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Covid-19 Impact: Fiscal and Monetary Policies in Malaysia, Singapore, and Indonesia

Roziana Baharin[a], Noorhalizam Mohamed Noor[b],
Faculty of Economics & Management, Universiti Kebangsaan Malaysia, Malaysia
Corresponding Author Email: roziana.baharin@ukm.edu.my

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Abstract

Following the coronavirus pandemic (COVID-19) that occurred in 2020, indirectly affected the rate of economic growth globally. The economies of Malaysia, Singapore and Indonesia have not escaped the effects of weak global demand and domestic containment measures. This study applied the three-equation model macroeconomic framework and balanced panel data to analyze fiscal and monetary policies in these countries during the COVID-19 crisis from various official agencies. The Fixed Effects Model is the appropriate model chosen to determine the role of policy. The main findings of the study show that government spending is positively significant at the 0.01 level with gross domestic product. Therefore, during the COVID-19 crisis, fiscal policy is more effective for the economic growth of Malaysia, Singapore and Indonesia. This model is consistent, stable and robust. The study also recommends sound fiscal policies and the implementation of a sustainable policy mix framework to mitigate the disruption of COVID-19.

Keywords: Covid-19, Fiscal Policy , Monetary Policy, Ols, Economy Growth

Introduction

Global growth contracted by the COVID-19 pandemic

The world economy contracted sharply by 3.3% and experienced the worst recession since the Great Depression, including developed economies (-4.7%) and emerging markets & developing economies (-2.2%) (IHS Markit, 2021), as shown in **Figure 1**. The economic downturn stemmed from a major economic disruption caused by containment measures implemented in response to the unprecedented coronavirus disease (COVID-19) pandemic. Measures taken to curb the spread of COVID-19, including travel restrictions, forced closures of businesses and restrictions on social activities, have been weakened in both demand and supply- chain disruptions. Nonetheless, many economies have adopted unprecedented large-scale fiscal and monetary stimulus measures to alleviate the economic impact upon the successful containing the pandemic.

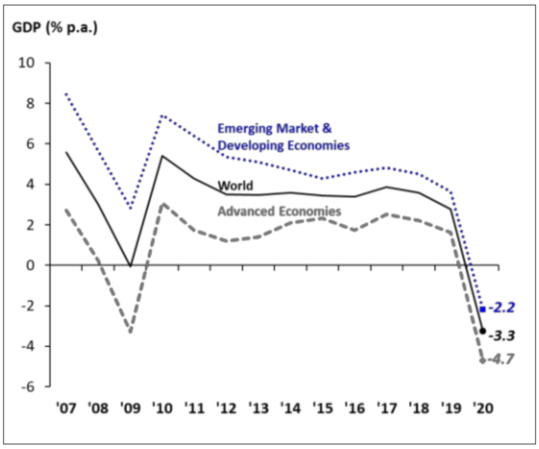


Figure 1: Gross domestic product (GDP), 2007 - 2021
Source: IHS Markit, 2021

Downside risk of Malaysia, Singapore and Indonesia's economy
Malaysia, Singapore, and Indonesia, adopted strict containment measures to break the transmission of COVID-19 pandemic. Measures taken such as total or partial lockdowns, physical distancing rules, bans on public gatherings, and border closures have led to the sudden cessation of personal mobility and non-essential business activities. These are manifested in severe production interruptions and declining demand, especially in consumer and tourism-related industries. As a result, the firm's profits plummeted, raising unemployment and deteriorating income conditions that affecting the labour market. These unfavourable spill-over effects on domestic demand, especially in the second quarter, led to a full-year GDP contraction in 2020, as shown in **Figure 2**.

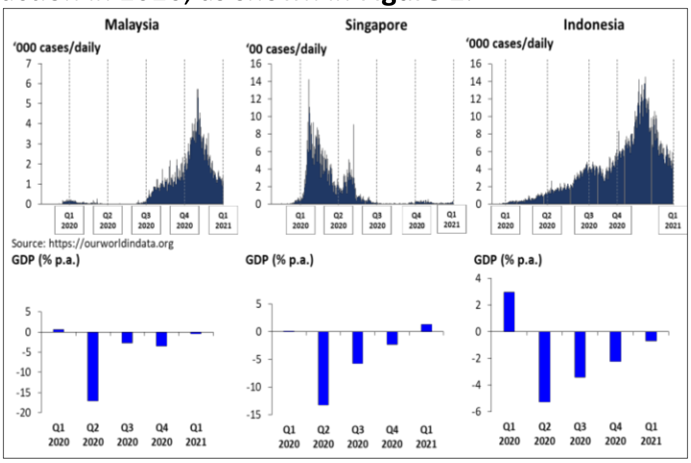


Figure 2: Daily COVID-19 infection and GDP
Source: DOSM, SingStat, BPS and https://ourworldindata.org

Fiscal and monetary policies introduced to cushion the impact from COVID-19
The unfavourable economic shock has triggered Malaysia, Singapore and Indonesia to introduce an unprecedented economic policy response to support households and businesses through government assistance called fiscal policy and central bank mechanisms or monetary policy, as shown in **Figure 3**.

(i) Malaysia

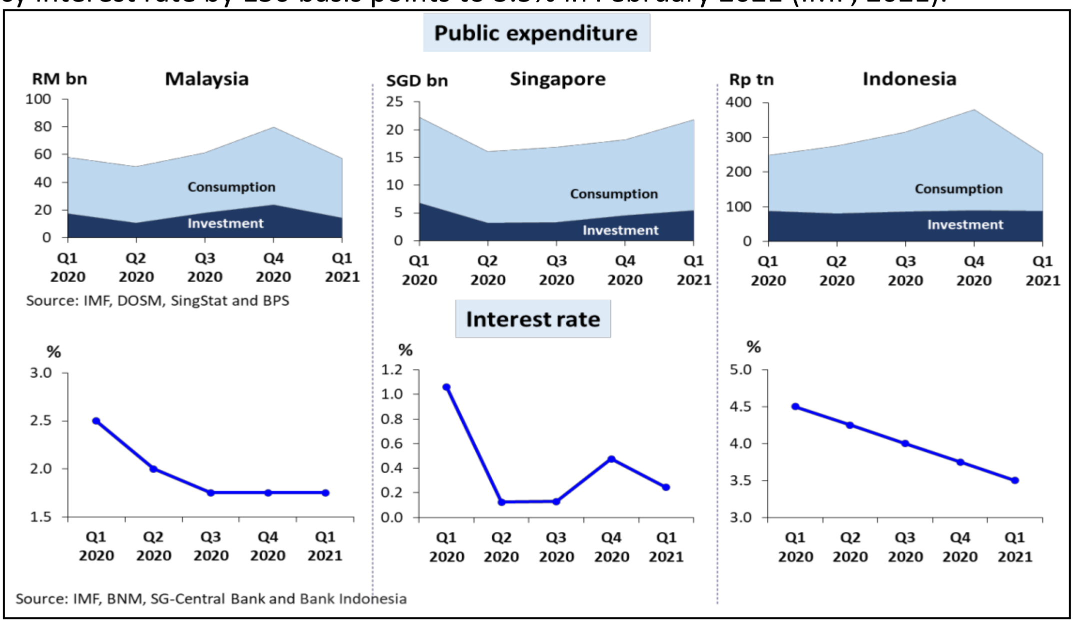
Malaysia has been hit hard by the spread of COVID-19 and has had a major impact on the economy, especially on the vulnerable household and small businesses. In order to mitigate the economic risks posed by the COVID-19 pandemic, the government injected about RM55 billion into the five fiscal stimulus plans for 2020-2021. Among them, about RM38 billion was spent in 2020, and the remaining RM17 billion has been allocated in 2021. The government also raised the temporary statutory debt limit by 5 percentage points to 60% debt-to-GDP ratio. In response to the crisis, Bank Negara cut the overnight policy rate by 125 basis points, which is at a historical low of 1.75% (IMF, 2021). The policy response is aimed to address market disruptions, financial market volatility, global economic weakness and subdued inflationary pressures.

(ii) Singapore

By the end of 2020, Singapore had successfully controlled the spread of COVID-19 infection, and the economy continued to recover by 1.3% in the first quarter of 2021. A number of financial support measures totalling S$92 billion to alleviate the impact of the pandemic, such as payment of cash to household, and cash wage subsidies to support businesses and workers. In 2021, the government announced the provision of S$11.8 billion as a comprehensive emergency relief to provide more targeted support as the economy recovers. In terms of the role of monetary policy, Monetary Authority of Singapore has adopted a zero percent per annum rate of appreciation of the policy band starting at the prevailing level of the S$NEER to ensure currency and financial stability (IMF, 2021).

(iii) Indonesia

The Indonesian government disbursed a total of IDR579.8 trillion in 2020 to address health impact, provide assistance to households and firms, support the vaccine roll-out, and as a part of the country's economic recovery. Nevertheless, the economy continued to decline by 0.7% in the first quarter of 2021. In response, the government's total budget continues to increase the fiscal budget of IDR 699.4 trillion. In addition, the Bank of Indonesia lowered its policy interest rate by 150 basis points to 3.5% in February 2021 (IMF, 2021).



Source:IMF

Figure 3: Fiscal expansion and monetary mechanism

Problem Statement

During a recession, fiscal and monetary policies can be used to increase demand, thereby increasing output and restoring the economy to equilibrium. However, Keynesian economist have argued that government should implement expansionary fiscal policy to combat recession because the fiscal policy has direct impact on aggregate demand (Keynes, 1936). According to the findings of (Baum, Poplawski-Ribeiro, & Weber, 2012), tightening fiscal policies implemented during a recession can harm economic growth. In contrast, monetarists believe that monetary policy has a more important role than fiscal policy (Friedman, 1959). (Ahmad, Afzal, & Khan, 2016) proved that expansionary monetary policy is important for economic growth, while interest rates is important for influencing output and inflation (Tang, 2006). Recent research by (Diaz-Bonilla, 2020) shows that during the COVID-19 pandemic, the expanded money supply has democratised the economy. However, expansionary fiscal policy corrects external imbalances, but it may not be sustainable in the long run (Bonga-Bonga, 2019). Therefore, there is no clear answer to adopt appropriate fiscal or monetary policies to reduce the economic losses caused by the crisis. By comparing these two policies, this study may provide guidance to respond to the COVID-19 crisis and similar crises in the future.

Objective

The objective of this study is to examine the impact of fiscal and monetary policies on economic growth in Malaysia, Singapore, and Indonesia during the COVID-19 crisis. These countries were chosen because they are Southeast Asian countries with common economic characteristics and similar demographic changes.

Significant of Study

This study is employed the three-equation model in open economy to provider higher understanding the effect of fiscal and monetary policies in Malaysia, Singapore, and Indonesia during the COVID-19 crisis would be important to the policy maker in making better policy formulation. Panel data analysis is used to reduce the bias of omitted variables (Wooldridge, 2015) to determine the impact of these countries.
The organization of this study is divided into five parts. Section 2 provides an in-depth study of the literature review. Section 3 describes the econometric technique as a methodology. Section 4 lays out the data and empirical results. Finally, Section 5 conclusions and recommendations.

Literature Reviews

There are two sets of policy tools used to promote recovery after a recession: monetary policy and fiscal policy, because these two policies are usually used to accelerate economic growth.

Fiscal policy

During a recession, the government may stimulate the economy through fiscal policies such as government spending or tax cuts. (Gali, 2020) refers to fiscal policy as an urgent execution during the COVID-19 pandemic. In this case, extraordinary problems require extraordinary and bold solutions. The evidence provided by the International Monetary Fund (IMF, 2013) shows that during the Great Recession in 2008, fiscal policy was an appropriate countercyclical policy tool. During a recession, the expenditure multiplier for each public expenditure will be greater than 1, indicating that expenditure on these projects increases output more than their cost (Blinder & Zandi, 2015). The fiscal multiplier during a recession will be higher as compared with under normal economic conditions (Auerbach, Gale, & Harris, 2010).

Monetary policy
Monetary policy is an action taken by the central bank to keep interest rates low and reduce unemployment during and after a recession. Central banks can play a key role by adopting unconventional monetary policies and establishing various channels to inject liquidity into the economy (Diaz-Bonilla, 2018). Recent finding (Feldkircher, Huber, & Pfarrhofer, 2021) indicate that monetary expansion leads to higher output growth, stock market returns, and dollar depreciation during the COVID-19 recession. (Cecchetti, Flores-Lagunes, & Krause, 2006) found that efficient monetary policy can improve the stability of output, reduce the variability of supply shocks, and changes in the economic structure of 24 countries.

Methodology
This study employs a macroeconomic model, namely the three-equation model (PC-MR, IS-RX and AD-ERU) in the open economy to explain the dynamic adjustment of economic shocks to the return to medium-term equilibrium path. In addition, the empirical framework uses panel data analysis as estimation methods, diagnostic tests, and data descriptions to supplement the interpretation of the methods used in this study. Public expenditure is used as a measure of fiscal expenditure, while interest rates are used to measure monetary policy.

Conceptual Framework
Before the COVID-19 crisis, the country's economy was stable, which can be described as point A or bliss, that is, the interest rate is stable at r^*, the equilibrium output is y_e. At this point, the Phillips Curve PC curve, PC ($\pi_0{}^E = \pi^T$) and Monetary Rules, MR intersect, as shown in **Figure 4**.
When the COVID-19 pandemic crisis hit to the economy, as an open economy with a flexible exchange rate system experience a positive aggregate demand due to a drastic increase in public expenditure. Therefore, there is fiscal expansion, the *IS* curve (planned investment and savings decision) represents the demand side shift to the right $IS(A', \overline{q})$ at point B. At this point, the increase in output (Y) and inflation (π_0) on the PC is higher than the target inflation (π^T) on the PC ($\pi^E{}_0 = \pi^T$). Realising that π_0 is higher than π^T, then central bank forecasts a new PC that must shift to the left and go through π_0 and y_e and move along the PC ($\pi_1{}^E = \pi_0$) towards MR, and increase the interest rate from r^* to r_0 at desired point C. During this period, the foreign exchange (forex) market predicts r > r*, thus real interest rate appreciated. The central bank knows this and sets r_0 on monetary rule (RX). Economy is at π_0, y_0, r_0 and q_0.
At period 1 onwards, when the central bank increases the r_0, the real exchange rate ($\overline{q}_0$) decreases means appreciation in home currency, the country's export decreases due to the higher prices of goods and services relative to the foreigner. This appreciation moves the IS curve to the left IS(A', q_0) at point C. As a result, the central bank reduces r_0 to r* , y_1 less than y_e. Since y_1 is less than y_e the central bank has to increase the output by decreasing the interest rate that leads to increase in the real exchange rate means depreciation in home currency, and consequently will increase the country's exports due to the lower prices of goods and services relative to the foreigner, and consequently the IS curve gradually shift to the right $IS(A', \overline{q}')$ at point Z.

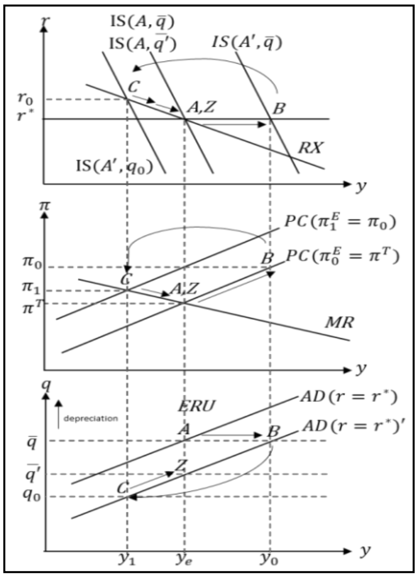


Figure 4: Dynamic adjustment to the shock
Source: Wendy Carlin & Skskice, 2015

Empirical Framework
Based on the three-equation model in the open economy, when estimating the determinants of output, the general model is specified in **Equation 1** as follows:

$GDP = f(GOV, IR)$ … . . (1)

Real GDP is a function of real public expenditure (GOV) and interest rate (IR)

From equation 1, the simple linear model with common intercept for all cross-sections and time derivatives in **Equation 2** is as follows:

$GDP_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 IR_{it} + \mu_i + \varepsilon_{it}$ … . . (2)

i = 1,2,3 t = 1,2,3 … 13

By taking the logarithms of equation (2) and rearranging the terms, the following panel model specifications are given in **Equation 3**, as follows:

$LNGDP_{it} = \beta_0 + \beta_1 LNGOV_{it} + \beta_2 IR_{it} + \boldsymbol{\mu_i} + \varepsilon_{it}$ … . . (3) LGDP refers to log real GDP. LGOV and IR refer to the log of public expenditure and interest rate. β_1, β_2, are estimated coefficient, μ_i is individual specific effect (unobserved heterogeneity and time invariant) and idiosyncratic error term ε_{it} is a random error

$\varepsilon_{it} \sim N(0, \sigma^2)$ and $Corr(x_{it}, e_{it}) = 0$

According to the literature review, the hypothesis test of the model specification in Equation (3) is as follows:

Public expenditure Interest rate

H_0: $\beta_1 \leq 0$ H_0: $\beta_2 \leq 0$

H_a: $\beta_1 > 0$ H_a: $\beta_2 > 0$

Model specification
The model specification starts with the classical ordinary squares (OLS) method and explains how OLS uses dummy variables to deal with unobserved heterogeneity

(i) Pooled OLS

The pooled OLS is a linear regression does not distinguish it from other type of error, where as the Fixed Effects Model regards it as coefficient to be estimated, and the Random Effects Model treats it as a random variables (Wooldridge, 2015). Pooled OLS assumes that the intercept and slope are constant, regardless of group and time period. Based on equation 1, the pooled OLS model becomes:

$GDP_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 IR_{it} + \varepsilon_{it}$ ($\mu_i = 0$)

If the individual's unobserved effect μ_i does not exist ($\mu_i = 0$), ordinary least squares (OLS) will produce valid and consistent parameter estimates. However, the pooled OLS ignore the nature of panel data, and treat ε as identically and independently (i.i.d) disturbance that are correlated with independent variables (x) or $Corr(\varepsilon_i, x_i) = 0$ (Gujarati, 2003 and Wooldridge, 2015). The estimator of the slope denotes by β_{ols}.

(ii) Fixed Effect Model

A Fixed Effect (FE) Model assumes that μ_i exist and correlated with (x) or $Corr(\varepsilon_i, x_i) \neq 0$ and idiosyncratic error ε_{it} is independent of the explanatory variables (Baltagi, 2001 and Kmenta, 1997). Based on equation (1), the FE model become the equation (2). The coefficient derived from regression in equation (2) by using OLS will be bias. This means the second OLS assumption of exogeneity is violated (Greene, 2008) and (Peter Kennedy, 2008). The FE model is estimated by within-group FE estimation methods and least squares dummy variables (LSDV) FE regression (OLS with a set of dummies).

(a) Within group

The model is manipulated in such a way that the μ_i is eliminated by subtracting the individual mean ($\bar{x}$) from each observation (Baltagi, 2001; Gujarati, 2003 and Kmenta, 1997) from the equation 2 and the running OLS on the transformed model.

$$GDP_{it} - \overline{GDP}_i = \beta_0 - \beta_0 + \beta_1(GOV_{it} - \overline{GOV}_i) + \beta_2(IR_{it} - \overline{IR}_i) + (\mu_i - \overline{\mu}_i) + \varepsilon_{it}$$

The intercept β_0 and μ_i are eliminated by this transformation. The above transformation is called the within or time series transformation because the model uses the within variation in the data only and the FE estimator denote as β_{fe}. Since β_{fe} relies on the within variation, the effects of variables that do not change through time cannot be identified or time invariant variables are unable to estimate.

(b) Least squares dummy variables (LSDV)

An alternative view of the FE model is that the μ_i is brought explicitly into the model to be estimated (Greene, 2003). Let say a set of dummy variable D_i, where D_i is equal to 1 in the case of observation relating to individual i and 0 otherwise, from the equation 2 the model can be written:

$GDP_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 IR_{it} + D_1\mu_1 + D_2\mu_2 + \varepsilon_{it}$

The μ_i is now being treated as the coefficient of the individual-specific dummy variable, the $D_1\mu_1$and $D_2\mu_2$ representing a FE Model on the dependent variable GDP for individual i. The LSDV model can be estimated by using OLS. However, the untransformed model with a distinct intercept for each unit of LSDV can be cumbersome if number of N is large. In the same time, include of dummy variable tend to lose degree of freedom.

(iii) Random Effect Model

A Random Effect (RE) Model assumes that μ_i exist and uncorrelated with (x) or $Corr(\varepsilon_i, x_i) \neq 0$ and as a random variables rather than fixed ones (Baltagi, 2001; Greene, 2003). Based on equation (1), the FE model become the equation (2) because the μ_i is characterised as random and assume part of ε_{it} that have variance σ^2 and σ^2, respectively. In the RE model, ε is

λ u it

serially correlated within a unit. This is because all observations within a unit have a common component, viz. λ_i. Because of this autocorrelation, the third OLS assumption of non-autocorrelation is violated (Greene, 2008) and (Peter Kennedy, 2008). The RE model can be estimated by generalized least square (GLS), involves the following transformed model by OLS and the RE estimator is β_{re}

$$(GDP_{it} - \theta\overline{GDP}_t) = \beta_0 + \beta_1(GOV_{it} - \theta\overline{x}_i) + \beta_2(IR_{it} - \theta\overline{x}_i) + v_{it}$$

Notice that the β_{re} uses a weighted average of within and between variations in the data.Then if the θ = 0 the RE estimator become Pooled OLS and the θ = 1 will back to FE Model.
In simplicity, pooled OLS ≤ RE ≤ FE or can be represented as $0 \leq \theta \leq 1$

Test on model selection

There are three basic test that can help to make the right decision for the model selection.
(i) The Lagrange multiplier (LM) test for the existence of the random effects was designed by (Breusch & Pagan, 1980) to distinguish the Pooled OLS model and the RE model. The presence of μ_i distinguishes the RE model from the Pooled OLS model. If $\mu_i = 0$, the OLS would be BLUE as there would be no autocorrelation. Otherwise, the RE model is most appropriate (Greene, 2003). The hypothesis test as follows:

H_o: $u_1 = u_2 = 0$ **(Pooled OLS model)** H_A: $u_1 = u_2 \neq 0$ **(RE model)**

LM test requires the OLS residual ε_{it}. Under the null hypothesis, the LM distribution is a chi-square with one degree of freedom. Since the variables are defined as Equation 3, it is necessary to test whether the RE model using GLS is necessary or a simple OLS for pooled OLS
(ii) The second test is the **F-statistics**, which is used to identify Pooled OLS and FE models. The data need to run OLS regression by group or by time. As in the first test, there is μ_i to distinguish the FE model from the pooled OLS model. If $\mu_i = 0$, the Pooled OLS model is chosen (Baltagi, 2001). The hypothesis testing as follows:

H_o: $u_1 = u_2 = 0$ **(Pooled OLS model)** H_A: $u_1 = u_2 \neq 0$ **(FE model)**

If the p-value<0.05, reject the null hypothesis indicating the FE estimator should be used.
(iii) The third test commonly used in applied panel data analysis attempts to determine which is more suitable for the RE model or the FE model by using the Hausman specification test. This test compares FE Model and RE Model under the null hypothesis, that is, μ_i is

independent of the other explanatory variables in the model (Baltagi, 2001; Greene, 2003). Haus-statistics will have an asymptotic chi-squared distribution with k degrees of freedom under the null hypothesis of regressor-effect independent (RE is appropriate). A large value of Haus is evidence against this (p-value<0.05) indicating the FE estimator should be used. The hypothesis test translates into:

H_O: $efficient\ model$ **(RE model)**
H_A: $consistence\ model$ **(FE model)**

Diagnostic checks
In order to reiterate the results obtained in the panel data model, this study also provides diagnostic checks to ensure that the results obtained are reliable.

(i) Multicollinearity
Detection of multicollinearity by using variance inflation factor (VIF). VIF shows how the variance of the estimator is inflated by the presence of multicollinearity. If the VIF is greater than 10, then there is a problem of multicollinearity.

(ii) Heteroskedasticity
A test for heteroskedasticity is available for the FE model by using modified wald statistic for groupwise heteroskedasticity. The test using the hypothesis is as follows:
H_O: Homoskedasticity
H_A: Heteroskedasticity

(iii) A Lagrange-Multiplier test is using for serial correlation, as the hypothesis as follows:
H_O: No serial correlation
H_A: Serial correlation

Data and Empirical Result
Data
Given the description in Equation 3, this study uses the quarterly balanced panel series data from the first quarter of 2018 to the first quarter of 2021, which contains 39 observations with three countries namely Malaysia, Singapore and Indonesia. The data sources of real gross domestic product, real public expenditure and interest rate of each country obtained from various official agencies, as shown in **Table 1**. All variables are shown as natural logarithms except for interest rate. The analysis and discussion of fiscal and monetary policies during the COVID-19 crisis will be interoperable based on theory and literature review.

Table 1
Descriptive statistics

Variables	Unit	Malaysia	Singapore	Indonesia
LGDP	USD million	DOSM[1]	DOS[3]	BPS[5]
LGOV	USD million	DOSM	DOS	BPS
IR	%	BNM[2]	MAS[4]	BI[6]
ER*	Home currency/USD	BNM	MAS	BI

Note: Department of Statistics Malaysia (DOSM[1]) and Bank Negara Malaysia (BNM[2]),

Singapore Department of Statistics (DOS[3]), The Monetary Authority of Singapore (MAS[4]), Badan Pusat Statistik (BPS[5]) and Bank Indonesia (BI[6])
* ER refers to exchange rate for conversion from home currency to USD
The descriptive statistics in **Table 2** shows for $lnGDP$ the overall variance is $0.166^2 = 0.027$ of which the **within variance** is $0.023^2 = 0.001$, or just 1.935%. Similar with $lnGOV$ (85.946%) and IR (120.386%) variables the **between variance** component dominates.

Table 2
Descriptive analysis

Variable		Mean	Std. Dev.	Min	Max	Observations
lngdp	Overall	5.043	0.166	4.826	5.300	N = 39
	Between		0.198	4.921	5.272	n = 3
	Within		0.023	4.948	5.071	T = 13
lngov	overall	4.209	0.101	4.055	4.433	N = 39
	between		0.094	4.127	4.311	n = 3
	Within		0.065	4.093	4.335	T = 13
ir	overall	2.883	1.735	0.126	6.000	N = 39
	between		1.903	1.097	4.885	n = 3
	Within		0.728	1.498	3.998	T = 13

The correlation between the lngdp and all independent variables are highly significant at 0.05 level which ir has more than 80%, as shown in **Table 3**.

Table 3
Correlation table

Variables	$lnGDP$	$lnGOV$	IR
$lnGDP$	1.000		
$lnGOV$	0.747**	1.000	
IR	**0.820****	0.718**	1.000

Note: The value of high correlation with more than 0.8 should be in bold
** denotes significance level at the 0.05 level

Analysis of result and test on model specification
Table 4 shows the regression of Pooled OLS, FE model, and RE model. The FE model is found to be an appropriate model through selection tests. **Table 5** shows the test results of model selection to determine the appropriate model.

Table 4
Regression analysis for Pooled OLS, FE Model and RE Model

Dependent variables: $\boldsymbol{lnGDP}$	**Pooled OLS**	**Fixed Effect model**	**Random Effect model**
$lnGOV$	0.534 **	0.157 ***	0.534 **
	(0.206)	(0.053)	(0.206)
IR	0.056 ***	0.007	0.056 ***
	(0.012)	(0.005)	(0.012)
cons	2.633 ***	4.280 ***	2.633 ***
	(0.845)	(0.217)	(0.845)
Country 1 (dummy)		0.280 ***	
		(0.021)	
Country 2 (dummy)		-0.035 ***	
		(0.011)	
F-test (model)	47.380	588.180 ***	
DF	38	38	
R^2	0.725	0.986	
SSE (SRMSE)	0.287	0.015	
SEE or $\hat{\sigma}_v$	0.089	0.021	0.021
$\hat{\sigma}_u$			0.000
θ			0.000
Effect Test		311.57 ***	1.000
N	39	39	39

Note: Standard error in parenthesis
Statistical significance: ***0.01 **0.05 *0.10 level

Table 5
The tests on model selection

Test	Hypothesis	Conclusion
Breusch-Pagan, Lagrangian Multiplier (LM) Test for Pooled OLS and RE Model	H_o: $u_1 = u_2 = 0$ $(\boldsymbol{Pool})$ H_A: $u_1 = u_2 \neq 0$ $(\boldsymbol{RE})$	Chi-square = 0.000 Prob > Chi-square = 1.000 p-value > 0.05 Fail to reject H_o Pooled OLS is chosen
F-statistics for Pooled OLS and FE Model	H_o: $u_1 = u_2 = 0$ $(\boldsymbol{Pool})$ $(\boldsymbol{FE})$ H_A: $u_1 = u_2 \neq 0$	F(2, 34) = 311.57 Prob > F = 0.000 p-value < 0.05 Reject H_o FE Model is chosen
Hausman specification test	H_o: $efficient\ model\ (\boldsymbol{RE})$ H_A: $consistence\ model\ (\boldsymbol{FE})$	Chi-square = 24.14 Prob > Chi-square = 0.000 p-value < 0.05 Reject H_o FE Model is chosen

Model selection specification
Based on OLS regression analysis in equation 3 and test on model specification, the FE Model will become:

$$\widehat{lngdp}_{it} = 4.280 + 0.157 lngov_{it} + 0.007 ir_{it} \quad t\text{-}stat$$
$$(19.76)^{***} \ (2.98)^{**} \quad (1.52)$$

R^2 = 0.9858
F-statistics = 588.18^{***}

The result shows that FE model fits the data well; a high R^2 (0.986) means 98.6% of the variance in the explanatory variable can be explained by the variance of $lngdp$. Only $lngov$ variable is significant at the 0.01 level means for USD 1 million increase in public expenditure, the gross domestic product is expected to rise by USD 0.157 million on average, holding other variables constant indicating fiscal policy is more effective for the economic growth of Malaysia, Singapore and Indonesia. This finding consistent with (Gali, 2020) which fiscal policy as an urgent execution during the COVID-19 pandemic and (IMF, 2013) that fiscal policy was an appropriate countercyclical policy tool. This model is also consistent because u_i has been removed from the model. This model implies that each country has different intercept reflecting every country has initial technology, resource endowments and so that differ across countries.

Diagnostic checks
The three techniques of diagnostic checks are shown in **Table 6**. The results of FE model to estimate the fiscal and monetary of these countries during the COVID-19 crisis are stable because there is no multicollinearity, homoskedasticity and no serial correlation problem.

Table 6
Result of diagnostic check

Diagnostic checks		**Conclusion**
Multicollinearity Detection: variance inflation factor (VIF) (consistent with the advantage of using panel data with less collinearity)	**Variable** $lnGOV$ 2.07 IR 2.07 Mean VIF 2.07	VIF is <10, indicating no multicollinearity
Heteroskedasticity Detection: Modified Wald statistics for groupwise heteroskedasticity	chi (3) = 0.34 Prob > Chi2 = 0.9529 H_o: Homoskedasticity H_A: Heteroskedasticity	A p-value is no significant suggests fail to reject the null hypothesis and conclude there is a homoskedasticity (variances are constant). The model is robust to rectify for heteroskedasticity
Serial correlation (Autocorrelation) Detection: Wooldrige (2002) serial correlation test	F (1,2) = 6.015 Prob > F = 0.1337 H_o: No serial correlation H_A: Serial correlation	A p-value is no significant suggests fail to reject the null hypothesis and conclude there is **no serial correlation**

Conclusion and Recommendation

Conclusion

This study uses balanced panel data to investigate the importance of the fiscal and monetary policies used by Malaysia, Singapore, and Indonesia in response to the economic recession from the first quarter of 2005 to the first quarter of 2021. The empirical results show that the appropriate model is a FE Model. The result revealed that the public spending is positively significant at the 0.01 level with gross domestic product, holding other variables constant. In other words, an increase of USD 1 million in public expenditure is expected to rise the gross domestic by USD 0.157 million on average, *cateris paribus*. This finding consistent with (Gali, 2020) and (IMF, 2013) that fiscal policy is an appropriate countercyclical policy tool during the crisis. Therefore, during the COVID-19 crisis, fiscal policy is more effective for the economic growth of Malaysia, Singapore and Indonesia. These findings are further confirmed by using VIF, modified Wald statistics and Wooldrige (2002) serial correlation test indicating the model is consistent, stable and robust.

Recommendation

According to the empirical results, this study recommends sound fiscal policies and effective implementation, countries will emerge stronger from this global health crisis. Although fiscal policy has a positive effect on economy, it should be remembered that both policies are interdependent, and it requires a consistent and sustainable policy-mix framework to avoid possible inconsistencies. Hence, it is very important to incorporate both policies into a single model, because their interaction has a significant impact on economic growth. These two policies should be considered at the same time, rather than in isolation.

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