The Effect of Value Added Tax (VAT) Revenue Ratio and C-Efficiency Ratio on Tax Ratio in Indonesia*

Bonarsius Sipayung[1], Muhammad Zilal Hamzah[2], Yon Arsal[3]

[1]Doctoral Economics of Public Policy Concentration, Trisakti University, Jakarta, Indonesia. Email: sipayungbonarsius.author@gmail.com
[2]Doctoral Economics of Public Policy Concentration, Trisakti University, Jakarta, Indonesia. Email: mhd_Zilal_Hamzah@trisakti.ac.id
[3]Directorate General of Taxes, Ministry of Finance of the Republic of Indonesia, Jakarta, Indonesia. Email: sahlikp2020@gmail.com

Article	Abstract
	Indonesia's tax ratio has been dominated by income tax (PPh) for the past ten years, exceeding 50%. The overall objective of Value Added Tax (VAT), which is to tax consumption broadly, should suggest a greater role for VAT in increasing the tax ratio in Indonesia. Based on the multiple linear regression method on the data of tax ratio, VRR, and C-efficiency of VAT from 2014 to 2022, this study produces 3 (three) conclusions. First, VRR affects the tax ratio. Second, the C-Efficiency ratio affects the tax ratio. Third, the VRR and C-Efficiency Ratio of VAT simultaneously affect the tax ratio. VRR and C-Efficiency Ratio of VAT affect the variable tax ratio by 91.8%, while other variables outside this regression equation influence 8.2%. It is recommended that in increasing the C-efficiency of VAT, Indonesian tax authorithy must reformulate the VAT regulations by paying attention again to VAT regulations related to the budgetary function and regulatory functions which have a direct influence on the calculation of C-Efficiency of VAT. The reformulation of VAT regulations also must be accompanied by VAT enforcement as the consequence of the implementation of the self-assessment system in Indonesia.

A.   INTRODUCTION

The tax ratio in Indonesia in the last ten years has remained dominated by Income Tax (PPh), which exceeds 50%. The VAT tax ratio in 2019 was only 3.4%, with the highest achievement in 2014, at 4.0%, and the lowest achievement in 2016, at 3.3%.[1]

---

[1] Data diolah dari Laporan Tahunan Direktorat Jenderal Pajak 2007-2020.

Although various studies have been conducted on tax ratios, such as the Value Added Tax (VAT) Revenue Ratio (VRR) or C-Efficiency Ratio, research related to the influence of VRR and C-Efficiency Ratio on tax ratio in Indonesia is still rare. For example, research conducted by Nikolaus et al. concluded that five out of twelve explanatory variables studied strongly influence the VAT Gap in Greece.[2] Two of the five variables are the VAT to total tax ratio and the number of tax audits, which negatively correlate with Greece's VAT gap. While the other three variables, namely government final consumption expenditure, the difference between the standard and reduced VAT rates, and the gross value added/gross domestic product ratio, positively correlate with Greece's VAT gap. The tax ratio in Indonesia in the last ten years has remained dominated by Income Tax (PPh), which exceeds 50%. The VAT tax ratio in 2019 was only 3.4%, with the highest achievement in 2014, at 4.0%, and the lowest achievement in 2016, at 3.3%.positive with Greece's VAT gap.[3] Previous research conducted by Nikolaus et al. still uses VRR as the dependent variable to measure the VAT Gap in Greece. In contrast, the novelty of the research that will be used is the use of VRR or VAT C-Efficiency Ratio as an independent variable and tax ratio as the dependent variable in Indonesia. Then, research conducted by Cnossen shows that calculating VAT C inefficiency separately from C efficiency will produce a more precise benchmark, especially regarding the VAT policy gap.[4] Based on the analysis of VAT revenues in the Netherlands, the large policy gap, around 0.50, is the background for exploring three options to improve VAT performance: reforming the general guidelines, drafting a VAT for EU Member States, and introducing a modern VAT that EU Member States can shoulder.[5] The previous research conducted by Cnossen has yet to examine the direct role of VRR or VAT C-Efficiency Ratio on the tax ratio, especially in the context of VAT in Indonesia. Furthermore, research conducted by Sopek on the systematic value-added taxation in Croatia and the main changes in its legislation concluded that Croatia in 2010 had better efficiency indicators than all EU member states observed.[6] However, the Sopek's research has yet to directly examine the relationship between VRR or VAT C-Efficiency Ratio to tax ratio.

Indonesia's tax ratio should increase, considering that value-added tax (VAT) revenues have a major influence on it compared to the ratio of each type of income tax, which consists of Corporate Income Tax, Individual Income Tax, and Withholding Income Tax. This is also reinforced by the overarching purpose of VAT, which is to tax consumption broadly,[7] which can be seen in the increasing value of final goods and services produced by all economic units in Indonesia in the last ten years. It is necessary to conduct a study that can determine the role of VAT, namely Value Added Tax (VAT) Revenue Ratio (VRR) and C-Efficiency Ratio, on the tax ratio in Indonesia, both partially and simultaneously.

---

[2] Eriotis Nikolaos, Missiakoulis Spyros, Papadakis Spyros, dan Vasiliou Dimitrios, Greek tax reality and the VAT gap: Influential factors, Journal of Accounting and Taxation, Vol.13, No. 1, January 2021, pp. 28-44 , https://doi.org/10.5897/JAT2020.0438.

[3] *Loc.cit.*

[4] Sijbren Cnossen, The C-inefficiency of the EU-VAT and what can be done about it, International Tax and Public Finance, Vol. 29, 2022, pp. 215–236, DOI: https://doi.org/10.1007/s10797-021-09683-0.

[5] *Loc.cit.*

[6] Petar Sopek, Tax expenditures and the efficiency of Croatian value added tax, 2012, available at https://hrcak.srce.hr/file/127911, accessed on March 30, 2022.

[7] Organisation for Economic Co-operation and Development, International VAT/GST Guidelines, Paris: OECD Publishing, 2017.

B. LITERATURE REVIEW AND THEORY

Several VAT performance measures exist, including the VAT C-efficiency ratio and the VAT Revenue Ratio (VRR). The C-efficiency ratio is the ratio of VAT revenue to VAT standard rate product and final consumption (excluding VAT revenue collection), where C-efficiency measures the deviation of VAT from a perfectly enforced tax levied at a single rate on all consumption.[8] That is, this ratio measures the efficiency ratio of VAT on all domestic consumption, where the ratio will be 100% if the VAT rate is uniform and imposed on all aggregate consumption in the country.[9] For example, if the VAT C-efficiency ratio 2022 is 61.52%, the government can only collect 61.52% of the total VAT that should have been collected during the 2022 tax year. The C-efficiency ratio is different from the VAT efficiency ratio. The VAT efficiency ratio is the ratio of VAT revenue to Gross Domestic Product (GDP) divided by the general VAT rate. This ratio is used as a summary indicator of performance and to measure the extent to which VAT is evenly levied over a broad tax base, where a low ratio can be considered primary evidence of VAT reduction or erosion.[10]

The VRR is a measure of VAT performance introduced by Organisation for Economic Co-operation and Development (OECD).[11] VRR incorporates the impact of lost VAT revenue due to VAT object exemptions, reduced rates, fraud, evasion and tax planning. VRR measures the difference between actual and theoretical VAT revenues at the standard rate, to provide a measure of a country's tax authority's ability to effectively secure its potential tax base.[12] Ideally, VRR is equal to or close to one, indicating that all potential bases of VAT taxation can be collected effectively and without excluding VAT objects.[13] There are a number of factors that can affect the VRR figure, namely the application of the VAT rate[14] lower than the standard rate, the VAT turnover threshold for small businesses that are not required to collect VAT, the scope of VAT object exemptions, the VAT treatment of public/government sector activities, taxation arrangements on international trade that deviate from the destination principle in VAT, the capacity of the tax administration in managing the VAT administration system efficiently and the level of taxpayer compliance, the obstruction of the administrative process of VAT refund (restitution) to businesses in the event of VAT overpayment, the evolution of public consumption patterns, and the measurement of final consumption expenditure in GDP.

---

[8] Santiago Acosta-Ormaechea and Atsuyoshi Morozumi, The value-added tax and growth: design matters, International Tax and Public Finance, Vol. 28, 2021, pp. 1211–1241, https://doi.org/10.1007/s10797-021-09681-2.

[9] Sulfan, Kinerja PPN di Indonesia Tahun 2011-2020, *Jurnal Pajak Indonesia*, Vol. 5 No. 2, 2021, hlm. 209, pp. 206-206.

[10] *Ibid.*, hlm. 208.

[11] Albana Demi, Eglantina Hysa, Fatjon Nanaj, Fiscal Rules of VAT In Albania, The Analytical Methodology of The Factors in Fluencing Its Efficiency in State Budget, Journal of European Social Research, Vol.2, Issue.1, 2018, p. 24.

[12] Chris Evans, Richard Highfield, Binh Tran-Nam and Michael Walpole, Diagnosing the VAT Compliance Burden: A Cross-Country Assessment, available at https://www.sbs.ox.ac.uk/sites/default/files/2019-07/evans_19_06_26_oxford_paper_evans_et_al.pdf, accessed on May 27, 2023.

[13] OECD, Consumption Tax Trends 2012 VAT/GST and Excise Rates, Trends and Administration Issues, 2012, DOI:10.1787/ctt-2012-en.

[14] J.A Gieseckea and Tran Hoang Nhi, A general framework for measuring VAT compliance rates, available at https://vuir.vu.edu.au/38907/1/g-206.pdf, accessed on June 30, 2023.

C. METHOD

In order to produce an ideal value-added tax policy to increase the tax ratio in Indonesia, this study uses a multiple linear regression method. The data used is secondary data in the form of tax ratio, VRR, and C-efficiency Ratio of VAT from 2014 to 2022. The multiple linear regression equation in this study is:

$$Y = a + b_1X_1 + b_2X_2 + Error$$

Tax ratio data is obtained from tax revenue and GDP data during the research period. Data sources will be from the Directorate General of Taxes, Ministry of Finance Annual Report, Central Bureau of Statistics. Then, VRR data is obtained by calculating based on the following formulation.[15]

$$VRR = \frac{VR}{(FCE - VR) x\ r}$$

The hypotheses proposed related to VRR in this study are as follows: VRR affects the tax ratio.

Furthermore, VAT C-efficiency data is obtained by calculating based on the following formulation.

$$Rasio\ C\ efficiency\ PPN = \frac{Penerimaan\ PPN}{Konsumsi\ dalam\ PDB\ x\ Tarif\ PPN}$$

The hypotheses proposed related to VAT C-efficiency in this study are as follows: VAT C-efficiency ratio affects the tax ratio. Furthermore, this study also proposes the hypothesis that VRR and VAT C-efficiency ratio simultaneously affect the tax ratio.

D. ANALYSIS AND DISCUSSION

Based on secondary data, data on tax ratio, VRR, and C-efficiency of VAT for 2014-2022 are obtained as follows.

Year	Tax Ratio (Y)	VRR=VAT Revenue Ratio (X1)	C-efficiency Ratio (X2)
2014	13,10%	0,62	58,11%
2015	11,60%	0,49	47,08%
2016	10,80%	0,50	47,41%
2017	10,70%	0,54	51,37%
2018	11,40%	0,58	54,86%
2019	10,70%	0,53	50,31%

---

[15] Olena Sokolovska and Dmytro Sokolovskyi, VAT efficiency in the countries worldwide, 2015, available at https://mpra.ub.uni-muenchen.de/66422/1/MPRA_paper_66422.pdf, accessed on June 26, 2023.

2020	8,91%	0,45	42,75%
2021	9,95%	0,64	59,76%
2022	11,71%	0,80	61,52%

Researchers have conducted several classical assumption tests to ensure that the regression equation obtained is accurate in estimation, unbiased, and consistent. Classical assumptions must be met in the OLS linear regression model to validate the model as an estimation tool. The classical assumption tests carried out are the data normality test, linearity test, multicollinearity test, heteroscedasticity test, and autocorrelation test..

The data normality test was conducted through the One-Sample Kolmogorov-Smirnov Test. Kolmogorov-Smirnov results with a significant value of 0.200. A value greater than 0.05 indicates that the residual value is normally distributed. The results of the One-Sample Kolmogorov-Smirnov Test are summarised in the following table.

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		9
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.21023772
Most Extreme Differences	Absolute	.225
	Positive	.172
	Negative	-.225
Test Statistic		.225
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

The linearity test results are obtained based on the analysis of variance (ANOVA) table. Based on the output, the Deviation from the Linearity value for X1 is 0.994 and for X2, it is 0.508, where the values are greater than 0.05. Thus, there is a significant linear relationship between variables X1 and Y and between X2 and Y. The Anova results of the linearity test are summarised in the following table.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Y * X1	Between Groups	(Combined)	.675	5	.135	.111	.981
		Linearity	.446	1	.446	.368	.587
		Deviation from Linearity	.229	4	.057	.047	.994
	Within Groups		3.632	3	1.211		
	Total		4.307	8			

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Y * X2	Between Groups	(Combined)	2.935	4	.734	2.140	.240
		Linearity	1.989	1	1.989	5.800	.074
		Deviation from Linearity	.946	3	.315	.920	.508
	Within Groups		1.371	4	.343		
	Total		4.307	8			

The multicollinearity test is based on the following 'Coefficients' output table. In the 'Collinearity Statistics' section, it is known that the Tolerance value for variables X1 and X2 is 0.304 and 0.304, respectively, which is greater than 0.10. Meanwhile, the VIF value for variables X1 and X2 is 3.291, respectively, less than 10.00. So, referring to the basis for making multicollinearity test decisions, it can be concluded that there are no multicollinearity symptoms in the regression model. The multicollinearity test results are summarised in the following table.

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	4.741	.781		6.066	.001		
	X1	-6.230	1.282	-1.031	-4.860	.003	.304	3.291
	X2	.187	.024	1.632	7.689	.000	.304	3.291

a. Dependent Variable: Y1

The heteroscedasticity test was carried out using the Glejser test, and a significant value of X1 of 0.278 and a significant value of X2 of 0.275 were obtained, where these values were greater than 0.05. So, there are no symptoms of heteroscedasticity in the regression model. The results of the heteroscedasticity test are summarised in the following table.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.441	.259		-1.707	.139
	X1	1.060	.424	.891	2.499	.057
	X2	.000	.008	-.018	-.050	.962

a. Dependent Variable: Abs_Res

The autocorrelation test is based on the Durbin-Watson value and obtained a Durbin-Watson value of 1.944, greater than the upper limit (dU) of 1.6993 and less than (4-dU) of 2.056. So that based on the decision-making in the Durbin-Watson Test, it can be concluded that there are no symptoms of autocorrelation. The results of the autocorrelation test are summarised in the following table.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.958[a]	.918	.891	.24276	1.944

a. Predictors: (Constant), X2, X1
b. Dependent Variable: Y

After the classical assumption test, this study conducted the F-test and the t-test. The results of the F test are as summarised in the following table.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.958[a]	.918	.891	.24276

a. Predictors: (Constant), X2, X1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.953	2	1.976	33.537	.001[b]
	Residual	.354	6	.059		
	Total	4.307	8			

a. Dependent Variable: Y
b. Predictors: (Constant), X2, X1

Based on the output table above, the Sig. value of 0.001 is obtained, which is smaller than 0.05. So, the hypothesis is accepted, and it can be concluded that variables X1 and X2 simultaneously affect variable Y. The magnitude of the

coefficient of determination (R Square) is 0.918, or equal to 91.8%. This means that variable X1 and X2 simultaneously affect variable Y by 91.8%, while other variables outside this regression equation influence 8.2%. In line with the opinion of Hair Jr et al., the R square value of 0.75 is included in the strong category,[16] So VRR and C-Efficiency Ratio strongly influence the tax ratio.

The results of the t test are as summarised in the following table.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.741	.781		6.066	.001
	X1	-6.230	1.282	-1.031	-4.860	.003
	X2	.187	.024	1.632	7.689	.000

a. Dependent Variable: Y

Based on the output table above, the Sig value is obtained. X1 is 0.003, and X2 is 0.000, where these values are smaller than 0.05. It can be concluded that partially X1 or X2 affects Y. The regression equation formula in this research analysis is as follows:

$$Y = 4.741 - 6.23X_1 + 0.187X_2$$

E. CONCLUSION'

Based on the analysis and discussion, this study produces 3 (three) conclusions. First, based on the t-test, it can be concluded that VRR partially affects the tax ratio. Second, based on the t-test, it can be concluded that the C-Efficiency ratio partially affects the tax ratio. Third, based on the F-test, it can be concluded that simultaneously (together) VRR and C-Efficiency Ratio affect the tax ratio. The C-Efficiency ratio of VAT in Indonesia in the last 10 years, which is still at a maximum of 61.52%, must be handled by prioritizing the reformulation of VAT regulations by paying attention again to VAT regulations related to the budgetary function and regulatory functions which have a direct influence on the calculation of C-Efficiency of VAT, such as provisions governing thresholds, rates, objects, mechanisms and VAT subjects. The reformulation of VAT regulations must be accompanied by VAT enforcement as the consequence of the implementation of the self-assessment system in Indonesia.

Bibliography

Acosta-Ormaechea, Santiago and Morozumi, Atsuyoshi, The value-added tax and growth: design matters, *International Tax and Public Finance*, Vol. 28, 2021, pp. 1211–1241, https://doi.org/10.1007/s10797-021-09681-2.

---

[16] Joseph F. Hair, Jr. et al, *Multivariate Data Analysis*, Pearson Education Limited, 2013.

Cnossen, Sijbren, The C-inefficiency of the EU-VAT and what can be done about it, *International Tax and Public Finance*, Vol. 29, 2022, pp. 215–236, DOI: https://doi.org/10.1007/s10797-021-09683-0.

Demi, Albana, Hysa, Eglantina, and Nanaj, Fatjon, Fiscal Rules of VAT In Albania, The Analytical Methodology of The Factors in Fluencing Its Efficiency in State Budget, *Journal of European Social Research*, Vol.2, Issue.1, 2018.

Direktorat Jenderal Pajak, Laporan Tahunan Direktorat Jenderal Pajak, 2007-2020, Jakarta: Direktorat Jenderal Pajak.

Evans, Chris, Highfield, Richard, Tran-Nam, Binh and Walpole, Michael, Diagnosing the VAT Compliance Burden: A Cross-Country Assessment, available at https://www.sbs.ox.ac.uk/sites/default/files/2019-07/evans_19_06_26_oxford_paper_evans_et_al.pdf, accessed on May 27, 2023.

Gieseckea, J.A and Nhi, Tran Hoang, A general framework for measuring VAT compliance rates, available at https://vuir.vu.edu.au/38907/1/g-206.pdf, accessed on June 30, 2023.

Hair, Jr., Joseph F. *et al*, *Multivariate Data Analysis*, Pearson Education Limited, 2013.

Nikolaos, Eriotis, Spyros, Missiakoulis, Spyros, Papadakis and Dimitrios, Vasiliou, Greek tax reality and the VAT gap: Influential factors, *Journal of Accounting and Taxation*, Vol.13, No. 1, January 2021, pp. 28-44 , https://doi.org/10.5897/JAT2020.0438.

OECD, Consumption Tax Trends 2012 VAT/GST and Excise Rates, Trends and Administration Issues, 2012, DOI:10.1787/ctt-2012-en.

Organisation for Economic Co-operation and Development, International VAT/GST Guidelines, Paris: OECD Publishing, 2017.

Sokolovska, Olena and Sokolovskyi, Dmytro, VAT efficiency in the countries worldwide, 2015, available at https://mpra.ub.uni-muenchen.de/66422/1/MPRA_paper_66422.pdf, accessed on June 26, 2023.

Sopek, Petar, Tax expenditures and the efficiency of Croatian value added tax, 2012, available at https://hrcak.srce.hr/file/127911, accessed on March 30, 2022.

Sulfan, Kinerja PPN di Indonesia Tahun 2011-2020, *Jurnal Pajak Indonesia*, Vol. 5 No. 2, 2021, hlm. 209, pp. 206-206.

Undang-Undang Dasar Negara Republik Indonesia Tahun 1945.

Undang-Undang Nomor 6 Tahun 1983 tentang Ketentuan Umum dan Tata Cara Perpajakan sebagaimana diubah beberapa kali terakhir dengan Undang-Undang Nomor 6 Tahun 2023 tentang Penetapan Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 Tentang Cipta Kerja Menjadi Undang-Undang.