# The Relationship of VAT Rate and Revenues in the Case of Informality

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# The Relationship of VAT Rate and Revenues in the Case of Informality

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### Abstract

This study explored relationship between tax rate and revenues in the case of VAT, one of few type of consumption taxes that is considered to be a broad-based tax. Based on a larger set of countries - in comparison to previous studies, this study shows VAT rate has an inverted U-shaped relationship to VAT revenues, confirming the Laffer Curve theory. Exploring further on the effect of informality to maximum VAT rate, we found that higher informality will reduce government flexibility in its effort to increase tax rate. Furthermore, openness has significant and positive effect on VAT revenues performance, and tax administration capacity may also play role on improving VAT revenues performance.
Keywords: consumption tax; VAT - Value Added Tax; Laffer Curve; informality

### Abstrak

Studi ini mengkaji hubungan antara tarif pajak dan penerimaan dalam konteks PPN (Pajak Pertambahan Nilai). PPN adalah salah satu dari beberapa jenis pajak konsumsi dengan cakupan basis pajak yang luas. Berdasarkan sampel cakupan negara yang lebih banyak - dibandingkan dengan studi-studi sebelumnya, temuan dari studi ini menunjukkan tarif PPN memiliki hubungan berbentuk U terbalik dengan penerimaan pajaknya, mengkonfirmasikan teori Laffer Curve. Sementara itu, mengenai pengaruh informalitas terhadap besar tarif maksimal PPN, studi ini menemukan bahwa informalitas yang tinggi di suatu negara akan mengurangi fleksibilitas pemerintah terkait dalam upaya meningkatkan penerimaan PPN melalui perubahan tarif pajak. Selain itu, keterbukaan ekonomi memiliki pengaruh yang signifikan dan positif terhadap kinerja penerimaan PPN. Perbaikan administrasi yang diasumsikan terjadi sejalan dengan jangka waktu implementasi pajak terkait, juga berhubungan positif terhadap peningkatan penerimaan PPN.
Kata kunci: pajak konsumsi; PPN - Pajak Pertambahan Nilai; Kurva Laffer; informalitas

JEL classifications: E26; E62; H21; H25; H61

## 1. Introduction

Value Added Tax (VAT)[1], is the main consumption tax type adopted in all European countries, which mostly enacted in the 1960s and 1970s. The VAT system has also become one of major changes in tax and economic policy in developing countries (Bird & Gendron 2007). VAT is levied to consumption that are quite buoyant, and it has been relatively effective as major source of revenues for the majority of countries in the world (Keen & Lockwood 2010). Previous studies show most countries that has adopted VAT experienced an increase in the tax ratio, thought its effectiveness in developing countries tend to be inconclusive especially in Sub-Saharan Africa (Keen & Lockwood 2010). By 2016, the number of countries implementing VAT is 167 countries (OECD 2016). The United States is the only OECD country that has not yet applied the VAT

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[1]that is also called Good and Services Tax (GST) - in some other countries

system.

VAT is considered as one of the innovations in the consumption tax system. The tax is collected on a graded basis on every transaction on all distribution chains, which then applied a tax crediting mechanism (Bird & Gendron 2007; Tait 1988). Bird and Gendron (2007) explains that VAT has several advantages that does not cause double taxation as it credits tax imposition on input, can improve administration, and can also increase tax ratio. Although some studies view that VAT will be relatively less fair if there is much informality in the economy (Emran & Stiglitz 2005; Piggott & Whalley 2001). In comparison to other consumption tax type, such as turnover tax - levied as percentage of gross sales, though this (turnover) tax is easy to administer, but as it is levied to all sales, every transaction will be taxed which may worsen the economy. Other type of tax, the retail sales tax, imposed tax at the level of end-consumer (final consumption). This tax can overcome the adverse impact on the economy from turnover tax, but in practice it is difficult to administer in terms of business input.

One of the most important policies in VAT structure is tax rate (Bird & Gendron 2007). In tax theory, a tax rate increase may not always increase taxes revenues. An increase in tax rate may result to lower revenues when the drop in the tax base is higher that change of tax rate. There is an issue of adjusting the tax rate that is still "acceptable", which means that it will not come at the expense of a higher shrinking base – then explained by Laffer curve (Wanniski 1978; Laffer 2004). Thus, an impact of tax rate increase on revenues is ambiguous.

Empirical studies that assessed an impact of tax rate on tax revenues in the context of VAT are still fragmented. It is either based on cross-section data on a limited number of countries, specific country studies, or regional specific (Bogetić & Hasan 1993; Pagán, Soydemir, & TijerinaâĂŘGuajardo 2001; Tijerina-Guajardo & Pagán 2000; Sarmento 2016; Matthews 2003; Matthews & Lloyd-Williams 2000; de Oliveira & Costa 2015).

Based on a sample of developed and developing countries, Bogetić & Hasan (1993) shows a positive linear relationship between VAT rate and VAT revenues. In this case, the country that levied VAT on a broad base and applied a single tax rate has better performance in terms of VAT revenues collection. However, this study only used cross section data and therefore the study did not take into account variation in time referring to a condition in which many countries may have made tax rate changes. In addition, this study has not incorporated the characteristics of the economy- i.e. across region (regional characteristics). Meanwhile, a study by Pagán, Soydemir, & TijerinaâĂŘGuajardo (2001) and Tijerina-Guajardo & Pagán (2000) which based on a sample of Mexico, used time series data but it is more of a country specific study. The results of the above studies show that VAT rates have a positive impact on revenues. The weakness of this cross section or time series data studies was corrected using panel data of 27 countries in Europe (Sarmento 2016).

The non-linear relationship between tax rates and the VAT revenues has been studied empirically by Matthews (2003) and Matthews & Lloyd-Williams (2000). They showed that there is a Laffer curve reflecting VAT rates adopted in EU countries. Matthews (2003) also found that an increase in VAT rates would lead to inefficiencies in terms of reduced tax bases resulting from tax avoidance, and therefore, tax rate increases resulted in lower revenues. This indicates that the average tax rate in the European Union is (or near) its maximum magnitude. Furthermore, de Oliveira & Costa (2015) explored the maximum VAT rate, and whether it is influenced by the economic cycle in EU countries. The results show that at the time of the recession the maximum rate will be lower than at the time of no recession.

These previous studies findings, especially on recent studies which used data of EU countries, may not be adequate to reflect the general impact of tax rates on revenues in the case of VAT. These previous studies may not provide a relatively comprehensive profile, of whether the findings also applied to other countries as well. For example, there is a regulatory framework on the rate setting, in which the tax rates of countries joined in the EU cannot be lower than 15%, which make VAT rate variation in EU countries are not as high as in other regional economy. There may also be differences in the case of pattern of countries economic activities. The EU countries are mostly developed countries, and there is not much informal activity. In the case of developing countries, these countries may be constrained by the many informal activities that are difficult to tax (Schneider 2002).

Given that context, and as we also interested to explore the case of developing countries especially Indonesia, in this study, we use a larger set of countries sample to identify the relationship between VAT rate and VAT revenues, involving both developed and developing countries. This study explore of whether the informality, a characteristic of developing countries, may hamper the tax (VAT) revenues collection and further whether the maximum rate of VAT may also be influenced by the presence of this informality.

In terms of effect of tax rate on VAT base, several studies have shown that response of VAT base from tax rate increased may also depend on the extend of informality in the economy. Studies have shown that the adoption of VAT in the economy in which informal economy is quite high is considered less effective and can reduce welfare (Emran & Stiglitz 2005; Piggott & Whalley 2001). The informality here is defined as the number of parties (or firms) who are not registered as taxpayers in tax administration. However, to a degree, there can also be a condition in which informality can be reduced from

an adoption of VAT. There is an incentive to become formal, as by staying informal, firms cannot credit tax on its input, imported goods or during domestic transaction (Keen 2008). However, on the other hand, the adoption of VAT in the economy with high informality may cause the VAT chain distorted. Companies tend to transact to other companies that have the same formal / informal status (De Paula & Scheinkman 2010). If in an economy, there is more informal sector there will be many transactions that are not included in the VAT chain. Thus, the existence of this informal economy may instead erode the VAT tax base. Therefore, on the optimal tax rate, the level of optimal VAT tax rate in a country could vary at least by the level of informal economy in that specific country.

## 2. Literature Review

### 2.1. Tax Rate and Tax Revenues

In practice, increasing the VAT standard rate is often done by countries as it is viewed as the easiest way to increase revenues in the short term. Meanwhile, lowering the standard tax rate is generally aimed to support purchasing power in times of crisis, which then it is expected that it will expand the tax base on the medium term (Carter 2013). There is no specific trend internationally on whether VAT rate tend to be lower, has increased, or no change in tax rates over the years. Countries in Europe made several changes to the standard VAT rate for example in 1991, the standard rate of 18% has been reduced to 15% in 2009, though a year later rose to 18% then to 20% since 2011 (see Annex). In Latin America, for example Argentina, the country has changed the VAT standard rate at the start of implementation from 16% to 18% in 1994 and up to 21% in 1997. In Asia, Japan increased its standard VAT rate at the time of initial adoption from 3% in 1988 to 5%

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in 1997, and then latter increased to 8% in 2014. Philippines has raised the VAT rate from 10% to 12% in 2006. On the other hand, there are also countries that lowered their VAT rates as in Senegal which at the beginning of the VAT application in 1980, applied tax rate of 20% but later decreased to 18% in 2004. In addition, there are countries that have not made VAT rate changes since the its adoption, as in the case of South Korea that levy a 10% VAT rate since 1977, or Australia which also levy 10% VAT rate since 2000, and to some extent, it is also the case of Indonesia, the VAT standard rate of 10% has not changed since first implemented in 1985.

On average, the pattern across countries of VAT rates and VAT revenues (VAT/GDP) is shown in Figure 1 and 2. Figure 1 shows a relatively positive relationship of scatter-plot between VAT rate and VAT Revenues (as ratio to GDP). However, as shown in Figure 2, high tax rate does not always associate with high revenue. African regional countries have average tax rates that are higher than those of regional countries in the Americas, but these African (regional) countries, on average generated lower VAT revenues (as ratio to GDP). Meanwhile, in Europe, the average VAT rate is the highest and it also correspond with relatively high average VAT revenues. In contrast, Asia Pacific is the region with the lowest VAT rate (on average), and these countries experienced on average lowest VAT revenues. These characteristics across regional economies, may indicate a revenue inefficiency across countries or region, and this profile may either regional specific or influenced by other characteristics.

The tax-revenue curve, or better known as Laffer curve (Wanniski 1978), shows the relationship between tax rates and tax revenues. The Laffer curve illustrates the idea that changes in tax rates have two different effects on tax revenues: the tax rate can be treated similar to change in price level. Response from an increase in tax rate would depend

on the dynamic interaction and cooperation has not yet been agreed by profession affiliated to AAI. However, change in the tax rate may also influence tax base, which sometime referred as 'the substitution effect'. By lowering the tax rate, it will provide economic incentives for the agent (i.e. firms) as reduction of tax rate may induce higher compliance and or higher net revenues of existing firms) which may lead to more investment or expansion to the economy. As a result, this expansion of base may lead to an increase in revenues. Similarly, an increase in tax rate may lead to economic disincentives and thus it may result to a decline in tax revenues. The arithmetic effect works against 'the economic effect'. Therefore, if the economic effects and arithmetic effects are combined then the impact of tax rate change on tax revenues becomes less clear.

The horizontal line in Figure 3 shows the percentage of tax rates, and the vertical line represents the tax revenue obtained (Laffer 2004). From the range of 0% up to 100% tax rate, it indicates of assuming administration is adequately efficient, as there is no revenue condition from a positive tax rate unless the tax rate is either 0 or 100% tax rate. Point E shows the maximum (magnitude of) tax rate that can generate highest revenue, note that the symmetry of the curve is only for simplicity[2]. The vertical line through the E point separates the normal area (normal range) and the prohibited area (prohibited range). Tax rates in the normal area indicate that increase of tax rate will increase tax revenues, while tax rates in the prohibited range indicate that increase of tax rate will decrease tax revenues. To note, point E is the tax rate that maximizes tax revenues is not an optimal point – as optimality associates with efficiency in the sense that tax rates must produce the least economic distortion (minimum deadweight loss). Meanwhile

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[2]Therefore, it does not mean the (maximum) rate that generates the highest revenue is 50%.
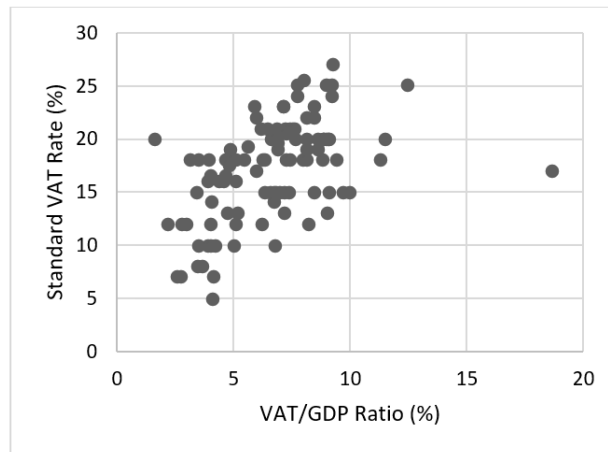
**Figure 1: Standard VAT Rate and VAT/GDP Ratio Year 2014**
Source: Authors' calculation
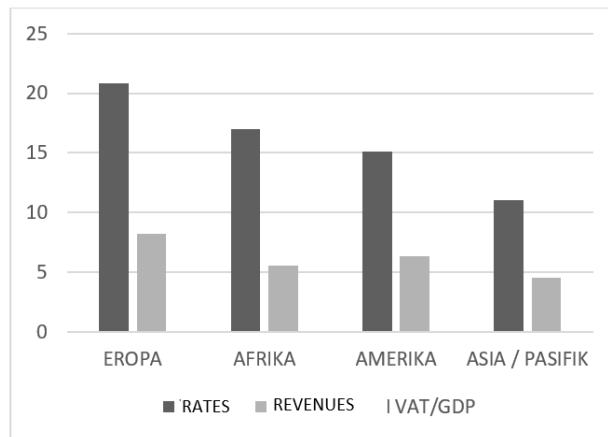


**Figure 2: Average Rate of VAT Standard (%) and VAT/GDP Receipts (%) Year 2014**
Source: Authors' calculation

the horizontal line passing through points A and B shows two different tax rates but produces the same amount of tax revenue. Point A shows relatively low rates (slightly above 0%) while point B shows relatively high rates (slightly below 100%). This indicates that point A with relatively low tax rate results in revenue on a large tax base while point B with relatively high tax rate results in revenue on a small tax base.

The Laffer Curve theory is furthered explored in the context of VAT by de Oliveira & Costa (2015) in which VAT revenues will increase with increasing tax rates (v) under the conditions of a certain tax base

(minimal response). Given the economic effects of tax rates that affect the tax base, the VAT revenues function becomes:

$$\text{VAT Revenue}^*(\text{v}) = \text{v} \times \text{Base VAT}(\text{v}) \tag{1}$$

As long as the direct effect of increased tax rate on VAT revenues is higher than the indirect effect of the tax base change, the VAT revenue will increase, and vice versa. This happens to the point of maximizing revenue. If the tax rate has passed the maximum point, the increase in tax rate will decrease VAT revenue.

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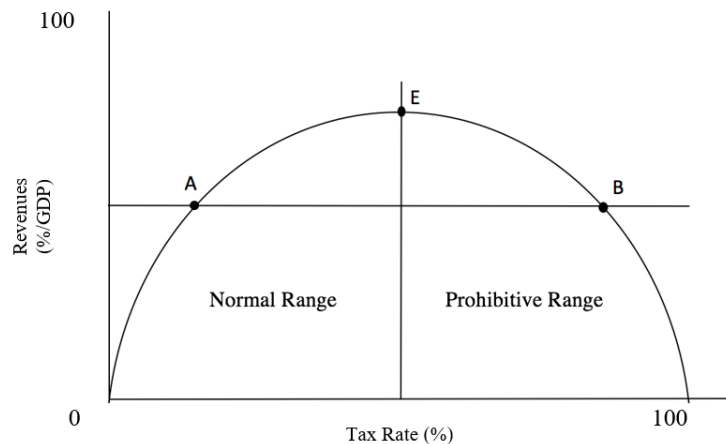
**Figure 3: Tax Rate and Tax Revenues (Laffer Curve)**
Source: Wanniski (1978)

## 2.2.  VAT and Informal Sector

In terms of tax base, the extent of how VAT rate may have effect on the base may be influenced by the amount of informality in a country. De Paula & Scheinkman (2010) say that firm has a desire to conduct transactions with firms that have the same formal/informal status. Informal firms, in this case are firms that are not registered in the VAT administration system, while formal firms are firms registered in VAT administration. Informal firms tend to make transaction with other informal firms, and vice versa. This is because in the VAT system, there is a tax credit option from the previous production chain (upstream firm). This tax can be credited with tax on the sale of the next level (downstream firm). When formal firms buy input from an informal supplier firm, the formal firm cannot obtain a tax invoice. This can provide incentives for informal firms to choose conducting transactions with other informal firms, resulting in an increasing informal sector (non-taxed sector).

In Figure 4, initially the government does not charge VAT on a good/service, then the equilibrium is at point E. After the imposition of VAT, the equilibrium is at point B. If in an economy more and more firms

choose to be informal, the VAT chain will be not optimal. The amount of deadweight loss due to the imposition of VAT will increase e.g from the triangle B-D-E to G-I-E. With an increase of deadweight loss, the tax base will erode and in the end the revenue may also decrease. The amount of tax revenue changed from point A-C-D-B to F-H-I-G.

Under VAT scheme, formal firms will instead choose make transaction with formal firms in order to credit their taxes. To some extent, though it depends on the degree of informality, VAT scheme may encourage informal firms to become formal in order to be able to make transactions with formal firms, which resulted to higher number of formal firms (an expansion of formal sector).

In Figure 5, suppose that initially the government does not impose VAT on a good/service, then equilibrium is at point E. If the government imposes VAT at a certain level, the deadweight loss due to VAT occurs in the G-I-E triangle. In a condition where an economy within a country experienced of more firms moving from the informal sector to formal, the VAT chain will become more optimal. The amount of deadweight loss due to VAT will decrease from e.g from the G-I-E triangle to B-D-E. With the decreasing deadweight loss, the tax base will increase,
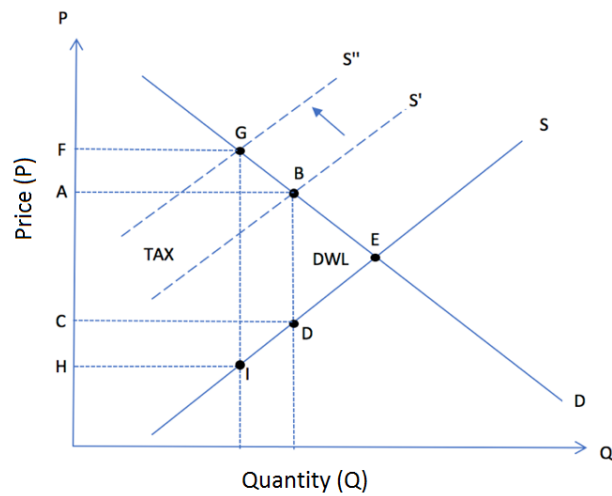
**Figure 4: Increased Informal Firms**
Source: Authors' illustration
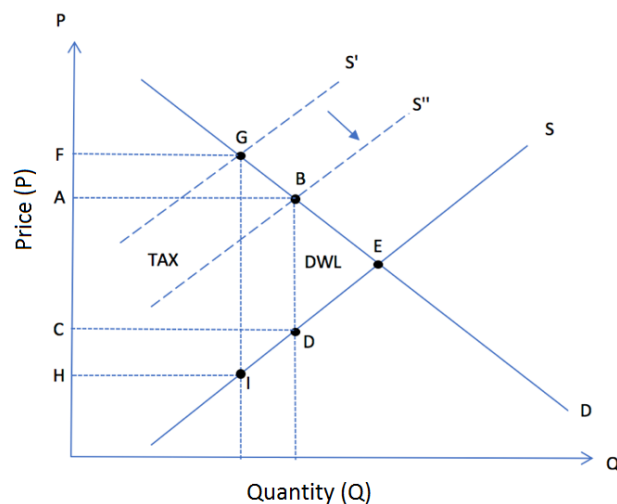


**Figure 5: Increased Formal Firms**
Source: Authors' illustration

so in the end the revenue can also increase. Tax revenues will increase from the point F-H-I-G to A-C-D-B.

## 2.3. Previous Empirical Research

Tax revenues related research is a classic research that has been done in the form of tax ratio analysis (Bahl 1971; Chelliah, Baas, & Kelly 1975; Truong & Gash 1979; Shin, 1969). The tax ratio-related study

generally uses the dependent variable of total tax ratio or ratio of tax revenue as percentage to Gross Domestic Product (GDP). By using tax revenue as ratio to GDP, it can be viewed as an ability of a country with certain economic conditions to collect revenue. But this measurement cannot disentangle the performance of revenues on certain types of taxes. Therefore, there is also a tax ratio that uses per tax type as dependent variable such as tax on goods and services over GDP (Agbeyegbe, Stotsky,

& WoldeMariam 2006; Crivelli 2016; Karimi et al. 2016) or indirect tax/GDP (Leuthold 1991).

To our knowledge, previous studies on the effect of VAT Rates to VAT revenues are still limited and fragmented in terms of sample of data that are used. As stated in previous section, there are studies exploring relationship between VAT rates and VAT revenues, though the sample are limited on either cross-section or time series data. Bogetić & Hasan (1993) used cross section data with a sample of developed and developing countries in 1988. They found that the VAT rates positively and significantly affect revenues. Meanwhile, there are also other studies that are based on time series data, focusing on a country specific case on its VAT adoption (Pagán, Soydemir, & Tijerina‐Guajardo 2001; Tijerina-Guajardo & Pagán 2000). Those studies used quarterly data on Mexico from 1981 to 1997, controlling of macro-indicators such as economic condition, budget deficits, and inflation. These studies show that changes on VAT rate have a positive impact on revenues. However, given the rarity of VAT structure changes as well as time-variant controlled variables that needs to be included, as response may be different in the short-term and in the long-term, a panel – data approach may be a better approach to more accurately explored the relationship between VAT rates and VAT revenues.

In the case of cross-country panel data, existing studies are limited on the case EU countries and developed countries (Sarmento 2016; Matthews 2003; Matthews & Lloyd-Williams 2000). Sarmento (2016) used a sample of 27 EU countries from period of 1998–2011, and by also controlling of economic conditions, administrative, and governance capacity, he found a positive and significant effect of VAT rate on VAT revenues, in this case this study explored instead of only a linear relationship between VAT rate and its revenues. Other studies have tested the presence of the Laffer curve in the context of EU countries (Matthews 2003; Matthews & Lloyd-

Williams 2000). Based on cross-section data of 20 developed countries in 1993, Matthews & Lloyd-Williams (2000), found the maximum standard VAT rate in developed countries is 20%. However, as the study only used cross-section data, there is no time-variant controlled variables that are included, and in the context of VAT, it may as well that tax revenues are influenced by these macro time-variant variables (Tijerina-Guajardo & Pagán 2000; de Oliveira & Costa 2015). Matthews (2003) further explored on the relationship between VAT rate and VAT revenues using panel data on EU countries. Based on the unbalanced panel of 14 EU countries from 1970-1998, Matthews (2003) show there has been a decrease in revenue efficiency due to the increase in VAT rates and pointed out that tax rates in Europe has already relatively high. Furthermore, de Oliveira & Costa (2015) incorporate conditions of business cycle to explore on whether it affects the magnitude of maximum VAT rate in its relation to VAT revenues. Using a sample of 27 European countries in 1995–2011, they show that in the condition of recession, the maximum rate of VAT will decrease while at the time of economic expansion, a maximum tax rate of VAT will be higher, which reflect a sensitivity of (maximum) rate of VAT from macro-economic condition.

To sum, existing studies that assess the presence of Laffer Curves on VAT, that use panel data is only done for the case of developed countries – studies on EU countries. Given the characteristic of EU countries and its regional – EU bloc, may create a unique characteristic of EU countries. Furthermore, most of EU countries are also developed countries, and there seem to be a view that the condition may be different in the case of developing countries. For example, as in developing countries, the presence of informality is more visible than in developed countries (Keen & Lockwood 2010). Thus, previous findings tend to be inadequate to make a general conclusion on the effect tax rate on tax

revenues in the context of VAT. In this case, different results may occur in countries in other regions such as Africa, America, and Asia Pacific where in that region there are many developing countries with different economic characteristics compared to European countries. Keen & Lockwood (2010) found that the adoption of VAT has significantly increased the tax ratio, but for developing countries, especially in Africa, there is no significant revenue increase from adoption of VAT.

# 3. Methodology

## 3.1. The Model

Following from a theoretical and previous studies on Laffer-Curve, we use VAT Ratio as a dependent variable with several combinations of different independent variables. We use stochastic models to explain the VAT rates as independent variables as well as some other independent (explanatory) variables as controls that affect the VAT Ratio in different countries. By adopting a non-linear model on the relationship between the tax rate and tax revenues, the estimation model(s) are as follows:

$$
\begin{aligned}
\mathrm{VATREV_{itt}} = \beta_0 &+ \beta_1 \mathrm{VATRate_{it}} \\
&+ \beta_2 \mathrm{VATRate_{it}^2} + \beta_3 \mathrm{Age_{it}} \\
&+ \beta_4 \mathrm{Agriculture_{it}} + \beta_5 \mathrm{Openness_{it}} \\
&+ \beta_6 \mathrm{Inflation_{it}} + \beta_7 \mathrm{Europe_{it}} \\
&+ \beta_8 \mathrm{Africa_{it}} + \beta_9 \mathrm{AsiaPacific_{it}} \\
&+ \beta_{10} \mathrm{VATRate} * \mathrm{Agriculture_{it}} + \varepsilon_{it}
\end{aligned}
$$
(2)

From the above estimation model, i representing country, t representing (year) period, $\beta_0$ represents the constant intercept of parameter estimation, $\beta_1$ to $\beta_{10}$ represents the slope of parameter estimation on each respective explanatory variable, whereas

$\varepsilon_{it}$ represents the error term. For more details, description on the construction and data source for each variable is shown in Table 1.

This study uses fixed effect (unbalanced) panel estimation in the case of estimation with no regional specific dummy variables (model 1). The advantage of using panel data is that there is flexibility in modeling behavioral differences between unit of observations. By having more cross section units, panel data can minimize biased results (Greene 2007). As the number of observation by each country is not the same, in regard to period (years) of data availability, the type of data is an unbalanced panel. Assuming no statistical problem, the fixed effect can be estimated consistently so that the estimation parameter depends on the country/ regional impact and the year on the sample (Hsiao 2004).

As stated in Table 1, the dependent variable used the VAT ratio or VAT / GDP, to capture the country's ability to collect VAT revenues. And the main independent (explanatory) variables are tax rates and tax rate squares (de Oliveira & Costa 2015; Hsing 1996; Matthews 2003; Matthews & Lloyd-Williams 2000). The presence of this quadratic rate variable is to test a Laffer curve whose function is non-linear.

Previous studies informed on other explanatory variables that may explain variations on VAT revenues across countries. The first is the VAT 'age' variable. This variable is a proxy on the ability of a country administration in managing VAT tax system. The longer a country implements the VAT, the better the experience will be in managing tax administration. Thus, the longer a country has implemented the VAT, then the ability to collect revenues will be better (De Mello 2009; Sarmento 2016).

The second is the agricultural sector in the economy. This variable is usually used as a proxy for the size of the informal sector in the economy (Keen & Lockwood 2010). Higher share of agricultural sector in GDP may associate with lower VAT revenues. In

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**Table 1: Variables and Data Sources**

| Variable | Description | Unit | Source |
|---|---|---|---|
| VATREV | Revenues of VAT<br>Dependent variable that describes the magnitude of the state's ability to collect VAT revenues. | (%/GDP) | OECD Revenue Statictics (2018) |
| VATRate | Standard Rate VAT<br>The magnitude of the tax rate imposed on goods and services that are the object of VAT in general. | (%) | Attached (in Annex) |
| VATRate$^2$ | Square Standard Rate VAT<br>The variable is used to obtain rate that maximize revenue (Laffer Curve). | (%) | |
| Age | Age VAT<br>It is a proxy of a country's VAT administration capability. The greater the administrative capacity of VAT then the compliance will increase which then implies an increase in revenues. | Year | Consumption Tax Trend OECD (2016) |
| **Agr** | Share of Agriculture Sector<br>This variable indicates the size of the informal sector in a country. The agricultural sector is hard to tax and in many countries are exempted as tax object. Thus, higher agricultural sector may associate to a decrease in VAT revenues. | (%/GDP) | World Development Indicators (2018) |
| **Openness** | International Trade (Export and Import)<br>It is the volume of international trade activities that are easy to tax. If the volume of international trade in the economy is high, then revenues of VAT will also high. | (%/GDP) | World Development Indicators (2018) |
| **Inflation** | Inflation<br>Inflation can increase or lower VAT revenues. | (%) | World Development Indicators (2018) |
| Europe | It is a European regional variable dummy, where 1 for European countries and 0 for non-Europeans | 1 and 0 | World Development Indicators (2018) |
| Africa | The dummy is an African regional variable, of which 1 is for African countries and 0 for non-Africans. | 1 and 0 | World Development Indicators (2018) |
| Asia-Pacific | The dummy is an Asia Pacific regional variable, of which 1 for Asia Pacific and 0 for non-Asia Pacific countries. | 1 and 0 | World Development Indicators (2018) |
| VATRate*Agriculture | Interaction between Rate of VAT and Share of Agriculture Sector | | |

Source: Source: OECD (2018) and World Bank (2018)

addition, the agricultural sector is a sector that commonly received exemptions or excluded from VAT, and it is also a sector that is hard to tax. Countries whose economies are dominated by the agricultural sector, usually have a poor tax performance as there is high informality.

The third is the role of international trade in each specific country's economy. This variable shows the magnitude of a country's openness (export and import) in the economy. VAT is collected at the time of import and exempted for export goods, either exporting firms filed 0% tax rate or it is excluded from VAT imposition. High volume of international trade also indicates the magnitude of trade liberalization. The existence of trade liberalization is generally fol-

lowed by treating VAT as import tariff (Import Duty). In the context of more liberalization, these tariffs have a declining trend on its rate that can be levied which will be soon eliminated. However, in general, the extent of international trade in a country that applies VAT as a consumption tax will have a positive impact on revenue because much of the VAT revenue is collected at the time of imports, and may increase domestic acceptance (Baunsgaard & Keen 2010).

Last is the inflation variable. In the concept of seigniorage (inflation as a tax), the effect of higher inflation will be similar to price increase of goods/services. As a result, the collected tax (VAT) revenues may increase. The effect of inflation on

VAT revenue will be positive. However, some empirical studies show that the effect of inflation on revenue is negative. Inflation will overvalue the price of a good and affect domestic consumption and export/import activities (Agbeyegbe, Stotsky, & Wolde-Mariam 2006). Therefore, the effect of inflation on VAT revenue, in general, can be positive or negative.

## 3.2. Data Source and Descriptive Statistic

There are several sources of consumption tax data on cross-countries data: (1) Taxes on Goods and Services data on World Development Indicators from World Bank, however the data has not separated indirect tax revenue data between VAT and type of consumption tax such as sales tax or excise; (2) Data from the International Center for Tax and Development where data availability for the year 2018 are still mixed between VAT, Sales Tax, and Tax on Capital and Financial Transaction, and (3) OECD Revenue Statistic [code 1111 (VAT/GDP)].

This study used the third type of data, OECD Revenue Statistics [code 1111 (VAT/GDP)] downloaded in 2018, given that the data are already disaggregated to only include VAT although the data coverage for some countries is not available. In his case, to increase the number of observations, we added data of VAT revenues (as percent to GDP) from Government Financial Statistic from International Monetary Fund which was downloaded in 2018.

The data on VAT rate comes from sources spread across multiple sources (see Annex). The tax rate (VAT rate) used in this study is the VAT standard rate, as most of VAT rate is a single rate. The main sources of data for VAT standard rate are collected from previous studies, as follows: "International Value Added Tax" (Tait, 1988); "The Modern VAT" (Ebrill et al. 2001); "The VAT in Developing

and Transitional Country" (Bird & Gendron 2007); "VAT In Africa" (Krever 2008), "VAT Rates Applied in The Member States of the European Union" (European Commission 2014). Apart from these sources, the VAT standard rates are also collected from Worldwide VAT, "GST Guide" (Ernest and Young 2006,2010,2013,2015), "Indirect Tax Rates Table" (KPMG 2018), "VAT/GST Rates" (OECD 2016), some Country Report Staff from International Monetary Fund, as well as from several other websites and articles as attached in this study.

Within each specific country, VAT rate changes is considered to be effective in current year if the changes occurred prior mid-year (before June). For countries that make tax rate changes by or after mid-year, we treated VAT rate data changes in the following year. While for control variable data comes from *World Development Indicators* from World Bank (2018), while data of VAT implementation comes from *Consumption Tax Trend 2016* (OECD 2016).

Overall, this study used 127 countries as sample data, both developed and developing countries in all regions in the world with data series ranged from 1965 to 2016. But because the amount of data between individuals is not the same then the data used is unbalanced panel. The sample countries are shown in Table 2.

Summary statistic on (whole sample) data consisted of dependent variable and explanatory variables is shown in Table 3. From Table 3 of the descriptive statistic, the average of VAT revenues (as ratio to GDP) is 5.09%. On VAT 'age' explanatory variable, based on 2016 data, the average VAT system has been applied for 16 years. In regard to agriculture sector which is the proxy of informality, the maximum magnitude of informality as shown in Table 3 is 83% of GDP. In this case, Africa became the region with the largest agricultural sector, while the European region has many countries with the small share of agricultural sector. There are coun-

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**Table 2: Sample Countries**

| Region | Countries |
|---|---|
| Europe | Albania, Armenia, Austria, Belarus, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxemburg, Malta, Moldova, Netherland, Norway, Poland, Portugal, Romania, Serbia, Slovak Rep., Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom |
| Africa | Algeria, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Congo Dem. Rep., Cote d' Ivoire, Equatorial Guinea, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia |
| America | Argentina, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Columbia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Savador, Grenada, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and The Grenadines, Trinidad & Tobago, Uruguay |
| Asia / Pacifik | Australia, Azerbaijan, Bangladesh, Cambodia, China, Fiji, Indonesia, Japan, Jordan, Kazakhstan, Korea, Rep., Kyrgyz Rep., Lebanon, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Tajikistan, Thailand, Vietnam |

Source: OECD (2018) and International Monetary Fund (2018)

**Table 3: Statistics Description: Whole Sample**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| VAT/GDP | 2.503 | 5,87 | 2,32 | 0 | 19 |
| VAT Rate | 3.032 | 16,04 | 4,96 | 3 | 35 |
| VAT Rate Square | 3.032 | 280,7 | 151,73 | 9 | 1.225 |
| Age | 3.304 | 16,05 | 11,35 | 1 | 57 |
| Agriculture | 4.630 | 17,21 | 15 | 0 | 83 |
| Openness | 5.559 | 76,23 | 50,59 | 5 | 532 |
| Inflation | 5.369 | 35,5 | 448,72 | -36 | 23.773 |

Source: Author's calculation

tries with share of agriculture sector close to 0% of GDP reflecting the phase-out role of agricultural sector in the economy.

# 4. Estimation Results

Table 4 shows that the tax rate (VAT Rate) has a positive and significant impact on the revenue while the square rate (VAT Rate Square) is negative and significant. This indicates that the relationship of VAT rates on VAT revenues is reversed U-shaped, which is in line with the Laffer Curve theory. There is a maximum level of VAT rate that needs to take into account in order to maximize VAT revenues. Our findings also in line and confirmed previous studies of de Oliveira & Costa (2015), Matthews (2003), and Matthews & Lloyd-Williams (2000).

The variable of VAT (Age) has also a positive and significant effect on VAT revenues. This suggests of higher VAT revenues for a country with longer implementation of VAT system (Sarmento 2016). As length of VAT implementation represent maturity of tax administration, it is assumed that administration maturity may drive to higher compliance. Tax administrative capabilities and competence will improve over the years, and naturally countries with longer experiences implementing VAT will tend to better collect revenues. In a different context, changing a system also post risk of investing in capacity on tax administration and thus may not always associate of increased revenues in short-term.

On macro-indicators, it is openness rather than inflation rate that may influence VAT revenues. Higher role of international trade in the economy (Openness) associate with higher VAT revenues. This is in line with previous study by Keen (2008) that shows VAT revenues will be positively affected from import activities despite trade liberalization. It also shows that international trade activities will increase

domestic revenues (Agbeyegbe, Stotsky, & Wolde-Mariam 2006; Baunsgaard & Keen 2010; Karimi et al. 2016). From import and export activities, the domestic economy will grow that will further positively affected VAT revenues. Meanwhile, the estimation results shown in Table 4 describe that the effect of inflation on VAT revenues is inconclusive. There is no evidence that inflation variation has affected VAT revenues. As shown in previous section, inflation may function as either seigniorage and thus associate to higher VAT revenues, or it may also instead contribute to an overvalue price of goods and services which then may lead to a decrease in VAT revenues (Agbeyegbe, Stotsky, & Wolde-Mariam 2006).

Regional dummy shows that VAT revenues in the European Region (Europe) is higher than that of the America region (which function) as a baseline. To some extent, despite a relatively higher VAT rate on average, VAT revenues in EU countries also tend to be higher on average in comparison to its counterpart in America (region). Being a country in Africa or in Asia Pacific regions, these countries will not have specific differences to baseline countries, countries in America (region). Other that EU countries, other region is dominated by developing countries, and thus informality may play a role on differences on VAT revenues performance in EU countries from countries in other region.

The agricultural sector is a proxy of informality, and higher informality in the economy may have effect of lowering VAT revenues. From Table 4, assuming the tax rate does not change, 1% increase in the share of agricultural sector will decrease VAT revenues, in the range of 0.1% up to 5% of VAT revenues. The negative result on this part of agriculture is similar to Keen & Lockwood (2010). On the other hand, it also indicates that the VAT system in informality becomes less effective because many companies choose to be informal companies, because companies tend to transact with companies that have the same formal status (De Paula & Scheinkman 2010). This shows that the greater the informality with the assumption that the fixed VAT rate will decrease the revenue.

Figure 6 shows VAT rate maximum is lower amids a decrease in revenues as a result of higher informality in a country. Due to informality, the maximum VAT rate dropped from point E to point F.

## 4.1. Maximum VAT Rate (World - estimated average - and Indonesia)

To obtain maximum VAT rates between countries, the first difference is applied to the VAT rate on the model (1) or (2), so that:

$$\frac{\partial \mathrm{VATRevenue}}{\partial \mathrm{VATRate}} : \beta_1 + 2\beta_2 \mathrm{VATRate} \qquad (3)$$
$$= 0$$

$$\mathrm{VATRate}^* = \frac{-\beta_1}{2\beta_2} \qquad (4)$$

Based on model 1 and model 2, the maximum VAT rate between countries in the world is 26.5%. By 2015, the standard rate of 25%–27% has been used in many European countries: Hungary, Croatia, Denmark, and Sweden. For these countries, raising VAT rate will likely lower their respective VAT revenues. However, considering the presence of informality, the maximum VAT rate will be lower. To obtain an optimal VAT rate due to informality, the first difference to the VAT rate on model (3) or (4) is calculated as follows:

$$\frac{\partial \mathrm{VATRevenue}}{\partial \mathrm{VATRate}} : \beta_1 + 2\beta_2 \mathrm{VATRate} + \beta_{10}\mathrm{Agr} \qquad (5)$$
$$= 0$$

$$\mathrm{VATRate}^* = \frac{-\beta_1 - \beta_{10}\mathrm{AGR}}{2\beta_2} \qquad (6)$$

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**Table 4: Fixed Effect Model Estimation Result**

| | Dependent Variable: VAT/GDP | | | |
| | Model (1) | Model (2) | Model (3) | Model (4) |
|---|---|---|---|---|
| VAT Rate | 0.431*** | 0.454*** | 0.508*** | 0.527*** |
| | (11.36) | (12.18) | (10.54) | (11.26) |
| VAT Rate Square | -0.00888*** | -0.00934*** | -0.0104*** | -0.0107*** |
| | (-7.61) | (-8.08) | (-7.99) | (-8.42) |
| Age | 0.0280*** | 0.0259*** | 0.0264*** | 0.0244*** |
| | (8.32) | (8.00) | (7.71) | (7.45) |
| Openness | 0.00306*** | 0.00369*** | 0.00299*** | 0.00364*** |
| | (3.01) | (3.18) | (2.98) | (3.15) |
| Agriculture | -0.0536*** | -0.0473*** | -0.00612 | -0.00138 |
| | (-6.04) | (-5.96) | (-0.30) | (-0.07) |
| Inflation | -0.000741 | -0.000113 | -0.0000507 | -0.000915 |
| | (-0.44) | (-0.66) | (-0.30) | (-0.53) |
| Europe | | 1.142** | | 1.110** |
| | | (2.46) | | (2.38) |
| Africa | | -0.348 | | -0.258 |
| | | (-0.71) | | (-0.52) |
| Asia - Pacific | | -0.267 | | -0.227 |
| | | (-0.50) | | (-0.42) |
| VAT Rate*Agriculture | | | -0.00327*** | -0.00312*** |
| | | | (-2.59) | (-2.58) |
| Constant | 1.147*** | 0.752 | 0.382 | 0.0213 |
| | (3.19) | (1.55) | (0.82) | (0.04) |
| N | 2155 | 2155 | 2155 | 2155 |
| R Square | 0.30 | 0.35 | 0.31 | 0.35 |

Source: Author's calculation
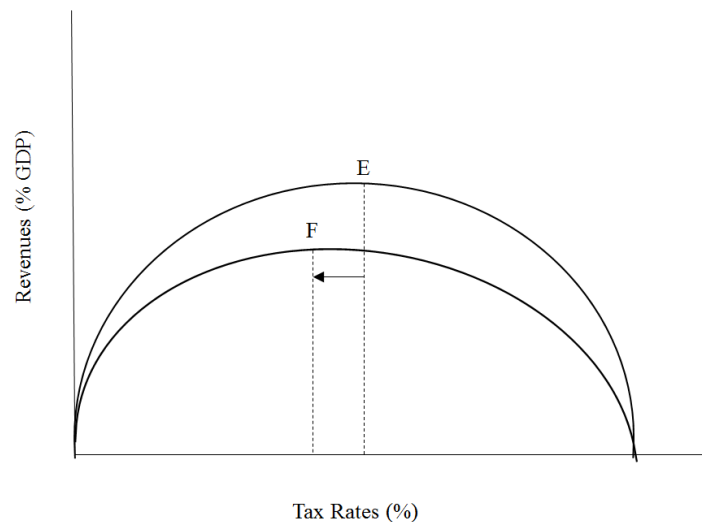


**Figure 6: VAT and Informality – Laffer Curve**

Based on data of the informal sector, maximum and minimum value as shown in previous Table 3, the informality ranged from 0% to 83%, and thus the maximum VAT rate is in the range of 13.4%–26.5%. In the case of Indonesia, the value of informal structures in Indonesia is required. The average share of Indonesia's agricultural sector from 1965 to 2016 was 24.88% (World Bank, 2017; 2018). Thus, based on model 3 or model 4 above the maximum VAT rates for the case of Indonesia is approximately 22%–22.5%.

Indonesia has applied the VAT standard rate of 10%

since 1985. This VAT standard rate, referring to an estimated maximum VAT rate, is still in the normal range (of Laffer Curve). As stated in previous section, the maximum VAT rate is not optimal rate as it is more of assessment of feasibility of attaining maximum VAT revenues. A more importance factor on determine VAT rate is when the objective (ideally) to minimize overall welfare loss (inefficiencies). Reflecting also to experiment of increasing VAT rate in other countries, an increase of VAT rate is generally set in incremental, which ranged from 1% to a maximum of 5% increase. For example, Chile increased the 1% VAT rate from 18% to 19% in 2005, Philippines has increased VAT rate from 10% to 12% in 2006, while Ghana increased the VAT rate from previous 12.5% to 17.5% in 2014.

# 5. Conclusion and Recommendation

Based on a larger set of countries, in comparison to previous studies, this study shows VAT rate has a reversed U-shaped relationship to VAT revenues, confirming the Laffer Curve theory. Exploring further on the effect of informality to maximum VAT rate, we found that higher informality will reduce government flexibility in its effort to increase tax rate. Maximum VAT rates based on informality conditions, for world average, is in the range of 13.4%–26.5%. In this case, 10% increase in share of import and export activities to GDP will approximately contribute to 0.03% of VAT revenues (as ratio to GDP). Though openness has significant and positive effect on VAT revenues performance, it is tax administration capacity that may play more role on improving VAT revenues performance. A-one year longer of implementing VAT will contribute to 0.02% increase in VAT revenues (as ratio to GDP). For the case of Indonesia, VAT rate of 10% is still in normal range, and with an informality in the range of 22%, VAT

maximum rate may be lowered by 6.6%.

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# Annex

| Country | Year | Standard VAT Rate | Source |
|---|---|---|---|
| Albania | 2002-2015 | 20% | OECD (2003), KPMG (2018) |
| Algeria | 2003-2015 | 17% | Annacondia & van der Corput (2003), KPMG (2018) |
| Argentina | 1988-1991 | 16% | Tait (1988) |
| | 1992-1996 | 18% | Martner & Tromben (2004) |
| | 1997-2015 | 21% | Ebrill et al. (2001), KPMG (2018) |
| Armenia | 2001-2015 | 20% | Ebrill et al. (2001), KPMG (2018) |
| Australia | 2000-2015 | 10% | Ebrill et al. (2001), KPMG (2018) |
| Austria | 1973-1975 | 16% | European Commission (2014), KPMG (2018) |
| | 1976-1983 | 18% | |
| | 1984-2016 | 20% | |
| Azerbaijan | 2005-2015 | 18% | KPMG (2018) |
| Bangladesh | 1991-2015 | 15% | Bird & Gendron (2007), KPMG (2018) |
| Barbados | 1997-2009 | 15% | Bird & Gendron (2007), Ebrill et al. (2001) |
| | 2010-2015 | 17% | Ernst & Young (2010,2015) |
| Belarus | 2001-2003 | 20% | Annacondia & van der Corput (2003) |
| | 2004-2009 | 18% | OECD (2003), KPMG (2018) |
| | 2010-2015 | 20% | |
| Belgium | 1971-1977 | 18% | European Commission (2014), KPMG (2018) |
| | 1978-1980 | 16% | |
| | 1981-1982 | 17% | |
| | 1983-1991 | 19% | |
| | 1992-1993 | 19,50% | |
| | 1994-1995 | 20,50% | |
| | 1996-2016 | 21% | |
| Benin | 1991-2015 | 15% | Bird & Gendron (2007), KPMG (2018) |
| Bolivia | 1990-1993 | 10% | Tait (1988) |
| | 1994-2015 | 13% | Bird & Gendron (2007), Ebrill et al. (2001), Navarro & Turnbull (2010) |
| Bosnia & Herzegovina | 2006-2015 | 17% | KPMG (2018) |
| Bostwana | 2001-2010 | 10% | Ebrill et al. (2001), KPMG (2018) |
| | 2011-2015 | 12% | |
| Brazil | 1990-2015 | 20,48% | Bird & Gendron (2007), KPMG (2018), Tait (1988), (Tanzi, 2000) |
| Bulgaria | 1994-1995 | 18% | European Commission (2014), KPMG (2018) |
| | 1996-1998 | 22% | |
| | 1999-2015 | 20% | |
| Burkania Faso | 2001-2015 | 18% | Ebrill et al. (2001), Tradingeconomics (2018) |
| Burundi | 2009-2015 | 18% | OECD (2016) |
| Cabo Verde | 2004-2014 | 15% | Krever (2008) |
| | 2015 | 15,50% | VATlive.com (2016) |
| Cambodia | 1999-2015 | 10% | Bird & Gendron (2007), KPMG (2018) |
| Cameroon | 1999-2001 | 18,70% | Krever (2008) |
| | 2002-2015 | 19,25% | Ebrill et al. (2001), Bird & Gendron (2007), Ernst & Young (2010,2015) |
| Canada | 1991-2006 | 7% | Ebrill et al. (2001) |
| | 2007 | 6% | KPMG (2018) |
| | 2008-2016 | 5% | |
| Central Africa Republic | 2001-2005 | 18% | Ebrill et al. (2001), Bird & Gendron (2007), Tradingeconomics (2018) |
| | 2006-2015 | 19% | |
| Chile | 1990-1992 | 16% | Tejera (2008) |
| | 1993-2004 | 18% | OECD (2016) |
| | 2005-2016 | 19% | |
| China | 1994-2015 | 17% | Bird & Gendron (2007), KPMG (2018) |
| Colombia | 1990-1991 | 12% | Atria, Groll, & Valdés (2018) |
| | 1992-1994 | 14% | |
| | 1995-1998 | 16% | |

*to be continued...*

*...continued*

| Country | Year | Standard VAT Rate | Source |
|---------|------|-------------------|--------|
| Congo Dem. Rep | 2012-2016 | 16% | OECD (2016) |
| Costa Rica | 1990-1995 | 8% | Martner & Tromben (2004), KPMG (2018) |
| | 1996-2001 | 15% | |
| | 2002-2015 | 13% | |
| Cote d Ivoire | 1990-1994 | 25% | Tait (1988) |
| | 1995-2000 | 18% | International Monetary Fund (2001) |
| | 2001-2003 | 20% | Ebrill et al. (2001) |
| | 2004-2015 | 18% | Bird & Gendron (2007), Krever (2008), Tradingeconomics (2018) |
| Croatia | 1998-2009 | 22% | European Commission (2014), KPMG (2018) |
| | 2010-2011 | 23% | |
| | 2012-2015 | 25% | |
| Cyprus | 1994-1999 | 8% | European Commission (2014), KPMG (2018) |
| | 2000-2001 | 10% | |
| | 2002 | 13% | |
| | 2003-2011 | 15% | |
| | 2012 | 17% | |
| | 2013 | 18% | |
| | 2014-2015 | 19% | |
| Czech Republic | 1993-1994 | 23% | European Commission (2014), KPMG (2018) |
| | 1995-2003 | 22% | |
| | 2004-2009 | 19% | |
| | 2010-2012 | 20% | |
| | 2013-2016 | 21% | |
| Denmark | 1967 | 10% | European Commission (2014), KPMG (2018) |
| | 1968-1969 | 12,50% | |
| | 1970-1977 | 15% | |
| | 1978 | 18% | |
| | 1979-1980 | 20,25% | |
| | 1981-1991 | 22% | |
| | 1992-2016 | 25% | |
| Dominica | 2006-2015 | 15% | Government of The Commonwealth Dominica (2018) |
| Dominican Republic | 1983-1996 | 6% | Tait (1988), Martner & Tromben (2004) |
| | 1997-2000 | 8% | Martner & Tromben (2004) |
| | 2001-2005 | 12% | Jenkins, Jenkins, & Kuo (2006) |
| | 2006-2012 | 16% | Ernst & Young (2006,2013) |
| | 2013-2015 | 18% | Ernst & Young (2013,2015) |
| Ecuador | 1990-1999 | 10% | Martner & Tromben (2004) |
| | 2000-2015 | 12% | Ebrill et al. (2001), KPMG (2018) |
| El Savador | 1992-1996 | 10% | Martner & Tromben (2004) |
| | 1997-2015 | 13% | KPMG (2018) |
| Equatorial Guinea | 2005-2015 | 15% | Bird & Gendron (2007) |
| Estonia | 1993-2009 | 18% | European Commission (2014), KPMG (2018) |
| | 2010-2016 | 20% | |
| Ethiopia | 2003-2015 | 15% | Bird & Gendron (2007), KPMG (2018) |
| Fiji | 2003-2010 | 13% | Ebrill et al. (2001), Annacondia & van der Corput (2003), Bird & Gendron (2007), KPMG (2018) |
| | 2011-2015 | 15% | |
| Finlandia | 1994-2009 | 22% | European Commission (2014), KPMG (2018) |
| | 2010-2012 | 23% | |
| | 2013-2016 | 24% | |
| France | 1968 | 16,66% | European Commission (2014), KPMG (2018) |
| | 1969 | 19% | |
| | 1970-1972 | 23% | |
| | 1973-1976 | 20% | |
| | 1977-1981 | 17,60% | |
| | 1982-1995 | 18,60% | |
| | 1996-1999 | 20,60% | |
| | 2000-2013 | 19,60% | |
| | 2014-2016 | 20% | |
| Georgia | 1993-2004 | 20% | Ebrill et al. (2001), Ministry of Finance of Georgia (2011) |
| | 2005-2015 | 18% | |

*to be continued...*

*...continued*

| Country | Year | Standard VAT Rate | Source |
|---------|------|-------------------|--------|
| Germany | 1968 | 10% | European Commission (2014), KPMG (2018) |
| | 1969-1977 | 11% | |
| | 1978-1979 | 12% | |
| | 1980-1983 | 13% | |
| | 1984-1992 | 14% | |
| | 1993-1997 | 15% | |
| | 1998-2006 | 16% | |
| | 2007-2016 | 19% | |
| Ghana | 2000-2013 | 12,50% | Ebrill et al. (2001), KPMG (2018) |
| | 2014-2015 | 17,50% | |
| Greece | 1987 | 18% | European Commission (2014), KPMG (2018) |
| | 1988-1989 | 16% | |
| | 1990-2004 | 18% | |
| | 2005-2009 | 19% | |
| | 2010-2015 | 23% | |
| Grenada | 2011-2015 | 15% | Tradingeconomics (2018) |
| Guatemala | 1992-1996 | 7% | Martner & Tromben (2004) |
| | 1997-2001 | 10% | Ebrill et al. (2001) |
| | 2002-2015 | 12% | KPMG (2018) |
| Honduras | 1990-1993 | 3% | Martner & Tromben (2004) |
| | 1994-2002 | 7% | Martner & Tromben (2004), Ebrill et al. (2001) |
| | 2003-2013 | 12% | KPMG (2018) |
| | 2014-2015 | 15% | |
| Hungary | 1988-2005 | 25% | European Commission (2014), KPMG (2018) |
| | 2006-2009 | 20% | |
| | 2010-2011 | 25% | |
| | 2012-2016 | 27% | |
| Iceland | 1990-2009 | 25% | OECD (2016) |
| | 2010-2014 | 26% | |
| | 2015-2016 | 24% | |
| Indonesia | 1985-2015 | 10% | OECD (2016) |
| Ireland | 1972-1973 | 16,37% | European Commission (2014), KPMG (2018) |
| | 1974-1975 | 19,50% | |
| | 1976-1979 | 20% | |
| | 1980-1981 | 25% | |
| | 1982 | 30% | |
| | 1983-1984 | 35% | |
| | 1985 | 23% | |
| | 1986-1989 | 25% | |
| | 1990 | 23% | |
| | 1991-2000 | 21% | |
| | 2001 | 20% | |
| | 2002-2008 | 21% | |
| | 2009 | 21,50% | |
| | 2010-2011 | 21% | |
| | 2012-2016 | 23% | |
| Israel | 1995-2005 | 17% | OECD (2016) |
| | 2006 | 16,50% | KPMG (2018) |
| | 2007-2009 | 15,50% | |
| | 2010-2011 | 16% | |
| | 2012 | 17% | |
| | 2013-2014 | 18% | |
| | 2015-2016 | 17% | |
| Italy | 1973-1976 | 12% | European Commission (2014), KPMG (2018) |
| | 1977-1980 | 14% | |
| | 1981-1982 | 15% | |
| | 1983-1988 | 18% | |
| | 1989-1997 | 19% | |
| | 1997-2011 | 20% | |
| | 2012-2013 | 21% | |
| | 2014-2016 | 22% | |

*to be continued...*

*...continued*

| Country | Year | Standard VAT Rate | Source |
|---|---|---|---|
| Jamaica | 1990-1993 | 10% | Shome (1999) |
| | 1994-1996 | 12,50% | |
| | 1997-2005 | 15% | KPMG (2018) |
| | 2006-2009 | 17% | |
| | 2010-2011 | 18% | |
| | 2012-2015 | 17% | |
| Japan | 1990-1996 | 3% | OECD (2016) |
| | 1997-2013 | 5% | |
| | 2014-2016 | 8% | |
| Jordan | 2001-2015 | 16% | Bird & Gendron (2007), KPMG (2018) |
| Kazakhstan | 1997-2000 | 20% | Ebrill et al. (2001), Bird & Gendron (2007), KPMG (2018) |
| | 2001-2006 | 15% | |
| | 2007 | 14% | |
| | 2008 | 13% | |
| | 2009-2015 | 12% | |
| Kenya | 2000-2003 | 18% | Ebrill et al. (2001) |
| | 2004-2015 | 16% | International Monetary Fund (2007), KPMG (2018) |
| Korea, Rep | 1978-2016 | 10% | OECD (2016) |
| Kyrgyz Rep | 2001-2008 | 20% | Ebrill et al. (2001) |
| | 2009-2015 | 12% | International Business Publication (2016) |
| Latvia | 1995-2008 | 18% | European Commission (2014), KPMG (2018) |
| | 2009-2015 | 21% | |
| Lebanon | 2002-2015 | 10% | Bird & Gendron (2007), KPMG (2018) |
| Leshoto | 2003-2015 | 14% | Bird & Gendron (2007), KPMG (2018) |
| Lithuania | 1994-2008 | 18% | European Commission (2014), KPMG (2018) |
| | 2009 | 19% | |
| | 2010-2015 | 21% | |
| Luxemburg | 1970 | 8% | OECD (2016) |
| | 1971-1982 | 10% | |
| | 1983-1991 | 12% | |
| | 1992-2014 | 15% | |
| | 2015-2016 | 17% | |
| Madagascar | 1994-2004 | 20% | Bird & Gendron (2007) |
| | 2005-2007 | 18% | Tradingeconomics (2018) |
| | 2008 | 20% | |
| | 2009 | 21% | |
| | 2010-2015 | 20% | |
| Malawi | 2009-2015 | 16,50% | KPMG (2018) |
| Malaysia | 2015 | 6% | OECD (2016) |
| Mali | 2000-2006 | 18% | Bird & Gendron (2007), Krever (2008), Tradingeconomics (2018) |
| | 2007-2009 | 15% | |
| | 2010-2015 | 18% | |
| Malta | 1995-2003 | 15% | European Comission (2014), KPMG (2018) |
| | 2004-2015 | 18% | |
| Mauritius | 1999-2000 | 10% | Nationsencyclopedia.com (2018) |
| | 2001 | 12% | |
| | 2002-2015 | 15% | KPMG (2018) |
| Mexico | 1980-1982 | 10% | Tijerina-Guajardo & Pagán (2000) |
| | 1983-1991 | 15% | |
| | 1992-1994 | 10% | |
| | 1995-2009 | 15% | KPMG (2018) |
| | 2010-2016 | 16% | |
| Moldova | 1998-2015 | 20% | Bird & Gendron (2007), KPMG (2018) |
| Mongolia | 2002 | 10% | International Monetary Fund (2008) |
| | 2003-2006 | 15% | |
| | 2007-2015 | 10% | |
| Morocco | 1996-2015 | 20% | Ebrill et al. (2001), KPMG (2018) |
| Mozambique | 1999-2015 | 17% | OECD (2016) |
| Namibia | 2000-2015 | 15% | OECD (2016) |
| Nepal | 2005-2015 | 13% | Rana & Dowling (2009), OECD (2016) |

*to be continued...*

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| | | | ...continued |
|---|---|---|---|
| Country | Year | Standard VAT Rate | Source |
| Netherlands | 1969-1970 | 12% | European Commission (2014), KPMG (2018) |
| | 1971-1972 | 14% | |
| | 1973-1975 | 16% | |
| | 1976-1983 | 18% | |
| | 1984-1985 | 19% | |
| | 1986-1988 | 20% | |
| | 1989-1992 | 18,50% | |
| | 1993-2000 | 17,50% | |
| | 2001-2012 | 19% | |
| | 2013-2016 | 21% | |
| New Zealand | 1986-1990 | 10% | OECD (2016) |
| | 1991-2010 | 13% | |
| | 2011-2016 | 15% | |
| Nicaragua | 1991-1995 | 10% | Tait (1988); (Tanzi, 2000) |
| | 1996-2015 | 15% | Martner & Tromben (2004), KPMG (2018) |
| Niger | 2000-2003 | 17% | Ebrill et al. (2001) |
| | 2004-2015 | 19% | Krever (2008) |
| Nigeria | 1994-2015 | 5% | Bird & Gendron (2007) |
| Norway | 1970-1994 | 20% | OECD (2016) |
| | 1995-2000 | 23% | |
| | 2001-2004 | 24% | |
| | 2005-2016 | 25% | |
| Pakistan | 1999-2008 | 15% | Bird & Gendron (2007) |
| Panama | 1977-2009 | 5% | Ebrill et al. (2001), Bird & Gendron (2007) |
| | 2010-2015 | 7% | KPMG (2018) |
| Paraguay | 1992-1993 | 12% | Martner & Tromben (2004) |
| | 1994-2015 | 10% | KPMG (2018) |
| Peru | 1991-2002 | 18% | Martner & Tromben (2004) |
| | 2003-2010 | 19% | Guigale, Fretes-Cibils, & Newman (2007) |
| | 2011-2015 | 18% | KPMG (2018) |
| Philipines | 1998-2006 | 10% | Bird & Gendron (2007), KPMG (2018) |
| | 2007-2015 | 12% | KPMG (2018) |
| Poland | 1993-2010 | 22% | European Commission (2014), KPMG (2018) |
| | 2011-2016 | 23% | |
| Portugal | 1986-1987 | 16% | European Commission (2014), KPMG (2018) |
| | 1988-1991 | 17% | |
| | 1992-1994 | 16% | |
| | 1995-2001 | 17% | |
| | 2002-2004 | 19% | |
| | 2005-2007 | 21% | |
| | 2008-2009 | 20% | |
| | 2010 | 21% | |
| | 2011-2016 | 23% | |
| Romania | 1992-1997 | 18% | European Commission (2014), KPMG (2018) |
| | 1998-1999 | 22% | |
| | 2000-2009 | 19% | |
| | 2010-2015 | 24% | |
| Rwanda | 2002-2015 | 18% | OECD (2016) |
| Samoa | 2007-2015 | 15% | KPMG (2018) |
| Senegal | 1980-2003 | 20% | Ebrill et al. (2001), Oxford Bussines Group (2009) |
| | 2004-2015 | 18% | Krever (2008), (KPMG, 2018) |
| Serbia | 2005-2011 | 18% | KPMG (2018) |
| | 2012-2015 | 20% | |
| Seychelles | 2013-2015 | 15% | OECD (2016) |
| Sierra Leone | 2009-2015 | 15% | OECD (2016) |
| Singapore | 1994-2002 | 3% | Ebrill et al. (2001) |
| | 2003 | 4% | Annacondia & van der Corput (2003) |
| | 2004-2007 | 5% | KPMG (2018) |
| | 2008-2015 | 7% | |
| Slovak Rep | 1996-2002 | 23% | European Commission (2014), KPMG (2018) |
| | 2003 | 20% | |
| | 2004-2010 | 19% | |
| | 2011-2016 | 20% | |

*to be continued...*

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*...continued*

| Country | Year | Standard VAT Rate | Source |
|---|---|---|---|
| Slovenia | 1999-2001 | 19% | European Commission (2014), KPMG (2018) |
| | 2002-2013 | 20% | |
| | 2014-2016 | 22% | |
| South Africa | 1990-1992 | 10% | Ebrill et al. (2001), Pricewaterhouse Coopers (2012) |
| | 1993-2015 | 14% | KPMG (2018) |
| Spain | 1986-1991 | 12% | European Commission (2014), KPMG (2018) |
| | 1992 | 13% | |
| | 1993-1994 | 15% | |
| | 1995-2010 | 16% | |
| | 2011-2012 | 18% | |
| | 2013-2016 | 21% | |
| Sri Lanka | 1998-2003 | 12,50% | Ebrill et al. (2001), Annacondia & van der Corput (2003), Bird & Gendron (2007), KPMG (2018) |
| | 2004-2008 | 15% | |
| | 2009-2014 | 12% | |
| | 2015 | 11% | |
| St. Kitts n Navis | 2010-2015 | 17% | OECD (2016), KPMG (2018) |
| St. Lucia, | 2012-2015 | 15% | OECD (2016), KPMG (2018) |
| St. Vincent & Grenadines | 2007-2015 | 15% | OECD (2016), KPMG (2018) |
| Swaziland | 2012-2015 | 14% | Swaziland Revenue Authority (2018) |
| Sweden | 1969-1970 | 11,11% | European Commission (2014), KPMG (2018) |
| | 1971-1976 | 17,65% | |
| | 1977-1980 | 20,63% | |
| | 1981 | 23,46% | |
| | 1982 | 21,51% | |
| | 1983-1990 | 23,46% | |
| | 1991-2016 | 25% | |
| Switzerland | 1990-1998 | 6,50% | OECD (2016) |
| | 1999-2004 | 7,50% | |
| | 2005-2010 | 7,60% | KPMG (2018) |
| | 2011-2016 | 8% | |
| Tajkistan | 2001-2009 | 20% | Ebrill et al. (2001), Bird & Gendron (2007) |
| Tanzania | 2006-2009 | 20% | Tradingeconomics (2018) |
| | 2010-2015 | 18% | |
| Thailand | 1992-2015 | 7% | Bird & Gendron (2007), KPMG (2018) |
| Togo | 1995-2015 | 18% | Bird & Gendron (2007), OECD (2016) |
| Trinidad n Tobago | 1990-2015 | 15% | Bird & Gendron (2007), Tradingeconomics (2018) |
| Tunisia | 1997-2000 | 17% | Nationsencyclopedia.com (2018) |
| | 2001-2015 | 18% | |
| Turkey | 1985-1990 | 10% | OECD (2016) |
| | 1991-1994 | 12% | |
| | 1995-1997 | 15% | |
| | 1998-2000 | 17% | |
| | 2001-2016 | 18% | |
| Uganda | 1996-2004 | 17% | Seatini & Oxfam (2017) |
| | 2005-2015 | 18% | KPMG (2018) |
| Ukraine | 1992-2015 | 20% | Bird & Gendron (2007), KPMG (2018) |
| United Kingdom | 1973-1974 | 10% | European Commission (2014), KPMG (2018) |
| | 1975-1979 | 8% | |
| | 1980-1990 | 15% | |
| | 1991-2008 | 17,50% | |
| | 2009 | 15% | |
| | 2010 | 17,50% | |
| | 2011-2016 | 20% | |
| Uruguay | 1990-1994 | 22% | Tait (1988) |
| | 1995-2006 | 23% | KPMG (2018) |
| | 2007-2015 | 22% | KPMG (2018) |
| Vietnam | 1999-2015 | 10% | Bird & Gendron (2007), KPMG (2018) |
| Zambia | 2001-2007 | 17,50% | Ebrill et al. (2001), Bird & Gendron (2007), KPMG (2018) |
| | 2008-2015 | 16% | |