

Analyzing the Asymmetric Impact of Taxation on Economic Growth: A Case Study of Vietnam

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Abstract

Tax revenue can serve as a potential source to control fiscal deficit, but it may also hinder economic growth. Thus, our study is driven by the nonlinear effects between taxation and growth. The literature often overlooks emerging and developing economies, particularly transitional ones. This study investigates the asymmetric impact of taxes on Vietnam's economic growth using time series data from 1990 to 2020, employing the NARDL framework. The results reveal that changes in tax rates can have asymmetric effects on production in the long run, and increasing tax collection rates will negatively impact economic growth. Specifically, a 1% increase in taxes leads to a 2.518% decrease in economic activity, whereas a 1% reduction in taxes results in a 0.714% increase in economic activity. These findings are significant for the quantitative analysis of taxation through fiscal policies in typical emerging economies.

Keywords: asymmetric impact, economic growth, taxation, NARDL, Vietnam

1. Introduction

A government promotes economic growth through fiscal policy, utilizing various tax policies and government expenditures. Tax revenues are primarily used to finance direct investments unavailable to the private sector. For economic activity and long-term investments to thrive, a government must efficiently provide essential public services. Furthermore, tax revenues also support activities related to public spending and significant area investments. Consequently, tax revenues are a vital tool in fiscal policy for implementing government expenditures.

One function of taxation is its direct effect on resource allocation within the economy. The flow of income between taxpayers and the government, created when taxes are spent, reduces the incomes of households and businesses. This reduction constrains the economy's ability to invest, consume, and save. The distributional effects of taxes depend on various factors, including tax structure, rates, the capacity of tax rate bands, the subject and basis of taxation, the scope and size of tax exemptions, the distribution of tax burdens, and methods of tax collection. In a market economy, how entities respond to taxes or tax burdens is crucial. Each response depends on the extent and pass-through process of the tax's effect on changes in the supply and demand of a specific factor in the market, as well as the duration over which the tax impacts the economy (Musgrave & Musgrave, 1984). Additionally, fiscal policy is a key driver of economic growth. Governments can enhance economic growth by providing public services used in production or investing in public education to improve workers' skills and abilities. Fiscal policy supports these public services and educational initiatives, thereby boosting the economy's growth

rate. However, the growth rate also depends on how effectively the government uses taxation to generate revenue for its spending purposes.

Each country has a distinct political system and economic environment, leading to different approaches to tax reform. No single tax system is universally perfect; instead, reforms aim to develop tax policies that align with the requirements of the market economy and ensure international competitiveness. Besley & Persson (2013) argue that corruption hampers the development of tax compliance standards in developing countries, potentially leading to higher incomes from lower taxes. Corruption manifests in various forms, frequently undermining tax collection efficiency in countries like Vietnam. Developed countries tend to have effective tax policies that generate substantial revenue for their governments. Typically, Asian countries maintain more complex tax systems than European nations. Developing countries often struggle to scale up tax collection effectively and equitably, facing challenges such as limited resources and large informal markets that hinder the enforcement of a broad tax base. In Vietnam, tax revenues are crucial for supporting national development, particularly public community activities. However, government tax collection policies can impact per capita income during transitions to new equilibrium growth rates. Higher tax rates may reduce economic output by discouraging firm production, raising the question of whether increased tax revenue in Vietnam might harm economic growth. Current literature lacks specific studies addressing this issue, highlighting the need for more empirical evidence to explore the relationship between a country's economic development and its tax collection capabilities.

This paper investigates the impact of funding public activities through state revenues on Vietnam's economic growth from 1990 to 2020. Various empirical studies across different countries have shown that taxes significantly

negatively affect economic growth. Additionally, revenues are sometimes used to finance unnecessary expenditures due to the political system or inefficient redistributive policies, and tax efficiency does not necessarily reflect in GDP growth rates (Baiardi et al., 2019). This study aims to determine whether the tax policies in Vietnam have a temporary or long-term impact on economic growth. The paper further discusses the theoretical and empirical background, provides analysis estimates, and reviews the findings. Investigating tax reform is seen as a promising approach to mitigating economic inequality (Bhattarai & Benjasak, 2021; Hayford, 2017). However, it remains unclear whether the taxation scheme can support Vietnam's economic growth, particularly given the remarkable growth of the Vietnamese economy after normalizing diplomatic relations with the United States and other countries.

Our primary contribution is twofold. Firstly, this paper is the inaugural study to explore the asymmetric relationship between the use of taxation as fiscal policy and economic growth in Vietnam. Previous research has not delved into the nonlinear effects of taxes on economic growth, particularly in emerging markets like Vietnam. Typically, the impact of increasing taxes is not universally positive, with most studies focusing solely on the linear effects of taxation on economic growth. However, both theoretically and practically, tax collection aims to support public spending and infrastructure for economic development, yet beyond a certain threshold, it negatively impacts economic activities. Thus, this study employs the NARDL model to examine the asymmetric impacts of taxes on economic growth, with a focus on Vietnam to understand the current situation and refine tax policies, providing empirical evidence on the disproportionate and measurable effects of taxes on Vietnam's economic growth. Secondly, by meticulously controlling for macroeconomic variables, we draw several policy implications for Vietnam's economic

development. As tax policies vary globally, studying a specific economy like Vietnam, which is in the midst of opening up and integrating economically later than many developed and regional counterparts, offers valuable insights into fiscal policy mechanisms. Tax revenue is crucial for public expenditures, but excessive taxation can dampen domestic economic activities and hinder compliance with international trade commitments. Unlike developed countries, where tax revenue primarily comes from property taxes, Vietnam predominantly relies on corporate profits and individual income taxes, which directly impact the manufacturing sector. This study provides empirical evidence of the disproportionate impact of taxes, reinforcing that taxation in emerging markets like Vietnam does not function as effectively as in developed countries.

This research is anchored in previous studies that investigated the relationship between fiscal policy and economic growth, such as Arawatari et al. (2018), Sriyana and Ge (2019), and Falahi and Hajamini (2017), which have documented the significant impact of fiscal policy on output growth. This study aims to determine whether the tax policies in Vietnam have temporary or long-term asymmetric impacts on growth—a crucial question given the heavy reliance on corporate and personal income taxes. This aligns with theoretical expectations and findings from prior empirical research, thus providing a foundation for meta-analytical or comprehensive studies in this field and expanding the scope of tax literature on economic transitions.

The paper is structured as follows: Section 2 reviews the existing literature on tax policy and economic growth, focusing on the positive, negative, and nonlinear effects. Section 3 describes the data and methodology used. Section 4 systematically presents the findings and results. Finally, Section 5 concludes with a discussion of the empirical evidence.

2. Relevant Literature

2.1. Theories on Tax Policy and Economic Growth

The correlation between taxes and economic growth has varied among economists, leading to several schools of thought based on different theoretical perspectives in the literature.

2.1.1. The impact of taxes on economic growth

Growth theory, specifically the neoclassical growth model, posits that long-term growth is driven by the savings rate and the human capital ratio. Solow (1956) argued that the rate of technological progress is a critical factor in economic growth. He introduced a technological variable, distinct from labor and capital, that changes over time. As technology evolves, new capital generates more value than older capital. Solow's model demonstrated that taxes do not affect the economy in its steady state, suggesting that the impact of taxes on economic development is neutral in the long run. Consequently, the model does not facilitate an assessment of fiscal policy's impact on long-run growth at a steady state. Gordon (1998) noted that in a neoclassical model, the growth rate depends on the accumulation of human and physical resources over time. Over extended periods, any tax structure leads to an equilibrium in the labor ratio (or capital income) and the level of education per worker. A significant rate of technical change is required to drive further growth in output per capita. The tax structure has no lasting impact on the growth rate of output per capita, regardless of the potential misallocations created by the tax structure. However, changes in tax policies can alter these equilibria, leading to temporary growth effects that may be measurable over decades. Thus, the impact of a tax change on capital equilibrium may take a considerable amount of time to become apparent.

In terms of the negative impact of taxes on economic conditions, certain theories propose that taxes, as determinants of investment, may hinder economic growth by discouraging innovation and reducing business expansion motivation. Prominent advocates of this view, such as Judd (1985), Chamley (1986), Barro (1979), and King and Rebelo (1990), suggest reducing taxes to foster creativity. Additionally, Engen and Skinner (1996) argued that taxes could negatively impact economic growth through five channels: (1) discouraging investment, (2) affecting labor supply, (3) reducing growth productivity, (4) decreasing the marginal productivity of capital, and (5) reducing efficiency in employing human resources. High tax rates may deter the performance of invested capital and prompt business owners to avoid taxes by underreporting corporate profits. Tax policy may also stifle production growth by discouraging research and development, which is crucial for productivity. Unequal taxation leads to investment distortions from moving capital from heavily taxed to less taxed sectors, potentially causing inefficient labor allocation.

Harberger (1962, 1966) noted that tax policy changes could affect the marginal productivity of labor. The endogenous model by Mendoza et al. (1997) considered the impact of taxation on economic growth through three main channels: (1) human resources, (2) physical capital, and (3) consumption. Higher consumption taxes, like VAT, also affect labor because consumer goods become more expensive, possibly influencing the labor supply as the reward for employment diminishes. The model predicted that taxation on physical capital or human resources could directly impact economic growth through labor supply and indirectly through consumption, while higher consumption tax has only an indirect effect. Factors such as the elasticity of labor supply will determine the magnitude of these effects.

Economic theory assumes that all taxes have the potential to distort economic development, but consumption taxes do so to a lesser extent than income or profit taxes. Fiscal policies, especially taxation, affect economic growth by discouraging new investment and business or distorting investment decisions, as tax rates make certain forms of investment more profitable than others or discourage workers from exerting effort and acquiring skills.

Empirical studies generally show an inverse relationship between tax burden and economic growth rate, suggesting that a lower tax burden could increase the economic growth rate. Thus, with an optimal tax rate, future GDP could be higher, and future tax revenue could increase even with a lower tax rate. Endogenous growth models indicate that new government policies might permanently influence economic conditions, as reflected by the GDP per capita growth rate. Economic growth is typically measured by the change in a country's GDP or GNP (in annual or quarterly frequencies) and the sum of its factor productivity.

Taxes directly influence all four components of GDP—consumption, investment, government spending, and net exports. As a primary source of government revenue, taxes also play a crucial role in determining the level of government expenditure. Furthermore, tax rates are a significant factor in a country's attractiveness to businesses, potentially stimulating production for exports, creating jobs, and generating income for consumption. From a positive perspective, taxation can have beneficial impacts on the environment and the business ecosystem. Tax revenues fund public goods, such as infrastructure, education, and healthcare systems, which are distributed to individuals and businesses, thereby enhancing the quality of life and economic productivity. Thus, an increase in taxes is often seen as desirable to support these public services and raise the revenue of entrepreneurs. Moreover, higher taxes and

redistribution are viewed as mechanisms to increase investment opportunities within the economy (Afonso et al., 2021). According to the endogenous growth theory proposed by Romer and Romer (2010), economic growth can be influenced by taxation over a longer period. The authors argue that taxation can sustain and boost the economy while enhancing global competitiveness. Additionally, taxes provide stable and predictable fiscal policies, enabling the accumulation of funds to finance public infrastructure and societal needs. They also help reduce long-term dependence on aid and ensure good governance by strengthening government accountability.

2.1.2. Keynesian economics of taxes, government expenditures, and economic growth

The economic relationship between taxes, spending, and economic growth is rooted in Keynesian economics, which was the dominant macroeconomic theory until about 1970. Keynes (1936) emphasized that tax rates should be adjusted based on the economic cycle's boom or bust phases. During these periods, the government uses fiscal policy tools, e.g., government expenditures and tax revenues, in two primary ways: pro-cyclical and counter-cyclical, depending on the phase of the economic cycle.

A pro-cyclical fiscal policy aims to balance the government budget. For example, when facing a budget deficit, it is necessary to increase tax revenue and reduce government spending to balance the budget. In contrast, a counter-cyclical fiscal policy focuses on restoring the economy to its potential. During recessions, the government may increase spending and reduce taxes to stimulate economic growth (Keynes, 1936). Developed countries often implement counter-cyclical, or expansionary, fiscal policies during economic downturns. Conversely, they may adopt contractionary policies during growth

phases. These countries also use automatic stabilizers, such as unemployment insurance and social transfers that increase with higher unemployment rates, to maintain counter-cyclical fiscal policy. Tax policy itself can be counter-cyclical since personal income reductions during downturns lead to decreased tax revenues.

In developing countries, however, the approach often tends to be pro-cyclical. Governments in these economies frequently boost investment and public spending, particularly during recovery phases, to catch up with developed nations. Local governments may increase spending during growth phases but lack automatic stabilizers during recessions. In such times, unemployment insurance is rare, and social transfers make up only a small portion of the government budget. Government consumption and wages often represent significant public expenditures, and taxes are typically indirect (trade and consumption taxes) rather than direct (income taxes).

Therefore, governments need to apply fiscal policy appropriately to achieve long-term macroeconomic management goals during recession or boom phases (Talvi & Vegh, 2005). According to Keynesian economics, governments are encouraged to increase taxation and finance long-term expenditures during boom cycles to repay debts, while in recessions, they should cut taxes and increase spending to facilitate economic recovery. Through robust spending, governments can temporarily create jobs and inject capital into the market, while in recessions, they might finance deficit expenditures by applying heavy taxation during expansion phases. This fiscal policy response aims to smooth out the boom and bust cycles and promote steady economic growth (Acemoglu et al., 2013; Fatas & Mihov, 2013).

2.1.3. Supply-side economics of taxes and economic growth

For 30 years following the Great Depression, the US economy adhered to Keynesian economics, emphasizing the role of taxes and government spending in managing economic cycles. However, during the 1970s, the emergence of inflation, which depreciated the US dollar, coupled with a stagnant economy, led to a stall in economic growth. This period marked the beginning of significant criticism of Keynesianism and the rise of a new school of thought known as supply-side economics.

Supply-side economics focuses on the importance of tax policy, advocating for generally low tax rates to stimulate the economy by creating more jobs than would be generated by government spending alone. The theory proposes that lower taxes increase disposable income, leading to more spending and investment, which in turn drives economic prosperity. Additionally, supply-side economics identifies a revenue maximization point on the Laffer Curve, developed by economist Arthur Laffer, which suggests that there is an optimal tax rate that maximizes government revenue. According to the Laffer Curve, taxing beyond this point can be counterproductive, leading to decreased economic growth and reduced tax revenue. The curve illustrates a range from 0% tax, where businesses operate without government interference, to a 100% tax rate, where business activities are completely stifled.

Unlike Keynesianism, which often involves redistributing wealth through various government interventions, supply-side economics promotes a trickle-down effect. This approach assumes that lower taxes for middle and high-income earners will lead to increased spending and investment, subsequently boosting economic growth (Laffer, 1981a; 1981b). Thus, supply-side economics posits that economic growth can be best achieved by

empowering individuals and businesses with more financial freedom rather than through direct government intervention.

2.2. Empirical Evidence About This Relationship

Taxation is a crucial tool of fiscal policy, but its impact on economic conditions remains ambiguous. Theories and empirical studies have yet to yield consistent results regarding the relationship between taxes and economic development. This ambiguity has led researchers to categorize their findings into three main areas: (1) positive effects, (2) negative effects, and (3) nonlinear effects.

2.2.1. Evidence of positive relationship

Andrašić et al. (2018) explored the influence of taxes on economic growth in 35 OECD countries using the Fixed Effect Model (FEM) over a 20-year period starting in 1996. Their findings indicated that a 1% increase in tax revenue enhances economic conditions by 0.29%. Similarly, Gashi et al. (2018) investigated the impact of tax structure on economic development in Kosovo from 2007 to 2015, finding that most taxes positively affected economic development. Stoilova (2017) also examined the relationship between tax structure and economic growth in the European Union using pivot table data and linear approaches from 1996 to 2013 and demonstrated that selective consumption taxes, along with taxes on personal income and wealth, supported economic growth. Additionally, Takumah and Iyke (2017) analyzed the connection between tax revenue and economic growth in Ghana. Using a quarterly dataset from 1986Q1 to 2014Q4, they observed evidence of a one-way positive causality from tax revenue to economic growth.

2.2.2. Evidence of negative relationship

Firstly, Baiardi et al. (2019) analyzed the relationship between tax policy and economic development in 21 OECD countries from 1971 to 2004, utilizing the pooled mean group (PMG) estimator, and concluded that the relationship between tax revenue and economic growth is significantly negative. They found that tax revenue has a substantial negative impact on economic growth when analyzing infrastructure and tax burdens through a panel data approach. Additionally, Gridinić et al. (2017) empirically examined the predictive power of tax structure on economic growth in Central and Eastern European (CEE) countries using the PMG estimator for 20 selected countries between 1990 and 2010. They concluded that all forms of taxation hinder economic growth.

Secondly, Marsden (1990) explored how total tax revenue impacts GDP by selecting the average tax rate to estimate the effects on economic growth. He examined 20 countries, dividing them into groups based on similar per capita income but different tax rates. These countries were compared over nine years, starting from 1970, based on their lower and higher tax rates and the effect of taxes on growth rates. The results showed that economies with a lower average tax burden on their citizens achieved significantly higher GDP growth than those with higher taxes. Specifically, the low tax group's average annual GDP growth rate was 7.3%, compared to 1.1% for the high tax group. The average tax-to-GDP ratio in the low tax groups increased from 13.3% in 1970 to 15.2% in 1979, while in the high tax groups, it rose from 21% to 23.9% during the same period. The financial incentives provided by low-tax countries shifted resources from less productive to more productive sectors, thereby enhancing the overall efficiency of resource utilization.

From a macroeconomic perspective, taxes influence the formation of supply, demand, and market equilibrium for specific commodities, as well as

the decisions of producers, consumers, and investors. Increasing taxes on a particular good decreases its sales and demand, leading to a drop in its real price even as the gross price rises. The response of buyers and sellers to rising prices depends on economic conditions such as supply and demand and the ability of sellers (manufacturers) to adjust their cost structures. The less flexible the supply and demand, the smaller the impact of an income tax on a specific economic activity. Conversely, the greater the flexibility of supply and demand, the larger the impact of taxation on resource allocation.

Furthermore, taxes affect the price of a taxed product, and price fluctuations impact the market situation. An increase in tax rates can lead to changes in a taxpayer's total taxable income, where their net income decreases, or the taxpayer tries to increase gross income to protect their net income. This effect can reduce consumption, savings, and the capital supply to the economy. The effect of taxes on saving and investment is demonstrated by the saving interest rates of commercial banks, inflation, and the tax rate on capital income. Investment trends are also influenced by income from investments. The tax burden on capital income can limit the investment rate, causing investments to be allocated to tax-advantaged sectors with lower investment rates, potentially leading to skewed investment decisions. Taxing capital gains—such as interest on savings accounts, bonds, investment units, and dividends—reduces the efficiency of the rate of returns, thereby diminishing the benefits of savings and leading to a reduction in savings due to the substitution effect (Feldstein & Samwick, 1996).

2.2.3. Studies on the nonlinear effects of taxes on economic growth

Numerous studies have investigated the nonlinear relationship between taxes and economic growth using diverse samples, periods, and methodologies.

For example, Aydin and Esen (2019) analyzed the nonlinear relationship between optimal tax collection and economic growth in transitional economies using a threshold regression approach. They applied a dynamic panel threshold framework to 11 countries in Middle and Southeast Europe, including the Baltic states, covering the period from 1995 to 2014. The results indicated that the optimal tax rate for transitional, developing, and developed economies is approximately 18.00%, 18.50%, and 23.00% of GDP, respectively. The findings suggest that tax rates below these thresholds positively affect economic growth, but the effect turns negative when the thresholds are exceeded.

The outcomes of studies on fiscal policy's effects on economic growth vary based on factors such as the selection of country samples, levels of development, time frames, controlled variables, implemented methodologies, and factor variables. Consequently, there is no consensus on the relationship between taxes and economic growth, leading to conflicting viewpoints regarding the impact of fiscal policy levels and tax system structures on economic growth.

One group argues that a low tax burden fosters economic growth and that reducing the real tax rate would be beneficial. This perspective often overlooks the structure of the tax system; instead, it emphasizes the general tax rate (the proportion of taxes in GDP) and the financial burden ratio (the proportion of total financial burdens in GDP) as critical factors in economic development. Post-economic boom, the government budget is typically offset by higher tax revenues. However, tax reductions can reduce the government's role in redistributing GDP, which some proponents of liberalism view positively, arguing that private institutions utilize resources more efficiently than public expenditures in terms of economic growth.

Conversely, another group focuses on the direct effects of low taxes on economic growth, highlighting the negative consequences of reduced tax revenues. They point out that a lack of financial resources in sectors such as infrastructure, administration, and education could hinder economic growth. Proponents of this view also note that while the positive effects of tax cuts may materialize after several years, the immediate impact on the government budget can be detrimental.

Recent research by Arin et al. (2024) examined the asymmetric impact of labor taxes and corporate taxes on growth using a panel smooth transition model for 19 advanced economies from 1961 to 2017. Their findings revealed asymmetric effects, with individual taxes having a larger adverse impact on long-term growth compared to corporate taxes. Şen and Kaya (2023) studied a panel dataset of 9 OECD countries for the period 1981–2017 and found that corporate income tax, followed by personal income tax, most significantly impedes growth. They suggest that shifting from income taxes to consumption taxes could promote higher growth, whereas moving from social security contributions and wealth taxes to payroll and labor force taxes significantly negatively affects growth.

3. Data and Methods

3.1. Data

The research objective focuses on studying the impact of taxes (TAXES) on Vietnam's economic growth (GDP). When considering the impact of taxes on economic growth, it must be placed in the context of the transmission mechanism of many other factors, especially those related to monetary policy. Therefore, in the NARDL model, the author added the

following controlled variables: the money supply of the economy (BM), deposit interest rate (BIR), average USD/VND exchange rate (EX), Consumer Price Index (CPI), and Public Consumption Expenditure (PCE). The data is taken for the period 1990–2020 from the International Monetary Fund (IMF). GDP, BIR, and PCE are taken as a percentage. TAXES, BM, EX, and CPI are trend variables without a normal distribution, and the deviation must be very high. We had to convert those variables into a logarithmic base of natural form so that the variable has a distribution close to the normal distribution, meeting the input data conditions of the model. Table 1 summarizes our main variables.

Table 1. Summary of data description

Variable	Description	Unit	Notes
GDP	Economic growth	%	Dependent variable
TAXES	Total tax revenues	Logarithm	Nonlinear
BIR	Deposit interest rate	%	Control variable
BM	Money supply in the economy	Logarithm	Control variable
CPI	Consumer price index	Logarithm	Control variable
EX	The average USD/VND exchange rate	Logarithm	Control variable
PCE	Public Consumption Expenditure Growth	%	Control variable

Notes: All the data sources are collected from the IMF database.

In Vietnam, the variables of money supply, interest rate, and exchange rate serve as transmission variables of monetary policy, while the price index variable serves as the transmission variable of the commodity market to measure the impact of these macro factors on economic growth. Any change in taxes will also be transmitted to the price index in the commodity market and lead to the effects of the money supply, interest rate, and exchange rate variables in the money market, ultimately impacting economic growth. Unlike other countries, Vietnam has an underdeveloped financial market with many limitations, so the level of state control over the currency market is quite high.

Therefore, two factors, interest rate and exchange rate, greatly impact the factors of the economy. In addition, the operation of an open economy under the market mechanism depends heavily on external economic activities such as import-export and business of transnational corporations. Tax revenue from related activities outside the country will be affected by the state's exchange rate policy. Therefore, we have chosen the money supply, interest rate, exchange rate, and consumer price index variables as control variables. Fiscal policy and monetary policy are two important tools to achieve a country's economic growth goals, so management and changes in fiscal policy through tax policy are always associated with monetary factors of the economy, including interest rates (BIR), exchange rates (EX), supply and demand (BM), and inflation (represented by CPI). Therefore, in this study, control variables related to monetary policy including interest rates, exchange rates, money supply, and consumer price index are used as control variables to accurately measure the impact of taxes on Vietnam's economic growth.

3.2. Methodology

The research analyzes the relationship between total tax revenues and Vietnamese economic growth by implementing the NARDAL model with $GDP = f(TAXES, BM, BIR, CPI, EX, PCE)$.

Initially, Shin et al. (2014) asserted an asymmetry in the short- and long-term through the positive and negative coefficient analyses of explanatory variables. This model has the advantage of being consistent with reality and is applied in the economic field when testing the relationship of asymmetric time series. Shin et al. (2014) built a long-term NARDL asymmetric regression model:

$$y_t = \beta^+ x_t + \beta^- x_t + u_t \quad (1)$$

$$\Delta x_t = v_t, \quad (2)$$

To use the NARDL model for the strings, x_t and y_t must be stationary with the highest degree of difference at 1. x_t is divided into $x_t = x_0 + x_t^+ + x_t^-$, in which x_t^+ and x_t^- show the effects in an increasing or decreasing direction of the independent variable x on dependent variable y :

$$x_t^+ = \sum_{j=1}^t \Delta x_j^+ = \sum_{j=1}^t \max(\Delta x_j, 0), \quad x_t^- = \sum_{j=1}^t \Delta x_j^- = \sum_{j=1}^t \min(\Delta x_j, 0) \quad (3)$$

The stationary linear combination of components:

$$z_t = \beta_0^+ y_t^+ + \beta_0^- y_t^- + \beta_1^+ x_t^+ + \beta_1^- x_t^- \quad (4)$$

If z_t does not change, y_t and x_t will be the asymmetrical affiliation. The normal linearity (symmetrical) is a special case of (4), obtained only when $\beta_0^+ = \beta_0^-$ và $\beta_1^+ = \beta_1^-$. Shin et al. (2014) consider the following limited case: $\beta_0^+ = \beta_0^- = \beta_0$. In the expression (4), $\beta^+ = -\beta_1^+ / \beta_0$ and $\beta^- = -\beta_1^- / \beta_0$.

Shin et al use this basis to propose the NARDL model (p, q):

$$y_t = \sum_{j=1}^p \phi_j y_{t-j} + \sum_{j=0}^q (\theta_j^+ x_{t-j}^+ + \theta_j^- x_{t-j}^-) + \varepsilon_t, \quad (5)$$

$$\begin{aligned} \Delta y_t &= \rho y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} (\phi_j^+ \Delta x_{t-j}^+ + \phi_j^- \Delta x_{t-j}^-) \\ &= \rho \zeta_{t-1} + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} (\phi_j^+ \Delta x_{t-j}^+ + \phi_j^- \Delta x_{t-j}^-) \end{aligned} \quad (6)$$

where, $\rho = \sum_{j=1}^p \phi_{j-1}, \gamma_j = -\sum_{i=j+1}^p \phi_i$ with $j=1, \dots, p-1$,

$\theta^+ = \sum_{j=0}^q \theta_j^+, \theta^- = \sum_{j=0}^q \theta_j^-, \phi_0^+ = \theta_0^+, \phi_j^+ = -\sum_{i=j+1}^q \theta_i^+$ with $j=1, \dots, q-1$.

$\phi_0^- = \phi_0^-, \phi_j^- = \sum_{i=j+1}^q \theta_i^-$ with $j=1, \dots, p-1$ and $\zeta_t = y_t - \beta^+ x_t^+ - \beta^- x_t^-$ is the asymmetric error correction (ECM). Based on the expression of the correlation

between the regression and residuals in expression (6), Shin et al. (2014) propose the following short form:

$$\Delta x_t = \sum_{j=1}^{q-1} \Lambda_j \Delta x_{t-j} + v_t, \quad (7)$$

$$\varepsilon_t = \omega' v_t + e_t = \omega' (\Delta x_t - \sum_{j=1}^{q-1} \Lambda_j \Delta x_{t-j}) + e_t, \quad (8)$$

If replacing the expression (8) by (6), an asymmetrical ECM is obtained:

$$\Delta y_t = \rho \zeta_{t-1} + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} (\pi_j^+ \Delta_{t-j}^+ + \pi_j^- \Delta_{t-j}^-) + e_t, \quad (9)$$

where $\pi_0^+ = \theta_0^+ + \omega$, $\pi_0^- = \theta_0^- + \omega$, $\pi_j^+ = \varphi_j^+ + \omega' \Lambda_j$ with $j=1, \dots, q-1$.
 $\pi_j^- = \varphi_j^- + \omega' \Lambda_j$

Equation (9) is the NARDL model that shows the nonlinear effects of the independent variable x_t on the dependent variable y_t in the short and long period.

4. Findings and Results

4.1. Data Description

Table 2 summarizes descriptive statistics of the variables used in the study, including GDP, TAXES, BIR, BM, CPI, EX, and PCE. Where GDP, BM, CPI, and EX are normally distributed while TAXES is negatively skewed and has a high mean value, BIR has high positive skewness; both TAXES and BIR have high Jarque-Bera skewness.

Table 2. Summary of descriptive statistics

Value	GDP	TAXES	BIR	BM	CPI	EX	PCE
Mean	6.863	16.625	12.094	4.110	4.282	9.653	6.930
Median	6.812	18.290	7.492	4.262	4.092	9.671	7.430
Maximum	9.540	22.463	60.100	5.105	5.128	10.052	12.822
Minimum	2.906	4.023	3.653	2.973	3.641	8.785	1.240
Standard Deviation	1.488	5.549	12.781	0.788	0.550	0.309	2.707
Skewness	-0.285	-1.048	2.742	-0.317	0.325	-0.650	0.092
Kurtosis	3.031	2.862	9.949	1.563	1.461	3.086	2.871
Jarque-Bera	0.423	5.702	101.240	3.188	3.607	2.195	0.065
	(0.809)	(0.057)	(0.000)	(0.203)	(0.164)	(0.333)	(0.967)
Sum	212.75 6	515.383	374.934	127.423	132.772	299.24 4	214.849
Sum Sq. Dev.	66.464	923.813	4901.085	18.658	9.098	2.882	219.942

Notes: The number of observations is 31, obtained for 31 years. The number in brackets is the p-value for the Jarque-Bera test.

The variable descriptive statistics are presented in Table 3. This study uses the ADF test (Dickey-Fuller test) to analyze the unit root of strings. Table 3 provides the results of the original ADF unit root test, which show that TAXES and BIR exhibit stationary at the degree of difference $I(0)$ and GDP, BM, CPI, EX, and PCE are stationary at the degree of difference $I(1)$. For the NARDL model, a unit root test is required because the autoregressive distributed lag model (ADL) applies stationary series at $I(0)$ or $I(1)$ or a mixture of $I(0)$ and $I(1)$. The model cannot be applied when any variable is at order $I(2)$, as the F-statistic of the cointegration test becomes invalid because of the presence of variables $I(2)$ (Ibrahim, 2015; Ouattara, 2004). Therefore, it is important to use the unit root test in the NARDL model. The results of the ADF Test confirm that there are no stationary strings being at order 2, so this study can progress to the NARDL model

Table 3. Unit root test

Variables	I(0)	I(1)
Augmented Dickey-Fuller Unit Root Test – t-values (P-values)		
GDP	-2,080 (0,253)	-3,632 (0,011)**
TAXES	-3.177 (0,031)**	
BIR	-6.639 (0.000)***	
BM	-0.642 (0.846)	-4.599 (0.001)***
CPI	-0.016 (0.949)	-3.072 (0.040)**
EX	-1.481 (0.528)	-10.803 (0.000)***
PCE	-0.075 (0.197)	-6.359 (0.000)***

4.2. Main Results

There are different studies on the NARDL model (Ibrahim, 2015; Katrakilidis & Trachanas, 2012; Shin et al., 2014). The main goal is to eliminate all the significant lags of the regression to mitigate noise in the dynamic coefficient (Katrakilidis & Trachanas, 2012). We employed two lagged terms as the maximum choice for variables. Before implementing NARDL, different tests were performed, including the Ramsey test for the functional problem, the Jarque-Bera test for residuals, and the Breusch/Pagan test for the heteroskedasticity phenomenon. The NARDL model is presented in Table 4. The results confirm that the model does not have any of the problems stated above; thus, this study can estimate NARDL.

Table 4. The NARDL model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	-0.622	0.136	-4.546	0.013
GDP(-2)	2.559	0.246	10.401	0.061
TAXES_POS	-4.149	0.403	-10.273	0.061
TAXES_POS(-1)	1.630	0.154	10.537	0.060
TAXES_NEG	3.473	0.224	15.449	0.041
TAXES_NEG(-1)	-4.187	0.408	-10.250	0.061
BIR_POS	1.453	0.259	5.608	0.112
BIR_POS(-1)	-1.304	0.159	-8.161	0.077
BIR_NEG	0.351	0.082	4.237	0.147
BIR_NEG(-1)	-0.232	0.056	-4.112	0.151
BM_POS	9.547	2.932	3.256	0.189
BM_POS(-1)	39.692	2.984	13.301	0.047
BM_NEG	7.420	3.161	2.346	0.256
BM_NEG(-1)	-0.879	2.431	-0.361	0.779
CPI_POS	-102.527	7.055	-14.532	0.043
CPI_POS(-1)	192.967	16.462	11.721	0.052
CPI_NEG	85.743	7.422	11.552	0.055
CPI_NEG(-1)	-9.553	7.744	-1.233	0.433
EX_POS	-102.496	17.408	-5.887	0.107
EX_POS(-1)	136.771	14.124	9.683	0.065
EX_NEG	141.294	17.655	8.002	0.079
EX_NEG(-1)	5.921	4.849	1.221	0.436
PCE_POS	1.251	0.197	6.322	0.099
PCE_POS(-1)	-0.327	0.036	-8.988	0.070
PCE_NEG	-0.238	0.047	-5.065	0.124
PCE_NEG(-1)	1.346	0.175	7.656	0.082
C	78.366	10.338	7.580	0.083

R-squared	0.958
F-Stat	1.585
Ramsey RESET test	P-value = 0.562
Breusch/Pagan heteroskedasticity test	P-value = 0.098

Notes: Prob. shows that the hypothesis is accepted at the significance level *P<0.1, ** P<0.05, and *** P<0.01.

In addition, Table 5 shows the results of nonlinear cointegration between the variables based on Pesaran's F-statistic and t_{BDM} (Banerjee et al., 1998). Hypothesis H_0 : no cointegration. The F-statistic is larger than t_{BDM} , confirming a long-term relationship between tax revenue and economic growth. Therefore, the long-run relationship can be analyzed further when a nonlinear cointegration estimate is available.

Table 5. Cointegration test

Co-integrated test statistics:	F-stat: 0.244
	t_{BDM} : -0.314

Table 6. Short-run and long-run asymmetric test

Wald test	Asymmetric relationship in the long run		Asymmetric relationship in the short run	
	F-stat	Sig.	F-stat	Sig.
	WLR = 118.370	0.0048	WSR = 1.76	0.000
Result	An asymmetrical relationship		An asymmetrical relationship	

Table 7. The asymmetrical impact of Taxes on GDP in the long run

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	78.366	0.338	7.580	0.017
GDP(-1)	0.937**	0.161	5.798	0.010
TAXES_POS(-1)	-2.518**	0.433	-5.810	0.010
TAXES_NEG(-1)	0.714**	0.330	-2.162	0.027
BIR_POS(-1)	0.148	0.267	0.557	0.067
BIR_NEG(-1)	0.118**	0.070	1.677	0.034
BM_POS(-1)	49.240**	2.767	17.795	0.035

BM_NEG(-1)	6.541	4.830	1.354	0.404
CPI_POS(-1)	90.440	12.945	6.986	0.090
CPI_NEG(-1)	76.190	8.129	9.372	0.067
EX_POS(-1)	34.275	5.940	5.770	0.109
EX_NEG(-1)	147.215	16.041	9.177	0.069
PCE_POS(-1)	0.924	0.188	4.915	0.127
PCE_NEG(-1)	1.107	0.139	7.945	0.079
DGDP	-2.559	0.246	-10.401	0.061
DTAXES_POS	-4.149*	0.403	-10.273	0.061
DTAXES_NEG	3.473**	0.224	15.449	0.041
DBIR_POS	1.453	0.259	5.608	0.112
DBIR_NEG	0.351	0.082	4.237	0.147
DBM_POS	9.547	2.932	3.256	0.189
DBM_NEG	7.420	3.161	2.346	0.256
DCPI_POS	-102.527**	7.055	-14.532	0.043
DCPI_NEG	85.743	7.422	11.552	0.055
DEX_POS	-102.496	17.408	-5.887	0.107
DEX_NEG	141.294	17.655	8.002	0.079
DPCE_POS	1.251	0.197	6.322	0.099
DPCE_NEG	-0.238	0.047	-5.065	0.124

Notes: Prob. shows that the hypothesis is accepted at the significance level *P<0.1, ** P<0.05, and *** P<0.01.

Table 8. The impact of Taxes on GDP in the short run

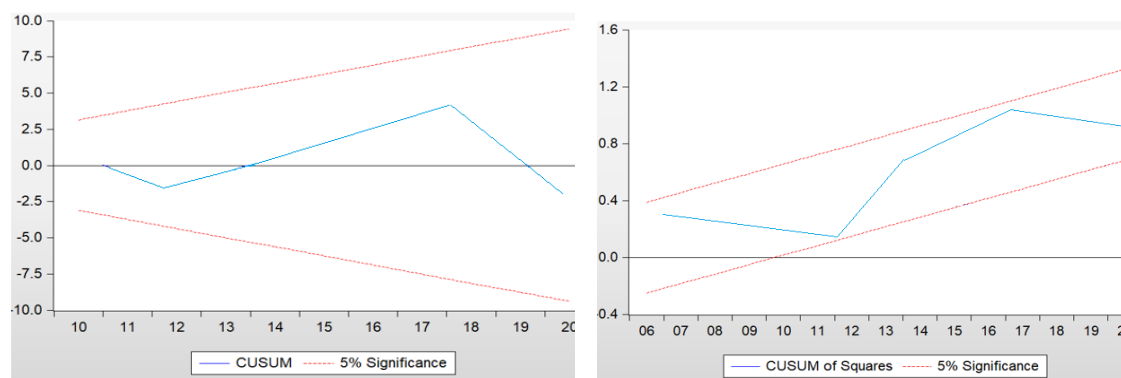
Variables	Coef.	Std. Err.	t-Statistic
DTAXES_POS	-4.149*	0.403	0.061
DTAXES_NEG	3.473**	0.224	0.041

Notes: The t-stat threshold is 1.96 for 5% significance level.

To evaluate the nonlinear effect of total tax revenue on economic growth, the Wald test is performed. The results of Table 6 show that WLR = 118.370 (with a corresponding probability value of 0.048), which shows that the impact of taxes on economic growth is statistically significant in the long run. The positive and negative changes of taxes on economic performance in the

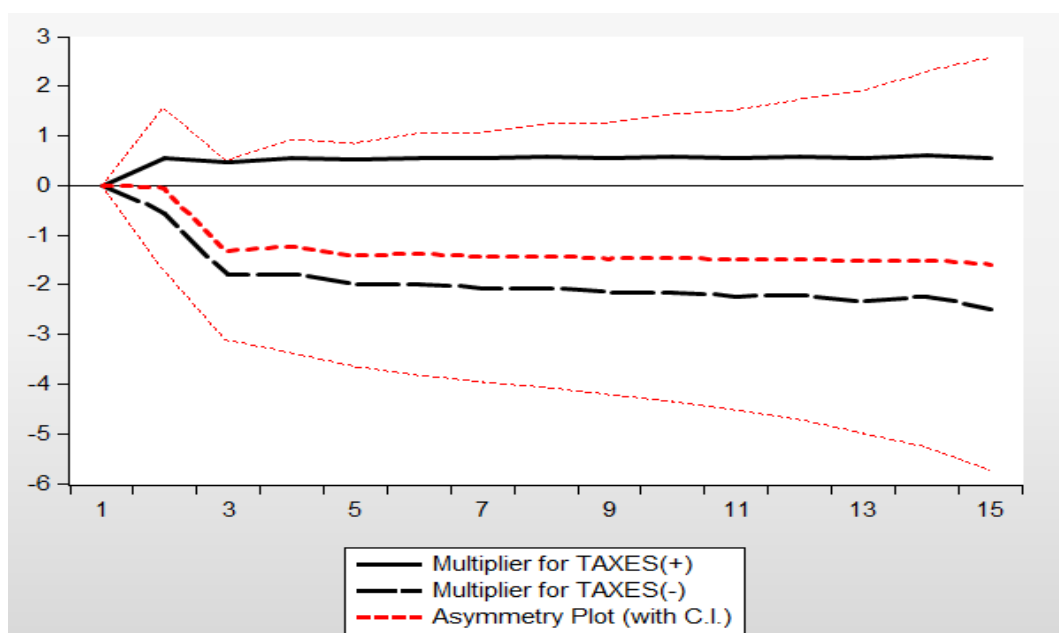
long term are shown in Table 7. Specifically, a 1% increase in taxes leads to a decrease in economic activity of 2.518%. In contrast, a 1% reduction in taxes resulted in a positive change in economic activity of 0.714%. The findings are supported by Baiardi et al. (2019), Gridinić et al. (2017), and Marsden (1990), who concluded that increasing the government's tax collection rate can have effects in the direction of reducing the growth rate of the economy. The research results are consistent with Laffer Curve theory, which demonstrates that if the taxation is above the equilibrium point, it will negatively affect economic growth and lead to a decrease in tax revenue (Laffer, 1981a; 1981b). This study also finds that the impact of tax revenue is negatively correlated with economic growth in the short run, as shown in Table 8, in which a 1% reduction in tax revenue leads to positive volatility in economic activity of 3.473%. When the government increases tax revenue by 1%, it can reduce economic growth by 4.149%. Rising prices result from increasing tax rates, which in the long run will create upward pressure on wages not to weaken global demand in the economy. This situation will increase the cost of wages and other production factors for manufacturers. Then, they will raise the asking price to offset their costs and shift the tax burden. Thus, there is an indirect tax burden on businesses. It can explain why tax policy immediately affects the market and economic growth of most developing countries, such as Vietnam, which have a tax structure with a higher proportion of corporate tax and goods and services tax than property tax. This result is consistent with Owsiak (2000) and Feldstein and Samwick (1996). Taxes affect the price of the taxed product, and then price fluctuations affect the market situation. Taxing corporate capital gains affects the efficiency of returns, thus affecting the growth of the economy.

Figure 1. CUSUM and CUSUM-Square tests



The estimated results in Table 7 indicate that the co-integration coefficient exhibits -1.028 at the 5% significance level, implying that economic growth can adjust to long-run equilibrium after each short-run tax-induced shock. The statistics of NARDL are presented in Table 6 to check the significance of the study. This study performed a parameter stability test using CUSUM and CUSUM-square, as shown in Figure 1. The results confirm that CUSUM and CUSUM-square lie within the critical lines at the significance level of 5%, showing that the model is stable and does not suffer from sudden shocks or structural breaks.

Figure 2. Asymmetric cumulative dynamic multiplier chart of economic growth



In order to analyze in detail the asymmetric impact of tax changes on economic growth in both domains, the author conducted a cumulative dynamic multiplier analysis, which is derived from the NARDL model. Figure 2 shows the impact of positive and negative changes in taxes on economic development. In the short run, economic growth responds immediately and faster to tax increases than tax decreases. However, in the long run, the impact of tax reduction on economic growth is stronger than the impact of tax increases. The impact of tax increase is inverse with economic development, while tax reduction positively affects economic growth. The difference between the increase and decrease changes (red dashed line) is statistically significant over the entire cycle, implying a significant difference between the positive and negative impact of tax change on economic growth. Thus, taxes have asymmetrical effects on economic growth in both domains.

The research also shows a negative impact of tax rates on economic performance in the short horizon. The higher the tax rate, the lower the GDP growth. These results are consistent with the theoretical postulates of supply-side economics and the theoretical model (Jaimovich & Rebelo, 2017). However, we also place a caveat on this point: Although Jaimovich and Rebelo (2017) mainly rely on the individual and entrepreneurs' decisions regarding taxation choices, our study is motivated by this study with the nonlinear effects. Therefore, we would like to extend the literature by considering the nonlinear effects. It can be argued that lowering tax rates results in lower labor costs. Concomitantly, this phenomenon stimulates consumption and production and, as a result, shifts the supply curve to the equilibrium point of supply and demand, which can foster economic status. This fiscal policy results in economic growth and a decrease in the inflation rate. These activities can widen the trade deficit due to growing demand for consumer and investment goods

and increase the capital surplus due to an increase in foreign capital inflows and a decrease in domestic capital outflows. In the long run, price increases due to increased taxes can lead to an inflationary process. Manufacturers will raise their prices, which will create exponential responses to changes in prices. Household members are burdened with rising prices of necessary goods, limiting their demand for goods, reducing output, and affecting economic growth. High (increasing) taxes, through rising prices and inflationary effects, lead to a decrease in society's real income, a decrease in demand, and a decline in production, and, eventually, hamper economic growth.

The impact of tax collection is negatively correlated with economic growth. Rising prices as a result of increasing tax rates will, in the long run, create upward pressure on wages so as not to weaken demand in the economy. This increases the cost of wages and other factors of production (suppliers offset their costs by shifting the tax burden). Therefore, we feel the indirect burden of indirect taxes on businesses. This can be explained by the fact that most developing countries like Vietnam have a tax structure with a higher proportion of corporate tax and tax on goods and services than property tax, so tax policy affects immediately enter the market and have an effect on economic growth. Taxes affect the price of the taxed product, and price fluctuations affect the market situation. Taxing corporate capital gains affects the efficiency of returns, thus affecting the growth of the economy.

Tax collection in Vietnam still mainly relies on a number of tax instruments such as VAT, corporate income tax, and trade tax on goods and services. Personal income tax contributes only a modest part of total budget revenue. Tax system reform has become essential to not only generate additional revenue but also stabilize the macro-economy, improve social welfare, and promote income equality among households.

In Vietnam, as in other developing countries, tax revenue is mainly derived from enterprise profits and employee income. In contrast to developed countries, property is not a major source of tax revenue, and taxes are not collected in areas that directly affect the manufacturing sector. This difference means that tax increases in the long run have no positive effect on the economy in developing countries like Vietnam. Without expanding the tax base, taxes applied to new areas, such as emissions and poor and outdated digital technology, have limited tax revenue potential in developing countries. The high tax rate on corporate profits and employee income has greatly affected domestic enterprises and inhibited worker motivation. Meanwhile, tax policies remain limited, so transfer pricing by multinational corporations does not tend to decline. Therefore, while government tax increases may support public spending in the short term, they will make already high corporate and personal income tax rates even higher and negatively impact the economy.

5. Conclusion

A particularly interesting relationship considered in the study is the correlation between the degree of fiscal burden in taxes and the rate of economic development. Countries with high fiscal levels produce lower economic growth rates. Furthermore, countries are not characterized by a negative relationship between changes to fiscal policy and annual GDP growth rates. It is obviously clear that the fiscal level negatively affects economic dynamics and growth rates in the long run. Vietnamese tax revenues still mainly rely on several tax instruments such as VAT, profit tax, and commercial tax, where income tax contributes only a modest part, about 6% of total budget revenue. Taxes and expenditures policies in Vietnam negatively impact growth and equality in the

redistribution of income. Tax system reform has become essential to generate additional revenue and stabilize the macro-economy, improve social welfare, and promote income equality among households. The dual target of the Vietnamese government is developing a tax system matching international law while achieving budgetary objectives. The government needs to build and complete the tax system to decline the tax burden for businesses entities to achieve their goals.

Increasing the tax collection rate will negatively affect the economic growth of developing countries like Vietnam. Most developing countries have tax revenues mainly from corporate taxes instead of property taxes like developed countries. In terms of theory as well as empirical research, corporate tax rates are negatively correlated with GDP. In the ranking of taxes most harmful to economic growth, the corporate tax is the tax that has the most harmful impact on economic growth (Baiardi et al., 2019).

In fact, one of the decisive factors for the success of tax systems in supporting economic development in other emerging countries, such as Thailand and Malaysia, is an effective tax system that actively supports budget spending by the country and the government. Those governments implement anti-fraud and tax evasion policies to increase tax revenue. They also limit the forms of tax increases by increasing tax rates on items that cause large price fluctuations in the economy (Sujjapongse, 2005). Therefore, Vietnam's tax policy needs to simplify tax collection in order to minimize taxpayer compliance costs and government administrative costs. The government needs to take measures to limit transfer pricing and tax evasion by entities participating in economic activities. It is necessary to consider reducing the tax burden on the manufacturing sector to reduce the negative impact of taxes on economic growth. Vietnam is aiming to build a simpler, more transparent,

and growth-friendly tax system. The simplified tax policy will actively support tax collection activities.

The analysis shows that the policies to increase tax revenue applied by Vietnam have a negative impact on the growth rate. Fiscal policies through government tax collection can affect per capita income during the transition to a new level of equilibrium growth. Higher tax rates reduce the economy's output level. Tax administrations in Vietnam often face a lack of resources and a large informal economy that limits their ability to enforce a broad tax base. The effectiveness of tax policy is emphasized to minimize tax calculation for production and business goods and international payment activities. Tax policy can lead to fluctuations in market prices and impede international trade. Therefore, rebalancing tax policies to avoid putting excessive burden on some specific industries, especially those largely contributing to the economic growth, is essential and requires further thoughts. On the other hand, tax policy also needs to learn from the experience of developed countries in tax collection for underground economic activities, which are a prominent concern in Vietnam.

Vietnam is an emerging market, although economic conditions are still limited. However, economic growth remains steady, and it is one of the countries with economic development prospects in Southeast Asia. Vietnam and other developing countries in Southeast Asia have their main source of tax revenue from profits from production, business activities of enterprises, and the income of workers. Therefore, if the government continues to increase taxes on the production sector, it will have a negative impact on the economy. Therefore, developing economies like Vietnam need to avoid increasing rates but should expand other taxes that do not directly affect the production sector, such as environmental taxes and digital technology taxes.

Thus, in terms of policy implications for Vietnam, balancing taxation and government intervention is crucial to creating incentives for all economic sectors to develop. A vital issue in limiting the harmful effects of tax policy on economic growth is to adjust the tax structure appropriately. Tax reform makes the tax system aligned with international and regional regulations to mitigate the tax burden on businesses and, at the same time, to achieve the government budget goals. However, the government should adopt supportive measures to offset the adverse impacts on some main sectors of the total economy and avoid undesirable deviations in income (welfare distribution). The objectives of the tax system are to be fair, efficient, and suitable for the market economy, simple and transparent, to promote exports and competitiveness, to encourage investment, especially in technological advancement, and to create jobs and promote growth. Vietnam is dealing with a series of challenges in terms of taxes and commitments in regional and international conventions, as negotiated under trade agreements in recent years. Such problems pressure the government to redesign the tax and tariff systems. Thus, in terms of policy implications for Vietnam, it is imperative to modify tax policies in a way that contributes to their budget and creates motivation for all economic sectors to develop.

Our research focuses on the disproportionate impact of taxes on economic growth. The time series model used in this study is limited by the number of variables it can include, preventing a comprehensive inclusion of all relevant variables. Additionally, the impact of taxes varies across different sectors of the economy, but we faced limitations in collecting data on various taxes. This issue is prevalent in some countries like Vietnam, where data synchronization is lacking. Therefore, we aim for our future studies to explore the specific impacts of individual taxes on Vietnam's economic growth.

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