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The Statistical Relationship between Budget Deficits and Money Supply and its Effects on Inflation and Exchange Rates

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Abstract: National governments which have always operated with chronic budget deficits regularly attempt to justify this practice by asserting that increases in government spending are necessary in order to achieve the country's economic growth targets. However, rising chronic budget deficits result to the accumulation of larger public debts which will require increased taxation and will have the effect of discouraging both domestic and foreign investment. But aside from higher taxes in the future, the immediate problem created by budget deficit spending is the accumulated inflation which steals the value of savings, decreases the purchasing power of fixed income earners, reduces the value of retirement pensions and severely hurts the poor whose meager incomes end up buying a lesser amounts of goods and services over the years. Budget deficit spending causes inflation because it provides the opportunity for the Central Bank to increase money supply which is backed up by government bonds. Rapid increases in money supply are the cause of inflation, which leads to more importation, widens the trade deficit, increases foreign debt and puts pressure on the exchange rate to depreciate.
Key words: budget deficits; inflation, money supply, imports, trade deficits, foreign debt, exchange rates

1.0 INTRODUCTION

National governments which have always operated with chronic budget deficits attempt to justify this practice by asserting that increases in government spending are necessary in order to achieve the country's economic growth targets, alongside the provision of more infrastructure and social services for all, with special emphasis on the poor and their needs for public health care, education, housing and cash transfer programs.

However, the strength of an economy does not depend on government spending but rather on increasing and improving the ability of the firms in the private sector to produce a wider variety and a larger volume of goods and services at competitive prices and at a lower cost per unit. More competitive firms and industries create sustainable jobs from profitable operations which in turn, encourages new investment and the expansion of productive capacity. The government can only collect more tax revenue to finance its spending if firms in the private sector are allowed to invest, compete and grow in a market with low sales taxes, minimal tariff rates , low income tax rates and regulations at the bare minimum (no price controls, no subsidies, less bureaucratic red tape, no special privileges and no protection given to special interests). These are the conditions which attract more domestic and foreign investment, create jobs and lead to more success in reducing poverty.

If the government continues with the practice of continually operating with growing budget deficits, then the ideal conditions needed to attract investment will not exist and the accumulation of public debt from these chronic budget deficits will just lead to higher taxation and a bigger bureaucracy in the long run.

But aside from higher taxes in the future, the immediate problem created by budget deficit spending is the accumulated inflation which continually steals the value of savings, decreases the purchasing power of fixed income earners , reduces the value of retirement pensions and severely hurts the poor whose meager incomes end up buying a lesser amount of goods and services.

From the year 2008 (CPI=100), the consumer price index has risen by more than 67 percent, substantially reducing the purchasing power of money over the last 15 years. If the year is 2000 is used as a starting point, the consumer price index for 2023 would be at 243.034, indicating a price increase of more than 2.43 times over the last 23 years. If the base year was set at 1990, the consumer price index would have risen from 100 to 541.71, or a price increase of more than 5.41 times over the last three decades. Accumulated inflation increases the cost of doing business which discourages investment as well as increases the cost of living for all households in the economy.

2.0 STATEMENT OF THE PROBLEM

What is the relationship between budget deficits and money supply and its effect on inflation and exchange rates?

3.0 THEORETICAL FRAMEWORK

The Budget Deficit and Money Supply - Money supply is increased by the Central Bank because it is used to finance the excess of government spending over taxation. This is referred to as budget deficit spending (or fiscal deficit spending). Government is capable of spending more than the amount of tax revenues it collects because of its ability to borrow money from the Central Bank which has the sole authority to create and print new money out of nothing and simply require a government bond issued by the Bureau of Treasury in order to back it up (Salerno, 2000).

Government can issue bonds and directly borrow from the Central Bank (monetizing public debt) and or borrow from commercial banks (public borrowing) based on directives from the Central Bank. However, commercial banks consequently sell these government bonds to the Central Bank in order to get access to new money at artificially low interest rates. Therefore the government bonds issued to the commercial banks end up being used by the Central Bank to back up the newly created money. This practice remains faithful to the condition that newly created money must be backed up by government issued treasury bonds.

Money Creation and Inflation - The classical definition of inflation refers to the increase in money supply that causes a sustained increase in prices (Reed, 2012). This is the definition which has proven to be true based on the fact that rapid inflation and specifically hyperinflation has occurred in various countries at different periods of time, and in all cases, were attributed to the rapid growth of money supply created by a Central Bank which was used to finance massive government spending that exceeded tax revenues. These are the experiences of countries such as Zimbabwe in 2008 (89.7 sextillion percent), Greece in 1942 to 1944 (8.5 billion percent) , Bolivia in 1984 to 1986 (20,000 percent), Argentina in 1989 (4,923 percent) , Brazil in 1994 (2,075 percent), Chile in 1971 to 1973 (1,200 percent), Russia in 1992 to 1994 (2,520 percent) , Austria in 1921 to 1923 (1,426 percent), Germany in 1920 to 1923 (1 trillion percent) and the Ukraine in 1993 to 1995 (1,400 percent), just to mention a few (Mankiw, 2012). The increasing budget deficits funded by Central Bank money creation and backed up by government bonds are responsible for the existence of high and rising inflation (Greaves, 2021).

Quantity Theory of Money - In theory, the rapid increases in money supply which cause inflation are explained by the "Quantity Theory of Money" which states that the total spending on the amount of goods and services produced in the entire economy (which refers to the price of each good and service (P) multiplied by its respective quantities (Q)) can only be undertaken if there is a quantity of money (M) that is created and is adequate enough to facilitate the spending. The quantity of money multiplied by the velocity of money (V) will be equal to the total spending on all goods and services produced in the entire economy. The equation can be expressed as $M*V = P*Q$. Assuming that the velocity of money (V) and the quantity of products (Q) are stable, an increase in the quantity of money (M) will result to an increase in the prices of goods and services (P). This occurs particularly when the growth of the amount of goods and services (Q) fail to catch up with the rising demand for products caused by the increase in the quantity of money(M) (Friedman, M. 1987).

Inflation is a Hidden Tax - When the Central Bank creates new money, it increases the demand for goods and services by the recipients of the new money which are both government and borrowers from the private sector. Considering that there is no accompanying increase in the amount of goods and services being produced when new money is created, prices continually increase because of the larger aggregate

demand. When output production fails to catch up with the increasing demand, this condition inevitably results to a higher inflation rate. New money injected by the Central Bank and spent by the national government into the economy has an inevitable ripple effect; the early receivers of new money (government and private contractors) spend more and bid up prices, while later receivers (the rest of the private sector) or those on fixed incomes find the prices of the goods they must buy unaccountably rising, while their own incomes lag behind or remain the same (Rothbard, 2023). Inflation is a policy used by the government , and such a policy can be changed by not inflating the money supply and balancing the budget of government (Mises, 1979). Because newly created money finances excessive government spending (or budget deficit spending), its inflationary outcome which is expected to be within 2 to 4 percent (or perhaps, above it) becomes the inflation tax or a hidden tax. This is the cost of government's actions which is shouldered by all individuals in the economy in the form of higher prices (Reisman, 2003). If the ruling political party does not want to imperil its popularity by the imposition of immediate heavy taxation, it takes recourse to inflation (Mises, 1944). British economist John Maynard Keynes actually wrote that "By a continuing process of inflation, governments can confiscate, secretly and unobserved, an important part of the wealth of their citizens" (Keynes, 1919, Reed, 2012).

4.0 METHODOLOGY

The study covers a 33 year period from 1990 to 2023 with data taken from the Key Indicators for Asia and the Pacific Report of the Asian Development Bank released in 2023, the Bureau of Treasury Statistics Handbook published in 2023, and the Monetary Policy Report of the Bangko Sentral ng Pilipinas February 2024. Regression analysis was used to determine the relationship between the explanatory variables and the dependent variables. The Cochrane-Orcutt autoregressive procedure was applied on all of the regression equations in order to correct for the presence of autocorrelation.

5.0 RESULTS AND ANALYSIS

The summary statistics of the dependent variables and the explanatory variables used for the estimation of the regression equations are found in **Appendix A.** The budget deficit, real gross domestic product (Real GDP), money supply (M3) and foreign debt are figures expressed in trillions of pesos. The money supply (M3) contains currency in circulation, demand deposits, time deposits , institutional money market funds and deposits substitutes such as government securities.

The consumer price index (CPI), uses the base value of 100 for the year 2008. The exchange rate is expressed as the number of PH pesos needed to purchase one U.S. dollar. The trade deficit is stated in trillions of U.S. dollars, while the imports and the international reserves are expressed in billions of U.S. dollars.

Model 1

Budget deficits encourage more money creation by a Central Bank

Model 1 (refer to **Appendix B**) illustrates how the money supply (L_M3) is affected by three explanatory variables namely: 1) the national government's budget deficit (Budget_DEFICIT_trillions); 2) the total output production in the economy (L_Real_ GDP) and: 3) the real gross domestic product lagged by one period (L_Real_GDP-1).

The money supply, the real gross domestic product and its one year lagged value have been converted into natural logarithms to better capture their respective non-linear relationships as well as to produce coefficients which can be interpreted as percentage changes. All three explanatory variables show individually significant results at a 95 percent degree of confidence (or a 5.0 percent level of significance). Their respective coefficient signs are all consistent with the theoretical expectations.

The model provides an excellent goodness of fit with 99.7444 percent (Adjusted R-squared) of the variations in L_M3 being explained by the variations in the three explanatory variables (Adjusted R-squared at 0.997444). The model is significant overall with the computed F-statistic at 44.32437 and a p-value of 9.21e-11 which is well below the critical p-value of 0.01. The model has been corrected for autocorrelation and there is no evidence of positive first-order serial correlation given that the equation's computed Durbin-Watson statistic at 2.027402 is well above the critical upper d_u (Durbin-Watson) statistic at 1.428 at a 1.0 percent level of significance.

The regression equation clearly shows that a one trillion peso increase in the national government's budget deficit (Budget_DEFICIT_trillion), will increase the money supply (L_M3) by 0.153026 percent. This validates the fact that a budget deficit will require the issuance of more government securities by the Bureau of Treasury in order to borrow money and finance the excessive spending. These publicly issued securities can be directly sold to the Central Bank and will be used to back up the creation of new money that can be directly released to the government consequently increasing the amount of money in circulation.

Commercial banks can also lend to government by purchasing securities from the Bureau of Treasury (on their own volition and / or in compliance with Central Bank regulations) and will also have the opportunity to sell these public debt instruments to the Central Bank in exchange for new money which could be borrowed at a very low interest rate under open market operations. The government securities being sold by the commercial banks to the Central Bank is again used as a basis to back up the creation of new money which will then be released to the commercial banks under a reverse repurchase agreement. The commercial banks will use the new money as additional reserves that become the basis for creating new loans increasing the amount of money in circulation.

A Central Bank accommodates economic growth with increases in money supply - The second explanatory variable which is the natural logarithm of real gross domestic product (L_Real_GDP) has a positive significant effect on the natural logarithm of money supply(L_M3). A one percent increase in L_Real_GDP will increase money supply(L_M3) by 1.02073 percent. Increases in output production are expected to increase the demand for money, however, if the money supply cannot meet the increasing money demand, a consequent increase in interest rates will occur and is expected to discourage new borrowing to finance investments. Therefore, the Central Bank will increase money supply enough to meet money demand, in order to prevent an increase in the interest rate as output production (L_Real_GDP) rises.

The third explanatory variable which is the natural logarithm of total output production lagged by one year (L_Real_GDP-1) also shows a positive significant effect on the natural logarithm of money supply (L_M3). An increase in the total production of output during the previous year (L_Real_GDP-1) by one percent, will increase money supply (L_M3) of the current year by 0.656598 percent. Higher output production during the previous year may induce the Central Bank to further increase money in circulation for the succeeding year in order to better respond to the expected increase in money demand and avoid the prospect of rising interest rates.

Model 2

Increases in money supply increase prices

Model 2 (refer to **Appendix C**) is the regression equation that shows the impact of increasing money in circulation on the consumer price index. The explanatory variable used is the natural logarithm of the ratio of money in circulation to real gross domestic product (L_M3_RGDP_ratio). The dependent variable on the other hand is the natural logarithm of the consumer price index (L_CPI) Both the explanatory variable and the dependent variable were transformed into their respective natural logarithmic values in order to have a model specification that better captures their non-linear relationship and expresses the regression coefficient as a percentage change.

The ratio of M3 to Real GDP and its effect on the CPI - The ratio of money in circulation to the real gross domestic product shows the rate at which money supply increases relative to an increase in total output production. If the value of the ratio is rising, this implies that money supply is increasing at a much faster rate compared to real gross domestic product. When the money supply is increasing faster than output production, then such a condition leads to more spending and larger aggregate demand relative to a slower expansion of aggregate supply forcing buyers to compete for a limited amount of goods and services, offering higher bids that consequently pushes prices upward.

The model confirms this relationship by showing that as the ratio of money in circulation to real gross domestic product (L_M3_RGDP_ratio) increases by one percent, the consumer price index (L_CPI) increases by 0.576761 percent. The highly significant p-value (less than 0.0001) of the ratio of money in circulation to real gross domestic product (L_M3_RGDP_ratio) clearly shows that increasing

money supply leads to rising prices, specifically if the money in circulation is growing at a rate faster than real gross domestic product.

The use of a double logarithmic function provides another extremely good fit with 99.2700 percent (Adjusted R-squared) of the variations in the consumer price index (L_CPI) being explained by the variations in the ratio of money supply to real gross domestic product (L_M3_RGDP_ratio). The equation has been corrected for autocorrelation with a computed Durbin- Watson statistic of 1.517522, which is greater than the critical upper d_u (Durbin-Watson) statistic at 1.291 given a 1.0 percent level of significance. This regression result confirms that inflation indeed is a purely monetary phenomenon.

The impact of money supply on exchange rates using a transmission mechanism process involving imports, the trade deficit, and foreign debt - After establishing the significant impact of money supply on the consumer price index, it will then be necessary to determine if the increasing money in circulation also has an effect on the exchange rate. This is important because the higher prices of imported goods are usually identified as another cause of inflation which is an argument that is at best very superficial and at worst misleading. Rapid increases in domestic money supply leads to a depreciating exchange rate, which makes imported goods more expensive.

Imported goods have their prices expressed in foreign currency, while prices of goods in the local economy are in domestic currency. While the U.S. dollar remains as the international reserve currency and the internationally acceptable medium of exchange, the prices of foreign goods offered for sale in the world market will be expressed in U.S. dollars and this will be completely independent, distinct and separate from the prices of local goods expressed in PH pesos. The only connection between foreign prices and local prices is the exchange rate, which is affected by a Central Bank's implementation of expansionary monetary policy and its propensity to intervene in the foreign exchange market. The rapid increases in money supply which raises aggregate spending, will lead to rising prices if domestic production fails to meet the increase in total demand. Because of the shortfall in domestic production , there will be more local currency being used to purchase foreign currency to pay for increased importation.

Given the limited amount of foreign currency reserves (due to chronic trade deficits, debt payments and net capital outflows), the increase in demand for foreign currency will make the U.S dollar more expensive, leading to an exchange rate depreciation. This will require more local currency to purchase foreign currency, increasing the cost of importation, which results to imported goods being sold in the local economy at higher domestic prices. Slower money supply growth would lead to lesser domestic currency running after foreign currency, which reduces the pressure on exchange rates to depreciate. In effect, , it is the exchange rate depreciation (which is affected by expansionary monetary policy), that makes the imported goods more expensive in local currency.

Model 3

Increasing money supply induces more importation

Model 3 (refer to **Appendix D**) shows the effect of money supply on imports. The money supply explanatory variable is represented by the natural logarithm of the ratio of M3 to real gross domestic product (L_M3_RGDP_ratio) while the dependent variable is the natural logarithm of imports(L_Imports). The model shows the highly significant impact of money supply (the L_M3_RGDP_ratio) on imports (L_Imports) with a p-value less than 0.0001 percent and 95.3960 percent (Adjusted R-squared) of the variations in L_Imports being explained by the variations in the ratio of money supply to gross domestic product (L_M3_RGDP_ratio). The model shows no evidence of autocorrelation with a Durbin-Watson statistic of 1.741272 which is greater than the critical upper d_u (Durbin-Watson) statistic at 1.291 at a 1.0 percent level of significance.

This regression result clearly shows that if the ratio of money supply to real gross domestic product (L_M3_RGDP_ratio) increases by 1 percent, the dependent variable (L_Imports) increases by 0.792106 percent . The explanatory variable (L_M3_RGDP_ratio) will only increase if the money supply (M3) is growing faster than real gross domestic product (RGDP). Given this situation, the increase in money supply which leads to more spending and higher aggregate demand will induce more importation, particularly if the total domestic production is not growing fast enough. More importation alongside the slow growth of exports is

expected to worsen the trade deficit.

Model 4

Increasing money supply leads to an expansion of the trade deficit

This regression equation **Model 4** (refer to **Appendix E**) shows that increases in money supply lead to an expansion of the trade deficit. The explanatory variable which is the natural logarithm of the ratio of money supply to the real gross domestic product lagged by one year (L_M3_RGDP_ratio_1) shows a positive effect on the trade deficit (Trade_DEFICIT). A one percent increase in the lagged ratio of money supply to real gross domestic product (L_M3_RGDP_ratio-1) will increase the trade deficit by 0.0272839 trillion dollars. The relationship is significant with a p-value of 0.0316 at a 95 percent degree of confidence. Approximately 80.8623 percent (Adjusted R-squared) of the variations in the trade deficit are explained by the variations in the lagged ratio of money supply to real gross domestic product. The model reveals no evidence of autocorrelation with the computed Durbin-Watson statistic of 1.815056 being greater than the critical upper d_u (Durbin-Watson) statistic of 1.282 at a 1.0 percent level of significance.

The regression equation confirms that increases in money supply that is faster than domestic output production, will lead to an expansion of the trade deficit. Trade deficits become larger as imports grow more rapidly than exports. This outcome was confirmed by the significant results of Model 3 (presented earlier), showing that imports increase when the money supply is growing faster than output production.

Model 5

Increasing money supply widens the trade deficit and increases the foreign debt

Model 5 (refer to **Appendix F**), establishes the effects of money supply and the trade deficit on foreign debt.

The impact of increasing money supply on foreign debt - Regression results show that the natural logarithm of the ratio of money supply to real gross domestic product lagged by one year (L_M3_RGDP_ratio-1) has a significant positive effect on the natural logarithm of the dollar denominated foreign debt (represented by the variable (1_F_DEBT_dollars) with a p-value less than 0.0001 at a 99 percent degree of confidence. A one percent increase in the lagged ratio of money supply to real gross domestic product increases the dollar denominated foreign debt by 0.543137 percent. An increase in the ratio of money supply to real gross domestic product indicates that money supply growth is faster compared to domestic output growth. This ultimately increases importation, leading to an expansion of the trade deficit and consequently increasing the need to borrow more foreign currency resulting to a larger foreign debt.

The effect of the trade deficit on foreign debt - The trade deficit lagged by one year (Trade_DEFICIT-1) is included as the second explanatory variable which shows a positive effect on the natural logarithm of the dollar denominated foreign debt (L_F_DEBT_dollars). A one trillion dollar increase in the trade deficit of the previous year will increase foreign debt by 0.0519743 percent. Although the one year lagged trade deficit does not generate a significant result (with a p-value at 0.9824) (because of its correlation with the ratio of money supply to real output), this explanatory variable still plays an important role in providing a good fit where 93.0163 percent (Adjusted R-squared) of the variations in dollar denominated foreign debt are explained by the variations in all the explanatory variables combined. In addition, the positive coefficient sign correctly illustrates the impact of a larger trade deficit on increasing foreign debt. The regression equation passes the test of overall significance with a computed F-statistic at 42.32376 along with a very low p-value at 2.51e-09 which is significant at a 99 percent degree of confidence. The model does not show evidence of autocorrelation with a computed Durbin-Watson statistic at 2.143363 which is higher than the upper critical d_u (Durbin-Watson) statistic at 1.428 at a 1.0 percent level of significance.

Model 6

The impact of money supply, international reserves and foreign debt on the exchange rate

The regression equation **Model 6** (refer to **Appendix G**), illustrates the impact of three explanatory variables namely: 1) the money supply; 2)

international reserves and; 3) the foreign debt, on the peso dollar exchange rate. All of the above mentioned explanatory variables as well as the dependent variable were transformed into their respective natural logarithmic values which facilitates the interpretation of the regression coefficients as percentage changes. All of the explanatory variables are statistically significant and their respective coefficient signs correctly illustrate the expected theoretical impact on the peso dollar exchange rate. Approximately 95.8197 percent (Adjusted R-squared) of the variations in exchange rates are explained by the variations in the explanatory variables. The model is significant overall with a computed F-statistic at 19.85075 and a computed p-value at 4.25e-07 which is substantially below the critical p-value of 0.01 at a 99 percent degree of confidence. The computed Durbin-Watson statistic at 1.531002 is above the upper critical d_u (Durbin-Watson) statistic of 1.428 at a 1.0 percent level of significance.

The effect of money supply on exchange rates - A one percent increase in the money supply of the previous year (L_M3-1) will increase the peso dollar exchange rate by 0.137178 percent, with a p-value at 0.0629, which is significant at a 90 percent degree of confidence. A rapid increase in money supply is expected to increase importation, particularly if domestic production fails to meet the increase in aggregate demand fueled by expansionary monetary policy. This will lead to an expansion of the trade deficit, particularly, if exports do not grow fast enough to meet the increased importation. A widening trade deficit increases the demand for foreign currency which makes the U.S. dollar more expensive, consequently requiring a larger amount of PH pesos to pay for its purchase making the exchange rate depreciate.

The effect of international reserves on exchange rates - A country's international reserve contains various types and amounts of foreign currency, gold and special drawings rights; all of which can be used to increase the supply of foreign currency that will meet the rising demand for it, and consequently achieve exchange rate stabilization.
The regression results show that a one percent increase in the international reserves (L_International__Reserves) will lead to a (- 0.250447) percent **reduction** in the exchange rate (L_Exchange__Rate). This is consistent with the expectations in the market, considering that a Central Bank with a larger international reserve can always supply more foreign currency to meet a country's rising demand for it, consequently reducing the price and leading to a lower exchange rate. Foreign currency will become cheaper in the domestic financial market if the supply for it is greater than the demand leading to an exchange rate appreciation. The regression coefficient is highly significant with a p-value at 0.0007 given a 99 percent degree of confidence.

The impact of foreign debt on exchange rates - A larger amount of foreign debt being accumulated by the economy will have the effect of depreciating the exchange rate. A one percent increase in the foreign debt of the previous year (L_Foreign_DEBT-1) will increase the exchange rate (L_Exchange__Rate) by 0.451264 percent. This is consistent with the theoretical expectation because, an increase in the foreign debt will mean more debt servicing payments to be made in the future that includes both interest and the principal amount relative to the actual loan obtained. More foreign debt service payments relative to the loans received, will lead to larger foreign currency outflows relative to inflows in the balance of payments capital account. This will increase a country's demand for foreign currency relative to its supply, ultimately putting pressure on the price of foreign currency to increase, requiring a larger amount of local currency to pay for its purchase. The effect is significant with a p-value less than 0.0001 at a 99 percent degree of confidence.

6.0 CONCLUSION

Results from the six regression models based on the 33 years of observations beginning from the year 1990 up to 2023 reveal that:

1) Budget deficits definitely increase money in circulation - Regression results are consistent with the fact that a national government which spends more than the amount of tax revenues it collects will issue more government securities which are used by the Central Bank to back up the creation of new money. The Central Bank can also purchase government securities being sold by commercial banks to create new money which it can release to these commercial banks at low interest rate loans under open market operations.

Budget deficits cause inflation because it provides the opportunity for government to issue treasury bonds/ securities which are used by the Central Bank to back

up the creation of new money. This new money leads to more spending and without a corresponding increase in production, will therefore result to a sustained price increase in practically all goods and services.

2) Increases in money supply cause inflation - particularly when money supply growth is faster compared to the growth of real gross domestic product. This condition fuels increases in spending and aggregate demand which is not adequately met by the expansion of domestic output. This forces buyers to compete for a limited amount of goods and services, consequently offering higher bids that push prices upward along with firms attempting to sell goods and services to those willing to pay the higher prices.

3) The rapid expansion of money supply increases importation, widens the trade deficit and increases foreign borrowing which all result to a depreciation of the exchange rate which makes imported goods more expensive in terms of local currency. It is the exchange rate depreciation caused by increases in money supply that makes imported goods more expensive in local currency.

In view of these results, the inflation which: i) ruins the purchasing power of domestic currency; ii) steals the value of savings and retirement pensions; iii) increases the cost of living and; iv) increases the cost of doing business can only be eliminated if the national government abolishes the practice of budget deficit or fiscal deficit spending. This will reduce the issuance of government securities and decreases the amount of money being created by the Central Bank which is the real source of inflation.

Accumulating inflation, increasing public debt, a bigger and continually growing government bureaucracy, increasing government regulations, higher and more aggressive taxation and the gradual loss of potential investments both domestic and foreign are the real outcomes of chronic budget deficit spending.

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7.0 Appendices

Appendix A

Summary Statistics, using the observations 1990 – 2023

Variable	Mean	Median	S.D.	Min	Max
Budget Deficit	0.321	0.147	0.480	-0.0163	1.67
M3	5.25	3.15	5.25	0.300	17.5
CPI	93.8	91.1	38.4	30.9	167.
Real GDP	10.9	9.54	5.05	5.22	21.1
Exchange Rate	43.2	45.3	10.3	24.3	56.0
Imports	57.2	49.6	33.9	12.9	137.
International Reserves	45.0	28.4	37.3	2.05	110.
Trade Deficit	0.0138	0.00677	0.0160	-0.00359	0.0576
Foreign_ Debt	2.02	2.27	1.11	0.396	4.77

Appendix B

Model 1 : Cochrane-Orcutt, using observations 1992-2023 (T = 32)
Dependent variable: L_M3
rho = 0.874863

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−2.42286	0.426982	−5.674	<0.0001	***
Budget_DEFICIT_trillions	0.153026	0.0636054	2.406	0.0230	**
L_Real__GDP	1.02073	0.258713	3.945	0.0005	***
L_Real__GDP-1	0.656598	0.266968	2.459	0.0204	**

Statistics based on the rho-differenced data:

Sum squared resid	0.089611	S.E. of regression	0.056572
R-squared	0.997691	Adjusted R-squared	0.997444
F(3, 28)	44.32437	P-value(F)	9.21e-11
rho	−0.043496	Durbin-Watson	2.027402

Statistics based on the original data:

Mean dependent var	1.194682	S.D. dependent var	1.118543

Appendix C

Model 2 : Cochrane-Orcutt, using observations 1991-2023 (T = 33)
Dependent variable: L_CPI
rho = 0.535374

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	5.16266	0.0259101	199.3	<0.0001	***
L_M3_RGDP_ ratio	0.576761	0.0202302	28.51	<0.0001	***

Statistics based on the rho-differenced data:

Sum squared resid	0.042001	S.E. of regression	0.036808
R-squared	0.992928	Adjusted R-squared	0.992700
F(1, 31)	812.8168	P-value(F)	8.31e-24
rho	0.185212	Durbin-Watson	1.517522

Statistics based on the original data:

Mean dependent var	4.478327	S.D. dependent var	0.429617

Appendix D

Model 3 : Cochrane-Orcutt, using observations 1991-2023 (T = 33)
Dependent variable: L_Imports
rho = 0.498378

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−2.06463	0.0841766	−24.53	<0.0001	***
L_M3_RGDP_rati o	0.792106	0.0650610	12.17	<0.0001	***

Statistics based on the rho-differenced data:

Sum squared resid	0.512333	S.E. of regression	0.128557
R-squared	0.955399	Adjusted R-squared	0.953960
F(1, 31)	148.2263	P-value(F)	2.40e-13
rho	0.110425	Durbin-Watson	1.741272

Statistics based on the original data:

Mean dependent var	−3.002031	S.D. dependent var	0.598721

Appendix E

Model 4 : Cochrane-Orcutt, using observations 1992-2023 (T = 32)
Dependent variable: Trade_DEFICIT
rho = 0.835158

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0435502	0.0122328	3.560	0.0013	***
L_M3_RGDP_ ratio-1	0.0272839	0.0121013	2.255	0.0316	**

Statistics based on the rho-differenced data:

Sum squared resid	0.001537	S.E. of regression	0.007158
R-squared	0.814797	Adjusted R-squared	0.808623
F(1, 30)	5.083384	P-value(F)	0.031614
rho	0.086831	Durbin-Watson	1.815056

Statistics based on the original data:

Mean dependent var	0.014386	S.D. dependent var	0.016293

Appendix F

Model 5: Cochrane-Orcutt, using observations 1992-2023 (T = 32)
Dependent variable: L_F_DEBT_dollars
rho = 0.517556

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−2.50440	0.106779	−23.45	<0.0001	***
L_M3_RGDP_ Ratio-1	0.543137	0.0688127	7.893	<0.0001	***
Trade_DEFICIT -1	0.0519743	2.34189	0.02219	0.9824	

Statistics based on the rho-differenced data:

Sum squared resid	0.343250	S.E. of regression	0.108794
R-squared	0.934669	Adjusted R-squared	0.930163
F(2, 29)	42.32376	P-value(F)	2.51e-09
rho	−0.093822	Durbin-Watson	2.143363

Statistics based on the original data:

Mean dependent var	−3.169007	S.D. dependent var	0.411481

Appendix G

Model 6 : Cochrane-Orcutt, using observations 1992-2023 (T = 32)
Dependent variable: L_Exchange__Rate
rho = 0.788172

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	2.49805	0.291459	8.571	<0.0001	***
L_M3-1	0.137178	0.0708273	1.937	0.0629	*
L_International_ Reserves	−0.250447	0.0653511	−3.832	0.0007	***
L_Foreign_ DEBT-1	0.451264	0.0744320	6.063	<0.0001	***

Statistics based on the rho-differenced data:

Sum squared resid	0.074487	S.E. of regression	0.051578
R-squared	0.962243	Adjusted R-squared	0.958197
F(3, 28)	19.85075	P-value(F)	4.25e-07
rho	0.183987	Durbin-Watson	1.531002

Statistics based on the original data:

Mean dependent var	3.762294	S.D. dependent var	0.251503