

MACROECONOMIC DETERMINANTS OF VAT REVENUE IN NEPAL

A Thesis

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IN
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DECLARATION

I, hereby, would like to declare that this thesis entitled **MACROECONOMIC DETERMINANTS OF VAT REVENUE IN NEPAL** which I have submitted to the Department of Economic, Patan Multiple Campus, Tribhuvan University, in partial fulfillment of the requirement for the Degree of **MASTER OF ARTS in ECONOMIC**, is entirely my original work prepared under the guidance of my supervisor. I have made due acknowledgements to all ideas and information thesis have not been prepared or submitted anywhere else for the award of any degree. I shall solely responsible for any evidences found against my declaration.

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This thesis entitled MACROECONOMIC DETERMINANTS OF VAT REVENUE IN NEPAL has been prepared by Ms. BISHUMNA PANTA under my guidance and supervision. I, hereby, recommend it in partial fulfillment of the requirement for the degree of MASTER OF ARTS in ECONOMICS for final examination.

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LETTER OF APPROVAL

We certify that this thesis entitled MACROECONOMIC DETERMINANTS OF VAT REVENUE IN NEPAL submitted by Miss. BISHUMNA PANTA to the Department of Economics, Faculty of Humanities and Social Sciences, Patan Multiple Campus, Tribhuvan University, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

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ABSTRACT

For Nepal, VAT is a substantial source of revenue that is essential to maintaining both fiscal stability and economic progress. This study examines how Nepal's VAT revenue is affected by macroeconomic variables such as GDP, gross domestic consumption (C), imports (I), and government expenditure (GE). The study makes utilizes secondary data from government publications, economic surveys, and Nepal Rastra Bank reports. The connection between the variables was studied using an Autoregressive Distributed Lag (ARDL). The findings show the strong correlation between Nepal's VAT revenue and important macroeconomic determinants like GDP, consumption, imports, and government expenditures all of which have consistently grown over time. These variables have a positive and significant impact on VAT revenue, according to the ARDL model's results. VAT revenue rises by 0.45% for every 1% increase in GDP, while government expenditure adds 0.25% and imports and consumption contribute 0.32% and 0.28%, respectively. Growth in VAT revenue is mostly driven by GDP and government expenditures over the long run, whereas imports and consumption have impact on short run. In order to further increase VAT revenue and assist Nepal's fiscal stability and development, our findings show the necessity of policies that promote economic growth, increase the effectiveness of public revenue, stable trade, and improve tax compliance systems. In conclusion macroeconomic determinants have a significant impact on Nepal's VAT revenue. In order to maximize VAT revenue, policymakers must prioritize stable trade policies, promoting economic growth, and increasing the effectiveness of government expenditures. Strengthening the nation's fiscal framework can be achieved by improving compliance mechanisms and addressing possible negative causes.

Keywords: VAT revenue, GDP, consumption, government expenditure, imports, ARDL model, macroeconomic determinants, Nepal, economic growth, co-integration, autocorrelation, heterosecedasticity, statistical test, economic growth, policy implication.

ABBREVIATIONS

BM	Business Man
C	Gross Domestic Consumption
CBS	Central Bureau of Statistics
CEDA	Central for Economic Development and Administration
DC	Discretionary Change
FY	Fiscal Year
GDP	Gross Domestic Product
GE	Government Expenditure
GNP	Gross National Product
GON	Government of Nepal
I	Import
IRD	Inland Revenue Department
MOF	Ministry of Finance
NRB	Nepal Rastra Bank
SAARC	South Asian Association for Regional Cooperation
UDCs	Under-Developed Countries
VAT/V	Value Added Tax

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CHAPTER I

INTRODUCTION

1.1 Background of the Study

The Value Added Tax (VAT), which was first implemented in France in 1954, has become a key instrument of fiscal policy worldwide. The effectiveness of VAT in collecting taxes and its neutrality across many economic sectors have led to its adoption by more than 160 nations by 2024, including both developed and developing nations. VAT produces more than 20% of tax collections on average in Europe, and it is a major source of revenue in many other regions as well (Ernst et al., 2024) and (Andersen, 2024), it is acknowledged as a major force behind sustainable public finances and economic growth. Moreover, nations like the UK and EU countries modified VAT rates to support individuals and companies during economic downturns like the COVID-19 pandemic while preserving vital revenue streams (Blei, 2020). VAT has increasingly been adopted by countries globally due to its capacity to boost revenue and support economic growth. This tax system enhances fiscal policies and contributes to public investment by providing a stable and equitable source of government revenue (Wang et al., 2023).

The success and implementation of VAT in South Asia have varied. To simplify compliance and unify various indirect taxes, nations such as India implemented the Goods and Services Tax (GST), a variant of VAT. In a similar vein, the main source of income for Bangladesh and Sri Lanka is VAT. VAT continues to play a crucial role in financing regional infrastructure and public expenditure, although problems with administration, compliance, and leakage of revenue. In order to maintain fiscal policy goals, regional initiatives target raising VAT's GDP contribution while resolving inefficiencies (Alavuotunki et al., 2019).

VAT was first implemented in Nepal as a component of a larger fiscal reform program designed to replace ineffective indirect taxes. VAT was first implemented in 1997 and swiftly established itself as a tax system pillar in Nepal. Several outdated taxes, such as the sales tax, contract tax, and entertainment tax, were changed in order to bring the economy into compliance with global best practices for earning revenue and promoting transparency. VAT rates have been changed over time, with the

biggest rise to 13% in 2004 to help solve operational difficulties and income shortfalls (Dahal et al., 2024).

In Nepal, VAT serves as a policy tool to control economic activity in addition to being a source of revenue. It is operated by the Inland Revenue Department (IRD), which is in control of compliance, registration, and collection. As part of a planned strategy to increase the tax base, companies that generate more than Rs. 5 million in sales of commodities and Rs. 2 million in services annually are now obliged to register (Koriala, 2022). But problems still exist, such as a significant informal economy, lax enforcement, and tax fraud.

Nepal's VAT collection significantly contributes to national revenue, with VAT accounting for 23–24% of total revenue between 2019 and 2022. These numbers show possible inefficiencies in enforcement and compliance while also emphasizing its significance to the fiscal system. As Nepal seeks to increase its economic resilience and competitiveness, upgrading VAT procedures, enhancing compliance, and lowering tax evasion are crucial reform areas (IRD, 2023).

The macroeconomic elements that influence Nepal's VAT revenue, including trade volume, inflation, economic growth, and policy frameworks, are the main subject of this study. The study aims to put light on these factors in order to maximise VAT collection and its significance for Nepal's fiscal sustainability. The efficacy of recent digital tax systems and reforms implemented between 2019 and 2024—which take advantage of new opportunities in the global digital economy while addressing modern issues like tax evasion and administrative inefficiencies—is specifically examined (Kunwar et al, 2024; EY, 2023).

Furthermore, by examining the relationship between economic indicators and trends in VAT revenue, the study emphasizes how important GDP growth and trade expansion are to the effectiveness of VAT collection. According to research, economic activity and consumption taxes like VAT are positively correlated, with GDP growth resulting in increased tax compliance and revenue generation (Ayoub et al., 2019). In the meanwhile, the necessity for strong policy changes is highlighted by inflation's dual effects, which increase the taxable base while making compliance more difficult (Durovic et al., 2019).

In addition, the research examines the policy frameworks that oversee Nepal's VAT registration thresholds, which are presently Rs. 2 million for services and Rs. 5 million for products. These benchmarks seek to strike a compromise between administrative viability and tax production, but they are frequently difficult to apply, especially in Nepal's largely not organized economy (Koirala, 2022). By analyzing these dynamics, this study advances our knowledge of VAT's function in fiscal stability and provides policymakers with useful suggestions.

1.2 Statement of the Problem

Value-added tax (VAT) has become important for the modern taxation systems worldwide due to its efficiency in generating government revenue. According to published study, macroeconomic variables including GDP, imports, government expenditures, and consumption all have a big impact on how much VAT is collected. Prior study shows that VAT and GDP are positively correlated, especially in emerging nations (Ayoub et al., 2019; Acosta-Ormaechea et al., 2019). These studies highlight how VAT is extremely subject to shifts in the economy, particularly shifts in consumer expenditure and governmental fiscal policy. Understanding how these macroeconomic factors interact in various national contexts is still difficult, particularly in emerging nations like Nepal whose economic vulnerabilities, tax compliance, and economic structure varies from those of more advanced economies.

VAT is essential to Nepal's government's ability to raise money. With a sizeable portion of tax revenue coming from VAT, it plays a vital role in funding infrastructure and public services. Despite its significance, Nepal's VAT collection has been erratic due to a number of macroeconomic factors, such as government expenditures, imports, consumption patterns, and economic growth. For example, it has been shown that variations in GDP and government expenditure habits have a direct effect on the amount of VAT collected. However, issues including low tax compliance, the existence of the informal sector, and the country's increasingly complex economy pose problems for Nepal's VAT system. The government's capacity to produce sufficient money for economic growth is impacted by these issues, which limit the system's ability to maximize VAT collection (Dahal et al., 2024; Kunwar et al., 2024).

The literature that is currently available on VAT in Nepal has looked at a number of macroeconomic factors that influence VAT revenue. The impact of GDP, imports, and government expenditures on VAT collections has been demonstrated by studies by Dahal et al. (2024) and Kunwar et al. (2024), however they frequently neglect to incorporate these factors into the dynamic macroeconomic context. Furthermore, a large portion of the work currently in publication tends to rely on secondary data and ignores how more recent developments like international trade agreements and digital affect VAT efficiency. The reliable relationships between these macroeconomic variables and VAT remain unclear, especially with regard to their long-term effects and the underlying structural changes in the economy, despite the fact that studies on VAT in Nepal have highlighted trends in revenue growth and the role of external factors (Poudel, 2023; Koirala, 2022).

Examining the connection between macroeconomic factors and VAT revenue in Nepal is crucial given the significance of VAT in the nation's fiscal policy. The following study questions are intended to be addressed by this study:

- What is the trend of macroeconomic determinants and VAT revenue in Nepal?
- How do macroeconomic determinants affect VAT revenue in Nepal?

1.3 Objectives of the Study

The general objective of this study is to analyze the macroeconomic variables affecting VAT revenue collection in Nepal. The specific objectives of the study are

- To study the trend of macroeconomic determinants and VAT revenue in Nepal
- To examine the effect of macroeconomic determinants on VAT revenue in Nepal.

1.4 Significance of the Study

This study examines the relationship between important macroeconomic determinants such as government expenditures, GDP, consumption, imports and the amount of VAT revenue generated in Nepal, making a substantial contribution to empirical

knowledge. The study reveals the direct effects of these factors on VAT revenue, particularly in light of the Nepali economy's structural changes and evolving economic trends. It emphasizes that while changes in imports and consumption patterns create both possibilities and problems for revenue generation, VAT revenue generally rises as Nepal's GDP and government expenditure grow. The study highlights the dynamic interaction between internal fiscal policies and external economic shocks while offering fresh perspectives on the sensitivity of VAT receipts to these variables. By providing a data-driven examination of Nepal's distinct economic structure and its impact on VAT systems, this contribution fills in gaps in the regional literature on taxation and advances the body of knowledge.

From a policy standpoint, the results highlight how crucial it is to change VAT administration in order to improve collection methods and increase the revenue base. Changes to the VAT rates on necessities and luxury items have had conflicting results, thus a balanced strategy is required to preserve revenue while reducing negative effects on consumer behavior. Policies should concentrate on diversifying income sources to lessen dependency on imports, enhancing digital infrastructure for tax compliance, and adjusting thresholds to include more SMEs in order to increase VAT collection. The 2024 budget highlights the government's fiscal plan, which places a strong emphasis on improved tax administration, foreign investment, and domestic consumption as essential components of both fiscal sustainability and economic growth. In addition to indirectly boosting VAT revenues, remittance inflows and consumption stabilization are also essential for achieving the larger economic objectives of lowering fiscal deficits and fostering equitable growth.

1.5 Limitations of the Study

Limitations of the Study are:

- The study is confined to the analysis of VAT revenue and related to macroeconomic determinants from fiscal year 1996/97 to 2022/23.
- The study focuses only on the macroeconomic variables GDP, government expenditure, import and Consumption due to their well-established significant in influencing VAT revenue, as documented in literature.

- Secondary data is used which might affect how accurate, complete, and up-to-date the information is. The econometric models used might have their own limitations and assumptions that could affect the results.

1.6 Outline of the Study

This study is divided into five chapters. The first chapter includes a general background of the study, a statement of the problem, objectives of the study, significance of the study, scopes and limitations of the study, outline of the study. The second chapter is the review of literature that includes an introduction, international and national literature review and study gap. The third chapter is the study methodology describes the introduction, conceptual framework, study design, nature and source of data, data collection method, tools of analysis and operational definition of the variables. The fourth chapter is the data Presentation and Analysis Present the study's Study and findings, along with its statistical conclusions and interpretations. The chapter also addresses how macroeconomic variables affecting Nepal VAT revenue collection. The fifth chapter is summery and conclusion gives an overview of the study's findings, conclusions, discussions, and implications. It also provides proposals for further Study and recommendations for policymakers.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

The review of literature regarding macroeconomic variables affecting the collection of VAT revenues in Nepal is organized in this section into two main contexts: National and International context. Understanding the macroeconomic variables affecting Nepal's VAT revenue and assessing the approaches taken in previous studies are the goals. The review offers a comprehensive examination of VAT's function in economic development and emphasizes the Study gaps by looking at global and regional studies. This method guarantees a thorough comprehension of the effects of VAT on Nepal's economy and guides policy suggestions.

2.2 Literature Review

2.2.1 International Context

Anastasiou et al. (2024) aimed to examine the causal and long-term links between macroeconomic variables like GDP and government expenditures, which is closely related to examining the factors that influence VAT revenue in Nepal. The study looked at both short-term and long-term dynamics using panel co-integration techniques and error correction models (ECMs). From 2015 to 2018, information was gathered for 26 European nations from reliable national and international databases. The analysis found strong long-term relationships, demonstrating the major influence of GDP, consumption, and government expenditure on VAT revenue levels. Due to its brief duration and narrow focus on variables, the study may have missed other significant factors affecting VAT revenue. The conclusions' ability to be applied broadly is limited by the brief time frame (2015–2018) and possible omitted variable bias. This study is relevant to your research since it examines the relationship between macroeconomic factors such as GDP and government expenditures offering valuable information for assessing Nepal's VAT revenue.

Babalola (2024) examined at how government expenditures and Value Added Tax (VAT) affect economic growth, with a particular emphasis on the connection between GDP and VAT. The data from the National Bureau of Statistics (NBS) and the

Central Bank of Nigeria (CBN) Annual Bulletin for the years 1994–2011 were analyzed using Ordinary Least Squares (OLS) regression. The results show that VAT and GDP have a positive connection, indicating that VAT boosts economic growth while government expenditure has a detrimental impact on growth since it prioritizes consumption over capital. The study found a knowledge gap about how to properly manage the negative effects of VAT on citizens and overall welfare. The studies focused on government consumption expenditure, which might not adequately account for the wider effects of VAT on economic growth, is the main limitation. The research is relevant to your study because it offers light on the possible benefits of VAT on economic growth and provides insights into the wider ramifications of VAT in relation to government revenue collection and economic performance.

Jewel, (2022) examined into how VAT affects Bangladesh's GDP and emphasizes how important it is to the country's economic development. The study examines data from 1991–2021 using a co-integration strategy, specifically the Johansen method with a constrained Vector Autoregressive (VAR) model. It indicates that VAT has been crucial to Bangladesh's transformation from a low-income to a middle-income country since it establishes a positive correlation between VAT and GDP. However, other macroeconomic factors are not examined because the study primarily concentrates on the impact of VAT on GDP. Using data from only Bangladesh limits the applicability to other nations. Furthermore, the research skips over the long-term effects of VAT that go beyond GDP. This study offers insights that could be applied to the Nepalese context and is pertinent to your research on the effect of VAT on national economies. Improved VAT policy and more comprehensive fiscal policies in Nepal may benefit from an understanding of the contribution of VAT to economic growth.

Andrejovska and Helcmanovska (2021) aimed to examine how changes in the VAT rate impact the national economies of EU member states, which is consistent with your goal of examining the impact of macroeconomic factors on VAT revenue. To analyze these impacts, the study employed linear regression analysis. Macroeconomic indicators and VAT rate modifications were evaluated using data for 28 EU member states from 2004 to 2018. According to the study, rising VAT rates caused imports and consumer expenditure, to decline. Regarding the long-term economic effects of

VAT changes, there is a study invalid. The study's dependence on linear regression, which might not adequately reflect complex relationships, is one of its limitations. This study is relevant to your research because it sheds light on how tax revenues and macroeconomic factors are affected by VAT modifications, which is relevant when examining VAT revenue in Nepal.

Erero (2021) evaluated how raising the VAT rate from 14% to 15% will affect South Africa's GDP and VAT revenue collection. It used an improved Dynamic Computable General Equilibrium (CGE) model to examine revenue streams and tax components. According to the findings, an extra R3.2 billion in VAT revenue was generated annually as a result of the VAT rate hike. Additionally, it resulted in a slight GDP decrease of 0.0002% in 2018 and a 0.0028% increase in 2019, underscoring the immediate as well as long-term economic impacts of VAT modifications. Data from the 2015 Social Accounting Matrix (SAM) was used in the study. The lack of analysis on differing spending patterns by income deciles and the effect of zero-rated essential products on reducing the regressive impacts of VAT was one of the main research gaps that were found. The study's use of old data limited its ability to provide insights into more recent economic patterns. This study offers important insights for the formulation of fiscal policy and is vital to comprehending how changes in the VAT rate affect revenue collection and economic growth.

Ihualam et al. (2021) examined the relationship between tax revenue and macroeconomic factors in the ECOWAS region, focusing on the effects of aggregate output, inflation, and unemployment on tax revenue. The study utilized fixed effects regression with panel data analysis from 2005 to 2019 across six ECOWAS countries, confirming the model's suitability through Wald's and Hausman tests. Drawing on reliable sources such as central banks and national statistical agencies, the study found a positive and statistically significant relationship between tax revenue and both economic growth and inflation, while revealing a negative relationship with unemployment. Specifically, a unit increase in inflation resulted in a 0.007 percent increase in tax revenue, and a unit rise in GDP led to a 0.78 percent increase in tax revenue, whereas tax revenue decreased by 0.10 percent with a unit increase in unemployment. However, the study acknowledges limitations, including potential representativeness issues, reliance on secondary data, and the restricted time frame,

which may overlook current trends. These insights are crucial for understanding how macroeconomic conditions in the ECOWAS region influence tax revenue, emphasizing the need for tailored fiscal policies to enhance tax collection efforts.

Saptono and Mahmud (2021) investigated the macroeconomic factors influencing tax revenue in six Southeast Asian countries from 2008 to 2019. The study aimed to assess the effects of per capita income, manufacturing, trade openness, and inflation on the tax-to-GDP ratio and tax effort using a fixed effects (FE) model with Driscoll-Kraay standard errors. The findings revealed that manufacturing, trade openness, and per capita income positively and significantly impacted tax performance metrics, while inflation had no statistically significant effect. The study also classified countries based on their tax effort and revenue, offering policy recommendations to enhance tax collection efficiency. However, the study acknowledges limitations, including its focus on only six Southeast Asian countries, the potential omission of other significant factors, and the narrow analysis period, which may overlook long-term trends or unexpected economic developments. Despite these limitations, the study contributes valuable insights into the determinants of tax revenue in developing economies, emphasizing the importance of macroeconomic variables in shaping tax policy.

Ayoub and Mukherjee (2019) examined the relationship between GDP and VAT in China, with particular attention to the effects of VAT on short- and long-term economic growth. The study used secondary macroeconomic data from 1986 to 2016 using the Auto-Regressive Distributed Lag (ARDL) model to do this. The National Office of Statistics and the World Bank provided the statistics, which included factors like GDP growth, employment rates, the consumer price index, VAT, and the overall population. The findings showed a positive correlation between GDP and VAT, suggesting that VAT had a major impact on China's economic growth in both time periods. This finding is consistent with earlier studies and emphasizes the significance of VAT, especially in view of the 1993 and 2012 tax system modifications. The study does, however, have certain limitation, such as a small sample size and the possible omission of important factors like export volume and foreign investment flows. Furthermore, even if the ARDL model works well, not all of the complex interactions between the variables may be captured by it. More factors should be included in

future studies, and the Non-Linear ARDL (NARDL) model should be used to gain deeper understanding of the relationship between VAT and economic growth.

Dahri et al. (2019) analyzed the relationship between consumption taxes, particularly value-added taxes (VAT), and GDP growth as well as gross savings in Pakistan and Japan between 1989 and 2015. Regression analysis is used to examine time series secondary data from economic reports and national statistics organizations. The study indicates a substantial positive relationship between VAT and GDP growth rates as well as gross savings in Pakistan and Japan. It's interesting to note that in both nations, an increase in VAT had a greater impact on gross savings than on GDP growth. These findings imply that governments might use higher VAT rates to boost savings, which could then be used to fund investments in human and physical capital, resulting in long-term economic growth. The report also suggests policies be put in place by Pakistani and Japanese officials to lessen the loss of VAT revenue from the export of basic products. The use of aggregated national statistics and inherent biases in secondary data sources are limitations that emphasize the need for future studies to fully examine regional and sectoral variations in VAT impacts.

Dordevic et al. (2019) emphasized the crucial role that indirect taxes play in the tax systems of developing EU nations, with a special emphasis on the factors that affect the effectiveness of VAT collection. The objective of the study was to explore the potential adverse effect of raising the VAT rates on VAT collection efficiency in these countries. Using pertinent data from 1997 to 2017, this study employed correlation and regression analyses to examine various determinants, including household consumption, wages and salaries, exports of goods and services, economic growth rate, standard annual VAT rate, and export of goods. The findings indicate that exports of goods and services have a positive impact on the efficiency of VAT collection, while the standard VAT rate and household consumption have a negative impact. While there may be data limitations and potential omissions in fully capturing all aspects influencing VAT performance, overall, the findings provide insightful information for policymakers seeking to maximize VAT collection in EU nations with less developed economies.

2.2.2 National Context

Dahal et al. (2024) studied how Nepal's VAT affects the country's overall tax income collection as well as indirect tax. The study makes use of secondary data from several economic surveys that span 48 annual data points. Using statistical and economic techniques such as graphs, scatter plots, regression analysis, variance analysis, multicollinearity tests, the Shapiro-Wilk normality test, and heteroscedasticity tests, it uses both descriptive and exploratory study designs. The findings show that Nepal's indirect tax and overall tax revenue are statistically significantly influenced by VAT revenue. To be more precise, a 1percentage increase in VAT results in an increase of 0.919percentage in indirect tax revenue and 0.944percentage in overall tax revenue. In the Nepalese economy, VAT is responsible for 97.8percentage of variations in total tax revenue and 98.9percentage of variations in indirect tax revenue. The study has limitations, though, such as its dependence on secondary data that might not adequately account for all facets of the impact of VAT. Furthermore, the past data might not accurately represent the state of the economy now or recent adjustments to tax laws.

Kunwar et al. (2024) studied macroeconomic implications of Value Added Tax (VAT) in Nepal, concentrated on how it affected important macroeconomic variables such as GDP, total consumption (TCON), imports (M), and government expenditure (GOVEXP). They accomplished this by using sophisticated econometric techniques, specifically two-stage least squares (2SLS) and three-stage least squares (3SLS), to mitigate the possibility of simultaneous equation bias and results that are inconsistent. According to their findings, VAT had a negative effect on total consumption (TCON) but a considerable positive impact on government expenditure, GDP, and imports. The study used 45 years of nominal data from national economic statistics, covering the years 1974 to 2019. Understanding the intricate and dynamic links between VAT and macroeconomic variables over an extended period of time is a study gap that the authors discovered. The study had a few limitations despite its sound methodology, including the use of nominal data that would not accurately reflect actual economic conditions and the omission of external economic factors that could have an impact on VAT. However, the study is still very relevant today, providing policymakers in

Nepal with insightful information that is especially useful for formulating tax laws and evaluating the contribution of VAT to economic growth.

Poudel (2023) examined advances in VAT collection efficiency and its influence on the Nepali economy by evaluating VAT performance through the analysis of the VAT to GDP ratio, VAT efficiency ratio, and C-efficiency ratio. The study makes use of trend analysis and secondary data from government publications between 2010/011 and 2020/021. The results show a rising trend in GDP and VAT collection, which reflects improved VAT efficiency and an increasing role in Nepal's economy. Despite these encouraging signs, the study notes that it is limited by its dependence on secondary data, which may contain errors and compromise the accuracy of the findings. Interpreting the results with caution is warranted due to the fundamental limitations of secondary sources and the possibility of inconsistent data. VAT is vital for long-term income collection and economic stability, the report notes, and it may be a key tool in resolving Nepal's budget deficits in the future.

Bhoosal and Byanjankar (2022) aimed to empirically examine the macroeconomic factors that influence government income in Nepal, with a particular emphasis on factors like GDP per capita and imports that are relevant to the collection of VAT. It made use of time-series data from 1975 to 2021 for both descriptive and econometric studies. The results showed that while GDP per capita and imports along with other were important factors in the long term, they had a considerable impact on government revenue in the short term. To provide thorough historical coverage, the study used secondary data from government reports and Nepal Rastra Bank. The lack of attention paid to particular tax components, such VAT revenue, and their direct relationship to macroeconomic factors was one of the most significant study gaps found. The study's main limitation was its wide focus on government income, which obscured insights into certain tax categories. Nonetheless, the study provides a basis for additional focused research on VAT and its macroeconomic drivers and is extremely relevant to comprehending how imports and GDP per capita, as important variables, affect VAT collection in Nepal.

Kunwar (2022) aims to evaluate how Nepal's VAT revenue generation is affected by macroeconomic factors including GDP, CPI, money supply (M2), and currency rates. The study uses a quantitative study approach using time series data from secondary

sources, including Nepal Rastra Bank and the Ministry of Finance, that span the years 1974–2017. Both the short- and long-term links between VAT revenue and key macroeconomic factors are examined using the ARDL model. The results show those exchange rates, GDP, and the money supply all have a major impact on VAT revenue, and those higher VAT collections are positively correlated with increases in these factors. VAT revenue is less significantly impacted by the CPI, though. The study's lack of attention to the informal sector, VAT compliance, and the administrative obstacles affecting tax efficiency creates a study gap. The study's limitations include its reliance on secondary data, which could lead to inaccurate reporting, and its absence of sector-specific or geographical analysis. Notwithstanding these limitations, the study is still highly relevant to Nepali policymakers, including suggestions for enhancing VAT collection and streamlining tax laws.

Mandal (2022) examined the connection between Nepal's GDP and Value Added Tax (VAT), with a particular emphasis on how these factors affect economic growth. Using annual time series data from 1992 to 2020, the main goal is to use the Autoregressive Distributed Lag (ARDL) model to examine the long-term connection between VAT and GDP. The results show that, although there is no clear short-term association, VAT has a negative impact on GDP over the long term. Government spending reports and economic surveys provided secondary data. By neglecting particular mechanisms such as compliance problems, administrative inefficiencies, and sector-specific dynamics that underlie the detrimental effects of VAT on GDP, the paper highlights a significant research gap. Furthermore, the analysis does not take into consideration developments or the importance of informal economic activity after 2020. Those limitations confine the study's focus to the overall effects of VAT on GDP without taking structural variables into account. Nonetheless, the results are pertinent to policymakers since they emphasize the necessity of focused changes in VAT administration and compliance in order to reduce negative consequences and increase its GDP growth contribution. VAT may contribute more significantly to Nepal's economic growth and spending stability by overcoming these issues.

Koirala (2022) examined the performance of Nepal's VAT policy over the past two decades by analyzing trends in VAT revenue collection. Utilizing econometric modeling and descriptive analysis, secondary time series data from the Economic

Survey 2021 and Ministry of Finance reports spanning fiscal years 1997/98 to 2020/21 are analyzed. A revenue growth model calculates annual changes in VAT revenue relative to previous years. Data variables include nominal GDP, private consumption, total VAT revenue, import-based VAT, inland VAT, total tax revenue, and total revenue. The analysis's conclusions, which are attributable to growing imports, rising private consumption, and the installation of a VAT withholding system, show steady rise in VAT collection with a diminishing collection gap. The revenue growth model is a useful tool for evaluating taxpayer compliance and revenue activities. Limitations include the subjective presentation of data and the performance and VAT gap estimation dependent on data availability, which may restrict the breadth of study and interpretation.

Chapagai (2021) studied the effect of value added generated by the nation's production of goods and services on the value added created by VAT, a consumption tax that is imposed at every level of the consumption chain and must be borne by the ultimate consumer. The study applies the Ordinary Least Squares (OLS) technique to examine the hypotheses established using time series macroeconomic data of GDP and VAT obtained through the Ministry of Finance's economic survey. Results show that VAT has a considerable impact on GDP, with an average growth rate of 17.42 percentages and an average ratio of 4.38percentage between VAT revenue and GDP throughout the timeframes that are being examined. Furthermore, a strong and positive correlation between VAT and GDP is indicated by the results. According to the study's final analysis, to promote economic growth and facilitate public services, the Nepali government should increase VAT collection by optimizing the networks connecting all federal, provincial, and municipal taxation bodies and government institutions. The study does point out several limitations, including the possibility that subsequent Study might look into other variables influencing GDP and VAT revenue and that longer-term improvements in data consistency and accuracy could lead to a more thorough knowledge of the relationship between the two.

Shrestha (2019) analyzed the trends in VAT compliance among businesses in Nepal. The study identified key factors influencing compliance behavior, including the clarity of tax regulations, enforcement mechanisms, and the level of taxpayer education. Understanding these trends is crucial for assessing the overall effectiveness

of VAT in generating revenue for the government. Good taxpayer services and well-designed and targeted publicity campaign are crucial elements in encouraging taxpayers to comply voluntarily with the tax legislation. To facilitate voluntary compliance, the tax administration should provide taxpayers with consistent, impartial, courteous and prompt service. In many developing countries and countries with economies in transition, relatively simple measures, such as providing taxpayers with tax return forms, eliminating fees for receipt of tax payment by the banks, a common practice in some Eastern European countries and establishing taxpayer assistance counters in easily accessible locations in the tax administration would significantly improve taxpayer services.

2.3 Research Gap

The macroeconomic elements affecting VAT revenue and its wider economic ramifications are well understood in the corpus of extant work. Studies conducted abroad have shed important light on the connections between VAT revenue and macroeconomic factors like GDP, imports, and consumption. The effectiveness of VAT collection, the effect of governmental expenditures, and the contribution of institutional capacity to increasing VAT revenue in different nations have all been studied by studies. The significance of VAT in Nepal's tax system and its significant contribution to the nation's overall tax revenue collection has been emphasized by national studies. VAT has a major impact on Nepal's indirect tax collection and overall economic performance, according to studies by Dahal et al. (2024), Kunwar et al. (2024), and Kerala (2022). The results indicate favorable connections between VAT revenue and GDP, imports, and government expenditures.

Regarding the unique dynamics and difficulties related to VAT collection in Nepal, there are still a number of gaps in the national literature. Without going into great detail about other possible factors that could affect VAT collection, such as tax compliance, activities in the informal sector, or the effectiveness of VAT enforcement systems, many of the studies mainly focuses on macroeconomic variables like GDP and imports. Additionally, the studies typically use secondary data, which may not be entirely accurate and may not adequately reflect the intricacies of recent policy changes or the state of the economy. Furthermore, little study has been done on the long-term patterns and effects of changes to the VAT policy on the Nepali economy.

A comprehensive understanding of VAT's significance in Nepal is also hampered by the narrow geographic and coverage of the study that is currently available.

This study intends to close these gaps by performing a thorough analysis that looks at the influence of institutional factors including tax administration, compliance rates, and the informal sector in addition to the conventional macroeconomic variables influencing VAT revenue in Nepal. The dynamic relationship between VAT and other newly emerging macroeconomic variables that have received little attention in prior study will also be considered in this study. This study will provide an expanded view of the impact of VAT on Nepal's economy and aid in the creation of more effective VAT policies by applying a more varied and current dataset, including primary data from surveys or interviews with taxpayers and tax authorities. The study will also look at how VAT affects budget deficits and economic growth, which could help shape Nepal's future fiscal policies.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the Study methodology employed to investigate in Macroeconomic variable affecting VAT collection in Nepal. It provides a comprehensive overview of the chosen Study design, conceptual framework, sources of data, sample size, sampling procedure, data collection methods, model specifications, variable definitions, and the techniques employed for data analysis.

3.2 Theoretical / Conceptual Framework

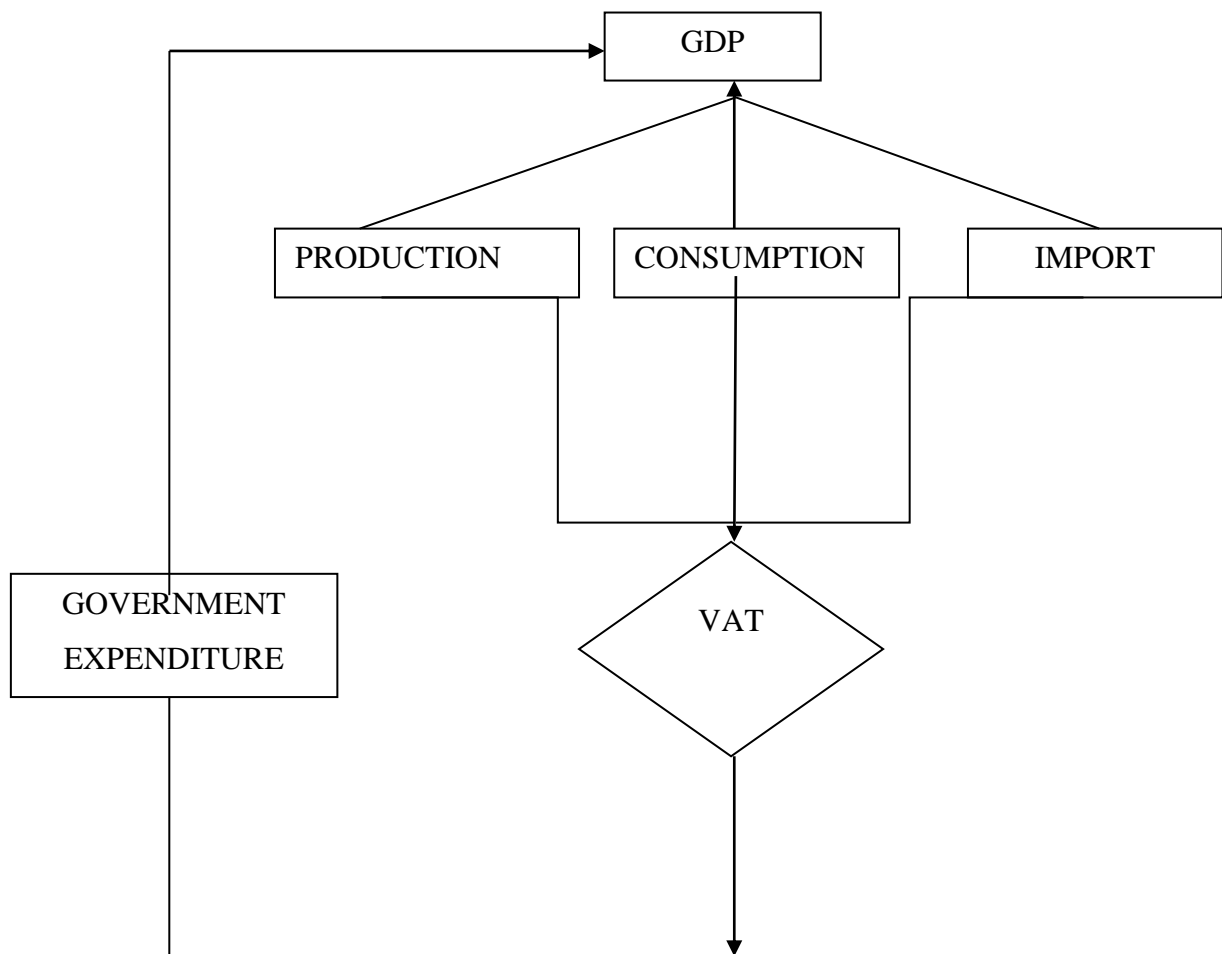
The study "Macroeconomic Determinants of VAT Revenue Nepal" incorporates recognized economic theories and prior empirical Study into its theoretical and conceptual framework. These include:

Mahara (2023) explored the relationship between government expenditure, GDP, and VAT revenue collection, finding a strong positive correlation. Koirala (2022) and Poudel (2023) also highlighted the importance of imports and domestic consumption in calculating VAT revenue. These studies underscore the importance of understanding macroeconomic determinants for effective fiscal policy and tax management, indicating that a thorough grasp of these factors is essential.

Following the same theory, this study intends to explore the effects of macroeconomic factors on Nepal's VAT collection, including government expenditure, GDP, imports, and gross domestic consumption. Trying to find causal relationships and comprehend how they affect VAT revenue by adding these factors into an econometric model. This framework offers a systematic method for examining how changes in these variables affect VAT revenue by building on theoretical and empirical bases. The objective is to promote academic discourse, advance knowledge of VAT dynamics, and provide policymakers with useful information to promote fiscal stability and economic expansion.

Figure 3.1

Conceptual Framework



Source: Adopted from Mandal (2022)

3.3 Research Design

This study has employed descriptive as well as explanatory or causal Study design to attain the objectives of the study. Quantitative data regarding the variables VAT revenue, government expenditure, GDP, imports, and gross domestic consumption are explained through descriptive analysis, such as through trend analysis. The relationship between the independent variables i.e. government expenditure, GDP, imports, and gross domestic consumption and dependent variable i.e. VAT revenue has been examined through causal or explanatory analysis. For causal analysis, ARDL model has been employed. For simplicity, the value of variable is converted into natural logarithms.

3.4 Nature and Sources of Data

The secondary data were collected from FY 1996/97 to 2022/23 is used to obtain the objectives of the study. Before VAT was introduced in 1998, Nepal had various sales-related taxes, such as sales tax, entertainment tax, contract tax and air flight tax. Including data from 1990 to 1997 helps us understand the economic conditions and tax revenue trends before VAT. Allowing better comparison of the effects of VAT with the old tax system. The data is collected from the website of Nepal Rastra Bank (NRB), Ministry of Finance (MoF) and Inland Revenue Department (IRD). Economic survey and annual reports of such government websites are used to obtain the data. The data used in the study are time series.

3.5 Tools of Analysis

The data collected was carefully entered into Microsoft Excel for processing and analysis. It was displayed in both tables and charts to clearly show the relationships between different variables. We used descriptive statistics to examine trends, while EViews 14 helped us run the Autoregressive Distributed Lag (ARDL) model and regression analysis. We also performed correlation analysis to find out how strong and directional the relationships among the variables were. Our approach included first analyzing trends in Excel, then conducting ARDL testing in EViews, and finally performing descriptive analysis to understand VAT revenue patterns over the study period. The equation of ARDL model (Kunwar 2023) is as follows:

$$VAT_t = \alpha + \sum_{i=1}^p \beta_i VAT_{t-i} + \sum_{j=0}^q \gamma_j GDP_{t-j} + \sum_{k=0}^r g_k \Delta \ln I_{t-1} + \sum_{i=0}^m d_i \Delta \ln C_{t-1} + \sum_{i=0}^m \lambda_i \Delta \ln G_{t-1} + u_t \dots \dots \dots (i)$$

3.5.1 Unit Root Test

Determining if a series is stationary is crucial in time series analysis since non-stationary data might produce incorrect or misleading regression results. A stationary series is more suited for forecasting and regression analysis since it maintains its mean, variance, and auto covariance throughout time. The unit root test is utilized to check for stationary, and one of the most popular techniques is the Augmented Dickey-Fuller (ADF) test. Kunwar (2023) discusses the three possibilities that could

occur in time series data and offers a thorough explanation of the ADF test and its use in testing for unit roots.

Case I: No Intercept and No Trend

The no intercept and no trend model of ADF test can be written mathematically as:

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \mu_t(a) \dots \dots \dots (ii)$$

Where, Y_t is the time series used in the data, p is the lag order of the autoregressive process and μ_t is a white noise error term.

The null hypothesis of the ADF t-test is that:

- $H_0: \gamma = 0$, the series contains a unit root
- $H_1: \gamma < 0$, the data does not contain a unit root

And if the computed DF statistic is more negative than the test critical values, the null hypothesis is rejected.

Case II: Intercept but no Trend

The intercept but no trend model of ADF test can be written mathematically as:

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \mu_t(b) \dots \dots \dots (iii)$$

Where, Y_t is the time series used in the data, α_0 is the intercept of the model, p is the lag order of the autoregressive process and μ_t is a white noise error term.

The null hypothesis of the ADF t-test is that:

- $H_0: \gamma = 0$, the series contains a unit root
- $H_1: \gamma < 0$, the data does not contain a unit root

And if the computed DF statistic is more negative than the test critical values, the null hypothesis is rejected.

Case III: With Intercept and Trend

The model with intercept and trend test can be written mathematically as:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \gamma Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \mu_t \quad (iv)$$

Where, Y_t is the time series used in the data, α_0 is the intercept of the model, α_1 is the coefficient on a time trend (t), p is the lag order of the autoregressive process and μ_t is a white noise error term.

The null hypothesis of the ADF t-test is that:

$H_0: \gamma = 0$, the series contains a unit root

$H_1: \gamma < 0$, the data does not contain a unit root

And if the computed DF statistic is more negative than the test critical values, the null hypothesis is rejected.

3.5.2 Lag Selection

Introduction of Lag Selection time series analysis, lag selection is essential when employing the Autoregressive Distributed Lag (ARDL) model. The model's capacity to represent the dynamics of the interactions between variables is impacted by the delays that are used. Appropriate lag duration guarantees good model fit and accurate estimations (Kumar, 2023).

Steps for Selecting Lag

1. Establish a Reasonable Maximum Lag Length: Choose a maximum number of lags that makes sense. This frequently depends on the frequency and quantity of the data collection. 1 to 4 delays are typical selections.
2. Utilize Information Criteria: To determine the ideal lag duration, use information criteria. The most widely applied standards are:
 - The Akaike Information Criterion (AIC) weighs complexity and model fit. A better model is indicated by lower AIC values.
 - The Schwarz Criterion (BIC) is a model complexity penalty that is more severe than the AIC. A better model is suggested by lower BIC values.
 - The Hannan-Quinn Criterion (HQC), which finds a middle ground between AIC and BIC, is another tool for balancing fit and complexity.

3. Calculate Models with Various Lags: Compute the ARDL model with various lag durations. Determine the AIC, BIC, and HQC values for every model.
4. Determine the Ideal Lag Length: Pick the lag length that reduces the values of AIC, BIC, or HQC. Because it offers the finest balance between goodness of fit and model complexity, this lag time is regarded as ideal.
5. Check the Model: Make sure that the lag length you have chosen does not cause problems like autocorrelation or multicollinearity.

3.5.3 Co-integration: ARDL Bounds Tests

The Autoregressive Distributed Lag (ARDL) approach to co integration was developed by Pesaran et al., (2001). This test can be used to examine the existence of co integration in time series data. If the long-run relationship between the data is detected, the model can be used to estimate the long-run coefficients and analyses the short run dynamics in the relationship.

To estimate the factors affecting the VAT revenue collection, the basic model used are specified (Mandal, 2022) as:

$$\ln \text{VAT}_t = \alpha + \beta_1 \ln \text{GDP}_t + \beta_2 \ln G_t + \beta_3 \ln I_t + \beta_4 \ln C_t + \varepsilon \dots\dots\dots(v)$$

Where,

$\ln \text{VAT}_t$ = VAT revenue collection in fiscal year t expressed in natural log

$\ln \text{GDP}_t$ = GDP of Nepal in fiscal year t expressed in natural log

$\ln G_t$ = Government expenditure of Nepal of year t expressed in natural log

$\ln I_t$ = Import in fiscal year t expressed in natural log

$\ln C_t$ = Gross domestic consumption fiscal year t expressed in natural log

α = Intercept of the model

ε = Error term of the model

The ARDL representation of unrestricted version is specified in the following equation Kunwar 2023

$$\text{VAT}_t = \alpha + \sum_{i=1}^p \beta_i \text{VAT}_{t-i} + \sum_{j=0}^q \gamma_j \text{GDP}_{t-j} + \sum_{k=0}^r g_k \Delta \ln I_{t-1} + \sum_{i=0}^m d_i \Delta \ln C_{t-1} + \sum_{i=0}^m \lambda_i \Delta \ln G_{t-1} + u_t \dots\dots\dots(vi)$$

Where, the Δ denotes first order difference, μ is the intercept term of the equation and u_t is the white noise residuals. The coefficients η_j , g_i , d_j , k_i , represents the short-run dynamics of the model and the Θ_1 to Θ_4 represents the coefficients of long-run relationship of the variables. While, $\ln GDP_{t-1}$, $\ln R_{t-1}$, $\ln T_{t-1}$ and $\ln M_{t-1}$ are the one period lagged natural log transformed values of Government expenditure, GDP, imports, and gross domestic consumption in the economy. The model combines short-run dynamics of the data with long-run equilibrium also preserving all the pertinent information for the long-run. Kunwar (2023) assert that the ARDL model allows establishing relationship between the explanatory variables and the dependent variable in the long run, thereby capture the sustained equilibrium dynamics.

3.5.4 Diagnostic Tests

The data diagnostic is important as it shows whether the data is normal or not and whether all the assumptions of regression equations are met or not. Data normality tests, RESET test, Breusch-Godfrey serial correlation LM test, Breusch-Pagan-Godfrey Heteroscedasticity test, CUSUM test and CUSUM of square test are done and discussed below:

Normality Test

The normality test is done using Jarque-Bera (JB) test. This test checks whether the skewness and kurtosis are equal to the expected values in normal distribution or not. The JB statistic is always nonnegative where the further the JB value from zero, the more deviation from normal distribution. The null hypothesis of the test is that both the skewness and kurtosis are zero, which follows that the data is normally distributed. It is important to test for the data normality before applying the statistical tests.

Ramsey's RESET Test

This test assesses the functional form of a regression model. The test is used to check whether the linear regression model adequately presents the relationship between the explanatory variables and dependent variables or not. The null hypothesis of this test is that the functional form of the model is correctly specified. Where, if the p-value of

the test is less than 0.05 the null hypothesis is rejected and it indicates that there is evidence of non-linearity of the data.

Breusch-Godfrey Serial Correlation LM Test

The Breusch-Godfrey serial correlation LM test assesses the validity of the regression model used in the study by checking the presence of serial correlation or the autocorrelation. The autocorrelation occurs when the errors of the model present a pattern of dependence on timeline. The null hypothesis of this test is that there is no autocorrelation of any order up to specified a specified lag, meaning there exists no autocorrelation in the model over time. If the p-value of the test statistic is less than the significance level, the null hypothesis is rejected.

Breusch-Pagan-Godfrey Heteroscedasticity Test

The Breusch-Pagan-Godfrey Heteroscedasticity test assesses the presence of heteroscedasticity in the regression model. The heteroscedasticity in the model occurs if the variance of error term of the predictor variable in a regression model varies. It is important to assess the heteroscedasticity as it affects the reliability of regression model. The null hypothesis for the test is that there exists homoscedasticity in the model. If the p-value of chi-square test is less than chosen level of significance, there exists heteroscedasticity.

CUSUM Test

The CUSUM test identifies changes in the mean value of a quality characteristic over time. It is used to analyse time-series data to detect any shifts and changes in the mean value of the data. This test also plots the cumulative sum squares within five percent level of significance, which helps to find the instability if the cumulative sum resides outside the critical lines.

CUSUM of Square Test

This test provides a plot of cumulative sum of squares against time. The critical lines are set at five percent level of significance. Movements of data outside the critical lines suggest parameter or variance instability. The test monitors the residuals of

regression model where if the residuals start accumulating in one direction, it signals a deterioration in the model fit of the regression model.

3.6 Model Specification

In this study, we examine the relationship between VAT revenue and important macroeconomic variables in Nepal using the Autoregressive Distributed Lag (ARDL) model. The ARDL model has the benefit of allowing for the inclusion of various lag lengths for each variable, which enables the capture of both long- and short-term dynamics (Kumar 2023).

The following is a specification of the ARDL model:

$$VAT_t = \alpha + \sum_{i=1}^P \beta_i VAT_{t-i} + \sum_{j=0}^q \gamma_j GDP_{t-j} + \sum_{k=0}^r g_k \Delta \ln I_{t-k} + \sum_{l=0}^m d_l \Delta \ln C_{t-l} + \sum_{i=0}^m \lambda_i \Delta \ln G_{t-i} + u_t \dots \dots \dots (i)$$

Where:

VAT_t = The amount of VAT collected at time T.

α : Intercept term

VAT_{t-i} = Values of VAT revenue collected those are lag-related.

GDP_{t-j} = Lagged values of GDP.

$\ln I_{t-k}$ = The first difference of the natural log of imports, lagged by k periods, is represented as $\ln I_{t-k}$.

$\ln C_{t-l}$ = The initial discrepancy of the gross domestic consumption's natural log, trailed by l intervals.

$\ln G_{t-i}$ = The first discrepancy of the natural logarithm of government expenditure,

Trailed by m intervals.

u_t : It is white noise residuals

m, k, k, n: Maximum lag times for VAT, GDP, imports, consumption, and government expenditure are P, q, r, m, and n, in that order.

Definition of Terms

$\sum_{i=1}^p \beta_i \text{VAT}_{t-1}$ = represents the dynamic impact of previous VAT revenue on current VAT revenue.

$\sum_{j=0}^q \gamma_j \text{GDP}_{t-j}$ = This expresses the impact of previous GDP values on VAT revenue.

$\sum_{k=0}^r g_k \Delta \ln I_{t-1}$ = Represents the impact of import adjustments that lag on VAT revenue in the short term.

$\sum_{i=0}^m d_i \Delta \ln C_{t-1}$ = Represents the short-term impacts of behind-time fluctuations in GDP on VAT collection.

$\sum_{i=0}^m \lambda_i$ = The short-run impacts of lags in government expenditure on VAT revenue are captured by $\Delta \ln G_{t-m}$.

The term "Unrestricted Form" refers to the model's ability to incorporate both lagged levels and initial differences of the explanatory variables, as well as flexibility in the lag structure.

Short-Run and Long-Run Dynamics: The lags and differences in the ARDL model represent the long-run equilibrium relationship and the short-run dynamics, respectively.

3.7 Operational Definition of the Variables

The variables used in the study are VAT revenue collection as a dependent variable. The explanatory variables are the GDP, government expenditure, Import and Consumption. The definitions of the variables are presented in the preceding units.

3.7.1 Dependent Variable

The dependent variable for the study is VAT revenue collected by Nepal. OECD (2023) defines VAT revenue as a consumption tax levied on the incremental value added to a product or service at each stage of production and distribution. Similarly, IMF (2024) asserts VAT revenue as the total amount of tax collected by government from businesses registered for the value-added tax system, representing the difference between the VAT charged on sales and the VAT paid on purchases. The

government's receipts from the value-added tax, reflecting the total tax liability paid by businesses after deducting the input tax credits (Tax Foundation, 2023).

3.7.2 Independent Variables

The independent variables of the study are GDP, imports, gross domestic consumption and government expenditure. The data of these variables are collected from the economic surveys published in the government websites. The explanation of the dependent variables is presented in the preceding units.

GDP (Gross Domestic Product)

GDP Often employed as an indicator of economic health, GDP is often associated with tax receipts, especially VAT. Increasing GDP is a sign of increasing economic activity, which raises income, consumption, and output and raises VAT revenue. Poudel (2023) asserts that one of the main factors influencing VAT income in Nepal is GDP development, which is correlated with rises in total economic output and expands the tax base. In a similar vein, Kunwar (2023) backs this up by pointing out that GDP growth improves the government's ability to collect taxes, including VAT.

GDC (Gross Domestic Consumption)

GDP represents consumer spending on products and services that are subject to VAT, it has a direct impact on VAT. Mandal (2022) stresses that since consumption fuels the demand for taxable goods and services, rising domestic consumption results in higher VAT revenue collection. In a similar vein, Gisaina (2019) examines how shifts in consumer purchasing habits brought on by global economic conditions have an immediate effect on VAT revenue.

Import

Imports play a significant role in VAT revenue generation, as they are subject to import duties and taxes upon entry into a country. Particularly for nations like Nepal, where the import industry is vital to the economy, the volume of imports has a direct impact on the amount of VAT collected. Koirala (2022) highlights that since a significant amount of imports are taxed upon entering the local market, increasing VAT income are a result of this. In a similar vein, Abbass et al. (2021) emphasize the significance of imports in determining the dynamics of VAT income, particularly in

smaller economies where the impact of international commerce on local tax receipts is more noticeable. In addition to immediately increasing VAT collection, rising imports also reflect broader patterns of economic demand and consumption, which further propels VAT income in these economies.

GE (Government Expenditure)

Government expenditure has a significant impact on VAT income and stimulates economic activity. It is an important independent variable in our study since it influences both production and consumption. More government investment, especially on public services and infrastructure development, promotes economic growth and raises output, consumption, and income levels, all of which raise VAT collection, as Kumar (2022) highlights. Similar to this, Sapkota et al. (2023) point out that government expenditure affects consumer habits and fiscal policy, changing consumption trends and having an impact on Nepal's VAT collection. In addition to indirectly promoting economic stability, government expenditures on social welfare and infrastructure strengthen the foundation for the collection of VAT.

CHAPTER IV

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents data presentation and data analysis of the collected data. The chapter covers overview of the study area, data presentation and analysis of the data. The dependent and independent variables are thoroughly analyzed as per the adopted model.

4.2 Overview of the Study

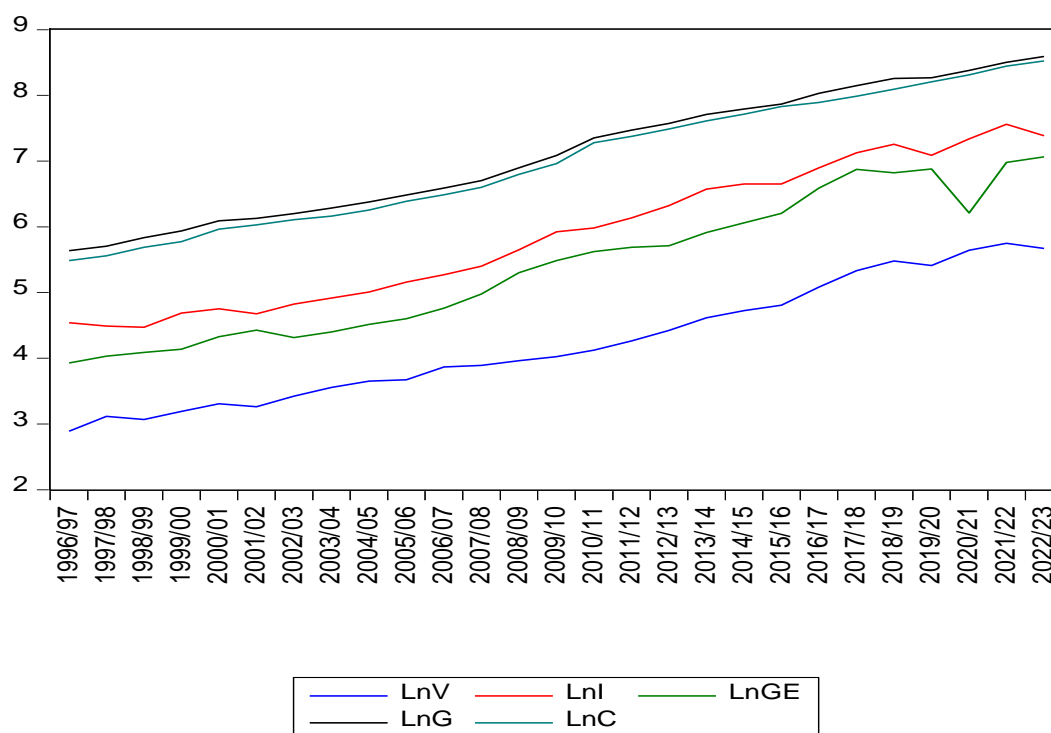
As part of a reform to replace the existing sales tax system, Nepal implemented the Value Added Tax (VAT) in 1997 after the passage of the VAT Act of 1995. In order to provide a more effective system that would keep up with Nepal's expanding economy, this transformation sought to improve revenue collection, simplify tax administration, and broaden the tax base. The VAT rate was first established at 10% and then raised to 13% in 2011, reflecting the need for more government revenue in the face of economic difficulties. The full potential of VAT has been undermined in Nepal due to serious problems with tax evasion and non-compliance, especially from the informal sector, notwithstanding its introduction. The impact of major macroeconomic factors, including GDP, government expenditure, imports, and domestic consumption, on Nepal's VAT revenue collection between 1996–1997 and 2022–2023 is examined in this paper. To provide a thorough grasp of the patterns in VAT collection, the main goal is to evaluate the short- and long-term relationships between VAT revenue and various macroeconomic variables. Through better fiscal and economic policies that address issues like inflation, trade imbalances, and changing consumer patterns, the study seeks to provide policymakers with insightful information that will increase the effectiveness of VAT revenue collection. This study aims to support efforts to achieve long-term economic stability and improve the efficiency of Nepal's tax system by examining the factors that influence VAT revenue and their effects on the economy. The results will aid in the formulation of plans that can improve VAT collection and fortify Nepal's economy (Koirala, 2023).

4.3 Trend Analysis of Variables

The trend study of the major macroeconomic factors affecting Nepal's VAT revenue from the fiscal years 1996–1997 and 2022–2023 is shown in Figure 4.1. The purpose of this figure is to graphically show the variations and connections among VAT revenue, GDP, government expenditures, imports, and domestic consumption. Understanding how economic conditions have affected VAT revenue over time requires knowledge of these variables. The figure may have several line graphs that show these variables' yearly patterns.

Figure 4.1

Trend Analysis of Variables



Source: Calculation based on Annex I

The Figure 4.1 shows the trends in LnG Gross domestic consumption, LnI imports, LnGE government expenditures LnV VAT revenue, and LnC consumption over the time under observation. Every measure shows an upward trend, which is indicative of steady economic expansion and heightened fiscal activity. The two that have the greatest values overall are LnC Consumption and LnG Gross Domestic Consumption, which both demonstrate a substantial economic contribution. Even though it is lower in size, LnV VAT Revenue continues to show a positive rising trend, indicating slow

increases in VAT collection, while LnGE Government Expenditure and LnI Imports also exhibit steady growth.

The variables' parallel movement indicates a strong positive correlation between them, and increasing imports, consumption, and government expenditures are probably responsible for higher VAT revenue. Nonetheless, modest declines in variables such as LnGE in certain years might be the result of brief policy changes or economic upheavals. All things considered, the patterns highlight the strong correlation between VAT revenue and important macroeconomic variables, offering a visual foundation for more econometric study to measure these connections.

4.3.1 Unit Root Test

Unit root tests were performed using the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) approaches to guarantee data reliability and prevent false regressions. These tests determine if the variables are stationary at first difference (1) $I(1)$ or at level $I(0)$ $I(0)$. Because non-stationary data might result in inaccurate econometric conclusions, stationary is essential for time-series analysis, (Kumar, 2023):

Table 4.1

Unit Root Test at PP

Test Type	Variable	I(0)		I (1)	
		t-Statistic	Prob	t-Statistic	Prob
With Constant	lnV	0.1999	0.9672	-5.4306	0.0002***
	lnI	0.5048	0.9836	-5.6174	0.0001***
	lnGE	-0.1178	0.9374	-6.6627	0.0000***
	lnG	-0.1021	0.9393	-3.6400	0.0121**
	lnC	-0.1172	0.9375	-4.3527	0.0023***
With Constant and Trend	lnV	-1.8711	0.6403	-5.5616	0.0007***
	lnI	-2.9323	0.1693	-4.9300	0.0029***
	lnGE	-3.1260	0.1214	-6.5326	0.0001***
	lnG	-17533	0.6978	-3.5433	0.0562*
	lnC	-18268	0.6624	-4.2456	0.0132**
Without Constant and Trend	lnV	7.5551	1.0000	-2.9970	0.0043***
	lnI	7.4346	1.0000	-2.9942	0.0044***
	lnGE	3.2431	0.9993	-5.0133	0.0000***
	lnG	8.5405	1.0000	-0.9449	0.2980 n0
	lnC	8.7060	1.0000	-1.0990	0.2388 n0

Source: Calculation based on Annex – I

The table shows that there are three test specifications—with constant, with constant and trend, and without constant or trend—the table displays the findings of the Phillips-Perron (PP) unit root test, which evaluates the stationarity of the variables. lnV (VAT revenue), lnI (Imports), lnGE (Government Expenditure), lnG (Gross Domestic Consumption), and lnC (Consumption) are among the variables that were examined.

With Constant: High probabilities (higher than 0.05) show that none of the variables are stationary at level I(0). All variables, however, become stationary during initial differencing I(1), and t-statistics are very significant (p-values < 0.05). For instance, the t-statistic for lnV is -5.4306 with a probability of 0.0002, whereas the t-statistic for lnGE is -6.6627 with a probability of 0.0000.

With Constant and Trend: The majority of variables continue to be non-stationary with probabilities greater than 0.05 at level I(0)). All variables, with the exception of lnG (marginally significant at 10percentage, $p = 0.0562$), become stable at first difference I(1). For instance, the t-statistic for lnV is -5.5616 with a probability of 0.0007, and the t-statistic for lnGE is -6.5326 with a chance of 0.0001.

Without Constant and Trend: All variables have non-stationary probabilities of 1.0000 at level I (0)). After first differencing I (1), lnV, lnI and lnGE become stationary with significant t t-statistics and probability below 0.05. For example, the t-statistic for lnGE is -5.0133, and its probability is 0.0000. At this specification, however, lnG and lnC continue to be non-stationary.

Table 4.2*Unit Root Test at ADF*

Test Type	Variable	I(0)		I (1)	
		t-Statistic	Prob	t-Statistic	Prob
With Constant	lnV	0.0742	0.9573	-5.4201	0.0002***
	lnI	-2.5175	0.1257	-5.7663	0.0001***
	lnGE	-0.3000	0.9121	-6.5755	0.0000***
	lnG	-0.4545	0.8845	-3.6418	0.0121**
	lnC	-0.0876	0.9409	-4.2991	0.0026***
With Constant and Trend	lnV	-19543	0.5979	-55354	0.0007***
	lnI	-1.7655	0.6848	-0.0081	0.9931 n0
	lnGE	-3.1781	0.1123	-6.4623	0.0001***
	lnG	-17102	0.7164	-3.5468	0.0559*
	lnC	-2.3602	0.3889	-4.1873	0.0150**
Without Constant and Trend	lnV	5.4223	1.0000	-0.6210	0.4367 n0
	lnI	4.2768	1.0000	-0.4577	0.5051 n0
	lnGE	2.5432	0.9961	-5.0034	0.0000 ***
	lnG	2.9434	0.9985	-1.1184	0.2081 n0
	lnC	10.4518	1.0000	-0.7391	0.3857 n0

Source: Calculation based on Annex – I

Unit Root Test results shown in Table 4.2. Three conditions are used to conduct the test: without constant and trend, with constant and trend, and with constant. The stationarity of the variables lnV VAT revenue, lnI Imports, lnGE Government expenditure), lnG Gross domestic consumption, and lnC consumption is assessed by the Augmented Dickey-Fuller (ADF)

With Constant: Probabilities larger than 0.05 show that none of the variables are stationary at level I(0). For instance, the t-statistic for V is 0.0742 with a probability of 0.9573, and the t-statistic for GE is -0.3000 with a probability of 0.9121. All variables become stationary during initial differencing I(1), with significant t-statistics and probability below 0.05. For example, the t-statistic for lnV is -5.4201 with a

probability of 0.0002, whereas the t-statistic for lnGE is -6.5755 with a probability of 0.0000.

With Trend and Constant: The majority of variables continue to be non-stationary at level I(0) with probabilities greater than 0.05. For instance, the t-statistic for lnV is -1.9543 with a probability of 0.5979, and the t-statistic for lnGE is -3.1781 with a probability of 0.1123. All variables become stationary after the first differencing lnI; probability = 0.9931), with the exception of lnI. For instance, the t-statistic for lnV is -5.5354 with a probability of 0.0007, whereas the t-statistic for lnGE is -6.4623 with a chance of 0.0001. With a probability of 0.0559 and a t-statistic of -3.5468, lnG is marginally significant at 10percentage.

Without Constant and Trend: All variables have probabilities of 1.0000 or below at level I(0), making them non-stationary. For instance, the t-statistic for lnV is 5.4223, and the t-statistic for lnC is 10.4518. Following first differencing (I(1)), lnGE becomes stationary with a probability of 0.0000 and a t-statistic of -5.0034. Probabilities over 0.05, however, show that the remaining variables (lnV, lnI, lnG, and lnC) are still non-stationary in this specification.

4.3.2 Lag Length Selection Criteria

Finding the right lag length for each variable is essential to successfully estimating the ARDL model. This is a typical application of the Akaike Information Criterion (AIC), which helps to balance the trade-off between model fit and complexity. We make sure the model is neither over fitted nor under fitted by choosing the lag length that minimizes the AIC value.

The lag durations used for each variable according to the AIC criterion are listed in the following table (Kumar, 2023):

Table 4.3*Lag length selection*

Lag	Logl	LR	FPE	AIC	SC	HQ
0	78.00255	NA	2.00e-09	-5.840204	-5.596429	-5.772591
1	189.8982	170.0815*	2.01e-12*	-12.79186	-11.32921*	-12.38618*
2	217.5972	31.02278	2.13e-12	-13.00777*	-10.32625	-12.26403

Source: Calculation based on table 1

Table 4.3 displays the findings of the lag length selection process, a crucial step in time series, particularly for econometric models such as Vector Autoregression (VAR) and ARDL. Log-Likelihood (Logl), Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ) are among the metrics used to calculate the lag length. The most effective lag is found by taking the lowest value of the information criteria or the highest statistical significance of the LR test.

Lag 0: This lag produces a Final Prediction Error (FPE) of 2.00×10^{-9} and a Log-Likelihood logl value of 78.00255. The comparable values for the information criteria are -5.772591 (HQ), -5.596429 (SC), and -5.840204 (AIC). This lag is not the best lag, though, as it fails the LR test and does not reduce the requirements.

Lag 1: With a significantly higher Logl value of 189.8982, lag 1 exhibits a notable improvement. The inclusion of this lag enhances the model fit, as evidenced by the large LR value of 170.0815 that surpasses Lag 0. AIC, SC, and HQ all achieve minimal values of -12.79186, -11.32921, and -12.38618, respectively, while the FPE is at its lowest at 2.01×10^{-12} and 2.01×10^{-12} . Most significantly, this latency is chosen as the best one by the Schwarz Criterion (SC), which is frequently more conservative.

Lag 2: Lag 2 lowers the AIC to -13.00777, the lowest of all the lags, and marginally increases the Logl value to 217.5972. But the SC value (-10.32625) is greater than Lag 1, and the FPE rises marginally to 2.13×10^{-12} and 2.13×10^{-12} . While the AIC indicates that this lag may be ideal, most criteria, such as SC, LR, and FPE, support Lag 1.

In summary, Lag 1 is the best lag for the model according to the lag selection criteria since it minimizes the FPE, SC, and HQ values and produces a statistically

meaningful LR statistic. This lag time will probably prevent over fitting or under fitting problems by striking a balance between model fit and inconsistency.

4.3.3 Descriptive Statistics of Variables

The distribution, variability, and central tendencies of the variables employed in the study are summarized using descriptive statistics. The variables in this case are associated with macroeconomic determinants that impact the VAT revenue in Nepal, such as VAT, imports, government expenditures, GDP, and consumption. The statistics aid in giving a broad overview of how these variables behaved between 1996–1997 and 2022–2023 (Koirala, 2022)

Table 4.4

Descriptive Statistics of Explanatory and dependent Variables

	VAT	Import	Government Expenditure	GDP	Consumption
Mean	4.229504	5.879025	5.404623	7.107568	7.000938
Median	4.023063	5.925152	5.485862	7.084037	6.961869
Maximum	5.750252	7.560314	7.065212	8.590685	8.524545
Minimum	2.890150	4.471928	3.929936	5.636620	5.485797
Std. Dev.	0.908123	1.055300	1.055259	0.964518	0.982160
Observations	27	27	27	27	27

Source: Calculation based on Annex I

A summary of the descriptive data for the explanatory variables (Import, Government Expenditure, GDP, and Consumption) and dependent variable (VAT revenue) utilized in the analysis is given in Table 4.4. These statistics, which are based on 27 observations for each variable, illustrate important aspects of the dataset, such as measurements of central tendency (mean and median), variability (standard deviation), and range (minimum and maximum values).

The average performance of each variable over the study period is shown by the mean values. For example, the average GDP is 7.11 while the average VAT revenue is 4.23. The VAT revenue median, which is marginally below the mean (4.02), indicates that the average may be influenced by some higher numbers. Significant variance between variables can be seen in the range of values, which are represented by the maximum and minimum. VAT revenue fluctuates throughout time, ranging from a minimum of 2.89 to a maximum of 5.75.

The amount of data range around the mean is measured by the standard deviation. Compared to import and government expenditure, which both have standard deviations of roughly 1.06, VAT revenue shows comparatively little variability (0.91). This suggests that, in contrast to other explanatory variables, VAT revenue is less changeable.

All things considered, the descriptive statistics offer a basis for comprehending the distribution and variability of the data, which are essential for additional econometric modeling and examination of the connections between VAT revenue and its factors. By taking these measures, the dataset's accuracy in describing economic trends and patterns is maintained.

4.3.4 ARDL Estimates

ARDL estimations examine the connection between VAT revenue and important macroeconomic factors as GDP, imports, government expenditures, and consumption. The relevance of these variables in affecting VAT revenue collection is evaluated with the aid of the coefficients, standard errors, t-statistics, and p-values, which provide insights into both short-term and long-term dynamics. The findings help policymakers by highlighting how economic conditions affect VAT and can help lead policies for enhancing economic stability and tax collection effectiveness. The results of the ARDL estimation for the study period are given in the table below (Kumar, 2023).

The formula is

$$LNV_t = \alpha + \sum_{i=0}^2 \beta_i LNV_{t-i} + \sum_{j=0}^2 \gamma_j LNGE_{t-j} + \sum_{k=0}^2 \delta_k LNC_{t-k} + \lambda LNG_t + \epsilon_t \dots\dots\dots(i)$$

Where,

LNV_t =: The dependent variable, which represents VAT revenue at time t (in natural log form).

α = The intercept term.

β_i = Coefficients for the lagged values of the dependent variable (LNV). This includes the current and previous two periods of VAT revenue.

γ_j =Coefficients for the lagged values of government expenditure (LNGE), where $j = 0, 1,$ and 2 corresponds to the current period and two previous periods.

δ_k =Coefficients for the lagged values of consumption (LNC), including the current and two previous periods.

λ =Coefficient for GDP (LNG), which is included with no lag in this equation.

ϵ_t =The error term.

This formula models the relationship between VAT revenue (LNV) and several macroeconomic factors such as government expenditure (LNGE), consumption (LNC), and GDP (LNG), considering both short- and long-term effects through lagged values of these variables.

Table 4.5

ARDL Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNV(-1)	0.270953	0.168217	1.610738	0.1295
LNV(-2)	0.400942	0.158349	2.532020	0.0239
LNI	0.015088	0.210934	0.071529	0.9440
LNGE	-0.096868	0.080312	-1.206144	0.2478
LNGE(-1)	-0.169281	0.079869	-2.119475	0.0524
LNGE(-2)	0.115228	0.064129	1.796827	0.0940
LNG	2.328389	0.822522	2.830791	0.0133
LNC	-2.118139	0.570770	-3.711020	0.0023
LNC(-1)	-0.298814	0.312968	-0.954774	0.3559
LNC(-2)	0.603502	0.235080	2.567225	0.0224
C	-1.514184	0.616798	-2.454911	0.0278
R-squared	0.997948	Mean dependent var		4.327620
Adjusted R-squared	0.996482	S.D. dependent var		0.870041
S.E. of regression	0.051603	Akaike info criterion		-2.790296
Sum squared resid	0.037280	Schwarz criterion		-2.253991
Log likelihood	45.87870	Hannan-Quinn criter.		-2.641548
F-statistic	680.8489	Durbin-Watson stat		1.894046
Prob(F-statistic)	0.000000			

Source: Calculation based on Annex – I

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Estimates table 4.5 shows the results of Autoregressive Distributed Lag (ARDL) model estimation. This model analyses the short- and long-term relationships

between the dependent variable likely VAT revenue, ($\ln V$) and a number of independent variables, including imports ($\ln I$), government expenditures ($\ln GE$), gross domestic consumption ($\ln G$), and other macroeconomic factors.

The results show a short-run effect with a coefficient of 0.4009 and a p-value of 0.0239, indicating that the lagged values of VAT revenue, in particular $\ln V(-2)$, significantly increase VAT revenue. The coefficient for imports ($\ln I$) is modest (0.0151) and statistically insignificant (p-value = 0.9440), indicating that imports do not significantly affect VAT revenue in the short term. The results of government expenditure ($\ln GE$) are mixed; the current value of $\ln GE$ is not statistically significant, but the lagged value ($\ln GE(-1)$) is negative and marginally significant (p-value = 0.0524), and the second lag ($\ln GE(-2)$) has a positive impact (p-value = 0.0940). With a coefficient of 2.3284 (p-value = 0.0133), gross domestic consumption ($\ln G$) and VAT revenue show a substantial positive association, indicating that short-term increases in consumption lead to increased VAT revenue. With a coefficient of -2.1181 and a p-value of 0.0023, consumption ($\ln C$) exhibits a strong negative short-run relationship with VAT revenue, suggesting that decreases in consumption are linked to lower VAT revenue. However, the lagged effects of consumption ($\ln C(-2)$) demonstrate a positive and statistically significant relationship (p-value = 0.0224). With a coefficient of -1.5142 (p-value = 0.0278), the constant term is significant and negative, suggesting a baseline negative association in the absence of the explanatory variables.

The high R-squared value of 0.9979 indicates that the model explains 99.8 percentage of the variation in VAT revenue, and the modified R-squared value of 0.9965 demonstrates the model's resilience. The model is generally very significant, as indicated by the F-statistic of 680.8489 and the p-value of 0.0000. The residuals appear to have no discernible autocorrelation, according to the Durbin-Watson value of 1.8940. Furthermore, a good model fit is suggested by the Hannan-Quinn Criterion (HQ), the Schwarz Criterion (SC), and the Akaike Information Criterion (AIC), where lower values denote a better-fitting model. In summary, the ARDL estimates show that macroeconomic factors have a major impact on Nepal's VAT revenue collection, especially gross domestic consumption and lagged government expenditures.

4.3.5 ARDL Error Correction Model

This section examines the dynamic link between VAT revenue and important macroeconomic factors in Nepal by analyzing the output of the ARDL (Auto Regressive Distributed Lag) Error Correction Model. The short- and long-term impacts of changes in GDP, imports, government expenditure, and consumption on VAT revenue are evaluated using the ARDL model. The error correction term sheds light on how long-term equilibrium deviations are corrected and how various factors affect VAT revenue over time, coupled with the coefficients of the contemporaneous and lag variables. The ARDL Error Correction Model's comprehensive results, including coefficients, standard errors, t-statistics, and significance levels for each variable, are shown in the following table (Kumar, 2023).

Table 4.6

ARDL Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNV(-1))	-0.400942	0.111480	-3.596531	0.0029
D(LNGE)	-0.096868	0.046725	-2.073144	0.0571
D(LNGE(-1))	-0.115228	0.041464	-2.778994	0.0148
D(LNC)	-2.118139	0.269882	-7.848379	0.0000
D(LNC(-1))	-0.603502	0.168009	-3.592090	0.0029
CointEq(-1)*	-0.328105	0.031047	-10.56812	0.0000
R-squared	0.829648	Mean dependent var		0.102240
Adjusted R-squared	0.784819	S.D. dependent var		0.095490
S.E. of regression	0.044296	Akaike info criterion		-3.190296
Sum squared resid	0.037280	Schwarz criterion		-2.897766
Log likelihood	45.87870	Hannan-Quinn criter.		-3.109161
Durbin-Watson stat	1.894046			

* P-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.71573	10percentage	2.2	3.09
k	4	5percentage	2.56	3.49
		2.5percentage	2.88	3.87
		1percentage	3.29	4.37

Source: Calculation based on Annex I

The results of the ARDL Error Correction Model (ECM) are shown in table 4.6, which also explains the adjustment mechanism towards long-run equilibrium and the short-term correlations between VAT revenue and its explanatory variables (government expenditure and consumption).

Short-run dynamics coefficients (D (LNV (-1)), D (LNGE), and D (LNC)) show how changes in the independent variables affect VAT revenue. For example, ((-1)) D(LNV(-1)) has a negative coefficient (-0.4009), indicating that lagged VAT revenue has a negative impact on its current values. This effect is statistically significant ($p = 0.0029$ $p=0.0029$). Government expenditures (D (LNGE)) and its lag (D (LNGE (-1))) both show negative coefficients, with the lag effect being significant ($p=0.0148$) and demonstrating its influence over time. Consumption (D (LNC) shows a large and significant negative impact .With a considerable and significant negative impact (-2.1181, $p = 0.0000$), highlighting its dominant role in variations in VAT revenue. With a coefficient of -0.3281, the error correction term ((-1)) is negative and statistically significant ($p = 0.0000$ $p = 0.0000$). This proves the existence of a long-term link by showing that 32.81% of any VAT revenue imbalance is fixed in the next month.

The reliability of the model is confirmed by the diagnostic statistics. Strong explanatory power is indicated by the R-squared (0.8296) and modified R-squared (0.7848). The model's correctness is demonstrated by the low standard error of regression (0.0443) and the Durbin-Watson statistic (1.894), which indicates no significant autocorrelation. A long-term link is also supported by the F-Bounds test because the F-statistic (13.71573) is higher than the crucial values at all significant levels.

In conclusion, the ARDL ECM analysis shows important short- and long-term relationships between the factors that affect VAT revenue. The system's stability and capacity to return to equilibrium following deviations are highlighted by the error correcting process.

Table 4.7*Level Relationship among Variables (long run)*

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	13.71573	10percentage	2.2	3.09
K	4	5percentage	2.56	3.49
		2.5percentage	2.88	3.87
		1percentage	3.29	4.37
Actual sample size	25	10percentage	2.525	3.56
		5percentage	3.058	4.223
		1percentage	4.28	5.84

Source: Calculation based on Annex -I

The F-Bounds test, table 4.7 shows which determines whether a long-term link between variables exists in an Autoregressive Distributed Lag (ARDL) model, is shown in the table. In order to ascertain if the null hypothesis that there is no long-term association should be rejected, the computed F-statistic of 13.71573 is compared with critical values at different significance levels. The sample size has an impact on the critical values, which vary depending on whether the variables are integrated of order one (I(1)) or stationary (I(0)). The critical values for I(0) and I(1) at the 10percentage, 5percentage, 2.5percentage, and 1percentage significance levels are given for a sample size of 25 (as in this instance). The critical values for I(0) and I(1) are 2.2 and 3.09 at the 10percentage significance level, 2.56 and 3.49 at the 5percentage level, 2.88 and 3.87 at the 2.5percentage level, and 3.29 and 4.37 at the 1percentage level, respectively. Additionally, the chart provides slightly higher critical values for a finite sample size of thirty. In this instance, there is strong evidence to reject the null hypothesis and come to the conclusion that there is a significant long-term association between the variables in the model because the F-statistic of 13.71573 is more than the critical values at all significance levels.

Table 4.8*Estimated Long-run Coefficients of ARDL*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.514184	0.616798	-2.454911	0.0278
LNV(-1)*	-0.328105	0.082305	-3.986453	0.0014
LNI**	0.015088	0.210934	0.071529	0.9440
LNGE(-1)	-0.150920	0.119038	-1.267834	0.2255
LNG**	2.328389	0.822522	2.830791	0.0133
LNC(-1)	-1.813451	0.597400	-3.035572	0.0089
D(LNV(-1))	-0.400942	0.158349	-2.532020	0.0239
D(LNGE)	-0.096868	0.080312	-1.206144	0.2478
D(LNGE(-1))	-0.115228	0.064129	-1.796827	0.0940
D(LNC)	-2.118139	0.570770	-3.711020	0.0023
D(LNC(-1))	-0.603502	0.235080	-2.567225	0.0224

Source: Calculation based Annex I

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as $Z = Z(-1) + D(Z)$.

The table 4.8 displays the ARDL model's estimated long-run coefficients, which illustrate the correlation between several macroeconomic variables and VAT revenue. With a coefficient of -0.328105 and a p-value of 0.0014, the findings show that the lagged VAT revenue (LNV(-1)) significantly reduces VAT collection. With a coefficient of 2.328389 and a p-value of 0.0133, GDP (LNG) and VAT revenue have a positive and significant association, whereas imports (LNI) and government expenditures (LNGE(-1)) do not. VAT revenue is significantly impacted negatively by consumption (LNC(-1)), as indicated by the coefficient of -1.813451 and the p-value of 0.0089. As seen by the differenced terms, such as D(LNV(-1)) and D(LNC), with p-values showing statistical significance, the short-run dynamics show that changes in VAT revenue and consumption have a considerable impact on VAT collection. These findings imply that whereas certain macroeconomic factors, such as GDP and consumption, have a long-term, significant impact on VAT revenue, others, such as imports and government expenditures, do not.

4.3.6 Diagnostic and Residual Tests

The diagnostic tests show that the data for the study are fitted for the study. Different types of diagnostic residual tests such as normality test, serial correlation tests, heteroscedasticity test, error test, recursive residuals tests are done to verify that the data are fit for further examination. The preceding units are used for diagnostic and residual tests.

Normality Test

The normality test is done using Jarque-Bera estimates. The null hypothesis of the JB test is that the data are normally distributed. The following table shows the normality test of the data:

Table 4.9

Jarque-Bera Test

Jarque-Bera	0.871700
Probability	0.646715

Source: Calculation based Annex I

The above table 4.9 shows the data is typically distributed, according to the Jarque-Bera test results. We are unable to reject the null hypothesis of normalcy because the Jarque-Bera statistic of 0.871700 and the probability (p-value) of 0.646715 are both higher than the generally accepted significance level of 0.05. This supports the premise of normality by indicating that there is no discernible departure from a normal distribution in the data.

Breusch Godfrey Serial Correlation LM Test

The serial correlation or the autocorrelation between variables is tested using Breusch Godfrey Serial Correlation LM Test. The null hypothesis of this test assumes that there exists no serial correlation between the variables. the following table shows the results of this test:

Table 4.10*Serial Correlation Test*

F-statistic	0.698508	Probability F(2,12)	0.5165
Obs*R-squared	2.606954	Probability Chi-square (2)	0.2716

Source: Calculation based Annex I

The table 4.10 shows that the model's residuals show no discernible signs of autocorrelation. The p-value of 0.5165, which is greater than 0.05, and the F-statistic of 0.698508 indicate that we are unable to rule out the null hypothesis that there is no serial connection. Similarly, as the p-value is higher than 0.05, the Obs*R-squared statistic of 2.606954 and its associated p-value of 0.2716 likewise show no significant serial connection. Consequently, the test results indicate that the residuals are not auto correlated, thereby validating the model's appropriateness for analysis without serial correlation issues.

Breusch Pagan Godfrey Heteroscedasticity Test

Heteroscedasticity is his situation where he variability of the residuals are not constant across the explanatory variables. Here it is important as if the data is heteroscedastic the standard errors can provide biased results. The null hypothesis of this test is that there exists homoscedasticity. The following table shows the results of the test:

Table 4.11*Heteroscedasticity Test*

F-statistic	0.287208	Prob. F (10,14)	0.9733
Obs*R-squared	4.255675	Prob. Chi-square (10)	0.9351
Scaled explained SS	1.404555	Prob. Chi-Square (10)	0.9992

Source: Calculation based on Annex I

The table shows that the Heteroscedasticity Test results, the model does not appear to exhibit any substantial heteroscedasticity. With a p-value of 0.9733 and an F-statistic of 0.287208, we are unable to rule out the null hypothesis of homoscedasticity (constant variance of residuals) because the p-value is significantly more than 0.05. Likewise, the Scaled explained SS statistic of 1.404555, with a p-value of 0.9992, and the Obs*R-squared statistic of 4.255675, with a p-value of 0.9351, both attest to the absence of significant heteroscedasticity in the model. These findings imply that the

model does not have heteroscedasticity problems and that the residuals have constant variance.

Ramsey RESET Test

The Ramsey RESET (Regression Equation Specific Error Test) test is the specification test for the linear regression model. This test examines whether the linear regression model is correctly specified or not. The test evaluates whether non-linear combinations of the explanatory variables improve the model fit or not. The null hypothesis of this test is that the coefficients of the additional non-linear terms are zero. The null hypothesis is rejected if the F-statistic is less than five percent. The following table shows the results of this test:

Table 4. 12

RESET Test

	Value	df	Probability
t-statistic	0.306682	13	0.7639
F-statistic	0.094054	1,13	0.7639

Source: Calculation based on Annex I

The table shows The Ramsey RESET test, which looks for specification flaws such missing variables or improper functional form. Since the t-statistic and F-statistic p-values are both higher than 0.05, we are unable to rule out the null hypothesis that the model is correctly specified, suggesting that there are no problems with the model's specification.

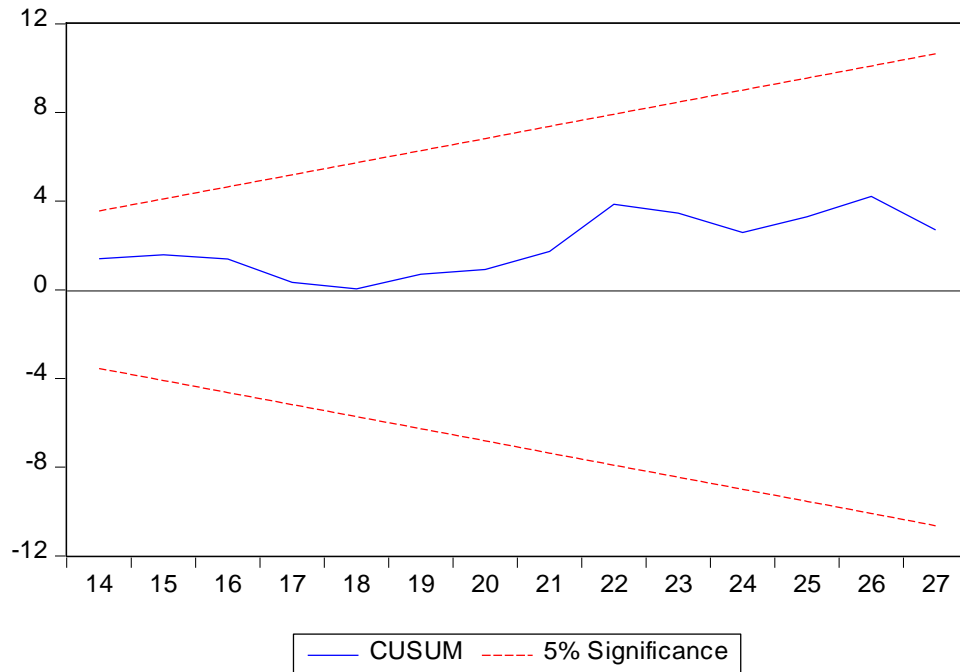
CUSUM and CUSUMSQ Test

The CUSUM (Cumulative Sum) test is a statistical test to detect structural changes in a time series data. The test takes samples from the process and assigns weights and the value of CUSUM is determined by adding up the weighted samples. If the value of CUSUM exceeds a certain threshold, it indicates a change in underlying process. In addition to CUSUM test, the CUSUMSQ (Cumulative Sum of Squares) is the extension of CUSUM test. Addition to CUSUM CUSUMSQ detects the changes in variance as well as mean value of the regression model.

The following figure shows the plot of cumulative sum of recursive residuals:

Figure 4.2

Plot of CUSUM of Recursive Residuals

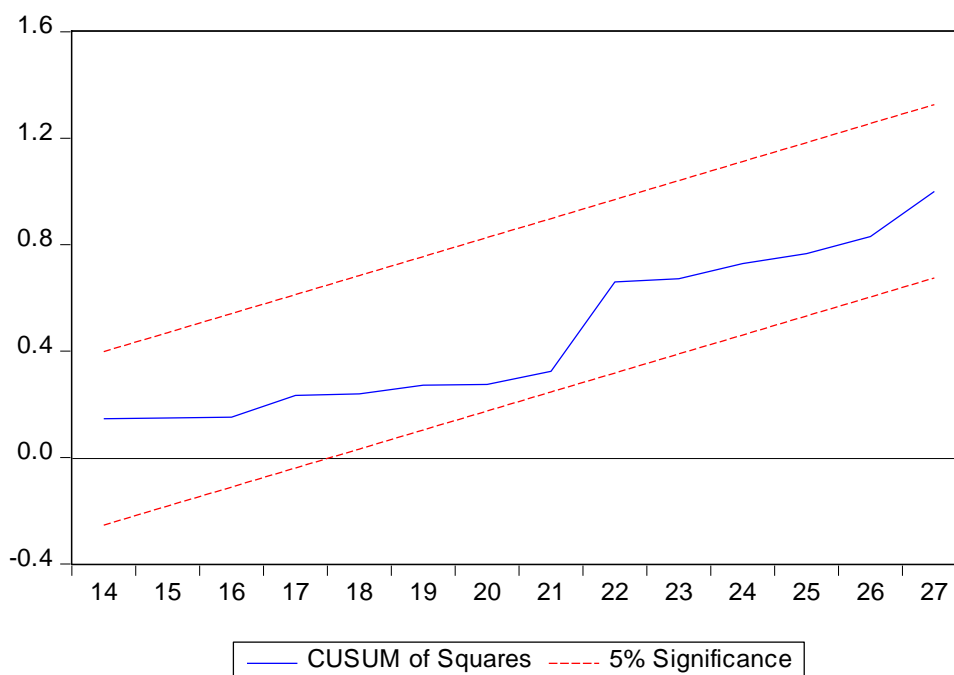


Source: Calculation based on Annex-I

The figure 4.2 shows the plot of CUSUM of Recursive Residuals of the collected data. The figure shows that the CUSUM line is within the five percent level of significance. The following figure shows the cumulative sum of squares of recursive residual.

Figure 4.3

Plot of CUSUMSQ of Recursive Residuals



Source: Calculation based on Annex-I

The figure 4.3 shows the cumulative sum of squared recursive residuals. The figure 4.2 and 4.3 shows that the values of CUSUM and CUSUMSQ are within the boundaries defined by five percent critical lines. Thus, these observations show that parameter space of the ARDL model of co-integration is stable, and the model is not mis-specified.

4.4 Discussions

The study examines about how macroeconomic determinants affect Nepal's VAT revenue collection with ARDL model analyzing time series data from 1996 to 2023.

The study finds the result of the objective I to analyze the trend of VAT and macroeconomic determinants from 1996 to 2023, the path of macroeconomic indicators and VAT revenue demonstrates both times of growth and disruption. Notable effects were caused by important events like the COVID-19 pandemic and the 2015 earthquake. VAT revenue reduced dramatically as a result of the earthquake's major impact of economic activity and the pandemic's lockdowns and decreased trade. However, the post-pandemic recovery has demonstrated a steady

improvement in GDP, imports, and VAT income, showing the Nepalese economy's resilience.

Similarly, the result of objective II to determine the relationship between VAT and macroeconomic variables like GDP, government expenditures, imports, and gross domestic consumption is presented in short and long run. In the short term, VAT revenue positively correlates with imports and GDP, while government expenditure has a longer-term effect that reflecting its indirect influence. These results demonstrate how vulnerable VAT collection is to abrupt economy shifts. The long-term shows stable and consistent relationship between VAT revenue and GDP, imports, and government expenditure, which underscores the significance of trade and economic growth in sustaining VAT revenue over time.

The results are validated using econometric methods including ARDL model estimation and diagnostic testing. The results are consistent with previous research, including studies by Mandal (2022) and Mahara (2023), which highlight the substantial influence of government expenditures, imports, and GDP on VAT revenue. Furthermore, Kunwar (2019) and Poudel (2023) highlight how macroeconomic factors affect VAT revenue, which adds support to the accuracy and applicability of these findings. The validity of the research is further supported by the agreement of the current findings with those of earlier studies on VAT, including the effects of GDP, imports, and government expenditures.

The discussion highlights the dynamic character of Nepal's VAT income collection. The trends highlight the economy's susceptibility to outside shocks such as pandemics and natural disasters, and the empirical findings show a strong correlation between macroeconomic variables and VAT over both the short and long term. To maintain and increase VAT revenue collection, policymakers are urged to concentrate on encouraging trade, encouraging economic growth, and upholding budgetary restraint.

CHAPTER V

SUMMARY AND CONCLUSIONS

5.1 Introduction

This chapter presents the conclusions drawn from the empirical Study done to look into how macroeconomic factors affect Nepal's ability to collect. This chapter provides a summary of the goals, techniques used, data examined, major conclusions, and recommendations for strategy and policy.

5.2 Summary

The main objective of the study is to analyze the macroeconomic factors influencing the collection of VAT revenue in Nepal. It is relevant in the presence of conflicting findings about the relationship between macroeconomic factors and VAT revenue; some have found strong correlations, while others have shown little relevance. The study employs ARDL model based on the time series data from 1996 to 2023.

Key finding of the Study:

- In the short run imports, consumption, government expenditures, and GDP all have a positive effect on VAT income. Higher taxable transactions result from increased government expenditure and economic expansion, whereas an increase in imports immediately broadens the VAT base.
- In the long run, there is a consistent positive correlation between VAT revenue and important macroeconomic factors such as GDP, imports, government expenditures, and gross domestic consumption. As long as these elements continue to grow, VAT income will gradually rise.
- An upward trend in VAT revenue is found in the analysis, which reflects the benefits of growing imports and economic expansion. However, obstacles like administrative roadblocks and compliance problems limit the overall effectiveness of the VAT income increase.
- VAT revenue temporarily decreased as a result of the 2015 earthquake and the COVID-19 pandemic, which severely affected economic activity. While the epidemic caused a decline in imports and consumption, the earthquake delayed economic activity. VAT revenues gradually improved during the

recovery era in spite of these hurdles, demonstrating the resilience of the economy.

5.3 Conclusions

The study examining the macroeconomic factors impacting VAT revenue collection in Nepal found a number of noteworthy trends in Nepal's VAT income collection. In the short term, taxable consumption is greatly enhanced by rapid economic development, greater imports, and higher government expenditure, which raises VAT collection. The increasing import trend broadens the VAT base even further, highlighting the close connection between commerce, fiscal activity, and the production of VAT revenue. Over time, there is a steady and positive correlation between VAT revenue and macroeconomic factors including GDP, imports, and government expenditures. The pattern shows that VAT revenue gradually rises in tandem with the economy's steady expansion and the rise in imports, indicating the long-term influence of these factors on tax collection. As a result of improved compliance and rising economic activity, the trend analysis showed steady growth in VAT revenue over time. Nonetheless, variations in important metrics, including imports and government expenditures, highlight the necessity of sound fiscal policies to sustain consistent increases in VAT revenue. Thus, VAT depends on the performance of macro-economic variables. Therefore, the government should stabilize macro-economic variables for the success of VAT in terms of performance and productivity.

5.4 Recommendation

The effectiveness and potential of Nepal's VAT income collection are hampered by a number of issues. The antiquated tax administration infrastructure, which results in inefficiencies in tracking, monitoring, and compliance, is one of the most urgent problems. Furthermore, the substantial reliance on imports makes VAT collection susceptible to changes in the external economy, and the widespread presence of the informal sector lowers the VAT base. Furthermore, these problems are made worse by tax administration's lack of modernization, particularly with regard to implementing new technology, which results in less openness and fewer real-time data analysis tools.

Recommendations

- 1. Modernize Tax Administration with Technology:** In order to boost productivity and cut down on VAT leakage, Nepal's VAT administration must be modernized. The tax collecting process will be streamlined by putting modern digital technologies including real-time VAT tracking platforms, electronic billing (e-billing), and automated data processing systems into place. By giving tax authorities precise, up-to-date information on VAT transactions, these technologies can facilitate compliance monitoring and audits. Routine tax tasks that are automated will also increase system transparency, decrease human error, and improve data accuracy. Nepal can improve its capacity to monitor taxable transactions, lower tax evasion, and provide a more effective and efficient tax collection environment by using contemporary technology into the VAT system.
- 2. Increasing Public Awareness and Capacity Building:** Businesses' and consumers' ignorance of VAT compliance and its long-term advantages is one of the main barriers to Nepal's efficient VAT revenue collection. Launching public awareness campaigns to inform stakeholders on the significance of VAT, its function in the national economy, and the benefits of compliance is essential to addressing issue. To help tax officials, business owners, and staff grasp the ins and outs of VAT filing, invoicing, and compliance, these efforts should be combined with frequent workshops and training sessions. Furthermore, tax authorities will be better prepared to manage VAT collection if their ability is increased through ongoing training and exposure to new tools and technology. Nepal can increase VAT collection rates and decrease cases of evasion or non-compliance by fostering a culture of compliance through education and training.
- 3. Boost Monitoring and Compliance Mechanisms:** Accurate and timely VAT collection depends on a strong monitoring system. Compliance can be considerably increased by fortifying Nepal's VAT enforcement and monitoring mechanisms. One aspect of this is the introduction of digital tax filing systems, which would facilitate the smooth reporting of transactions pertaining to VAT. A clear, easy-to-use system would make compliance easier for companies and lower the risk of fraud or mistakes. Furthermore, putting in

place sophisticated monitoring systems like automated audits and real-time tracking would assist tax authorities in promptly identifying and resolving disparities. Tax evasion will be decreased, and the legitimacy of the VAT system would be strengthened, if tax inspectors are trained to use these technologies and are given better tools to check compliance. Nepal can increase VAT collection and create a more open and effective tax system by concentrating on enhancing monitoring and compliance.

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ANNEX – I
DATA OF VARIABLES

Year	VAT	GDP	Import	Consumption	Govt. Expenditure
1996/97	18.00	280.51	93.55	241.24	50.90
1997/98	22.56	300.85	89.00	259.33	56.33
1998/99	21.47	342.04	87.53	295.52	59.78
1999/00	24.29	379.49	108.50	321.81	62.59
2000/01	27.28	441.52	115.69	389.86	75.73
2001/02	26.11	459.44	107.39	415.80	83.60
2002/03	30.63	492.23	124.35	449.90	74.84
2003/04	34.97	536.75	136.28	473.95	81.42
2004/05	38.50	589.41	149.47	521.04	91.61
2005/06	39.32	654.08	173.78	595.22	99.61
2006/07	47.77	727.83	194.69	656.50	116.85
2007/08	48.93	815.66	221.94	735.72	144.96
2008/09	52.55	988.27	284.47	895.37	200.83
2009/10	55.87	1192.77	374.34	1055.61	241.26
2010/11	61.66	1559.20	396.18	1448.50	276.98
2011/12	70.93	1758.38	461.67	1598.37	294.85
2012/13	83.42	1949.30	556.74	1789.45	302.05
2013/14	101.15	2232.53	714.37	2022.67	370.23
2014/15	112.52	2423.64	774.68	2239.44	428.25
2015/16	122.41	2608.18	773.60	2514.29	494.55
2016/17	161.07	3077.15	990.11	2677.12	727.36
2017/18	206.81	3455.90	1245.10	2944.43	967.63
2018/19	240.12	3858.93	1418.54	3268.51	918.69
2019/20	224.01	3888.70	1196.80	3667.04	973.23
2020/21	282.01	4352.60	1539.84	4074.03	498.70
2021/22	314.27	4933.70	1920.45	4647.55	1075.05
2022/23	290.60	5381.30	1611.73	5036.90	1170.53

(Sources: Economic Survey from 1996/97 to 2022/23)

ANNEX – II
DATA OF VARIABLES

Year	LnV	LnG	LnI	LnC	LnGE
1996/97	2.89	5.64	4.54	5.49	3.93
1997/98	3.12	5.71	4.49	5.56	4.03
1998/99	3.07	5.83	4.47	5.69	4.09
1999/00	3.19	5.94	4.69	5.77	4.14
2000/01	3.31	6.09	4.75	5.97	4.33
2001/02	3.26	6.13	4.68	6.03	4.43
2002/03	3.42	6.20	4.82	6.11	4.32
2003/04	3.55	6.29	4.91	6.16	4.40
2004/05	3.65	6.38	5.01	6.26	4.52
2005/06	3.67	6.48	5.16	6.39	4.60
2006/07	3.87	6.59	5.27	6.49	4.76
2007/08	3.89	6.70	5.40	6.60	4.98
2008/09	3.96	6.90	5.65	6.80	5.30
2009/10	4.02	7.08	5.93	6.96	5.49
2010/11	4.12	7.35	5.98	7.28	5.62
2011/12	4.26	7.47	6.13	7.38	5.69
2012/13	4.42	7.58	6.32	7.49	5.71
2013/14	4.62	7.71	6.57	7.61	5.91
2014/15	4.72	7.79	6.65	7.71	6.06
2015/16	4.81	7.87	6.65	7.83	6.20

(Sources: Economic Survey from 1996/97 to 2022/23)