Monetary Policy Indicators and Economic Growth in the Philippines 1986-2017

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ABSTRACT

The study presents the monetary policy indicators and the measures of economic growth in the Philippines for the past 30 years. It determines the role of the selected macroeconomic indicators on the economic growth in the country through the analysis of the functional relationship of monetary policy indicators on gross domestic product and finally determine the causality among macroeconomic indicators. The descriptive result showed that there has been an unstable fluctuation in some of the macroeconomic variables from 1986 to 2017. The study concludes that there is a significant relationship between money supply, inflation rate and economic output (GDP). It is therefore observed that money supply and inflation cause the fluctuation in gross domestic product but not vice versa. An increased in inflation rate may lead to lower gross domestic product but a higher money supply leads to a higher gross domestic product. On the contrary there is no significant long run relationship observed among variables. The study further concludes that the relationship between variables is unidirectional.

Keywords: monetary policy, gross domestic product, money supply, consumer price index

I. INTRODUCTION

Money is the most important commodity in the market economy. Its role is very significant since anything that affects the value of money affects every market transaction. Moreover, the value of money affects not only the transactions of the moment but also all transactions over periods of time (Greaves, 2012). It is the life blood that needs to circulate in the economy.

There were several researches conducted to investigate the role of money and its relationship on several economic variables. The link between money supply and output has been getting an increasing attention in the recent times, especially on the role it plays in economic growth in the emerging and industrialized economies (Hussan and Haque, 2017).

According to Phibian (2010), money supply and mild inflation rate are key determinants of high economic growth rate capable of creating employment

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opportunities, poverty reduction, higher per capita income and standard of living that culminate into economic development. The government can control money supply by directly controlling the interest rate paid on deposits and it can also affect it through imposing mandatory reserve ratio as part of the monetary policy being imposed in the country (Aksoy, 2015).

Monetary policy is a set of measures and policies that has to meet the required targets through monetary or currency policy instruments. (Hynková, 2014). Monetary policy involves adjustment of the supply of money in the economy to achieve some combination of inflation and output stabilization (Mathai, 2009). Central banks play a crucial role in ensuring economic and financial stability. They conduct monetary policy to achieve low and stable inflation. Since the late 1980s, inflation targeting has emerged as the leading framework for monetary policy. Central banks in Canada, the euro area, the United Kingdom, New Zealand, and elsewhere have introduced an explicit inflation target. Many low-income countries are also making a transition from targeting a monetary aggregate (a measure of the volume of money in circulation) to an inflation targeting framework (IMF, 2016).

In the Philippines, Banko Sentral ng Pilipinas is primarily mandated by law to ensure the maintenance of price stability conducive to a balanced and sustainable growth of the economy. Thus, price stability is considered a necessary complement, rather than an alternative, to economic growth. Price stability can mean one of two things: the general price level is stable, meaning it is not moving; or the inflation rate is low and stable (Lamberte, 2003 p. 7).

The attainment of this monetary stability and convertibility of the Philippine peso is also an explicit goal of the Philippines' monetary authority (BSP, 2012). Beginning in January 2002, the BSP has formally adopted Inflation Targeting (IT) as its main monetary framework after two years of meticulous preparation (Lamberte, 2003, p. 29). In this framework the central bank forecasts the future path of inflation and compares it with the target inflation rate. It determines how much monetary policy has to be adjusted (Jahan, 2012). Inflation targeting is focused mainly on achieving a low and stable inflation, supportive of the economy’s growth objective. This approach entails the announcement of an explicit inflation target that the BSP promises to achieve over a given period of time (BSP).

The major advantage of inflation targeting is that it combines elements of both “rules” and “discretion” in monetary policy. This “constrained discretion” framework combines two distinct elements: a precise numerical target for inflation in the medium term and a response to economic shocks in the short term (Jahan, 2012).

The national government of the Philippines, through the Department of Budget Coordinating Council (DBCC), sets the inflation target based on the Consumer Price Index two years ahead in consultation with the Bangko Sentral ng Pilipinas (BSP). The BSP has full powers over and responsibility for the announcement of the inflation target and the determination of appropriate monetary policy to achieve the target (Guinigundo, 2008 p. 1).

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In employing Inflation Targeting framework, Banko Sentral ng Pilipinas used M3 or total liquidity as its intermediate target, specifically because the ultimate target is the rate of inflation. It reflects a more relevant feature for this framework because it consists of total money circulating in the Philippine economy since it involves money supply, peso savings and time deposits and deposit substitutes of deposit money banks held by the general public (BSP, 2004 p. 39).

According to Mathai (2009) most economists would agree that in the long run, output—usually measured by Gross Domestic Product (GDP)—is fixed, so any changes in the money supply only cause prices to change. But in the short run, because prices and wages usually do not adjust immediately, changes in the money supply can affect the actual production of goods and services. That makes monetary policy a meaningful tool for achieving both inflation and growth objectives of the country.

Given such scenario, this study, therefore is very relevant not only for the Philippines but for the rest of the neighboring Asian countries that are developing since it determines the role of selected macroeconomic indicators vis-à-vis the economic growth that unfolds in a particular country. The major goal of the study is to develop a theoretical model that illustrates the causality among macroeconomic indicators. Different sectors of the economy such as the government, household, businesses and financial sectors can benefit from the study as it broadens their knowledge base and understanding regarding the topic. The model developed in the study can serve as a basis by the government in policy making and contribute to the evolution of the national economy in the achievement of a balanced, sustainable and more progressive economic development.

A. Theoretical Review

1. Quantity Theory of Money

John Locke (1692) took this idea and "stated" the Quantity Theory of Money as a general rule: if the supply of money is increased, the prices of all goods will rise. Locke applied this immediately: if money supply fell and the prices of goods fell, then the prices of foreign goods would rise relative to domestic goods "both of which will keep us poor" (Fonseca, n.a.)

Quantity theory was one of Keynes's main contributions in his General Theory (1935). Since then, economics has gone back and forth over whether money affects prices or output. We have also recurrently reversed the question and talked about how prices and output in turn affect the quantity of money - a theory that is much more recent reflecting the more contemporary phenomenon of considering bank-created deposits as "money" (Fonseca, n.a.).

The quantity of money determines the supply of liquid resources, and hence the rate of interest, and in conjunction with other factors (particularly that of confidence) the inducement to invest, which in turn fixes the equilibrium level of incomes, output and employment and (at each stage in conjunction with other

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factors) the price-level as a whole through the influences of supply and demand thus established (Keynes, 1935 p.11). Friedman (1956) emphasizes the role of money growth in determining inflation, by way of quantity theory of money and the neutrality of money. He reports that inflation occurs when an increase in money supply growth (or velocity of money) is greater than the output growth rate, but that inflation would not hamper the GDP growth rate when the neutrality of money holds.

2. The Monetarism Theory

Monetarists are particularly concerned with the potential abuse of monetary policy and destabilization of the price level. They believe that persistent fluctuations are purely monetary phenomena brought about by persistent expansionary or contractionary monetary policies. As a means of combating persistent periods of inflation or deflation, monetarists argue in favor of a fixed money supply rule. They believe that the Reserve Bank should conduct monetary policy so as to keep up with the growth rate of the money supply fixed at a rate that is equal to the real growth rate of the economy over time. Thus, monetarists believe that monetary policy should serve to accommodate increases in real output without causing either inflation or deflation (Chicheke, 2009 p.47).

II. METHODOLOGY

A. Sources of Data

The data used in the study are time series data. The following information on money supply, Consumer Price Index, Gross Domestic Product, investment and employment were gathered from different organizations which have direct relevance with the study.

The annual data on money supply from 1988-1999 were gathered from the National Economic and Development Authority (NEDA) website and in the library of the Institution of Banko Sentral ng Pilipinas, while data from 2000-2016 were gathered from Asian Development Bank (ADB) website. The data on Interest rate was collected from international statistical websites of World Bank and International Monetary Fund (IMF). For Gross Domestic Product, data were gathered from the Philippine Statistics Authority (PSA). For some years without data that are unavailable, the same were collected from different institutional official websites, and other reports from country data websites.

B. Model Specification

Various macroeconomic variables related to monetary policy have been identified as significant factors of economic growth (GDP). The Vector Autoregressive Model adopted by Atangan (2011) and Gatawa *et al.* (2017) was used in the study. In realizing the objectives of the study, the Gross Domestic Product was used in measuring the economic growth of the country vis-à-vis the Money Supply (M3) which served as the indicator for monetary policy being employed in the

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Philippines. Inflation rate which was measured based on the Consumer Price Index is also part of the monetary instruments that was considered to have a significant correlation on Gross Domestic Product.

The VECM specification employed in this study were presented as:

GDP= f (M3, Inflation rate) (1.1)
M3 = f (GDP, Inflation rate) (1.2)
Inflation rate = f (GDP, M3, Interest rate) (1.3)

III. RESULTS AND DISCUSSION

Data collected for the research were from secondary sources particularly on the official government website, reports and publications. Originally, a total of 30 samples were collected from the annual data available, however upon deep analysis of the extent of the impact of the variables, the study extended its range of coverage from years 1986 to 2017 to further test the relationship between the variables. This relationship was designed using multiple regression model assuming there is such linear relationship between variables.

A. Descriptive Analysis

Table 1 shows a summary of statistics of the variables used in the study. The data used is a time series data from year 1986 to 2017. The gross domestic product ranges from 2,215,773.00 to 8,668,287.00 with an average of 4,373,790.00 and standard deviation of 1,825,185.00. Money supply ranges from 144,325,000,000 to 10,636,069,000,000 with a mean value of 2,853,897,000,000 and standard deviation of 2,957,968,000,000. Consumer Price Index ranges from 19.16 to 120.21 with an average value of 69.03 and standard deviation of 32.22.

Table 1. Summary Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Year	32	1986	2017	2001	9.38
Gross Domestic Product	32	2,215,773.00	8,668,287.00	4,373,790.00	1,825,185.00
Money Supply	32	144,325.00	10,636,069.00	2,853,897.00	2,957,968.00
Consumer Price Index	32	19.16	120.21	69.03	32.22

1. Unit Root Test

The Augmented Dickey Fuller Test and Phillips-Perron were employed to test the presence of unit roots in the data set. Based on the result, it showed that the study failed to reject the null hypothesis. It implies that gross domestic product, money supply and consumer price index is non-stationary at level.

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After taking the first difference of the variables, gross domestic product and money supply were still non-stationary. Only the consumer price index is observed to be stationary at first difference. This suggests subjecting the data to vector error correction model.

Table 2. Augmented Dickey Fuller Test

VARIABLE	AT LEVEL			AT 1ST DIFFERENCE		
	ADF T-stat	*P-Value*	*Decision*	*ADF T-stat*	*P-Value*	*Decision*
Gross Domestic Product	9.39623	1.0000	NS	0.53374	0.9849	NS
Money Supply	7.97523	1.0000	NS	3.59863	1.0000	NS
Consumer Price Index	0.17901	0.9667	NS	-5.2267	0.0002	S

Table 3. Phillips-Perron

VARIABLE	AT LEVEL			AT 1ST DIFFERENCE		
	ADF T-stat	*P-Value*	*Decision*	*ADF T-stat*	*P-Value*	*Decision*
Gross Domestic Product	9.96611	1.0000	NS	-1.0337	0.7280	NS
Money Supply	32.6931	0.9999	NS	-1.4881	0.5258	NS
Consumer Price Index	0.13937	0.9637	NS	-5.2257	0.0002	S

2. Lag selection criteria

Table 4 presents the result of lag selection criteria. Most of the criteria are suggesting to apply one lag for the VECM, including LR, FPE, AIC, SC and HQ. Therefore, the analysis is proceeded using one lag.

Table 4. Lag Selection Criteria

Lag	LogL	LR	FPE (in billions)	AIC	SC	HQ
0	-925.5853		12,800,000,000,000,000	66.32752	66.47026	66.37116
1	-770.8135	265.3231*	388000000000*	55.91525*	56.48619*	56.08979*
2	-761.8987	13.37215	401,000,000,000	55.92134	56.92049	56.22679
3	-759.2473	3.408997	674,000,000,000	56.3748	57.80217	56.81116
4	-750.3546	9.527884	775,000,000,000	56.38247	58.23804	56.94974

3. Johansen Co-integration Test

Co-integration test determine the existence of long run relationship among variables. Tables 5 and 6 show the co-integration result using Trace Test and maximum Eigen Value Test.

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Table 5. Trace Test

Rank	Eigenvalue	Statistic	Critical Value	P-value
0	0.632669	49.19635	29.79707	0.0001
1	0.446586	19.15159	15.49471	0.0134
2	0.045662	1.402117	3.841466	0.2364

The trace test implies that there is a long run relationship among variables with 2 co-integrating equation with a critical value of 15.49471 (P<0.05) (Rank 1) at 5% level of significance in the model.

Table 6. Maximum Eigen Value Test

Rank	Eigenvalue	Statistic	Critical Value	P-value
0	0.632669	30.04476	21.13162	0.0022
1	0.446586	17.74947	14.2646	0.0135
2	0.045662	1.402117	3.841466	0.2364

Similar with the Trace Test, Eigen Value Test implies that there is a long run relationship among variables with 2 co-integrating equation with a critical value of 14.2646 (P<0.05) (Rank 1) at 5% level of significance in the model.

B. Empirical Analysis

1. Vector Error Correction Model

Since, there is co-integration between variables the vector error correction was applied and the following system equations were formulated:

(1) D(GDP) = C(1)*(GDP(-1) - 12907.3318833*CPI(-1) - 0.423251851994*M3(-1) - 2275785.43502) + C(2)*D(GDP(-1)) + C(3)*D(CPI(-1)) + C(4)*D(M3(-1)) + C(5)

Table 7. Estimation Output (1)

Variable	Coefficient	Std. Error	t-Statistic	P-value
GDP(-1)	-0.21486	0.325117	-0.66087	0.5147
CPI(-1)	-37196.3	16066.83	-2.3151	0.0291
M3(-1)	0.210848	0.077843	2.708636	0.012
C(5)	309593.1	94953.79	3.26046	0.0032
R-squared	0.702163			
F-statistic	14.73463			
Prob(F-statistic)	0.000003			

The first estimation output has been observed with r-squared of 0.702163 and the 70.22 percent of the model as cited. The F-statistics is 14.73463 (P-

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value< 0.05) which is less than the critical value at 5 percent level of significance.

(2) D(CPI) = C(6)*(GDP(-1) - 12907.3318833*CPI(-1) - 0.423251851994*M3(-1) - 2275785.43502) + C(7)*D(GDP(-1)) + C(8)*D(CPI(-1)) + C(9)*D(M3(-1)) + C(10)

Table 8. Estimation Output (2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-4.2E-06	4.57E-06	-0.92076	0.366
CPI(-1)	-0.10607	0.225633	-0.4701	0.6424
M3(-1)	-2.7E-07	1.09E-06	-0.24795	0.8062
C(5)	4.600768	1.333472	3.450218	0.002
R-squared	0.115823			
9F-statistic	0.818719			
Prob(F-statistic)	0.52543			

Table 8 reflected an estimation output showing the R-squared of 0.115823 and F-statistics of 0.818719 (P-value> 0.05) which is greater than the critical value at 5 percent level of significance.

(3) D(M3) = C(11)*(GDP(-1) - 12907.3318833*CPI(-1) - 0.423251851994*M3(-1) - 2275785.43502) + C(12)*D(GDP(-1)) + C(13)*D(CPI(-1)) + C(14)*D(M3(-1)) + C(15)

Table 9. Estimation Output (3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.09394	0.790337	-0.11886	0.9063
CPI(-1)	-39186.6	39057.33	-1.00331	0.3253
M3(-1)	0.314507	0.18923	1.662037	0.109
C(5)	397146.9	230825.9	1.720547	0.0977
R-squared	0.7134			
F-statistic	15.55736			
Prob(F-statistic)	0.000002			

The last estimation output has been observed with the R-squared of 0.7134 and the 71.34 percent of the model as presented while the remaining was cited as unknown. The F-statistics is 15.55736 (P-value< 0.05) which is less than the critical value at 5 percent level of significance.

IV. SUMMARY

The descriptive result showed that there has been an unstable fluctuation in some of the macroeconomic variables from 1986 to 2017. Gross Domestic Product amounted to 2,215,773,000,000 in 1986 had increased up to 8,668,287,000,000 in 2017 with an average of 4,373,790,000,000 while Money Supply from

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144,325,000,000 had increased to 10,636,069,000,000 in 2017 with an average value of 2,853,897.00.

The regression result showed that inflation rate has a negative significant relationship with gross domestic product while money supply has a positive significant relationship with the said variable as shown in the first model. The model is evidently significant with an r-squared of 0.702163 ($p<0.01$). The second model have been observed to be insignificant with r-squared of 0.115823 ($P>0.05$). On the contrary, the fluctuation on inflation rate and gross domestic product jointly have significant effect on money supply with r-squared of 0.7134 ($p<0.01$) as shown in the third model.

V. CONCLUSION

The study concludes that there is a significant relationship between money supply, inflation rate and economic output (GDP). It is therefore observed that money supply and inflation cause the fluctuation in gross domestic product but not vice versa. An increased in inflation rate may lead to lower gross domestic product but a higher money supply leads to a higher gross domestic product.

On the contrary there is no significant long run relationship observed among variables. The study further concludes that the relationship between variables is unidirectional.

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APPENDIX

Appendix 1. Serial Correlation Test

Lags	LM-Stat	Prob
1	2.317943	0.9854
2	3.257745	0.9532
3	6.833537	0.6544
4	9.787422	0.368
5	14.29585	0.1122
6	8.812707	0.4547
7	7.163649	0.6201
8	9.500125	0.3924
9	13.65696	0.1351

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Appendix 2. Heteroskedasticity Tests

Joint test:

Chi-sq	df	Prob.	
77.6920560		0.062	(GOOD)

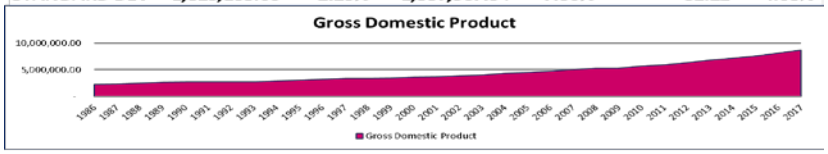
Appendix 3. Individual Components

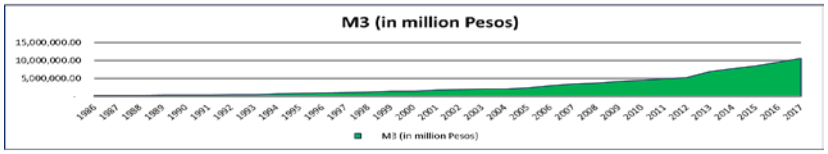
Dependent	R-squared	F (10,19)	Prob.	Chi-sq (10)	Prob.
res1*res1	0.291979	0.783537	0.6443	8.759376	0.5551
res2*res2	0.727296	5.067262	0.0012	21.81888	0.0161
res3*res3	0.688689	4.203212	0.0035	20.66066	0.0236
res2*res1	0.596061	2.803684	0.0255	17.88184	0.057
res3*res1	0.615873	3.046278	0.0176	18.47618	0.0474
res3*res2	0.712265	4.703293	0.0019	21.36794	0.0187

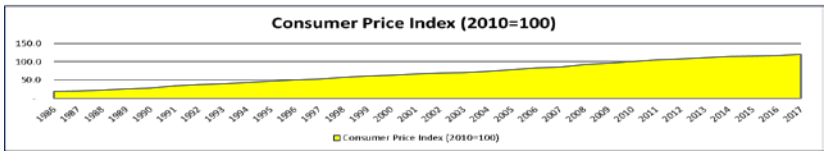
Appendix 4. Historical Highlights – Philippines, 1986-2017

HISTORICAL HIGHLIGHTS FROM 1986 to 2017

Year	GDP	Growth Rate	M3 (in million Pesos)	Growth Rate	CPI (2010=100)	Growth Rate
1986	2,215,772.90		144,325.00		19.16	
1991	2,684,457.70	-0.58%	347,079.00	15.48%	34.1	19.23%
2003	4,008,469.00	4.97%	1,957,367.40	3.29%	70.5	2.32%
2010	5,701,539.20	7.63%	4,483,332.60	9.95%	100	3.84%
2013	6,750,631.40	7.06%	6,925,038.00	31.84%	110.7	2.59%
2015	7,600,175.10	6.07%	8,429,928.80	9.42%	115.4	0.61%
2017	8,668,287.00	6.67%	10,636,068.60	11.89%	120.2	2.82%
AVERAGE	***4,373,789.58***	***4.52%***	***2,853,896.58***	***15.12%***	***69.03***	***6.18%***
MINIMUM	***2,215,772.90***	***-0.58%***	***144,325.00***	***3.29%***	***19.16***	***0.61%***
MAXIMUN	***8,668,287.00***	***7.63%***	***10,636,068.60***	***31.84%***	***120.20***	***19.23%***
STANDARD DEV	***1,825,185.06***	***2.25%***	***2,957,967.54***	***7.56%***	***32.22***	***4.08%***







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