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Unanticipated Money Growth and Unemployment in the Philippines

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Abstract

The Philippines has had high levels of unemployment for years. During the 2000s, the unemployment rate hovered between seven and ten percent. High unemployment can have adverse effects on individuals and society. The question that this paper analyses is how unanticipated money growth affect the unemployment situation in the Philippines. There has been literature on the relationship between unanticipated growth on the money supply and unemployment. The paper proposes that only unanticipated money movements will affect real economic variables like unemployment and the output level. In order to test our hypothesis, it is important that we need to quantify the concepts of anticipated and unanticipated money movements. This paper uses time-series data on several economic variables as well as a model based on Geetha et al. (2023). Using an error-correction model, the results show that an unanticipated increase in M2 money is a factor that contributes to unemployment in Philippines.

Keywords: Philippines, unanticipated money, unemployment, time-series data.

JEL Classification: E24, E51.

Introduction

Unemployment is a serious problem that besets the Philippines. There have been instances in the past twenty years where the unemployment rate hit double digits. Millions of Filipinos have already gone abroad in order to look for jobs. Fresh college graduates find difficulty in getting decent work each year. More and more Filipinos enter the workforce with few opportunities waiting for them. High unemployment contributes to various social problems such as crime and family separation. The human costs of unemployment create a need for public policy to address the problem. Enforced idleness and a catastrophic drop in income may lead to hunger, ill health, social depression or even death. The costs of unemployment are both economic and psychological. Forced idleness of experienced workers will deprive the economy the use of their productive services. It is thus imperative that we try to look for solutions to this problem. What factors contribute to this problem? Could unanticipated movements in money be one of them? What role do they play in the unemployment situation in the country? Barro (1977) and Rush (1986) claim that unanticipated money growth has an influence on unemployment. This is what this paper will try to find out.

The question that this paper will analyse is how the growth of unanticipated money impacts the unemployment situation in the Philippines. The paper will investigate if unanticipated money movements are a major factor in determining unemployment in this country. In order to test our hypothesis, it is important that we need to quantify the concept of unanticipated money movements. We will also investigate the significance of overseas Filipino workers (OFWs) and the minimum wage on employment. Using time-series data and the error correction model, we do find that unanticipated movements in money supply have a significant effect on unemployment in the Philippines.

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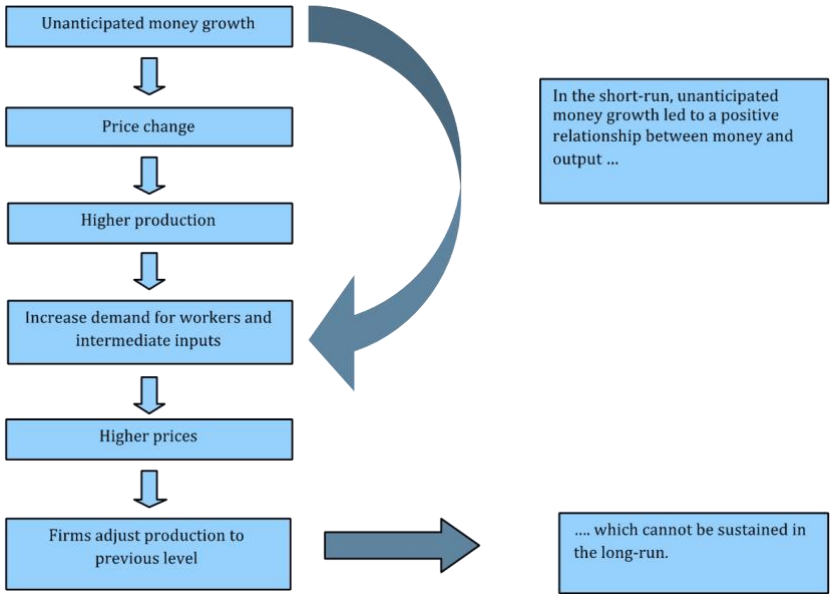
1. Review of Related Literature

Lucas (1972) pioneered the concepts of rational expectations and the neutrality of money. His model is summarized in Figure 1. According to this model, when unanticipated changes in money occur, agents have difficulty determining whether this change is general or relative. Firms that see this change as a relative price change would expand their production because they believe that there is an increase in demand for their goods and services. Increased production leads to hiring more workers which would then lead to an increase in wages as firms compete for these workers. The increase in wages as well as the increase in the price of other inputs leads to an increase in the costs of production which then leads to higher prices. As wages and prices rise, agents realize that a general price change has occurred, and they adjust their production back to its former level. Therefore, unanticipated money growth results in an increase in output in the short run but not the long run (Cacnio, 2013).

Figure 1. Real effects of unanticipated money shocks



Source: Cacnio (2013)

Barro (1977) found that unanticipated money could explain for unemployment in the United States while actual money growth was insignificant in explaining for unemployment, given the values of unanticipated money growth. Rush (1986) also arrived at the same result in his study. However, Mishkin (1982) argued that anticipated monetary policy matters and that it is more important than unanticipated monetary policy. Small (1979) criticized Barro's model by saying that the theory of rational expectations has received little empirical support in extending the long-run neutrality of monetary and fiscal policy to the short run. He thus questioned Barro's model and proposed a more flexible monetary model. Barro (1979) answered Small's criticism by stating that the estimated effects of monetary shocks on unemployment are robust to Small's suggested changes in specification. Thus, there is considerable debate as to the role of unanticipated monetary policy.

There have been studies that have been done in order to analyse the relationship between unanticipated monetary growth and other economic variables aside from unemployment. Barro (1978) has stated that unanticipated monetary policy is significant in influencing output and the price level. Pearce & Roley (1983) stated that as predicted by the efficient markets' hypothesis, stock prices would only be sensitive to unanticipated changes in the money supply. Their research has also shown that unanticipated increases in the announced money supply tend to lower the prices of stocks while unanticipated decreases in the announced money supply would tend to increase the prices of stocks. Gochoco (1984) in her study on unanticipated money growth and interest rates found that unanticipated money growth generates a substantial liquidity effect.

There have been several studies on the effect of unanticipated money in developing nations especially those in the Asia Pacific region. Marashdeh (1983) examined the effects of anticipated and unanticipated policy changes on economic variables using Malaysia as a case study. Using data from the period 1970 to 1990 and an autoregressive model, he found that unanticipated movements in inflation affect inflation in the short run. However, real output is not affected by unanticipated changes in monetary policy, fiscal policy and the balance of payments. Unanticipated changes in the money supply though have a significant effect on inflation.

Sam et al. (2015) also investigated the effects of unanticipated money on the Malaysian economy. Using a vector error correction model as well as two-stage regression, they found that unanticipated money has short run effects on the growth rate of real gross domestic product. Unanticipated money is found to have a larger effect on real output as opposed to anticipated money. This implies then that there is little evidence that monetary neutrality exists in Malaysia.

Khhatri-Chetri et al. (1990) sought to examine if unanticipated and anticipated money have an effect on real output in Thailand. Using data from 1960 to 1984, they discovered that anticipated money has an effect on real output, but unanticipated money does not. They also found that anticipated or unanticipated movements in government expenditure have no effect on output.

There has been recent research on the role of unanticipated money on output. Maitra (2010) examined how unanticipated monetary policy affected floating exchange rates in Sri Lanka. Using a GARCH (generalised autoregressive conditional heteroskedasticity) model, he discovered that unanticipated monetary shocks have a significant effect on the variation of Sri Lankan exchange rates. Maitra (2011) examined the role of unanticipated money in the Singaporean economy from the period 1971 to 2008 and found that the unanticipated part of the money supply affects output growth. Ajisafe et al. (2022) used an autoregressive distributed lag (ARDL) model to examine how anticipated and unanticipated money supply affects output in Nigeria. They found out that anticipated money has a neutral effect on output while the effect of unanticipated money on output is positive and significant. Hlasny (2009) used a state-space model to examine the effect of unanticipated money supply on gross domestic product in South Korea. His results show that a one percent shock to the money supply causes national demand to increase by 0.02%. Jha and Donde (2001) used the two-step procedure developed by Barro (1978) as well as the cointegrating vector autoregression (VAR) method to examine the effect of anticipated and unanticipated money on output in India. They found that anticipated money has a significant effect on output while no robust conclusion can be drawn about the effect of unanticipated money. Lastly, Geetha et al. (2023) examined the role that anticipated and unanticipated money plays with regard to Malaysian stock prices during a crisis. They discovered that most of their unanticipated monetary variables had a significant effect on stock returns.

Deheri (2021) investigated the effect of monetary policy shocks on inflation and output in India. Using monthlydata from 2001 to 2020 and a time-varying parameter VAR model, he found that contractionary monetary policy shocks have a negative effect on both output and inflation. However, the effect of monetary policy on inflation weakens as time goes on but it becomes stronger when it comes to output.

Cacnio (2013) discusses the economic effects of anticipated and unanticipated policy shocks on the Philippine setting. She used a simulation based on a macroeconomic model of the Philippines developed by the Bangko Sentral ng Pilipinas (the Philippines' central bank) to test her hypothesis. She found that both anticipated and unanticipated shocks have an effect output, the nominal exchange rate and inflation. These shocks lead to a higher output gap, higher inflation and lower nominal exchange rates in the immediate term. The effects of these unanticipated shocks though do not persist into the long term.

Tolulope (2013) examined the effects of monetary policy shocks on prices and output in Nigeria. Using quarterly data from 2000 to 2010 and an autoregressive distributed lag (ARDL) model, he found that anticipated monetary policy had a significant effect on output and prices, but unanticipated monetary policy is shown to be not significant.

Similar to Tolulope's study, Goshit et al. (2022) examined the asymmetric effects of positive and negative monetary shocks on output growth in Nigeria using quarterly data from 1981 to 2018. Employing a nonlinear autoregressive distributed lag (NARDL) model, they found that in the long run, both positive and negative monetary policy rate shocks have a positive and significant effect on output. In the short run, the effects of negative monetary policy rate shocks outweigh those of positive monetary policy rate shocks while the effects of positive money supply shocks outweigh those of negative money supply shocks.

Also looking at Nigeria, Iorember et al. (2022) examined the impact of monetary policy shocks on output in that country using ARDL and VECM tests. Their results show that money supply shocks have a positive effect on the growth of domestic output in the long-run, while interest rate and exchange rate shocks have a negative effect on long-run domestic output growth.

Ulke & Berument (2016) studied the asymmetric effects of monetary policy shocks on output, inflation and exchange rates in Turkey. Using monthly data from 1990 to 2014 and a nonlinear VAR model, they found that contractionary monetary policy lowers output, prices and the exchange rate while expansionary monetary policy has the opposite effect on those variables similar to what the theory says. However, their study showed that the effects of expansionary monetary policy are weaker than those of contractionary monetary policy and this is because expansionary monetary policy shocks are not as strong as contractionary monetary policy shocks.

Darracq-Paries & De Santis (2015) sought to investigate the effects of three-year long-term refinancing operations (LTRO) on the European economy. These LTROs were developed by the European Central Bank to make the supply of credit easier. The authors then treated these LTROs as a credit supply shock and then developed a panel VAR model which uses generalized method of moments (GMM) and the Arellano Bond estimator. Using quarterly data from the first quarter of 2003 to the fourth quarter of 2011, they found that these LTROs led to an increase in GDP over the short and medium terms and also had a positive effect on the provisions of loans to non-financial firms meaning that these instruments helped prevent a credit crunch in Europe.

Dahlhaus & Vashishta (2020) sought to examine the effect of American monetary policy news shocks on capital flows in emerging markets. Using Bayesian vector autoregression, they found that the effect of these shocks on portfolio inflows is relatively small but does vary from country to country.

Thanh et al. (2019) examined how stock prices in India are affected by unanticipated monetary shocks over the period of 1984 to 2018. Using a Markov dynamic switching regression model, they found that unanticipated monetary shocks have lagged effects on stock prices. Negative unanticipated shocks have a positive effect on stocks in bull markets while positive unanticipated shocks have a negative effect on stocks in bear markets.

Aßhoff et al. (2021) examined the effects of unconventional monetary policy on inflation expectations in the Euro zone. Using data from the period 2009 to 2018 and the Qual VAR model, they discovered that an unanticipated shock in unconventional monetary policy will raise inflation expectations in the short term, but these expectations will then decline after a few months.

D'Amico & King (2023) used a structural VAR model to identify the effects of monetary policy innovations that are either perfectly or imperfectly anticipated. The discovered that forward guidance set one year ahead has large effects on real activity and prices, but these effects do not grow stronger as the time horizon of forward guidance expands.

Tang et al. (2022) studied how monetary policy can affect investment on non-listed real sector companies in China. Using a proxy VAR model, they found that unanticipated expansionary monetary policy spurs investment in non-listed companies in the first year of the shock but by the fourth year of the shock, no positive accumulation of investment has happened.

Gogas et al. (2018) studied the effects of anticipated and unanticipated monetary policy shocks on real industrial production in the US and Brazil. They found that both unanticipated expansionary monetary shocks and unanticipated contractionary monetary shocks both have an effect on the industrial production index of both countries. They also discovered that positive monetary shocks have a bigger impact than negative monetary shocks in both countries.

Lastly, Milani & Treadwell (2012) examined the effects of both unanticipated (surprise) and anticipated (news) shocks on monetary policy. Using a structural general equilibrium model, they discovered that news shocks account for a larger share of output fluctuations as opposed to surprise shocks. Also, their paper found that surprise shocks have a smaller and more short-lived effect on output as opposed to news shocks which are slower, larger and more persistent effect.

This study tests the Barro model in the Philippine setting. However, our methodology differs from that of Barro by choosing explanatory real variables that are relevant to the Philippine labor market. Finally, it is the intention of this study to fill the existing empirical void and make a pioneering research work in this area.

2. Theoretical Framework

Model

To determine unanticipated money growth, we first need to estimate money growth. Barro (1977) estimated money growth as shown in the following equation:

$$DM_t = \beta_0 + \beta_1 DM_{t-1} + \beta_2 DM_{t-2} + \beta_3 FEDV_t + \beta_4 UN_{t-1} \quad (1)$$

where M_t is an annual average of M1 or M2 and $DM_t \equiv \log (M)_t - \log (M)_{t-1}$ measures the annual average money growth rate. Two lagged values of money growth are also added. FEDV is derived by the equation:

$$FEDV_t \equiv \log (FED)_t - [\log (FED)]^*_t \quad (2)$$

where FED is real US federal government expenditure and $[\log (FED)]^*_t$ is generated from the formula:

$$[\log (FED)]^*_t = \beta[\log (FED)]_t + (1 - \beta)[\log (FED)]_{t-1}, \quad (3)$$

where β is the adaptation coefficient with a value greater than zero but less than 1. This equation uses β = 0.2 as the value for the adaptation coefficient. $UN_{t-1} = \log (U/(1 - U))_{t-1}$ where U is the annual average unemployment rate (in % terms) in the total labour force.

Barro (1977) measured the impact of expansionary monetary policy on unemployment by the lagged and current values of unanticipated money growth. Once we get the value of DM_t we can now get the value of unanticipated money growth, DMR = DM – DM' where DM' is the value estimated through equation (1). Afterwards the unemployment equation is specified as:

$$\log (U/(1–U))_t = \beta_0 + \beta_1 DMR_t + \beta_2 DMR_{t-1} + \beta_3 DMR_{t-2} + \beta_4 MIL_t + \beta_5 MINW_t \quad (4)$$

where MIL is a measure of military conscription calculated as the ratio of military personnel to the male population aged 15-44 and MINW is the minimum wage variable. The other explanatory variables are current and lagged values of the unanticipated money growth.

In this study we estimate unanticipated money DMR using the method used by Geetha et al. (2023). In this method, the first difference of M1 and M2 is regressed on lags 1 and 2 of the same variable as shown below:

$$DM_t = \beta_0 + \beta_1 DM_{t-1} + \beta_2 DM_{t-2} \quad (5)$$

The residuals are then squared, and these squared residuals represent the unanticipated money variable DMR. We shall then estimate the following equation:

$$UN_t = \beta_0 + \beta_1 DMR_t + \beta_2 DMR_{t-1} + \beta_3 DMR_{t-2} + \beta_4 OFW_t + \beta_5 MINW_t + \mu \quad (6)$$

where OFW is the ratio of overseas Filipino workers (OFWs) to the total labour force and MINW is the hourly minimum wage in Metro Manila. We use the OFW variable as a substitute for the military personnel (MIL) variable in Barro's (1977) study.

For Barro, joining the military was an alternative that young Americans can do instead of staying in school or joining the civilian labour force. Similarly, working overseas provides an alternative for young Filipinos instead of staying in school or working in the Philippines. The unemployment variable UN will be calculated similar to Barro's (1977) model. Equation (6) shall also use current and two lagged values of DMR.

Data

This paper uses time series data which comes from various sources. A total of 44 observations per variable will be used in this study representing the years from 1979 up to 2022. Data on money supply (M1 and M2) came from the statistical bulletins of the annual reports of the Bangko Sentral ng Pilipinas (BSP) which is the Philippines' central bank. M1 or narrow money, is defined by the BSP as currency in circulation (money held outside of banks) and transferable deposits (which includes manager's and cashier's checks). M2 (or broad money) on the other hand, consists of M1 and other deposits such as savings and time deposits. The BSP collects data on liquidity aggregates such as M1 and M2 through its Depository Corporations Survey (Bangko Sentral ng Pilipinas, 2021). Data on unemployment, labour force, number of OFWs processed, and Metro Manila minimum wage were sourced from various issues of the Philippine Statistical Yearbook (PSY) published by the Philippine Statistics Authority (PSA). Table 1 shows the descriptive statistics (mean, median, standard deviation, minimum and maximum) of the variables.

Table 1. Descriptive statistics

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
M1 (millions of Pesos)	1,229,139	396,576	1,754,548	18,906	6,623,398
M2 (millions of Pesos)	3,557,180	1,565,058.	4,484,181	45,647	15,918,055
Minimum Wage (Pesos per day)	266.93	257.50	180.75	20.48	570.00
Unemployment Rate (%)	7.97	7.45	2.07	4.20	11.80
Labour Force (thousands of people)	32,120	31,860	8,975	17,464	49,562
Number of OFWs (thousands of people)	1,122	776	725	137	2,553

3. Empirical Results

This study will use two different definitions of money supply to examine the impact of unanticipated money growth on unemployment. M1 and M2 will both be utilized in estimating the results, and the study will evaluate which measure of the money supply provides the best results.

Regressions involving time-series data may follow a random walk and may have a tendency to appear to follow a trend. If our variables have unit roots, they will all have a tendency to trend, even if they are completely unrelated. Then, the results obtained could possibly be spurious or dubious. Therefore, it is very important to identify whether the variables in question are stationary. The second problem with testing time-series data is the potential for serial correlation in the error term. If serial correlation is present, the distribution of the tau-statistic used in the Dickey-Fuller test would be inaccurate and bias the results of the test.

According to Nelson & Plosser (1982), macroeconomic time series data are not stationary and will usually display a unit root process. Spurious results come from estimations are obtained using nonstationary data. It is therefore imperative that stationarity tests be performed on time series data. We use the augmented Dickey-Fuller test to evaluate the stationarity of my variables. The equation for this test is

$$\Delta X_t = \alpha + \rho_t + \beta X_{t-1} + \sum_{i=1}^{n} \lambda_i \Delta X_{t-1} + \varepsilon_t \quad (7)$$

In equation (7), the variable we are considering is X, Δ is the first difference operator, t is a time trend, and ε is a stationary random error term. The results of the augmented Dickey Fuller test for unit roots are shown in Table 2. We see from the results that at level form, M1, OFW and MINW are not stationary. Meanwhile at level form M2 and UN are stationary. In first difference form however, all variables are stationary.

Table 2. Unit Root Test

Variable	Level	First Difference
M1	-1.06481	-6.90979***
M2	-3.35643**	-4.71607***
OFW	-1.06879	-2.76114*
MINW	1.27479	-4.64095***
UN	-2.74233*	-5.87134***

Note: *Significant at the 10%% level; **Significant at the 5%% level; ***Significant at the 1% level

The study has determined that the variables are first order integrated. Therefore, Johansen's (1988) cointegration test is being utilized in order to evaluate the long run relationship of the variables in the model. This procedure is performed before running a regression on the model in the first difference form.

Table 3 presents the results of the test. The p-values in Table 3 show that for all four specifications, the null hypothesis of no cointegration is rejected. Because the hypothesis of no cointegration has been rejected, an error correction model based on the work of Engle and Granger (1987) is created and we estimate the following equation:

$$UN_t = \beta_0 + \beta_1 DMR_t + \beta_2 DMR_{t-1} + \beta_3 DMR_{t-2} + \beta_4 OFW_t + \beta_5 MINW_t + \beta_6 EC_{t-1} + v, \quad (8)$$

In equation (8), EC_{t-1} represents the error correction term, or the lag of the error term estimated from equation (6) while the term of random error is represented by *v*. Table 4 presents the estimated results. There are two specifications in this paper. The first specification uses M1 as the monetary variable and the second specification uses M2 as the monetary variable.

Table 3. Johansen's Cointegration Test for Specifications 1 and 2

	(1)			(2)		
H_0	Eigenvalue	Trace test	p-value	Eigenvalue	Trace test	p-value
r = 0	0.5285	45.260	0.0848	0.5790	49.232	0.0352
r ≤ 1	0.2707	15.187	0.7715	0.2598	14.624	0.8057
r ≤ 2	0.0534	2.5589	0.9768	0.0545	2.5920	0.9757

Table 4. Error correction model estimation results

Dependent variable: UN		
Coefficients standard errors in ()	(1)	(2)
Constant	0.0013 (0.0520)	0.0010 (0.0611)
DMR_t	2.7518 (4.1130)	10.1805* (5.8255)
DMR_{t-1}	-0.5742 (4.0741)	-4.1644 (5.5401)
DMR_{t-2}	3.4416 (3.9789)	-1.6224 (5.4109)
OFW	-0.0206** (0.0094)	-0.0250** (0.0092)
MINW	-0.0019 (0.0031)	-0.0003 (0.0031)
EC_{t-1}	-0.5417*** (0.1704)	-0.6976*** (0.1992)
Adjusted R^2	0.3074	0.3361
Durbin-Watson	1.8910	1.7544
F-stat	3.7373	4.1224

Note: *Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level

Table 4 shows the effects of monetary expansion, overseas employment, and minimum wage rate on unemployment rate. As mentioned earlier, current and lagged values of unanticipated money growth are introduced as determinants of unemployment rate. In addition to monetary variables, two real variables are added as determinants of unemployment rate. These real variables are overseas Filipino employment and minimum wage rate. Overseas opportunities have direct effect on domestic unemployment rate. The rise in the number of OFWs would work toward a reduction in the unemployment rate or at best a dampening of the increase in the unemployment rate, ceteris paribus, for unemployed persons in the Philippines.

According to Barro (1977), the minimum wage variable is expected to have a positive effect on unemployment if the negative impact of the minimum wage on employment dominates the probable negative effect on labor force participation. The International Labor Organization (ILO) has considered minimum wages to play an important role in protecting low-income groups (Freeman, 1992). On the other hand, the World Bank holds a contrary view. They consider minimum wages as simply a way of raising the cost of labor in the formal sector (Freeman, 1992).

Table 4 shows that for both specifications, the number of OFWs have a negative and significant effect on the unemployment rate which is expected. The minimum wage is not significant for both estimations. The results also show that the error correction term is significant and negative for both specifications. In specification (1), the current and lagged values for M1 are not significant though the current value for M2 is positive and significant in specification (2) even though the lagged variables are not. The results imply that an increase in unanticipated money may help contribute to increasing unemployment in the Philippines.

Conclusions

This paper tried to test whether unanticipated money growth affected unemployment in the Philippines. The theoretical hypothesis that unanticipated movements in money would affect economic activity was empirically tested using Philippine data for the years 1979 - 2022. Anticipated money growth was quantified as the amount that could have been predicted based on the historical relation between money growth and lagged money growth. (Barro, 1977; Rush, 1986), Mishkin (1982) & Gochoco (1984) added interest rate to the set of explanatory variables. The current and lagged values of unanticipated M1 money growth are shown to have no significant effect on unemployment rate in the Philippines. While lagged values of M2 also have no significant effect on unemployment, the study has found that current values of M2 have an effect on unemployment.

The results reported in this paper partly mirrors the empirical results obtained for the US economy by Barro (1977) & Rush (1986). However, further research could be done on this subject as well as on the effect of unanticipated money growth on output in this country. Some of the equations in this model could be modified. For example, adding government borrowing and unemployment as independent variables for estimating money growth (modifying equation (5) to be similar to Barro's (1977) model) to see if those variables have an effect on money

growth. It is hoped that these studies may shed new light into the factors that affect unemployment and contribute to helping solve one of the Philippines' most crippling problems.

Credit Authorship Contribution Statement

Jason C. Patalinghug, is the sole author of this paper. J.C.P formulated the initial idea, acquired grant funding and resources, reviewed the literature, collected and analysed the data, designed the methodology and model, and drafted and edited the manuscript.

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Conflict of Interest Statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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