RESEARCH ARTICLE

The Impact of Personal Income Tax on Economic Growth: The Case of China and Thailand

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Abstract: This paper aims to study the impact of personal income tax (PIT) on economic growth in China and Thailand using the Chinese and Thai data, which were collected between 1999 and 2018, after the economic crisis of Thailand in 1997. The ordinary least squares (OLS) method was used to analyze the annual data for evaluating the impact of PIT on economic growth in the long run. The study revealed that in China, there is a significantly positive relationship between PIT and economic growth over the study period. On the other hand, Thailand's PIT has a significantly negative relationship with economic growth. Corporate income taxes (CIT) in both China and Thailand have a negative impact on economic growth. Thailand's value-added tax (VAT) has a negative relationship with economic growth, whereas VAT in China does not have a significant impact on economic growth. This study, therefore, recommends that the fiscal revenue policy used to stimulate economic growth should consider lowering CIT rather than PIT and VAT.

Keywords: taxation, personal income tax, value-added tax, corporate income tax, economic growth.

摘要

本文收集1997年泰国经济危机后，1999年至2018年间中泰两国的数据，旨在探讨个人所得税 (PIT) 对中泰两国经济增长的影响。本研究采用最小二乘法（OLS）分析年度数据，以评价个人所得税对经济增长的长期影响。研究发现，中国的个人所得税与经济增长之间存在显著的正相关关系，而泰国的个人所得税与经济增长有显著的负相关关系。中国和泰国的企业所得税 (CIT) 都对经济增长有负面影响。泰国的增值税 (VAT) 与经济增长呈负相关，而中国的增值税对经济增长的影响不显著。因此，本研究建议，刺激经济增长的财政收入政策应考虑降低企业所得税，而不是个人所得税和增值税。

关键词：税收，个人所得税，增值税，企业所得税，经济增长。

Economic growth refers to the expansion of the economic size, which is the size of GDP or the total income of the whole country or the total value of goods and services produced in each country each year. Accordingly, sustainable growth means that GDP per capita continues to grow. A country can become wealthy only if its economic growth continues for a long period of time to cause changes in socio-economic conditions (Samgoseth, 2018).

Asian countries need funds or large budgets to spend on development projects in their countries, such as procurement of public goods or services, national defense, education, social welfare, and so forth. Those large government budgets are derived from taxation and non-taxable income, and tax is the main source of income for the government. Taxation is an important tool in fiscal policy that is conducive to the economic growth of a country. Yet it may have a negative effect on the dynamics and economic growth rate of the country in the long-term; the 1% increase in fiscal level may lead to a 0.14% decrease in per capita economic growth (Chigbu et al., 2012; Wolowiec et al., 2014). Therefore, taxation, that is, government revenue and tax spending in the form of a government budget, inevitably affects economic growth. The key economic growth indicator is the gross domestic product (GDP) growth rate. GDP is used as a parameter for measuring domestic economic growth (Okoli et al., 2014).

Personal income tax (PIT) occupies an important position in a country to raise fiscal revenue. This is the case for both China and Thailand. In 2018, the data from the Revenue Policy Division, Fiscal Policy Office and Ministry of Finance of Thailand, and the State Taxation Administration of the People's Republic of China respectively reported the ratio of PIT to fiscal revenue ratio of 11% (in Thailand) and 7.6% (in China). In addition, the PIT to GDP ratio was 1.99% in Thailand and 1.54 % in China (State Taxation Administration People's Republic of China, 2018; Revenue Policy Division, 2019).

In the past five years, the Chinese government has not stimulated economic growth through PIT. China's PIT was last reformed in 2019. As regards Thailand, its government has started to apply some PIT measures to stimulate the economy in the short-term from 2015 until now (2020); for example, the economic stimulus measures at the end of 2016 (Shopping to Help Nation scheme) were implemented from December 14 to December 31, 2016. These measures were put in place with the principle that people would use the expenditures from the purchase of goods or services specified by the government at a specified time to deduct personal income tax and not exceed the amount specified by the state (Revenue Department, 2016). This Shopping to Help Nation scheme is likely to be implemented more often in the future. From the beginning, those short-term measures were implemented once at the end of the year. Later, there was an increase in the length of time. In 2019, there were many actions taken in one year, including the so-called "SHOPPING TO HELP NATION."

Comparing the GDP growth rate from 2015 to 2018, it is worth noting that China's GDP growth rate trends showed a small decrease, from 6.905 in 2015 to 6.566 in 2018. However, the GDP growth rate of Thailand increased slightly, from 3.134 in 2015 to 4.129 in 2018. Knowledge of the impact of taxes, especially PIT, can help policymakers to design the proper tax policies for the country to enhance economic growth and economic development (The World Bank, 2020).

Tax and Economic Growth

We know that government budgets are the results of revenues coming from taxation and non-taxable income, and tax is the main source of income for the government. Taxes play both a repressing and a promoting role in an economy; thus, governments of different countries try to boost economic growth by using foreign investments and by lowering corporate tax rates (CIT) such as among European Union countries since 2000 and, in addition, governments use lower PITs to satisfy their voters (Kalendienė & Pukelienė, 2011).

Government tax revenues are a combination of direct taxes and indirect taxes. Direct taxes mean a type of tax that is paid by a person or enterprises directly to the government; this includes income taxes (mainly PIT and CIT), property taxes, profit tax, capital gain tax, pay-as-you-earn (PAYE), and so forth. Indirect taxes are the ones paid by a person to the producers, sellers, or service providers, who are liable to pay the same to the account of the government, and they include consumption tax (mainly VAT), trade tax, custom duty, excise duty, and so forth. Oil tax and non-oil tax revenue are also often heard of in the main oil tax revenue countries such as Nigeria.

Ever since, the main tax revenues and tax structures in several countries are different. In studying the

relationship between GDP and taxes, researchers in each country choose different tax types depending on the tax that is used as the main income of that country; for instance, this is the base of reference when studying the relationship of GDP with oil tax or non-oil tax in the main oil-tax revenue countries such as Nigeria (Ojong et al., 2016; Chigbu et al., 2012; Raifu & Raheem, 2018; Umoru & Anyiwe, 2013; Ameyaw et al., 2015; Babatunde et al., 2017; Onakoya & Afintinni, 2016). Government revenue inevitably affects economic growth, and in that context, the oil tax has more impact than other taxes. The countries with the main revenue from trades, on the other hand, study the relationship of GDP with direct taxes and indirect taxes or study the relationship of GDP with a subtype of taxes such as total taxes, PIT, CIT, or VAT (Raifu & Raheem, 2018; Apere & Durojaiye, 2016; Etale & Bingilar, 2016).

Overall Tax and Economic Growth

Several empirical studies have been conducted on the relationship between taxes and economic growth. Most of the studies have found a significantly negative impact of the overall taxes on economic growth, but such results have not been found in some papers. Taxes play an important role in assuring the activities of the countries by financing the production of public goods and income redistribution; thus, taxes have a significant impact on the economic growth in different ways of various tax populations and tax subpopulations. Accordingly, taxation and economic development have a significant relationship (Gurnak, 2014; Harelimana, 2018). Khumbuzile and Khobai (2018) reported that the impact of taxes (tax on income, profits, and capital gains) on economic growth is negative and significant in the short and long-run in South Africa. Ahmad et al. (2016) also stated that total tax revenues have a significantly negative effect on economic growth in the long run; due to a 1% increase in total taxes, economic growth would decrease by -1.25%. A study on taxes and economic growth in Brazil by Sachsida and Mendonca (2016) showed a negative and statistically significant impact of the overall tax burden on per capita GDP as a 1% increase in the overall tax burden decreases GDP per capita by 0.3% because increasing overall tax burden leads to decrease of labor force participation rate, private investment, and total productivity. In addition, the total tax rate (total annual tax to GDP) also has a negative effect on real GDP per capita; thus, adverse impacts on the overall economic growth are detected in the long run (Azeem et al., 2013). However, a review of 26 empirical studies made by McBride (2012) revealed that 23 studies showed a negative effect of taxes on economic growth, and three studies did not support the claim that tax increases were harmful to economic growth.

However, some researches indicate that the overall impact of taxes on economic growth is very small and not statistically significant. For example, a study of taxes and economic growth in OECD countries published by Alinaghi and Reed (2016) showed a statistically insignificant and negligibly small effect of taxes on economic growth, whereas the use of manipulative tax revenue in non-productive activities has a significantly negative effect on economic growth. This is the case seen in the report made by Onakoya and Afintinni (2016) that the tax components of PIT, CIT, customs, and excise duties do not significantly affect the Nigerian economic growth.

Some studies that aim to highlight the impact of taxation on economic growth have taken into account some tax cuts. Yi and Suyono (2014) studied the relationship between tax revenue and economic growth of Hebei province in China, which showed a more positive impact of tax cuts on growth in the short-term, as tax cuts create work incentives, savings, and investment. On the other hand, a paper outlining the case of the United States published by Gale and Samwick (2014) showed that tax cuts as a stand-alone policy raise the federal budget deficit, leading to the reduction of national savings and an increase in interest rates. This eventually has a negative effect on investment and economic growth. To reduce the effect of the rate cuts on budget deficits, the government should broaden the base in a revenue-neutral manner. Therefore, in a short period of time, it is very difficult to show the relationship between tax cuts and GDP growth rates (Wolowiec et al., 2014).

Direct Tax and Indirect Tax on Economic Growth

A study in Pakistan by Ahmad et al. (2016) reported that a negative impact of the total taxes on economic growth has some relation with indirect taxes due to the 63% huge share of indirect taxes in total taxes; such a case implies that the negative impact of indirect taxes is responsible for the effect of total taxes.

The empirical literature on taxation subject depicts different findings on the impact of direct taxes on economic growth. The comparative analysis of

different countries by Stoilova and Patonov (2012) found that tax structure based on direct taxes is more efficient for supporting economic growth in the European Union countries than in others, implying that the revenue from direct taxes has a significant positive effect on the long-term economic growth. Similarly, Umoru and Anyiwe (2013) indicated a statistically significant and positive impact of direct taxable income on the economic growth of the Nigerian economy and suggested that the policy of direct taxation should be a veritable instrument in enhancing the growth rate in the short run. On the other hand, in the case of Jamaica, the exploration of the impact of taxation on economic growth by Scarlett (2011) estimated that increasing direct taxation has an insignificant negative impact on GDP per capita in the long run and the short run; further, this study shows the greatest harm of income tax on GDP per capita over time, and correction to equilibrium from such an impact would take up to nine quarters. When accompanied by spending cuts, the cuts in income tax rates can have positive impacts on growth (Gale & Samwick, 2014). Nevertheless, Jaimovich and Rebelo (2017) indicated a small impact of labor and capital income taxes on long-run growth when tax rates and other disincentives to investment are low or moderate.

Probably the most discussed question within the empirical studies is the relationship between economic growth and CIT. Several studies show that corporate taxation is the most harmful to economic growth (Dackehag & Hansson, 2012; Macek, 2014). As CIT can lower the return on innovations and reduce the amount spent on research and development, it impacts growth negatively (Saidin et al., 2016). Some studies that aim to highlight the impact of CIT on economic growth have taken into account tax rates. Ramot and Ichihashi (2012) studied the effects of tax structure on economic growth using a panel dataset of cross-national data consisting of 65 countries; the result indicates that CIT rates are strongly associated with economic growth in a negative way. The review of empirical studies by McBride (2012) reported that taxes on corporations are particularly harmful to economic growth as a reduction of corporate tax rate of, for example, 10 points would add 1 to 2 points to GDP growth and likely not lose tax revenue. Similarly, Ferede and Dahlby (2012) stated that a 1% point cut in the corporate tax rate is related to a 0.1–0.2% point increase in the annual growth rate. Hynes and O'Connor (2014) also indicated that each 1% change in the corporate tax rate is a decline of between 0.6% and 1.8% on economic growth. The relatively higher tax rate can lower economic growth by discouraging firms from investing their earnings domestically (Khan et al., 2017). Moreover, Veronika and Lenka (2012) studied taxation of corporations and their impact on economic growth in 27 EU countries. The result showed a negative relationship between corporate tax burden and long-term economic growth in 15 old EU members such as France and Germany, and the same for the United Kingdom, its ex-member. However, the results from the 12 new EU member countries, such as Poland and Romania, are not clear. This result is similar to the findings of Ojong et al. (2016), McNabb (2018), and Kalaš et al. (2017a), who saw an insignificant relationship between CIT and economic growth. Otherwise, in a study of U.S. state economies, the effect of business taxes on economic growth is positive and statistically significant; thus, business tax increases could be implemented to spur economic development, but state business tax cuts have little to no positive impact on gross state product (Prillaman & Meier, 2014). Similarly, the study in Nigeria also revealed a significantly positive relationship between CIT and economic growth (Onakoya & Afintinni, 2016). An increase in tax collection, especially from corporate tax, will lead to financial development, which will increase government revenue (Loganathan et al., 2017).

Besides business tax, PIT is also an important income tax. Some empirical studies that consider the relationship between economic growth and PIT have result of no effect between them. For instance, Ferede and Dahlby (2012) examined the impact of the Canadian provincial governments' tax rates on economic growth, and the result indicates that the PIT rate does not affect growth rate and investment once one controls for provincial fixed effects. This result is in accordance with a study data collected from 65 countries by Ramot and Ichihashi (2012). In summary, personal income tax rates have no significant impact on economic growth, implying that there is no relationship between PIT and economic growth. Similarly, a study in Serbia by Kalaš et al. (2017b) revealed that PIT does not have a statistically significant impact on GDP. Explaining this result, Ramot and Ichihashi (2012) gave the account that the majority of the lowest group income does not pay

PIT because of the existence of tax-free threshold, individual allowance or deductions, which is confirmed by Brys et al. (2013) who expressed that most people in China do not earn high income and therefore do not pay PIT, as well as the basic allowance in the PIT, which is set at a relatively high level. Despite this, some empirical studies in OECD countries indicate a negative influence of PIT on economic growth (Dackehag & Hansson, 2012; Macek, 2014). This result goes in line with the findings of McNabb (2018), who found that PIT and social contributions appear most harmful for long-run GDP growth rates. The review of the empirical studies, which were conducted in the United States, OECD, or developed countries, also shows a significantly negative impact on economic growth (McBride, 2012). The given results can imply that a lower PIT rate enhances growth, whereas higher rates slow it down because PIT cuts are more effective in creating jobs and stimulating consumption, at least in the short run (Mertens & Ravn, 2013).

In studying the relationship between indirect taxes and economic growth, Scarlett (2011) stated that increasing the share of revenue on indirect taxes has a significantly positive impact on GDP per capita in the long run due to a 1% increase in indirect taxes, which is expected to increase by 0.2%. Phiri (2016) estimated an optimal tax of 10.27% on the indirect tax-growth ratio. According to him, under the optimal tax rate, indirect taxes are positively related to economic growth, whereas direct taxes are negatively related to growth, and at above the optimal tax rate, taxation has an insignificant relationship with economic growth. Wolowiec et al. (2014) indicated that indirect taxes have a negative effect on economic growth in New Member States of OECD countries; this is the case because indirect taxes most negatively affect the income of poor households by increasing the price level of products. Furthermore, two empirical studies indicate the statistically insignificant and negative effect of indirect tax revenue on GDP growth (Stoilova & Patonov, 2012; Umoru & Anyiwe, 2013). As VAT is the main component of indirect taxes, the studies in Nigeria and Serbia indicated that VAT has a strong positive and significant impact on economic growth as a proxy by GDP (Ofishe, 2015; Kalaš et al., 2017b). Macek (2014) further stated that in case of the VAT approximated by tax quota, the negative impact on economic growth was not confirmed in OECD countries, implying that VAT has no relation with growth.

There are several studies that aim to emphasize the change of tax structure or the shifting of a tax type toward another one. For instance, Keho (2013) conducted a study in Côte d'Ivoire, and reported that the increases of the share of direct tax with total tax revenue are strongly related to the decreases in economic growth; thus, switching the tax burden from direct to indirect taxes is likely to have a positive effect on growth. This implies that a switch from direct to indirect taxes is a potent way of enhancing economic growth. Likewise, Macek (2014) suggested that the loss of income tax revenues from lower corporate taxes and personal income taxes should be compensated by the growth of indirect tax revenues. In addition, studying tax structures, economic growth and development, McNabb and LeMay-Boucher (2014) indicated that increases in direct taxes and offsetting by a similar reduction in indirect taxes lead to a fall in GDP growth rates of around -0.13% and revenue-neutral shifts from trade, or consumption taxes towards PIT are most harmful to growth, as a point increase in PIT offset by trade or consumption taxes has a negative effect on GDP growth rates of around 0.4%. Furthermore, McNabb (2018) confirmed that neutral revenue shifting away from consumption and property taxes toward income taxes are harmful for GDP growth rates of upper-middle-income countries, but they have no significant effects in lower-middle-income countries. Because low-income households, unemployed people, and pensioners have a low burden of direct taxes as PIT, changes in the structure of the tax system can influence economic activity (Pestel & Sommer, 2013; Gale & Samwick, 2014). Conversely, a study in Hebei province, China, indicated that reforming indirect tax to the direct tax is conducive to GDP growth (Yi & Suyono, 2014).

Purpose of the Present Study

This paper studies the relationship between personal income tax and economic growth by using econometric methods. If the PIT, CIT, VAT, and total tax revenue are considered as the revenue side of fiscal policy, government consumption expenditure is considered as the expense side of fiscal policy, the money supply (M1) should also be added as the representative of monetary policy to the model.

Method

Data

In this study, the impact of PIT on economic growth in China and Thailand is analyzed using the annual time series data from 1999 to 2018, after the economic crisis of Thailand took place in 1997. The secondary data of the variables used in this study were obtained from different sources. The data of the dependent variable (GDP) and independent variables (taxation, narrow money supply, and government consumption expenditures) of China were acquired from the China Statistical Year Book of 2019. Thailand's GDP data was collected from the Office of the National Economic and Social Development Board. The data on tax revenues of Thailand was gathered from the Revenue Department, Ministry of Finance, and that of the money supply was obtained from the Bank of Thailand.

Model specification

According to tax definition, taxes are non-penal compulsory transfer of resources from the private sector to the public sector levied on all taxable individuals, businesses, and institutions. Taxes have an effect on disposable income of household (consumption) and investment and research and development (R&D) of business sector, in which household consumption (C) and business investment (I) are the main components of GDP expenditure approach, implying that taxes may have an impact on GDP indirectly. In addition, Lee and Gorgon (2005) applied the principle of a production function to specify an econometric model to study the taxation effects on the rate of growth of per capita GDP using cross-country data during 1970–1997. Myles (2007) put taxes into the endogenous growth model because different taxes can have an effect on some variables of economic growth.

This study adopts econometric methods, including the development of the regression model with ordinary least squares (OLS) technique for data analysis to empirically verify whether a significant relationship exists between the dependent variables (GDP) and the explanatory variables that affect economic growth, such as PIT, CIT, VAT, taxes revenue (TT), money supply (M1), and government consumption expenditure (GCE). The linear model for this study was applied based on the empirical studies of Lee and Gorgon (2005) and Dackehag and Hansson (2012). The function relationship between economic growth, taxation, and other control variables can be specified as:

$$GDP = f\ (PIT, CIT, VAT, TT, M1, GCE) \quad (1)$$

The model given above was translated into a specific and linear regression equation as follows:

$$GDP = \beta 0 + \beta 1PITt + \beta 2CITt + \beta 3VAT\,t + \beta 4TTt + \beta 5M1t + \beta 6GCE + ut \quad (2)$$

$$GGDPT = B0 + B1SPITT + B2SCITT + B3SVATT + B4STTT + B5SM1T + B6SGCET + UT \quad (3)$$

where

GGDP = the growth rate of gross domestic product (GDP)

SPIT = the share of personal income tax to GDP

SCIT = the share of corporate income tax to GDP

SVAT = the share of value added tax to GDP

SM1 = the share of money supply to GDP

STT = the share of tax revenue to GDP

GGCE= the share of government consumption expenditure on GDP

u = the error term

$\beta 0$ = the intercept

$\beta 1, \beta 2, \beta 3, \beta 4, \beta 5, \beta 6$ = the slope coefficients

Following the convention in time series analysis, the first step is to determine the stationarity of the series and also to predict the existence of long-run relationship between the dependent variable and the explanatory variables. The augmented Dickey-fuller (ADF) unit root test is applied to ensure that regression outcomes are reliable and non-spurious, indicative of significant statistical parameters being constant over time in line with linear regression assumptions.

In order to confirm the robustness and validity of regression model, some post-estimation tests were conducted. These are the autocorrelation and heteroscedasticity tests. Thus, the Breusch-Godfrey LM test is implemented to detect the autocorrelation, and Breusch-Pagan/Cook-Weisberg test is adopted to

detect heteroscedasticity. Hypothesis tests for the slope coefficients can be written as:

H0: $\beta j = 0$ (j=1, 2, 3, 4, 5, 6)

H1: $\beta j \neq 0$

The task is to test H0: $\beta j = 0$ against the alternative H1: $\beta j \neq 0$ using a sample of data. The null hypothesis will be rejected at a 1%, 5% or 10% significance level if *p*-value is less than 0.01, 0.05 or 0.1. The estimations are carried out with the aid of STATA

Results

Empirical Results for China's Data

The ADF tests were performed at the initially estimated model; none of the seven variables were stationary. At the first difference, only four variables were stationary at a 5% significance level. The second difference were taken, and the rest variables were stationary at a 1% significance level. The final results of augmented Dickey-Fuller test for China's data are shown in Table 1. The variables that were stationary at the first difference are *ΔGGDP, ΔSPIT, ΔSCIT,* and *ΔSM1*, and at the second difference are *ΔSVAT2, ΔSTT2*, and *ΔSGCE2*. In addition, the initially estimated model has been modified to improve the results, as the result model shows:

$$\Delta GGDPt = \beta 0 + \beta 1 \Delta SPITt + \beta 2 \Delta SCITt + \beta 3 \Delta SVAT2t + \beta 4 \Delta STT2t + \beta 5 \Delta SM1t + \beta 6 \Delta SGCE2t + ut \quad (4)$$

The results of the autocorrelation and heteroscedasticity detections for China's data are shown in Table 2. For the Breusch-Godfrey LM test, as $\chi^2 = 0.012$ and the *p*-value is 0.9142, the *p*-value is larger than 0.1. Thus, the null hypothesis is accepted at any significant level in which there is no autocorrelation between the variables. For the Breusch-Pagan/Cook-Weisberg test, as $\chi^2 = 0.74$ and the *p*-value is 0.3895, the *p*-value is larger than 0.1. Thus, the null hypothesis is accepted at any significant level in which there is no heteroscedasticity that relies on the *t* and *F* tests about the slope coefficients.

The results of regression analysis for China's data are shown in Table 2. The results indicate that there are only two tax variables affecting a difference in the growth rate of the gross domestic product, which are a difference in the share of PIT to GDP and a difference in the share of CIT to GDP. The regression coefficient expresses the negative impact of the difference in the share of CIT to GDP (*ΔSCIT*) on a difference in the growth rate of gross domestic product (*ΔGGDP*) at a 5% level. If the difference in the share of CIT to GDP increases by 0.01 point, a difference in the growth rate of GDP will decrease by 0.0195995 point. Although a difference in the share of PIT is estimated to have a positive impact on a difference in the growth rate of GDP, an increase of 0.01 point in a difference in the share of PIT increases a difference in the growth rate of GDP 0.06781271 point.

Table 1

The Results of Augmented Dickey-Fuller Test for China's Data

Variable	DF t-statistic 1st difference	Variable	DF t-statistic 2nd difference
ΔGGDP	-4.462***	–	–
ΔSPIT	-3.451**	–	–
ΔSCIT	-4.179***	–	–
ΔSVAT	-2.55	ΔSVAT2	-3.922***
ΔSTT	-2.813	ΔSTT2	-5.574***
ΔSM1	-42.459***	–	–
ΔSGCE	-2.366	ΔSGexp2	-8.973***

Empirical Results for Thailand's Data

The ADF tests were performed at the initially estimated model; all variables were non-stationary. At the first difference, the results of a unit root test for Thailand's data are shown in Table 3. The results show the stationary of the difference in growth rate of gross domestic product (*ΔGGDP*) as a dependent variable at 1% of the critical value, and all the explanatory variables as the difference in share of PIT to GDP (Δ*SPIT*) at 1% of the critical value, the difference in share of CIT to GDP (Δ*SCIT*) at 1% of critical value, the difference in share of VAT to GDP (Δ*SVAT*) at 1% of critical value, the difference in share of money supply to GDP (Δ*SM1*) at 1% of critical value, the difference in growth rate of tax revenue (Δ*STT*) at 1% of critical value, and the difference in the share of government consumption expenditure to GDP (*ΔSGCE*) at 5% of critical value. Thus, the regression analysis can be carried on.

In the first difference, the results of the Breusch-Godfrey LM test show a correlation between independent variables because ΔSTT_t is omitted, and $\chi^2 = 5.581$ and the *p*-value is 0.0182, which is less than 0.1. Thus, the null hypothesis is rejected at any significant level. The Breusch-Pagan Godfrey test indicates heteroscedasticity because $\chi^2 = 3.97$ and the *p*-value is 0. 0464 which is less than 0.1. Thus, the null hypothesis is rejected at any significant level. To correct the autocorrelation between independent variables, this study transforms the difference of

Table 2

Regression Analysis for China's Data. Dependent Variable is ΔGGDP

Variable	Coefficient	t-statistic	Prob.>
ΔSPIT	6.781271	2.3**	0.042
ΔSCIT	-1.95995	-2.75**	0.019
ΔSVAT2	0.266783	0.43	0.674
ΔSTT2	0.512105	0.79	0.447
ΔSM1	-0.12777	-2.59	0.025
ΔSGCE2	-0.45776	-1.85	0.092
Constant	-0.00309	-0.39	0.704

$n = 18$

$F = 2.68^*$ (Prob.> $F = 0.0744$)

$R^2 = 0.5940$ Adj. $R^2 = 0.3725$

Breusch-Godfrey LM test: $\chi^2 = 0.012$ (Prob.> $\chi^2 = 0.9142$)

Breusch-Pagan/Cook-Weisberg test: $\chi^2 = 0.74$ (Prob.> $\chi^2 = 0.3895$)

Table 3

The Results of Augmented Dickey-Fuller Test for Thailand's Data

Variable	DF t-statistic	Critical value		
		1%	5%	10%
ΔGGDP	-8.368***	-3.75	-3	-2.63
ΔSPIT	-5.046***	-3.75	-3	-2.63
ΔSCIT	-7.209***	-3.75	-3	-2.63
ΔSVAT	-9.181***	-3.75	-3	-2.63
ΔSTT	-5.121***	-3.75	-3	-2.63
ΔSM1	-5.281***	-3.75	-3	-2.63
ΔSGCE	-3.561**	-3.75	-3	-2.63

independent variable (Tax) from *ΔSPIT, ΔSCIT, ΔSVAT*, and *ΔSTT* to $\Delta SPIT_{t-1}$, $\Delta SCIT_{t-1}$, $\Delta SVAT_{t-1}$, and ΔSTT_{t-1} respectively.

The final results of detecting autocorrelation and heteroscedasticity for Thailand's data are shown in Table 4. The result of the Breusch-Godfrey LM test shows no autocorrelation because $\chi^2 = 0.002$ and the *p*-value is 0.9608, which is larger than 0.1. Thus, the null hypothesis is accepted at any significant level. The result of the Breusch-Pagan/Cook-Weisberg test shows no heteroscedasticity because $\chi^2 = 0.69$, the *p*-value is 0.4071, which is larger than 0.1. Thus, the null hypothesis is accepted at any significant level, which relies on the *t* and *F* tests for the slope coefficients. However, ΔSTT_{t-1} is still omitted by STATA regarding the correlation between the independent variables. There is a possible indication of one of these variables being redundant within the model.

The results of regression analysis for Thailand's data are shown in Table 4. The results show that the difference in the growth rate of GDP is affected by a difference in the share of PIT to GDP at a 5% significance level, a difference in the share of CIT to GDP at a 1% significance level, a difference in the share of VAT to GDP at a 10% significance level. A difference in the share of PIT to GDP is estimated to have a negative impact on a difference in the growth rate of GDP. If a difference in the share of PIT increases by 0.01, a difference in the growth rate of GDP will decrease by 0.0647455. A difference in the share of CIT to GDP is estimated to have a negative impact on a difference in the growth rate of GDP. If a difference in the share of CIT to GDP increases by 0.01, a difference in the growth rate of GDP will decrease by 0.0835535. A difference in the share of VAT to GDP is estimated to have a negative impact on a difference in the growth rate of GDP. If a difference in the share of VAT to GDP increases by 0.01, a difference in the growth rate of GDP will decrease by 0. 101154.

Discussion

The study's results reveal that there is a significantly positive relationship between PIT and economic growth in China. This result is in congruence with the finding of Amin et al. (2018) who studied the impact of PIT on economic growth in China and Pakistan, and the result showed the positive impact of PIT on economic growth both in China and Pakistan.

Thailand's PIT has a significantly negative impact on economic growth. This finding has been supported by Dackehag and Hansson (2012), Scarlett (2011), McBride (2012), and Okoli et al. (2014). Furthermore,

Table 4

Regression Analysis for Thailand's Data. Dependent Variable is ΔGGDP.

Variable	Coefficient	t-statistic	Prob.>
$\Delta SPIT_{t-1}$	-6.47455	-2.84**	0.015
$\Delta SCIT_{t-1}$	-8.35535	-3.46***	0.005
$\Delta SVAT_{t-1}$	-10.1154	-3.62***	0.003
ΔSTT_{t-1}	(omitted)	0	0
ΔSM1	0.767804	2.03	0.065
ΔSGCE	-0.77108	-2.6	0.023
Constant	0.000684	0.09	0.931

$n = 18$

$F = 3.55^{**}$ (Prob.> $F = 0.0335$)

$R^2 = 0.5966$ Adj. $R^2 = 0.4286$

Breusch-Godfrey LM test: $\chi^2 = 0.002$ (Prob.> $\chi^2 = 0.9608$)

Breusch-Pagan/Cook-Weisberg test: $\chi^2 = 0.69$ (Prob.> $\chi^2 = 0.4071$)

the research conducted in the OECD countries showed that PIT is the most harmful to economic growth; thus, governments should lower personal income taxes to stimulate economic growth in OECD countries (Macek, 2014). McNabb and LeMay-Boucher (2014) also confirmed this result showing that PIT has a negative and significant effect on economic growth, and it is strongly in middle-income countries. Most people in China and Thailand have individual income under the tax threshold, and tax allowances are the reasons why taxpayers pay less tax or do not pay tax. However, the highest PIT rate in China at 45% is higher than Thailand's PIT rate of 35% - a higher tax on salaries and wages leads to higher tax revenue which will enhance economic growth (Amin et al. 2018). Ramot and Ichihashi (2012) suggested that tax reform should focus on enhancing tax enforcement and broadening the tax base by minimizing tax incentives, exemptions and allowances to reduce the administrative costs of taxation and increase tax revenue.

Corporate income tax has a negative and significant impact on economic growth both in China and Thailand. This is found in accordance with most studies, such as those of Ojong et al. (2016) and Veronika and Lenka (2012). In addition, the research in Ireland also showed that CIT generally has negative effects on economic growth and that the reduction of the CIT in Ireland increased the economic activity in the post-1990s (Hynes & O'Connor, 2014). However, Kalendienė and Pukelienė (2011) indicated that the risk of too low corporate income and profit tax rates is harmful to total income in the public budget, which might cause serious imbalances in the economy.

The value-added tax of China only has an insignificant relationship with economic growth. This result is in congruence with the finding of the study on the impact of taxation on economic growth in OECD countries by Macek (2014). The result does not confirm the negative impact of VAT on economic growth. Although, the VAT of Thailand has a negative impact on economic growth. This result is consistent with the finding of Simionescu and Albu (2016) who studied the impact of standard VAT on economic growth in CEE-5 countries, and the result showed a slow negative impact of VAT rate on economic growth in Bulgaria, Czech Republic, Poland, and Romania. However, the result of this study does not go in line with the finding of a research in Nigeria, which revealed a lasting and significant positive relationship between VAT and each of the government's total revenue and GDP, a proxy of economic growth (Apere & Durojaiye, 2016). Also, another research in Nigeria specifically revealed that VAT has a significantly positive impact on economic growth (Etale & Bingilar, 2016).

Value-added tax is the tax burden resulting from the fact that everyone pays the same rate for purchasing the same products. This paper shows the different results of the impact of VAT on economic growth in China and Thailand. The VAT of Thailand has a negative impact on economic growth on both short-run and long-term bases, whereas the VAT of China does not have any impact on economic growth.

The Awareness of Consumer Spending Behavior

The World Bank's data showed that the percentages of households' final consumption expenditure on GDP of China and Thailand in 2017 were 38.54 and 48.94, respectively. In addition, the percentages of households' final consumption expenditure on GDP are highest in Thailand, whereas in China, the percentages of gross capital formation are highest. These show that the proportion of household consumption in Thailand is higher than that of China. Thai people tend to like spending more and saving less than Chinese people. VAT revenue of Thailand is high, which clearly has an effect on economic growth.

Adoption of a VAT Reform

The VAT system was implemented in Thailand in 1992 with a 10% actual official single rate. However, the VAT rate was reduced to 7% in 1997 as part of the economic measures because of the economic crisis. Since then, the reduced rate of 7% has been confirmed every year. At the onset of China's Opening Up policy in 1979, VAT was introduced to be the first public revenue pilot in some cities and some business sectors, and it began as an experiment in 1984. It was extended into goods and processing/repairing service sectors in 1994. Because of the global financial crisis in 2009, the China VAT was diverted from being production-oriented to consumption-oriented. In 2012, China started to reform its VAT, phasing in the VAT to replace the business tax it had been administering, with the aim of total replacement by 2016. The VAT rate was reformed in 2017, and the last reform of China's VAT was in 2019. The result of reform has appeared in the long run rather than on a short-term basis.

The Use of Tax Measures to Stimulate Growth

The Thai government has used the PIT measure to stimulate economic growth every year since 2015 as a PIT deduction for purchasing specific products and services at a specific time. This measure may affect growth both in the short-run and long-run. If more goods and services are sold and taxed, the tax revenue base of the country will increase and cause a downward surge in the purchasing power of the household sector of Thailand in the next period of time.

Conclusion

The study's results reveal that there is a positive relationship between PIT and economic growth in China, but the PIT of Thailand has a negative effect on economic growth. CIT has a significantly negative impact on economic growth both in China and Thailand. Although the VAT of Thailand has a negative impact on economic growth, the VAT of China has an insignificant relationship with economic growth.

According to the study results, the governments should adopt some effective fiscal revenue policies along with momentous improvements in tax structure for stabilizing economic growth. Fiscal revenue authorities should consider corporate income taxes rather than personal income taxes and value-added taxes, and it would be important to decrease corporate income taxes, which are compensated by increasing value-added taxes to give a rising trend in the economic growth in China. Directly increasing the VAT rate would disfavor the middle-low-income group; a shift from PIT to VAT would lead to a price increase of products that has a negative impact on household budgets, especially for low-income households. Because low-income people have less direct tax burdens, they almost never receive the benefit from PIT deduction, yet they must bear the tax burden from the consumption tax increase, which may define the overall effects on inequality and progressivity. Thus, the government should carefully consider accreting tax revenue indirectly from VAT by stimulating household consumption as a personal income tax deduction for purchasing goods and services because the impact of both PIT and VAT on economic growth is negative in Thailand.

According to the impact of taxes on economic growth, the government must raise the awareness of the importance of taxes on the development of the country in all sectors of society from kindergarten until high education and educate taxpayers on the basic rules and regulations of tax administration, namely their responsibilities, offenses and penalties. Finally, this study is recorded with the fact that China and Thailand are of unique economic statuses; yet, the impacts of PIT on economic growth may be different from one country to the other. In addition, China is a very vast country; accordingly, the impacts of PIT on economic growth in each area may also be different.

Declaration of Ownership

This report is our original work.

Conflict of Interest

None.

Ethical Clearance

This study was approved by our institution.

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