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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Does there exist an optimal budget balance to improve economic growth? empirical evidence from Asian countries

Oanh Kim Thi Tran^{1*}

Abstract: Using panel data regression of 48 countries during 2000–2019, the research aims to examine the role of budget balance on economic growth in Asia. Also, with the application of Panel Threshold Regression (PTR), the author tests the nonlinear relationship and to identify an optimal budget balance threshold to achieve the most effective economic growth. The study shows that the lower national budget deficit level is remained, the greater economic growth in Asia is driven. Additionally, it is revealed that an effective economic growth is best promoted with budget balance ranging from 22.6935% GDP to 25.1950% GDP. However, only a few of nations in the sample have achieved the optimal threshold of budget balance above during the period of research. Meanwhile, several countries in Asia have been suffering from the budget deficit for many years. Therefore, in order to stabilize the economic development, most of the Asian countries should adjust the national budget revenue and expenditure process to keep the balance properly.

Subjects: Asian Studies; Economics; Finance

Keywords: Budget balance; economic growth; threshold regression; nonlinear relationship; Asian countries

JEL Classification: B23; C24; H61; O47

1. Introduction

Government budget is a material condition used to perform the national functions and tasks. At the same time, it acts as a tool of fiscal policy to regulate the macro-economy of many countries. Various debates on the impact of budget balance on countries' economic growth have been mentioned in previous researches during the development of economic theories. Barro (1989) pioneering in proposing the endogenous growth model indicates that budget expense has a significant impact on economic growth. Since then, a lot of domestic and international authors have found the relation between budget deficit and economic growth, but the empirical results are still controversial.

Stemming from December 2019, the COVID-19 pandemic has negatively affected the entire world-wide economies in general and particularly Asian countries. Ejiogu et al. (2020), Upadhaya et al. (2020), and Vaccaro et al. (2020) study the government's activities to balance budget and to determine economic and social impacts of budget balance in response to COVID-19 pandemic in many countries with an attempt to balance the government budget by increasing debt to finance economic and social interventions incurred during the pandemic in many countries. Worldwide

countries have rapidly implemented epidemic prevention measures: increasing spending on health care activities, environmental sanitation, disinfection, masks and hand sanitizers production to well serve the current people's needs and epidemic control activities, and greater expense on social security to ensure people's lives during the pandemic. Due to the COVID-19 pandemic, dramatical restraints on production activities have been imposed, resulting in an increase in government budget deficit. According to the data of Asian Development Bank (2021), budget imbalance occurs when a government spends more than revenues in developing Asian countries due to impact of coronavirus disease. Specifically, some countries in Central and West Asia present government finance with negative fiscal balance in 2020 such as Afghanistan (−2.5% of GDP), Armenia (−5.4% of GDP), Azerbaijan (−2.4% of GDP), Georgia (−9.3% of GDP), Kazakhstan (−4% of GDP), Pakistan (−9.1% of GDP). It is implied that ineffective distribution of government budget has an impact on the country's resources for economic development. Therefore, it is such an urgent task to study the role of budget balance on economic growth in the context of COVID-19 pandemic to ensure the country's economic growth contributing to a stable macroeconomy, especially in Asian nations.

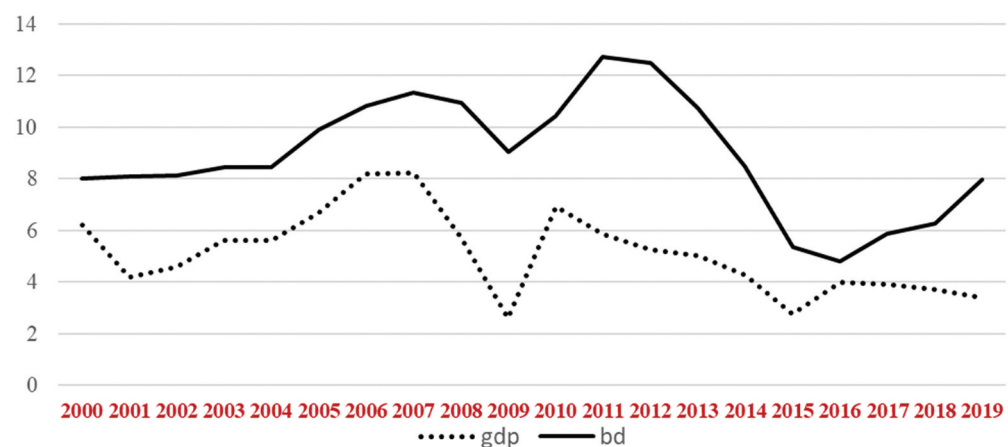
According to Figure 1, it can be seen that the fluctuations of the budget balance and economic growth are in the same direction. However, the level of budget balance increases gradually while there is an opposite tendency in GDP growth rate from the year of 2016 to 2019. Moreover, there exist some Asian countries having positive average real GDP growth rate with long-term deficit budget from 2000 to 2019 such as: Vietnam (−2.64% GDP), Turkmenistan (−6.94% GDP), Myanmar (−0.55% GDP), Japan (−7.70% GDP), China (−4.05% GDP), United Arab Emirates (−6.74% GDP). Therefore, an impact of budget balance on economic growth in Asia needs to be studied as well as whether the government should remain a suitable level of national budget balance to improve the economy. In general, the main objective of this paper is to study the impact of budget balance on economic growth in Asian countries and determine the budget balance threshold towards sustainable economic growth in Asia.

2. Theoretical basis and overview of previous studies

2.1. Definition of budget balance

Balanced budget is a concept derived from the budget management process to regulate a country's economy. Originated from the meaning of a country's "purse" or "wallet" (Adams, 1998) that related to the government's financial affairs, "Government budget" reflects cash inflows and outflows of a country over a specific period, usually a financial year (Smith & Lynch, 2004). For this reason, budget figures are always associated with socio-economic goals and continuously fluctuated at different times, representing a country's financial resources. According to Morgan (1997), budget plays an important role in the economy because it allows managers to have a thorough grasp of the financial situation to implement solutions in accordance with changes of the macro environment. Gupta (2007) believed that government budget

Figure 1. Trend of budget balancing and GDP growth rate in Asia countries.



always exists in three financial states of surplus, deficit or balance. The negative difference in total revenue minus total expenditure is called budget deficit while the positive one is called budget surplus. A budget deficit arises when government spending exceeds revenues. In contrast, a budget surplus occurs when revenues exceed government expenditures. Budget balance is the state that shows total revenues equals total expenditures. Therefore, the term “budget balance” is referred to the Government’s budget management process which aims to balance a country’s revenue and expenditure. In case of budget deficit, the exceeding spending should be less than the expenditure on development investment. When the budget is in surplus, revenue can be used to pay the principal and interest of Government to reach revenue-expenditure equilibrium.

In summary, the definition of budget balance reflects the correlation between budget income and expenditure in a fiscal year, measured by the difference between total Government budget’s revenue and expense. In this research, the budget balance means the difference between government revenues and expenditures which presents the outcome of budget management of a country.

2.2. *The nexus of budget balance—economic growth*

Previously, many economic scholars have mentioned the relation between budget regulation and economic growth. Typically, it is supposed by Keynesian economic theory that Government expenditure will stimulate economic growth. Thus, budget deficit has a positive effect on growth rate through an increase in domestic production and private investment (Frank & Bernanke, 2001). On the contrary, the Neoclassical theory argues that budget deficit has a negative impact on the economy as an increase in consumption certainly means a decrease in savings. Afterward, interest rates will be raised to equalize capital markets. Undoubtedly, a prolonged deficit outweighs private capital accumulation results in adverse effects on the economy (Bernheim, 1989). On the other hands, with a belief that present budget deficit will be offset by an increase in future tax revenue, Ricardian learns that the budget deficit does not affect any macroeconomic variables or any individual’s interest in the economy (Williamson, 2005). Though the impact of budget balance on economic growth has been a concern and developed in economic theories, controversial arguments remain depending on different theoretical points of view.

According to relating empirical studies, some authors affirm that the nexus between budget balance on economic growth is positive. Collecting data of 39 low-income countries during 1990–2000, Gupta et al. (2005) pointed out that budget deficit due to expenditure on salary dramatically reduces a country’s economic growth. A negative impact of budget deficit on economic growth is the finding of Fatima et al. (2012) in Pakistan during 1978–2009. Similarly, a negative correlation between budget deficit and economic growth in MENA countries in the period of 2000–2013 is pointed out by Arjomand et al. (2016). Considering the influence of budget deficit on economic growth in 20 Asian countries, Amgain and Dhakal (2017) concluded that fiscal deficit adversely affects growth in both short and long run. Besides, long-term debt accumulation due to budget deficit is also negatively related to growth.

On the contrary, some studies indicate that budget deficit might improve economic growth of a country. That means there is a negative impact of budget balance on economic growth in the results of previous researches. Using OLS regression method to study the effects of budget deficit and interest rate on economic growth of countries in Eastern territories of Africa in the period of 2004–2013, Magehema (2015) showed that budget deficit has a positive impact on economic growth. Upon the impact of budget deficit on economic stability in Nigeria during 1970–2013, Eze and Ogiji (2016) indicated positive and significant implications of budget deficit on economic stability. Conducting a study on the link between fiscal deficit and economic growth in Malaysia in the period of 1980–2017, Bhari et al. (2020) indicated a positive impact of budget deficit on promoting economic growth, in line with Keynes’s theoretical view.

However, the nonlinear relationship as well as the result of no relation between budget management and economic growth are indicated in some studies. Additionally, Adam and Bevan (2005) examined the relation between fiscal deficit and economic growth of 45 developing countries in 1970–1999 period. By using panel data regression method with the fixed effects model, the authors built a model using a variable of budget deficit threshold affecting economic growth. This study revealed an evidence of the threshold effects on economic growth at deficit level of approximately 1.5% of GDP. For OECD countries, Minea and Villieu (2008) conducted a study to determine whether fiscal deficit has a nonlinear effect on growth dependent on the ratio of public debt to GDP. The study indicates that an increase in budget deficit in economies with low debt and a reduction in growth in high-debt countries. Nevertheless, using quarterly data from 2000 to 2011, Abd Rahman (2012) found no long-term relation between the budget deficit and economic growth in Malaysia.

Applying a combination of research methods of OLS and Spline regression in the Vector Error Correction Model (VECM) on quarterly data from 2000 to 2012, Akosah (2013) aimed to determine the budget deficit threshold effect on economic growth in Ghana and learns that short-term budget deficit promotes economic growth, but exceeding deficit over the threshold of 4% of GDP is harmful to economic growth. With Threshold Auto Regression (TAR) model on time series data, Onwioduokit and Bassey (2014) conducted a study to determine the threshold of fiscal deficit affecting economic growth in Gambia during 1980–2009 and point out a positive and significant effect of fiscal deficit on real economic growth with one year latency. Slimani (2016) studied the relation between fiscal policy and economic growth of 40 developing countries during 1990–2012 with a focus on comparative analysis between Morocco and other developing countries. The research showed a negative effect on economic growth when budget deficit exceeds 4.8% of GDP or fiscal surplus reaches 3.2% of GDP. Using Error Correction Model (ECM) on quarterly data during 2003–2016, Tung (2018) pointed out a strong relation—a negative impact of fiscal deficit on economic growth in Vietnam in both short and long run.

In general, the author's statistics show inconsistent results of previous studies on the relation between budget balance and economic growth. By different research methodologies, some figure out a positive impact of budget deficit on economic growth economic while the others conclude the opposite influence; no relation between the above factors or a nonlinear relationship between budget balance and economic growth also exists. Moreover, common techniques of Pooled, FEM, REM and GMM for panel data and VECM, ARDL for time series data are applied in numerous studies on the impact of budget balance on economic growth in Asian and worldwide developing countries. Threshold Regression model is also used to test the nonlinear relation between budget balance and economic growth of countries.

In conclusion, in the context of many countries in Asia are affected by Covid-19 epidemic, it is deniable that researching the nexus of budget balance—economic growth—is necessary to affirm the threshold of budget balance in order to improve the development of Asian economy.

3. Research methodology

Considering scientific gaps in previous researches, the author uses the regression method with static panel data to examine the effect of budget balance on economic growth of Asian countries from 2000 to 2019. Next, the nonlinear relationship between budget balance and economic growth is tested through the static Panel Threshold Regression (PTR) model proposed by Hansen (1999). Thereby, the researcher evaluates the role of budget balance in economic growth in Asian countries.

According to classical theoretical models, the capital and labor source are primary factors affecting economic growth. Besides, based on Neoclassical theory and inherited from previous studies of Onwioduokit and Bassey (2014); Slimani (2016); Salma et al. (2016); Tung (2018); Bhari et al. (2020), the paper builds a research model of the impact of budget balance on economic growth as follows:

$$\text{gdp}_{it} = \beta_0 + \beta_1 \text{ge}_{it} + \beta_2 \text{ns}_{it} + \beta_3 \text{inv}_{it} + \beta_4 \text{inf}_{it} + \beta_5 \text{bd}_{it} + \beta_6 \text{labo}_{it} + \beta_7 \text{open}_{it} + \beta_8 \text{exch}_{it} + \beta_9 \text{rate}_{it} + \beta_{10} \text{m2}_{it} + \mu_i + e_{it} \quad (1)$$

In which, $i = 1, 2, \dots, n$; $t = 1, 2, \dots, t$ (i is the country and t is observation time in the model) is a country's fixed effect and errors are similarly and independently distributed $\approx$ i.i.d (0, $6e2$).

The dependent variable: Economic growth (gdp);

The explanatory variables include Government expenditure (ge); national savings (ns); total investment capital (inv); inflation (inf); budget balance (bd); labor (labo); trade openness; exchange rate (exch); interest rate (rate); money supply (m2).

Similar to Onwioduokit and Bassey (2014); Slimani (2016); Salma et al. (2016) with the application of Hansen's (1999) threshold regression theory, the author uses the threshold regression model to test whether there is a nonlinear relationship between budget balance and economic development in Asian countries.

Table 1. Variables in the research model (1) and (2)

Variable	Abb.	Measurement	Period	Source	Previous studies
Dependent variable					
Economic growth	gdp	Real GDP increase rate: $(\text{gdp}(t) - \text{gdp}(t-1)) / \text{gdp}(t-1)$		Database of World Bank, IMF, IRS	Onwioduokit and Bassey (2014); Slimani (2016); Salma et al. (2016); Tung (2018); Bhari et al. (2020)
Explanatory variable					
Government expenditure	ge	Current Government expenditure rate/GDP	-		
National savings	ns	National savings rate/ GDP	+		
Total investment	inv	Ratio of total investment/GDP	+		
Inflation	inf	$(\text{cpi}(t) - \text{cpi}(t-1)) / \text{cpi}(t-1)$	-		
Budget balance	bd	Overall budget balance ratio/ GDP	$\pm$		
Labor	labo	Labor rate/ population	+		
Trade openness	open	$(\text{Exports} + \text{Imports}) / \text{gdp}$	+		
Exchange rate	exch	Multilateral real exchange rate (REER) (2010 =100)	-/+		
Interest rate	rate	Interest rate	-		
Money supply	m2	Money supply ratio/GDP	+		
Threshold variable					
Budget balance	bd	Overall budget balance ratio / GDP	$\pm$		

Source: Summarized by the author

The regression model of the threshold impact of the budget on economic growth is demonstrated as follows:

$$gdp_{it} = \beta_0 + \beta_1 bd_{it} I(bd_{it} \leq \gamma) + \beta_2 bd_{it} I(bd_{it} > \gamma) + \beta_x X_{it} + e_{it} \quad (2)$$

Where: $i = 1, 2, \dots, n$; $t = 1, 2, \dots, t$ (i is the country and t is the observation time in the model)

The dependent variable is economic growth (gdp_{it});

The threshold variable is the independent variable of budget balance (bd_{it}); γ is the estimated value of threshold; control variables (X_{it}): government expenditure (ge); national savings (ns); total investment capital (inv); inflation (inf); labor ($labo$); trade openness; exchange rate ($exch$); interest rate ($rate$); money supply ($m2$). All the variables and measurements of them are indicated in Table 1.

The paper uses balanced panel data of 48 Asian countries collected from World Bank's and the IMF's during 2000–2019 with a total of $48 \times 20 = 960$ observations in which the means of the applicable variables and economic growth's max and min values are all presented to show the validity of the collected data.

According to Table 2, the maximum level of real GDP is 34.46621% but the minimum GDP growth rate is -33.1008 (%) in the sample. However, the average level of GDP growth rate of 48 nations in Asia during 20 years from 2000 to 2019 is about 5.14%. About fiscal management, Asian nations remain the level of budget balance is about 8.92% GDP in average. Nevertheless, the level of budget balance is -11.6767% GDP in minimum and the maximum level is 256.3858% GDP.

4. Research results

4.1. Unit root test and cointegration test

Before examining the impact of budget balance on economic growth in the research model, the author checks the stationary of variables through the Im—Pesaran—Shin unit root test. The testing results are shown in Table 3:

The results from Table 3 showed that all variables are stationary as a result of p-value smaller than 0.1. Therefore, all variables in research model have been continued to examine the impact of budget balance on economic growth in Asia.

4.2. The effect of budget balance on economic growth of countries in Asia

Firstly, the paper uses regression model techniques (1) on panel data of 48 Asian countries in the period of 2000–2019 (960 observations) with 3 estimation methods of Pooled-OLS, Fixed Effects Model (FEM) and Random Effects Model (REM). Additionally, the author has performed the multicollinearity test in the model. No serious multicollinearity in the model is concluded due to relatively small value of VIF with the average VIF at 1.97 (<10 ; Table 4). Following that, a relatively small p-value resulted from the F-test draws to conclusion that FEM is a better option, compared to Pooled-OLS. As p-value is less than 1% in the Breush–Pagan test, REM seems to be more appropriate than the model of Pooled-OLS. With the p-value less than 1% significance level from the Hausman test, Fixed Effects Model is the best decision despite the existence of variable variance and autocorrelation from the disability test.

Undoubtedly, the article has prioritized using the FEM and FGLS estimation method for the improvement of estimation efficiency (Gujarati & Porter, 2009). Regression model and testing results (1) are summarized in Table 4 as follows:

Table 2. Descriptive statistics of variables in the model

Variable	Observation	Average	Std. Dev.	Min	Max
gdp	960	5.143572	5.001177	-33.1008	34.46621
ge	960	15.37419	12.62258	3.460336	147.7333
ns	960	31.00628	27.13275	-16.359	372.9881
inv	960	27.01378	9.146997	9.077629	69.52741
inf	960	5.335678	6.859288	-10.0675	57.07451
bd	960	8.924415	21.98086	-11.6767	256.3858
labo	960	61.96513	11.46615	36.828	87.898
open	960	98.01235	67.1637	0.167418	442.62
exch	960	96.38023	18.13781	22.2904	296.331
rate	960	11.5211	6.627365	0.994	56.47303
m2	960	72.78627	61.2689	7.865443	400.4068

Source: The author's calculations

Table 3. The unit root test result

Variables	Statistic	p-value
gdp	-9.4251	0.0000
ge	-1.7767	0.0378
ns	-3.2640	0.0005
inv	-1.5905	0.0559
inf	-9.0445	0.0000
bd	-2.4532	0.0071
labo	-9.4251	0.0000
open	-1.8297	0.0336
exch	-9.0445	0.0000
rate	-1.7441	0.0406
m2	-1.9543	0.0253

Source: The author's calculations

As shown in Table 4, budget balance (bd) has a positive effect on economic growth (gdp) in Asian countries, meaning that economic growth in Asian countries will be boosted as national budget balance decreases the level of deficits, gradually moves to equilibrium or remains a higher level of surplus. That is consistent with the neoclassical theory and previous experimental studies of Onwioduokit and Bassey (2014); Slimani (2016); Salma et al. (2016); Tung (2018); Bhari et al. (2020). In addition, economic growth is also affected by government expenditure (ge); labor (labo); inflation (inf) and money supply (m2).

4.3. Estimated budget balance threshold

By estimating the threshold regression model of Hansen (1999) with the bootstrap loop method, the author tests the existence of single and double thresholds and concludes that the double threshold effect exists because the result of p-value at 0.0533 is less than the significance level of 10%.

The results of the threshold regression model (2) summarized in Table 5 indicate that the threshold value of the budget balance is 22.6935% GDP and 25.1950% GDP with accuracy of 95%. Additionally, budget balance is less than or equals to the range of 22.6935–25.1950% of GDP; the estimated coefficient $\hat{\beta}_1$ is 0.3600114 and statistically significant at 1%, contributing to the

Table 4. Estimated results of regression model (1)

Variable	Pooled-OLS	FEM	REM	FGLS
ge	−0.062 (0.019)***	−0.038 (0.034)	−0.057 (0.024)**	−0.062 (0.019)***
ns	0.020 (0.012)*	0.010 (0.016)	0.020 (0.014)	0.020 (0.012)*
bd	0.073 (0.018)***	0.081 (0.025)***	0.075 (0.022)***	0.073 (0.018)***
inf	−0.031 (0.026)	−0.067 (0.028)**	−0.046 (0.026)*	−0.031 (0.025)
inv	0.004 (0.014)	0.013 (0.021)	0.004 (0.018)	0.004 (0.014)
labo	0.053 (0.015)***	−0.069 (0.067)	0.033 (0.026)	0.053 (0.015)***
open	−0.002 (0.003)	0.022 (0.008)***	0.003 (0.004)	−0.002 (0.003)
exch	0.014 (0.009)	0.018 (0.011)*	0.015 (0.010)	0.014 (0.009)
rate	0.070 (0.029)**	0.017 (0.063)	0.043 (0.043)	0.070 (0.029)**
m2	−0.008 (0.003)**	−0.053 (0.010)***	−0.017 (0.005)***	−0.008 (0.003)**
_cons	−1.017 (1.481)	7.515 (4.548)*	0.532 (2.170)	−1.017 (1.472)
Total observations	960	960	960	960
F-test	Prob>F = 0.0000			
Breusch—Pagan test	Prob>chibar2 = 0.0000			
Hausman test	Prob>chi2 = 0.0121			
VIF mean	1.97			
Heteroskedasticity		Prob>chi2 = 0.0000		
Autocorrelation		Prob>chi2 = 0.0011		

Source: The author's calculations. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level

Table 5. Results of the threshold regression model (2)

Threshold variable	Threshold value/Regression coefficient	p-value
(1) Double threshold effect test		
bd	22.6935–25.1950	0.0533*
(2) Results of estimation coefficient of the threshold regression model		
$\hat{\theta}_0$	0.0304305	0.548
$\hat{\theta}_1$	0.3600114	0.000***
$\hat{\theta}_2$	0.0106747	0.609

Source: The author's calculations. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level

argument that growth rate will increase by approximately 36% when budget balance is improved towards the state of surplus with the rate greater than 22.6935% of GDP, and less than or equal to 25.1950% of GDP. When the budget balance is out of range, either less than or equal to 22.6935% of GDP or greater than 25.1950% of GDP, an increase in efficiency of budget balance management does not contribute to improving the economic growth rate due to the corresponding estimated coefficients $\hat{\beta}_0$ and $\hat{\beta}_2$ are not statistically significant.

To attain reliable empirical results, the article retests the above using dummy variable (exam_1). For observations with budget balance values within the threshold range of 22.6935% GDP—25.1950% GDP, the dummy variable equals 1. For those that are out of the range, the dummy variable exam_1 is 0.

With similar regression techniques applied to model (1), the estimation results in Table 6 indicate differences in economic growth among observations with budget balance value within

Table 6. Results of the threshold test (2)

Variable	Pooled-OLS	FE	RE	FGLS
ge	−0.051 (0.019)***	−0.040 (0.033)	−0.054 (0.024)**	−0.051 (0.019)***
ns	0.024 (0.011)**	0.014 (0.015)	0.024 (0.013)*	0.024 (0.011)**
bd	0.065 (0.018)***	0.059 (0.025)**	0.058 (0.022)***	0.065 (0.018)***
inf	−0.029 (0.025)	−0.067 (0.028)**	−0.046 (0.026)*	−0.029 (0.025)
inv	−0.007 (0.014)	0.012 (0.021)	−0.002 (0.017)	−0.007 (0.014)
labo	0.053 (0.015)***	−0.044 (0.066)	0.037 (0.025)	0.053 (0.015)***
open	−0.002 (0.003)	0.019 (0.008)**	0.002 (0.004)	−0.002 (0.003)
exch	0.014 (0.009)*	0.015 (0.011)	0.013 (0.010)	0.014 (0.009)*
rate	0.072 (0.029)**	0.034 (0.062)	0.054 (0.042)	0.072 (0.029)**
m2	−0.007 (0.003)**	−0.046 (0.010)***	−0.015 (0.005)***	−0.007 (0.003)**
exam_1	8.969 (1.391)***	8.518 (1.457)***	8.969 (1.411)***	8.969 (1.383)***
_cons	−1.176 (1.450)	6.348 (4.471)	0.510 (2.130)	−1.176 (1.441)
Total observations	960	960	960	960
F-test	Prob > F = 0.0000			
Breush-Pagan test	Prob > chibar2 = 0.0000			
Hausman test	Prob>chi2 =0.0597			
VIF mean	1.89			
Heteroscedasticity	Prob>chi2 = 0.0000			
Autocorrelation	Prob > F = 0.0012			

Source: The author's calculations. * indicates significance level at 0.10 level, ** indicates significance level at 0.05 level, *** indicates significance level at 0.01 level

Table 7. Distribution of Asian countries classified by budget balance threshold values

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$bd \leq 22.6935\% \text{ GDP}$	92%	92%	90%	90%	90%	90%	88%	88%	88%	90%
$22.6935\% \text{ GDP} < bd \leq 25.1950\% \text{ GDP}$	0%	0%	2%	4%	4%	2%	2%	4%	2%	2%
$bd > 25.1950\% \text{ GDP}$	8%	8%	8%	6%	6%	8%	10%	8%	10%	8%
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
$bd \leq 22.6935\% \text{ GDP}$	90%	88%	88%	90%	90%	96%	96%	96%	96%	94%
$22.6935\% \text{ GDP} < bd \leq 25.1950\% \text{ GDP}$	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%
$bd > 25.1950\% \text{ GDP}$	10%	10%	13%	10%	10%	4%	4%	4%	4%	6%

Source: Calculated results

the threshold from 22.6935% GDP to 25.1950% GDP. The variable exam_1 with coefficient of 8.969 (FGLS model) has statistical significance at 1%, showing that countries with budget balance values satisfying the threshold range are impacted in a way that economic growth is better driven compared to those with out-of-range budget balance. The above outcome further reinforces the conclusion of the existence of budget balance threshold for economic growth in Asia.

Table 7 shows very low percentage of Asian countries that satisfies the range of budget balance threshold from 22.6935% GDP to 25.1950% GDP during 2000–2019.

As can be seen from Table 7, there are about 90% of Asian nations having budget balance less than 22.6935% GDP. Many countries have long-term budget deficit during a researched period such as: United Arab Emirates, China, Japan, Myanmar, Turkmenistan, Vietnam. On the other hand, there are about 8–10% of Asian countries remaining the high level of surplus in budget management which is more than 25.1950% GDP. However, these figures are not an optimal budget balance to enhance the economic growth rate in Asia. During the mentioned research period, only about 2% to 4% of Asian countries have the threshold budget balance from 22.6935% GDP to 25.1950% GDP which might seem to improve the economy. Specifically, Azerbaijan only had the optimal threshold of budget balance from the year 2002 to 2007 while the figure of Kuwait and Macao were remained from 22.6935% GDP to 25.1950% GDP in 2003–2004 and 2008–2009, respectively. Meanwhile, the level of budget balance of Mongolia and Saudi Arabia in the researched threshold has only happened in one year during the long period from 2000 to 2019.

5. Conclusion and discussion

With the results of panel data regression, the study has proven a positive relation between budget balance and economic growth in Asian countries from 2000 to 2019. The research also strengthens the belief that a reduction of Government budget deficit will help Asian countries to improve economic growth, especially when government budget is vulnerable to deficit due to high expenditure as well as poor revenue during the complicated COVID-19 epidemic.

In addition, the paper also examines the nonlinear relationship between budget balance and economic growth during the research period in Asia. The test results indicate the existence of budget balance threshold related to economic growth. In details, when government budget in

surplus within the range of 22.6935–25.1950% of GDP, its impact drives economic growth to the highest, at 36%. During the research period, poor budget management that fails to support economic growth in Asian countries is another finding of the study. It is critically important for Asian countries to overcome prolonged budget deficit and maintain the country's budget balance within 22.6935–25.1950% of GDP threshold, which contributes to the best driven economic growth.

Besides, some interesting policy implications might be analyzed in order to improve economic development through managing the government budget. First, a prompt reduction of spending in managing administration and improving the performance is highly recommended to save recurrent expenditures and to decrease Government spending rate in some Asian countries having high rate of budget deficit. For examples, instead of spending money on organizing typical gatherings which are restricted in the context of the complicated COVID-19 epidemic, the Government can better make use of these expenses for the pandemic's prevention activities, ensuring that Government budget is balanced. Second, many countries should reform strongly in tax policy, entail a far more robust tax system to reduce the burden of taxes. Therefore, stable and equitable sources of earnings are recommended in the context that the COVID-19 epidemic seriously affects production and business activities of various entities.

Nevertheless, the framework of this study did not base on the modern growth theory, therefore, the variables presenting institutional quality of countries were not mentioned in the research model. In further researches, some factors relating to institutions might be added to the model to examine the effects on economic growth beside other variables of the classical economic theory.

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Appendix

Table 1. List of countries in the sample of study

id	Code	Country	id	Code	Country
1	AFG	Afghanistan	25	LBN	Lebanon
2	ARM	Armenia	26	MAC	Macao SAR, China
3	AZE	Azerbaijan	27	MYS	Malaysia
4	BHR	Bahrain	28	MDV	Maldives
5	BGD	Bangladesh	29	MNG	Mongolia
6	BTN	Bhutan	30	MMR	Myanmar
7	BRN	Brunei Darussalam	31	NPL	Nepal
8	KHM	Cambodia	32	OMN	Oman
9	CHN	China	33	PAK	Pakistan
10	CYP	Cyprus	34	PHL	Philippines
11	GEO	Georgia	35	QAT	Qatar
12	HKG	Hong Kong SAR, China	36	SAU	Saudi Arabia
13	IND	India	37	SGP	Singapore
14	IDN	Indonesia	38	LKA	Sri Lanka
15	IRN	Iran, Islamic Rep.	39	SYR	Syrian Arab Republic
16	IRQ	Iraq	40	TJK	Tajikistan
17	ISR	Israel	41	THA	Thailand
18	JPN	Japan	42	TLS	Timor-Leste
19	JOR	Jordan	43	TUR	Turkey
20	KAZ	Kazakhstan	44	TKM	Turkmenistan
21	KOR	Korea, Rep.	45	ARE	United Arab Emirates
22	KWT	Kuwait	46	UZB	Uzbekistan
23	KGZ	Kyrgyz Republic	47	VNM	Vietnam
24	LAO	Lao PDR	48	YEM	Yemen, Rep.



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