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RESEARCH ARTICLE

Budget Deficit Spending Causes Inflation

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Using the Cochrane-Orcutt iterative procedure, the paper provides strong statistical evidence that inflation is a monetary phenomenon caused by budget deficit spending when the central bank buys government debt. Regression results validate that increasing budget deficits lead to the issuance of more debt securities the central bank uses to back the creation of new money. The central bank purchases government securities from commercial banks to implement expansionary monetary policy. The increase in money supply is not possible without the issuance of government debt securities, which, in turn, is only undertaken by the Bureau of Treasury when it finances budget deficits. Budget deficit spending and its funding by the central bank using fiat money creation, therefore, is the primary cause of inflation. Hence, inflation is an implicit tax, as it is the burden transferred by the national government to all individuals in the economy when it finances its budget deficits by selling government securities to the central bank. This additional burden is over and above the increasing explicit direct and indirect taxation imposed by the government over several decades.

Keywords: inflation, money supply, deficit spending, implicit tax, tax reform

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The need to provide more infrastructure and social services is usually the primary reason for increasing public spending. But aside from this goal, budget deficit spending, which occurs when government expenditures exceed tax and non-tax revenue collection, is also condoned in the interest of maximizing economic growth through the expected multiplier effect. The estimated multiplier effect from government spending, however, is not realistic because when mathematically derived, it assumes that all other forms of spending are held constant (private consumption, investment, exports, and imports), which is not true when public expenditure is increased. In spite of the multiplier effect asserted by government economists, the fact remains that more public spending reduces the potential investment and consumption undertaken by the private sector when more taxes are collected from the earnings of firms and consumers. Even if taxes were not increased, government borrowing from the private sector exerts a crowding-out effect on investment and, to some extent, on consumption. On the other hand, if new money is created by a central bank and is used to fund deficit spending, then the accumulated inflation that is created (a) reduces the ability of consumers to purchase goods and services and (b) increases the cost of doing business and decreases profits for firms, which, in turn, discourages the expansion of productive capacity.

The real growth in the production of goods and services comes from competitive firms in the private sector that are subject to the discipline of the market, where efficiency is rewarded and complacency is penalized. The government cannot produce goods or provide services unless it taxes the income earned by firms and workers. The government is dependent on tax

collections from a productive private sector in order to function. If it borrows newly created money from a central bank or foreign currency from international financial institutions to fund its budget deficits, then the long-term ramifications are the escalation of both domestic and foreign debt, increased taxation, and a consequent reduction in investment, consumption, and prolonged economic stagnation. The immediate problem created by deficit spending is the inflation that erodes the purchasing power of fixed-income earners, reduces the value of savings and retirement benefits, and "severely hurts the poor, whose meager incomes end up buying a lesser amount of goods and services" (Raymundo, 2024, p. 1). This paper provides empirical evidence that inflation is a monetary phenomenon caused by deficit spending when the central bank buys government debt.

Inflation is Purely a Monetary Phenomenon

The Classical Definition of Inflation

The continued expansion of the money supply, which eventually leads to rising prices, is the classical definition of inflation (Reed, 2012; Shostak, 2002; Mises, 1990). The price increases are sustained as long as money supply growth is faster than the increase in the real value of output production, which becomes inadequate in meeting the rising demand. This was always the outcome in every situation where the government deliberately suspended or deviated from a monetary system that used a gold standard for the purpose of printing more money to finance both the war effort and economic recovery afterward. The experiences of both Germany and Austria after the 1st World War clearly illustrate this outcome (Salerno, 2017, 2021a, 2021b). Germany experienced hyperinflation at a rate of 1 trillion percent from 1920 to 1923, while Austria had a rate of 1,426% from 1921 to 1923 (Mankiw, 2012; Terrell, 2010). Increasing the amount of money in circulation without a corresponding expansion in the number of goods and services produced reduces the purchasing power of the currency as prices increase in response to the rising excess demand fueled by easy access to the newly created money (Mises, 2006). Even in the absence of war, because countries abandoned the gold standard, inflation continued to be a monetary phenomenon as fiat money creation undertaken by central banks is still used to fund government spending in excess of tax and non-tax revenues. Several Latin American countries that adopted socialism, for example, granted welfare state benefits to their citizens, huge subsidies for inefficient government-owned firms, and larger budgets for police and military spending. Combined with a shrinking private sector (suffering from the lack of investment) and a declining tax base, this resulted in governments that relied on chronic budget deficit spending and accumulated public debt that destabilized economies and created hyperinflation (as the central bank printed money to fund excessive public spending). Such is the experience of Venezuela in 2018, with an inflation rate of 33,151%; Bolivia from 1984 to 1986 at 20,000%; Argentina in 1989 at 4,923%; Brazil in 1994 at 2,075%, and Chile from 1971 to 1973 at 1,200% (Hanke & Krus, 2012; & Mankiw, 2012; Terrell, 2010, as cited in Raymundo, 2023; Hanke, 2018). Currently, the worst example of hyperinflation on record is in Zimbabwe in 2008 at 89.7 sextillion percent (Hanke & Krus, 2012; Terrell, 2010, as cited in Raymundo, 2023).

At present, inflation is commonly defined as the occurrence of continuously increasing prices in the economy (Mankiw, 2012). The problem with this definition is that it removes the role of money supply as the primary cause of price increases and allows the government to lay blame on some other factor that is not its true cause. If the government completely ignores the role of money supply growth in inflation, then it will implement erroneous solutions (i.e., price controls and subsidies) to prevent prices from rising, which will make the situation far worse and, at the same time, miserably fail to address the real source of the problem—that is, money creation that funds massive budget deficit spending (Mises, 1990).

Price Fluctuations from Cost-Push Factors are not the Same as Sustained Price Increases from Money Supply Growth

Cost-push factors can increase prices in the short and medium term but do not cause sustained increases in prices over several years because of the following reasons:

1. Cost-push factors from bad weather and natural calamities, which lead to supply disruptions, can increase prices. However, the national government always intervenes during these situations to correct the supply disruption by imposing price controls and, later on, allowing

the entry of more imported agricultural products in order to augment domestic supply and bring prices back to their original level or at least close to it. The government always responds to these supply shocks in order to appease consumers and avoid losing political support. Prices will rise after the onset of bad weather or a natural calamity but will consequently decline within several months after the supply disruption is corrected. The abovementioned situation illustrates a price fluctuation that occurs over several months, indicating adjustments in the market and is definitely not a sustained price increase.

2. Blaming higher import prices, which are in foreign currency, is misleading. Imported oil, as well as other imported products, have their prices expressed in foreign currency (the U.S. dollar), whereas prices in the Philippines are in local currency (pesos). Prices of imported goods in U.S. dollars move independently from the prices of local goods in Philippine pesos. These two prices are only connected through the exchange rate. Increasing domestic money supply leads to an exchange rate depreciation, which makes imported products more expensive in local currency. In this situation, it is still the expansion of the money supply that is making imported products more expensive in local currency, contributing to a higher headline inflation rate. Increasing money supply leads to an increase in the demand for foreign currency as more importation is needed to supplement the lack of domestic production when aggregate demand is rising faster than output growth.

In reality, oil and gas prices have risen equally everywhere, yet headline inflation (the percentage change in the CPI) is vastly different in the Euro area and the United States compared to countries where energy imports are much higher, like Japan and Korea. The headline inflation rate is two times higher in the Euro area and the United States relative to Japan and Korea and the difference is explained by the growth of broad money. Broad money growth in 2021 is much higher in the Euro area and the United States as compared to Japan and Korea (Lacalle, 2022).

Finally, price inflation should not be blamed on wage increases, considering that workers' demands are responses to rising prices, which occur due to central bank money creation.

Increasing Government Bonds to Fund Budget Deficits Leads to Increases in Money Supply

Whether it involves borrowing from private banks or monetizing public debt, as long as the government bonds are eventually purchased by the central bank, then the issued securities become the basis for creating new money that increases the monetary base and all other monetary aggregates. When the central bank creates new money, it increases the demand for goods and services among the recipients of the new money, which are both government and contractors from the private sector. Should there be no corresponding increase in the production of goods and services when new money is created, then the artificial increase in demand will put pressure on prices to rise. Therefore, when the central bank purchases government bonds (either from commercial banks or directly from the government) to implement expansionary monetary policy, it creates price inflation, which is the outcome of money creation that funds the budget deficit (Greaves, 2021).

Unbeknownst, governments can take a significant portion of the value of the wealth generated by firms and workers through a policy of inflation imposed every year (Keynes, 1919). When the government receives the newly created money, it is able to purchase goods and services at current prices. When this money is spent and starts circulating over several months, however, prices would have risen and eroded the purchasing power of individuals who become its later recipients (Rothbard, 2023). Even if the government initially sells its bonds to commercial banks, as long as the central bank purchases these debt securities, then newly created money is released to commercial banks in the form of reserves—which leads to the creation of more loans—thus, increasing the money supply and consequently raising prices. The government, which initially sold the bonds to the commercial banks, has the opportunity to use the borrowed funds before prices actually increase. Only those who understand the process of money creation backed by public debt truly understand that the purchasing power of currency is taken away by the government from everyone else when it implements deficit spending. "Inflation is not an act of God, it is not

a natural catastrophe of the elements, or a disease that comes like the plague, it is a policy used by government" (Mises, 2006, p. 12). When the government deliberately avoids imposing heavy taxation in the short term in order to keep its political support from the voters intact, then it resorts to the approach of financing a budget deficit that is inflationary—the issuance of government securities purchased by the central bank and used for money creation (Mises, 1944). Inflation is, therefore, an implicit tax because it is the hidden cost of financing budget deficits through central bank money creation that is eventually passed on to every individual in the economy in the form of higher prices on all goods and services (Reisman, 2003).

The Quantity Theory of Money

$$M*V = P*Q$$

The quantity theory of money (refer to the equation above) illustrates that the total spending on the amount of goods and services produced in the entire economy (P*Q) can only be undertaken if there is a quantity of money (M) that is created and is adequate to facilitate expenditures. The quantity of money multiplied by the velocity of money (V) is therefore equal to the total spending on all goods and services produced in the entire economy. Assuming that the velocity of money (V) and the quantity of products (Q) are stable, an increase in the quantity of money (M) results in an increase in the prices of goods and services (P). Thus, the rapid increase in money supply causes inflation—which occurs particularly when the growth of the number of goods and services (Q) fails to catch up with the rising demand for products owing to the increase in the quantity of money (Friedman, 1987).

Methodology

The impact of budget deficit spending on the money supply and, consequently, on inflation is estimated using Cochrane-Orcutt regressions covering a 44-year period from 1980 to 2023. The Cochrane-Orcutt procedure, which is the iterative version of the feasible generalized least squares (FGLS) method, is applied to correct for the presence of serial correlation and eliminate spurious results that normally occur for time series regressions when the ordinary least squares (OLS) approach is initially used.

Annual data on budget deficits, debt securities, and total public debt were taken from the Bureau of Treasury's (2024) report on the national government debt. The money supply, real gross domestic product, and the consumer price index were obtained from the Asian Development Bank's (2024) key economic indicators report for Asia and the Pacific and the Philippine Statistical Authority's (2024a) report.

Regression Results and Analysis

Presented in Table 1 are the summary statistics of the variables used for the estimation of the regression equations. The budget deficit (BUDGET DEFICIT), government debt securities (DEBT SECURITIES), real gross domestic product (RGDP), total public debt (TOTAL DEBT), and money supply (M1 or narrow money) are all expressed in trillions of pesos. Consumer price index (CPI) uses the year 2000 as the base year.

Table 1. *Summary Statistics Using the Observations 1980–2023*

Variable	Mean	Median	S.D.	Min	Max
BUDGET DEFICIT	0.256	0.0951	0.438	-0.0163	1.670
DEBT SECURITIES	2.238	1.333	2.519	0.0340	10.017
RGDP	9.461	7.332	5.164	4.167	21.06
TOTAL DEBT	3.944	3.144	3.775	0.0716	14.966
M1	1.383	0.435	1.939	0.0226	6.867
CPI	111.1	106.8	67.88	12.83	243.03

Table 2. *Cochrane-Orcutt Regression Results (Sample Period Covering 1980 to 2023)*

Dependent Variables:	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	L_Debt Securities	***L_M1***	***d_M1***	***L_CPI***	***d_CPI***
constant	1.89029***	-4.31225***	0.187071*	5.79527***	4.79826***
	(<0.0001)	(<0.0001)	(0.0834)	(<0.0001)	(<0.0001)
Budget Deficit	0.221447**		1.58666***		
	(0.0382)		(<0.0001)		
Total Debt	0.0481394*				
Lagged (-1)	(0.0545)				
L_Debt		0.592535***			
Securities		(<0.0001)			
L_RGDP		1.64370***			
		(<0.0001)			
d_Budget Deficit			0.310698***		
			(0.0094)		
L_M1 to RGDP					
Ratio				0.266264***	
Lagged (-1)				(0.0004)	
d_M1					5.18221**
Lagged (-1)					(0.0387)

Presented in Table 2 are five regression equations (from Model 1 to Model 5) that use the Cochrane-Orcutt iterative procedure. All of the explanatory variables used for each of the five equations are statistically significant and illustrate the correct theoretical effects on their respective dependent variables.

Table 3 shows that all of the equations do not display any evidence of autocorrelation given that their computed Durbin Watson statistics are higher than their respective critical upper d_u (Durbin Watson) values at a 1% level of significance. Likewise, the regression results are not spurious given that Models 1 to 5 display computed Durbin Watson statistics that are greater than their respective coefficients of determination (Granger & Newbold, 1974).

Model 1 shows that increasing budget deficits lead to the issuance of more government debt securities. Government bonds are issued by the Bureau of Treasury when the national government needs to borrow money to finance public spending, as tax collections are insufficient. Thus, if the budget deficit rises by P1 trillion, the amount of government debt securities issued increases by 0.221%. Increasing budget deficits will lead to the issuance of more government securities in order to finance the excess of government spending over tax and non-tax revenue. The total debt lagged by one year also increased the issuance of government debt securities. A 1% increase in the total debt of the previous year will lead to a 0.048% increase in government debt securities for the current year. A larger total public debt during the previous year will require the issuance of more debt securities in the current year to pay for previously issued bonds that are on the verge of maturing, especially if tax and non-tax revenues

Table 3. *Statistics Based on the Rho-Differenced Data*

	Model 1	Model 2	Model 3	Model 4	Model 5
R-squared	0.996640	0.997411	0.773649	0.995422	0.232592
Adjusted R-squared	0.996468	0.997282	0.767990	0.995307	0.212915
Durbin Watson Statistic	**1.791105**	**1.774744**	**2.344692**	**1.807630**	**1.774560**
Critical upper d_u at $\alpha = 0.01$	1.398	1.398	1.398	1.344	1.344
Standard Error of the Regression	0.088146	0.090582	0.107473	0.050771	2.635396
	6.447671***				
	(0.003809)				
	F(2,39)				
F-statistic	0.949497	2224.882***	7.450603***	14.73763***	4.575532**
		(9.92e-42)	(0.009381)	(0.000430)	(0.038749)
	37	F(2,40)	F(1,40)	F(1,40)	F(1,39)
		0.460578	0.842565	0.922081	0.295239
rho	42	4	6	44	4
Number of iterations n		43	42	42	41

*Notes: 1) Figures in parenthesis are p-values; 2) ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively; 3) Dependent variables for Models 1, 2, 4 and 5 were converted into logarithmic values; 4) Explanatory variables for Models 2, 4 and 5 were converted into logarithmic values; and 5) M1 is narrow money = currency in circulation + demand deposits*

are inadequate. The coefficients of the budget deficit and total debt lagged by one year are statistically significant at a 95% and 90% degree of confidence, respectively.

Model 2 illustrates that the issuance of more government debt securities leads to a rising money supply (L_M1). A 1% increase in government debt securities will increase money supply by 0.592%. The central bank's purchase of government securities from either commercial banks or from the government will lead to the creation of more money as government bonds back the issuance of more currency in circulation and available reserves in the banking system. Increasing the money supply, particularly the monetary base, will require the creation of additional currency in circulation as well as reserves in the accounts of commercial banks held within the central bank. The production of new currency in circulation and reserves can only be accomplished if a government bond is purchased by the central bank[1]. The government bond will be used to back the creation of new money (either in the form of currency in circulation or reserves). Treasury bills and bonds may be sold to commercial banks, quasi-banks, and accredited government securities dealers. However, if the central bank implements an expansionary monetary policy, it will purchase these government securities from the abovementioned institutions and use these debt instruments to guarantee the issuance of new notes, coins, and reserves for commercial banks.

The second explanatory variable, which is the real gross domestic product (L_RGDP), is also expected to have a direct relationship with the money supply. A 1% increase in real gross domestic product will lead to a 1.644% increase in the money supply. When the economy expands, the demand for money increases, and if the supply of money does not adjust fast enough to meet the demand, then interest rates are expected to increase. The central bank will increase the money supply to accommodate economic growth, thereby keeping interest rates low and stable. The coefficient of government debt securities and real gross domestic product are both statistically significant at a 99% degree of confidence, with both explanatory variables displaying p-values at less than 0.0001.

Because rising budget deficits lead to the issuance of more government securities, which consequently increases the money supply, then the regression results of Model 3 further reinforce the direct impact of the budget deficit on money in circulation. If the incremental budget deficit increases by P1 trillion, the incremental money supply (M1) will increase by P0.310698 trillion. Budget deficits financed by government securities, which are eventually purchased by the central bank, will increase the money supply. The incremental budget deficit is a statistically significant explanatory variable at a 99% degree of confidence and with a p-value of 0.0094.

The results of both Model 4 and Model 5 confirm the direct, positive impact of money supply on the consumer price index. Model 4 uses the ratio of money supply to real gross domestic product lagged by one year [L_M1 to RGDP Lagged (-1)] as the explanatory variable. If this ratio increases by 1%, then the consumer price index (L_CPI) is expected to increase by 0.266%. The ratio of money supply to the real gross domestic product shows the rate at which money supply increases relative to an increase in the value of total output produced. If the value of the ratio is rising, then this implies that the money supply is increasing at a much faster rate compared to the value of real gross domestic product. This condition leads to more spending and greater aggregate demand relative to a slower expansion of aggregate output, forcing buyers to compete for a limited amount of goods and services and offering higher bids that consequently push prices upward. The one-year lag indicates that the effect of the ratio of money supply to real gross domestic product is delayed, considering that the newly created money still needs to circulate in the economy before the inflationary impact on prices occurs.

Model 5 uses only the incremental money supply lagged by one year [d_M1 Lagged (-1)] as the explanatory variable and the regression results show that an incremental increase in the money supply lagged by one year will lead to a 5.18221 increase in the incremental consumer price index (d_CPI). The one-year lag again indicates the delayed effects of rising money supply, which needs to circulate for a year before the inflationary impact on prices is felt. The explanatory variables in both Models 4 and 5 are statistically significant at 99% and 95% confidence levels, respectively, with p-values at 0.0004 (Model 4) and 0.0387 (Model 5). The regression results from Models 4 and 5 validate that inflation is indeed a purely monetary phenomenon.

Implications: The Absence of Price Stability

The previous regression results (specifically Model 4 and Model 5) confirm that prices will continue to rise each year as long as the central bank consistently expands the money supply using government debt to back it. Under the inflation targeting approach, price stability is supposed to be attained when the actual inflation rate falls within the range set by the Bangko Sentral ng Pilipinas (BSP). When this approach was implemented in January 2002, the BSP had adjusted its targets on nine occasions from a maximum range of 5% to 6% in 2005 to a minimum range of 2% to 4% in 2015. From the year 2002 up to 2023, this target was achieved 16 times over a period of 22 years. Changing the inflation target nine times over the past two decades allowed the BSP to have a higher chance of meeting the target. For instance, if the inflation target was kept consistently at 2% to 4%, then from the year 2002 up to 2023, per the ADB database (2024), this target would have been achieved only thirteen times over a period of 22 years, with the other nine years showing inflation rates beyond 4%.

In fact, using data from the Asian Development Bank (2024), when 2018 is used as the base year, the CPI actually increased by 22.21% from 2018 to 2023, resulting in an annual average price increase of 4.44%, which is above the upper limit of the inflation target set by the BSP. Using the same database, the average interest rate for savings deposits during the 2018 to 2023 period was 0.72% per annum, whereas the average 6-month time deposit rate was 2.52% per

annum. This illustrates that inflation is eroding the value of savings faster than the rate at which it earns interest.

Moreover, if 2006 is used as the base year, the consumer price index would have increased by 86.4% from 2006 to 2023, resulting in an annual average price increase of 5.08%, which is higher than the upper limit of the BSP inflation target. During this period, the average interest rate for savings deposits at 1.24% and 6-month time deposits at 2.49% are both substantially lower than the average annual inflation rate, showing that rising prices reduce the value of savings faster than the rate at which the depositors are compensated. Clearly, inflation, which exerts a cumulative effect, has stolen the value of savings (Raymundo, 2023).

Hyperinflation, which is at least 50% inflation per month, reduces the value of money in a short period of time. The impact of an 86.4% price increase over a 17-year period is practically the same—a substantial reduction in the value of fiat money—except that it occurs at a slower rate and over a longer period of time.

The cumulative price increase normally reported is limited to a six-year period starting at the base year where the CPI is set at 100 (Philippine Statistical Authority, 2024a). This method of presenting only six years of price increases actually removes the impact of the inflation that accumulated during the previous years before the designation of a new base year (Raymundo, 2023). For instance, if the year 2000 is used as the base year instead of 2006, the consumer price index for 2023 would be at 243.03—indicating that prices have more than doubled during the last 23 years at an average of 6.22% per year. If the base year is set at 1990, then the consumer price index would have risen from 100 to 541.17 at the end of 2023—evidence of the quintupling of prices from 1990 to 2023. Inflation—be it gradual or drastic—imposes the heaviest penalty on the poor, the elderly who rely on retirement benefits and fixed-income earners, who, per the Philippine Statistical Authority (2024b) database, account for 68.3% of the total number of employed persons.

The BSP actually stated that "Price stability promotes income equality by protecting the purchasing power of the poor who often do not have assets (real or financial) that allow them to hedge against inflation" (BSP, 2020, p.1). An analysis of the inflation and CPI data, however, shows that there is no protection of the purchasing power for the poor as the general price level has risen by 86.4% since 2006, 143.03% since 2000, and 441.17% since 1990.

Implications: Rising Public Debt Results in More Taxation

A central bank's continuing purchase of government securities under expansionary monetary policy encourages a greater issuance of these debt instruments, which leads to further increases in the budget deficit and rising public debt. As the budget deficit increased from PHP3.387B in 1980 to PHP1.512T in 2023, the amount of government securities issued increased from PHP34B to PHP10.01T during the same period, thus resulting in a total public debt that ballooned from PHP71.63B to PHP14.965T over the last 43 years (Bureau of Treasury, 2024). In the 1980s, the Philippine debt crisis was primarily attributed to excessive external debt with high interest rates alongside a continuously increasing domestic debt. The 1990s accumulated national debt, absorbed by the national government and, thus, carried over until mid-2000, is traced to the losses incurred by government-owned and controlled corporations "that failed to become self-sustaining" (Sicat & Abdula, 2003, as cited by Debuque-Gonzales et al. 2023). Consequently, total debt servicing—sum of interest payments and principal amortization—as a proportion of total revenues had steadily increased from 22.2% in 1999 to 39.3% in 2004 (Diokno, 2005). The late 2000 debt, on the other hand, is mainly accounted for by rising public spending alongside declining tax and non-tax revenues (de Dios et al. 2004, as cited by Debuque-Gonzales et al. 2023). Thus, the decades-long Philippine fiscal crisis has been managed by the past five administrations via the implementation of tax reform laws—from President Corazon Aquino's Tax Reform Package in 1986 to President Rodrigo Duterte's Tax Reform for Acceleration and Inclusion in 2017—that introduced new taxes or revised the existing tax structure so as to increase tax collection.

Whereas the 1986, 1997, and 2017 tax reforms included provisions for restructuring direct taxation that reduce the tax burden of individuals (i.e., unifying tax schedules for compensation and professional income, raising personal tax exemptions, reducing tax rates—from 35% to the present 32%, etc.), the introduction of new taxes and revisions in the structure and rates of indirect taxation resulted in overall increases in tax collection. The tax reform

programs with the highest upsurges in tax revenue, per the Bureau of Treasury (2024) database, are the: (a) 1986 Tax Reform Package, which raised total tax revenues annually by an average of 23.96% from 1987 to 1989—from PHP65.5B in 1986 to PHP122.5B in 1989 vis-à-vis the 18.29% annual average increase in 1983 to 1986; (b) tax revenue went up by 21.86% in 2006 with the implementation of the 2005 Expanded Value-Added Tax Law—from PHP705.6B in 2005 to PHP859.9B in 2006. Bureau of Internal Revenue's VAT and Bureau of Customs collections, in particular, rose by 60.4% and 72.75%, respectively. Furthermore, overall tax collection from 2005 to 2008 increased by an average of 14.27% annually—from PHP705.6B in 2005 to PHP1.05T in 2008—with the share of VAT to total government revenue collections rising from 22.2% to 30.25% (Reside & Burns, 2016); and (c) tax revenue in 2018—the first year of the implementation of TRAIN—was 14% higher as compared to 2017, from PHP2.25 trillion in 2017 to PHP2.57 trillion in 2018. The steady increase in excise taxes collected from the goods and services taxed under TRAIN (i.e., petroleum products, mineral products, etc.) raised tax collection by 10.21% in 2019—from PHP2.57 trillion in 2018 to PHP2.83 trillion in 2019.

International Monetary Fund (IMF) Recommendations to Lower Inflation

The IMF often recommends that governments adopt a more disciplined fiscal policy by cutting public spending and improving revenue collection. Reducing budget deficits can dampen inflation by decreasing aggregate demand in the economy. In response to economic hardships, countries like Argentina, Brazil, Chile, and Greece—to name a few—had to adopt tightening fiscal measures (i.e., cuts to government spending) to control inflationary pressures and stabilize the economy. This illustrates why there is a strong link between budget deficits and money creation. Hence, the connection between budget deficits and money creation is not a "premise" but is a practice in countries that suffer from price instability (Tobias & Gaspar, 2022; Chen et al., 2023; Kalter, 2004; Sirken, 1968; International Monetary Fund, 2005).

Conclusions

Regression results provide strong statistical evidence that increasing budget deficits leads to the creation of more money that eventually results in sustained price increases. Growing budget deficits require the issuance of more debt securities that are purchased by the central bank to back the creation of new money. The central bank can buy government securities primarily from commercial banks or directly from the government when it implements expansionary monetary policy. The budget deficit spending undertaken by the national government and its direct or indirect funding by the central bank using fiat money creation is the main cause of inflation.

Inflation is an implicit tax because it is the hidden cost of financing budget deficits that is eventually passed on to every individual in the economy in the form of higher prices. Real price stability will only be possible if inflation is close to zero, and this will only occur if a balanced budget policy is adopted, wherein government spending will only be based on the amount of tax and non-tax revenue collected. This will decrease the issuance of government securities and reduce the excessive money creation being done by the central bank. Chronic budget deficit spending increases the public debt, leads to higher taxation, and discourages investment and sustainable job creation in the long term. It also increases the size of the government, which creates more opportunities to commit graft and corruption and undertake wasteful spending.

Final Notes

When the Bangko Sentral lowers key policy interest rates during open market operations and purchases government securities from financial institutions, the money supply increases, artificial credit expands, and inflation is created because aggregate demand, fueled by an expansion in money supply, becomes larger than the growth in real output.

When the inflation rate exceeds the BSP target, then key policy interest rates are increased under open market operations, and the BSP sells government securities to financial institutions to reduce liquidity in the financial system, decreasing money in circulation and consequently reducing aggregate demand and lowering the inflation rate.

In both cases, it is clear that inflation is a monetary phenomenon and that the use of monetary policy actually confirms that manipulating the money supply can either raise prices or reduce the rate at which

these prices increase. If inflation was not a monetary phenomenon, then the use of monetary policy tools would be irrelevant. Therefore, the use of monetary policy tools to control inflation strongly confirms that inflation is a monetary phenomenon.

Endnotes

[1]Section 52 of R.A. 7653 (The New Central Bank Act) states that:

> *"All notes and coins issued by the Bangko Sentral shall be fully guaranteed by the Government of the Republic of the Philippines and shall be legal tender in the Philippines for all debts, both public and private."*

The guarantee provided by the Republic of the Philippines on all notes, coins, and reserves produced is the government bond issued by the Bureau of Treasury, which is purchased by the Bangko Sentral when increasing the money supply.

> *The Secretary of Finance with the approval of the President of the Philippines and in consultation with the Monetary Board is authorized to borrow on the credit of the Republic of the Philippines such sum(s) as in his judgement may be necessary to meet public expenditures authorized by law or to provide for the purchase, redemption or refund of any obligation, either direct or guaranteed of the Philippine Government, and to issue thereof, Treasury Bills and Bonds which may be payable in Philippine currency, or in any readily convertible foreign currency.* (Department of Finance, 2004)

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Appendix

Appendix 1: Limitations of OLS and the Cochrane-Orcutt Method

Ordinary Least Squares

Ordinary least squares (OLS) was initially used but produced results that were spurious, heteroscedastic, and auto-correlated. These results are obviously not acceptable, hence the need to use the Cochrane-Orcutt procedure, which automatically corrects for heteroscedasticity, autocorrelation, and yields non-spurious results.

Cochrane-Orcutt Method

The Cochrane-Orcutt procedure, which is the iterative version of the feasible generalized least squares (FGLS) method, is applied to correct for the presence of serial correlation and eliminate spurious results that normally occur for time series regressions when the OLS approach is initially used.

The Cochrane Orcutt procedure takes the residuals of a regression and estimates a coefficient called *rho*. The coefficient *rho* is generated by a regression from the origin that uses the residuals as the dependent variable and the residuals of the previous period as the explanatory variable. Once *rho* (which is called rho_1) is computed, it is then used to transform the dependent and the explanatory variables.

A new regression is estimated using the transformed dependent and explanatory variables that yields a new *rho* (called rho_2).

If the difference between rho_2 and rho_1 is 0.01 or less, then the iterative procedure stops. The last regression produced becomes the final result with the expectation that it yields a Durbin Watson statistic that shows the correction for serial correlation.

Therefore, the Cochrane-Orcutt model is useful for correcting first-order autocorrelation in time-series data that assumes a simple AR(1) process for residuals and requires the linearity of the regression. The Cochrane-Orcutt model, however, involves some loss of data because of the use of the AR(1) process.

Appendix 2: Table of Data

The study uses annual data from 1980 to 2023.

Variable	Definition	Units	Treatment	Source
BUDGET DEFICIT	Excess of government spending over tax and non-tax revenues	In trillions of pesos	Model 1: No treatment Model 3: First differencing	2024 Bureau of Treasury Report on the National Govt. Debt
DEBT SECURITIES	Government securities issued by the Bureau of Treasury	In trillions of pesos	Natural Logarithm	2024 Bureau of Treasury Report on the National Govt. Debt
RGDP	Real Gross Domestic Product	In trillions of pesos	Model 2: Natural Logarithm Model 4: used as the denominator to obtain the ratio of M1 to RGDP, after which the ratio was converted into a natural logarithmic value	2024 Asian Development Bank Key Economic Indicators Report for Asia and the Pacific
TOTAL DEBT	Total public debt as reported by the Bureau of Treasury	In trillions of pesos	Model 1: lagged value by one year	2024 Bureau of Treasury Report on the National Govt. Debt

Variable	Definition	Units	Treatment	Source
M1	The sum of currency in circulation and demand deposits	In trillions of pesos	Model 2: Natural Logarithm Model 3: First differencing Model 4: used as the numerator to obtain the ratio of M1 to RGDP, after which the ratio was converted into a natural logarithmic value Model 5: First differencing lagged by 1 year	2024 Asian Development Bank Key Economic Indicators Report for Asia and the Pacific
CPI	Consumer price index	Index number with the base at year 2000	Model 4: Natural logarithm Model 5: First differencing	2024 Asian Development Bank Key Economic Indicators Report for Asia and the Pacific and the 2024 Philippine Statistical Authority Report.

Appendix 3: Tests of Assumptions

Endogeneity/Simultaneity

The specification of models 1 to 5 does not exhibit any form of endogeneity nor simultaneity. The dependent variable in Model 1, which is the natural logarithm of debt securities, becomes an explanatory variable in Model 2. However, the dependent variable in Model 2, which is the natural logarithm of M1, is not used as an explanatory variable in Model 1; therefore, simultaneity does not exist in both Models 1 and 2. In effect, the approach of Model 1 and 2 is similar to a two-stage least squares procedure, except that Model 2 does not use the fitted values from Model 1.

In the same manner, the natural logarithm of the ratio of M1 to RGDP is used as an explanatory variable in Model 4. The first differencing of M1 lagged by one year is the explanatory variable for Model 5. However, the dependent variable in these two models, which is the natural logarithm of CPI, is not used as an explanatory variable in Models 1, 2, and 3; which again illustrates that there is no endogeniety/simultaneity in the five models.

Models 1, 4, and 5 use explanatory variables that are lagged by one year. As mentioned in the previous section, lags of more than one year produce spurious results, incorrect coefficient signs, insignificant test statistics, or, at worst, no results at all because the convergence criterion of 0.01 is not met under the Cochrane-Orcutt iterative procedure.

Using Different Lags

Models 1, 4, and 5 use at least one explanatory variable, which is lagged by one year. Lags greater than one year were initially used for the abovementioned models. However, these were consequently eliminated either because:

1. they produced very low Durbin Watson statistics that did not pass the test for serial correlation, coefficient signs that did not conform to the a-priori expectations, and did not produce significant test statistics; or
2. final results could not be generated because it did not meet the convergence criterion of 0.01 required under the Cochrane Orcutt iterative procedure.

In view of this, the ideal lag is no more than one year.

Omitted Variables

A Link test was used to confirm if variables were omitted for each of the equations from Models 1 to 5.

The Link test is conducted as follows:

1. From each regression result of Model 1 to Model 5, the respective fitted values were obtained.
2. The square of the fitted values were generated.
3. The fitted values and the square of the fitted values were used as explanatory variables and regressed against the respective dependent variables of Model 1 to Model 5.
4. For each of the five models, if the square of the fitted value is insignificant, it can be concluded that there is no omitted variable.

	Model 1	Model 2	Model 3	Model 4	Model 5
Squared fitted value (Y-hat²)	0.6038 (P-value)	0.4994 (P-value)	0.4446 (P-value)	0.6749 (P-value)	0.3230 (P-value)

All of the squared fitted values in each of the five models are insignificant, indicating that there were no omitted variables in the original regression results presented in the paper.

Heteroscedasticity

The study uses the Park test to determine the presence of heteroscedasticity. The Park test initially takes the residuals from the original regression results, after which these residuals are squared and consequently transformed into their natural logarithmic values.

Park test to detect for heteroscedasticity

	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable	***Natural logarithm of the squared residuals***	***Natural logarithm of the squared residuals***	***Natural logarithm of the squared residuals***	***Natural logarithm of the squared residuals***	***Natural logarithm of the squared residuals***
Explanatory Variables:					
constant	-5.44152	-4.26735	-6.23251	-10.0484	0.269983
	(<0.0001)	(0.2486)	(<0.0001)	(<0.0001)	(0.5591)
	* **		***	***	
Budget Deficit	-2.25085 **(0.1042)**				
Total Debt Lagged (-1)	-0.131417 **(0.4620)**				
L_Debt Securities		0.184319 **(0.7459)**			
L_RGDP		-1.01687 **(0.5549)**			
d_BUDGET DEFICIT			1.21625 **(0.5942)**		
L_M1 to RGDP Ratio Lagged (-1)				-0.627242 **(0.0932)**	
d_M1 Lagged (-1)					1.46008 **(0.3868)**

Note: All values in parenthesis are p-values

The logarithmic value of the squared residuals becomes the dependent variable in an ordinary least squares regression that uses the explanatory variables from the original models.

The Park test, as applied to Models 1 to 5, shows that the changes in the explanatory variables do not affect the natural logarithm of the squared residuals, indicating that there is no heteroscedasticity (their p-values are greater than the 1% and 5% levels of significance), hence the variances are homoscedastic (refer to Park test results for Models 1 to 5 presented in the table above).

Stationarity Tests

The augmented Engel Granger (AEG) test was conducted for Models 1 to 5 to determine if the error term or residual is stationary. The residuals for each model were obtained, and the AEG test was implemented by using OLS regression wherein the dependent variable is the first difference of the residuals and the explanatory variable is the residuals lagged by one year. If the absolute value of the test statistic of the coefficient exceeds the critical value, the conclusion would be that the estimated residuals are stationary and, therefore, the explanatory variables used in each of Models 1 to 5, despite being individually non-stationary, are actually cointegrated with their respective dependent variables.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Augmented Engel Granger (AEG) Test Results	-5.765 (t-stat)	-5.723 (t-stat)	-7.591 (t-stat)	-5.873 (t-stat)	-5.704 (t-stat)
	-3.66 (t-critical)	-3.65 (t-critical)	-3.66 (t-critical)	-3.66 (t-critical)	-3.5 (t-critical)
	$1.01e^{-6}$ (p-value)	$1.07e^{-6}$ (p-value)	$2.85e^{-9}$ (p-value)	$7.13e^{-7}$ (p-value)	$1.33e^{-6}$ (p-value)
	n=41 k=1	n=42 k=1	n=41 k=1	n=41 k=1	n=40 k=1

The AEG test was necessary because the augmented Dickey Fuller tests revealed that the explanatory variables and the dependent variables used in Models 1 to 5 were non-stationary.

Given that the AEG test revealed that the explanatory variables and the dependent variables from Models 1 to 5 are cointegrated, the results are not spurious. This confirms the non-spurious results obtained from Models 1 to 5, wherein all the Durbin Watson statistics are greater than the R-squared and adjusted R-squared (Granger & Newbold, 1974).

Normality of Residuals

Given that the number of observations ranged from a low of 42 (Models 1, 4, and 5) to a high of 43 (Models 2 and 3), a t-distribution was used for testing the normality of the residuals.

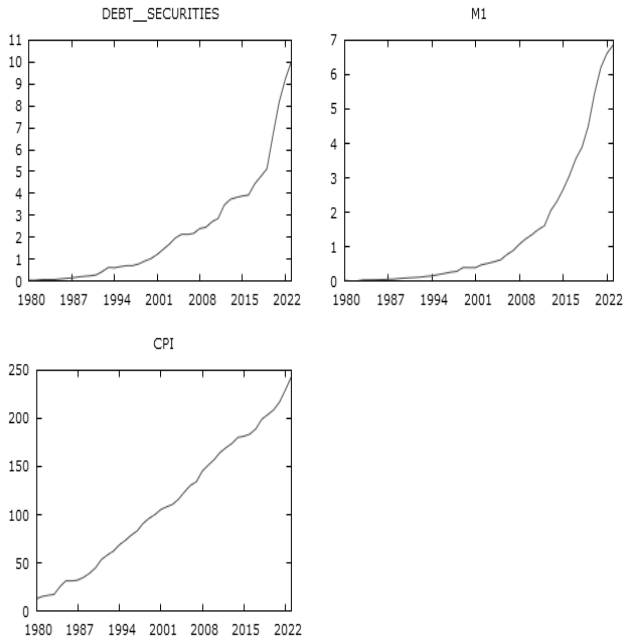
The test statistic is computed by dividing the mean error (ME) of the regression by the standard error of the regression (SER). If the absolute value of the test statistic is less than the critical t-value, then we do not reject the null hypothesis and conclude that the residuals may follow a normal distribution with a mean of zero.

	Model 1	Model 2	Model 3	Model 4	Model 5
Testing the normality of residuals using a t-distribution	0.088146 (SER)	0.090582 (SER)	0.107473 (SER)	0.050771 (SER)	2.6354 (SER)
	$4.7251e^{-17}$ (ME)	$-1.091e^{-15}$ (ME)	$-3.965e^{-18}$ (ME)	$2.1147e^{-17}$ (ME)	$9.9649e^{-16}$ (ME)
	$5.3605e^{-16}$ (t-stat)	$-1.204e^{-14}$ (t-stat)	$-3.689e^{-17}$ (t-stat)	$4.1652e^{-16}$ (t-stat)	$3.7812e^{-16}$ (t-stat)
	2.326 (t-critical)	2.326 (t-critical)	2.326 (t-critical)	2.326 (t-critical)	2.326 (t-critical)
	H_o: Normally distributed with mean zero	**H_o: Normally distributed with mean zero**	**H_o: Normally distributed with mean zero**	**H_o: Normally distributed with mean zero**	**H_o: Normally distributed with mean zero**
	t-stat < t-critical	t-stat < t-critical	t-stat < t-critical	t-stat < t-critical	t-stat < t-critical
	Accept H_o	**Accept H_o**	**Accept H_o**	**Accept H_o**	**Accept H_o**

Control for Structural Breaks

In the presence of structural breaks with an obvious truncation in the data points, a regression using such a data set will normally produce bad-fitting results with insignificant t and f statistics. The structural break may be corrected using dummy variables or splitting the sample to improve the model fit.

However, data on government securities from the Bureau of Treasury, as well as money supply (M1) and the consumer price index (CPI) from the ADB Key Indicators Report that were used as bases for the dependent variables do not exhibit structural breaks (refer to the graphs presented below).



The visual inspection of the time series graphs is a commonly used approach to detect structural breaks or truncation (Stock & Watson, 2015).

The issuance of government debt securities depends primarily on the size of the budget deficit as well as the components of the public debt, which is expected to mature and will require immediate financing through the issuance of new treasury bonds, particularly when tax and non-tax revenue remains inadequate.

The consumer price index responds to changes in monetary policy. Whether money supply growth is rapid (under expansionary monetary policy) or is slowed down (under contractionary monetary policy), as long as the money supply is increasing every year, this will lead to sustained price increases as shown by the upward-sloping CPI curve from 1980 to 2023.

Finally, the generally smooth upward-sloping curve of M1 does not show any signs of structural breaks despite a financial crisis in 1984, 1997, the global economic slowdown in 2008, and the outbreak of COVID-19 in 2020.

In general, the central bank's response to a financial crisis, is embedded or integrated into its use of monetary policy, which involves increasing interest rates and slowing the growth of money supply particularly during the Philippine financial crisis of 1984 and the Asian financial crisis of 1997.

The central bank implemented an expansionary monetary policy after the Global financial crisis of 2008 and the COVID-19 pandemic in order to offset the expected economic slowdown.

In general, the central bank is mandated to implement monetary policy as it responds to both crisis and non-crisis situations. Its actions are directly reflected in the movements of interest rates and money supply. Therefore, the central bank's implementation of monetary policy is already reflected, embedded, and integrated in its responses to crises. The increase or reduction in money supply growth is the result of changes in key policy interest rates, which is the central bank's traditional approach to addressing a crisis, whether it be financial or pandemic-related.

Because Models 1 to 5 exhibit good fitting results with significant t and f statistics and pass all of the tests of assumptions, adding dummy variables or splitting the sample to account for structural breaks is not necessary to improve the reliability of the current model results.

Appendix 4: Robustness Checks

Alternative Measures of Money Supply

Model 5 serves as a test of robustness for Model 4. In both equations, money supply significantly increases the natural logarithm of the consumer price index. The test of robustness is shown by the use of different transformations of the money supply explanatory variable that yield the same results. Model 4 uses the natural logarithm of the ratio of M1 to RGDP lagged by one year. Model 5, on the other hand, uses the first differencing of M1 lagged by one year.

An additional test of robustness is done using the natural logarithm of the ratio of M3 to RGDP as the first explanatory variable, the natural logarithm of the ratio of M3 to RGDP lagged by one year as the second explanatory variable, and the natural logarithm of the ratio of M3 to RGDP lagged by two years as the third explanatory variable. The conclusions are practically the same as Models 4 and 5—that increases in money supply lead to an increase in CPI—with the p-value of L_M3_RGDP_Ratio at 0.0341, significant at the 5% level. The model has an R-squared and an adjusted R-squared that is slightly above 99% and a Durbin Watson statistic at 1.812095, indicating that the regression result is not spurious and does not show any evidence of serial correlation.

The regression results showing the tests of robustness are presented below:

Dependent Variables:	**Model 4**	**Model 5**	**Additional Test for Robustness using M3 as the explanatory variable**
	L_CPI	***d_CPI***	***L CPI***
Explanatory Variables:			
constant	5.79527*** (<0.0001)	4.79826*** (<0.0001)	5.58087*** (<0.0001)
L_M1 to RGDP Ratio Lagged (-1)	0.266264*** (0.0004)		
d_M1 Lagged (-1)		0.5.18221** (0.0387)	
L_M3_RGDP_ RATIO			0.273091** (0.0341)
L_M3_RGDP_RATIO Lagged (-1)			0.221582 (0.1109)
L_M3_RGDP_RATIO Lagged (-2)			0.0981072 (0.4159)
Statistics based on the rho-differenced data			

	Model 4	Model 5	Additional Test for Robustness using M3 as the explanatory variable
R-squared	0.995422	0.232592	0.995314
Adjusted R-squared	0.995307	0.212915	0.994934
Durbin Watson Statistic	**1.807630**	**1.774560**	**1.812095**
Critical upper d_u at $\alpha = 0.01$	1.344	1.344	1.344
Standard Error of the Regression	0.050771	2.635396	0.049597
F-statistic	14.73763*** (0.000430) F(1,40)	4.575532** (0.038749) F(1,39)	226.0769*** (7.73e-24) F(3,.37)
rho	0.922081	0.295239	0.67005
Number of iterations	44	4	9
n	42	41	41

The model, which uses the natural logarithm of the ratio of M3 to RGDP is used as a final equation to test for robustness. The model passes all tests of assumptions:

No autocorrelation (Durbin Watson statistic at 1.812095)

No heteroscedasticity (all explanatory variables are insignificant when regressed with the natural logarithm of the squared residuals:

L_M3_RGDP_RATIO	P-value=0.1067
L_M3_RGDP_RATIO Lagged (-1)	P-value=0.4214
L_M3_RGDP_RATIO Lagged (-2)	P-value=0.7080

No omitted variable bias (using L_CPI as the dependent variable and the square of the fitted values as the second explanatory variable yields a p-value of 0.5907)

Residuals are stationary; hence, the variables L_CPI and L_M3_RGDP_RATIO are cointegrated (regressing the first difference of residuals as the dependent variable and the residuals lagged by one year as the explanatory variable yields a test statistic of t=-8.058 with a p-value of $7.93e^{-10}$ indicating that the residuals are stationary).

Residuals have a mean of zero and a distribution that is approximately normal (mean error=$1.6464e^{-15}$, a standard error of the regression SER=0.049597, a test statistic of $3.31955e^{-14}$). The absolute value of the test statistic is well below the critical t-value of 2.326 at a 1% level of significance.