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The Effects of Unemployment, Inflation and Interest Rates on the Government Expenditure in the Philippines

Carl Vincent Bienes,
Patrick Mello Domingo,
Arkyl Joshua Pinpin, and
[*]**Ronaldo Cabauatan,** University of Santo Tomas
E-mail: rrcabauatan@ust.edu.ph

Abstract: *This study examines the nature and interaction of the government expenditure (GE) and the macroeconomic variables such as unemployment rate (UNEM), inflation rate (IN), and real interest rate (RIR) in the Philippines from 1976 to 2019. This study aims to determine the effect of the macroeconomic variables on GE in the Philippines based on time series data from the World Bank Database. The econometric techniques such as Augmented Dickey-Fuller (ADF), Johansen cointegration test and Granger causality were used to investigate the relationship that transpires in the variables. The properties of time series were examined through unit root test and the results of the ADF unit root test which showed that the independent variables IN, RIR, and UNEM are stationary at level form, while government expenditure percent of GDP is stationary at first difference. The Johansen cointegration test stated that there exists a long-run relationship between UNEM, IN, RIR and GE. The Granger causality revealed that UNEM, IN, RIR does not cause GE, hence, there is no causation between these variables.*

Keywords: Government expenditure, Unemployment rate, Inflation rate, Real interest rate, Econometric techniques

1. Introduction

Unemployment (UNEM) and inflation (IN) have been the subject of concern in developing countries (Ademola & Badiru, 2016) where UNEM and IN are some determinants of economic growth which is, according to classical economists, UNEM is the excess supply of labor which is caused by adjustment in the real wage and they also defined IN as caused by the alteration in the supply of money. For classical economists, the increase in government expenditure makes the performance of the economy slow and does not raise aggregate demand. For example, when the government tries to impose an increase in tax and interest to increase the expenditure, it may discourage individuals from working because a higher tax and interest means a higher deduction from the income (Nurudeen & Usman, 2010).

[*]Corresponding Author

However, the view of the Classical economist contradicts the view of Keynesian (Nurudeen & Usman, 2010) where the government increases the money supply to meet the demand. An increase in government spending, following the Keynesian approach, can reduce unemployment (Ebi and Ibe, 2019). Thus, government expenditure is a genuine tool for the enhancement of economic activities and stimulates employment (Anyingang & Udoka, 2015). Furthermore, through GE, the government can influence the economy which means that it is an important measurement and is an important mechanism on the growth of the economy (Iheanacho, 2016).

According to the Bank (2010), the Philippines' economic performance has often been seen as disappointing compared to other neighbors in East Asia. However, the economic performance strengthened in the year 2001 to 2006 as the inflation and unemployment rate decreases which is an improvement in the country's economic growth. On the other hand, the national government expenditure of the Philippines over the past decade since the mid-1990s was contracted by about 2-3% of GDP. Between the years 1996-2006, public investments and maintenance contracted by more than 2% of the GDP, and this was mainly due to an increase in interest payments after the Asian financial crisis which led the level of interest rates rise steadily.

The study aims to assess the impact of UNEM, IN, and RIR in the Philippines. The focus of this study is to investigate if there is an existing relationship between the variables UNEM, IN, and RIR on GE in the Philippines and to examine the causal direction of the relationship and to compare the short-run and long-run effects of the variables (Zayed, 2018; Zayed & Zahan, 2017; Zayed, 2015).

2. Literature Review

2.1 Unemployment Rate and Government Expenditure

The Organization (2013) defined UNEM as a share of the labor force that is currently not working but is willing to work and searching for work (Office, 2019). Alamaoudi (2017) stated that in decreasing the unemployment rate, government expenditure is important since it has the power to shape policies. Saraireh (2014) and Nwosa (2014) found that the unemployment rate has a positive significant correlation coefficient with government expenditure. Tayeh and Mustafa (2011) concluded that UNEM is significantly and positively related to GE. When the unemployment is higher, the government expenditure is also higher because the government should spend money to support project development to solve problem. Tagkalakis (2013) revealed that unemployment can be large in case of cuts in government expenditures. Ebi and Ibe (2019) showed that there is a negative relationship between UNEM and recurrent expenditure but has a positive relationship to capital expenditure. Murwirapachena et al. (2013) revealed that government consumption

positively affect UNEM while government investment negatively affects UNEM in South Africa.

Aboulfrag and Qutb (2020) concluded that as UNEM increases in the long run due to higher expenditure on subsidies and employee compensation which causes an increase in GE. Seitaridis and Koulatikiotis (2013) found a causal relationship between GE and UNEM. Fosu (2019) revealed that UNEM decreases when there is an increase in GE. Shadi (2020) found a negative long-run relationship between UNEM and government spending. Maku and Alimi (2018) used OLS and found a negative long-run relationship between UNEM and GE. Egbulonu and Amadi (2016) and Mehmood and Sadiq (2010) found a negative relationship between UNEM and GE. Bruckner and Papa (2012) and Ogbeide et al. (2015) showed that the unemployment rate significantly increases government expenditure. Olofsson (2013) concluded that unemployment decreases when government spending increases. Auerbach and Gorodnichenko (2012) found a negative relationship between GE and UNEM in Nigeria using error correction model. Tayeh and Mustafa (2011), Tagkalakis (2013), and Seitaridis and Koulatikios (2013) found a causality between the UNEM and GE. Saraireh (2014), and Ebi and Ibe (2019) concluded that the UNEM has a positive and significant relationship to GE and capital expenditure. Aboulfrag and Qutb (2020), and Bruckner and Papa (2012) showed that the UNEM significantly increases GE. Shadi (2020) and Maku and Alimi (2018) found a negative relationship between the UNEM and GE but Ebi and Ibe (2019) only found a negative relationship in the recurrent expenditure.

2.2 Inflation Rate and Government Expenditure

Tayeh and Mustafa (2011) concluded that the IN is negatively related to GE. As the IN increases, GE decreases. Attari and Javed (2013) explore the relationship between IN and GE showed that in the short run, the IN affects GE. Anokwuru and Ekpenyong (2020) stated the insignificant relationship between IN and GE in the short run, while significant in the long run. The IN does not affect GE but GE affects IN. Dada (2013) mentioned that there is a long-run unidirectional causality from IN to government spending. Oyerinde (2019) showed that there is a strong relationship between IN and GE and there is a significant impact both from the short run to the long run.

Ogbole and Momodu (2015) revealed that the variables inflation and government expenditure are stationary, weakly, and inversely correlated in the long run. Using the Granger test shows that there is no causation between inflation and government expenditure. While Nguyen (2019) confirmed a causation in the long run. Mehrara and Sujoudi (2015) and Oniore et al. (2015) concluded that there is no effect between IN and GE. Nguyen (2015) said that government expenditure and interest rate are statistically significant to each other.

Ezirim et al. (2014) indicated that there exists one cointegrating equation and a sustainable long-run equilibrium relationship between the inflation and the government expenditure variables in Nigeria, and a positive relationship between inflation and recurrent government spending in the short-run. According to Olayungbo (2013), high inflation is caused by low government spending while Sabaj (2019) stated that high inflation is because of the higher response in the government expenditure. Surjaningsih et al. (2012) also said that when there is a decrease in inflation, there is an increase in government spending.

2.3 Real Interest Rates and Government Expenditure

Du (2015) established the correlation with the hypothesis using a Ramsey Model and meticulous examination of time series from 1959 to 2002 US data and 16 years of Chinese data stated that an increase in government expenditure can increase real interest rates and using the ADF-Test showed that government spending is non-stationary (Zayed et al., 2020c; Zayed et al., 2019a; Zayed et al., 2019b; Zayed et al., 2019c; Zayed et al., 2019d; Zayed et al., 2018a; Zayed et al., 2018b).

Murphy and Walsh (2020) proposed a wide range of empirical data that shows government expenditure shocks lead interest rates to fall to zero or to fall to negative levels. If the government increases its expenditures with money-like assets, there is an excess supply of loans, which causes long-term interest rates to fall causing a negative correlation. Ezeji and Ajuduan (2015) showed that interest rate is significant to the government expenditure which conforms to the Keynesian model. Adam et al. (2018) examined the relationship between interest rates and government expenditure and concluded that there is a short and long-run relationship between the two variables and in the long run, there is a negative relationship. While Radhi and Sallal (2018) concluded that government expenditure is not affected by the change in the interest rate.

In general, government expenditure may be utilized as a direct instrument to stimulate aggregate demand and resuscitate an economy. According to Sy (2020), massive government spending raises interest rates in the long run. Odhiambo and Nyasha (2019) investigated that, as a means of funding its expenditure, the government puts pressure on the credit market, raising interest rates. When interest rates rise, they affect everyone, including the private sector, not just the government as stated by Weinstock (2020).

Murphy and Walsh (2020) found that an increase in government expenditure would cause long-term interest rates to decrease causing a negative correlation. Sy (2020) identified that a massive increase in government spending raises interest rates, therefore, causing a positive relationship. Odhiambo and Nyasha (2019) found that an increase in GE positively correlates to an increase in interest rates. Weinstock (2020) identified that additional government spending does not increase interest rates, therefore, forming a negative correlation.

3. Methodology

This study is on government expenditure and how unemployment rate (UNEM), inflation rate (IN), and interest rate (RIR) affect the government expenditure (GE). The data for the variables were obtained from the World Bank. The data used for the paper were annual and cover from the period 1976-2019. The reason for this is because the researchers wanted to have more than 30 observations for the validity of results and also to see the trend of the government expenditure for the past years. The Keynesian economic model will be used as a framework for this study (Stepnov et al., 2021; Zayed et al., 2021; Zayed et al., 2020a; Zayed et al., 2020b).

Hence, the model is specified as:

$$GE = B_0 + B_1 UNEM + B_2 IN + B_3 RIR + u$$

where GE is the government expenditure, UNEM is the unemployment rate, IN is the inflation rate and RIR real interest rate.

To operationally define the variables, the government expenditure includes the government purchases on final goods and services but this does not include transfer payments. UNEM is the share of the labor force without work and seeking employment. The IN is measured by the consumer price index. The RIR is the lending interest rate adjusted for inflation (Rahman et al., 2021; Rakhimova et al., 2021).

This study used the Augmented-Dickey Fuller (ADF) unit root test to check the stationary properties of the variables. The Ordinary Least Square (OLS) method will be used to estimate the linear regression model's parameter and identify the variables' relationship. The Johansen Cointegration test will be used to check the long-run relationship in the variables. Lastly, the Granger causality test which was developed by Granger (1969) will be used to examine the direction of causation between the variables (Mishu et al., 2020).

3.1 Granger Causality

Causality between GE and UNEM

$$\Delta GE_{it} = \sum_{k=1}^{p} \beta_k \, \Delta GE_{i,t-k} + \sum_{k=0}^{p} \theta_k \, \Delta UNEM_{i,t-k} + u_{i,t}$$

$$\Delta UNEM_{it} = \sum_{k=1}^{p} \beta_k \, \Delta UNEM_{i,t-k} + \sum_{k=0}^{p} \theta_k \, GE + v_{i,t}$$

Causality between GE and IN

$$\Delta GE_{it} = \sum_{k=1}^{p} \beta_k \, \Delta GE_{i,t-k} + \sum_{k=0}^{p} \theta_k \, \Delta IN_{i,t-k} + u_{i,t}$$

$$\Delta IN_{it} = \sum_{k=1}^{p} \beta_k \, \Delta IN_{i,t-k} + \sum_{k=0}^{p} \theta_k \, GE + v_{i,t}$$

Causality between GEC and RIR

$$\Delta GE_{it} = \sum_{k=1}^{p} \beta_k \, \Delta GE_{i,t-k} + \sum_{k=0}^{p} \theta_k \, RIR_{i,t-k} + u_{i,t}$$

4. Results and Discussion

The result of the unit root test is summarized in Table 1. It shows the unit root test of the variables to determine whether the variables are stationary or non-stationary. The independent variables inflation rate, real interest rate, and unemployment rate are stationary at level form, while government expenditure percent of GDP is stationary at first difference. Table 2 shows that there is at most one cointegrating equation which is implied that there is at most one equation with long-run relationship that exists among the variables (Egbulonu & Amadi, 2016; Ebi & Ibe, 2019).

Table 1: Unit Root Test

Variable	Level	Prob	First Difference	Prob
GE	-2.188358	0.2135	-4.304408	0.0014
IN	-4.790591	0.0004	-1.425228	0.5580
RIR	-6.291158	0.0000	-7.966037	0.0000
UNEM	-3.433191	0.0627	-2.547702	0.3050

Source: Estimated.

Table 2: Cointegration Test

Hypothesized	Trace		Max-Eigen	
No. of CE(s)	Statistic	Prob.	Statistic	Prob.

None	61.93822	0.0014	30.23706	0.0223
At most 1	31.70116	0.0298	19.17527	0.0919
At most 2	12.52589	0.1334	11.47110	0.1321
At most 3	1.054792	0.3044	1.054792	0.3044

Source: Estimated.

Table 3: Granger Causality Test

Sample: 1976 2019

Null Hypothesis:		Prob.
IN does not Granger Cause DGE		0.1898
DGE does not Granger Cause IN	No causation	0.2608
RIR does not Granger Cause DGE		0.3435
DGE does not Granger Cause RIR	No causation	0.2470
UNEM does not Granger Cause DGE		0.5312
DGE does not Granger Cause UNEM	No causation	0.8373

Source: Estimated.

Table 3 shows the results of the Granger causality, stating that there is no causality between IN and GE, between RIR and GE, and between UNEM and GE. This result is consistent with Ogbole & Momodu (2015) that there is no causation between inflation and government expenditure and to the study of Ebi & Ibe (2019) that there is no causation between unemployment rate and government expenditure (Hosaain et al., 2019; Hosaain & Zayed, 2016; Kader et al., 2021).

Table 4: Estimation Results

Dependent Variable: DGE					
Sample (adjusted): 1977 2019					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	VIF
Constant	0.164809	0.278985	0.590743	0.5598	NA
IN	0.074449	0.045246	1.645431	0.1119	2.744572
RIR	0.108096	0.042361	2.551768	0.0169	1.433499
UNEM	-0.251293	0.114932	-2.186454	0.0380	3.350082
R-squared	0.222294	F-statistic		2.477212	
Adjusted R-squared	0.132558	Prob(F-statistic)		0.083648	
Jarque-Bera stat	0.281022	Akaike info criterion		1.766216	
Prob(Jarque-Bera)	0.868914	Schwarz criterion		1.953042	
Durbin-Watson stat	1.398070	Hannan-Quinn criter.		1.825983	
Breusch-Godfrey Serial Correlation LM Test:					
F-statistic	2.307997	Prob. F(2,37)			0.1413
Heteroskedasticity Test: Breusch-Pagan-Godfrey					
F-statistic	0.321393	Prob. F(3,39)			0.8098
Heteroskedasticity Test: ARCH					
F-statistic	0.834301	Prob. F(1,40)			0.3691
Chow Breakpoint Test: 2000					
Null Hypothesis: No breaks at specified breakpoints					

F-statistic	0.451612	Prob. F(4,35)	0.7701
Ramsey RESET Test	Value	df	Probability
t-statistic	1.391089	38	0.1765
F-statistic	1.935130	(1, 38)	0.1765

Source: Estimated.

Table 4 shows that there is normality in the estimation results, there is no serial correlation error, there is no heteroskedasticity, there is no breakpoint, and there is no misspecification error. Table 4 in the estimation results shows that the RIR has a positive effect on DGE. This finding is also the same as Odhiambo & Nyasha (2019) and Sy (2020). An increase in RIR is also associated with an increase in DGE. Moreover, Odhiambo and Nyasha (2019) said that as a means of funding the expenditure of the government, increasing the RIR is important by putting pressure on the credit market as this affects not just the government but also the private sectors. The IN has a positive effect on DGE. In the study of Tayeh & Mustafa (2011), they found a typical relationship between DGE and IN. This is contrary to the study of Oniore et al. (2015) which revealed the insignificant relationship between IN and DGE. However, UNEM has a negative effect on DGE. The result is consistent with the works of Shadi (2020), Maku and Alimi (2018), Egboluno and Amadi (2016), and Mehmood and Sadiq (2010) who discovered a negative effect of the UNEM on DGE. Tayeh and Mustafa (2011) found a substantial relation between government expenditure and unemployment expenditure (Bukharbayeva et al., 2021; Chowdhury et al., 2019).

5. Conclusion

This study empirically examined the relationship between UNEM, IN, and RIR on GE from 1976 to 2019. The objectives of this paper are to know if there is an existing relationship that transpires in the variables and determine its causal direction relationship. The study adopted econometric tools like OLS and Granger causality in its data analysis. The properties of time series were examined through unit root test and the results of the ADF unit root test showed that UNEM, IN, and RIR are stationary at level form, while GE is stationary at first difference. The Johansen cointegration test indicated that there exists a long-run relationship between UNEM, IN, RIR and GE. The Granger causality revealed that UNEM, IN, and RIR does not granger cause the GE, hence, there is no causation between these variables.

As a policy recommendation, the study suggests that the government should consider restructuring its expenditure by focusing more on capital projects like construction to reduce the unemployment rate in the country and create more employment. The government should also provide appropriate macroeconomic policies to ensure sustainable govern-

ment spending and funds should be invested properly to stimulate national incomes and create more jobs.

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