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THE RELATIONSHIP BETWEEN FEDERAL GOVERNMENT REVENUE AND SPENDING: EMPIRICAL EVIDENCE FROM ASEAN-5 COUNTRIES

Zulkefly Abdul Karim
Norain Mod Asri
Azrina Al-Hadi Abdullah
Antoni
Faculty Of Economics And Business
National University Of Malaysia

Zetty Zahureen Mohd. Yusoff
Faculty Of Business Management
Universiti Teknologi Mara (UiTM)

Abstract

The main objectives of this paper is to examine the long run relationship between total expenditure, revenue (tax and nontax) and economic growth in ASEAN-5 countries namely by Malaysia, Indonesia, Thailand, Singapore and Philippines. According to the prior studies, there are several hypotheses to explain the relationship between revenue and spending such as (1) spend-revenue hypotheses, (2) revenue-spend hypotheses and (3)bi-directional causality hypotheses. To test the validity of these hypotheses, this study will utilize a cointegration and variance decomposition analysis. Based on empirical evidence, we can concluded that the existence of long run relationship between government spending, revenue (tax and non tax) and economic growth for all ASEAN-5 countries. The result of variance decomposition also shows that the strong influence on expenditure to revenue in countries namely Malaysia, Indonesia and Philippines, which support the 'spend-revenue hypotheses. Meanwhile, for Thailand and Singapore the budget decision driven by revenue side which support the 'revenue-spend hypotheses'. In addition, public expenditure plays no role to stimulate economic growth in Malaysia, Thailand, Singapore and Philippines, except for Indonesia.

***Key words**: Fiscal economics; Wagner law; cointegration test; variance decomposition*

INTRODUCTION

Sound fiscal policy is crucial to promote internal balance such as price stability and sustainable growth in output and employment. Thus, understanding the relationship between government spending and revenue is important to evaluate how to address fiscal imbalances. According to prior studies, there are three hypotheses have resulted from the causal link of this relationship. Firstly, a bi-directional causality between revenue and expenditure support "the fiscal synchronization hypotheses". These hypotheses show that over time, expenditure decisions are not made in isolation from revenue decision. Secondly, in contrast if causality runs from revenue to expenditure, this refers to "the revenue-spend hypotheses" suggest that the spending level adjusts to the changes in revenue. Thirdly, "the

spend-revenue hypotheses" suggests that the opposite in that change in spending induce changes in revenue. Although these hypotheses has been extensive studies in industrial countries and some developing countries, but it has not been explored in ASEAN-5 countries. In ASEAN-5 countries the government play the major role to stimulate economic activities via government spending, Government in ASEAN-5 countries was collected their revenue from two main sources such as tax revenue and non-tax revenue.

The focus of the paper is to test the validity of these various hypotheses in the case of the ASEAN-5 countries for the period 1970 until 2000. In this study, we examine the relationship between total government expenditure and revenue in these countries by utilizing a cointegration and variance decomposition framework. To facilitate our discussion, the paper proceeds as follow. First, a brief review the prior studies that focusing in the relationship between tax (revenue) and spending in develop countries and developing countries. The second part will explain the episodes of growth and the fiscal performance in ASEAN-5 countries. The next section are discussing on research methodology and empirical evidence. The last section summarizes and concludes the findings.

LITERATURE REVIEW

One of the key requirements of sustained economic growth is that fiscal deficits should be under control. Given that government expenditure are mainly tax financed, the question of whether taxes lead expenditure or expenditure lead taxes is oh high significance for examining whether and how this requirement can be met.

While many studies have examined causality patterns between taxes and expenditure, no consensus exists as to whether taxes cause expenditure or vice-versa. For example, Anderson et al. (1986) using post-war data for the United States concluded that expenditure cause revenue. Von Furstenberg et al. (1985) also reached a similar conclusion concerning the US by examining the 1955 until 1981 time period. Manage and Marlow (1986), by conducting similar tests found that, in most cases bidirectional causality prevailed. Ahiakpor and Amirkhalkhali (1989) found that higher tax revenue causes higher government spending when they examined the 1926 until 1985 period for Canada. In a more recent studied concerning the US, Miller and Russek (1990) found bidirectional causality between expenditure and revenue for the federal, state and local level data. Another recent studied by Koren and Stiassny (1998) are trying to test the validity of tax and spend, or spend and tax hypotheses in nine industrialized countries. For that purposes, they were estimate a trivariate structural VAR model for each countries public sector that includes besides expenditures and revenue, aggregate income as an additional variable. They also implement impulse-response function and frequency domain techniques in order to identify the causal relation between government outlay and receipts. The empirical findings strongly support the spend and tax view that budget decision-making is significantly dominated by the expenditure side in Italy, Austria and France. The opposite (tax and spend hypotheses) seems to be true for the United Kingdom, Netherlands, Germany and United States. For Switzerland and Sweden neither forces are apparent.

For developing countries, empirical studied to test the relationship between tax (revenue) and spending had done by several researcher such as Baffes and Shah (1994) and Fasano and Wang (2002). For example, Baffes and Shah (1994), was studied the causality and co movement between taxes and expenditure in Argentina, Brazil and Mexico. These studied was utilized the time

series econometric such as cointegration, vector error correction model and impulse response function. The result show that the government of Mexico seems to have successfully aligned revenue and spending as means of controlling the deficit at least over the time period examined, while for Argentina this was the case for the post war period. For Brazil that was not been the case. For Argentina and Mexico, strong causality runs from both directions. Fasano and Wang (2002) was testing the relationship between government spending and revenue from GCC (Gulf Cooperation Council) countries namely by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. The studied was focusing to test the validity of these various hypotheses for the period 1975 until 2000 in the case of the GCC countries. Based on a cointegration, error-correction model and a variance decomposition analysis, the finding supports the revenue-spend hypotheses for all GCC countries. Thus, government spending follows revenue, suggesting a pro-cyclical expenditure policy to variations in oil revenue-the largest budgetary revenue component. In this context, GCC countries could enhance the effectiveness of fiscal policy by making budget expenditure les driven by revenue availability.

This paper extends the existing literature on cointegration and variance decomposition between government revenue, government expenditures and economic growth in three aspects. First, by specifically taking into consideration the behavior of two revenue components such as tax and non-tax on government spending in ASEAN-5 countries. Second, by quantifying the causality pattern through variance decomposition. Third, in this study also taking into account the role of economic growth in ASEAN-5 to test the relationship and causality pattern between economic growth, revenue and spending in ASEAN-5 countries.

EPISODES OF GROWTH AND FISCAL PERFORMANCE IN ASEAN-5 COUNTRIES

This section focuses on the fiscal performance of five ASEAN countries, namely Malaysia, Indonesia, Philippines, Singapore and Thailand. Our procedure helps us to identify episodes in which governments made strong and deliberate efforts to reduce the budget deficit. If the total revenue lines for all five countries were upper than its expenditure lines, this imply that the governments focus more on its tax policy (increase tax rate to generate income) rather than reducing spending rate in order to reduce deficit in its fiscal balance.

Based on Figure 1, when revenue of Malaysian government has decreased and less than its expenditure for the year 1985-1988, as a result the fiscal balance turned to be negative (deficit). However, during the period when its revenue was greater than expenditure, then the fiscal balance turned to be positive (surplus). Its total revenue reached its peak leveling 1994-1997, and then it fell down during the financial crisis. Even though Malaysian economics slightly slowdown during the financial crisis, but Malaysia still maintain a surplus in fiscal balance until year 2002. On the other hand, the GDP moved upward for several years and was slightly decreased in 1997 due to the economic crisis. The positive signed of GDP clearly shows that the important role of tax rate charged on the revenue. The results also indicate that the durability of consolidation episodes is reduced if the contribution of increased revenues to the total fiscal adjustment is small.

Figure 1

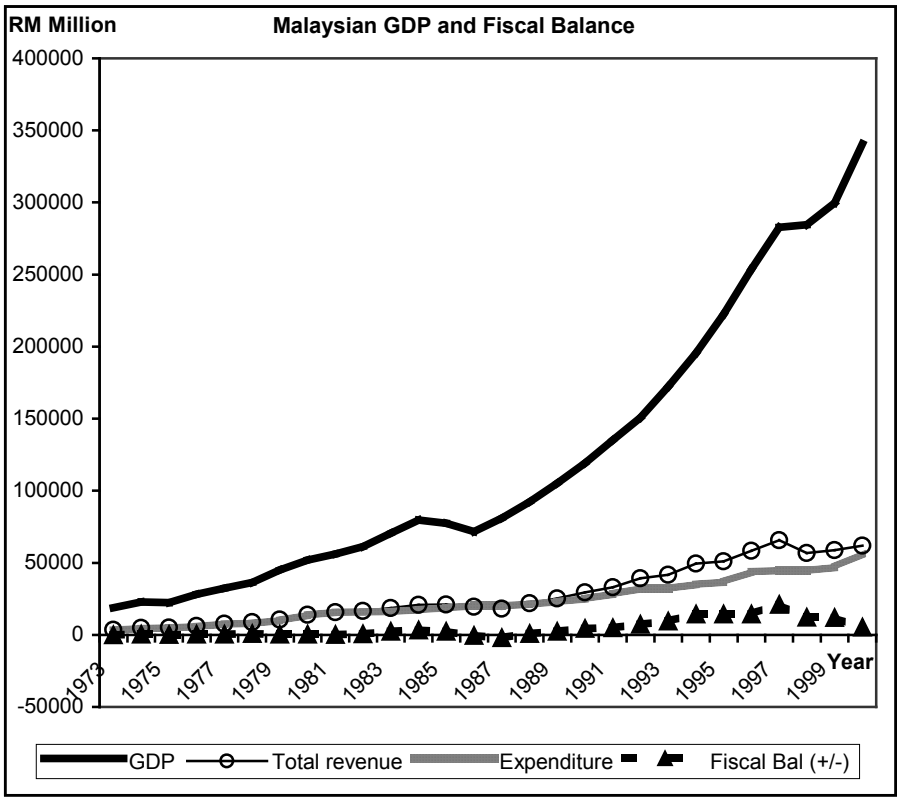
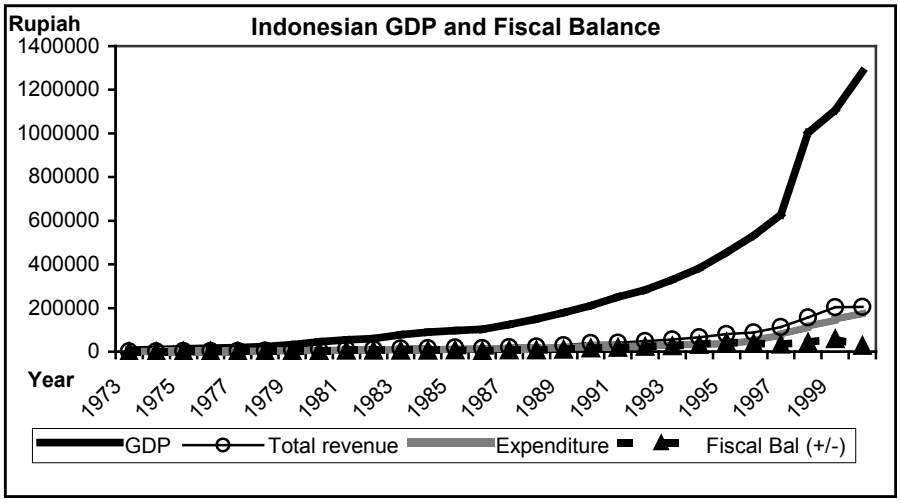


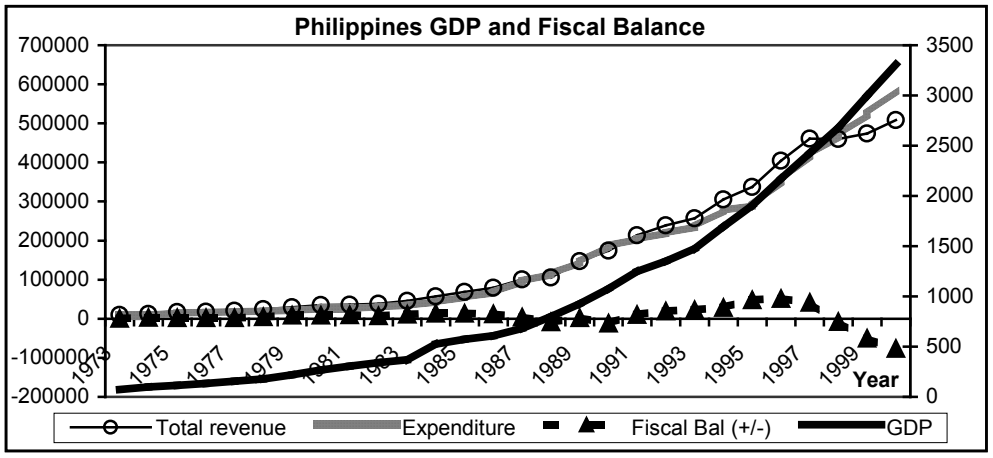
Figure 2



Similarly, result reveals that Indonesian total revenue was higher than its total expenditure. However, there is only a narrow gap between these two variables, which means both total revenue and spending are fluctuate not that much. The fiscal balance line showed that it was increased from year to year portrayed that the country is in a good condition (surplus fiscal balance). In addition, the GDP line was moving upward from year to year indicate that the economic condition was quite stable but suddenly a slight dropped in its revenue happened in 1997 due to economic crisis but yet it recovered back. However, the higher revenue could not last that long when it's fiscal balance had dropped again in 1999.

Now we move to the third ASEAN country, namely Philippines. Based on the Figure 3, result indicates that the country only gained a small revenue and small government spending during 1972-1986. As a consequence, its fiscal balance was nearly deficit. At the same time, the GDP was also low (proved by the GDP line that nearly reached the zero line). However, since 1987, gaps between total revenue and expenditure has widen that contribute to the worst effect and leads to the negative balance on the fiscal account. Specifically, the fiscal balance started to increase after 1987. However, it was back to square one when its fiscal balance turned to deficit again due to the Asian crisis in 1997. The deficit condition was continuously until year 2000.

Figure 3



Note : Secondary axis shows the value of GDP.

Figure 4

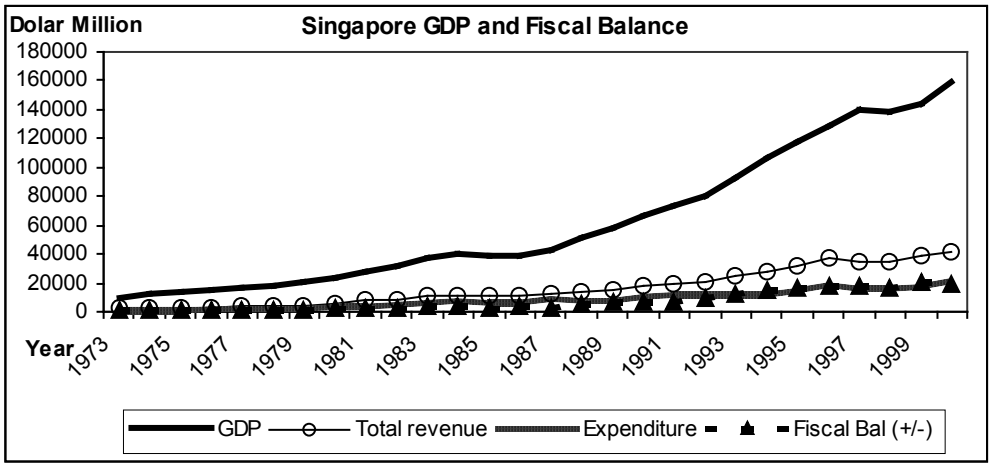
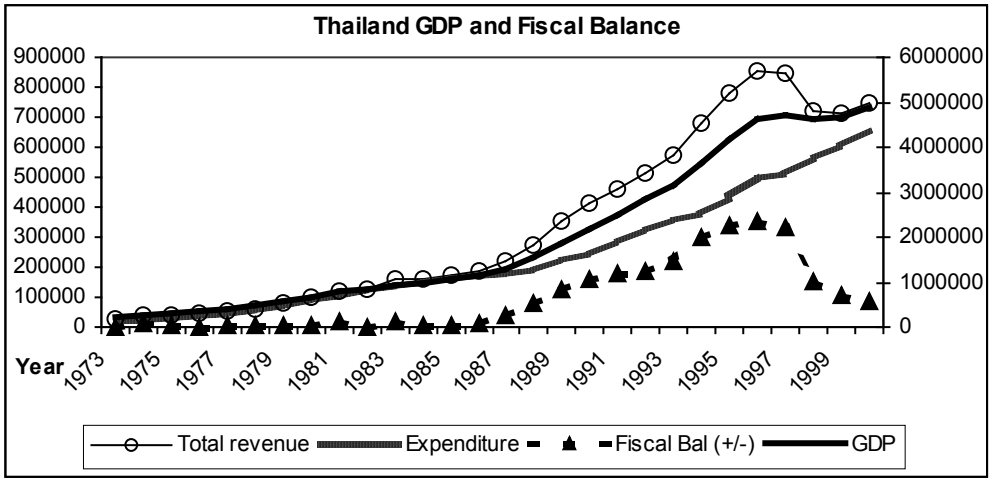


Figure 5



Note : Secondary axis shows the value of GDP.

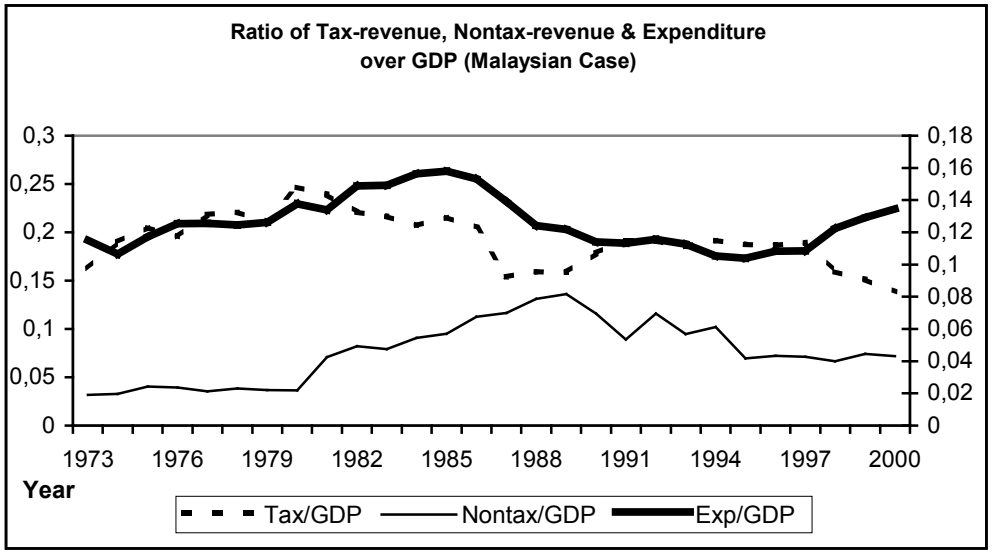
Singapore was considered the best among five ASEAN countries in maintaining its fiscal balance. Figure 4 above shows that the less government spending plus with the high revenue had made up the surplus in its fiscal balance. Thus, the more widened the gap between the total revenue and the government spending the better because it has contributed to the surplus in its fiscal balance. Also, we can see the same trends reveals between revenue, expenditure and GDP lines throughout the year. Even during the economic crisis in 1997, the country was not much affected by the crisis and able to maintain its surplus fiscal balance. Although there was a slight decreased in its fiscal balance but the fiscal account was still considered stable.

However, although Thailand was not as good as Singapore, but based on Figure 5, result reveals that this country able to maintain a surplus fiscal balance throughout the year. The gap between its total revenue and spending was flat during 1973 until 1986 but then the gap was become wider and wider until the crisis came. During the crisis, there was a huge decrease in its fiscal balance account because the revenue earned falls sharply and at the same time, its expenditure keeps increased. However, Thailand was able to maintain a surplus in its fiscal balance until year 2000. These results confirm the consolidation efforts relying mostly on tax revenue have a higher chance of surviving than operating on the spending side of the government budget.

To the extent, since we also concern about a specific impacts of government tax revenue, non-tax revenue and spending on its GDP, thus, we divided these three fiscal components by GDP. In general, we hypothesized that the revenues of all the five ASEAN countries namely Malaysia, Indonesia, Philippines, Singapore and Thailand are generated through tax revenue since tax system of each country heavily rely on current economic situation, and then we can say that government spending depends on its tax revenue. This hypotheses can be discussed later.

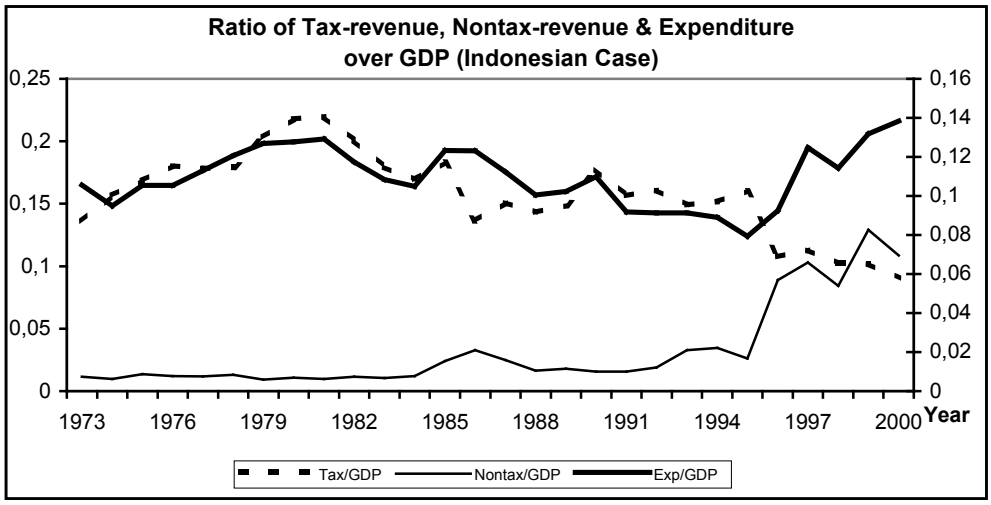
Based on Figure 6, result reveals that there was a wide gap between tax-GDP ratio and expenditure-GDP ratio between 1982-1991. These indicate that government practise high tax rate to generate their revenue. However, in the following year, the gap had narrowed down when the Malaysian government had reduced their spending. The Malaysian had taken some measures to enlarge its total revenue in 1997, but tax policy became geared toward a lower tax burden due to the economic crisis. Consequently, the gap between tax-revenue and expenditure ratio became widened consecutively until year 2000.

Figure 6



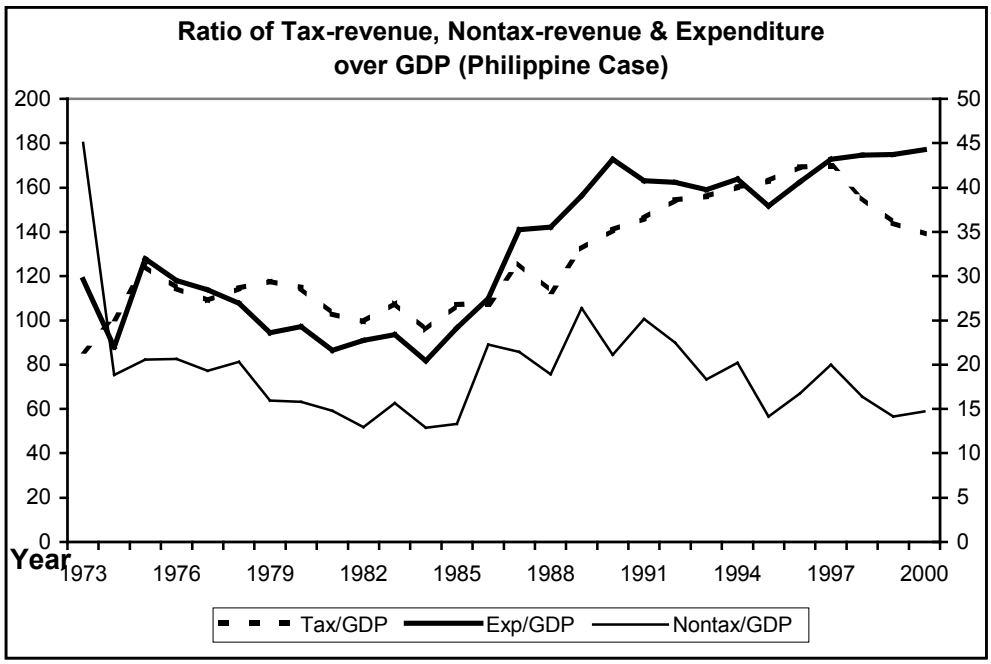
Note: Secondary axis show ratio of government expenditure per GDP and non tax revenue per GDP.

Figure 7



Note : Secondary axis show ratio of government expenditure per GDP and non tax revenue per GDP.

Figure 8:



Note : Secondary axis shows ratio of non tax per GDP.

Furthermore, Figure 7 shows Indonesia gains income through tax-generated. There is a huge gap between tax-revenue and non tax-revenue ratio in this country because the Indonesian government is focused more on tax policy to generate income for the country. However, during the crisis the expenditure rose up by more than tax increases and the consolidation efforts were briefly interrupted before they resumed in following years with a clearly non-tax revenue-driven strategy. During the latter episode, a less forceful adjustment effort was made but however the growing expenditures of borrowing loan from IMF actually weakened the fiscal adjustment until year 2000. As a consequence, revenues fell faster than expenditures and the primary cyclically adjusted budget balance deteriorated.

Continuously, Figure 8 also proved that there is a gap between tax and non-tax revenue for the case of Philippines. However, the gap is not that huge as compared to Indonesian. During the crisis in 1997, the Philippine government had taken the same measure as the Malaysian and Indonesian government in managing its fiscal balance by reducing its tax rate. But at the same time the government had to consider paying a huge amount on expenditures. As a result, a gap between tax-revenue and expenditure ratio was widened again until year 2000.

Based on Figure 9, before year 1985, the gap between tax and revenue-revenue revenue was huge but its getting smaller and smaller after that period. The Singaporean government had charged almost flat tax rate on its revenue. The government spending was supported by its non-tax-revenue because the line of non tax - revenue ratio was fluctuated on the same direction with the line of expenditure ratio. During the crisis, the Singaporean government only reduced a bit of its tax rate and at the same time they had reduced their spending and increased its non tax-revenue. The Singaporean is less suffers and not much affected by the Asian crisis amongst four other ASEAN countries.

Figure 9:

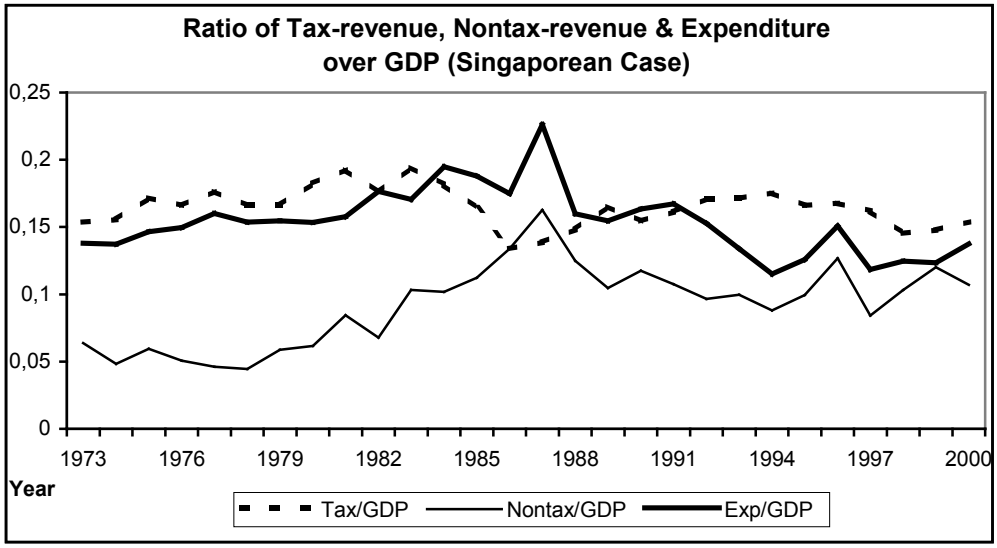
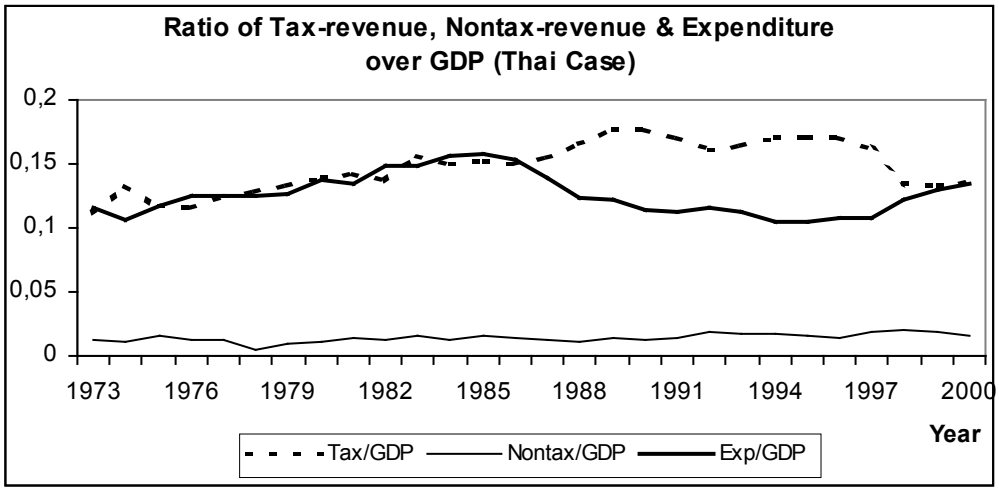


Figure 10:



Interestingly, based on Figure 10, Thai government had focused on both, tax-revenue and non tax-revenue as their sources of income. After year 1985, the government had increased its tax rate on revenue and had reduced its spending to balance up its fiscal account. During the crisis, the Thai government was suffered most because its total revenue, both tax and non-tax were reduced while it's spending had increased. For economic recovery, the Thai government had asked IMF as an instant solution to get out of the box. But end up, the fiscal balance of this country was deteriorated until year 2000.

Overall, result for each country shows that there is a correlation between fiscal balance and GDP. However, in order to validate this hypotheses, we will run a regression based on VAR framework.

RESEARCH METHODOLOGY AND EMPIRICAL EVIDENCE

The time series of government revenue, government expenditure, tax revenue, non tax revenue and output are in fact, the examples of non stationary time series, which is generated by random process, and can be written as follow:

$$Y_t = Y_{t-1} + \varepsilon_t \quad \text{..... (1)}$$

where ε_t is the stochastic error term that follows the classical assumptions, which means, it has zero mean, constant variance and is non autocorrelated (such an error term is also known as white noise error term) and Y is the time series. Since we need to use the stationary time series for the next cointegration test and we also need to solve this unit root problem, therefore, we will run the regression of unit root test based on the following equation:

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \delta_1 \Delta Y_{t-1} + \varepsilon_t \quad \text{..... (2)}$$

where we add the lagged difference terms of dependent variable Y to the right-hand side of equation (2). This augmented specification is then used to test:

H_o: $\gamma = 0$ $\qquad$ H_1: $\gamma < 0$

Therefore, both the Augmented Dickey-Fuller (1979) or ADF and Phillips-Perron (1988) or PP statistics are used to test the unit root as the null hypotheses.

Test Results for Unit Root

Table 1 below indicates that the ADF and PP test rejects the null hypotheses for all variables in the first difference at 10% level. Since all variables are stationary at first difference, therefore it is an I(1) stochastic process. The finding implies that it is reasonable to proceed with test for cointegrating relationship among combination of these series under the premise of non-stationary.

Table 1 : Results of Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) Statistics.

Level	ADF	PP
Malaysia :		
Total government revenue (REV)	-2.6220	-2.6200
Total government expenditure (EXP)	-1.0842	-1.2995
Tax revenue (TAX)	-2.9665	-2.9627
Non tax revenue (NON TAX)	-2.9665	-2.9627
Growth domestic product (GDP)	-2.2249	-2.6200
Indonesia:		
Total government revenue (REV)	0.0071	-1.1691
Total government expenditure (EXP)	1.6076	1.9343
Tax revenue (TAX)	-1.8422	-2.6019
Non tax revenue (NON TAX)	-1.4162	-2.6200
Growth domestic product (GDP)	-0.8585	-2.1259
Philippines:		
Total government revenue (REV)	-1.8884	-2.4328
Total government expenditure (EXP)	-0.4497	-1.0595
Tax revenue (TAX)	-1.7561	-2.1185
Non tax revenue (NON TAX)	1.7642	1.8720
Growth domestic product (GDP)	0.2197	-0.0647
Singapore:		
Total government revenue (REV)	1.7768	2.0310
Total government expenditure (EXP)	1.1326	1.1977
Tax revenue (TAX)	0.9587	1.2653
Non tax revenue (NON TAX)	1.3479	0.9396
Growth domestic product (GDP)	2.1788	-2.1565
Thailand:		
Total government revenue (REV)	-0.3762	0.1986
Total government expenditure (EXP)	-0.8693	-1.8526
Tax revenue (TAX)	-0.4827	0.0582
Non tax revenue (NON TAX)	0.2232	0.2987
Growth domestic product (GDP)	-0.1579	-2.0941

Table 1 (Continued)

First Difference	ADF	PP
Malaysia :		
Total government revenue (REV)	-7.6749*	-12.4656*
Total government expenditure (EXP)	-3.6926*	-5.8706*
Tax revenue (TAX)	-7.6509*	-12.5291*
Non tax revenue (NON TAX)	-6.6998*	-11.2476*
Growth domestic product (GDP)	-5.8379*	-5.7720*
Indonesia :		
Total government revenue (REV)	-6.1057*	-9.8126*
Total government expenditure (EXP)	-3.7005*	-2.7389***
Tax revenue (TAX)	-9.0794*	-4.9019*
Non tax revenue (NON TAX)	-9.8719*	-14.8367*
Growth domestic product (GDP)	-6.7639*	-10.5702*
Philippines:		
Total government revenue (REV)	-4.8612*	-6.9360*
Total government expenditure (EXP)	-5.7898*	-9.2192*
Tax revenue (TAX)	-4.5431*	-6.4765*
Non tax revenue (NON TAX)	-3.7591*	-4.4262*
Growth domestic product (GDP)	-5.6796*	-7.2557*
Singapore:		
Total government revenue (REV)	-3.7618*	-4.8189*
Total government expenditure (EXP)	-4.9867*	-6.0198*
Tax revenue (TAX)	-3.5008**	-3.5391**
Non tax revenue (NON TAX)	-6.4841*	-7.6691*
Growth domestic product (GDP)	-5.2928*	-4.9241*
Thailand:		
Total government revenue (REV)	-4.6172*	-5.174108*
Total government expenditure (EXP)	-6.9288*	-10.70368*
Tax revenue (TAX)	-3.9281*	-4.698919*
Non tax revenue (NONTAX)	-5.9840*	-5.223058*
Growth domestic product (GDP)	-6.9319*	-3.505568**

Notes: The ADF statistics were generated by a model with constant and 1 lags. All variables were tested in log form.

* denote rejections of the null at the 1 %

** denote rejections of the null at the 5 %

*** denote rejections of the null at the 10 %

However, in this paper, since we have been concerned with empirically investigating the long-run sustainability of fiscal policy in five of the ASEAN majors (namely Malaysia, Indonesia, Thailand, Singapore and Philippines)[1] during the period spanning from 1971 to 2001, therefore, we adopt a vector auto regression (VAR) approach. As we estimated a VAR model, the following variables were needed:

EXP	log (Government expenditure)
TAX	log (Tax revenue)
NON TAX	log (Non tax revenue)
GDP	log (Nominal growth domestic product)

To illustrate, a VAR model is specified as follows:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t, \quad \ldots\ldots\ldots\ldots (3)$$

where y_t is a vector of four variables as elaborated above, x_t is a *d* vector of exogenous variables, $A_1, \ldots\ldots, A_p$ and B are matrices of coefficients to be estimated, p is the order of auto regression and e_t is an 4 x 4 vector of error terms (or vector of innovations that may be contemporaneously correlated with each other but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables). By rearranging the Eq. 3, we can get:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots (4)$$

where ;

$$\Pi = \sum_{i=1}^{p} A_i - I, \quad \Gamma_i = -\sum_{j=i+1}^{p} A_j$$

Granger's (1969) representation theorem asserts that if the coefficient matrix Π has reduced rank $r<k$, then there exist k x r matrices α and β each with rank r such that $\Pi=\alpha\beta'$ and $\beta' y_t$ is stationary. r is the number of cointegrating relations (the cointegrating rank) and each column of β is the cointegrating vector. The elements of α are known as the adjustment parameters in the vector error correction model. Johansen's method is to estimate the Π matrix in an unrestricted form (reduced form), then it also allow us to test whether we can reject the restrictions implied by the reduced rank of Π.

Test Result for Cointegration

Since the time series of tax, non tax, expenditure and economics growth are found to be integrated of the same order (order one), a cointegration test can be conducted to determine whether a long run equilibrating relationship exist between them.

The parameter estimates of the cointegrating model are reported in Table 2 (a) to (e). The Johansen (1988) test reject the null hypotheses at 5% which proves the existence of cointegrating relationship between output, government expenditure and government revenue in the long term. However, the Johansen test result for Malaysia, Indonesia and Singapore also rejects the null hypotheses that at least exist one, three and two cointegrating vector, respectively, between output and government expenditure and revenue. Overall, this result indicates the presence of long-run co-movement or cointegration among the variables for these five major ASEAN countries.

[1] For these five countries, data are available on a yearly basis in the Government Financial Statistics.

Table 2(a): Johansen Test Statistics For Cointegration Between GDP, EXP, TAX and NON TAX, Malaysia.

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.824126	89.01638	53.12	60.16	None *
0.567647	38.61470	34.91	41.07	At most 1 **
0.289538	14.29779	19.96	24.60	At most 2
0.140313	4.384420	9.24	12.97	At most 3

Note: The Johansen statistics were generated by a model with constant. The lag intervals for this analysis is (1, 1) lags. All variables were tested in the log function
* denote rejections of the null at the 1 %
** denote rejections of the null at the 5 %

Table 2(b): Johansen Test Statistics For Cointegration Between GDP, EXP, TAX and NON TAX, Indonesia.

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.776521	115.4656	53.12	60.16	None *
0.699993	72.01085	34.91	41.07	At most 1 *
0.590047	37.09632	19.96	24.60	At most 2 *
0.321228	11.23663	9.24	12.97	At most 3 **

Note: The Johansen statistics were generated by a model with constant. The lag intervals for this analysis is (1 1) lags. All variables were tested in the log function.
* denote rejections of the null at the 1 %
** denote rejections of the null at the 5 %

Table 2(c): Johansen Test Statistics For Cointegration Between GDP, EXP, TAX and NON TAX, Philippines.

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.646634	55.96135	53.12	60.16	None **
0.445791	27.87456	34.91	41.07	At most 1
0.274408	11.93878	19.96	24.60	At most 2
0.114329	3.278075	9.24	12.97	At most 3

Note: The Johansen statistics were generated by a model with constant. The lag intervals for this analysis is (1 1) lags.. All variables were tested in the log function.
* denote rejections of the null at the 1 %
** denote rejections of the null at the 5 %

Table 2(d) : Johansen Test Statistics For Cointegration Between GDP, EXP, TAX and NON TAX, Singapore.

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.754929	90.77096	53.12	60.16	None *
0.669103	51.39718	34.91	41.07	At most 1 *
0.468407	20.43065	19.96	24.60	At most 2 **
0.093159	2.738075	9.24	12.97	At most 3

Note: The Johansen statistics were generated by a model with constant. The lag intervals for this analysis is (1 1) lags. All variables were tested in the log function.
* denote rejections of the null at the 1 %
** denote rejections of the null at the 5 %

Table 2(e): Johansen Test Statistics For Cointegration Between GDP, EXP, TAX and NON TAX, Thailand.

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.925349	109.2432	53.12	60.16	None *
0.550683	33.99010	34.91	41.07	At most 1
0.236973	10.78931	19.96	24.60	At most 2
0.096595	2.945932	9.24	12.97	At most 3

Note: The Johansen statistics were generated by a model with constant. The lag intervals for this analysis is (1, 1) lags. All variables were tested in the log function.
* denote rejections of the null at the 1 %
** denote rejections of the null at the 5 %

Since the cointegration test proved the exinstance of cointegration among variables in each country, then we can proceed with the variance decomposition and impulse response test. In empirical application, variance decomposition becomes the main use of vector auto regression (VAR) approach. The variance decomposition decomposes variations in a variable of interest to shocks in other variables in the system including its own innovations. Table 3, 4, 5, 6 and 7 reports the estimated parameter in variance decomposition of expenditure, tax revenue, non-tax revenue and gross domestic product for Malaysia, Indonesia, Philippines, Singapore and Thailand.

Variance decomposition exhibits the contribution of each source of innovation to the variance of the k-year ahead forecast error for each of the variables included in the systems. Stated otherwise, variance decomposition refers to the breakdown of the change in the value of the variable as well as other variables in previous periods. In order to compute variance decomposition, we orthogonalized the innovations by using the Choleski decomposition method.

The Result for Variance Decomposition

Table 3: Variance Decomposition of Malaysian Expenditure, Revenue and Gross Domestic Product

(a) Expenditure

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.041080	100.0000	0.000000	0.000000	0.000000
5	0.074705	64.33046	1.682734	3.127428	30.85937
10	0.100805	36.42702	2.094272	13.06426	48.41445
15	0.119570	26.13994	2.059306	18.79858	53.00218
20	0.131315	22.09222	2.003979	21.55747	54.34633
25	0.138293	20.24944	1.968139	22.94512	54.83730
30	0.142371	19.32017	1.947263	23.67978	55.05279

(b) Revenue (Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.210147	37.86026	62.13974	0.000000	0.000000
5	0.292165	38.79398	33.85660	21.04886	6.300555
10	0.300440	39.18812	32.16682	20.22415	8.420907
15	0.307788	37.39649	30.76586	20.54855	11.28910
20	0.314004	35.97430	29.63527	21.05041	13.34002
25	0.318265	35.08727	28.89268	21.42396	14.59608
30	0.320930	34.56385	28.44175	21.66049	15.33391

(c) Revenue (Non-Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.173312	16.02564	4.032596	79.94176	0.000000
5	0.266716	20.46707	1.883541	58.89575	18.75364
10	0.296320	19.66495	1.688773	55.17383	23.47245
15	0.306295	19.06230	1.654234	54.10035	25.18312
20	0.310712	18.72153	1.645619	53.63144	26.00141
25	0.312969	18.53065	1.642954	53.39027	26.43613
30	0.314208	18.42212	1.641954	53.25737	26.67855

(d) Gross Domestic Product

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.068935	0.547131	5.744305	2.136401	91.57216
5	0.121671	0.992866	3.470995	22.74770	72.78844
10	0.153804	1.584106	2.816961	27.34962	68.24932
15	0.171081	1.935727	2.590068	28.95217	66.52204
20	0.180758	2.132072	2.486469	29.68381	65.69765
25	0.186274	2.241416	2.433520	30.05757	65.26750
30	0.189450	2.302915	2.404860	30.25980	65.03242

Table 4: Variance Decomposition of Indonesian Expenditure, Revenue and Gross Domestic Product

(a) Expenditure

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.049079	100.0000	0.000000	0.000000	0.000000
5	0.109232	75.31814	9.213148	12.59475	2.873963
10	0.146961	48.19563	6.535006	22.70029	22.56908
15	0.174943	35.30643	7.691775	23.27359	33.72821
20	0.192491	30.90633	9.026889	23.02159	37.04519
25	0.204635	29.07177	9.208691	23.18609	38.53345
30	0.214322	27.75164	9.160787	23.41605	39.67152

(b) Revenue (Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.070935	24.00141	75.99859	0.000000	0.000000
5	0.117185	55.42749	42.93570	1.360606	0.276205
10	0.143012	54.17723	30.51177	9.749403	5.561592
15	0.164160	43.19756	23.82472	15.02686	17.95086
20	0.180428	36.90048	21.93658	16.44421	24.71873
25	0.191407	34.16492	20.95687	17.18026	27.69795
30	0.199689	32.57948	20.03250	17.82677	29.56125

(c) Revenue (Non-Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.126219	19.47370	41.03151	39.49480	0.000000
5	0.221246	7.932778	21.41460	38.70271	31.94991
10	0.282605	4.993064	20.12547	30.69015	44.19131
15	0.307976	5.645004	21.15738	28.37441	44.82321
20	0.323036	6.992380	20.15228	27.99713	44.85821
25	0.335820	7.616429	19.15320	27.92496	45.30540
30	0.346706	7.893215	18.52215	27.78945	45.79518

(d) Gross Domestic Product

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NON TAX	GDP
1	0.041662	31.28072	22.94703	0.883574	44.88867
5	0.085008	47.43995	7.925475	15.51122	29.12335
10	0.120009	34.15218	4.529132	23.64134	37.67735
15	0.146392	25.87893	5.636860	24.60963	43.87458
20	0.164645	22.68891	6.965862	24.44392	45.90131
25	0.177697	21.38508	7.476368	24.46240	46.67616
30	0.187827	20.57449	7.669313	24.55918	47.19702

Table 5: Variance Decomposition of Philippines Expenditure, Revenue and Gross Domestic Product

(a) Expenditure

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.044419	100.0000	0.000000	0.000000	0.000000
5	0.074320	80.53636	0.139932	2.059043	17.26466
10	0.092881	57.35452	0.139233	1.511487	40.99476
15	0.106132	45.62614	0.120560	1.262961	52.99034
20	0.115997	39.24450	0.121495	1.138168	59.49584
25	0.123586	35.33258	0.123479	1.063100	63.48084
30	0.129547	32.72945	0.124899	1.013279	66.13237

(b) Revenue (Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.034854	19.20964	80.79036	0.000000	0.000000
5	0.063398	28.70833	46.09781	12.54930	12.64455
10	0.080350	24.73804	28.76132	8.467209	38.03343
15	0.092965	20.46810	21.49939	6.451076	51.58144
20	0.102335	18.03296	17.76382	5.410568	58.79265
25	0.109505	16.55807	15.53096	4.789378	63.12159
30	0.115117	15.58981	14.06672	4.382163	65.96131

(c) Revenue (Non-Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.078740	29.08376	0.441782	70.47446	0.000000
5	0.106318	35.04069	9.688312	40.03336	15.23764
10	0.117735	30.14146	8.137642	32.67211	29.04878
15.	0.125659	27.19270	7.155399	28.73127	36.92063
20	0.131807	25.28683	6.516430	26.15928	42.03746
25	0.136695	23.95790	6.068642	24.35782	45.61564
30	0.140622	22.98962	5.742060	23.04421	48.22411

(d) Gross Domestic Product

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.024499	0.370456	17.85340	0.693941	81.08221
5	0.049367	2.686217	10.45624	2.323576	84.53396
10	0.066659	4.718015	5.915991	1.672776	87.69322
15	0.078453	5.254028	4.308418	1.354502	89.08305
20	0.087063	5.473313	3.523896	1.195401	89.80739
25	0.093612	5.596309	3.066809	1.102674	90.23421
26	0.094734	5.614780	2.997868	1.088694	90.29866
30	0.098719	5.675327	2.771763	1.042845	90.51006

Table 6: Variance Decomposition of Singapore Expenditure, Revenue and Gross Domestic Product

(a) Expenditure

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.047885	100.0000	0.000000	0.000000	0.000000
5	0.069835	80.01884	10.01852	6.762390	3.200257
10	0.079301	63.12066	14.61573	11.03828	11.22532
15	0.086111	53.61355	15.69105	14.05466	16.64075
20	0.091105	47.95460	16.05181	16.07145	19.92215
25	0.094822	44.31622	16.24227	17.41355	22.02796
30	0.097627	41.84378	16.36698	18.33245	23.45679

(b) Revenue (Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.047440	5.656922	94.34308	0.000000	0.000000
5	0.073044	3.030169	87.94048	0.679140	8.350211
10	0.084266	2.502899	75.85135	4.294036	17.35172
15	0.091384	2.139645	67.73448	8.071986	22.05389
20	0.096504	1.963582	62.67300	10.65331	24.71011
25	0.100308	1.863583	59.37901	12.36242	26.39499
30	0.103180	1.797481	57.13040	13.53195	27.54017

(c) Revenue (Non-Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.080328	28.19868	0.201011	71.60031	0.000000
5	0.113730	37.50032	0.983885	57.97469	3.541109
10	0.125346	33.14057	3.046657	54.80766	9.005118
15	0.133345	29.48173	4.896718	52.39737	13.22418
20	0.139339	27.06322	6.070333	50.80127	16.06518
25	0.143859	25.43033	6.842566	49.73471	17.99239
30	0.147294	24.28841	7.378313	48.99226	19.34102

(d) Gross Domestic Product

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.023832	2.505404	71.58931	1.087904	24.81739
5	0.048731	0.673110	54.35571	9.468664	35.50252
10	0.063720	0.408763	42.34759	16.55941	40.68424
15	0.073197	0.390347	36.80146	20.36861	42.43959
20	0.079794	0.420158	33.90222	22.44655	43.23107
25	0.084584	0.445446	32.19854	23.67960	43.67641
30	0.088144	0.462676	31.10887	24.46959	43.95887

Table 7: Variance Decomposition of Thailand Expenditure, Revenue and Gross Domestic Product

(a) Expenditure

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.019452	100.0000	0.000000	0.000000	0.000000
5	0.045749	66.41934	13.75439	12.14036	7.685904
10	0.069636	35.96223	42.86261	10.24249	10.93267
15	0.092342	22.06399	60.58437	8.645979	8.705661
20	0.107767	17.30932	67.20213	8.368496	7.120053
25	0.116744	15.68168	69.46251	8.472981	6.382824
30	0.122103	15.01099	70.35404	8.584244	6.050729

(b) Revenue (Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.046965	2.352600	97.64740	0.000000	0.000000
5	0.101547	6.240274	86.89929	6.733401	0.127036
10	0.124002	8.653464	82.05937	8.755370	0.531799
15	0.136149	9.190970	80.55063	9.153354	1.105044
20	0.145354	8.999748	80.36547	9.143589	1.491193
25	0.152355	8.752052	80.48795	9.095579	1.664423
30	0.157279	8.611073	80.56572	9.083690	1.739515

(c) Revenue (Non-Tax)

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.101891	3.614903	2.483934	93.90116	0.000000
5	0.134898	2.445102	37.73108	58.42174	1.402074
10	0.164545	2.726365	54.20166	41.64878	1.423192
15	0.178469	3.439265	58.23396	36.90411	1.422672
20	0.186122	3.928866	59.77575	34.78297	1.512416
25	0.191302	4.170033	60.77098	33.44491	1.614077
30	0.195128	4.286253	61.53047	32.49946	1.683814

(d) Gross Domestic Product

Explained by Innovations in:

Period	S.E.	EXPEND	TAX	NONTAX	GDP
1	0.024441	8.706702	73.72157	0.039008	17.53272
5	0.070213	4.754258	81.09091	4.647253	9.507580
10	0.103073	4.018297	83.80869	5.805760	6.367258
15	0.120941	4.342682	83.91861	6.524505	5.214205
20	0.130842	4.788115	83.45478	6.977129	4.779978
25	0.136944	5.080616	83.08723	7.222723	4.609436
30	0.141116	5.231550	82.89062	7.351536	4.526289

Based on table 3(a) to 3(d), results shows that a shock in GDP Malaysian affects around 50 percent of variations in expenditure compared to 10-15 percent variations in tax revenue and 25 percent variations in non tax revenue. A shock in expenditure shows larger impact towards tax revenue compared to the impact of a shock in tax revenue towards expenditure whereby almost 40 percent of variations in tax revenue in caused by a shock in expenditure. A shock in tax revenue comprises only 2 percent variations in expenditure. This finding show that the budget decision in Malaysia more driven by expenditure side. Another point, the GDP also plays a major role to forecast variation in expenditure. This means that, more growth will affect more public expenditure. This finding also consistent according to the Wagner law (1958), who states that the level of government spending depend on the economic growth in a countries. Countries that have more economic growth tend to accelerate their public expenditure. Another point, the public expenditure play no role to stimulate economic growth in Malaysia.

Variance decompositions analysis between tax revenue and expenditure on Indonesia and Philippines data exhibits similar results with Malaysia. Table 4(a)-4(d) shows that 40-50 percent of variations in tax revenue of Indonesia is accounted mostly by an innovation in expenditure. The impact of an innovation in tax revenue towards variations in expenditure is so much lower, i.e. around 10 percent. Furthermore, an innovation in GDP explained 30-50 percent variations in expenditure and non-tax revenue. Table 5(a)-5(d) suggest that an average 20 percent of variations in tax revenue of Philippines is explained by a shock in expenditure. Less than 1 percent of variation in expenditure is explained by a shock in tax revenue. However, an innovation in GDP plays a significant role in accounting for variations in expenditure, tax revenue and non tax revenue, i.e. around 30-60 percent.

For Singapore and Thailand, Table 6(a)-6(d) and Table 7(a)-7(d) suggests that a shock in tax revenue shows larger impact towards expenditure compared to the impact of a shock in expenditure towards tax revenue. Results shows that 13-17 percent of variations in expenditure of Singapore is explained by a shock in tax revenue compared to less than 3 percent of variations in tax revenue is explained by a shock in expenditure. Whereas, at most time more than 50 percent variations in expenditure of Thailand is explained by a shock in tax revenue. Meanwhile, less than 10 percent of variation in tax revenue is explained by a shock in expenditure.

Overall, results suggest that an innovation in expenditure plays a larger role in accounting for variations in tax revenue for Malaysia, Indonesia and Philippines. Meanwhile for Singapore and Thailand, an innovation in tax revenues explained larger percentage of variations in expenditure.

SUMMARY AND CONCLUSION

The main objective of this paper is to examine empirically the relationship between revenue (tax and non tax), government spending and economic growth in ASEAN-5 countries. In doing so, we utilized time series econometric framework such as Johansen cointegration methodology and variance decomposition framework. The findings can be summarized as follow. First, based on empirical evidence, we can concluded that the existence of long run relationship between government spending, revenue (tax and non tax) and economic growth for all ASEAN-5 countries. Secondly, result on variance decomposition also shows that the strong influence on expenditure to revenue in countries namely Malaysia, Indonesia and Philippines, which sup-

port the spend-revenue hypotheses. In this context, the budget processes in these countries are dominated on expenditure side. In this case, the federal government has to plane the spending and then can implement the strategy for tax collection. Meanwhile, for Thailand and Singapore the budget decision driven by revenue side which supports the revenue-spend hypotheses. In this context, the budget process in Thailand and Singapore are dominated in revenue side, which implied that the expenditures can be planned and insulated from the revenue availability. Third, public expenditure play no role to stimulate economic growth in Malaysia, Thailand, Singapore and Philippines, except Indonesia. For instance, in Indonesia the government expenditure play a prominent role to explain the variation in GDP, which support the Keynes (1936) hypotheses. Fourth, GDP also play a major role to stimulate government spending in countries namely Malaysia, Indonesia, Philippines and Singapore, which support the Wagner (1958) law, except for Thailand.

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