MACROECONOMIC IMPACT OF VALUE ADDED TAX IN NEPALESE ECONOMY

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Abstract

The term 'Value Added Tax (VAT)' can be defined as a tax levied (on the value created) at each stage in the process of production and distribution of a good or service. These stages can be import, manufacturing, dealers, wholesalers and retailers etc. Value added tax (VAT) is a tax on the value that a business firm adds to the things it buys from other firms in producing its own product. The main objective of this study is to assess the impact of VAT on GDP, PCON, IMP, GE, GNS, TI and to examine the relationship and causality among the macro economic variables. In model specification only few variables such as Gross Domestic production (GDP), value added tax (VAT), private consumption (PCON), import (IMP), government expenditure (GE), gross national saving (GNS) and total investment (TI) are including many other variables are unable to include. Literature review suggests a growing need for examining extensive study on the contribution of VAT on economic growth. There is lack of macro level studies ascertaining the impact of VAT in economic growth and moreover this study incorporate more important variables as like private consumption, import, government expenditure, gross national saving, disposable personal income and total investment in the study. Some important findings have been obtained. The econometrics results have shown the fact that a positively significant impact of VAT on gross GDP of a country (Model I). Regarding the relationship between private consumption, disposable personal income, value added tax(model 1.4), import, nominal gross domestic production, value added tax(model 1.5), government expenditure, nominal gross domestic production, value added tax(model 1.6), gross national saving , nominal gross domestic production, value added tax(model 1.7), The application of VAR to examine the long run relationship suggest long run relationship and all the explanatory variables are statistically insignificant but all the model are free from the autocorrelation, Heteroskedasticity and residuals are normally distributed which is desirable. There is unidirectional granger cause as like LnGDP to LnVAT, LnGDP to LnGNS and LnTI to LnGDP.

Keywords: *Unit root test, Cointegration test, VAT model etc.*

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1. Introduction

German businessman Wilhelm Von Siemens in 1918 at first introduced the concept of VAT; later on American economist Thomas S. Adams also put forward this concept. France in 1954, the tax on value added has spread like a prairie fire to a large number of countries. Its widespread adoption has specially been witnessed during the recent years. Until the 60s this tax had been introduced only by a handful of nations. During the 80s the tax has come to occupy an important place in the fiscal armory of nearly all industrialized countries and a large number of Latin American, Asian and African countries. More than 30 countries have adopted VAT since 1980. This has brought the total number of VAT-countries to more than 60. Benin, Paraguay, Tanzania, Tobago, Thailand and many other countries of the former Soviet Union have introduced VAT during just the last two years. The trend of the adoption of VAT has thus been the most remarkable event in the evolution of commodity taxes in the present century (Adam, 1982).

VAT was limited to less than ten countries in the late 1960s, and now it has been implemented by more than 150 countries across the world (Charlet and Butdens, 2012)

The term 'Value Added Tax (VAT)' can be defined as a tax levied (on the value created) at each stage in the process of production and distribution of a good or service. These stages can be import, manufacturing, dealers, wholesalers and retailers etc. Value added tax (VAT) is a tax on the value that a business firm adds to the things it buys from other firms in producing its own product.

There are three methods of calculation, viz, addition method, subtraction method, and credit invoice method. Under the addition method, VAT is calculated on the value derived by adding all costs incurred to the factors of production like material, wages, overheads, profits etc. while VAT is calculated by deducting raw materials from the sales under the subtraction method. Under the credit invoice method, tax paid on the purchase of inputs is allowed to deduct from the tax collected from the sale of goods and services. Moreover, some other important aspects of VAT design issues must be addressed. This comprises the numbers of tax rates, the scope of exemptions and zero-rating goods and services, level of exemption threshold, and administrative apparatus.

Olatunji (2013) adopted the descriptive research approach gathered primary data from the oral interviews and structured questionnaires while he also used secondary data showing the impact of VAT on the revenue generation in Nigeria and the perception of the citizen on VAT and Inflation. The study concludes that for a success of any fiscal policy, VAT must be properly planned, the

duration depending on the level of the development of the country, also effective communication should be used to improve the quality of its implementation and increase the revenue collected.

Adereti, et al. (2011) the main aim of VAT was to increase the revenue base of government and make funds available for developmental purposes that will accelerate economic growth.

Denis (2010) investigates the relationship between VAT and gross domestic product (GDP) in Nigeria on the basis of VAT revenue and GDP data for the period from 1994 to 2008. The test revealed a correlation Pearson with 96 percent strength. In addition, a major test confirmed that VAT revenue is significantly different to a confidence level of 99% relative to GDP. The study suggests maintaining the status quo because it would suggest supporting the economy and the convenience of tax principles.

Bird (2005) reveals VAT as the 'money machine' tax which necessarily adopted by both developed and developing countries that allow the government to collect sufficient amount of revenue. Hence, the majority of economists as well as experts of political scientists think that VAT is the best preferable general consumption tax recently available that enhances economic growth.

Goode (1986) described that VAT is most important innovation in public finance. This tax is applied to the value added at successive stages of production and distribution. Value added in equivalent to the sum of wages, salaries, interest, rent and profit. A value added tax may extend through the retail stage. In that case, it is similar to a retail sales tax on goods and services covered with the important difference that the value added tax is collected at each stage rather than being concentrated at the final stage of distribution.

Musgrave and Musgrave (1976) stated that a sales tax may be imposed in single or multiple stages. A properly implemented value added tax is equivalent to a single stage sales tax, from the economist's point of view. They suggested that among three types of VAT (GNP type, income type and consumption type), the consumption type of VAT is most important from the practical point of view, which includes both efficiency and equity criterion. Tax based on consumption is similar to the retail sales tax especially for the poor countries. Among the three types of tax calculation methods (additive, subtractive, and tax invoice), the latter is more preferable and advantageous.
Statement of the problem:

In twenty first century government has to spend a lot of money to full fill its responsibility towards its people. Government responsibility towards people has been increasing which enhances the Government expenditure in favorers of the people. To meet the growing expenditure, the government

has to manage its fund from internal as well as external sources. VAT has come of 18 years in Nepal, but it has completed 62 years in the international arena of taxation as it was firstly introduced in France in 1954.

VAT in Nepal has witnessed many ups and downs so far. VAT has become important source of revenue to the Nepal. The Government of Nepal is intending to increase percentage of VAT imposed on goods and services because of its relevance to income base of the country. It is therefore appropriate to carry out a research to determine the impact of VAT on the country's economic development.

The impact of VAT on the economic developments and macroeconomic variables should be empirically analyzed. VAT is the important sources of public revenue and major fiscal policy instruments have an important in increasing rate of capital formation and thereby achieving high rate of economic growth. Nepal is facing the serious problem of resources dearth and high dependency on foreign revenue. The Nepalese economy is persistently suffering from the general poverty stagnation. Tax reform and adoption of VAT is important fiscal phenomenon.

This study comprises following research questions:

- ✦ Is a VAT an effective instrument for resource mobilization?
- ✦ Is a VAT inflationary?
- ✦ Does the government collect significant amount from the VAT?
- ✦ Does the government apply effective measure to collect significant amount of VAT?
- ✦ Does VAT impact on macroeconomic variables in Nepalese economy?

Objective of the Study:

The specific objectives are as follows:

- ✦ To examine the contribution of VAT on economic growth of Nepal
- ✦ To assess the impact of VAT on macroeconomic variables of Nepal.

Significance of the Study:

Nepalese Government has already been implemented VAT for achieving ultimate objectives of economic development and accelerating growth rate of economy through expanding. During the last few years of VAT implementation, Government has made a great effort to make VAT more effective and productive. There was some correction in VAT rules and regulation then business community accept the system and further demanded it to extend retail level so that all business

firms will be treated equally. For strengthening the internal resource mobilization of Nepal, the Government has already adopted VAT administration and policy, according to the reform policy and programmed in the eight five year plans. Nepal has adopted VAT since 16 November 1997 which has the fowling objectives:

- ✦ Expanding the base of tax i.e. bring more goods and services under the tax net.
- ✦ Export formation.
- ✦ Reducing economic inefficiencies.
- ✦ Acceleration of the development pace through more resource mobilization.
- ✦ Evolving a simple and transparent tax system.

Despite more than a one and half decade of VAT implementation, many Nepalese are unknown about various aspects of it. This study basically concentrates on administrative structure of VAT, the importance of VAT to improve internal resource mobilization, existing problems of VAT and in Nepal and provided effective suggestion to making VAT effectiveness. In this regard, this study will also assess the impact of VAT on macroeconomic variables and successful implementation of VAT and hence make the country self-dependent to some extent instead of the rapidly persisting resource gap.

The study provides relevant information for government organs. The researcher insights the study would be useful to formulate appropriate policy to all stakeholders. Furthermore, the study will be used as a reference for other researchers for further study in the topic.

Limitation of the Study:

- ✦ The study centers on achieving the broad objective which is to evaluate the contribution of VAT for the development of Nepalese economy. This study only covers the time period of thirty one years from 1985/86 to 2015/16 the rational for choosing this period is mainly for simplicity of analysis.
- ✦ VAT was launched in 16 November 1997 in Nepal, no time series data prior to that time are available. For that reason, the aggregate data on sales tax, hotel tax, entertainment tax and contract tax are used in place of VAT prior to 1997. Disposable personal income (DPI) is also unavailable before 2000.
- ✦ This study will only use secondary data from the different sources so that validity and reliability may depend on the goodness of these data.
- ✦ This study will be examined the impact of VAT on macroeconomic variables such as private consumption (PCON), import (IMP), government expenditure (GE), gross national saving (GNS) and investment (INV) in current price. To this extent, for evaluation, disposable personal

income (DPI), nominal gross domestic product (GDPn) and value added tax (VAT) at current prices are considered as explanatory variables many other variables will not include.

- ✦ It is not a complete study of the whole tax system in Nepal.

Research methodology:

This study comprises both analytical and descriptive type. This study tries to carry out the impact of VAT on GDP and macroeconomic variables.

The Research Design:

This study combined form of both analytical and descriptive research. It uses both the qualitative and quantitative techniques depending on the nature and source of data and information. In this study, there has applied some tools such as econometric models, graphs, tables and statistical tools.

Nature and Sources of Data:

The basic objective of the study analyzes the impact of VAT on economic growth and macro-economic variables. In order to seek the information regarding this study the relevant materials review and gather the necessary information from the various secondary sources.

Time series data covering period of thirty one years from 1985/86 to 2015/16 has been used to assess the impact on GDP and macro-economic variables. The secondary data has been taken from Ministry of Finance (MOF), Nepal Rastra Bank (NRB), National Planning Commission (NPC), Central Bureau of Statistics (CBS), Department of Industry (DOI), Foreign Employment Department, Central Library of TU Kirtipur, and various web pages including google.com, libraries as per need.

Data Collection Tools and Procedures:

The study has been employed specific techniques of data collection and analysis methods in a way that seems pertinent to the study. As a result, has been used specific tool; review the existing data that enable to capture information pertinent to the study objectives. That means, the study has been employed a documentary reviewing method.

Techniques of Data Analysis:

The information collected from the secondary sources has been processed to analyze regression. To address the objectives of the research and to analyze the data, descriptive statistics, simple and multiple regressions will be employed.

This study examine the impact of VAT on private consumption (PCON), import (IMP), government expenditure (GE) gross national saving (GNS) and investment (INV) in current price. To this extent, for evaluation, disposable personal income (DPI), nominal gross domestic product (GDPn) and value added tax (VAT) at current prices are considered as explanatory variables. In similar way, this study also examines the elasticity and buoyancy of VAT in current prices.

The time series information (annual data has been used for statistical computations of the contribution and hence, has been used for testing the hypotheses. Statistical computation has been employed to explore the inherent relationships among the variables. This study will also test some reliable model as like Augmented- Dickey Fuller unit root test, Johansen co-integration test, Vector error correction model and Granger causality test which give reliability and validity of the model.

The Model Specification:

This study apply time series data covering the thirty one years from 1985/86 to 2015/16 or on the basis of improved models will be used and it captures the link between VAT and its role on economic growth in the Nepalese context by including some necessary variables and adjusting them based on the objective of this study.

Measures of VAT Impact on GDP (Model I)

$GDP = f(VAT)$…… (1.1)

From the above functional relationships, the following stochastic model is specified below:

$GDP = \beta_0 + \beta_1 (VAT)$…… (1.2)

Generally, the working model can be restated in its natural logarithm form as follows:

$LnGDP = \beta_0 + \beta_1 Ln (VAT) + \mu$ …… (1.3)

Where,

GDP = Gross domestic product

VAT= Value added tax

β_0 and β_1 are model parameters and μ is the stochastic error term.

Measures of VAT Impact on macroeconomic variables (Model II)

Measures of VAT Impact on other variables model will be appropriate for testing the impact of VAT on macroeconomic variables.

$$\text{Ln PCON} = \theta_0 + \theta_1 \text{Ln (DPI)} + \theta_2 \text{Ln(VAT)} + \mu \ldots\ldots\ldots (1.4)$$

$$\text{Ln IMP} = \alpha_0 + \alpha_1 \text{Ln}(GDP_n) + \alpha_2 \text{Ln(VAT)} + \mu \ldots\ldots\ldots\ldots (1.5)$$

$$\text{Ln GE} = \beta_0 + \beta_1 \text{Ln}(GDP_n) + \beta_2 \text{Ln(VAT)} + \mu \ldots\ldots\ldots\ldots\ldots (1.6)$$

$$\text{Ln GNS} = \delta_0 + \delta_1 \text{Ln}(GDP_n) + \delta_2 \text{Ln(VAT)} + \mu \ldots\ldots\ldots\ldots (1.7)$$

$$\text{Ln TI} = \Phi_0 + \Phi_1 \text{Ln}(GDP_n) + \Phi_2 \text{Ln(VAT)} + \mu \ldots\ldots\ldots\ldots (1.8)$$

Where,

PCON = Private consumption

DPI = Disposable personal income

IMP = Import

GE = Government expenditure

VAT= Value added tax

GDP_n = Nominal gross domestic production

GNS = Gross national saving

TI = Total Investment (Gross capital formation)

θ_0, α_0, β_0, δ_0, Φ_0, θ_1, α_1, β_1, δ_1, Φ_1, θ_2, α_2, β_2, δ_2 and Φ_2 are model parameters/ elasticity coefficients and μ is the stochastic error term. The 'priori' expectation is that the model parameter is expected to be positively signed.

Empirical Analysis

Measures of VAT Impact on GDP.

In the following equation the P- Value of VAT is less than 5 percent almost equal to zero (P<5%) so VAT is statistically significant to the GDP. P - Value of F-statistics is also less than 5 percent (P<5%) meaning overall model is also statistically significant and fit. The R- square value is 99 percent which is greater than 60 percent so we can accept this model. Since, 99 percent variation in GDP is explained by the explanatory variable VAT. But this model is affected by serial correlation even though residuals are normally distributed and Homoskedasticity which is desirable. The regression equation is:

LnGDP = 5.612752 + 0.775450VAT + μ

SE = (0.012183)

T value = [63.64834]

P value = 0.0000

R-squared=0.992892, Adjusted R-squared=0.992647, Prob(F-statistic)= 0.000000, Durbin-Watson stat= 0.779291

Measures of VAT Impact on Macro Economic Variables.

The empirical evidences help to define the fact that DPI and VAT have positively significant impact on PCON at 5 percent level of significance. P- value of F- statistics is less than 5 percent so this model is statistically significant. Lagrange multiplier test for autocorrelation of residuals seem serially correlated, JB test for normality of residuals are normally distributed and there is no heteroskedasticity which is desirable for the model

Ln PCON = 5.855911+ 0.012663DPI + 0.714234VAT + μ

SE =	(0.004468)	(0.022725)
T value =	[2.834375]	[31.42992]
P value =	0.0084	0.0000

R-squared=0.992892, Adjusted R-squared=0.992696, Prob(F-statistic)= 0.000000, Durbin-Watson stat= 0.905543

The result stated below positive coefficient of nominal gross domestic production and value added tax confers significant impact on import.

Ln IMP = -1.121682 + 0.724955GDP_n + 0.352882 VAT + μ

SE =	(0.219841	(0.171085)
T value =	[3.297628]	[2.062611]
P value =	0.0027	0.0485

R-squared=0.993110, Adjusted R-squared=0.992617, Prob(F-statistic)= 0.000000, Durbin-Watson stat= 0.403781

In a similar fashion, coefficient of nominal gross domestic production seems positive and significantly positive impact on government expenditure and the coefficient of value added tax seems positive but insignificant on government expenditure.

Ln GE = -0.332050+ 0.663033 GDP_n + 0.322590VAT + μ

SE =	(0.209679)	(0.163176)
T value =	[3.162142]	[1.976943]
P value =	0.0037	0.0580

R-squared=0.992508, Adjusted R-squared=0.991973, Prob(F-statistic)= 0.000000, Durbin-Watson stat= 0.626906

Coefficient of nominal gross domestic production seems positive and significantly positive impact on government expenditure and the coefficient of value added tax seems positive but insignificant on gross national saving.

Ln GNS =	**-5.241434+**	**1.125820GDP$_n$ +**	**0.224984VAT + μ**
SE =		(0.253733)	(0.197460)
T value =		[4.437020]	[1.139390]
P value =	0.0001		0.2642

R-squared=0.993633, Adjusted R-squared=0.993179, Prob(F-statistic)= 0.000000, Durbin-Watson stat= 0.843165

Coefficient of nominal gross domestic production seems positive and insignificant impact on total investment (gross capital formation) and the coefficient of value added tax seems positive and significant on total investment.

LnTI =	**0.897099+**	**0.339768GDP$_n$ +**	**0.667485VAT + μ**
SE =		(0.171107)	(0.133159)
T value =		[1.985704]	[5.012686]
P value =	0.0569		0.0000

R-squared=0.995947, Adjusted R-squared=0.995658, Prob(F-statistic)= 0.000000, Durbin-Watson stat= 1.283801

Lagrange multiplier test for autocorrelation of residuals seem serially correlated except model 1.8, JB test for normality of residuals are normally distributed and there is no heteroskedasticity except model 1.7 and model 1.8. (Appendix 1).

Unit root test

Augmented Dickey Fuller (ADF) test has revealed non stationary at level and stationary when the variables are converted into first difference from expressed as in the table.

Table No 4.1: Augmented Dickey Fuller Test (trend and constant)

Variables	Level variable p-value	First difference p-value
lngdp	0.2798	0.0652
lnvat	0.5838	0.0007
lndpi	0.5397	0.0009
lnpcon	0.3588	0.0003
lnimp	0.0047	0.7076
lngns	0.1089	0.0005
lnge	0.9607	0.0477
lnti	0.0126	0.0072

Source: Author's estimation

Johansen Cointegration Test

So we can apply Johansen cointegration approach to test the long run association between the variables. The result of Johansen cointegration test is expressed as below table.

Table No 4.2:
Johansen Test of Cointegration Trace Statistics 0.5% level of critical value

Model	Hypothesized No. of CE(s)	P-value
Model 1.4	None (0)	0.1830
Model 1.5	None (0)	0.1021
Model 1.6	None (0)	0.1948
Model 1.7	None (0)	0.0561
Model 1.8	None (0) At most 1	0.0073 0.0966

Source: Author's estimation

Table no 4.3:
Johansen Test of Cointegration Max-Eigen Statistic 0.5% level of critical value

Model	Hypothesized No. of CE(s)	P-value
Model 1.4	None (0)	0.1365
Model 1.5	None (0)	0.1401
Model 1.6	None (0)	0.4208
Model 1.7	None (0)	0.0629
Model 1.8	None (0) At most 1	0.0273 0.1793

Source: Author's estimation

In the above table **Trace Statistics and** Max-Eigen Statistic revealed that model no. 1.4, 1.5, 1.6 and 1.7 are not cointegrated the p- value is greater than 5 percent but model 1.8 is cointegrated so in this regard in the case of model no. 1.4, 1.5,1.6 and 1.7 should run unrestricted VAR model and in the case of model 1.8 should run the vector correction test.

Regarding the relationship between private consumption, disposable personal income, value added tax(model 1.4), import, nominal gross domestic production, value added tax(model 1.5), government expenditure, nominal gross domestic production, value added tax(model 1.6), gross national saving , nominal gross domestic production, value added tax(model 1.7), The application of VAR to examine the long run relationship suggest long run relationship and all the explanatory variables are statistically insignificant but all the model are free from the autocorrelation, Heteroskedasticity and residuals are normally distributed which is desirable.

In similar way total investment, nominal gross domestic production and value added tax are cointegrated therefore, the application of VECM suggest nominal gross domestic production and value added tax have long run relationship and causality on the total investment. The coefficient C(1) has negative sign. Coefficient of error term has been 66 percent meaning that the system corrects its previous period disequilibrium at a speed of 66 percent annually. For the short run causality wald test suggest there is no short run causality exist among the variables. The null hypothesis is serially correlated, residuals are homoskedasticity, residuals are normally distributed which is desirable.(Appendix 2)

Granger Causality Test

Ln PCON = $\theta_0 + \theta_1$Ln (DPI) + θ_2 Ln(VAT) + μ

Pairwise Granger Causality Tests

Sample: 1 31

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNDPI does not Granger Cause LNPCON	29	0.68536	0.5135
LNPCON does not Granger Cause LNDPI		1.99666	0.1577
LNVAT does not Granger Cause LNPCON	29	0.18461	0.8326
LNPCON does not Granger Cause LNVAT		2.82808	0.0789
LNVAT does not Granger Cause LNDPI	29	0.97559	0.3914
LNDPI does not Granger Cause LNVAT		1.06484	0.3605

Ln IMP = $\alpha_0 + \alpha_1 Ln(GDP_n) + \alpha_2 Ln(VAT) + \mu$

Pairwise Granger Causality Tests

Sample: 1 31

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP does not Granger Cause LNIMP	29	2.89918	0.0745
LNIMP does not Granger Cause LNGDP		2.16163	0.1370
LNVAT does not Granger Cause LNIMP	29	2.53059	0.1006
LNIMP does not Granger Cause LNVAT		2.27796	0.1242
LNVAT does not Granger Cause LNGDP	29	0.08580	0.9181
LNGDP does not Granger Cause LNVAT		6.53067	0.0054

Ln GE = $\beta_0 + \beta_1 Ln(GDP_n) + \beta_2 Ln(VAT) + \mu$

Pairwise Granger Causality Tests

Date: 06/07/17 Time: 16:06

Sample: 1 31

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP does not Granger Cause LNGE	29	0.27114	0.7648
LNGE does not Granger Cause LNGDP		1.59989	0.2227
LNVAT does not Granger Cause LNGE	29	0.41136	0.6673
LNGE does not Granger Cause LNVAT		4.41355	0.0233
LNVAT does not Granger Cause LNGDP	29	0.08580	0.9181
LNGDP does not Granger Cause LNVAT		6.53067	0.0054

Ln GNS = $\delta_0 + \delta_1 Ln(GDP_n) + \delta_2 Ln(VAT) + \mu$

Pairwise Granger Causality Tests

Sample: 1 31

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP does not Granger Cause LNGNS	29	4.27812	0.0258
LNGNS does not Granger Cause LNGDP		0.04574	0.9554
LNVAT does not Granger Cause LNGNS	29	0.46147	0.6358
LNGNS does not Granger Cause LNVAT		1.73415	0.1979
LNVAT does not Granger Cause LNGDP	29	0.08580	0.9181
LNGDP does not Granger Cause LNVAT		6.53067	0.0054

Ln TI = Φ_0 + Φ_1Ln(GDP$_n$) + Φ_2Ln(VAT) + μ

Pairwise Granger Causality Tests

Sample: 1 31

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNGDP does not Granger Cause LNTI	29	3.10921	0.0630
LNTI does not Granger Cause LNGDP		3.42713	0.0491
LNVAT does not Granger Cause LNTI	29	0.12939	0.8792
LNTI does not Granger Cause LNVAT		6.34569	0.0061
LNVAT does not Granger Cause LNGDP	29	0.08580	0.9181
LNGDP does not Granger Cause LNVAT		6.53067	0.0054

We cannot reject the null hypothesis because P- value is greater than 5 percent, meaning there is no short run and long run relationship among the variables. But in some variable there is unidirectional granger cause as like LnGDP to LnVAT, LnGDP to Ln GNS and Ln TI to Ln GDP.

Conclusion:

Some important findings have been obtained. The econometrics results have shown the fact that a positively significant impact of VAT on gross GDP of a country (Model I). Regarding the relationship between private consumption, disposable personal income, value added tax(model 1.4), import, nominal gross domestic production, value added tax(model 1.5), government expenditure, nominal gross domestic production, value added tax(model 1.6), gross national saving , nominal gross domestic production, value added tax(model 1.7), The application of VAR to examine the long run relationship suggest long run relationship and all the explanatory variables are statistically insignificant but all the model are free from the autocorrelation, Heteroskedasticity and residuals are normally distributed which is desirable. There is unidirectional granger cause as like LnGDP to LnVAT, LnGDP to LnGNS and LnTI to LnGDP.

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Appenix 1:
Estimate of LM Test of serial Correlation, Jarque-Bera Test of Normality and Heteroskedasticity Test: Breusch-Pagan-Godfrey

Model	LM Test of serial Correlation	Jarque-Bera Test of Normality	Heteroskedasticity Test: Breusch-Pagan-Godfrey
Model 1.3	P- value =0.0072	P- value =0.69793	P- value =0.4747
Model 1.4	P- value =0.0000	P- value= 0.78756	P- value =0.1057
Model 1.5	P- value =0.0002	P -value= 0.7322	P- value =0.1048
Model 1.6	P- value =0.0012	P- value= 0.00832	P- value = 0.4891
Model 1.7	P- value =0.0093	P- value= 0.57025	P- value =0.0104
Model 1.8	P- value =0.0619	P- value=0.99976	P- value =0.0270

Source: Author's estimation

Appendix 2:
Unrestricted VAR and VECM Model

Unrestricted VAR model

$Ln\ PCON = \theta_0 + \theta_1 Ln\ (DPI) + \theta_2\ Ln(VAT) + \mu$

LNPCON = C(1)*LNPCON(-1) + C(2)*LNPCON(-2) + C(3)*LNDPI(-1) + C(4)*LNDPI(-2) + C(5)*LNVAT(-1) + C(6)*LNVAT(-2) + C(7)

LNDPI = C(8)*LNPCON(-1) + C(9)*LNPCON(-2) + C(10)*LNDPI(-1) + C(11)*LNDPI(-2) + C(12)*LNVAT(-1) + C(13)*LNVAT(-2) + C(14)

LNVAT = C(15)*LNPCON(-1) + C(16)*LNPCON(-2) + C(17) *LNDPI(-1) + C(18)*LNDPI(-2) + C(19)*LNVAT(-1) + C(20)*LNVAT(-2) + C(21)

Dpendent variable lnpcon			Dpendent variable lndpi			Dpendent variable lnvat		
Independent	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**
C(1)	0.887938	0.0012	C(8)	-5.348627	0.6609	C(15)	1.392241	0.0229
C(2)	0.040917	0.8591	C(9)	15.91415	0.1780	C(16)	-0.697784	0.2107
C(3)	-0.003693	0.4003	C(10)	0.777039	0.0016	C(17)	-0.023401	0.0322
C(4)	0.004356	0.2933	C(11)	-0.139535	0.4994	C(18)	0.019098	0.0596
C(5)	0.020100	0.8236	C(12)	-2.165573	0.6331	C(19)	0.566759	0.0138
C(6)	0.021590	0.8050	C(13)	-4.394625	0.3221	C(20)	-0.076993	0.7112
C(7)	0.639092	0.3767	C(14)	-67.81611	0.0697	C(21)	-3.902831	0.0301
LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test
P- value =0.3594	P- value = 0.2688	P-value = 0.65553	P- value = 0.7002	P- value = 0.1662	P-value = 0.00000	P- value = 0.0486	P- value = 0.2730	P-value = 0.12618

Source: Author's estimation

LnIMP=α_0+ α_1 Ln(GDP$_n$)+α_2Ln(VAT)+μLNIMP= C(1)*LNIMP(-1) + C(2)*LNIMP (-2) + C(3)*LNGDP(-1) + C(4)
*LNGDP(-2) + C(5)*LNVAT(-1) + C(6)*LNVAT(-2) + C(7)
LNGDP = C(8)*LNIMP(-1) + C(9)*LNIMP(-2)+ C(10)*LNGDP(-1) + C(11) *LNGDP (-2) + C(12)*LNVAT(-1) + C(13)*LNVAT(-2) + C(14)
LNVAT = C(15)*LNIMP(-1)+C(16)*LNIMP(-2)+C(17)*LNGDP(-1)+C(18) *LNGDP (-2) + C(19)*LNVAT(-1) + C(20)*LNVAT(-2) + C(21)

Dpendent variable lnimp			Dpendent variable lngdp			Dpendent variable lnvat		
Independent	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**
C(1)	0.976115	0.0025	C(8)	0.059452	0.6082	C(15)	0.495837	0.1335
C(2)	-0.426548	0.1408	C(9)	-0.185434	0.1105	C(16)	-0.638915	0.0516
C(3)	0.370057	0.5621	C(10)	1.210557	0.0001	C(17)	1.403243	0.0572
C(4)	-0.045685	0.9447	C(11)	-0.102395	0.6975	C(18)	-0.584636	0.4279
C(5)	-0.074905	0.7281	C(12)	-0.047765	0.5797	C(19)	0.250121	0.3018
C(6)	0.218942	0.2719	C(13)	0.069296	0.3815	C(20)	0.254661	0.2510
C(7)	-0.223120	0.8603	C(14)	-0.049593	0.9220	C(21)	-4.233306	0.0060
LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test
P- value =0.1419	P- value = 0.1788	P- value = 0.66661	P- value =0.6621	P- value = 0.8501	P- value = 0.66334	P- value = 0.2416	P- value = 0.7778	P- value = 0.55777

Source: Author's estimation

Ln GE = β_0+ β_1Ln(GDP$_n$) + β_2Ln(VAT) + μ
LNGE = C(1)*LNGE(-1) + C(2)*LNGE(-2) + C(3)*LNGDP(-1) + C(4)*LNGDP(-2) + C(5)*LNVAT(-1) + C(6)*LNVAT(-2) + C(7)
LNGDP = C(8)*LNGE(-1) + C(9)*LNGE(-2) + C(10)*LNGDP(-1) + C(11)*LNGDP(-2) + C(12)*LNVAT(-1) + C(13)*LNVAT(-2) + C(14)
LNVAT = C(15)*LNGE(-1) + C(16)*LNGE(-2) + C(17)*LNGDP(-1) + C(18)*LNGDP(-2) + C(19)*LNVAT(-1) + C(20)*LNVAT(-2) + C(21)

Dpendent variable lnge			Dpendent variable lngdp			Dpendent variable lnvat		
Independent	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**
C(1)	1.135298	0.0007	C(8)	0.289922	0.0602	C(15)	0.218403	0.6226
C(2)	-0.119040	0.6945	C(9)	-0.143968	0.3547	C(16)	-0.033385	0.9422
C(3)	0.071809	0.9123	C(10)	0.903959	0.0115	C(17)	1.622779	0.1120
C(4)	-0.345188	0.5564	C(11)	0.035975	0.9038	C(18)	-1.104609	0.2222
C(5)	0.116898	0.4439	C(12)	-0.018166	0.8141	C(19)	0.420808	0.0786
C(6)	0.092050	0.5821	C(13)	-0.068306	0.4242	C(20)	0.031304	0.9018
C(7)	1.478801	0.1571	C(14)	0.043102	0.9339	C(21)	-3.602895	0.0284
LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test
P- value =0.2830	P- value = 0.7422	P- value = 0.96399	P- value = 0.9094	P- value = 0.7793	P- value = 0.44553	P- value = 0.4209	P- value = 0.0824	P- value = 0.97266

Source: Author's estimation

$\text{Ln GNS} = \delta_0 + \delta_1 \text{Ln}(\text{GDP}_n) + \delta_2 \text{Ln}(\text{VAT}) + \mu$

LNGNS = C(1)*LNGNS(-1) + C(2)*LNGNS(-2) + C(3)*LNGDP(-1) + C(4)*LNGDP (-2) + C(5)*LNVAT(-1) + C(6)*LNVAT(-2) + C(7)

LNGDP = C(8)*LNGNS(-1) + C(9)*LNGNS(-2) + C(10)*LNGDP(-1) + C(11)*LNGDP (-2) + C(12)*LNVAT(-1) + C(13)*LNVAT(-2) + C(14)

LNVAT = C(15)*LNGNS(-1) + C(16)*LNGNS(-2) + C(17)*LNGDP(-1) + C(18)*LNGDP (-2) + C(19)*LNVAT(-1) + C(20)*LNVAT(-2) + C(21)

Dpendent variable lngns			Dpendent variable lngdp			Dpendent variable lnvat		
Independent	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**	**Independent**	**Coefficient**	**P-value**
C(1)	0.434375	0.0769	C(8)	-0.009385	0.9049	C(15)	-0.009681	0.9643
C(2)	0.052254	0.8187	C(9)	0.025861	0.7325	C(16)	0.089662	0.6670
C(3)	1.461570	0.0939	C(10)	1.404739	0.0000	C(17)	2.101860	0.0115
C(4)	-0.293374	0.7099	C(11)	-0.406988	0.1292	C(18)	-1.545777	0.0407
C(5)	-0.044354	0.8612	C(12)	-0.035569	0.6730	C(19)	0.399241	0.0951
C(6)	-0.296244	0.2375	C(13)	0.010098	0.9018	C(20)	0.090635	0.6879
C(7)	-5.937103	0.0073	C(14)	0.158261	0.8143	C(21)	-3.304342	0.0851
LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test	LM serial correlation test	Heteroskedasticity Test	Normality test
P- value =0.0595	P- value = 0.7422	P- value = 0.84226	P- value = 0.5818	P- value = 0.1065	P- value = 0.75664	P- value = 0.5026	P- value = 0.0154	P- value = 0.96469

Source: Author's estimation

VECM Model

$\text{Ln TI} = \Phi_0 + \Phi_1 \text{Ln}(\text{GDP}_n) + \Phi_2 \text{Ln}(\text{VAT}) + \mu$

D(LNTI) = C(1)*(LNTI(-1) - 0.288996528159*LNGDP(-1) - 0.733741557298 *LNVAT (-1) - 0.936261300878) + C(2)*D(LNTI(-1)) + C(3)*D(LNGDP(-1)) + C(4)*D(LNVAT (-1)) + C(5)

Dpendent variable lnti		
Independent	**Coefficient**	**P-value**
C(1)	-0.662093	0.1753
C(2)	0.296397	0.4072
C(3)	1.724538	0.0615
C(4)	-0.302328	0.3280
C(5)	-0.072360	0.5086
LM serial correlation test	Heteroskedasticity Test	Normality test
P- value =0.0365	P- value= 0.4010	P- value = 0.32248

Source: Author's estimation

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