provision using panel data from 2005–2018; the study uses PLS-SEM.

The study's findings indicated that expenditure decentralization significantly improved public service provision. Nevertheless, revenue decentralization has no significant contribution to public service provision. Unlike expenditure decentralization, revenue decentralization improves regional capacity. In light of revenue decentralization, the above discussions on the study results contradict the theoretical assumption of fiscal federalism. It claims that providing better public service at a low cost may increase the demand for local public service, which is vital in increasing local government revenue by the benefit rule principle.

To realize the nation's objective to be one of the low-middle-income countries by 2025, Ethiopia's Growth and Transformation Plan II (GTP II) (2016–2020) strives to maintain fast growth. The Plan emphasizes enhancing macroeconomic indicators, sectoral economic development plans (for example, manufacturing, mining, tourism, and agriculture and rural transformation), and infrastructure (for example, transportation, power, digital, and water supply). Despite the efforts

made by the federal and SNGs, the country needed to improve its performance in achieving the national development plans (GTP II). It is due to Ethiopia's fiscal federalism arrangement, which provides SNGs with limited revenue autonomy. Enhancing residents' health education and infrastructure like the road is a priority because it is a means of attaining social welfare and sustainable development.

The study's findings revealed that regional capacity positively affects public service provision and mediates the relation between revenue decentralization and public service provision. However, it harms the connection between expenditure decentralization and public service. Fiscal imbalances arise because the distribution of the tax base and the demand for public goods need to follow an even manner.

#### **4.7.1. Policy Implication**

In Ethiopia, the ethnic-based federal arrangement and economic backdrop generated by it have needed more effectiveness in boosting public sector performance by broadening production and customizing it to population needs and economic priorities. The study findings would have implications for policymakers in that it offers an insight into fiscal federalism, public service provision, and areas for further improving the regional capacity. Policymakers would also use the findings to design strategic plans to increase the productivity of public service provision.

The fiscal system requires further decentralization of revenue sources commensurate with the regional governments' expenditure responsibilities. Therefore, the federal government should support expenditure decentralization for public service provision because it contributes positively. Besides, the IGT arrangement should be redesigned to match the expenditure responsibilities and

the revenue side and enhance the SNG capacity to generate adequate revenue to cover their spending.

#### **4.7.2. Limitations and Future Research Areas**

Some strengths are examining the mediating role of SNG capacity and alleviating endogeneity concerns. The study, however, has a flaw because it has the following limitations: First, the constitution of Ethiopia authorizes only the national government to collect import and export taxes, making it tough to get solid figures. Therefore, the study was obliged to calculate RGDP, excluding the trade balance. The study left out Addis Ababa City since it often receives inter-governmental transfers. Furthermore, the study excludes the two recently established SNGs (SNG of Sidama and Southwestern).

One avenue for future research is to include spatial geography and examine how the regional government's distance from a highly resource-concentrated location (capital city) to the peripheral region affects public service provision. Besides, the researcher/s can repeat the study at the federal, municipalities, Zonal (below regional states), and Woreda levels (below Zone). Finally, to answer the "egg and chicken" dilemma, further investigation is needed to examine whether institutional development should come first before introducing the decentralization program or vice versa.

## **CHAPTER FIVE**

### **5.The Effect of Fiscal Decentralization on Economic Growth in Sub-National Governments of Ethiopia**

#### **5.1. Introduction**

The public finance system, which includes government expenditure and revenue (taxes, borrowing, and grants), may enhance long-term economic growth. The following three premises form the basis of the fiscal federalism hypothesis, which connects decentralization with economic growth.

First, the SNGs are much closer to the consumer or voter than the central government, so they better understand local preferences. Using this information advantage, they can improve economic growth through efficient public service delivery (Oates, 1972, 2005; Boadway & Tremblay, 2012). Second, decentralization could encourage competition among local governments to better align local public service delivery with local tastes to draw movable production elements, which spurs economic growth (Tiebout, 1956; Boadway & Tremblay, 2012). Third, decentralization may restrain the rent-seeking behavior of local officials and politicians by establishing penalties such as losing citizens' votes or mobile production factors. It also forces them to develop better policies and initiatives that increase their effectiveness and local economic growth instead (Brennan & Buchanan, 1980; Weingast, 2009).

Decentralized spending demonstrates local governments' motives for spending taxpayer money. Given the initial hypothesis of the administrative unit inhabitant's homogenous social wants, it is plausible to anticipate that the expenditure decentralization will positively impact the economic

agents' behavior. Spending on the budget is separated into two categories: productive and non-productive. Fiscal decentralization might lead to a specific weighting of productive expenditures within the overall spending structure. Besides, the corollary of fiscal federalism is represented by revenue devolution. As a result, the structural optimization of revenue sources is a concern of SNGs in public finance.

## **5.2. Model Specification and Estimation Procedures**

Barro (1990) was the first to make an empirical attempt to examine the impact of government spending on economic growth. Following Barro's footsteps, Davoodi and Zou's (1998) study was the first to significantly attempt to incorporate fiscal decentralization into an endogenous growth model. Though these two initiatives opened the door to an empirical investigation of the relationship between fiscal decentralization and economic growth in various national contexts.

According to Blundell and Bond (1998, 2000), the two-step system GMM estimators correct the residuals for heteroscedasticity and produce consistent estimates in the presence of a lagged dependent variable as the lagged levels of explanatory variables turn out to be weak instruments for the first difference equation. A loss of important observations also affects the first differences in GMM estimation. First-differences GMM estimation will likely perform poorly and needs better finite sample qualities in these circumstances (bias and imprecision). Instead, Arellano and Bover proposed a system GMM estimator (1995). The standard set of equations in first differences and an additional set of levels equations are combined in the system GMM estimator.

The three fiscal decentralization indicators equation to be estimated can be written as follows in the levels and first differenced forms, depending on the explanations given above:

$$\ln RGDPgr_{it} = \beta_0 + \beta_1 \ln(RGDPgr_{it-1}) + \beta_2 \ln(Exp Dec_{it}) + \beta_3 \ln(Gov't size_{it}) + \beta_4 \ln(Inflation_{it}) + \beta_5 \ln(Human capital_{it}) + V_{it}, \quad (1)$$

$$\ln RGDPgr_{it} = \beta_0 + \beta_1 \ln(RGDPgr_{it-1}) + \beta_2 \ln(Rev Dec_{it}) + \beta_3 \ln(Gov't size_{it}) + \beta_4 \ln(Inflation_{it}) + \beta_5 \ln(Human capital_{it}) + V_{it}, \quad (2)$$

$$\ln RGDPgr_{it} = \beta_0 + \beta_1 (\ln RGDPgr_{it-1}) + \beta_2 \ln(Comp Dec_{it}) + \beta_3 \ln(Gov't size_{it}) + \beta_4 \ln(Inflation_{it}) + \beta_5 \ln(Human capital_{it}) + V_{it}. \quad (3)$$

### 5.3. Research Variables

Several significant elements must be considered while defining an empirical model (See Table 5.1). Following other studies, this study employed the gross domestic product growth rate to measure economic growth.

The present study selected explanatory variables depending on how theoretically connected they were to the dependent variable. The study examined the existing literature and measured Ethiopia's fiscal federalism using expenditure, revenue, and composite decentralization. The study also used control variables such as the government's size, inflation rate, and human capital. Therefore, Table 5.1 presents the operational definitions and computation of the study's dependent, independent, and control variables.

**Table 5.1. Research variables**

Variables	Definition	Computed	Source	Expected sign
<b>Dependent variable</b>				
Regional Economic growth (RGDPgr)	It is the growth rate of regional domestic products	Real RGDP growth rate	Davoodi and Zou (1998); Iqbal et al. (2012); Liu (2017)	
<b>Independent variables</b>				

Expenditure decentralization (Exp Dec)	It is the regional government's expenditure autonomy for their assigned responsibility	It is computed as the subnational expenditures as % of federal government expenditures	Davoodi and Zou (1998); Schneider (2003); Liu (2017)	+/-
Revenue Decentralization (Rev Dec)	It is the magnitude of regional government revenue autonomy to cover their expenses from their revenue share and the level of dependency on the federal grants	It is calculated as own sub-national revenues as % of total revenues	Schneider (2003); Liu (2017)	+/-
Composite Decentralization (Comp Dec)	It is a combined effect of expenditure and revenue decentralization	The ratio of revenue decentralization to (1 - Expenditure Decentralization)	Martinez-Vazquez and Timofeev (2010); Iqbal et al. (2012); Baskaran and Feld (2012)	+/-
<b>Control variables</b>				
Government size (Gov't size)	It is the size of the public sector	It is measured by Subnational expenditure as % of regional GDP	Loizides and Vamvoukas (2005); Martinez-Vazquez and Timofeev (2010); Makreshanska-Mladenovska and Petrevski (2019)	+/-
Inflation	Inflation reflects the increases in the pricing of goods and services over time	The annual inflation rate measures it	Zhang and Zou ((1998); Iqbal et al. (2012); Baskaran and Feld (2012).	+/-
Human Capital	It is the availability of an educated and skilled workforce	It is measured by sub-national government investment in social development	Used by the study	+

Source: Developed by the authors (2021)

## 5.4. Results

As presented in Table 5.2, the average value of *RGDPgr* is 0.2, with a minimum value of  $-4.048$  and a maximum value of 3.495. The mean and standard deviations of independent and control variables are presented as follows, regarding explanatory variables, *Exp Dec* (Mean = 3.1; Std. Dev = 3.42), *Rev Dec* (Mean = 0.518; Std. Dev = 2.182), and *Comp Dec* (Mean = 0.528; Std. Dev = 2.183). Besides, regarding the control variables, *Gov't size* (Mean = 0.244; Std. Dev = 0.189), *Inflation* (mean = 0.116; Std. Dev = 0.101), and *Human capital* (Mean = 4.862; Std. Dev = 1.679).

**Table 5.2. Descriptive statistics**

Variable	Obs.	Mean	Std. Dev.	Min	Max
<i>RGDPgr</i>	130	.2	.83	$-4.048$	3.495
<i>Exp Dec</i>	140	3.103	3.422	.003	16.2
<i>Rev Dec</i>	140	.518	2.184	.066	26.052
<i>Comp Dec</i>	130	0.528	2.183	0.67	26.51
<i>Gov't size</i>	140	.244	.189	.006	.833
<i>Inflation</i>	130	.116	.101	$-.451$	.36
<i>Human capital</i>	140	4.862	1.679	.588	7.968

Source: Study Panel Data (2008–2021)

Additionally, Tables A 3-1 and A 5-2 in the appendix show the normality and multicollinearity test results, respectively. As indicated in Table A 5-1, the variables in the study have a normal distribution. Besides, Table A 5-2 confirmed that the models in the study are free from multicollinearity problems.

The study's first objective is to measure the effect of expenditure decentralization on economic growth. To this end, the study used the two-step system GMM regression. Table 5.3 presents the model results on the effect of revenue decentralization on economic growth in Ethiopia. The Chi-square test statistics indicated the model's goodness of fit. Besides, the Sargan test accepted all

specifications and validated the over-identifying restrictions in the GMM estimation. The test for AR (2) validated the absence of second-order autocorrelation.

**Table 5.3. The Effect of Expenditure Decentralization on Economic Growth**

RGDPgr	Coef.	St. Err.	z value	p-value
Exp Dec	-.37	.158	-2.34**	.019
Gov't size	-3.897	2.352	-1.66*	.098
Inflation	-3.697	.567	-6.52***	0.000
Human capital	.026	.303	.09	.931
Constant	2.654	1.693	1.57	.117
Number of observations 130				
Arellano-Bond Test for Autocorrelation	AR (1) test		-2.15**	.032
	AR (2) test		-0.15	.882
Sargan Test of Overid. Restrictions	Wald chi2 (63)		56.3	.712
Model test	Wald chi2(4)		69.02***	0.000

Source: Study Panel Data (2008–2021).

*Note:* \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , and \*  $p < 0.1$  imply statistically significant at 1%, 5%, and 10% levels, respectively.

As presented in Table 5.3, expenditure decentralization ( $P = 0.019$ ;  $\beta = -0.37$ ), gov't size ( $P = 0.098$ ;  $\beta = -0.389$ ), and Inflation ( $P = 0.000$ ;  $\beta = -0.369$ ) have a statistically significant negative effect on economic growth. However, human capital has no significant effect on economic growth. The study's second objective is to examine the effects of revenue decentralization on economic growth. As shown in Table 5.4, the AR (2) test showed the absence of second-order autocorrelation. The over-identifying of the Sargan test asserted the acceptance of restrictions in the GMM estimation for all specifications. The Chi square-test statistics confirmed that the model is robust.

**Table 5.4. The Effect of Revenue Decentralization on Economic Growth**

RGDPgr	Coef.	St.Err.	z value	p-value	
Rev Dec	-.154	.048	-3.21***	.001	
Gov't size	-6.31	2.162	-2.92***	.004	
Inflation	-6.994	2.32	-3.02***	.003	
Human capital	-.271	.22	-1.23	.219	
Constant	3.906	1.406	2.78***	.005	
Number of observations 130					
Arellano-Bond Test for Autocorrelation			AR (1) test	-1.182*	.068
			AR (2) test	-0.48	.649
Sargan Test of Overid. Restrictions			Wald chi2 (63)	58.49	.638
Model test			Wald chi2(4)	116.06***	.000

Source: Study Panel Data (2008–2021).

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , and \*  $p < 0.1$  imply statistically significant at 1%, 5%, and 10% levels, respectively.

Table 5.4 shows that revenue decentralization ( $P = 0.001$ ;  $\beta = -0.154$ ), gov't size ( $P = 0.004$ ;  $\beta = -0.631$ ), and Inflation ( $P = 0.003$ ;  $\beta = -0.69$ ) have a statistically significant negative effect on economic growth. However, human capital has no significant effect on economic growth. The study's third objective is to examine the effects of composite decentralization on economic growth. Based on Table 5.5, the AR (2) and Sargan test confirmed the absence of high-order correlation and the instrument's validity. Chi square-test statistics confirmed the model's appropriateness.

**Table 5.4. The Effect of Composite Decentralization on Economic Growth**

RGDPgr	Coef.	St.Err.	z value	p-value	
Comp Dec	-.477	.258	-1.85*	.065	
Gov't size	-3.398	1.958	-1.74*	.083	
Inflation	-2.077	.475	-4.37***	.000	
Human capital	.001	.001	0.95	.343	
Constant	.235	.486	0.48	.629	
Number of observations 130					
Arellano-Bond Test for Autocorrelation			AR (1) test	-1.178*	.074
			AR (2) test	0.25	.800
Sargan Test of Overid. Restrictions			Wald chi2 (63)	62.51	.494

Model test	Wald chi2(4)	35.23***	.000
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Source: Study Panel Data (2008–2021).

*Note:* \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , and \*  $p < 0.1$  imply statistically significant at 1%, 5%, and 10% levels, respectively.

As presented in Table 3.5, composite decentralization ( $P = 0.065$ ;  $\beta = -0.447$ ), gov't size ( $P = 0.083$ ;  $\beta = -3.398$ ), and Inflation ( $P = 0.000$ ;  $\beta = -2.077$ ) have a statistically significant negative effect on economic growth. However, human capital has no significant effect on economic growth.

## **5.5. Discussion**

A comprehensive review of the effect of fiscal decentralization on regional economic growth is a crucial area for research, given the growing body of literature on the topic. The present study investigated the cause-effect relationship between fiscal decentralization variables and regional economic growth in Ethiopia. The study discusses the finding as follows.

The study finding is consistent with those of studies that come across the significant negative effect of expenditure decentralization on economic growth, such as Davoodi and Zou (1998), Zhang and Zou (1998), Jin and Zou (2005), Rodríguez-Pose and Ezcurra (2011), and Nguyen et al. (2019). It also supports studies that found revenue decentralization significantly negatively affects economic growth (Naumets, 2003; Rodríguez-Pose & Ezcurra, 2011; Nguyen et al., 2019). However, the finding contradicts studies that found a significant positive effect, such as Zhang and Zou (2001), Imi (2005), Malik et al. (2006), Philip and Isah (2012), Iqbal et al. (2012), Su et al. (2014), and Liu (2017). However, the study finding disagrees with Iqbal et al. (2012), who found that composite decentralization significantly contributes to economic growth.

Besides, the study finding on government size confirms Rodríguez-Pose and Ezcurra (2011) and Baskaran and Feld (2012), who found that government size significantly negatively affects

economic growth. However, it differs from Tarigan (2003) and Iqbal et al. (2012), who found a significant positive effect. It is also at odd with Blöchliger et al. (2013), who found that government size has an insignificant effect on economic growth.

The study supports scholars who found that inflation has a significant negative contribution to economic growth (Naumets, 2003; Iqbal et al., 2012; Baskaran & Feld, 2012). Nevertheless, it opposed studies that found the negative contribution of the inflation rate on economic growth (Jin & Zou, 2002; Su et al., 2014). Moreover, the study's finding contradicts Iqbal et al. (2012), who found that human capital has a positive statistically significant effect on economic growth.

Though the study's empirical results support some of the prior studies mentioned above, they directly contradict the fiscal federalism theory. Since the theory claims that the more accessible a government is to its citizens, the more likely it is to realize efficient resource allocation, which will result in economic growth (Tiebout, 1956; Oates, 1972; R. Musgrave & P. Musgrave, 1983).

## **5.6. Conclusion**

The study aims to investigate the effect of fiscal decentralization on regional economic growth. For empirical analysis, the study employed two steps of GMM estimation.

The Chi square-test statistics show that the three models used in the study are reliable. The Sargan test of over-identification failed to reject the null hypothesis, proving the validity of the study's instruments. Additionally, because AR (1) is statistically significant, but AR (2) is not, test statistics imply that the models are reliable and adhere to the correct specifications.

The study's findings revealed that expenditure, revenue, and composite decentralization have a statistically significant negative effect on regional economic growth. Moreover, among the control variables, inflation and government size have a statistically significant detrimental effect on

regional economic growth. However, human capital has no significant effect. Based on the results of the study, the following conclusions are drawn.

Though Ethiopia has established and exercised fiscal federalism that altered the country's political, administrative, and economic landscape, it prohibits fiscal decentralization from reaching its full potential. Consequently, fiscal decentralization has a detrimental effect on SNGs' economic growth. As a result, the study's findings may have significant policy consequences for the government and decision-makers, indicating that Ethiopia's federalism is incompatible with its objectives. Therefore, the study recommends that decentralizing the revenue side should be closely linked to decentralizing the expenditure side. Besides, intergovernmental transfers should not be the primary funding source for regional governments. It should also establish a firm control structure to make SNGs accountable for spending.

Future research may consider variables like political and geographical context. Future studies will adopt a mixed research approach because it supports using qualitative data to triangulate quantitative findings.

## **CHAPTER SIX**

### **6. Fiscal Federalism and Economic Development in Ethiopia: A Moderating Effect Analysis of Macroeconomics Instability**

#### **6.1. Introduction**

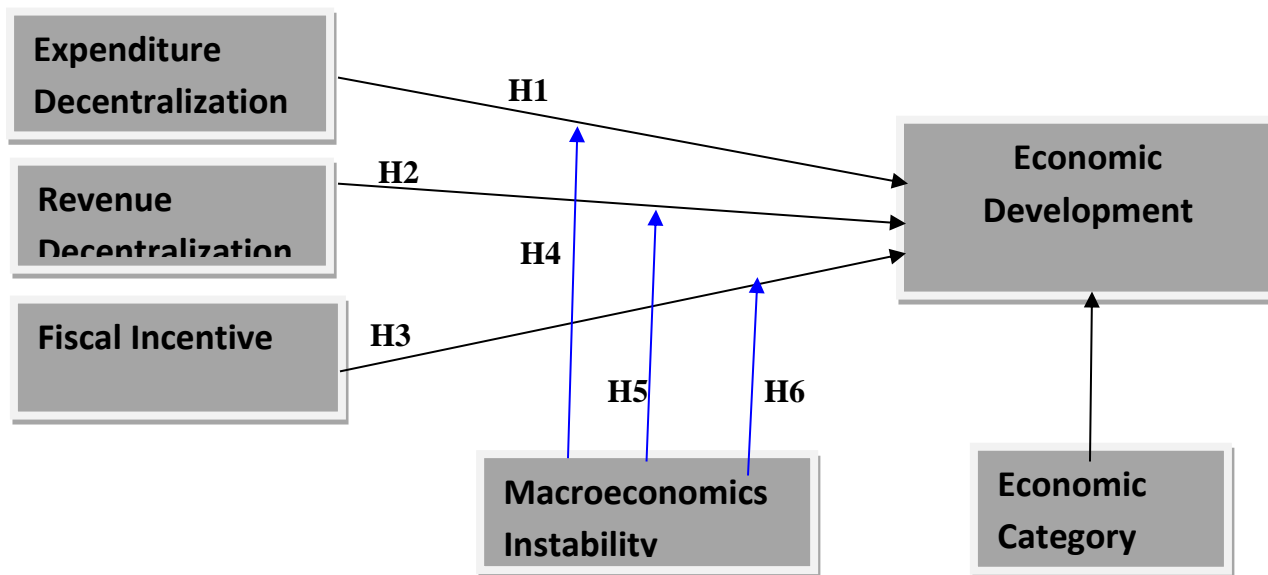
Raising a population's standard of living and overall well-being is known as economic development. In its most basic form, economic development is concerned with the gradual extension of human potential. Economic development encompasses poverty reduction, income redistribution, and raising the income and output linked to economic development.

The nexus between fiscal federalism and economic development might be conditioned on critical economic variables, which aligns with the theoretical literature, suggesting that the level of development could be a factor that conditions such a relationship (Aray & Pedauga, 2022). Among other variables, a stable macroeconomic environment encourages investment, the growth of the financial sector, integration, and globalization, all of which are potential pathways for economic growth (Khalid, 2017). Even though scholars have conducted much empirical research on the subject, they still need to be more conclusive (e.g., Siliverstovs & Thiessen, 2015; Liu, 2017; Nguyen et al., 2019; Hung & Thanh, 2022; Lechner et al., 2022; Xiao et al., 2022; Osmani & Tahiri, 2022; Bushashe & Bayiley, 2023a). Besides, the conflicting results point to the need for additional study.

#### **6.2. Analytical Framework**

Following the theories from the literature review, the conceptual model described below explains the relationship between the study's variables (See Figure 6.1 below).

**Figure 6.1. Proposed Conceptual Framework**



Source: Developed by Researcher Based on Literature (2022)

**Table 6.1. Operationalization of Variables**

Variables	Definition	Item	Source
<b>Dependent Variable</b>			
Economic Development	It is the economic and social well-being of SNGs activities.	The SNG growth rate of real GDP, Human Development Index (HDI) of SNGs, and Clean Water Access	WB; IMF; Bushashe & Bayiley (2023b).
<b>Independent Variables</b>			
Expenditure decentralization	It is the SNG's expenditure autonomy for their allotted responsibility.	% Share of Subnational government relative to central government expenditures (Regional Exp Dec), and SNG Expenditure per capita	Schneider (2003); Liu (2017); Bushashe & Bayiley (2023a, b & c)
Revenue Decentralization	It is the degree to which SNGs depend on federal funds and how much revenue autonomy they have to cover their costs.	Subnational Own revenues as % of total revenues It is also measured through Subnational federal grants as % of total revenues (Dependency)	WB; IMF; Schneider (2003); Liu (2017); Bushashe & Bayiley (2023a, b & c)
Fiscal Incentive	It links the changes in revenue of SNG with its changes in expenditure and Budget composition motives of SNG officials.	The propensity of % change in revenue need of SNG (R_Propensity), the propensity of % change in expenditure	Developed by researchers

		need of SNG (E_Propensity)), and the Budget composition decision of SNG.	
<b>Mediating Variable</b>			
Macroeconomic Instability	It is the volatility of the health of the SNG economy.	It is measured by the Misery Index (MI).	WB; IMF
<b>Control Variable</b>			
Economic Category	Two categories of SNGs in Ethiopia are grounded on economic level deference: Emerging states and Advanced States.	The dichotomies are based on economic level.	Developed by Researchers

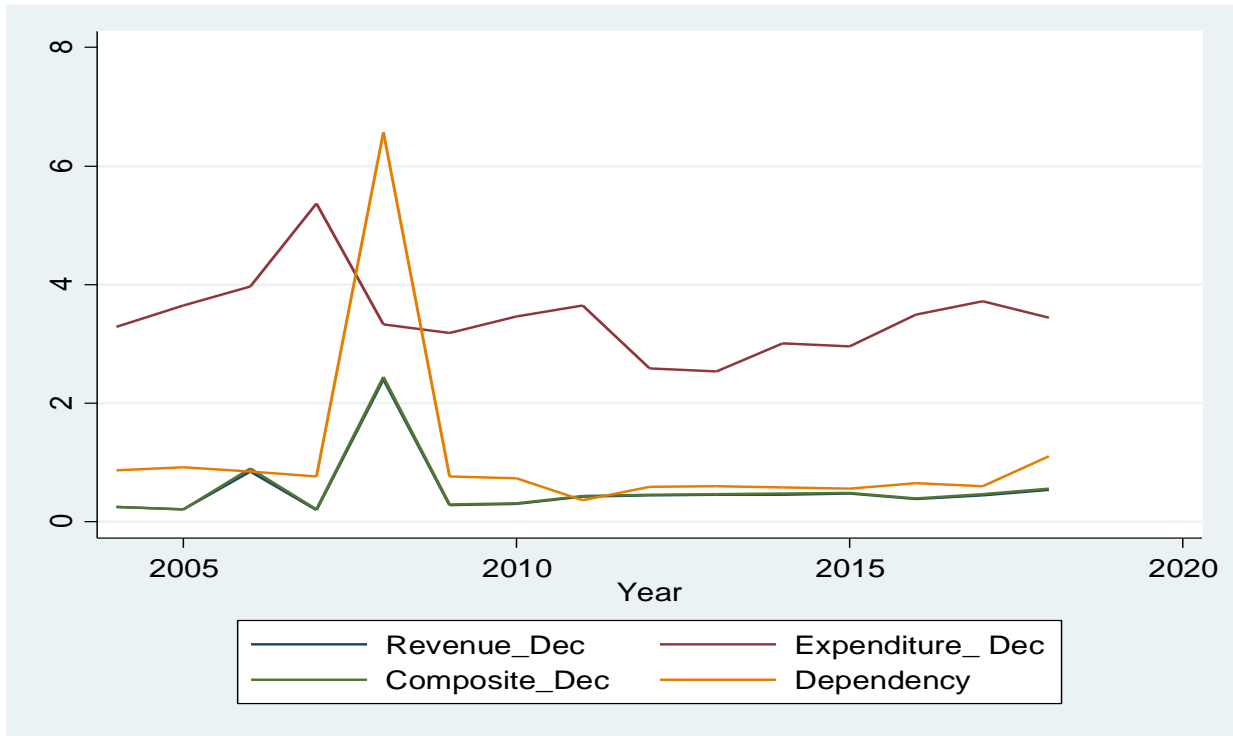
Source: Developed by Authors (2022)

### 6.3. Results and Analysis

### 6.4. Descriptive Statistics

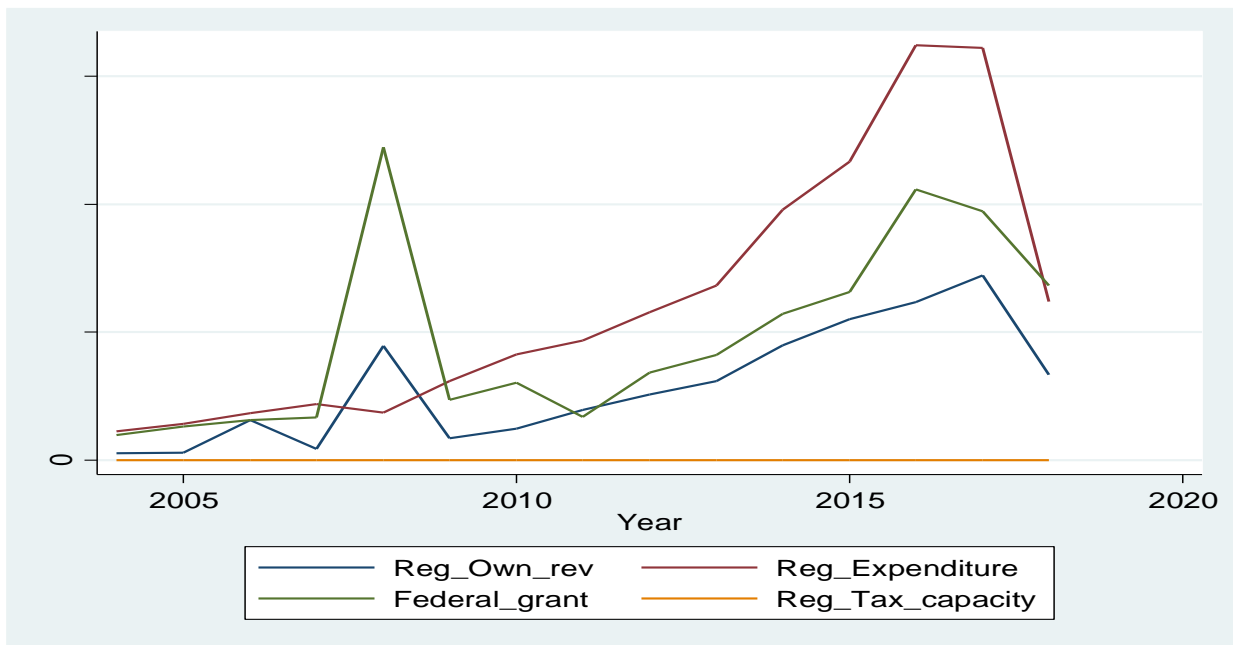
Figure 6.2 shows that the decentralization of revenue is very low relative to expenditure; thus, it shows the SNG's high reliance on federal transfer. Therefore, it implies a high centralization of revenue and a high reliance on the SNG for transfers from the federal government. Figure 6.3 also confirms this condition.

**Figure 6. 2. Trends in the Degree of Fiscal Decentralization**



Source: Authors' Computation (2023)

**Figure 6. 3. Trends of Expenditure, Own Revenue, Grants, and Tax Capacity**



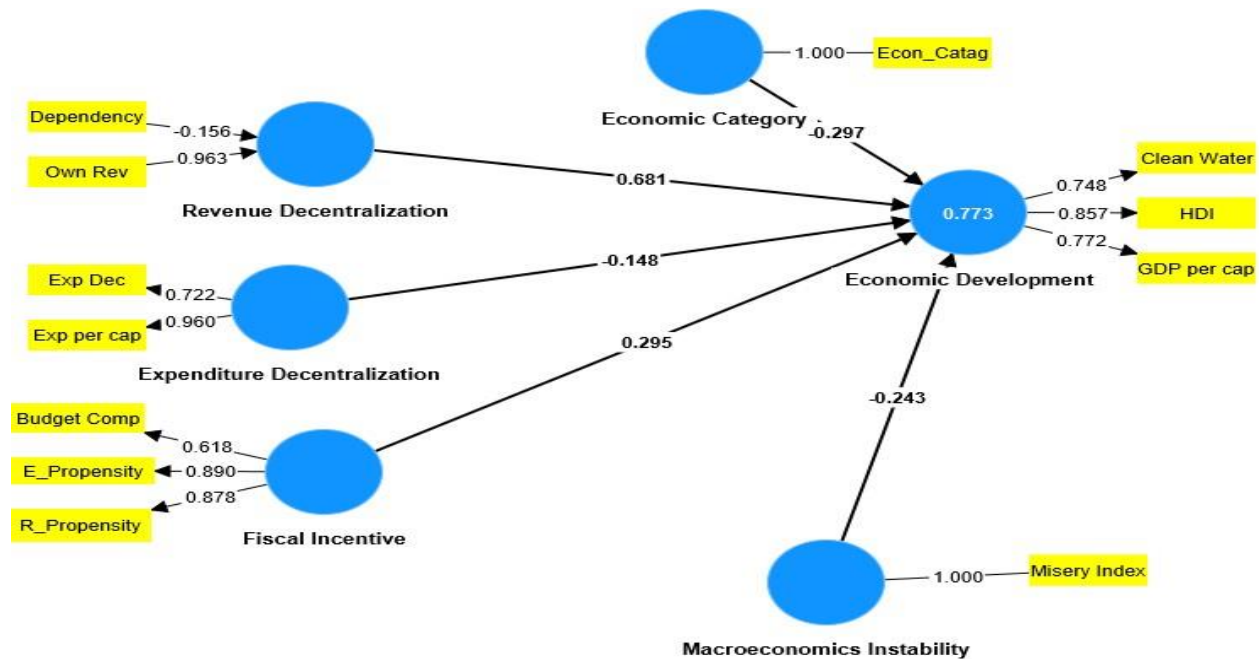
Source: Authors' Computation (2023)

Figure 6.3 also shows that compared to revenue needs change, a high expenditure needs increasingly changes at high speed. Thus, it tells the existence of fiscal disincentives in the regional government, meaning there is a feeble revenue collection motive and a weak link between revenue and expenditure.

## 6.5. Measurement Model Evaluation

Measuring validity is a form of a validity check on the measuring capabilities of latent (unobservable) entities. In PLS-SEM, evaluation of the measurement model comprises specific indicator reliability, internal consistency, discriminant, and convergent validity.

**Figure 6.4. Measurements Model**



Source: Source: PLS-SEM Outputs, 2023

### 6.5.1. Indicators' reliability

Reflective and formative models are the two forms of measuring models. Indicator dependability shows the variance in an item explicated by the construct. Using outer loading values for reflective

Components with less than 0.7 should be eliminated; if the model's objective is exploratory, a loading value exceeding 0.4 is plausible (Hair et al., 2021). When two or more predictors in a model have a high association with one another, this condition is known as multicollinearity. To be free from the collinearity problem, the Variance Inflation Factor (VIF) needs to be  $< 5$  (Hensler et al., 2015).

As shown in Figure 6.4 and Table 6.2, except for the Budget comp item (0.618), all items of the variables have an outer loading above 0.7. Since the loading  $>0.4$  is tolerable for an exploratory study, the study retained the Budget comp indicator, which has an outer loading of 0.618.

**Table 6.2. Inspecting of Construct Indicators**

	Expenditure Decentralization	Revenue Decentralization	Fiscal Incentive	Economic Category	Macroeconomics Instability	Economic Development	VIF	Q <sup>2</sup> Predict
Exp Dec	0.722***						1.334	
Expenditure per capita	0.960***						1.334	
Budget Comp			0.618***				1.236	
E_Propensity			0.890***				1.733	
R_Propensity			0.878***				1.823	
Clean Water						0.748***	1.500	0.304
HDI						0.857***	1.704	0.540
GDP per cap						0.772***	1.264	0.520
Econ_Catag				1.000			1.000	
MI					1.000		1.000	
<b>Outer Weight</b>								
Dependency		-0.156***					1.026	
Own Rev		0.963***					1.026	

Source: PLS-SEM Outputs, 2023

Table 6.2 presented Outer VIF values  $<5$  in the model, suggesting a tolerable multicollinearity requirement level. Thus, the model has no collinearity problems.

### 6.5.2. Construct-Level Reliability

According to Hair et al. (2017), construct-level reliability ensures that items belonging to the same constructs have a strong association. PLS-SEM utilized Cronbach's alpha to gauge internal consistency reliability in the study; however, it inclines to offer a rigid measurement, and composite reliability appraises how successfully the variable was estimated over its specified measures (Hair et al., 2017).

**Table 6.3. Constructs Validity Analysis**

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE	R <sup>2</sup>	Q <sup>2</sup> Predict (LV)
Economic Development	0.707	0.718	0.836	0.630	0.799	0.748
Expenditure Decentralization	0.667	1.070	0.836	0.722		
Fiscal Incentive	0.731	0.813	0.844	0.648		

Source: PLS-SEM Outputs, 2023

As suggested by the literature, Table 6.3 shows all constructs in the study have Cronbach alpha and Composite reliability values  $> 0.7$ ; thus, the study confirmed construct validity.

### 6.5.3. Checking Discriminant Validity

Fornell- Larcker criterion urges that the square root of Average Variance Extracted (AVE) in each construct may verify discriminant validity if this value is higher than other association values among the constructs (Garson, 2016; Hair et al., 2017).

PLS-SEM employed Heterotrait–Monotrait ratios (HTMT) to appraise discriminant validity, the mean score between all item associations across components in contrast to the mean of the average associations for items used to gauge the similar component, the HTMT value should be  $< 0.85$  (Garison, 2016; Hair et al., 2017, 2021).

**Table 6.4. Scrutiny of Discriminant Validity**

Fornell-Larcker criterion					
	Economic Category	Economic Development	Expenditure Decentralization	Fiscal Incentive	Macroeconomics Instability
Economic Category	1.000				
Economic Development	0.145	0,794			
Expenditure Decentralization	0.407	0.441	0.850		
Fiscal Incentive	0.362	0.646	0.494	0.805	
Macroeconomics Instability					
Heterotrait-monotrait ratio (HTMT) – Matrix					
Economic Category					
Economic Development	0.233				
Expenditure Decentralization	0.582	0.628			
Fiscal Incentive	0.454	0.823		0.679	
Macroeconomics Instability	0.051	0.604		0.329	0.225

Source: PLS-SEM Outputs, 2023

Table 6.4 indicated that all the values are <0.85; therefore, the model validated the discriminant validity.

#### **6.5.4. Convergent Validity**

To check convergent validity, which evaluates if the latent constructs are well signified by their manifest (observable) items, the individual construct’s AVE is assessed; the AVE value >0.5 is acceptable (Henseler et al., 2014). Thus, as indicated in Table 6.3, all AVE values exceed the acceptable threshold of 0.5, so convergent validity is confirmed.

#### **6.5.5. Assessing Formative Measurement Model**

All constructs in the model are not mandatory to be reflective measurements; when utilizing a formative measurement model, it is difficult to scrutinize indicator reliability, internal consistency

reliability, or discriminant validity because the formative indicators are not highly associated together (Garison, 2016; Hair et al., 2021). Instead, the research analyzed the outer weight of the constructs, convergent validity, and collinearity.

Since the outer weights are significant, it confirmed the indicators' reliability of the formative construct. Moreover, as presented in Table 6.5, the VIF values among the formative and other constructs in structural paths in the SEM are  $< 5$ , which is a suggested rule of thumb for multicollinearity. Thus, it confirmed convergent validity.

## **6.6. PLS-SEM Structural Model Evaluation**

A structural (inner) regression model connects exogenous variables, moderator factors, and endogenous variables. The inner structural model is shown in Figure 6.5.

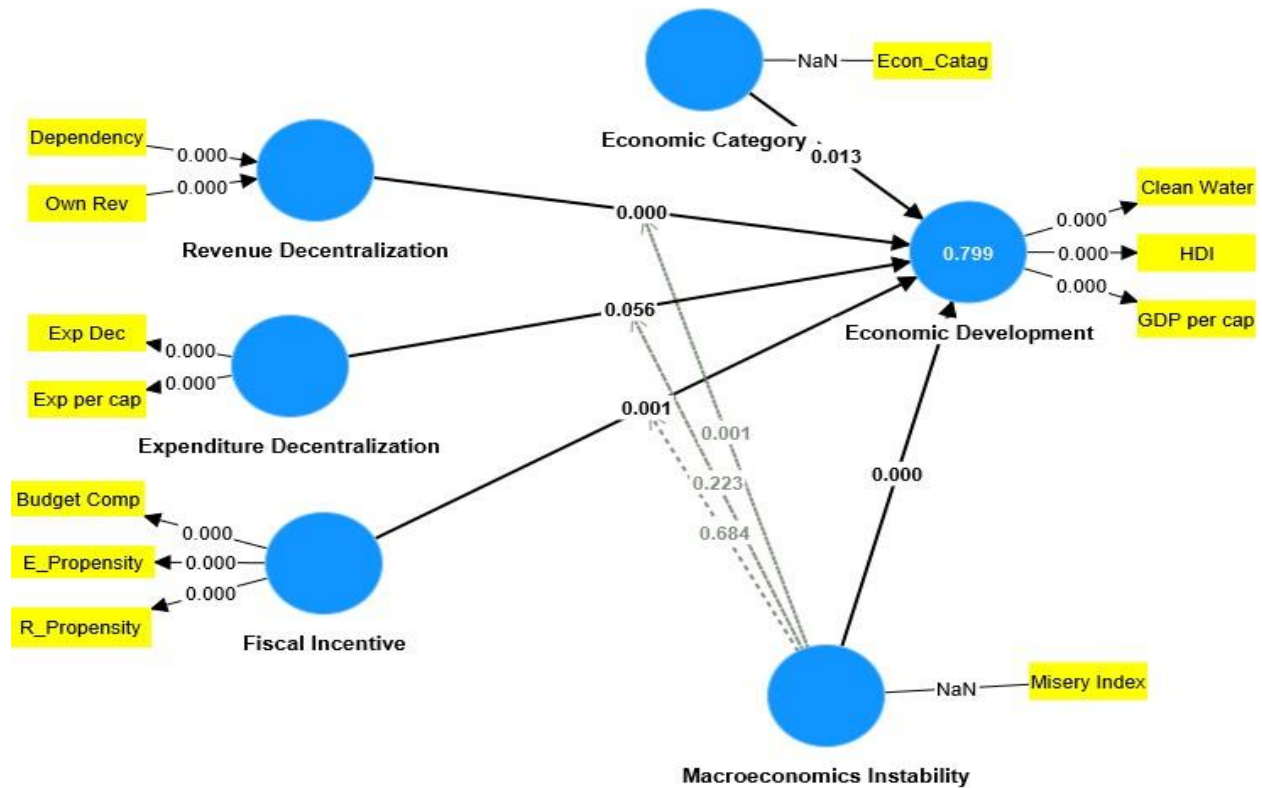
### **6.6.1. Coefficients of the Determinant and Predictive Relevance**

Checking the  $R^2$  value illustrates the overall influence of each endogenous variable and its indicators on the exogenous variable and its indicators in the inner model. A model with coefficients of the determinant ( $R^2$ ) of 0.67, 0.33, and 0.19 is rated as strong, modest, and weak, respectively (Henseler et al., 2014; Garrison, 2016). Table 4 presents the  $R^2 > 0.67$ ; therefore, the  $R^2$  of the model is high. It implies that the model has a highly robust estimating accuracy.

Predictive relevance ( $Q^2$ ) represents the predictive relevance of PLS-SEM. The  $Q^2$  values greater than zero indicate that the SEM has a predictive accuracy for a given dependent variable (Hair et al., 2017, 2021). In contrast, values equal to zero and lower indicate a lack of predictive relevance. Values of  $Q^2 < 0.02$ ,  $0.02 < Q^2 \leq 0.15$ ,  $0.15 > Q^2 \leq 0.35$ , and  $Q^2 > 0.35$  show that exogenous variables have a proportion of minor, average, or substantial predictive accuracy for a given endogenous

variable. Table 6.3 shows that the  $Q^2$  value of the study is 0.748; therefore, the SEM has a higher predictive relevance for the endogenous variable.

**Figure 6.5. Inner (Structural) Model of PLS-SEM**



Source: PLS-SEM Outputs, 2023

### 6.6.2. Assessing Path Coefficients Significance

Inspecting path ( $\beta$ ) coefficients explicates the effect of one construct on other constructs. The bootstrap procedure enables the predicted coefficients to be verified for significance. The technique generates numerous predetermined numbers of bootstrap samples; a 5,000 resample is recommended (Hair et al., 2017).

**Table 6.5. Inspecting Path Coefficients**

Hypotheses	Path Routes	$\beta$ Coff.	Effect Size	Inner VIF	t-statistics	Sig values	Decision
<b>Direct Effects</b>							
<b>H1</b>	Expenditure Decentralization -> Economic Development	-0.207	0.061	3.512	1.908	0.056	Significant
<b>H2</b>	Revenue Decentralization -> Economic Development	0.703	1.018	2.421	9.313	0.000	Significant
<b>H3</b>	Fiscal Incentive -> Economic Development	0.276	0.110	3.449	3.398	0.000	Significant
<b>Moderating Variable Effects</b>							
<b>H4</b>	Macroeconomics Instability x Expenditure Decentralization -> Economic Development	0.100	0.021	4.159	1.218	0.223	Not Significant
<b>H5</b>	Macroeconomics Instability x Revenue Decentralization -> Economic Development	-0.255	0.102	3.200	3.286	0.001	Significant
<b>H6</b>	Macroeconomics Instability x Fiscal Incentive -> Economic Development	0.038	0.002	2.565	0.407	0.684	Not Significant
<b>Control Variable</b>							
	Economic Category-> Economic Development	-0.241	0.050	1.378	2.476	0.013	Significant

Source: PLS-SEM Outputs, 2023

*Notice: The present study considered a 90% level of significance*

Table 6.5 shows that Expenditure decentralization (Significance level= 10%;  $\beta$  = -0.207) has significantly hampered economic development. However, Revenue decentralization (Significance

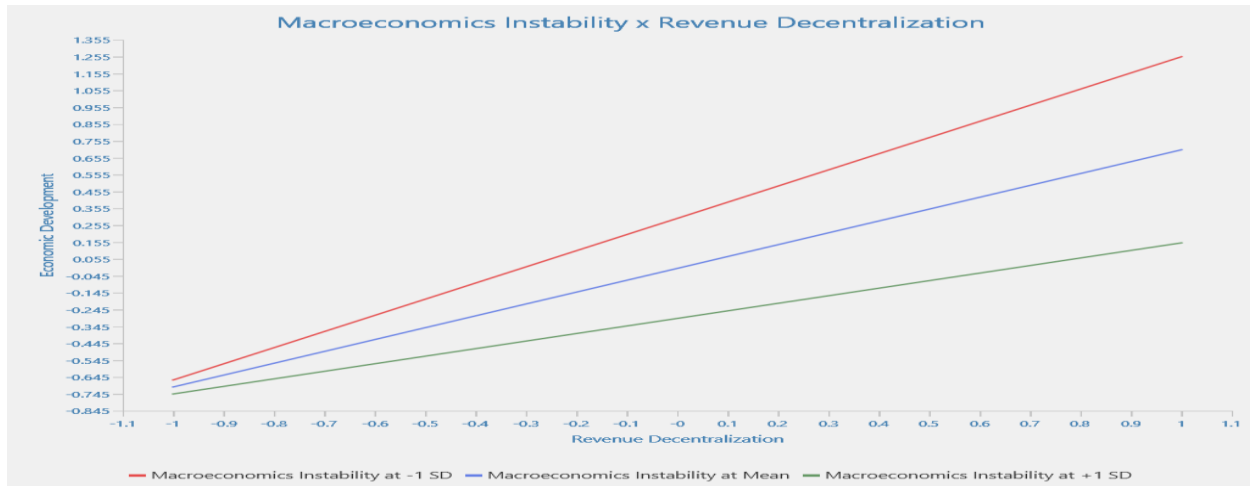
level= 1%;  $\beta = 0.703$ ) and Fiscal incentive (Significance level= 10%;  $\beta = 0.276$ ) significantly boost economic development. Therefore, Hypotheses 1, 2, and 3 are supported.

On the other hand, it is possible to assess the role of a third variable, Z, on the connection between variables X and Y utilizing the analysis of the moderating effect approach. Moderation investigates how an effect happens instead of examining a connection between these other constructs (Hair et al., 2021). A relationship's strength, brittleness, or nature can all be affected by moderators. As presented in Table 6.5, macroeconomic instability (Significance level = 5%;  $\beta = -0.255$ ) significantly moderates the association between Revenue decentralization and Economic development.

This relation becomes weaker when macroeconomic instability increases (i.e., negative interaction effect). Figure 6.6 also displays that the positive link between Revenue decentralization and Economic development was lower when there was a high degree of Macroeconomic instability. Therefore, Hypothesis 5 is supported. However, Hypothesis 4 and 6 are not supported because macroeconomic instability insignificantly moderates the connection between Expenditure decentralization, Fiscal incentive, and Economic Development.

Finally, concerning the control variable, the Economic category (Significance level= 5%;  $\beta = -0.241$ ) has a significant adverse contribution to Economic development. Therefore, SNGs of Ethiopia under the category of Emerging states' economy have low economic development compared to SNGs categorized under Advanced states' economy.

**Figure 6.6. Moderating Effect Graphical Analysis**



Source: PLS-SEM Outputs, 2023

## 6.7. Discussion

The study aims to look into the causal connections between factors related to fiscal federalism and economic development. Besides, it examines the moderating role of Macroeconomic stability on the effect of fiscal federalism on economic development.

The study confirms scholars that showed expenditure decentralization has adversely affected economic growth (Davoodi & Zou, 1998; Rodriguez-Pose & Kroijer, 2009; Rodríguez-Pose & Ezcurra, 2011; Philip & Isah, 2012; Nguyen et al., 2019; Hung & Thanh, 2022; Lechner et al., 2022; Bushashe & Bayiley, 2023a). However, it contradicts studies that showed a positive influence of expenditure decentralization on economic growth (Iimi, 2005; Malik et al., 2006; Su et al., 2014; Liu, 2017; Xiao et al., 2022). It also disagrees with studies that revealed expenditure decentralization insignificantly affects economic growth (e.g., Syamsul, 2003; Blöchliger et al., 2013).

Moreover, the findings do not support those studies that disclose that revenue decentralization significantly hampers economic growth (Malik et al., 2006; Rodríguez-Pose & Ezcurra, 2011; Hung & Thanh, 2022; Bushashe & Bayiley, 2023a). Nevertheless, it has been verified by studies that discovered a significant positive effect (Rodríguez-Pose & Kroijer, 2009; Philip & Isah, 2012; Su et al., 2014; Liu, 2017; Nguyen et al., 2019; Osmani & Tahiri, 2022; Xiao et al., 2022). Moreover, it is odd with studies that proved insignificant contribution of revenue decentralization on economic growth (e.g., Baskaran and Feld, 2012; Blöchliger et al., 2013).

This contradiction could be related to the fact that some research evaluated only one or two variables using a single indicator and missed other crucial features of fiscal federalism. The present study resolved this problem by using the fruits of PLS-SEM, which allows the use of multiple indicators for each variable. Besides, Lin and Liu (2000) and Siliverstovs and Thiessen (2015) verified the study findings on Fiscal incentives, which revealed that fiscal incentives significantly enhance economic growth. Therefore, the current study finding on Revenue decentralization and Fiscal incentive verifies SGFF, which contends that SNGs with higher tax autonomy typically have more incentives to raise their revenue by promoting SNG economic development (Weingast, 2009).

Moreover, though Macroeconomics has no moderating effect on the relation between other variables of fiscal federalism, it has a negative moderating role in the association between revenue decentralization and economic development. Therefore, it weakens the favorable influence of revenue decentralization on economic development. It can be due to many reasons. For instance, the SNGs cannot influence employment rates and prices as they have restricted possession of finances and have restricted openness to economic activity.

On the other hand, the SNGs of Ethiopia fall under two economic categories: Emerging and Advanced regional states. The study utilized the economic category of SNGs as a control variable to improve the statistical robustness. The finding validated that compared to SNGs in advanced economies, SNGs in emerging economies have less developed economies. Furthermore, though the previous studies lack such quality, including moderating and controlling variables simultaneously while running bootstrapping procedures for checking the significance of path coefficients improves the robustness and plausibility of the present study.

## **6.8. Conclusion**

An exhaustive investigation has contributed to the complex linkages between fiscal federalism and economic development, but convincing proof has yet to emerge. Some studies have shown that fiscal federalism negatively influences economic growth, while others have found the opposite result. As a result, the empirical studies are inconclusive and less credible, necessitating further research. Using PLS-SEM, the study analyzed the connection between fiscal federalism and economic development, utilizing data over the years between 2005 and 2018.

Out of the first suggested six hypotheses, the study supported four of them, but the remaining two hypotheses were not significant. The study indicated that revenue decentralization and fiscal incentives positively affect economic development. The finding on expenditure decentralization departs from the expected assumption of FGFF and SGFF. Because of Ethiopia's fiscal federalism, the prime emphasis is developing intergovernmental transfer programs rather than improving decentralized revenue sources. As a result, the SNG spending does not consider its own revenue. It may encourage SNGs to compete for transfer and rampant spending, making expenditure

decentralization hamper economic development. Besides, enhancing citizens' health and education is a precedence as it is a way of achieving continuous development.

The findings exposed that Macroeconomic Instability negatively moderates the indirect influence of Revenue decentralization on economic development. Nevertheless, it showed no effect on the other two fiscal federalism variables effect on Economic development. Moreover, the control variable (i.e., economic category) indicates that SNGs in emerging economies have less economic development than SNGs in advanced economies. It can be due to the divergence between the two SNGs' economic categories in fiscal and institutional capacity.

Fiscal federalism has been implemented within the bounds of political requirements in Ethiopia. The exercise changed the nation's political and economic climate. The ethnic-based political barrier creates administrative, institutional, and political constraints that prevent the country from realizing its full economic potential. It contrasts with a system where resources may readily move across areas. Economically speaking, when ethnicity becomes a factor in political and economic decision-making, agents are forced to operate more in particular locations than others. Investments in other regional states come with particular political concerns.

Furthermore, decentralizing the expenditure side should strongly link with the decentralization of the revenue side. SNGs should rely mainly on their revenue sources instead of intergovernmental transfers. Thus, the federal government should increase the fiscal autonomy of regional state governments. It should also construct a robust control system to hold regional administrations accountable for their spending. The study's shortcomings are as follows: First, obtaining accurate data is challenging since the constitution of Ethiopia merely permits the national government to impose taxes on imports and exports. Therefore, the study computes SNG GDP without taking

into account the trade balance. Future studies can also look into the influence of fiscal federalism on government size, quality, and accountability. The study can also be conducted at other levels of government.

## **CHAPTER SEVEN**

### **7. Fiscal Decentralization and Macroeconomics Stability Nexus**

#### **7.1. Introduction**

Musgrave (1959) divided the three allocation, distribution, and stability tasks under the heading of economic functions of government. The stabilization process involves the maintenance of price stability, fiscal policy, and total demand. The tax and transfer-based distribution function ensure that a certain level of economic efficiency is consistent with moral ideas about the fair allocation of household earnings. The allocation functions focus on producing and providing public goods and services, which the market economy could have produced more effectively.

Fiscal decentralization is affected by the three roles that the government plays. The government's stabilization function is carried out successfully and efficiently at the national level since the subnational government's attempts at stabilization policy are doomed to failure because locally sponsored fiscal policy is likely to benefit regions other than the one funding it. Therefore, the federal government is best for managing those stabilization policies. The stabilization process involves the maintenance of price stability, fiscal policy, and total demand. The SNG is better positioned to provide a policy response than the federal government when macroeconomic shocks are genuinely distributed asymmetrically (Martinez-Vazquez & McNab, 2003). Finally, a change in the revenue distribution to SNG lessens rivalry for financial resources among subnational governments (Thornton, 2007).

SNGs advance pro-cyclical fiscal policies as they compete for resources, destabilizing national fiscal policy objectives. According to the theory, the central government should stabilize the economy because of four crucial factors: First, a problem may occur when granting the SNG

independent authority over its money supply. Second, the local economy is primarily free; hence local fiscal policy has an adverse effect. Thirdly, deficit financing is viewed as inappropriate locally due to repayment-related issues requiring large intergovernmental transfers (IGT) of actual revenue to creditors based elsewhere than the jurisdictions of debtors. Fourthly, the types of revenue that local governments appeared to find acceptable tended to be inelastic in revenue, which limited their ability to implement the appropriate fiscal policy.

Expansionary or "loose" fiscal policy is defined as one that directly boosts aggregate demand through an increase in government spending. On the other hand, fiscal policy is frequently regarded as contractionary or "tight" if it lowers demand through lower spending. It impacts a region where fiscal decentralization can widen vertical imbalances, making SNG more dependent on IGT (Guo et al., 2022). Therefore, giving rise to the negative effect of decentralization, there is a gap in job search rates (Mergele & Weber, 2020). Increased government spending can increase aggregate demand, tighten the job market, and reduce unemployment, whereas increased government spending can reduce the risk of more unemployment (Albertini, Auray, Bouakez, & Eyquem, 2021).

## **7.2. Model Specification and Estimation Procedures**

The lagged levels of explanatory variables are inadequate instruments for the first difference equation; Blundell and Bond (1998, 2000) recommend using two-step system GMM estimators because they produce consistent estimates in the presence of a lagged dependent variable and correct the residuals for Heteroscedasticity. The loss of significant observations similarly impacts the first-differences GMM estimation. In these situations, first-differences GMM estimation is

expected to perform poorly and needs better finite sample characteristics (bias and imprecision). Instead, Arellano and Bover (1995) suggested a system GMM estimator.

The system GMM estimator combines the standard set of first differences equations with an additional set of levels equations. Equation 1 expressed the system GMM model of the present study:

$$MI_{it} = f(FD_{it}, X_{it}, C_{it}, \mu_{it}) \dots\dots\dots (1)$$

Where FD is fiscal decentralization, Misery Index (MI) measured macroeconomic stability,  $X_{it}$  and  $C_{it}$  represent explanatory and control variables of the cross-section in t time, and  $\mu_{it}$  is the error term, respectively. The i and t represent countries and years, respectively. Fiscal decentralization is measured in four ways: revenue decentralization, fiscal dependency, expenditure decentralization, and composite decentralization. Equations 2, 3, 4, and 5 provide the system GMM models for the four fiscal decentralization indicators.

$$MI_{it} = \beta_0 + \delta(MI_{it-1}) + \beta_1(Rev\ Dec_{it}) + \beta_2(FDI_{it}) + \beta_3(Popgr_{it}) + \beta_4(Unemp_{it}) + \beta_5(Welfare_{it}) + \beta_6(Public\ inv_{it}) + \beta_7(Enrollment_{it}) + \beta_8(RGDPgr_{it}) + \mu_{it} \dots\dots\dots (2)$$

$$MI_{it} = \beta_0 + \delta(MI_{it-1}) + \beta_1(Dependency_{it}) + \beta_2(FDI_{it}) + \beta_3(Popgr_{it}) + \beta_4(Unemp_{it}) + \beta_5(Welfare_{it}) + \beta_6(Public\ inv_{it}) + \beta_7(Enrollment_{it}) + \beta_8(RGDPgr_{it}) + \mu_{it} \dots\dots\dots (3)$$

$$MI_{it} = \beta_0 + \delta(MI_{it-1}) + \beta_1(Exp\ Dec_{it}) + \beta_2(FDI_{it}) + \beta_3(Popgr_{it}) + \beta_4(Unemp_{it}) + \beta_5(Welfare_{it}) + \beta_6(Public\ inv_{it}) + \beta_7(Enrollment_{it}) + \beta_8(RGDPgr_{it}) + \mu_{it} \dots\dots\dots (4)$$

$$MI_{it} = \beta_0 + \delta(MI_{it-1}) + \beta_1(Comp\ Dec_{it}) + \beta_2(FDI_{it}) + \beta_3(Popgr_{it}) + \beta_4(Unemp_{it}) + \beta_5(Welfare_{it}) + \beta_6(Public\ inv_{it}) + \beta_7(Enrollment_{it}) + \beta_8(RGDPgr_{it}) + \mu_{it} \dots\dots\dots (5)$$

### **7.3. Research Variables**

The present study considered several significant elements while defining and developing an empirical model. The following sub-sections present dependent, independent, and control variables used in the study.

#### **7.3.1. Dependent Variable**

There are various definitions of macroeconomic stability in literature. For instance, price stability measures macroeconomic stability, which uses inflation as a proxy (Treisman, 2000; King & Ma, 2001; Neyapti, 2004; Shah, 2006; Thornton, 2007). Iqbal and Nawaz (2010) and Martinez-Vazquez and McNab (2006) propose utilizing the Misery Index (MI), which blends unemployment and inflation, as a proxy for gauging macroeconomic stability. The study used MI to quantify macroeconomic stability, like prior studies.

#### **7.3.2. Independent and Control Variables**

Independent variables were chosen for this inquiry depending on how theoretically related they were to the Dependent Variable. The study used revenue, expenditure, composite decentralization, and fiscal dependency as explanatory variables for macroeconomic stability. Additionally, the study used control variables such as Foreign Direct Investment (FDI), public investment (Public inv), population growth rate (Popgr), and unemployment rate. Welfare, School enrollment, and Regional Gross Domestic Product growth rate (RGDPgr).

**Table 7.1. Research Variables**

<b>Variables</b>	<b>Operational Definitions</b>	<b>Computed</b>	<b>Expected Sign</b>
<b>Dependent Variable</b>			
Macroeconomics Stability (MI)	It is the predictability of domestic economic conditions.	Misery Index (MI) = <i>Inflation rate</i> + <i>Unemployment rate</i>	+/-
<b>Independent Variables</b>			
Expenditure decentralization (Exp Dec)	It is the regional government's expenditure autonomy for their assigned responsibility.	Exp Dec= SNG expenditures/Federal government expenditures	+/-
Fiscal Dependency	It is the SNG's reliance on federal grants.	Dependency = <i>Federal grant/Total SNG expenditure.</i>	+/-
Revenue Decentralization (Rev Dec)	It is the magnitude of regional government revenue autonomy to cover their expenses from their revenue share and the level of dependency on the federal grants.	Rev Dec= <i>SNG own revenues/Total SNG revenues</i>	+/-
Composite Decentralization (Comp Dec)	It is a combined effect of expenditure and revenue decentralization.	Comp Dec= <i>Rev Dec/1-Exp Dec</i>	+/-
<b>Control Variables</b>			
Foreign Direct Investment (FDI)	Foreign direct investment (FDI) is international capital flows linked to companies in which a foreign investor gets a controlling position.	FDI= <i>FDI/GDP</i>	+/-
Population Growth Rate (POPgr)	It is the annual growth rate of the population	POPgr= <i>%change in population/initial year population</i>	+/-
Unemployment Rate (Unemp)		Unemp = <i>Annual %change in total unemployment in SNG</i>	+
Welfare	It is the provision of service for social well-being and development.	Welfare= <i>annual SNG social development expenditure per capita</i>	+/-

Public investment (Public inv)	It is a productive investment of SNG.	Public inv= <i>annual SNG Economic development expenditure per capita</i>	+/-
School Enrollment	It is the access of children to primary education.	Enrollment= <i>% of Children that have access to primary education</i>	+/-
Regional Gross Domestic Product Growth Rate (GDP)	It is the annual economic growth rate of SNG.	GDPgr = <i>%change in GDP/Base year RGDP</i>	+/-

Source: Developed by Researcher (2020)

## 7.4. Empirical Analysis

## 7.5. Descriptive Statistics

As presented in Table 7.2, the average value of MI is 2.9428, with a minimum value of 1.361 and a maximum value of 3.761. The mean and standard deviations of independent and control variables are presented as follows, regarding explanatory variables, Rev Dec (Mean= 0.518; Std. Dev= 2.184), Exp Dec (Mean= 3.103; Std. Dev= 3.42), Fiscal Dependency (Mean= 0.22; Std. Dev= 0,222), and Comp Dec (Mean= 0.354; Std. Dev= 1.478). Besides, regarding the control variables, FDI (Mean= 1.422; Std. Dev= 1.456), POPgr (Mean= 2.819; Std. Dev= 0.066), unemployment rate (Mean= 7.843; Std. Dev= 1.316), Welfare (Mean= 4.862; Std. Dev= 1.679), Public inv (Mean= 1.036; Std. Dev= 0.23), Enrollment (Mean= 4.467 Std. Dev= 0.427), and GDP (Mean= 22.741; Std. Dev= 1.812).

**Table 7.2. Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
MI	140	2.9428	.3968	1.361	3.761
Rev Dec	140	.518	2.184	.066	26.052
Exp Dec	140	3.103	3.422	.003	16.2
Dependency	140	.22	.222	0	1.421
Comp Dec	140	.958	1.112	.037	4.304
FDI	140	1.422	1.456	.109	4.143
POP Gr	140	2.819	.066	2.71	2.89

Unemp	140	7.843	1.316	4.70	11.196
Welfare	140	4.862	1.679	.588	7.968
Public Inv	140	1.036	.023	.997	1.061
Enrollment	140	4.467	.424	3.04	5.201
GDP	140	22.741	1.812	18.653	25.965

Source: Study Panel Data (2005—2018)

Log transformation is a technique to reduce data variability, particularly in data sets that contain outlying observations (Feng, Wang, Lu & Tu, 2012). Additionally, using the logarithm of variables improves the model's fit by transforming the distribution features (Feng et al., 2012). Since Misery Index (MI) is not fulfilling the normality assumption, the study used a log-transformed variable of MI and alleviated the normality issues. Since it is essential to analyze the data, all variables in the study have a normal distribution (See Table A 7-1 in the Appendix). Moreover, the variables have no multicollinearity issues (See Table A 7-2 in the Appendix).

Finally, the study investigated the effect of fiscal federalization on macroeconomic stability. There are many ways to measure macroeconomic stability; however, in this paper, macroeconomic stability is the summation of unemployment and inflation rate, i.e., MI. The study made cross-sectional comparisons using a trend analysis graph of each SNG's inflation and unemployment rate. The graphs showed that for each SNGs, unemployment and inflation rates have been increasing without any significant divergence from other SNG (See Graph A 7-1 in the Appendix).

### **7.5.1. Unemployment and Inflation Rate of Regions**

Decentralization can reduce or escalate the inflation rate and unemployment depending on the economic activities and policies of SNGs. It can control inflation by providing public goods at stable prices and reducing prices by innovating a better production method. Besides, it can reduce unemployment by enhancing job opportunities and preserving a conducive environment for

investment, making private enterprises flourish in the regions. Therefore, the activities of SNGs play a crucial role in determining inflation and unemployment rate.

As presented in Table 7.3, considering each Region's 14 years average unemployment rate, their rank from the highest to the lowest are Dire Dawa, Harari, Afar, Somalia, SNNP, Amhara, Gambela, Benishangul, Oromia, and Tigray, respectively. Similarly, concerning the Inflation rate, they are ranked SNNP, Somalia, Amhara, Oromia, Afar, Harari, Gambela, Dire Dawa, Tigray, and Benishangul, respectively (See Table 7.3).

**Table 7.3. Summary of Unemployment and Inflation Rate of Each Region**

Variable	Obs	Mean	Std.Dev.	Min	Max
<b>Tigray (Region = 1)</b>					
Unemp	14	6.928	1.483	4.701	9.085
Inflation	14	11.834	8.597	0	28.924
<b>Afar (Region = 2)</b>					
Unemp	14	8.281	1.055	6.532	9.646
Inflation	14	12.761	5.851	2.357	22.560
<b>Amhara (Region = 3)</b>					
Unemp	14	7.717	1.440	5.674	11.196
Inflation	14	12.870	7.443	0.724	25.777
<b>Oromia (Region = 4).</b>					
Unemp	14	7.129	1.226	5.383	8.954
Inflation	14	12.833	8.482	1.113	28.146
<b>Somalia (Region = 5)</b>					
Unemp	14	7.788	0.993	5.796	9.488
Inflation	14	12.885	7.129	6.261	30.630
<b>Benshangul/Gumuz (Region = 6)</b>					

Unemp	14	7.441	0.800	6.283	8.644
Inflation	14	3.118	21.125	-45.140	30.408
<b>Southern Nations, Nationalities, and Peoples (SNNP) (Region = 7)</b>					
Unemp	14	7.950	1.170	5.965	9.927
Inflation	14	13.222	8.108	3.867	27.833
<b>Gambela (Region = 8)</b>					
Unemp	14	7.545	0.839	6.111	8.581
Inflation	14	12.315	10.508	-3.394	35.965
<b>Harari (Region = 9)</b>					
Unemp	14	8.329	1.574	5.797	10.622
Inflation	14	12.391	7.344	1.083	29.794
<b>Dire Dawa City Administration (Region = 10)</b>					
Unemp	14	9.327	0.943	7.316	10.672
Inflation	14	12.054	6.367	2.953	25.018

Source: Study Panel Data (2005—2018)

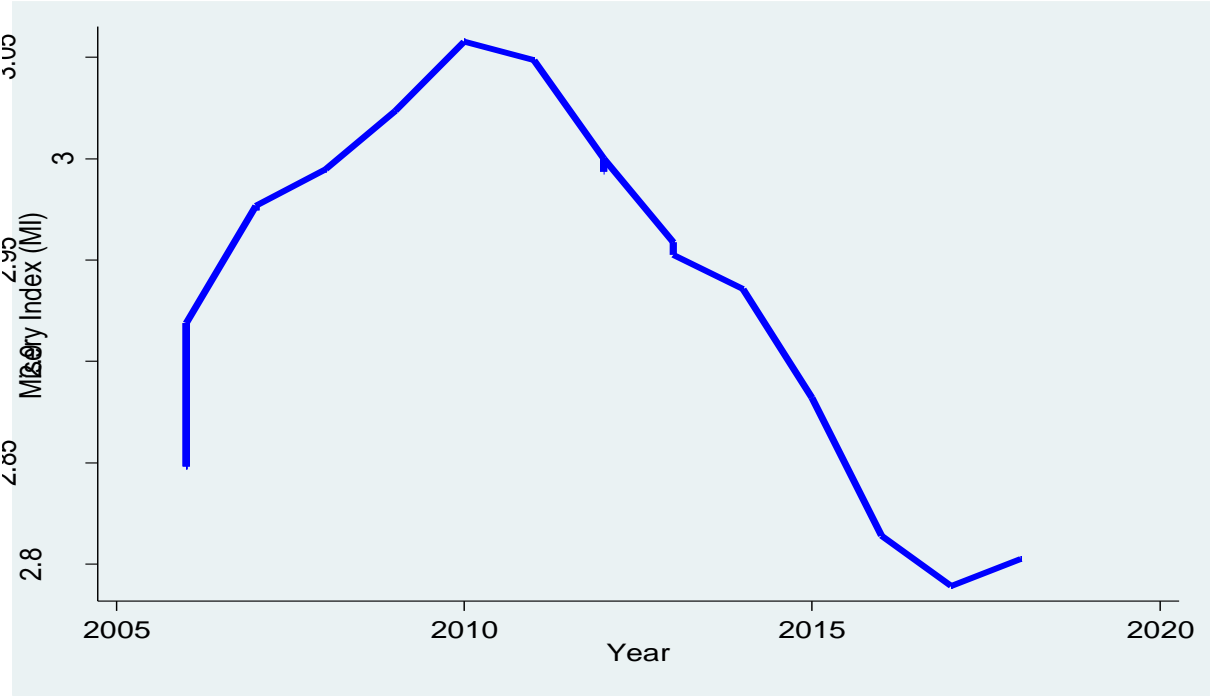
### 7.5.2. Misery Index (MI)

Arthur Okun defined the MI, and it has been further extended by others, assuming that higher rates of MI generate essential economic and social shocking difficulties. The MI is a mixture of the unweighted sum of unemployment and the inflation rate, which indicates the macroeconomic condition of various countries or regions within a single country. Therefore, MI is used to measure the welfare of the economy. An increase in the MI shows the commonness of a country's deteriorated economic and public well-being. In this context, the MI is used to measure economic well-being, which shows the condition of a country. There is an average difference between data points; as a result, a spike occurs in Graph 1 and other graphs.

Different graphs can be used in data analysis because each kind is best for particular purposes. Lowess smoothing graphical technique is non-parametric because it does not assume any specific form for the underlying trend; this makes it flexible and adaptable to different types of data and patterns (Cleveland, 1981; Wilcox, 2017). Therefore, to avoid spikes and improve the quality of the graphs, the study utilized the lowess smoothing technique to draw all graphs.

As Figure 7.1 demonstrates, the MI of the SNGs of Ethiopia is not stable over time. It indicates the fluctuation in the deterioration of the economic and public well-being of SNGs. Besides, the MI of each SNG is also unstable over time (See Graph A 7-2 in the Appendix).

**Figure 7.1. The Overall Trends of Misery Index (MI)**



Source: Study Panel Data (2005—2018)

## 7.6. Panel Data Unit Root Test

Recent literature advocates that panel-based unit root tests have higher power than the unit root test based on individual time. A panel unit root test was conducted to investigate whether any variables in the model were non-stationary; it helps avoid spurious results. Panel unit root tests that researchers commonly use are Levin, Lin, and Chu (2002), Breitung (n.d.), Im, Pesaran, and Shin (2003), and the Fisher-Type test. The LLC test performs better when the time and cross-sectional dimensions are small. Therefore, the present study relied on the LLC test, which suggests the following hypotheses:

Ho: Each time series contains a unit root

Ha: Each time series is stationary

**Table 7.3. Unit-root Test**

Variable	Levin-Lin-Chu Test			
	Level	Unadjusted t value.	Adjusted t value.	P value.
MI	0	-5.6498	-3.2484	0.000***
Rev Dec	0	-6.7768	-3.1627	0.000***
Exp Dec	0	-7.0491	-3.8524	0.000***
Dependency	0	-6.7768	-3.1627	0.000***
Comp Dec	0	-4.6285	-1.7234	.0.042**
FDI	0	-15.7518	-12.5139	0.000***
POP Gr	0	-6.1735	-2.6206	0.004***
Unemp	0	-7.3518	-3.8245	0.000***
Welfare	0	-5.0189	-3.5200	0.000***
Public Inv	0	-6.7318	-5.8066	0.000***
Enrollment	0	-4.3574	-2.6042	0.004***
GDP	0	-16.5183	-10.3301	0.000***

Source: Study Panel Data (2005—2018)

\*\*\*p < 0.01, \*\* p < 0.05, \* p < 0.1 implies statistically significant at 1%, 5% and 10% level respectively

Table 7.4 revealed that the LLC test rejects the null hypothesis; therefore, all variables stationary at level (0). Besides, except Comp Dec, which is significant at a 5% level, all other variables are statistically significant at a 1% significance level.

## 7.7. Revenue Decentralization and Macroeconomics Stability

The study's first objective is to measure the effect of revenue decentralization on macroeconomic stability. Table 7.5 presents the Chi square-test statistics indicating the model's goodness-of-fit—the Sargan test for the validity of the robustness of instruments in the GMM estimations. The second-order autocorrelation rejected through AR (2) test indicates no second-order autocorrelation.

**Table 7.4. Effect of Revenue Decentralization on Macroeconomics Stability**

MI	Coef.	St. Err.	t value	p-value
Lag of MI	-.846	.354	-2.39	.017**
Rev Dec	-.505	.278	-1.82	.069*
FDI	.486	.207	2.35	.019**
POP Gr	5.605	1.934	2.90	.004***
Unemp	7.581	2.474	3.06	.002***
Welfare	.195	.064	3.06	.002***
Public Inv	.039	.023	1.68	.094*
Enrollment	-7.49	2.724	-2.75	.006***
GDP	-.075	.039	-1.92	.055*
Constant	6.502	3.357	1.94	.053
Number of observations		109		
		AR (2) test	Z=-.64683	0.5177
Sargan Test of Overid. Restrictions		Chi2 (19)	5.10e-16	.999
Model test		Wald chi2(9)	27.35***	.001

Source: Study Panel Data (2005—2018)

\*\*\*p < 0.01, \*\* p < 0.05, \* p < 0.1 implies statistically significant at 1%, 5% and 10% level respectively.

As presented in Table 7.5, lags of MI ( $P=0.017$ ;  $\beta = -0.846$ ), revenue decentralization ( $P=0.069^*$ ;  $\beta = -0.505$ ), Enrolment ( $P=0.006$ ;  $\beta = -7.49$ ) and GDP ( $P=0.055$ ;  $\beta = 0.075$ ) have significant negative effect on macroeconomic stability. It indicates that an increase in these variables reduces macroeconomic instability. On the other hand, FDI ( $P=0.019$ ;  $\beta = 0.486$ ), POPgr ( $P=0.004$ ;  $\beta = 5.605$ ), Unemp rate ( $P=0.002$ ;  $\beta = 7.581$ ), and Welfare ( $P=0.002$ ;  $\beta = 0.195$ ), and Public inv ( $P=0.094$ ;  $\beta = 0.039$ ), have a statistically significant positive effect on macroeconomic stability. It implies that an increase in these variables escalates macroeconomic instability.

## 7.8. Fiscal Dependency and Macroeconomic Stability

The study's second objective is to examine the effects of fiscal dependency on macroeconomic stability. As shown in Table 7.6, the AR (2) test showed the absence of second-order autocorrelation. The over-identifying of the Sargan test showed that the instruments are valid, and the Chi-square test revealed that the model is appropriate.

**Table 7.5. Effect of Fiscal Dependency on Macroeconomics Stability**

MI	Coef.	St. Err.	t value	p-value
Lag of MI	-.757	.314	-2.41	.016**
Dependency	.085	.041	2.08	.038**
FDI	.294	.165	1.79	.074*
POP Gr	3.181	1.784	1.78	.075*
Unemp	5.97	2.075	2.88	.004***
Welfare	.143	.05	2.86	.004***
Public Inv	.015	.021	0.72	.474
Enrollment	-5.115	2.144	-2.39	.017**
GDP	.019	.029	0.65	.513
Constant	3.843	2.391	1.61	.108
Number of observations		109		
		AR (2) test	Z=-.58104	0.5612

Sargan Test of Overid. Restrictions	Chi2 (19)	4.43e-18	.998
Model test	Wald chi2(9)	920.34***	.000

Source: Study Panel Data (2005—2018)

As presented in Table 7.6, the lags of MI ( $P=0.016$ ;  $\beta = -0.757$ ) and Enrolment ( $P=0.017$ ;  $\beta = -5.115$ ) negatively affect macroeconomic stability. It indicates that an increase in these variables reduces macroeconomic instability. On the other hand, Dependency ( $P=0.038$ ;  $\beta = 0.85$ ), FDI ( $P=0.074$ ;  $\beta = 0.294$ ), POPgr ( $P=0.075$ ;  $\beta = 3.181$ ), Unemp rate ( $P=0.004$ ;  $\beta = 5.97$ ) and Welfare ( $P=0.004$ ;  $\beta = 0.143$ ) have a statistically significant positive effect on macroeconomic stability. It implies that an increase in these variables escalates macroeconomic instability. However, Public inv and GDP have no significant effect on macroeconomic stability.

## 7.9. Expenditure Decentralization and Macroeconomic Stability

Examining the effects of expenditure decentralization on macroeconomic stability is the third objective of the study. Table 7.7 presented the absence of second-order autocorrelation, and the Sargan test showed that the instruments used in the study are valid. Besides, the Chi-square test confirmed the appropriateness of the model.

Lag-dependent variables (LDV) have been used in regression analysis to provide robust estimates of the effects of independent variables. In empirical work, the coefficient of the LDV may be slightly over one but not substantially different from 1. It might be a feature of the data and is not a guarantee that something needs to be corrected. Serious questions about the proper specification of the model or estimator are raised when the coefficient estimates for the LDV are (much) bigger than 1. In such circumstances, researchers advise reducing instruments (either by limiting instrument lags or employing collapsed instruments). However, in the present study, some of the lag values of MI are not significantly greater than 1. Therefore, it could not be a problem.

**Table 7.6. Effect of Expenditure Decentralization on Macroeconomics****Stability**

MI	Coef.	St. Err.	t value	p-value
Lag of MI	-1.091	.447	-2.44	.015**
Exp Dec	2.392	1.22	1.96	.05**
FDI	.773	.308	2.51	.012**
POP Gr	9.88	3.628	2.72	.006***
Unemp	13.75	4.741	2.90	.004***
Welfare	.31	.1	3.10	.002***
Public Inv	.039	.022	1.72	.085*
Enrollment	-12.74	4.806	-2.65	.008***
GDP	-.166	.095	-1.75	.08*
Constant	-2.449	1.791	-1.37	.171
Number of observations		109		
		AR (2) test	Z=-.27875	.7804
Sargan Test of Overid. Restrictions		Chi2 (19)	2.07e-16	.999
Model test		Wald chi2(9)	191.79***	.000

Source: Study Panel Data (2005—2018)

As presented in Table 7.7, lags of MI ( $P= 0.015$ ;  $\beta = -1.091$ ), Enrolment ( $P= 0.008$ ;  $\beta = -12.74$ ), and GDP ( $P=0.08$ ;  $\beta = -0.166$ ) have a significant adverse effect on macroeconomic stability. It indicates that an increase in these variables reduces macroeconomic instability. On the other hand, Exp Dec ( $P=0.05$ ;  $\beta = 2.392$ ), FDI ( $P=0.012$ ;  $\beta = 0.773$ ), POPgr ( $P=0.006$ ;  $\beta = 9.88$ ), Unemp rate ( $P=0.004$ ;  $\beta = 13.75$ ) and Welfare ( $P=0.002$ ;  $\beta = 0.31$ ), and Public inv ( $P=0.085$ ;  $\beta = 0.039$ ) have a statistically significant positive effect on macroeconomic stability. It implies that an increase in these variables escalates macroeconomic instability.

## 7.10. Composite Decentralization and Macroeconomics Stability

The final objective of the study is to investigate the effects of composite decentralization on macroeconomic stability. As shown in Table 7.8, the AR (2) test disclosed no second-order autocorrelation. Moreover, Sargan and the Chi square-test statistics confirmed the validity of the instruments and the model, respectively.

**Table 7. 7. Effect of Composite Decentralization on Macroeconomics Stability**

MI	Coef.	St. Err.	t value	p-value
Lag of MI	-1.065	.426	-2.50	.012**
Comp Dec	-.702	.339	-2.07	.038**
FDI	.194	.156	1.24	.214
POP Gr	3.21	1.803	1.78	.075*
Unemp	5.28	2.001	2.64	.008***
Welfare	.153	.05	3.04	.002***
Public Inv	.057	.028	2.03	.042**
Enrollment	-4.24	2.037	-2.08	.037**
GDP	.006	.026	0.22	.828
Constant	3.66	2.226	1.64	.10
Number of observations		109		
		AR (2) test	Z=-1.0535	0.2921
Sargan Test of Overid. Restrictions		Chi2 (19)	4.74e-18	.997
Model test		Wald chi2(9)	611.57***	.000

Source: Study Panel Data (2005—2018)

As presented in Table 7.8, lags of MI ( $P= 0.012$ ;  $\beta = -1.065$ ), composite decentralization ( $P= 0.038$ ;  $\beta = -0.702$ ), and Enrolment ( $P= 0.037$ ;  $\beta = -4.49$ ) has a significant negative effect on macroeconomic stability. It indicates that an increase in these variables reduces macroeconomic instability. On the other hand, FDI ( $P=0.019$ ;  $\beta = 0.486$ ), POPgr ( $P=0.004$ ;  $\beta = 5.605$ ), Unemp rate ( $P=0.008$ ;  $\beta = 5.28$ ), and Welfare ( $P=0.002$ ;  $\beta = 0.153$ ), and Public inv ( $P=0.042$ ;  $\beta = 0.057$ ) have

a statistically significant positive effect on macroeconomic stability. It implies that an increase in these variables escalates macroeconomic instability.

## **7.11. Discussion**

While fiscal decentralization and macroeconomic stability nexus remain an ongoing research interest, empirical results still need to be conclusive, with positive and negative outcomes spanning different strands of the literature. Therefore, the study examined the cause-effect relationship between fiscal decentralization variables and macroeconomic stability.

Regarding the lag-dependent variables, the study findings showed that the lag of MI for all GMM models' estimations has a statistically significant negative effect on MI; this signals that every previous year's macroeconomic stability enhances the recent year's stability status. The findings support studies highlighting the significant positive effect of expenditure decentralization on macroeconomic stability (Treisman, 2000; Marinez & McNab, 2006; Palienko et al., 2017; Bojanic, 2018). However, it opposed studies that found expenditure decentralization negatively affects macroeconomic stability (Makreshanska & Petroski, 2015; Jaliel et al., 2012; Ali & Batool, 2017; Sheikh et al., 2020; Lago-Peñas et al., 2019; Ahmad et al., 2022; Maryanti et al., 2022). It is further inconsistent with studies that exhibited an insignificant revenue effect on macroeconomic stability.

The study finding of the study validates studies that found a negative effect of revenue decentralization on macroeconomic stability (King & Ma, 2001; Neyapti, 2004; Iqbal & Nawaz, 2010; Jaliel et al., 2012; Ali & Batool, 2017; Ahmad et al., 2022; Maryanti et al., 2022). Nonetheless, it disagrees with the study that found a positive effect of revenue decentralization on macroeconomic stability (Okonkwo & Godslov, 2015; Makreshanska & Petrevski, 2015; Palienko et al., 2017; Osmani & Tahiri (2022)). Moreover, it contradicts studies that showed revenue

decentralization has no significant effect on macroeconomic stability (Shaha, 2006; Thornton, 2007; Palienko et al., 2017). On the other hand, the study finding agrees with Okonkwo and Godslov (2015) and Rauf et al. (2020), who revealed that fiscal dependency positively affects macroeconomic stability.

Furthermore, regarding the control variables, the study agrees with Bojanic (2018), who found that FDI positively affects macroeconomic stability. The study's finding disagrees with this studies that showed a positive effect of GDP per capita on macroeconomic stability (Ali & Batool, 2017; Bojanic (2018), indicating that economic growth adversely affects macroeconomic stability. On the other hand, the study found that government expenditure for social welfare adversely destabilizes macroeconomics. This rising expenditure reduces resources that can help to foster human capital and infrastructure, bringing macroeconomic instability.

The study found an adverse effect of public investment on macroeconomic stability. It is because policies that increase aggregate expenditure will raise prices, leading to economic instability. Though the study finding is consistent with Ali and Batool (2017), it disagrees with Adindu & Ugondah (2021) and Maryanti et al. (2022) studies that revealed a negative effect of capital expenditure on macroeconomic stability, indicating that public investment is preserving macroeconomic stability. However, it contradicts studies that found a negative effect of investment on macroeconomic stability (Iqbal & Nawaz, 2010; Okonkwo & Godslov, 2015). Regarding the unemployment rate, the study finding is consistent with Ali and Batool (2017), which found that unemployment rates fuel macroeconomic instability.

On the other hand, population growth failed to bring macroeconomic stability to Ethiopia. A conceivable explanation can be that high population growth engenders a growth in demand,

increasing the burden on infrastructure, which causes a decrease in production, and therefore prices and unemployment rise. The study finding is consistent with Palienko et al. (2017), Rauf et al. (2020), and Osmani & Tahiri (2022) studies that found population growth adversely affects macroeconomic stability. However, it contradicts Iqbal and Nawaz (2010), who found an insignificant effect. The study finding is consistent with Dadgar & Nazari (2018), who found a negative effect of GDP on the MI. Moreover, the study contradicts Palienko et al. (2017), who found that GDP has no significant effect on MI. Finally, the finding contradicts Osmani & Tahiri (2022), who found that education aggravates macroeconomic instability.

In summary, the study findings suggest that the fiscal decentralization of Ethiopia does not generate settings to obstruct macroeconomic instability. Besides, the findings also uncover that poor design or implementation of decentralization policies may promote SNG's reckless and rampant expenditure. Because of the IGT design of Ethiopia advocates, SNG, with high fiscal gaps, receives large federal grants. Therefore, it engendered excessive competition among SNGs for the shared pool rather than fostering revenue collection efforts, which may induce macroeconomic instability. Finally, rapid population growth puts pressure on infrastructure and reduces production capacity, ultimately destabilizing the economy by increasing unemployment and inflation.

## **7.12. Conclusion**

The intricate nexus between fiscal decentralization and macroeconomic stability has been examined empirically, but no conclusive evidence has yet surfaced. Some studies have revealed a negative relationship between fiscal decentralization and macroeconomic stability, while others have found the opposite. Therefore, the empirical investigations are less reliable and inconclusive,

requiring additional studies. Therefore, the study investigated the effect of fiscal decentralization on macroeconomic stability. For empirical analysis, the study employed two steps of GMM estimation. The Chi-square test shows that the models used in the study are reliable. The Sargan and autocorrelation tests proved the validity of the instruments and models used in the study, respectively.

The study revealed that expenditure decentralization and fiscal dependency aggravate macroeconomic instability. Contrarily, revenue and composite decentralization significantly cause macroeconomic stability. Among the control variables, population growth, unemployment rate, FDI, and welfare have been intensifying macroeconomic instability; however, GDP and School enrollment are suppressing macroeconomic instability. Nevertheless, public investments and welfare hurt macroeconomic stability in most regression models.

Macroeconomic stability depends on the fiscal situation of the subnational entities; therefore, fiscal dependence is concerning since SNG has yet to implement initiatives to increase internally generated revenue because they depend on federal grants. Additionally, financial autonomy is a crucial component of fiscal federalism to understand the macroeconomic stabilizing effect of revenue devolution. Subnational governments should have access to sufficient resources and a sense of responsibility to carry out their assigned tasks. Therefore, problems engendered by ethnic-based federalism should be explicitly considered and alleviated to secure Ethiopia's macroeconomic stability.

Besides, the apparatus of fiscal relations among various levels of government should accustom to accomplishing the appropriate policy objectives, guaranteeing a stable macroeconomy. In line with the findings, the study recommends that the government follow a contractionary fiscal policy since

the current expansionary policy aggravates macroeconomic instability because social and capital expenditures bring instability to the economy.

The study's limitations are: First, it excluded Addis Ababa City Administration because it often gets federal grants. Besides, the analysis did not include the newly established regional states (Sidama and South-Western). From the perspective of future research, refining the measures of fiscal decentralization and macroeconomic stability to include migration, government quality, public sector efficiency, democracy, and other dimensions should be the next step of future work. Another avenue for future research will be employing a mixed research strategy because it allows using qualitative data to triangulate quantitative findings.

## **CHAPTER EIGHT**

### **8. Overall Conclusions, Policy Implications and Contributions**

#### **8.1. Overall Conclusions**

Government functions in public finance include allocation, redistributive, and stability. Theoretically, there are several motives for decentralization. The vital one is decentralization, which fosters SNGs' economic development and macroeconomic stability and contributes to the competitiveness of the public sector. It may also strengthen SNGs, bringing the government closer to citizens' preferences in providing public services. Though many countries, like Ethiopia, have launched decentralization programs to address political, social, and economic tensions, some countries have experienced success, and other countries still need to achieve the goal of the decentralization program; therefore, it needs to be more conclusive. Consequently, the four essays in the present dissertation scrutinized the fiscal federalism of Ethiopia.

The first essay that analyzed the effect of fiscal federalism on public service provision showed that expenditure decentralization significantly improved public service provision, while revenue decentralization had no significant contribution. Consequently, it contradicts the theoretical assumption of fiscal federalism, which suggests that providing better public service at a low cost may increase demand for local public service. The study also found that regional capacity positively affects public service provision and mediates the relationship between revenue decentralization and public service provision. The second essay examined the impact of fiscal decentralization on regional economic growth showed that expenditure, revenue, and composite decentralization negatively affect regional economic growth.

The third essay which scrutinized the relationship between fiscal federalism and economic development exhibited that revenue decentralization and fiscal incentives positively affect economic development. However, the study also found that macroeconomic instability negatively moderates the indirect influence of revenue decentralization on economic development. It also found that SNGs in emerging economies have less economic development than those in advanced economies due to the divergence between their economic categories in fiscal and institutional capacity. It is because fiscal federalism is implemented within political constraints, creating administrative, institutional, and political constraints that prevent the country from realizing its full economic potential.

The fourth essay, which investigated the link between fiscal decentralization and macroeconomic stability, asserted that expenditure decentralization and fiscal dependency aggravate instability, while revenue and composite decentralization enhanced stability. Furthermore, population growth, unemployment rate, FDI, and welfare intensify instability. GDP and school enrollment suppress it. In general, despite Ethiopia's government adopting a decentralization strategy to strengthen the capabilities of lower levels of government, Ethiopia's fiscal decentralization contradicts the goals and theoretical underpinnings of fiscal federalism. One crucial reason is that fiscal decentralization and economic activities function within an ethnically based federalism framework.

## **8.2. Policy Implications**

The findings of this study have several policy implications for various institutions, including the national government, the House of Federation (HoF), regional state governments, and international donors.

### **8.2.1. Federal Government**

The federal government should consider the essential points discussed in the following paragraphs.

The decentralization of public service provisions to the SNGs is not enhancing social well-being (welfare). It may be more beneficial if the federal government provides public service provisions such as clean water and primary education. The federal government should support expenditure decentralization for primary school provision because it contributes positively. Policy should also be geared toward improving variables such as primary education and clean water to enhance regional social well-being.

Also, it should have a nationwide minimum standard for public service provisions. It should have an instrument to check whether the minimum public service provision standard is achieved. Additionally, there has been a severe infrastructural problem in the SNGs of Ethiopia, and one of the goals of the decentralization program is to improve regional capacity.

The federal government should raise revenue sources for SNGs and reduce federal grants. Besides, inter-governmental fiscal interactions should uphold the benefit principle and connectedness between the expenditure and revenue sides. Another critical inference is that the center should review the devolution of expenditure responsibility and autonomy to SNGs since ideas of fiscal federalism contend that executing expenditure decentralization improves SNGs' economic development.

Though it is highly centralized in Ethiopia, revenue decentralization is considered a vital form of fiscal decentralization since it gives fiscal autonomy and reliable resources to enhance regional development activities. Though it is highly decentralized than revenue, expenditure decentralization is the weaker form of fiscal decentralization. The expenditure assignment is made

to satisfy the center since its financing relies on a federal grant. Therefore, the prime implication is that the federal government needs to give fiscal autonomy to SNGs since fiscal dependency is causing macroeconomic instability.

Moreover, the fiscal federalism of Ethiopia is characterized by the SNGs' high dependence on federal transfer (national shared pool) and limited revenue sources. Therefore, the federal government should increase the fiscal autonomy of SNGs and also put some robust mechanisms to hold the SNGs responsible for their spending behaviors. It should also re-examine its fiscal policy and restrict SNGs' spending because it can exacerbate macroeconomic instability. Besides, based on externality, feasibility, and efficiency assessment, the policymaker should re-evaluate which functions should be centralized and which should be decentralized.

### **8.2.2. House of Federation**

The House of Federation (HoF), entitled by the constitution to design the federal transfer system while designing the IGT, should consider three essential points presented below.

First, The SNGs showed unwanted behavior of competition for the shared pool at the expense of improving their tax collection effort. Therefore, this implies the need for an inter-governmental transfer structure to implement a "carrot and stick" approach in which the SNGs exhibited a better tax collection effort rewarded. The SNGs that showed a poor tax collection effort are punished. Second, the IGT system should be re-designed to deliver minimum threshold essential public services across the States to close vertical fiscal gaps. Third, it is mandatory to re-examine the federal government transfers to correct inter-jurisdictional spillover, and it should explicitly be defined and respected.

### **8.2.3. Subnational (Regional) Governments**

The SNGs should consider the essential points in the following two quintessential points.

First, the SNGs should emphasize their expenditure composition (regional total expenditure-to-regional total spending ratio) when making decisions. They should also re-assess their public investment policy and endeavor to create a regional conducive environment supporting private business development within their jurisdiction. Second, the SNGs should compete to provide better public provision and raise their fiscal capacity through regional business development rather than competing for the national shared pool to satisfy their unproductive and unlimited spending lust.

### **8.2.4. International Donor**

The international donor and community should consider the essential points delivered in the following two paragraphs.

The international donor and community should know that the decentralization program needs to achieve the objectives of the Washington Consensus. The study urges them to exert pressure on re-adjusting inter-governmental transfer structure, expenditure assignment, revenue assignment, and regional borrowing autonomy.

They should support federal public service provisions since it is fruitful if the higher level of government provides it. They should also support regional state government expenditure composition to increase the share of capital spending, which is higher than the recurrent share of total regional government spending.

### **8.3. Contribution to Knowledge**

In addition to providing directions for future research, the study has made three significant contributions to the literature, presented below.

First, to uphold the complete picture of fiscal federalism, the study employed some additional indicators of the dimension of fiscal federalism and also tried to collate the first and the second generation of fiscal federalism indicators while examining the effect of fiscal federalism on public service provision, economic growth, economic development, and macroeconomics stability. This holistic nature of the study makes the study unique. It diverges from previous studies that only use the revenue or expenditure sides. Therefore, this study solves the piecemeal work of previous studies that could be clearer to conclude based on limited indicators of fiscal federalism.

Second, while examining the nexus of Fiscal Federalism and Public Service Provisions, the present study bridges gaps in the existing knowledge since it embraced ignored variables (i.e., SNG capacity) essential in the debates of fiscal federalism theories. Therefore, this makes the study more complete and gives a remedy for the piecemeal work of previous studies. Furthermore, when investigating the effect of fiscal federalism on public service provision and economic development, the study used a novel analytical model of the (PLS-SEM, which helps measure measurement and theoretical models simultaneously).

Third, the study makes further advancement from previous studies on the topic by exploring the indirect effect of fiscal federalism on public service provision through SNG capacity. Therefore, this makes the study innovative and original. Finally, since the study attempts to combine the two theoretical perspectives of fiscal federalism and examines the direct effect of fiscal federalism on

economic development and their indirect influence through the moderating variable (i.e., Macroeconomic instability), the study contributes to the prevailing literature on fiscal federalism.

## REFERENCES

- Adindu A., and Ugondah, N. (2021). Effect of Fiscal Policy on Misery Index in Nigeria. *European Journal of Research in Social Sciences*, 9(1). ISSN 2056-5429
- Adodo, A. (2022). A political economy of well-being/Wellness in Nigeria. *Mediterranean Journal of Social Sciences*, 13(1), 1. doi: 10.36941/mjss-2022-0001
- Agénor, P., & Lim, K. Y. (2018). Unemployment, growth, and welfare effects of labor market reforms. *Journal of Macroeconomics*, 58, 19-38. doi: 10.1016/j.jmacro.2018.08.009
- Ahmad, S., Shah, S., Mazhar, F, Khan, M., and Javaid, M (2022). Fiscal Decentralization and Macroeconomic Performance in Pakistan. *Journal of Contemporary Issues in Business and Government*, 28 (1), 479-500. doi:10.47750/cibg.2022.28.01.033
- Albertini, J., Auray, S., Bouakez, H., & Eyquem, A. (2021). Taking off into the wind: Unemployment risk and state-dependent government spending multipliers. *Journal of Monetary Economics*, 117, 990-1007. doi: 10.1016/j.jmoneco.2020.07.007
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277-297. <https://doi.org/10.2307/2297968>
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29-51. [https://doi.org/10.1016/0304-4076\(94\)01642-d](https://doi.org/10.1016/0304-4076(94)01642-d)
- Arends, H. (2017). More with less? Fiscal decentralization, public health spending, and health sector performance. *Swiss Political Science Review*, 23(2), 144–174. doi:10.1111/spsr.12242
- Baltagi, B. H. (2005). *Econometric Analysis of Panel Data* (3<sup>rd</sup> ed.). Southern Gate, UK: John

- Barro, R. J. (1990). Human capital and growth: Theory and evidence. *Carnegie-Rochester Conference Series on Public Policy*, 32, 287-291. [https://doi.org/10.1016/0167-2231\(90\)90029-k](https://doi.org/10.1016/0167-2231(90)90029-k)
- Baskaran, T., & Feld, L. P. (2012). Fiscal decentralization and economic growth in OECD countries. *Public Finance Review*, 41(4), 421-445. doi:10.1177/1091142112463726
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *The Stata Journal*, 3(1), 1-31. doi:10.1177/1536867x0300300101.
- Bayu, T. B. (2022). Is federalism the source of ethnic identity-based conflict in Ethiopia? *Insight on Africa*, 14(1), 104–125. doi:10.1177/09750878211057125
- Becker, J., Proksch, D., & Ringle, C. M. (2021). Revisiting Gaussian copulas to handle endogenous regressors. *Journal of the Academy of Marketing Science*, 50(1), 46-66. doi:10.1007/s11747-021-00805-y
- Besley, T. and Ghatak, M. (2003) Incentives, choice, and accountability in the provision of
- Besley, T., & Coate, S. (2003). Centralized versus decentralized provision of local public goods: A political economy approach. *Journal of Public Economics*, 87(12), 2611-2637. doi:10.1016/s0047-2727(02)00141-x
- Bianchi, F., & Melosi, L. (2022). Inflation as a fiscal limit. *SSRN Electronic Journal*. doi:10.2139/ssrn.4205158
- Bird, R. M. (1999). Threading the fiscal labyrinth: Some issues in fiscal decentralization. *Tax Policy in the Real World*, 141-162. doi:10.1017/cbo9780511625909.009
- Bird, R. M., & Vaillancourt, F. (1999). Fiscal decentralization in developing countries: An overview. *Fiscal Decentralization in Developing Countries*, 1-48. doi:10.1017/cbo9780511559815.002

- Bird, R., & Vaillancourt, F. (n.d.). Expenditure-based equalization transfers. *Fiscal Equalization*, 259-289. doi:10.1007/978-0-387-48988-9\_11
- Blöchliger, H., Égert, B., & Fredriksen, K. (2013). *Fiscal Federalism and its Impact on Economic Activity, Public Investment and the Performance of Educational Systems* (OECD Working Papers No. 1051). OECD Publishing. <https://doi.org/10.1787/5k4695840w7b-en>
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143. [https://doi.org/10.1016/s0304-4076\(98\)00009-8](https://doi.org/10.1016/s0304-4076(98)00009-8)
- Blundell, R., & Bond, S. (2000). GMM estimation with persistent panel data: An application to production functions. *Econometric Reviews*, 19(3), 321-340. <https://doi.org/10.1080/07474930008800475>
- Boadway, R. (2005). The Vertical Fiscal Gap: Conceptions and misconceptions: In Canadian Fiscal Arrangements. In H. Lazar (Ed.), *What Works, What Might Work Better*, (pp. 51–80). Montreal and Kingston: McGill –Queens's Pres.
- Boadway, R., & Tremblay, J. (2012). Reassessment of the Tiebout model. *Journal of Public Economics*, 96(11-12), 1063-1078. <https://doi.org/10.1016/j.jpubeco.2011.01.002>
- Bodman, P. (2012). Fiscal decentralization and macroeconomic performance in Australia. The Future of Australian Federalism, pp. 339–362. doi:10.1017/cbo9780511902550.024
- Bojanic, A. N. (2018). The impact of fiscal decentralization on growth, inflation, and inequality in the Americas. *CEPAL Review*, 2018(124), 57–77. doi:10.18356/31c71be8-enBojanic
- Bojanic, A. N., & Collins, L. A. (2021). Differential effects of decentralization on income inequality: Evidence from developed and developing countries. *Empirical Economics*, 60(4), 1969–2004. doi:10.1007/s00181-019-01813-2

- Breitung, J. (n.d.). The local power of some unit root tests for panel data. *Advances in Econometrics*, pp. 161–177. doi:10.1016/s0731-9053(00)15006-6
- Brennan, G., & Buchanan, J. (1980). *Power to Tax: Analytical Foundations of a Fiscal Constitution*. New York: Cambridge University Press.
- Busemeyer, M. R. (2008). The impact of fiscal decentralization on education and other types of spending. *Swiss Political Science Review*, 14(3), 451-481. doi:10.1002/j.1662-6370.2008.tb00109.x
- Bushashe, M. A., & Bayiley, Y. (2023b). The effect of fiscal decentralization on economic growth in sub-national governments of Ethiopia: A two-step system general methods of moments (GMM) approach. *Public and Municipal Finance*, 12(2), 32-42. doi:10.21511/pmf.12(2).2023.03
- Bushashe, M. A. (2023). Determinants of private banks performance in Ethiopia: A partial least square structural equation model analysis (PLS-SEM). *Cogent Business & Management*, 10(1). doi:10.1080/23311975.2023.2174246
- Bushashe, M. A., & Bayiley, Y. (2023a). Fiscal decentralization and macroeconomics stability nexus: Evidence from the sub-national governments context of Ethiopia. *Cogent Economics & Finance*, 11(2). doi:10.1080/23322039.2023.2244353
- Bushashe, M. A., & Bayiley, Y. (2023c). Fiscal federalism and public service provision in Ethiopia: A mediating role of sub-national governments capacity. *Cogent Economics & Finance*, 11(2). doi:10.1080/23322039.2023.2255496
- Cameron, C.A., and Trivedi, P.K. (2005). *Microeconometrics: Methods and Applications*. NY: Cambridge University press.

- Canare, T., Francisco, J. P., & Caliso, R. A. (2020). Decentralization and income inequality in a panel and cross-section of countries. *Journal of International Development*, 32(4), 543-579. doi:10.1002/jid.3468
- Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20(2), 249-272. doi:10.1016/s0261-5606(00)00048-6
- Cleveland, W. S. (1981). LOWESS: A program for smoothing Scatterplots by robust locally weighted regression. *The American Statistician*, 35(1), 54. doi:10.2307/2683591
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, Hillsdale: Lawrence Erlbaum Associates.
- Creswell, J.W. (2014). *Research design: Qualitative, quantitative, and mixed methods approach* (4th ed.). Thousand Oaks, CA: Sage.
- Crook, R., and Manoor, J. (2000). *Democratic Decentralization (OED Working Paper No.11)*. Washington, DC: World Bank.
- Dadgar, Y., & Nazari, R. (2018). The institutional impact on economic development in Iran. *Institutionalist Perspectives on Development*, 89-101. doi:10.1007/978-3-319-98494
- Davoodi, H., & Zou, H. (1998). Fiscal decentralization and economic growth: A cross-country study. *Journal of Urban Economics*, 43(2), 244-257. <https://doi.org/10.1006/juec.1997.2042>
- Diaz-Serrano, L., & Rodríguez-Pose, A. (2012). Decentralization, subjective well-being, and the perception of institutions. *Kyklos*, 65(2), 179-193. doi:10.1111/j.1467-6435.2012.00533.x
- Estache, A., & Sinha, S. (1999). Does decentralization increase spending on public infrastructure? *Policy Research Working Papers*. doi:10.1596/1813-9450-1457
- Feltenstein, A., & Iwata, S. (2002). Fiscal Decentralization and Deficits: International Evidence Retrieved from <http://www.neyapti.bilkent.edu>

- Feng, C., Wang, H., Lu, N., & Tu, X. M. (2012). Log transformation: Application and interpretation in biomedical research. *Statistics in Medicine*, 32(2), 230-239.  
doi:10.1002/sim.5486
- Ferrante, L. (2016). *Decentralization and health performance in Italy: theoretical and empirical issues* (Doctoral Dissertation, University of Catania, Italy).
- Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal of Monetary Economics*, 32(3), 485–512. doi:10.1016/0304-3932(93)90027-d
- Fiszbein, A. (1997, December). Decentralization and Local Capacity: Some Thoughts on a Controversial Relationship, paper presented at the FAO/UNCDF/World Bank Technical Consultation on Decentralization, Rome.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.  
doi:10.1177/002224378101800104
- Freinkman, L., & Plekhanov, A. (2009). Fiscal decentralization and the quality of public services in Russian regions. *SSRN Electronic Journal*. doi:10.2139/ssrn.1548324
- Galvao, A. F., Montes-Rojas, G., Sosa-Escudero, W., & Wang, L. (2013). Tests for skewness and kurtosis in the one-way error component model. *Journal of Multivariate Analysis*, 122, 35-52. doi: 10.1016/j.jmva.2013.07.002
- Garson, G.D. (2016). *Partial Least Squares Regression and Structural Equation Models*, Statistical Associates, Asheboro.
- Ghebrehiwet, T. (2015). *The Practice of Fiscal Federalism in Ethiopia: A Critical Assessment 1991–2012. An Institutional Approach* (Doctoral Thesis). University of Fribourg, Switzerland. Retrieved from <https://folia.unifr.ch/unifr/documents/304235>

- Greene, W. H. (2012). *Econometric Analysis: International Edition* (7<sup>th</sup>ed.). London, UK:
- Greene, W.H. (2002). *Econometric Analysis* (5<sup>th</sup> ed.). New Jersey, USA: Prentice Hall.
- Guillermo, L.V, Bastián, G., & Felipe, B. (2020). Macroeconomic stability and economic growth: Myths and realities. *CEPAL Review*, 2020(131), 109-132. doi:10.18356/16840348-2020-131-6
- Gujarati, D.N. (2004). *Basic Econometrics* (4<sup>th</sup> ed.). New York: McGraw Hill Inc.
- Guo, S., Pei, Y., & Xie, Z. (2022). A dynamic model of fiscal decentralization and public debt accumulation. *Journal of Public Economics*, 212(10), 46-92.  
doi:10.1016/j.jpubeco.2022.104692
- Hair, J. F., Hult, G. T., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial least squares structural equation modeling (PLS-SEM) using R. *Classroom Companion: Business*. doi:10.1007/978-3-030-80519-7
- Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks, CA: Sage
- Hair, J.F., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM). *European Business Review*, 26(2), 106-121. doi:10.1108/or-10-2013-0128
- Hayes, F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis. *Psychological Science*, 24(10), 1918-1927.  
doi:10.1177/0956797613480187
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>

- Hung, N. T., & Thanh, S. D. (2022). Fiscal decentralization, economic growth, and human development: Empirical evidence. *Cogent Economics & Finance*, 10(1).  
doi:10.1080/23322039.2022.2109279
- Imi, A. (2005). Decentralization and economic growth revisited: An empirical note. *Journal of Urban Economics*, 57(3), 449-461. <https://doi.org/10.1016/j.jue.2004.12.007>
- Im, K. S., Pesaran, M., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53-74. doi:10.1016/s0304-4076(03)00092-7
- Iqbal, N., & Nawaz, S. (2010). Fiscal decentralization and macroeconomic stability: Theory and evidence from Pakistan.
- Iqbal, N., Musleh Ud Din, M. U., & Ghani, E. (2012). Fiscal decentralization and economic growth: Role of democratic institutions. *The Pakistan Development Review*, 51(3), 173-195.  
<https://doi.org/10.30541/v51i3pp.173-195>
- Islam, N. (1995). Growth empirics: A panel data approach. *The Quarterly Journal of Economics*, 110(4), 1127-1170. doi:10.2307/2946651
- Jalil, A. Z., Harun, M., & Mat, S. H. (2012). Macroeconomic instability and fiscal decentralization: An empirical analysis. *Prague Economic Papers*, 21(2), 150-165.  
doi:10.18267/j.pep.416
- Jin, J., & Zou, H. (2002). How does fiscal decentralization affect aggregate, national, and subnational government size? *Journal of Urban Economics*, 52(2), 270-293.  
[https://doi.org/10.1016/s0094-1190\(02\)00004-9](https://doi.org/10.1016/s0094-1190(02)00004-9)
- Jin, H., Qian, Y., & Weingast, B. R. (2005). Regional decentralization and fiscal incentives: Federalism, Chinese style. *Journal of Public Economics*, 89(9-10), 1719-1742. Doi: 10.1016/j.jpubeco.2004.11.008

- Kappeler, A., Solé-Ollé, A., Stephan, A., & Vålilä, T. (2013). Does fiscal decentralization foster regional investment in productive infrastructure? *European Journal of Political Economy*, 31, 15-25. doi: 10.1016/j.ejpoleco.2013.03.003
- Khalid, A. M. (2017). Combining macroeconomic stability and micro-based growth: The South East Asia/Asia Pacific experience. *The Lahore Journal of Economics*, 22(Special Edition), pp. 135–152. doi:10.35536/lje.2017.v22.isp.a6
- King, D., & Ma, Y. (2001). Fiscal decentralization, Central Bank independence, and inflation. *Economics Letters*, 72(1), 95-98. doi:10.1016/s0165-1765(01)00405-0
- Kis-Katos, K., & Sjahrir, B. S. (2017). The impact of fiscal and political decentralization on local public investment in Indonesia. *Journal of Comparative Economics*, 45(2), 344-365. Doi: 10.1016/j.jce.2017.03.003
- Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, 13(7), 546-580. doi:10.17705/1jais.00302
- Lago-Peñas, S., Martínez-Vázquez, J., & Sacchi, A. (2019). Fiscal stability during the Great Recession: Putting decentralization design to the test. *Regional Studies*, 54(7), 919-930. doi:10.1080/00343404.2019.1637836
- Latan, H., and Ghazali, I. (2013). Partial Least Squares: *Concept and Application Path Modelling using Program XLSTAT-PLS* Badan Penerbit Universitas Diponegoro: Semarang
- Lechner da Silva, Á., & De Brito Gadelha, S. R. (2022). Fiscal Federalism, Fiscal Decentralization, and Economic Growth in Brazil: 1954 - 2018. *Cadernos De Financas*, 22(02). doi:10.55532/1806-8944.2022.182

- Lee, J.-S. (2013). The Process of Decentralization in Ethiopia since 1991: Issues on Improving Efficiency. *Korea Review of International Studies*, 16, 3-16. Retrieved from <https://lawethiopia.com/images/ethnic%20politics%20in%20ethiopia/The%20Process%20of%20Decentralisation%20in%20Ethiopia%20since%201991-%20Issues%20on%20Improving%20Efficiency.pdf>
- Levin, A., Lin, C., & James Chu, C. (2002). Unit root tests in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics*, 108(1), 1–24. doi:10.1016/s0304-4076(01)00098-7
- Lin, J., & Liu, Z. (2000). Fiscal decentralization and economic growth in China. *Economic Development and Cultural Change*, 49(1), 1-21. <https://doi.org/10.1086/452488>
- Lin, J., & Liu, Z. (2000). Fiscal decentralization and economic growth in China. *Economic Development and Cultural Change*, 49(1), 1–21. doi:10.1086/452488
- Liu, L. C. (2017). Fiscal Decentralization, Public Governance, and Economic Performance Examination of Two PLS-SEM Models. *Taiwan Journal of Democracy*, 13(2), 55-72. Retrieved from <https://www.semanticscholar.org/paper/Fiscal-Decentralization-%2C-Public-Governance-%2C-and-Liu/673a8f23eb7619b5b7cfc5db017ba3eb2c34e6af>
- Loizides, J., & Vamvoukas, G. (2005). Government expenditure and economic growth: Evidence from Trivariate causality testing. *Journal of Applied Economics*, 8(1), 125-152. <https://doi.org/10.1080/15140326.2005.12040621>
- Lowry, P. B., & Gaskin, J. (2014). Partial least squares (PLS) structural equation modeling (SEM) for building and testing causal behavioral theory: *When to choose it and how to use it*. *IEEE Transactions on Professional Communication*, 57(2), 123–146. doi:10.1109/tpc.2014.2312452

- Lozano-Espitia, L. I., & Martínez, M. A. (2013). Has fiscal decentralization improved the enrollment and quality levels of Colombia's public primary education? doi:10.32468/be.747
- Makreshanska-Mladenovska, S., & Petrevski, G. (2019). Fiscal decentralization and government size: Evidence from a panel of European countries. *Revista Hacienda Pública Española*, 229(2), 33-58. <https://doi.org/10.7866/hpe-rpe.19.2.2>
- Malik, S., Hassan, M., & Hussain, S. (2006). Fiscal decentralization and economic growth in Pakistan. *The Pakistan Development Review*, 45(4), 845-854. <https://doi.org/10.30541/v45i4ipp.845-854>
- Mariani, S., Handra, H., & Yonnedi, E. (2022). The link between fiscal decentralization and unemployment evidence from Indonesia. *ADPEBI International Journal of Business and Social Science*, 2(2), 107–119. doi:10.54099/aijbs. v2i2.314
- Martinez-Vazquez, J. and MacNab, R.M. (2006). "Fiscal Decentralization, Macro stability, and Growth," *Hacienda Publica Espanola/Revista de Economica Publica* 179(4):25–49.
- Martinez-Vazquez, J., & McNab, R. M. (2003). Fiscal decentralization and economic growth. *World Development*, 31(9), 1597-1616. doi:10.1016/s0305-750x (03)00109-8
- Martinez-Vazquez, J., & Timofeev, A. (2010). Choosing between centralized and decentralized models of tax administration. *International Journal of Public Administration*, 33(12-13), 601-619. <https://doi.org/10.1080/01900692.2010.514467>
- McDonald, Q. E. (2021). Fiscal decentralization and macroeconomic outcomes in Nigeria. *International Journal of Multidisciplinary Research and Analysis*, 04(05). doi:10.47191/ijmra/v4-i5-24
- Meheret, A. (2007). Rapid Assessment of Woreda Decentralization. In A., Taye, and G., Tegegne (Eds.), *Decentralization in Ethiopia*. Addis Ababa: Forum for Social Studies.

- Melnyk, L., Sineviciene, L., Lyulyov, O., Pimonenko, T., & Dehtyarova, I. (2018). Fiscal decentralization and macroeconomic stability: The experience of Ukraine's economy. *Problems and Perspectives in Management*, 16(1), 105-114. doi:10.21511/ppm.2018.10
- Mergele, L., & Weber, M. (2020). Public employment services under decentralization: Evidence from a natural experiment. *Journal of Public Economics*, 182, 104-113. doi:10.1016/j.jpubeco.2019.104113
- Moges, G. (2008). An economic analysis of fiscal federalism in Ethiopia. *Northeast African Studies*, 10(2), 111–140. <https://doi.org/10.1353/nas.0.0005>
- Morozov, B. (2015). Theory and Practice of Decentralization in Developing Countries: Evidence from the Republic of Moldova. Retrieved from <http://irek.ase.md>
- Mulugeta, D. (2012). *Decentralization in Ethiopia: Concept and Process. The Case of Dendi District, West Shoa Zone of Oromia State*. (Doctoral Dissertation, Technische Universität Dortmund, Germany). Retrieved from <https://eldorado.tu-dortmund.de>
- Musgrave, R. (1959). *The Theory of Public Finance*. New York: McGraw-Hill.
- Musgrave, R. A., & Musgrave, P. B. (1989). *Public Finance in Theory and Practice* (5<sup>th</sup> ed.). Singapore: McGraw-Hill.
- Musgrave, R. A., and Musgrave, P.B. (1989). *Public Finance in Theory and Practice* (5<sup>th</sup> ed.). Singapore: McGraw-Hill.
- Musgrave, R. A., and Musgrave, P.B. (1989). *Public Finance in Theory and Practice* (5<sup>th</sup> ed.). Singapore: McGraw-Hill.
- Naumets, I. (2003). *Fiscal Decentralization and Local Public Sector Efficiency* (Master's Thesis). National University of Kyiv, Ukraine. Retrieved from <https://kse.ua/wp-content/uploads/2019/02/Naumets.pdf>

- Neyapti, B. (2004). Fiscal decentralization, Central Bank independence, and inflation: A panel investigation. *Economics Letters*, 82(2), 227–230. Doi: 10.1016/j.econlet.2003.09.005
- Nguyen, P. D., Vo, D. H., Ho, C. M., & Vo, A. T. (2019). Fiscal decentralization and economic growth across provinces: new evidence from Vietnam using a novel measurement and approach. *Journal of Risk and Financial Management*, 12(3), 143.  
<https://doi.org/10.3390/jrfm12030143>
- Oates, W. E. (1972). *Fiscal Decentralization*. New York: Harcourt Brace Jovanovich, Inc.
- Oates, W. E. (2005). Toward a second-generation theory of fiscal federalism. *International Tax and Public Finance*, 12(4), 349-373. <https://doi.org/10.1007/s10797-005-1619-9>
- Okonkwo, O. N., & Godslove, E. K. (2015). Fiscal decentralization and Nigerian macroeconomic performance and economic stability. *International Journal of Economics and Finance*, 7(2). <https://doi.org/10.5539/ijef.v7n2p113>
- Olowu, D., and Wunsch, J. (2004). *Local governance in Africa: The challenges of democratic decentralization*. London: Lynne Rienner Publishers.
- Osmani, R., & Tahiri, A. (2022). Fiscal decentralization and local employment growth: Empirical evidence from Kosovo's municipalities. *Series V - Economic Sciences*, 63-74.  
doi:10.31926/but.es.2022.15.64.1.7
- Palienko, M., Lyulyov, O., & Denysenko, P. (2017). Fiscal decentralization is a factor in the macroeconomic stability of the country. *Financial Markets, Institutions, and Risks*, 1(4), 74-86. doi:10.21272/fmir.1(4).74-86.2017
- Park, H.M. (2011). *Practical Guides to Panel Data Modeling: A Step-by-Step Analysis Using Stata*. Tutorial Working Paper. International University of Japan, Minami Uonuma.

- Parks, R. W. (1967). Efficient estimation of a system of regression equations when disturbances are both serially and contemporaneously correlated. *Journal of the American Statistical Association*, 62(318), 500-509. doi:10.1080/01621459.1967.10482923
- Patton, M.Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks: Sage.
- Paulos, C. (2007). *What One Hand Gives, the Other Hand Taketh*. The Netherlands: Shaker Publishing.
- Philip, A. T., & Isah, S. (2012). An Analysis of the Effect of Fiscal Decentralization on Economic Growth in Nigeria. *International Journal of Humanities and Social Science*, 2(8), 141-149. Retrieved from [https://www.ijhssnet.com/journals/Vol\\_2\\_No\\_8\\_Special\\_Issue\\_April\\_2012/18.pdf](https://www.ijhssnet.com/journals/Vol_2_No_8_Special_Issue_April_2012/18.pdf)
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891. doi:10.3758/brm.40.3.879
- Prud'homme, R. (1995). The dangers of decentralization. *The World Bank Research Observer*, 10(2), 201-220. <https://doi.org/10.1093/wbro/10.2.201>
- public services. *Oxford Review of Economic Policy*, 19 (2), 235-249.
- Qian, Y., & Wingiest, B. R. (1997). Federalism is a commitment to preserving market incentives. *Journal of Economic Perspectives*, 11(4), 83-92. <https://doi.org/10.1257/jep.11.4.83>
- Rauf, A., Khan, H., and Khan, G. (2021). Power Devolution and Economic Stability: Evidence from Pakistan. *Journal of Asian Finance, Economics, and Business*, 8(5), 573–581. doi: 10.13106/jafeb.2021.vol8.no5.0573

- Ribot, J. (2002). African Decentralization: Local Actors, Powers, and Accountability. *UNRISD Programme on Democracy, Governance and Human Rights* (Paper no. 8). Retrieved from <https://www.unrisd.org>
- Robalino, D. A., Picazo, O. F., & Voetberg, A. (2001). Does fiscal decentralization improve health outcomes? Evidence from a cross-country analysis. *Policy Research Working Papers*. doi:10.1596/1813-9450-2565
- Rodriguez-Pose, A., & Ezcurra, R. (2011). Is fiscal decentralization harmful to economic growth? Evidence from the OECD countries. *Journal of Economic Geography*, 11(4), 619-643. <https://doi.org/10.1093/jeg/lbq025>
- Rodríguez-Pose, A., & Krøijer, A. (2009). Fiscal Decentralization and Economic Growth in Central and Eastern Europe. *Growth and Change*, 40(3), 387-417. <https://doi.org/10.1111/j.1468-2257.2009.00488.x>
- Rompuy, P. F. (2017). Sub-national fiscal autonomy, infrastructure investment, and regional disparities. *SSRN Electronic Journal*. doi:10.2139/ssrn.2989039
- Rondinelli, D. A. (1982). The dilemma of development administration: Complexity and uncertainty in control-oriented bureaucracies. *World Politics*, 35(1), 43-72. doi:10.2307/2010279
- Rondinelli, D. A. (1982). The dilemma of development administration: Complexity and uncertainty in control-oriented bureaucracies. *World Politics*, 35(1), 43-72. doi:10.2307/2010279
- Rondinelli, D. A., & Nellis, J. R. (1986). Assessing decentralization policies in developing countries: The case for cautious optimism. *Development Policy Review*, 4(1), 3-23. doi:10.1111/j.1467-7679.1986.tb00494.x

- Roodman, D. (2009). How to do Xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal: Promoting communications on statistics and Stata*, 9(1), 86-136. <https://doi.org/10.1177/1536867x0900900106>
- Sarstedt, M. and Mooi, E.A. (2019). *A Concise Guide to Market Research: The Process, Data, and Methods Using IBM SPSS Statistics*. Springer, Heidelberg.
- Schneider, A. (2003). *Who Gets What from Whom? The Impact of Decentralization on Tax Capacity and Pro-Poor Spending* (IDS Working Paper No. 179). Brighton: IDS. Retrieved from <https://gsdrc.org/document-library/who-gets-what-from-whom-the-impact-of-decentralisation-on-tax-capacity-and-pro-poor-policy/>
- Shah, A. (2006). Fiscal decentralization and macroeconomic management. *International Tax and Public Finance*, 13(4), 437–462. doi:10.1007/s10797-006-8948-1
- Sheikh, M. R., Chaudhry, I. S., Akhtar, M. H., & Ali, H. (2020). An empirical analysis of the determinants of employment status in district Multan (Pakistan). *Review of Applied Management and Social Sciences*, 3(1), 1–21. doi:10.47067/ramss.v3i1.20
- Shmueli, G., Ray, S., Velasquez Estrada, J. M., & Chatla, S. (2015). The elephant in the room: Evaluating the predictive performance of partial least squares (PLS) path models. *SSRN Electronic Journal*. doi:10.2139/ssrn.2659233
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *European Journal of Marketing*, 53(11), 2322–2347. doi:10.1108/ejm-02-2019-0189
- Siddik, M. N. (2023). Does macroeconomic stability promote economic growth? Some econometric evidence from SAARC countries. *Asian Journal of Economics and Banking*. doi:10.1108/ajeb-05-2022-0052

- Silas, M. (2017). *Effects of Fiscal Decentralization on Poverty Reduction Outcome, Income Inequality and Human Development in Kenya* (Doctoral Dissertation, University of Kenyatta, Kenya). Retrieved from <https://ir-library.ku.ac.ke>
- Siliverstovs, B., & Thiessen, U. (2015). Incentive effects of fiscal federalism: Evidence for France. *Cogent Economics & Finance*, 3(1). doi:10.1080/23322039.2015.1017949
- Smoke, P. (2001). *Fiscal Decentralization in Developing Countries. A Review of Current Concepts and Practice*. Geneva, UNRISD. Retrieved from <https://www.files.ethz.ch/isn/45958/2.pdf>
- Smoke, P. (2003). Decentralization in Africa: Goals, dimensions, myths, and challenges. *Public Administration and Development*, 23(1), 7-16. <https://doi.org/10.1002/pad.255>
- Sow, M., & Razafimahefa, I. (2015). Fiscal decentralization and the efficiency of public service delivery. *IMF Working Papers*, 15(59), 1. doi:10.5089/9781484351116.001
- Studenmund, A.H. (2011). *Using Econometrics: A Practical Guide* (6<sup>th</sup> Ed.). Boston: Addison Wesley Longman.
- Su, D.T., Hoai, B.T and Lam, D., M. (2014). The nexus between fiscal policy and sustained economic growth. *Vietnamese Journal of Economic Development*, 280, 2–21.
- Syamsul, T.M. (2003). Fiscal Decentralization and Economic Development: A Cross-Country Empirical Study. *Forum of International Development Studies*, 8 (24), 845-271. Retrieved from <https://www.gsid.nagoya-u.ac.jp>
- Tanzi, V. (1996). Fiscal federalism and decentralization: In M. Bruno, and B. Pleskovic (Eds.), A review of some efficiency and macroeconomic aspects (Tanzi. 1996, pp. 295–316). Annual World Bank Conference on Development Economics, Washington, DC:
- Tanzi, V., & Ahmad, E. (2002). *Managing fiscal decentralization*. Routledge Studies in the Modern World Economy. doi: 10.4324/9780203219997.bmatt

- Tarigan, M. S. (2003). Fiscal Decentralization and Economic Development: A Cross-Country Empirical Study. *Forum of International Development Studies*, 8(24), 845-271.  
<https://doi.org/10.18999/forids.24.245>
- Thornton, J. (2007). Further evidence on revenue decentralization and inflation. *Economics Letters*, 95(1), 140–145. doi:10.1016/j.econlet.2006.09.025
- Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of Political Economy*, 64(5), 416-424. <https://doi.org/10.1086/257839>
- Treisman, D. (2000). Decentralization and inflation: Commitment, collective action, or continuity? *American Political Science Review*, 94(4), 837–857. doi: 10.2307/2586211
- Weingast, B. R. (2009). Second generation fiscal federalism: The implications of fiscal incentives. *Journal of Urban Economics*, 65(3), 279-293. <https://doi.org/10.1016/j.jue.2008.12.005>
- Wilcox, R. (2017). The regression smoother LOWESS: A confidence band that allows Heteroscedasticity and has some specified simultaneous probability coverage. *Journal of Modern Applied Statistical Methods*, 16(2), 29–38. doi:10.22237/jmasm/1509494580  
Wiley & Sons Ltd.
- Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.
- Wooldridge, J. M. (2013). *Introductory Econometrics: A Modern Approach* (5<sup>th</sup> ed.). South-Western: Cengage Learning.
- Xiao, Q., Lin, T., & Ma, Y. (2022). Fiscal decentralization, economic policy uncertainty, and high-quality economic development: an empirical study based on systematic GMM. *Proceedings of the 2022 International Conference on Computer Science, Information Engineering and Digital Economy (CSIEDE 2022)*. doi:10.2991/978-94-6463-108-1\_64

Zhang, T., & Zou, H. (1998). Fiscal decentralization, public spending, and economic growth in China. *Journal of Public Economics*, 67(2), 221-240. [https://doi.org/10.1016/s0047-2727\(97\)00057-1](https://doi.org/10.1016/s0047-2727(97)00057-1)

Zhang, T., & Zou, H. (2001). The growth impact of the intersectoral and intergovernmental allocation of public expenditure. *China Economic Review*, 12(1), 58-81. [https://doi.org/10.1016/S1043-951X\(01\)00043-8](https://doi.org/10.1016/S1043-951X(01)00043-8)

Zhuravskaya, E. V. (2000). Incentives to provide local public goods: Fiscal federalism, Russian style. *Journal of Public Economics*, 76(3), 337–368. doi:10.1016/s0047-2727(99)00090-0

## APPENDIX

**Table A 2-1. Federal Government Budget in Real Terms (in Billions)**

No	Sector	Fiscal year 2020/21	Fiscal year 2021/22
1	General Service	12.8	15.9
2	Justice and Security	10.3	10.3
3	National Defense	16.5	18.3
4	Education	56.8	55
5	Health	19.4	17
6	Urban Development and Construction	71	69.7
7	Trade and Industry	2.5	2.7
8	Water and Energy	21.5	14.6
9	Agriculture and Rural Development	15.3	15.4
10	Public Debt	37	37.5
11	Provisions	13.4	9.4
12	Others	16.3	21.7
Total		293.7	287.6

Source: Authors' Computation Based on Data from MOFEC and NBE (2020-2022)

**Table A 4-2. Examining the Endogeneity of the Model**

Examining Path GC tests	Original sample (O)	Sample mean (M)	Standard deviation	t statistics	Sig values
GC (Revenue Decentralization) -> Public Provision	0.300	-0.348	0.641	0.5611	0.554
GC (Expenditure Decentralization)-> Public Provisions	-0.861	-0.431	0.761	1.211	0.233
GC (Revenue Decentralization) -> Regional Capacity	0.587	0.569	0.358	1.211	0.221
GC (Expenditure Decentralization)-> Regional Capacity	0.218	0.260	0.392	0.777	0.441
GC (Regional Capacity) -> Public Provisions	0.580	0.354	0.442	1.131	0.1821

Source: Study Results, 2023

**Table A 5-1. Test of Normality**

Variable	Obs.	Pr(skewness)	Pr(kurtosis)	Adj. Joint chi2(2)	P value
<i>RGDPgr</i>	130	0.002	0.000	27.39	0.000
<i>Exp Dec</i>	140	0,000	0.075	23.05	0.000
<i>Rev Dec</i>	140	0.000	0.000	207.41	0.000
<i>Comp Dec</i>	140	0.000	0.000	30.76	0.000
<i>Gov't size</i>	140	0.000	0.033	24.6	0.000

<i>Inflation</i>	130	0.000	0.000	50.15	0.000
<i>Human capital</i>	140	0.000	0.000	48.61	0.000

Source: Study Panel Data (2008–2021)

**Table A 5-2. Test of multicollinearity. Matrix of correlations**

Variable	<i>RGDPgr</i>	<i>Exp Dec</i>	<i>Rev Dec</i>	<i>Comp Dec</i>	<i>Gov't size</i>	<i>Inflation</i>	<i>Human capital</i>
<i>RGDPgr</i>	1	–	–	–	–	–	–
<i>Exp Dec</i>	0	1	–	–	–	–	–
<i>Rev Dec</i>	–0.137	–0.092	1	–	–	–	–
<i>Comp Dec</i>	–0.085	–0.298	0.55	1	–	–	–
<i>Gov't size</i>	–0.303	–0.18	–0.16	–0.506	1	–	–
<i>Inflation</i>	–0.17	–0.161	0.154	0.119	–0.023	1	–
<i>Human capital</i>	0.015	0.182	–0.052	0.099	0.069	–0.141	1

Source: Study Panel Data (2008–2021).

**Table A 7-1. Test of Normality**

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
MI	140	0.000	0.000	25.960	0.000
Rev Dec	140	0.000	0.000	.	0.000
Exp Dec	140	0.000	0.075	23.050	0.000
Dependency	140	0.000	0.000	58.570	0.000
Comp Dec	140	0.000	0.289	20.350	0.000
FDI	140	0.000	0.000	22.300	0.000
POP Gr	140	0.067	.	.	.
Unemp	140	0.001	0.001	16.850	0.000
Welfare	140	0.000	0.000	48.610	0.000
Public Inv	140	0.060	.	.	.
Enrollment	120	0.000	0.000	38.020	0.000
RGDP	140	0.000	0.000	52.190	0.000

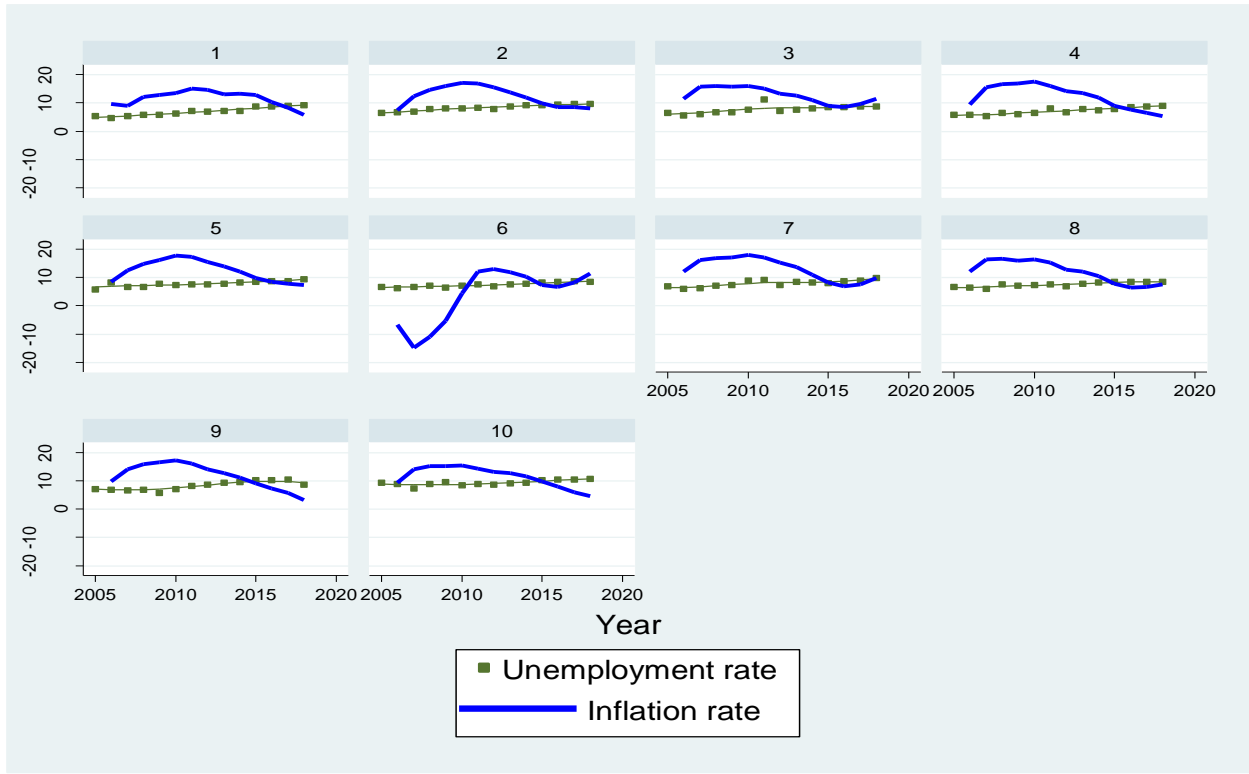
Source: Study Panel Data (2005—2018)

**Table A 5-2. Test of Multicollinearity****Matrix of correlations**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) MI	1.000											
(2) Rev Dec	-0.260	1.000										
(3) Exp Dec	0.015	-0.081	1.000									
(4)Dependency	0.181	-0.391	0.858	1.000								
(5) Comp Dec	0.412	-0.238	-0.194	-0.146	1.000							
(6) FDI	0.595	0.353	-0.080	-0.261	0.096	1.000						
(7) POP Gr	0.551	-0.400	0.051	0.251	-0.091	-0.876	1.000					
(8) Unemp	0.552	-0.441	0.103	0.255	-0.104	-0.640	0.676	1.000				
(9) Welfare	0.250	0.000	-0.026	-0.088	0.426	0.540	-0.531	-0.523	1.000			
(10) Public Inv	0.121	-0.053	0.553	0.429	-0.268	0.189	-0.201	-0.252	0.496	1.000		
(11)Enrollment	-0.124	0.200	0.240	0.223	0.255	0.189	-0.187	-0.228	0.128	0.014	1.000	
(12) GDP	-0.205	0.048	-0.516	-0.460	0.772	0.409	-0.387	-0.419	0.517	-0.367	0.121	1.000

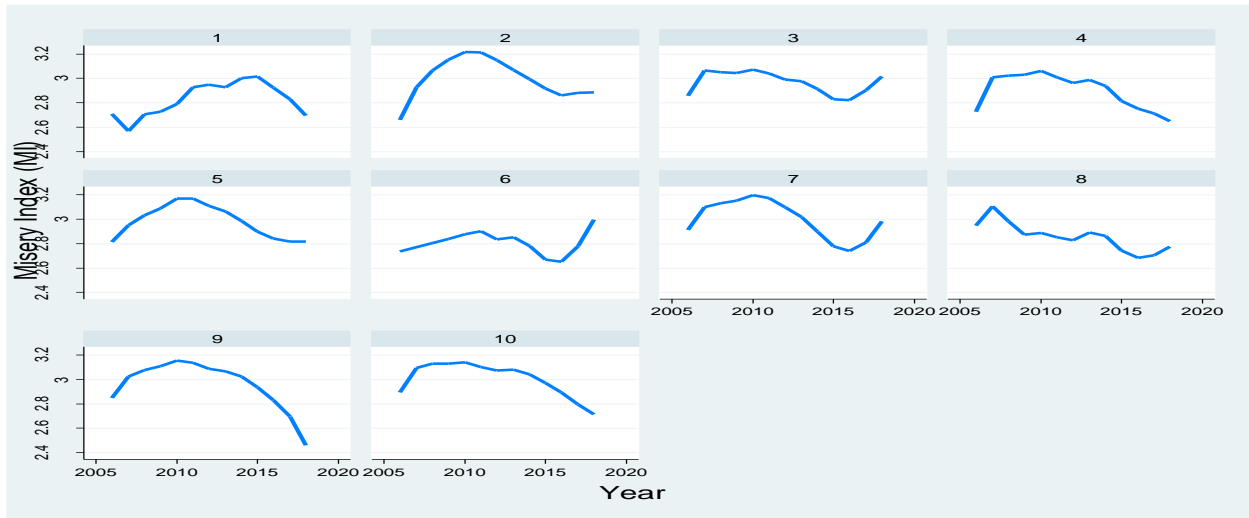
Source: Study Panel Data (2005—2018)

**Graph A 7-1. Unemployment and Inflation Rate of each SNG (Region)**



Source: Study Panel Data (2005—2018)

**Graph A 7-2. Misery Index (MI) of each SNG (Region)**



Source: Study Panel Data (2005—2018)

panel-data-2005-2018

Year	SNG	Fed_Gra_cap	cap_exp_cap	Eduexpperc	Health_exp_cap	Rev_Decntra	ExpDec
2005	1	65.19404237	19.3317466	45.75268948	17.6837978	0.077476794	0.019564559
2006	1	81.08897179	43.47355023	71.33703826	20.08256775	0.065730573	0.021252997
2007	1	106.0509742	24.27497742	72.2893643	20.9405025	0.098654504	0.024876093
2008	1	107.9405442	34.36868951	98.87692833	27.85979446	0.081146216	0.035291456
2009	1	117.0718755	63.55816997	105.7777524	37.53695368	0.084585175	0.020593797
2010	1	135.3817338	113.3926672	118.9289215	42.65870716	0.119842133	0.024378807
2011	1	158.2665335	160.5062328	161.271623	48.9418839	0.124458166	0.026233267
2012	1	66.99660007	416.9386401	224.3229528	68.34339798	0.149605193	0.028290439
2013	1	79.75625481	579.3737384	287.9775661	83.44190042	0.204215666	0.019960141
2014	1	69.77541152	674.362156	303.0350288	106.5308308	0.097100489	0.018641931
2015	1	284.8070065	716.9859794	432.1315339	151.5862559	0.320842808	0.020610304
2016	1	236.5641724	789.1768484	486.7040634	176.2429024	0.321277501	0.021688907
2017	1	576.5231303	882.9586991	737.9285339	237.467966	0.261060236	0.024930177
2018	1	280.1781364	811.7486787	760.1884625	262.1266645	0.159835879	0.032821679
2005	2	131.6017437	45.3294487	22.77679973	17.02930297	0.375838465	0.023313654
2006	2	175.4896564	52.26408688	34.72313799	20.5145906	0.367473887	0.023901523
2007	2	213.3325594	24.31539361	28.97503244	17.21934312	0.353149634	0.029199112
2008	2	248.2216779	49.20943511	46.31010545	31.14952978	0.371450882	0.03192752
2009	2	290.475157	91.17663499	63.77918114	42.80167106	0.500647425	0.020918306
2010	2	373.8918207	136.774089	79.83513773	43.11231361	0.575237246	0.019798229
2011	2	1026.025088	652.1605406	211.3953071	149.5896171	0.59237759	0.020720659
2012	2	516.3781715	446.3689854	124.0316556	87.40628714	0.890523007	0.022463499
2013	2	566.669416	644.4919332	188.9559505	120.6389493	0.895984885	0.01611569
2014	2	634.1865937	601.3735286	200.2548122	114.974291	0.905191303	0.016369479
2015	2	873.8853541	836.603034	280.0412217	171.2493215	0.709548752	0.019882125
2016	2	1052.189565	832.6499552	279.9924934	211.5841252	0.786805476	0.019066195
2017	2	1607.314623	1012.761726	392.4390088	251.8275634	0.633194325	0.02241402
2018	2	1643.081749	395.5758824	392.7679245	308.9127009	0.834392033	0.019861708
2005	3	53.43723709	9.212198026	29.43522686	8.35760749	0.165593325	0.008539538
2006	3	74.81869181	9.541668258	36.0756884	8.527729109	0.106974848	0.009686536
2007	3	99.99272522	10.20065978	44.37866499	10.9220939	0.105064751	0.010472305
2008	3	143.3100778	26.15185918	67.84339907	17.74891315	0.16697202	0.008906444
2009	3	172.4022359	37.61413517	86.12075122	22.32718615	0.179201095	0.004895037
2010	3	196.1127625	75.54839715	97.89345322	25.41357628	0.185184231	0.005482239
2011	3	228.2689396	96.48785652	116.2831306	29.73350132	0.226340274	0.005853804
2012	3	238.4394645	201.3791696	184.9939865	46.75791694	0.321174801	0.0063973
2013	3	260.0178318	309.6172631	228.2575686	73.90691754	0.356840578	0.004881117
2014	3	311.4893934	372.2018006	267.8481167	94.09379808	0.40009176	0.004840057
2015	3	486.9744043	396.208759	357.8001784	145.4779815	0.374412587	0.005897692
2016	3	521.7429974	392.2855462	378.5588963	145.1062872	0.33232035	0.00566261
2017	3	842.6881303	456.350734	571.7311784	212.9624505	0.262539403	0.006833138
2018	3	850.9708983	420.5475874	609.3172323	222.5412371	0.314740052	0.006029013
2005	4	42.11199678	12.72067267	28.6094234	5.959412533	0.242306342	0.058555964
2006	4	62.55529055	12.93504991	36.0520044	7.430225686	0.182263464	0.064982981
2007	4	48.46548883	21.66111749	47.10495886	11.85174443	0.176488603	0.077693691
2008	4	118.2247814	37.52646799	62.44458437	21.45831556	0.172664551	0.092588204
2009	4	135.8452933	44.3059803	77.1099715	27.95421718	0.195448208	0.059385299
2010	4	156.4967392	58.97136743	83.69822599	32.06516818	0.229678037	0.057671415
2011	4	178.1122969	78.12086109	114.6804319	38.58883807	0.275936924	0.059694717
2012	4	214.8007076	152.3619654	133.7884292	56.79795481	0.334941057	0.065594997
2013	4	198.5956451	279.5512199	172.5036284	76.88595337	0.42292451	0.04710553
2014	4	204.3651409	314.2247329	198.6507245	92.36816424	0.150673189	0.04594637

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2015	4	325.9224283	345.9906902	272.7317712	120.8599625	0.400675579	0.052531713
2016	4	426.5584774	328.6423896	275.8134245	151.1298657	0.43227797	0.053699698
2017	4	724.6139419	386.0768305	442.8660492	171.9226789	0.369164714	0.062169905
2018	4	855.0902359	286.7344641	463.2201863	196.4448636	0.350961203	0.068056248
2005	5	77.07403546	35.36603346	10.89490866	5.958503675	0.134895962	0.012470277
2006	5	95.70126113	49.90951426	18.23078187	11.55215014	0.124860738	0.013717338
2007	5	119.7973096	46.16795434	19.33570679	14.66906224	0.097183552	0.01580207
2008	5	165.5891907	78.4030796	23.12807447	23.86239035	0.088836813	0.016344614
2009	5	212.9055921	82.37950557	24.72899813	34.43423837	0.131704469	0.009020629
2010	5	290.3404484	143.2031012	39.1028002	33.6692461	0.109779325	0.009521136
2011	5	367.4655446	206.5766711	86.88126457	58.15666773	0.084963519	0.020720659
2012	5	429.7484728	344.2618582	95.11212122	63.49627541	0.18358174	0.011474162
2013	5	447.3046477	555.6317139	109.3037823	63.27195437	0.176600674	0.007920127
2014	5	606.9043758	415.3946354	132.8191461	85.25925089	0.234129484	0.007224047
2015	5	624.7828557	805.5483605	208.0146265	117.4272716	0.241148017	0.008087466
2016	5	777.8804599	697.356597	274.1624916	180.6417077	0.247451145	0.008324935
2017	5	1179.760348	1241.160649	350.9761512	163.3977467	0.201911752	0.009908422
2018	5	1913.913859	1438.79132	281.0685121	183.1092392	0.258914229	0.009786848
2005	6	166.1242059	47.06894434	52.18874268	21.76938676	0.322281012	0.065523792
2006	6	217.3748914	83.02940769	68.34242615	27.20858151	0.235095576	0.072836396
2007	6	252.3268396	82.94850794	100.9040494	27.10666884	0.17609692	0.092246962
2008	6	212.4511436	76.71817669	98.13034378	35.22816303	0.155709742	0.117185271
2009	6	212.9055921	51.3660868	114.9196681	40.28177067	0.220299791	0.074648288
2010	6	352.7859404	50.44151826	134.0099074	54.58106381	0.218390885	0.065920796
2011	6	416.5512217	130.8789821	178.2841332	76.20336011	0.267191155	0.06972591
2012	6	441.9952746	331.6994736	247.5217098	101.8496309	0.367456444	0.076343132
2013	6	520.7486788	451.1789457	295.6413002	152.3541879	0.405642153	0.053396414
2014	6	571.6503013	531.08058	314.7840717	231.1211245	0.392805285	0.053052328
2015	6	902.2491412	789.9807868	492.7845305	316.1499116	0.376691661	0.065644882
2016	6	1118.123839	746.389481	537.3844565	323.4098761	0.403771464	0.062035064
2017	6	1769.360072	886.4931357	919.2732933	410.0041259	0.336409069	0.073771746
2018	6	1576.232508	719.6820577	940.7274863	494.8963291	0.372185442	0.073172539
2005	7	52.4823989	11.96779683	32.99621366	6.176010939	0.08939092	0.006141016
2006	7	71.9304795	26.57888785	42.24092717	10.85063444	0.087211033	0.006396569
2007	7	92.2814047	17.0260726	49.46926109	11.92197393	0.094710285	0.0075944
2008	7	123.9597488	22.31174452	58.12177085	16.14226334	0.126428817	0.006133472
2009	7	156.6309062	40.08129373	64.17784034	19.33726529	0.179969552	0.00324205
2010	7	183.9029801	63.44581945	86.4626639	28.35864943	0.140226461	0.004568669
2011	7	215.5475118	80.41575899	102.7080288	36.82786757	0.175555661	0.004705516
2012	7	238.6930677	237.9222525	147.658006	54.33221673	0.237843874	0.005096534
2013	7	243.0736129	300.7191051	175.3035365	85.24033795	0.258001423	0.003544862
2014	7	421.6554839	365.7269128	194.0422401	96.07229956	0.34496738	0.003398315
2015	7	421.0332591	417.7066962	300.9642577	121.788113	0.088189685	0.004247011
2016	7	482.437186	387.7705933	344.0463788	128.8333844	0.320742505	0.003989135
2017	7	755.4640536	428.4745058	464.646533	177.0820379	0.235927007	0.004652606
2018	7	901.183502	473.3643404	502.7986825	217.2292021	0.290302138	0.004310073
2005	8	306.4985153	96.65869484	90.27901267	34.23415574	0.361575219	0.093930264
2006	8	375.887749	62.19539133	132.2026384	27.97425535	0.270776498	0.106886322
2007	8	464.3041549	85.43566212	135.5096573	39.58006901	0.353146637	0.092246962
2008	8	395.5142554	39.11135766	186.8856285	40.04878035	0.181314486	0.161999687
2009	8	460.1964208	48.48558454	192.9267969	56.79219112	0.243894322	0.100808357
2010	8	723.6903144	102.283231	275.1856377	92.90900409	0.263255891	0.094530643
2011	8	880.1646541	213.0032661	296.7984385	109.8346915	0.32665192	0.09804284

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2012	8	983.4315566	874.8757622	404.7843242	231.2830085	0.327896811	0.107176594
2013	8	1053.975845	463.8419535	494.0477956	247.010878	0.465603542	0.076113575
2014	8	1113.844277	702.2077112	503.8907338	266.9571497	0.537730865	0.074488413
2015	8	2339.833803	614.3503738	669.5801937	312.0836362	0.490583086	0.08772454
2016	8	1957.125437	1303.876839	794.2313716	417.7780442	0.428678088	0.086690969
2017	8	3074.175281	656.8468689	1047.595892	466.9406562	0.333219064	0.103639621
2018	8	2915.660889	619.480159	1042.700463	559.3288699	0.341798239	0.116947967
2005	9	301.54856	142.6487131	115.5114396	73.38357804	0.198268228	0.003971121
2006	9	391.7020268	177.9185507	160.2881676	112.6085723	0.204243734	0.004520548
2007	9	457.7662971	42.31836226	160.8823483	69.26059933	0.205063181	0.005076499
2008	9	423.4104091	173.4916781	132.5793922	101.9632137	0.255349494	0.004360238
2009	9	468.0419938	176.3945454	176.1224016	115.7971906	26.0519165	2.55E-05
2010	9	634.0497171	373.4266629	202.5657083	120.6957792	0.23929748	0.002555353
2011	9	778.584922	367.121998	249.465158	111.6243189	0.26503555	0.002633805
2012	9	912.4952925	989.6056033	381.5002626	259.2169779	0.28067988	0.00293851
2013	9	1003.273582	1349.379718	548.0069163	183.4702844	0.394693887	0.002345497
2014	9	1075.5168	2188.761939	464.0959086	201.3864185	0.449683256	0.00231405
2015	9	1160.859788	2383.752978	628.4707691	284.8892105	0.582225717	0.002562747
2016	9	1746.401703	2371.96008	777.5148617	387.8956421	0.478104653	0.002673326
2017	9	2234.136359	3863.489581	542.3826109	845.5961712	0.502121264	0.002961379
2018	9	1403.815463	2505.129117	857.9787145	492.6710085	0.667216667	0.002476646
2005	10	146.4918904	94.14713741	61.9938224	39.04846286	0.377993365	0.004519685
2006	10	230.7297266	72.53128162	81.43871636	37.37756755	0.305332129	0.005060198
2007	10	240.7615898	134.0082084	93.37780431	34.74019754	0.376905444	0.006268462
2008	10	251.5238385	225.8713881	166.8250732	53.42056673	0.40195857	0.006165888
2009	10	246.9078399	234.5023438	186.8998586	61.21006431	0.505630721	0.003499834
2010	10	158.3864508	201.7335623	189.8088993	78.49601727	0.679867624	0.002891066
2011	10	261.8762154	304.8482386	227.9870541	141.1245395	0.594429207	0.002995947
2012	10	232.0728668	702.0164485	354.7106398	190.8426907	0.704540596	0.00332185
2013	10	218.0682998	785.8497141	419.7914112	308.0217376	0.793752086	0.002710564
2014	10	159.1325668	1179.91655	492.397222	333.2895214	0.86945969	0.002683551
2015	10	9.475243426	1495.246952	602.6763127	376.8770495	0.998012666	0.002985182
2016	10	31.5946734	1850.318217	782.8445067	560.6995757	0.988877805	0.003105472
2017	10	900.5653338	2663.310964	1007.874437	588.9244836	0.68500414	0.003540211
2018	10	317.6593863	1855.992048	1054.226756	667.2522093	0.881715942	0.002922912

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CompDec	Tax_poten	TaxDecn	IGT_share	Inflation	exp_comp	RGDPgr
0.079022841	3.474420268	0.044321815	0.400385727	0.11891	0.405201644	
0.067157879	6.082287454	0.062844975	0.869988608	0.126544476	0.490762651	-0.559586525
0.10117125	11.57319296	0.091409792	0.577432063	0.074600935	0.332493097	0.634459019
0.084114748	16.00547962	0.075368002	0.469602307	0.161343813	0.436762929	0.530413151
0.086363732	17.48906446	0.071633491	0.645547537	0.36571908	0.355523705	-0.06687355
0.122836746	41.70043036	0.116857724	0.543560935	0.079525471	0.528865635	0.482162476
0.127811067	52.64776803	0.112603962	0.272594016	0.188639641	0.598678589	0.925733566
0.153960812	69.02876082	0.126727235	0.44034458	0.255767822	0.85188508	-0.323003769
0.208374857	111.8967704	0.177484452	0.391280826	0.147552967	1.168246388	0.158172131
0.098945016	58.53696373	0.082506349	0.499623592	0.105639458	0.713615119	0.060701847
0.327594633	254.3947866	0.260938933	0.108719629	0.094308853	0.916713953	1.554115772
0.328400141	316.0692348	0.260207037	0.122113409	0.064659119	0.698964775	0.10299015
0.267734915	315.8763482	0.187518161	0.143381395	0.106348991	0.877101302	0.255936623
0.165259989	298.1738774	0.124991263	0.216901241	0.066203594	1.066699266	0.069904327
0.384809787	88.37472491	0.318717907	0.094941299		0.3869012	
0.376472144	100.9533068	0.312465637	0.100113294	0.117002249	0.695951343	0.165134907
0.363771437	131.5540222	0.298221997	0.110156918	0.093414307	0.301832765	0.172769547
0.38370152	188.3772222	0.330319783	0.04049498	0	0.34944275	1.018388748
0.511343872	177.6874681	0.241379147	0.0402755	0.242561817	0.594319999	0.086642265
0.586855955	387.1883754	0.450099779	0.04126443	0.341422558	0.813627005	0.121052742
0.604911761	461.8339232	0.421300369	0.03716903	0.009129524	0.434624523	0.260706902
0.910986962	773.767648	0.602693097	0.025702857	0.092732906	1.887254834	-0.490764618
0.910660812	1032.325695	0.683215484	0.012435288	0.270977497	2.315969706	0.900397301
0.920255405	1337.206009	0.723094439	0.007560587	0.160378456	2.452790737	0.363895416
0.723942263	1546.981012	0.554141596	0.029519777	0.081824303	1.874187827	0.044418335
0.802098442	1955.323528	0.616896864	0.020352266	0.136007309	1.692652464	0.186276436
0.647712158	2171.25047	0.482975665	0.040162887	0.104678154	1.318825483	0.211044312
0.851300312	2630.580981	0.613888404	0.01812848	0.046996593	1.141167641	0.073869705
0.167019595	0.707750868	0.083132503	0.251846683		0.035015337	
0.108021199	0.871745658	0.079426359	0.746259639	0.077405453	0.04889055	-0.817365646
0.106176665	1.101808089	0.083081617	0.655103321	-0.291580677	0.034506097	0.279382706
0.168472511	1.721638959	0.12910563	0.247311872	-0.372531176	0.021248622	0.802129269
0.180082606	2.097417807	0.145256136	0.330045498	0.323350668	0.01133601	-0.073350906
0.186205051	3.009804765	0.150740271	0.15951875	-0.006272316	0.010209693	1.018989086
0.227673028	5.019915258	0.193376571	0.005716668	0.101617813	0.020569297	3.494923592
0.323242681	8.14255579	0.265682646	0.347529799	0.362519264	0.044072941	-4.048174858
0.358590903	10.53252968	0.274561348	0.24090994	0.112798691	0.052246928	0.530395985
0.402037645	13.8553133	0.30229675	0.165260322	0.086680412	0.051371433	0.470160961
0.376633858	20.38191793	0.293628087	0.178494099	-0.002636433	0.049687643	0.379329681
0.334212867	21.96315039	0.278337704	0.230952376	0.094848633	0.041958544	-0.043139458
0.264345714	23.70061699	0.206305403	0.253535081	0.038403511	0.034733981	0.365674973
0.316649133	26.20342665	0.240326855	0.253139457	0.144841194	0.02642902	-0.11401844
0.257377319	7.410850302	0.207738754	0.161183873		0.113918826	
0.194930638	7.034824335	0.156348166	0.242632652	0.142717123	0.19562307	-0.093780518
0.191355736	9.139814704	0.152015793	0.424044421	0.153081417	0.129916921	-0.309147358
0.190282463	12.3540692	0.145833612	0.204163157	0.226277113	0.081995279	1.026033401
0.207787745	17.20821124	0.160752639	0.403751465	0.326180696	0.120146953	-0.447945118
0.243734554	20.80217334	0.162066334	0.278223906	0.039441586	0.164263606	0.532889366
0.293454614	30.31514358	0.187398104	0.0726569	0.179753304	0.164866716	1.501451015
0.358453835	46.2244865	0.240711213	0.309284997	0.323625565	0.413043976	-1.346517563
0.443831425	72.1775167	0.319044879	0.091969738	0.145800591	0.448112309	1.230989456
0.157929475	28.43906978	0.106961536	0.275928213	0.084000111	0.462165862	-0.547856808

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0.422890755	113.7793674	0.301142746	0.149685967	0.043041229	0.360617697	0.610124111
0.456808445	140.942033	0.308218386	0.096119178	0.048383713	0.286125839	0.579089642
0.393637094	165.8501653	0.259658575	0.113518116	0.083921432	0.219195873	0.282108307
0.376590542	178.9433695	0.237921581	0.116418636	0.102428913	0.199505702	0.151145935
0.136599394	5.138293922	0.11006216	0.399972408		0.194804475	
0.126597316	6.730781582	0.115321259	0.043826894	0.07468462	0.181924134	2.49894762
0.098743911	6.695120289	0.089095554	0.273603552	0.135123253	0.064699978	-1.636160374
0.090312943	7.540638057	0.082056173	0.337848832	0.192960978	0.078063861	-0.059448242
0.132903341	12.0098034	0.120191841	0.127139645	0.242395639	0.12581037	1.134508133
0.110834596	12.88216301	0.098928015	0.231444621	0.120040417	0.129123122	-0.346605778
0.08676127	23.73776755	0.06879428	0.575721961	0.178807735	0.469906598	0.098196507
0.185712637	33.97984447	0.164615187	0.291709096	0.255669594	0.276068717	-0.006740093
0.17801054	59.93781514	0.256427788	0.228256115	0.165180683	0.344384491	0.338225365
0.235833154	82.14751543	0.319780423	0.16943747	0.105443001	0.285551727	0.410551071
0.243114195	82.14751543	0.229819563	0.171890809	0.023849964	0.289090246	0.306230545
0.249528453	99.42790466	0.228240056	0.170044478	0.142060757	0.230931193	0.196478844
0.2039324	115.6959733	0.184950405	0.242524	0.088020325	0.202542812	0.068651199
0.261473227	158.4703529	0.23843279	0.124496392	0.077702045	0.055862863	0.688832283
0.344878777	348.9130024	0.259562133	0.064192623		1.082065105	
0.253564285	314.286885	0.185062986	0.139722872	0.123573542	0.86935842	-0.441212654
0.193992102	344.1283636	0.143155507	0.12685773	0.171485424	0.769178152	0.386624336
0.176378732	465.5934675	0.128955451	0.119438502	0.227027178	1.961125374	0.420177937
0.238071414	761.0769535	0.167962621	0.27228175	0.298092604	2.604955435	-0.639215946
0.23380339	929.842109	0.18820626	0.141793128	0.007261753	3.783693075	0.781327724
0.287217668	1315.901727	0.206810848	0.108732544	0.148039341	3.716890812	0.417312622
0.397827869	2219.824416	0.294948494	0.224938737	0.291369438	6.570775986	-0.683346272
0.428523787	2796.996415	0.323894931	0.140722954	0.136716843	8.0710783	0.555669785
0.414812029	3084.326894	0.298347215	0.137924482	0.074429035	8.120734215	0.20070219
0.403156845	3295.149381	0.207256079	0.139489938	0.050746441	5.707899094	0.43555975
0.430476075	5419.564697	0.30466293	0.109650564	0.087121487	4.97140789	0.309657097
0.363203203	6135.526941	0.240398282	0.148464383	0.096615791	3.972367287	0.176375389
0.401569287	7408.593858	0.272067383	0.156470871	0.123580933	3.857083559	-0.042743683
0.089943263	0.552624195	0.080459334	0.337407235		0.032465056	
0.087772475	0.6241652	0.076764024	0.964952824	0.161006927	0.016562408	-0.846710682
0.095435057	0.919321965	0.085207404	0.878550402	0.137942791	0.017026141	0.305055141
0.12720905	1.008103837	0.097851679	0.338161725	0.195308685	0.005531924	0.794395924
0.18055492	1.832916068	0.170840275	0.263904767	0.445733786	0.005427012	0.399402618
0.140870049	2.454389172	0.131481484	0.090007434	-0.033380032	0.009548041	1.528406143
0.176385646	2.736200018	0.116882145	0.091411105	0.107303619	0.015776752	0.180270195
0.239062263	5.786859699	0.211265752	0.663044953	0.34291172	0.054587897	-1.870536327
0.258919256	7.085938962	0.226717972	0.202025514	0.110816002	0.024566632	1.257725239
0.346143685	8.747591935	0.242300595	0.295607523	0.087664127	0.031644888	-0.325390816
0.088565826	3.266027319	0.058241555	0.773487842	0.037178993	0.019482773	-0.219614029
0.322027115	16.32899102	0.261840364	0.340263258	0.078120232	0.034164913	0.642586708
0.237029813	14.92566466	0.17008676	0.434598535	0.040729523	0.01232187	0.206856728
0.291558778	20.65467294	0.236203324	0.142385836	0.092001915	0.00986896	1.062942505
0.399058929	1502.583118	0.314615203	0.056384304		3.400087833	
0.303182567	1427.922673	0.231178719	0.103725298	0.096245289	2.920517445	-0.213837147
0.389033825	1867.630822	0.313474458	0.107483726	0.174217224	3.685734749	-0.290792465
0.216365655	1998.974044	0.161592937	0.062262255	0.243352175	6.687044621	1.437720299
0.27123731	4626.489459	0.305058058	0.118403729	0.33053875	7.581297398	-0.503816128
0.290739702	3774.945838	0.21498539	0.10620739	0.01119566	5.799571037	0.250225067
0.362159018	7127.036289	0.321410956	0.094857656	0.180663586	6.126336575	0.242395401

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0.367258305	7127.036289	0.27216363	0.200764042	0.310486794	10.21165752	-0.562456608
0.503961882	11791.12678	0.386492489	0.077711141	0.107402325	16.42038918	0.870691776
0.581009328	16176.12595	0.449650801	0.056827708	0.075729847	15.97864151	0.341611862
0.537757626	21509.09299	0.408467565	0.064682608	0.112728119	11.32690048	0.337283134
0.46936806	22662.79893	0.367837217	0.090935827	0.099169254	9.674629211	-0.07157135
0.371746757	24640.57683	0.277279746	0.146774444	0.029076576	8.076888084	0.051146507
0.387064664	31176.93317	0.289036756	0.160526142	0.074085236	6.019786358	0.076007843
0.199058715	56.6058275	0.16094624	0.227609868		0.405589074	
0.20517122	77.04833267	0.16932593	0.386706571	0.118284702	0.391003072	-0.268462658
0.206109496	94.34304583	0.165194197	0.589076807	0.136336565	0.074099019	-0.265033245
0.256467754	127.4538263	0.219764802	0.440488691	0.177876472	0.299145579	0.212655067
26.05258134	117.7020211	17.60081315	1.421366788	0.353739977	26.37744141	-1.071273327
0.239910536	151.8106608	0.183615008	0.477369976	0.066465378	0.451658219	1.39465189
0.265735446	189.3664502	0.182504275	0.187099786	0.175431252	0.353817344	1.142000675
0.281507092	299.2216699	0.239261555	0.166770332	0.246961117	0.791299224	0.273729324
0.395621817	497.2059944	0.303623466	0.081729621	0.11390543	0.824008822	0.808041573
0.450726259	721.0439421	0.370394545	0.077265107	0.101026535	1.124346256	0.125706673
0.583721648	1279.663631	0.477565245	0.036989371	0.076780319	0.889604211	0.812972069
0.479386209	1376.592039	0.415963657	0.057272691	0.086288452	0.716731012	-0.02879715
0.503612652	1795.692877	0.405991767	0.054456329	0.100610256	0.87350142	0.296722412
0.668873229	2049.375884	0.515057844	0.213619629	0.0108881	0.629597783	-1.831459045
0.379709532	63.66707137	0.300069555	0.01337307		0.443724573	
0.306885028	72.43986585	0.268314348	0.033820435	0.104191542	0.268652529	-0.473545074
0.379282965	80.92416065	0.216495516	0.160055442	0.144176245	0.358510107	-1.51189518
0.404452378	110.6636695	0.254570074	0.030487476	0.209194899	0.519592404	1.701934814
0.507406559	133.4551443	0.274526226	0.017678551	0.287928581	0.482386351	0.526441574
0.681838866	170.2628953	0.343400793	0.036181635	0.053249836	0.406872898	-1.160177231
0.596215437	190.794456	0.304977385	0.035868059	0.136985779	0.487287074	0.511538506
0.706888774	336.6791283	0.449289003	0.042202017	0.219163418	0.93682009	-0.28344059
0.79590945	536.9700321	0.535311699	0.021067279	0.1065135	0.783421516	0.63250351
0.871799207	715.6715431	0.598083791	0.012043416	0.156134129	0.986049891	0.244132042
1.001000835	1172.005914	0.70840909	0.000358954	0.104208469	0.903787971	0.692023277
0.991958304	1627.811369	0.798841954	0.000830355	0.045375824	0.908034861	0.36564827
0.687437815	1506.954044	0.537690592	0.023707076	0.105100155	0.950284421	-0.001642227
0.884300675	1829.496688	0.735016027	0.007368223	0.029973507	0.74565959	0.126554489

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pubinv	ruroad	enroll	realgdp	FDI	Un_Rate	stability
			5.260093212	0.265111675	2.5	
38.67334747	0.665727496	91	4.700506687	0.545257102	2.47	2.596544504
22.11003685	0.069467157	101.5	5.334965706	0.222000573	2.435	2.509600878
34.36869049	0.746741593	104.8000031	5.865378857	0.108537544	2.406	2.567343712
49.86871719	2.959214211	109	5.798505306	0.221459581	2.38	2.745719194
80.5947876	6.0905509	107.0999985	6.280667782	0.288271568	2.339	2.418525457
159.0475922	10.13618374	103.3000031	7.206401348	0.628624806	2.312	2.500639677
380.0132141	7.843845844	102.0999985	6.883397579	0.278562822	2.287	2.542767763
441.849884	5.362955093	100.0999985	7.04156971	1.343876024	2.25	2.397552967
574.4359741	8.35158062	98.80000305	7.102271557	1.855052154	2.262	2.367639542
660.6552734	14.91816235	105.3000031	8.656387329	2.626517918	2.274	2.368308783
688.8221436	7.851947784	118.8000031	8.75937748	4.142937496	2.288	2.352659225
795.2055054	6.211287022	114.0999985	9.015314102	4.017159565	2.299	2.405349016
774.4816284	1.685647488		9.08521843	3.360419369	2.318	2.384203672
			6.531864643	0.265111675	2.5	
48.50295258	24.47672653	20.89999962	6.69699955	0.545257102	2.47	2.587002277
21.24213219	12.75976181	21.89999962	6.869769096	0.222000573	2.435	2.528414249
40.57387161	9.420034409	22.20000076	7.888157845	0.108537544	2.406	2.405999899
71.55047607	17.72867966	26.20000076	7.97480011	0.221459581	2.38	2.622561932
121.3028336	49.3746376	31.20000076	8.095852852	0.288271568	2.339	2.680422544
545.3800049	25.3922081	39.29999924	8.356559753	0.628624806	2.312	2.32112956
345.6670837	43.45659637	40.09999847	7.865795135	0.278562822	2.287	2.379732847
546.3621826	64.4573822	43.70000076	8.766192436	1.343876024	2.25	2.520977497
541.1915283	188.0583649	50.5	9.130087852	1.855052154	2.262	2.42237854
816.8861084	155.3480682	53.20000076	9.174506187	2.626517918	2.274	2.355824232
722.3807983	3.894590616	70.30000305	9.360782623	4.142937496	2.288	2.424007416
927.4289551	110.1673813	66.19999695	9.571826935	4.017159565	2.299	2.403678179
366.0025635	407.790863		9.64569664	3.360419369	2.318	2.364996672
			6.491670609	0.265111675	2.5	
8.432513237	0.130988836	75.90000153	5.674304962	0.545257102	2.47	2.547405481
8.593162537	0	93	5.953687668	0.222000573	2.435	2.143419266
20.84039688	0	93.09999847	6.755816936	0.108537544	2.406	2.033468723
27.91843224	0	112.4000015	6.68246603	0.221459581	2.38	2.703350782
75.00177765	0.12671873	112.5	7.701455116	0.288271568	2.339	2.332727671
83.21087646	0.482143223	104.9000015	11.19637871	0.628624806	2.312	2.413617849
150.4784241	0.620728612	104.1999969	7.14820385	0.278562822	2.287	2.649519205
270.0535889	1.112427473	100.3000031	7.678599834	1.343876024	2.25	2.362798691
345.5050354	3.749874115	100.6999969	8.148760796	1.855052154	2.262	2.348680496
376.6040955	0.609058797	106.6999969	8.528090477	2.626517918	2.274	2.271363497
359.555481	0.774490535	110.3000031	8.484951019	4.142937496	2.288	2.38284874
414.3231506	2.255625963	111.5999985	8.850625992	4.017159565	2.299	2.337403536
371.6589355	1.210610986		8.736607552	3.360419369	2.318	2.462841272
			5.785687447	0.265111675	2.5	
11.74814606	1.201448917	87.5	5.691906929	0.545257102	2.47	2.612717152
18.19781303	0.520978868	97	5.382759571	0.222000573	2.435	2.58808136
29.42058372	0.743121922	91.40000153	6.408792973	0.108537544	2.406	2.632277012
31.83545876	0.349505156	91.40000153	5.960847855	0.221459581	2.38	2.706180811
58.31482697	0.302050263	88.90000153	6.493737221	0.288271568	2.339	2.378441572
65.20874786	0.357575804	88.40000153	7.995188236	0.628624806	2.312	2.49175334
111.6950378	2.684788704	94.80000305	6.648670673	0.278562822	2.287	2.610625505
251.0829315	3.918455124	92	7.87966013	1.343876024	2.25	2.395800591
291.3072205	3.383038521	91.19999695	7.331803322	1.855052154	2.262	2.346000195

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309.105896	2.886646748	89.30000305	7.941927433	2.626517918	2.274	2.317041159
297.6150208	2.712164164	94.80000305	8.521017075	4.142937496	2.288	2.33638382
375.0126953	3.627950668	104.3000031	8.803125381	4.017159565	2.299	2.382921457
266.259491	3.698322058		8.954271317	3.360419369	2.318	2.420428991
			5.796140194	0.265111675	2.5	
43.97702026	1.531082392	23.29999924	8.295087814	0.545257102	2.47	2.544684649
42.84911728	0.511693418	30.29999924	6.658927441	0.222000573	2.435	2.570123196
66.72097015	0.388398379	38.5	6.599479198	0.108537544	2.406	2.598960876
57.14645386	1.513549209	32.70000076	7.733987331	0.221459581	2.38	2.622395754
132.2558746	13.15281105	35	7.387381554	0.288271568	2.339	2.459040403
171.0630035	3.046729803	65.59999847	7.48557806	0.628624806	2.312	2.490807772
266.569519	49.19031525	61.29999924	7.478837967	0.278562822	2.287	2.542669535
479.4082947	0	75.09999847	7.817063332	1.343876024	2.25	2.415180683
373.7508545	0	96.90000153	8.227614403	1.855052154	2.262	2.367443085
733.050415	0	84.80000305	8.533844948	2.626517918	2.274	2.297849894
653.6928101	104.0199051	91.69999695	8.730323792	4.142937496	2.288	2.430060863
1115.941284	57.41773605	95.90000153	8.798974991	4.017159565	2.299	2.38702035
1346.622437	0		9.487807274	3.360419369	2.318	2.395702124
			6.724374771	0.265111675	2.5	
76.84489441	13.98778915	107.4000015	6.283162117	0.545257102	2.47	2.59357357
111.0300369	31.25569344	122.5	6.669786453	0.222000573	2.435	2.606485367
111.3490601	66.91770172	127.9000015	7.08996439	0.108537544	2.406	2.633027077
37.17467499	93.92890167	112.3000031	6.450748444	0.221459581	2.38	2.678092718
50.75888443	393.9969177	112.0999985	7.232076168	0.288271568	2.339	2.34626174
118.2327728	422.4561768	114.5999985	7.64938879	0.628624806	2.312	2.460039377
230.8365936	1329.362183	119.6999969	6.966042519	0.278562822	2.287	2.578369379
403.0518494	2107.406982	115.9000015	7.521712303	1.343876024	2.25	2.386716843
486.985199	1709.514404	111.9000015	7.722414494	1.855052154	2.262	2.336429119
792.06604	2498.087402	95.40000153	8.157974243	2.626517918	2.274	2.32474637
678.8491821	828.5296021	107	8.46763134	4.142937496	2.288	2.375121593
853.0940552	755.4147949	109.5999985	8.644006729	4.017159565	2.299	2.395615816
622.6400757	685.8134155		8.601263046	3.360419369	2.318	2.441581011
			6.811677456	0.265111675	2.5	
23.04387283	6.133869171	78.90000153	5.964966774	0.545257102	2.47	2.631006956
14.60939026	12.51037025	89.40000153	6.270021915	0.222000573	2.435	2.572942734
17.7935524	9.514872551	97.80000305	7.064417839	0.108537544	2.406	2.601308584
28.92566299	9.842645645	102.9000015	7.463820457	0.221459581	2.38	2.8257339
60.99211502	27.90284348	101	8.992226601	0.288271568	2.339	2.305619955
67.18547058	29.78826714	97.30000305	9.172496796	0.628624806	2.312	2.419303656
172.1417389	101.1287155	102.5999985	7.301960468	0.278562822	2.287	2.629911661
259.9205017	267.7179565	100.6999969	8.559685707	1.343876024	2.25	2.360816002
336.2607727	251.8354797	98.40000153	8.234294891	1.855052154	2.262	2.349664211
400.1094666	280.2940063	100.3000031	8.014680862	2.626517918	2.274	2.311178923
369.4554749	209.6786194	108.4000015	8.65726757	4.142937496	2.288	2.366120338
393.9838867	174.5235443	115.5	8.864124298	4.017159565	2.299	2.339729548
427.2786255	147.0040741		9.927066803	3.360419369	2.318	2.410001993
			6.615897179	0.265111675	2.5	
52.94607544	20.92349052	127.4000015	6.402060032	0.545257102	2.47	2.566245317
74.42714691	95.98620605	137.1000061	6.111267567	0.222000573	2.435	2.609217167
32.17224503	100.4364395	181.3999939	7.548987865	0.108537544	2.406	2.649352074
31.04794502	85.9236908	121.4000015	7.045171738	0.221459581	2.38	2.710538864
105.7550888	256.714325	112.5	7.295396805	0.288271568	2.339	2.350195646
191.33078	649.3779907	125.0999985	7.537792206	0.628624806	2.312	2.492663622

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620.9001465	1738.770264		132	6.975335598	0.278562822	2.287	2.597486734
415.1864929	585.0784302		138.5	7.846027374	1.343876024	2.25	2.357402325
643.2704468	666.5036621	126.5999985		8.187639236	1.855052154	2.262	2.337729931
591.928833	0	136.3999939		8.524922371	2.626517918	2.274	2.386728048
1205.89502	424.0966492	151.3999939		8.453351021	4.142937496	2.288	2.387169361
630.6312256	579.1052246	154.3999939		8.504497528	4.017159565	2.299	2.328076601
565.0299072	699.4584351			8.580505371	3.360419369	2.318	2.392085314
				7.189053059	0.265111675	2.5	
158.0704956	0	92.40000153		6.920590401	0.545257102	2.47	2.588284731
36.92484665	0	103.0999985		6.655557156	0.222000573	2.435	2.571336508
145.220459	26.19659424	116.8000031		6.868212223	0.108537544	2.406	2.583876371
123.8391342	46.20476151	108.4000015		5.796938896	0.221459581	2.38	2.733740091
349.4134827	108.2233734	107.9000015		7.191590786	0.288271568	2.339	2.405465364
308.050354	77.45014954	95.30000305		8.333591461	0.628624806	2.312	2.487431288
773.0513306	318.0709229	91.5		8.607320786	0.278562822	2.287	2.533961058
1204.108643	445.296936	89.30000305		9.415362358	1.343876024	2.25	2.36390543
1978.441162	529.3355103	87.09999847		9.541069031	1.855052154	2.262	2.363026619
2207.578125	808.9750366	98.09999847		10.3540411	2.626517918	2.274	2.350780249
2175.869385	282.2239075	101.8000031		10.32524395	4.142937496	2.288	2.374288559
3493.696777	780.3270874	107.9000015		10.62196636	4.017159565	2.299	2.399610281
2478.000488	478.8553467			8.790507317	3.360419369	2.318	2.328888178
				9.301482201	0.265111675	2.5	
65.35449982	0.197131321	83.90000153		8.827937126	0.545257102	2.47	2.57419157
116.0156097	55.7078476	79		7.316041946	0.222000573	2.435	2.579176188
183.2352448	96.38614655	80		9.017976761	0.108537544	2.406	2.615194798
175.8334351	0	86.30000305		9.544418335	0.221459581	2.38	2.667928696
191.2722626	68.63548279	92.09999847		8.384241104	0.288271568	2.339	2.392249823
265.8224487	43.96129608	91.30000305		8.89577961	0.628624806	2.312	2.448985815
563.8527222	62.93132019	89.09999847		8.61233902	0.278562822	2.287	2.506163359
706.4499512	96.67292786	87.30000305		9.244842529	1.343876024	2.25	2.3565135
1009.353027	0	84.90000153		9.488974571	1.855052154	2.262	2.418134212
1347.273193	0	91.40000153		10.18099785	2.626517918	2.274	2.378208399
1768.235474	0	67.5		10.54664612	4.142937496	2.288	2.333375931
2397.603271	0	70.19999695		10.54500389	4.017159565	2.299	2.40410018
1801.187012	0			10.67155838	3.360419369	2.318	2.347973585