Journal of Economics, Finance and Accounting Studies
ISSN: 2709-0809
DOI: 10.32996/jefas
Journal Homepage: www.al-kindipublisher.com/index.php/jefas

JEFAS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Macroeconomic Determinants of Public Debt in the Philippines

John Louie Manalo [1], Mark Villamiel[2] ✉ and Eloisa Dela Cruz[3]
[123]Department of Economics, Faculty of Arts and Letters, University of Santo Tomas, Manila, Philippines
Corresponding Author: Mark Villamiel, **E-mail**: mark.villamiel.ab@ust.edu.ph

| ABSTRACT
In this study, the researchers discussed the underlying determinants of public debt in the Philippines, namely: Foreign Direct Investments Inflow, Gross Capital Formation, Inflation Rate, and Trade Balance. The goal of the researchers is to identify how these determinants affect the accumulation of public debt and to answer which of the variables would be possible to be recommended to the policy-making body with the hopes of gradually lessening public debt. The study utilized Multiple Linear Regression to clearly unfold if there is any attribution that exists between the variables and public debt. The data for the mentioned independent variables will be gathered from The World Bank Data. The platforms used to run the statistical tests are EViews 11 and Microsoft Excel. The final outcomes show that FDI had a negative and significant impact where a unit increase in FDI would result in a 272.559 decrease in debt. The trade balance showed a negative impact as well; however, the result was similar to the inflation rate, which manifested insignificant results to the study. Based on the findings, the researchers recommend making use of other variables similar to interest rates, exchange rates, and the debt-to-GDP Ratio. The researchers concluded that FDI could be relied upon as a debt reduction measure with its negative coefficient. To be specific, a unit increase to FDI is equivalent to a 272.559 decrease in public debt. Increasing FDI inflow will be favorable in mitigating the heavy reliance on debt and gradually finance the indebtedness of the country. On the other hand, inflation rate and trade balance were inconsiderable to the study as both variables exceeded the level of significance established by the researchers at 5%.

| KEYWORDS

Public debt, foreign direct investment, trade balance, gross capital formation, Inflation

| ARTICLE DOI: 10.32996/jefas.2022.4.1.40

1. Introduction

1.1 Background of the Study

In financing the existing public debt, more often than not, countries simply resort to incurring additional loans from different sources as their means of repayment. However, this may sound counterproductive considering the toll of debt inflow increasing through the years. It is also possible that a country finds it hard to collect revenue from their taxes which leaves them no option but to depend on external debt from neighboring countries. The researchers define public debt as the total amount of liabilities that a government currently owes. This may include bonds, securities, and other financial instruments that a certain country must pay back to its creditors. Public debt is also known as sovereign debt, national debt, or government debt. A country incurs more debt when deficit spending increases where there is insufficient revenue from sources like taxes or other income-generating projects by the government. Nevertheless, other sources conclude that this can initially act as the stimulation factor for an economy, especially during times of recession, according to Keynesian Economics. Additionally, it is generally believed that it promptly aids and heightens government spending at a rate that helps the country make both ends meet -especially for a developing country like the Philippines.

In this paper, the researchers will be discussing the macroeconomic determinants that either push up or pull down the government borrowings or has no impact at all on the public debt of the Philippines. The initial idea considered in this paper is that debt proves to be essential in financing lump sum projects and agendas of different countries. Although, such borrowings do not only bring in a beneficial prospect but also a handful of drawbacks that may anchor down the economy, and these are not mainly controlled by

political decisions; rather, they are equally affected by both external and internal forces (or the determinants) that constitute the economic activities being done (Filip, B.F., 2019).

Despite the fact that countries show a positive rate of productivity in terms of GDP and GDP growth, trade, and other forms of investment, some still manage to be heavily indebted. According to the IMF, the United States of America recorded a $21.5 trillion debt in 2018, making them the country with the highest debt during that time, considering the size of its economy. The USA almost matched the total debt of the Asia-Pacific region with a gross public debt of $21.1 trillion also in 2018. Another way to view these debts is by comparing the Debt-to-GDP ratios of different countries. The Debt-to-GDP ratio is equal to the country's debt divided by the GDP. This measurement shows how capable the country is in terms of paying back its gross debt, where a value below 60% is generally considered a good ratio. According to the World Bank, Japan's ratio reached 196% in 2016. In the same year, Malaysia only reached 51.9%. In 2018, the debt-to-GDP ratio of Japan rose to 236%, making it the 2nd country with the largest government debt, amounting to $11.1 trillion.

It was still acceptable during the recession period during 2007-2008 for countries to step up their level of loans to give way for the preliminary development and to enable stimulation across the economy. However, since 2010, deficit spending has remained abundant, and debts are continuously increasing year on year. Economists and policymakers got their attention raised with the abundance of public debt even by rich countries like the USA; Since deficit spending may only be best fit for economies experiencing busts and has the possibility to bring negative impacts to those who are actually stable enough not to go through deficit spending. With the constant growth of debt and rising debt-to-GDP ratios, the researchers utilized this as a motivating factor in identifying the factors that truly affect public debt.

1.1.1 Public Debt in the Philippines

From the early 1990s, the Philippines already owed over PhP 600 billion, according to the Bureau of Treasury. A number of incidents forced the total public debt to soar due to the following reasons: First, the volcanic eruption that occurred in the year 1991, which was actually referred to as one of the largest volcanic eruptions in history, this tragedy took the lives of approximately 800 locals that were near the eruption; Secondly, the power crisis that occurred during the years under Cory's administration and finally the Asian financial crisis that took place in 1997. At times like these, the government may be left with no choice but to rely on debt inflows as the driving force to try and uplift the economic state in the Philippines. Before passing the comprehensive tax reform in 2005, the Philippine economy experienced a high debt-to-GDP ratio that almost reached 90%, with over PhP 4.06 trillion of total outstanding debt (Duran, M.G).

In 2005, congress managed to implement the tax reform, which included "extended value-added tax." This paved the way for additional tax revenues that lowered the debt-to-GDP ratio from 86% in 2004 to 67.5% in 2006 (The World Bank, Data). Stability took over, and in 2010, the economy gained 7.3% of annual growth in GDP and a lower debt ratio amounting to 56%. In 2016, current president Duterte dubbed the term "DuterteNomics," where it includes the zero-to-ten-point socioeconomic agenda for the Philippines and the famous *Build, Build, Build* initiative that supports the increase in infrastructure spending from the socioeconomic agenda stated earlier. Given the situation, from 2016-2019, the debt ratio only went down by 1.5%, considering the consecutive debt incurred to aid the agenda with a total of PhP 7.78 trillion in 2018. Looking at the macro scale of the debt situation, the Philippines only shares 0.2% of the total debt by all the governments across the globe, amounting to $69 trillion.

1.2 Statement of the Problem

1. Can inflation, FDI, Domestic investment (GCF), and trade balance affect the amount of debt borrowed by the government?
2. How do these indicators impact public debt?

1.3 Hypothesis of the Study

Null Hypotheses

H01: Inflation rates do not affect in any way the accumulation of public debt.
H02: Foreign Direct Investments does not affect in any way the accumulation of public debt
H03: Gross Capital Formation does not affect in any way the accumulation of public debt
H04: Trade balance does not affect in any way the accumulation of public debt

Alternative Hypotheses

Ha1: Increase or decrease in the inflation rate significantly affects the public debt.
Ha2: Increase or decrease in the FDI's significantly affects the public debt.
Ha3: Increase or decrease in the GCF (domestic investment) significantly affects the public debt.
Ha4: Increase or decrease in trade balance significantly affects the public debt

1.4 Scope and Limitations of the Study

In this paper, the researchers will only be discussing the underlying determinants of public debt in the Philippines, namely: Foreign Direct Investments Inflow, Gross Capital Formation, Inflation Rate, and Trade Balance. These shall be the only variables to be measured for the research design and methodology process of this paper.

On the other hand, the researchers will not tackle how an increase in public debt, which can lead to an increase in public spending, may sacrifice the participation of the private sector also in terms of their expenditures. This concept is usually regarded as the crowding-out effect that takes place when the government steps up its expenditure by means of acquiring and executing available projects at hand. This would need a separate and more rigorous investigation in order to prove the impact of crowding out on the overall economic status of a country.

The researchers will also use the Total Government Debt instead of the debt-to-GDP ratio since the manifestations brought about by the ratio talk more about the country's capability to finance their debt rather than the actual count of debt.

1.5 Significance of the Study

Basically, the target of this study is to understand how the status of these economic indicators, whether it shows deterioration or improvement, affects the overall debt incurred. Time will come when the continuous increase in debt may reach the tipping point, and it seems to be unavoidable up to the point debts can become counterproductive for the economy. With this at hand, the following are a few fields of interest where this study can be beneficial.

1.5.1 Policy Makers and Economic Development Planners

Secondly, policymakers of national governments would also benefit from the results of this study. This econometric study will aid the lenses of policymakers and economic development planners in reassessing their views of how such macroeconomic factors can push or pulldown debt levels for the economy.

1.5.2 Future Researchers

First, by identifying which forces determine the current level of indebtedness, the researchers may be able to contribute useful data for future research that will be conducted either locally or abroad. This will reinforce the existing information tackling determinants of debt and can further provide an in-depth analysis of how each determinant can possibly influence public debt.

2. Literature Review

2.1 Public Debt and its Relation to the Overall Economy

Gargouri & Ksantini (2016) mentioned that public debt is another way to view the "fragility" of different countries in terms of their financial and economic aspects. The ceaseless growth of total public debt has been an alarming topic to the academe and the government, especially for policymakers. Despite the need for government borrowing to push social development, economic, and fiscal stimuli (Fatás et al. 2019; Aybarç, 2019; Salsman, 2017), numerous researchers are still pessimistic about the increasing debt of different national governments. Moreover, countries that experienced recession were at a great disadvantage with increasing budget deficit and public debt (Globan & Matosec, 2016). According to Asteriou et al. (2021), a relatively high debt-to-GDP won't be alarming for countries in recognizing their threshold. However, Calderón & Zeufack (2020) emphasized that the increasing debt profile may actually put countries deep at financial risk. As a result, there is a possibility for their debt threshold to be lowered caused by the increase in debt servicing alone.

One must understand that Asian countries have long been exposed to financial crises that challenged and disrupted their economic stability. The 1997 Asian Financial Crisis and the 2008 Global crisis somehow became the origin of the lump sum borrowings that Asian countries managed to sustain. In the same study of Asteriou et al. (2021), there is a clear yet non-linear relationship between debt and economic growth. Considering the fact that this may serve as a stimulus for the economy, they countered that this relationship also has the possibility of reaching the tipping point sooner or later, which jeopardizes growth. Nevertheless, these circumstances are avoidable if the incurred debt is allocated in creating income-generating projects, infrastructure development, or education that may result in the creation of added value for the economy (Koh et al. (2020); Ncanywa & Masoga, 2018; Bilan, 2016). This idea is supplemented by Sanchez-Juarez & Garcia-Almada (2016), wherein the countries that intentionally use debt primarily in debt financing instead of productive investments create a negative impact on the economy. Asteriou et al. (2021) also concluded that public debt proves to exhibit adverse effects on economic growth for both short and long-run phases where they emphasized that countries should instead initiate developmental projects that can compensate for the continuous increase in public debt.

Basically, the government must find ways to source funds to finance debts without accumulating more. Expenditures on developmental projects and initiatives that prove to be essential to the future of the economy must be prioritized for the security of growth.

In a study by Ncanywa & Masoga (2018), the Keynesian Model specifies that the high accumulation of public debt tends to increase taxes. From a consumer standpoint, these offset the positive effects brought about by public expenditures given the reduction of household consumption and decrease in investment that has the possibility of leading to the reduction of the economic growth. In addition, such countries who remain highly indebted or dependent on external and internal debt can send a negative signal to foreign investors and to the actual currency affecting the credit standing of a certain country. Lastly, the authors also emphasized that there is a bi-directional Granger causality effect between debt and economic growth. In talking about a bi-directional causality, this means that one variable causes the other. In this case, a movement along the debt levels causes economic growth to move up or down.

2.2 Inflation and its Relation to Public Debt

In a study done by Di Bartolomeo et al. (2018), they found that the right amount of inflation shall be maintained because of its capability to deflate the accumulation of debt and limit future borrowings that may happen in the long run. It is also stated that a temporary increase in inflation could have resolved the massive debt accumulation that occurred during the global financial crisis last 2008. This can be very useful for policymakers and the general public to change their perspective towards inflation. The results drawn by Di Bartolomeo et al. (2018) can be a foundation for the policy analysts in the reconsideration of inflation and how its role can be utilized in handling or reducing debt. In relation to the study of Akitoby et al. (2017), they also stated that a higher inflation rate could contribute to reducing the debt-to-GDP ratio of a country. This argument reinforces the study of Di Bartolomeo et al. (2018), where the volatility of inflation today can be helpful in finding the balance for the debt-to-GDP for countries in the long run

On the other hand, Akitoby et al. (2018) stated three specific ways how increasing inflation supposedly reduces debt:

1) Seigniorage - in other words, the act of issuing new money. Ideally, the government can actually make a profit from seigniorage revenues and can be added up for the debt repayment. However, revenue from this source won't be sufficient to say that the government can simply rely solely on seigniorage.
2) Inflation can diminish the real value of debt depending on the maturity structure that is seen in debt and the denomination of the incurred debt. Considering the fact that interest rates are greatly influenced by inflation, this can impact fixed rates and local currency denomination debt.
3) Inflation can also influence the primary balance of the government.

However, inflation alone won't be enough to settle the debt situation; rather be an additional financial tool in assisting the government in financing their debt. Considering that high inflation rates can also negatively affect interest rates and private consumption, there might be a chance soon that inflation will harm the overall economic growth. In addition, Chirwa (2018) emphasized that inflation is considered a debt-creating instrument based on the results of their study. Additionally, the findings of Filip (2019) were clear that the correlation between public debt and inflation was insignificant, yet, they still managed to draw sufficient evidence in pointing out that inflation still has a negative impact on the debt-to-GDP ratio. In support of these results, Bayale (2020) and Sadik-Zada & Gatto (2019) also found that inflation only shows little influence on the increase or decrease of public debt.

2.3 Foreign Direct Investment and its Relation to Public Debt

Over the years, foreign investments have been recognized as an essential component of economies for both developed and developing countries (Jilenga et al., 2016). In a study conducted by Sanchez-Juarez & Garcia-Almada (2016), there is an existing correlation between foreign direct investment and debt. In addition to that, they also proved that it is statistically significant at 0.01 if taken in a logarithmic manner. Looking in the absolute terms for FDIs, it is also statistically significant; however, it appears that the coefficient became negative.

Moreover, the emergence of international trade became one of the bridges that opened up integration between neighboring economies. These have been vital to the influx of global capital inflows and outflows that proved to be beneficial for the economy. Filip (2019) and Omrane & Gabsi (2017) found that FDI can be considered as an instrument that reduces the public debt of a country with its contribution to the improvement of fiscal sustainability. If foreign countries tend to be attracted to invest in a certain country, then they'll be willing to finance such projects for the government as their initial investment. With this at hand, a diminishing expense would be favorable for the government in order to allocate other available resources in financing the

accumulation of debt. In the same study by Filip (2019), his substantiate evidence proved that increase in FDI inflows is significant and that it negatively affects the public debt.

2.4 Gross Capital Formation and its Relation to Debt

Filip (2019) states that capital formation possesses a crucial role in setting the foundation for an economy. According to Omrane Belguith & Omrane (2017), similar to FDI, GCF proves to have a significant and negative impact on public debt. Their results made them conclude that GCF is a significant macroeconomic determinant in public debt. In addition, Filip (2019) found that GCF negatively affects the public debt. Matthew & Mordecai (2016) pointed out that countries resort to borrowing during the times when the GCF of a country is reported to be low, especially during depression periods. Furthermore, Matthew & Mordecai argued that the capital formation might vary depending on the proportion the government and the private sector contributes, which can either increase or decrease public debt. The composition of the capital formation must solely, or the majority be filled by the private sector; otherwise, public debt will continue to rise. This statement is contradicted by Mourougane et al. (2016), where an increase in public investment should be encouraged in order to boost demand and employment, consequently reducing the debt and debt ratio. In this regard, the researchers carefully note that gross capital formation shall be used as the proxy for private domestic investment.

2.5 Trade Balance and its Relation to Public Debt

This particular variable differs from trade openness, where the openness of an economy measures the involvement of a certain country in terms of international trade by getting the ratio of the sum of exports and imports to GDP. This was discussed in the study of Filip (2019) that the accumulated value of exports and imports provide rather confusing results, where such imbalances from both components are not easily identified if it poses a positive or negative effect on public debt. In addition to this, Filip (2019) argued that there are other studies that take the effects of exports and imports separately, as cited in (Gargouri & Ksantini, 2016), where it is then correlated to debt. For these reasons, the researchers will be considering trade balance as a determinant of debt in exchange for trade openness. Utilizing trade balance data can finally allow the researchers to study the integrated impact of both components (Exports and Imports) and how it may influence the accumulation of public debt. Butkus & Seputiene (2018) provided a theory to substantiate this idea, the Keynesian Twin Deficit Hypothesis. This suggests that there is a linkage between trade balance and debt by using the different macroeconomic models that are used in finding equilibrium levels of income. This hypothesis can be defined by the equation:

Figure 2.1. Equation for Twin Deficit Hypothesis

$$S + T + M = I + G + X$$

Where:
S = Savings
T = Taxes
M = Imports
I = Gross private domestic investment expenditures
G = Government expenditures
X = Exports

Butkus & Seputiene (2018) rearranged the equation shown in *figure 2.1*. to further establish and easily recognize how the trade balance of an economy proved to be significant. This is now defined by the equation:

Figure 2.2. Reorganized equation for Twin Deficit Hypothesis

$$(X - M) = (S - I) + (T - G)$$

Where:
(X − M) = Trade balance
(S − I) = private savings
(T − G) = public savings

This equation also tells us all about the possible effects of trade deficits. Given that rise in imports is generally bad for the economy, this harms the overall trade balance. Furthermore, an increase in domestic interest rates may be beneficial for the international fund flow, which may also increase domestic exchange rates. This circumstance, along with the increasing domestic exchange rates, forces exports to be too expensive; hence imported products become cheaper in value, thus encouraging imports over exports. Consequently, an import-sided economy creates a trade deficit leading to a lower pace in terms of economic growth (Butkus &

Seputiene, 2018). Additionally, Ansah (2017) also found in his study that a one-sided competition favoring imports causes local businesses and industries to shut down and exit the market since there is not enough profit to sustain the expense being suffered from exporting goods. The decline in local businesses is soon accompanied by a decline in local production, all because of cheaper imported goods entering the market. Eventually, exports will struggle to outperform imports and continue to heighten the trade deficit experienced by an economy. As the trade deficit increases, the government would likely be left with no choice but to resort to borrowing resources that will be enough to finance deficits from the trade sector.

3. Methodology

3.1 Research Design and Data Gathering Procedures

In answering the research questions and objectives proposed in this study, the researchers will be using descriptive analysis and multiple regression. The variables will not be controlled nor have intervention coming from the researchers; the data that will be collected will be used as it is provided in the reports. This approach will aid the researchers in investigating the impacts of FDI, GCF, Inflation Rate, and Trade Balance on the total public debt of the Philippines. All variables except for the inflation rates (where it is expressed in percentage) will be expressed in currency form. Secondary time series data will serve as the fittest type of data in order to properly process the variables using tools in statistics. The data for the mentioned independent variables will be gathered from The World Bank Data and will be converted into a tabular form using Microsoft Excel, where all variables will be organized. The researchers will use annual economic reports of the Philippines from 1990 - 2019, all from The World Bank with a total of 30 observations which is believed to be the optimal number of observations in using regression and correlation analysis. On the other hand, the data of the annual debt of the Philippines will be retrieved from the Bureau of the Treasury PH also consists of 30 observations from 1990 – 2019.

3.2 Statistical Instruments

The researchers will be using Microsoft Excel and EViews 11 as their two main statistical platforms in organizing, measuring, and testing the gathered data from The World Bank. These instruments will be useful for the regression and correlation analysis that will be conducted by the researchers as they process the gathered data.

3.3 Statistical Treatment

a. Empirical Method

The econometric model expressed in multiple regression for this study is defined by the equation below. *Figure 3.1* shows the effect of FDI, GCF, Inflation Rate, and Trade Balance on the Public Debt of the Philippines.

Econometric Model:

Figure 3.1. Econometric Model

$$\mathbf{Y} = \beta_0 + \beta_1 FDI_1 + \beta_2 GCF_2 + \beta_3 Inf_3 + \beta_4 TdB_4 + Ui$$

where:
Y = Public Debt
β_0 **= Intercept**
$\beta_1 FDI_1$ **= Foreign Direct Investment**
$\beta_2 GCF_2$ **= Gross Capital Formation**
$\beta_3 Inf_3$ **= Inflation Rate**
$\beta_4 TdB_4$ **= Trade Balance**
Ui **= Error Term**

Statistical treatment to be performed by the researchers within the data set are: **1)** Multiple Regression **2)** Variance Inflation Factor **3)** Beusch-Pagan Test **4)** Durbin-Watson Statistic**.** All the tests will be accomplished by using the EViews 11 platform. Each test corresponds to a different purpose, and with the integration of these four statistical tests, the researchers will be able to answer their research questions and come up with a conclusion discussing the influence of the gathered macroeconomic indicators. Moreover, these are the specific points for each test that will be used and interpreted in the succeeding chapters:

1) **Multiple Regression**
   This will be the overall statistical test to be used incorporating all four independent variables to get the coefficient of determination of the study. In addition, the coefficient of determination is the indicator that helps in determining the goodness of fit of the variables and how they fall in the regression line. Multiple regression is defined by the equation

Figure 3.2. Multiple Regression Model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + Ui$$

where:
Y **= Dependent Variable**
β_0 **= Intercept**
β_1 **= change in Y with respect to** X_1
β_2 **= change in Y with respect to** X_2
Ui **= Error Term**

2) **Variance Inflation Factor** (VIF)
One of the most important tests to be done is the VIF considering that this study consists of four independent variables, all drawn from macroeconomic observations. This test will measure the multicollinearity per variable and determine whether multicollinearity exists or does not exist. In other words, this is to measure if the independent variables are correlated with each other. If the results of this test are above 5 points, the researchers will be forced to execute different remedies to eliminate multicollinearity.

Figure 3.3. Equation for Variance Inflation Factor

$$VIF = \frac{1}{1 - R_i^2}$$

where:
R_i^2 **= is the result of the coefficient of determination**

3) Breusch-Pagan-Godfrey Test
The researchers will also conduct the Breusch-Pagan Test to check if the data is heteroscedastic. This is to avoid biased results and to make sure that the errors of the variance, once computed, are constant. The existence of heteroscedasticity can also affect the significance test of the study negatively by having too high probability results.

4) Durbin-Watson Statistic
Since the researchers will be using time-series type of data for their study, it is essential to test for autocorrelation to see if the errors of variables are correlated with each other. This is because time-series data, especially for economic data similar to this study, are prone to possess a pattern or formulation of a trend through the years. The existence of autocorrelation within the data set can initially affect the estimators, which results in the inaccuracy of statistical significance upon testing the hypothesis of the study.

Figure 3.4. Equation for Durbin-Watson Statistic

$$d = \frac{\sum_{t=2}^{n} (e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2}$$

4. Results and Discussion
The GCF, Inflation rates, FDI, and trade balance are all acquired from the World Bank database along with the dependent variable, public debt. The variables are organized and processed using Microsoft Excel and EViews 11. The EViews platform served as the main software for the researchers in executing all the necessary statistical tests. Before having the variables regressed, the researchers started with the descriptive analysis to view the data with ease without having to run down all observations.

4.1 Data Results

A. Descriptive Statistics

Independent Variables

Table 4.1 Descriptive Statistics of the Independent Variables

	GCF	IR	FDI	TB
Mean	1.58E+12	5.633667	2.86E+09	-8.13E+09
Median	1.07E+12	5.020000	1.72E+09	-3.67E+09
Maximum	5.11E+12	19.26000	1.03E+10	3.72E+09
Minimum	2.52E+11	03670000	2.30E+08	-4.49E+10
Std. Dev.	1.40E+12	3.740781	2.82E+09	1.19E+10
Skewness	1.249019	1.747886	1.509701	-1.985399
Kurtosis	3.526624	7.049950	4.096830	6.017967
Jarque – Bera	8.146907	35.77814	12.89978	31.09420
Probability	0.017019	0.000000	0.001851	0.000000
Sum	4.74E+13	169.0100	8.59E+10	-2.44E+11
Sum Sq. Dev.	5.71E+25	405.8099	2.31E+20	4.09E+21
Observations	30	30	30	30

The mean, median, and both minimum and maximum values are all listed in the descriptive statistics shown in *table 4.1*. Each of the independent variables has 30 equal observations from 1990 – 2019 with no gap years in between. GCF, Inflation rate, FDI, and Trade balance all show a positive Kurtosis, also referred to as Leptokurtic with values of **3.5266, 7.0499, 4.0968,** and **6.0179,** respectively. Coming up with a positive Kurtosis implies that there were more values from the data set that is above the mean of each variable. Graphically, this will show a higher peak of frequency within the curve (the curve is thinner due to the abundance of outliers) as compared to Mesokurtic and Platykurtic. The Jarque-Bera statistic measures the kurtosis and skewness of data to identify if the data set is under a normal distribution or not. Also shown in *table 4.1* are the values of the Jarque-Bera statistic where the researchers found all variables are above 0.05 significance level. Thus, the statistic ensures that the data set is normally distributed.

Dependent Variable

Table 4.2 Descriptive Statistics of the Dependent Variable

	DEBT
Mean	3.98E+12
Median	4.31E+12
Maximum	8.22E+12
Minimum	7.01E+11
Std. Dev.	2.30E+12
Skewness	0.091535
Kurtosis	1.771077
Jarque – Bera	1.929707
Probability	0.381039
Sum	1.19E+14
Sum Sq. Dev.	1.53E+26
Observations	30

The only factor that sets the dependent variable apart, in terms of its descriptive analysis shown in *table 4.2,* is the kurtosis level which is 1.77. This shows that there are more values that are located below the mean of 3.98E+12, commonly referred to as Platykurtic. Likewise, there are 30 observations that were used in Public Debt from 1990 to 2019. The Jarque-Bera statistic for the dependent variable also exceeds 0.05 level of significance, which implies that the 30 observations are also normally distributed.

C. Regression Analysis

Econometric Equation

Figure 4.1 Econometric Model of the Study

$$\mathbf{Y = (3.51E+12) + 1.0882}X_1 \mathbf{+ (-1.15E+11)}X_2 \mathbf{+ (-272.5591)}X_3 \mathbf{+ (-22.3310)}X_4 \mathbf{+ Ui}$$

4.2 Analysis

The test included the dependent variable, which is Public Debt (PD), and 4 independent variables, namely; Gross Capital Formation (GCF), Inflation Rate (IR), Foreign Direct Investment (FDI), and Trade Balance (TB). Based on the results, we can see the *Coefficient of Determination* or the R-Squared value at 0.9142 or 91%. Generally speaking, at this range of R-Squared value, the researchers can already prove that a strong attribution exists within the variables used in this study. However, the probability values shown in *table 4.3* outline varied results from the tested independent variables. GCF and FDI were the only two variables to have a probability value below 0.05 which results in rejecting null hypotheses of **H02** and **H03** only. Inflation rates and Trade balance, with a significance value of 0.0715 and 0.4404, respectively, show insignificant p-values since they have exceeded the significance level of 0.05. This will result in failure in rejecting both null hypotheses, **H01,** and **H04.**

Table 4.3 Multiple Regression Test Results

Dependent Variable: PD
Method: Least Squares
Date: 06/07/21 Time: 19:23
Sample: 1990 2019
Included Observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.51E+12	5.04E+11	6.960809	0.0000
GCF	1.088182	0.133004	8.181588	0.0000
IR	-1.15E+11	6.12E+10	-1.882082	0.0715
FDI	-272.5591	114.9715	-2.370666	0.0258
TB	-22.33103	28.48214	-0.784036	0.4404

R-Squared	0.914175	Mean dependent var	3.98E+12
Adjusted R-Squared	0.900443	S.D. dependent var	2.30E+12
S.E. of Regression	7.25E+11	Akaike info criterion	57.60880
Sum squared resid	1.32E+25	Schwarz criterion	57.84234
Log likelihood	-859.1321	Hannah-Quinn criterion	57.68351
F-statistic	66.57284	Durbin-Watson stat	0.475744
Prob(F-statistic)	0.000000		

Among the rest, the researchers obtained a positive coefficient from GCF equivalent to 1.0881. This corresponds to having a positive relationship to public debt. While inflation rate at -1.15E+11, foreign direct investment at -272.5591, and trade balance at -22.3310 all have a negative effect on public debt -as the independent variable increase, public debt tends to decrease. Furthermore, a 1 unit increase in GCF will result in an increase of 1.0882 in public debt. Consequentially, if there is a unit increase in the inflation rate, public debt will be reduced by 1.15E+11. If there is a unit increase in foreign direct investment, there will be a -272.559 decrease in public debt. Lastly, a unit increase from trade balance will decrease public debt equivalent to -22.3310. Each variable is to be correlated separately to the dependent variable while holding other variables constant. Isolation of each variable is necessary given that this is one of the main objectives in this paper as to how these macroeconomic indicators individually affect the public debt.

D. Diagnostic Tests of the Data

Testing for **Serial Correlation** using the **Durbin-Watson Statistic**

Figure 4.2 Durbin-Watson Statistic Result

Durbin – Watson Statistic = 0.475744

Among all the tests conducted by the researchers, the Durbin-Watson Test Statistic was the only test where the researchers discovered a downside. The expected outcome of the researchers in performing this test values within the range of 1.5 to 2.5. With this value shown in figure 4.2, Serial Correlation does not exist for the error terms of the variables. However, the results of the statistical test were at 0.4757, indicating a Positive correlation.

Testing for **Heteroscedasticity** using **Breusch-Pagan-Godfrey Test**

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null Hypothesis: Homoskedasticity			
F-statistic	2.539784	Prob. (3,26)	0.0650
Obs*R-squared	8.668418	Prob. Chi-square(3)	0.0699
Scaled explained SS	2.156704	Prob. Chi-square(3)	0.7070

Test Equation
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/07/21 Time 19:24
Sample: 1990 2019
Included Observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.29E+23	2.38E+23	1.804268	0.0833
GCF	-7.13E+10	6.29E+10	-1.133991	0.2676
IR	6.25E+22	2.89E+22	2.160717	0.0405
FDI	-7.99E+13	5.43E+13	-1.470119	0.1540
TB	2.09E+11	1.35E+13	0.015501	0.9878

R-Squared	0.288947	Mean dependent var	4.38E+23
Adjusted R-Squared	0.175179	S.D. dependent var	3.78E+23
S.E. of Regression	3.43E+23	Akaike info criterion	111.3721
Sum squared resid	2.94E+48	Schwarz criterion	111.6056
Log likelihood	-1665.581	Hannah-Quinn criterion	111.4468
F-statistic	2.539784	Durbin-Watson stat	1.267943
Prob(F-statistic)	0.064960		

Table 4.4 Breusch-Pagan-Godfrey Test

This test was deemed necessary by the researchers to spot if there's a presence of heteroscedasticity in the model. If heteroscedasticity exists, the researchers should transform all the observations into logarithmic form. Afterward, the test shall be conducted again to cross-check the test results. Upon performing the test, *table 4.4* shows that the Prob F is equal to 0.0650, which is greater than 0.05; therefore, heteroscedasticity does not exist within the data set used in this model.

3. Testing for **Multicollinearity** using **Variance Inflation Factor (VIF)**

Table 4.5 Variance Inflation Factors

Variance Inflation Factors			
Date: 06/07/21 Time: 19:23			
Sample: 1990 2019			
Included Observations: 30			
Variable	**Coefficient Variance**	**Uncentered VIF**	**Centered VIF**
C	2.54E+23	14.45949	NA
GCF	0.017690	4.439971	1.920290
IR	3.74E+21	9.661501	2.887231
FDI	13218.45	11.97612	5.802880
TB	811.2323	9.370243	6.312572

In executing this diagnostic test, the researchers used the Variance Inflation Factor to determine if a linear relationship exists between the independent variables. It is generally known in this test that if values of the centered VIF exceed 10, multicollinearity exists within the data set. As shown in *Table 4.5*, the produced values were **1.9202** (**GCF**), **2.8872** (**IR**), **5.8028** (**FDI**), and **6.3125** (**TB**). Since the Centered VIF of each variable is below 10, the researchers concluded that there is no presence of multicollinearity in the model.

4.3 Comparison of Findings

From the previous research mentioned in the literature review by Filip & Omrane Belguith & Omrane, GCF showed a contradicting outcome upon executing the statistical tests. Where the researchers found a positive relationship from this model, whereas GCF increases, there is also an equivalent increase in public debt; on the other hand, the trade balance showed similar effects to the public debt in parallel to the study of Filip (2019). The results were also insignificant to the public debt with a probability value of 0.4404, exceeding 0.05 as the standard to reject the null hypothesis. The results drawn from the inflation rates are also similar to Di Bartolomeo's study as it contributes to debt reduction.

Despite its effect is on the right track for this paper, the results produced by the researchers were also considered insignificant to the accumulation of public debt. For the correlation between FDI and public debt, the results from this study show a significant result which mirrors the study of Sanchez-Juarez & Garcia-Almada (2016) even at a 0.01 significance level. Moreover, per unit increase from FDI will have an equivalent decrease to the public debt.

5. Conclusion & Recommendations

5.1 Conclusion

Public debt has generally been a major component of fiscal accounts from different countries, and every country has its own strategic measure in handling these borrowings. However, there are countries that are too heavily indebted where a continuous accumulation of these borrowings becomes counterproductive to economic growth. This phenomenon is often referred to as the tipping point being defined in the earlier parts of the paper where incurring too much debt reaches a certain level that becomes too harmful to the economy. Among all the rest, the current indebtedness of the Philippines became the root of all the motives as to why the researchers pushed to finish the study. The rapid and continuous increase in debt certainly puts the economy at a huge financial risk.

Upon establishment of the premise, the researchers identified four macroeconomic indicators that can possibly be attributed to public debt with the hopes of discovering their correlation to the accumulation of public debt.

The regression results produced a high coefficient of determination leveled at 91.42%, which implies that the four variables together pose a great attribution towards public debt. However, tackling the probability values individually would open differed values as GCF and FDI were the only variables to prove its correlation significant to public debt, thus rejecting the null hypothesis **H02** and **H03** and accepting the alternative hypothesis of **Ha2** and **Ha3 (FDI and GCF, respectively).** At this point, we found that GCF has a positive relationship with public debt, implying that if there is a unit increase in GCF, there will be a 1.0882 equivalent increase to the public debt accumulation. Given GCFs contradicting impact on the accumulation of public debt, the researchers noted that FDI was the only variable that produced a statistically significant result which also answered the main goal of the study.

The researchers concluded that FDI could be relied on as a debt reduction measure with its negative coefficient. To be specific, a unit increase to FDI is equivalent to a 272.559 decrease in public debt. Increasing FDI inflow will be favorable in mitigating the heavy reliance on debt and gradually finance the indebtedness of the country. On the other hand, inflation rate and trade balance were inconsiderable to the study as both variables exceeded the level of significance established by the researchers at 5%.

5.2 Recommendations

Recommendations for the paper focuses on the pool of variables to be observed and the general contribution of the study towards the economy. First, apart from the four indicators measured in the study, other micro and macro-scale indicators may also be utilized for further research similar to; public spending, interest rates, exchange rates, and debt-to-GDP ratio. Lastly, given the positive impact drawn from foreign direct investments, this can be listed as a priority measure in the creation of efforts to reduce the accumulation of public debt. Policies can be geared towards the encouragement of more inflows from foreign investments, similar to the establishment of an optimal value of corporate income tax for the country. A balanced rate can possibly attract more investors. With more investors, cash/capital inflow would gradually increase alongside the productivity of the economy; hence, debt accumulation may be controlled and eased due to the aid brought about by FDI.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.

References

[1] Afanasiev, M. P., & Shash, N. N. (2016). Microeconomic effects of growing public debt on the Russian economy. *Вопросы государственного и муниципального управления*, (5).

[2] Aimola, A. U., & Odhiambo, N. M. (2021). Public debt and inflation: empirical evidence from Ghana. *Development Studies Research*, *8*(1), 1-13.

[3] Aimola, A. U., & Odhiambo, N. M. (2020). Public Debt and Inflation: A Review of International Literature. *Folia Oeconomica Stetinensia*, *20*(1).

[4] Akitoby, B., Binder, A., & Komatsuzaki, T. (2017). Inflation and Public Debt Reversals in the G7 Countries. *Journal of Banking and Financial Economics, 1* (7)), 28-50.

[5] Akram, N. (2015). Is public debt hindering the economic growth of the Philippines?. *International Journal of Social Economics*.

[6] Al-Fawwaz, T. M. (2016). Determinants of External Debt in Jordan: An empirical study (1990–2014). *International Business Research*, *9*(7), 116-123.

[7] Alloza, M., Andrés, J., Pérez, J. J., & Rojas, J. A. (2020). Implicit public debt thresholds: An operational proposal. *Journal of Policy Modeling*, *42*(6), 1408-1424.

[8] Ansah, J. P. (2017). Causal Analyses of Public Debt and Structural Adjustment. *International Journal of System Dynamics Applications (IJSDA)*, *6*(1), 21-37.

[9] Arčabić, V., Tica, J., Lee, J., & Sonora, R. J. (2018). Public debt and economic growth conundrum: Nonlinearity and inter-temporal relationship. *Studies in Nonlinear Dynamics & Econometrics*, *22*(1).

[10] Asteriou, D., Pilbeam, K., & Pratiwi, C. E. (2021). Public debt and Economic Growth: Panel Data Evidence for Asian Countries. *Journal of Economics and Finance*, *45*(2), 270-287.

[11] Aybarç, S. (2019). Theory of Public Debt and Current Reflections. In Public Economics and Finance. IntechOpen. DOI:http://dx.doi.org/10.5772/intechopen.82730

[12] Bayale, N. (2020). Empirical Investigation into the Determinants of Public Debts in Africa: New Insights Using a Panel Bayesian Model Averaging Approach.

[13] Bilan, I. (2016). Overview of the Main Theories on the Economic Effects of Public Indebtedness. In *European Integration-Realities and Perspectives Proceedings* (356-362). Editura Universitară Danubius.

[14] Botta, A., Godin, A., & Missaglia, M. (2016). Finance, foreign (direct) investment, and dutch disease: the case of Colombia. *Economia Politica*, *33*(2), 265-289.

[15] Briceño, H. R., & Perote, J. (2020). Determinants of the Public Debt in the Eurozone and Its Sustainability Amid the Covid-19 Pandemic. *Sustainability*, *12*(16), 6456.

[16] Butkus, M., & Seputiene, J. (2018). Growth Effect of Public Debt: The Role of Government Effectiveness and Trade Balance. *Economies*, *6*(4), 62.

[17] Calderón, C., & Zeufack, A. G. (2020). Borrow with Sorrow? *The Changing Risk Profile of Sub-Saharan Africa's Debt*. The World Bank.

[18] Caner, M., Grennes, T., & Koehler-Geib, F. (2010). Finding the tipping point--when sovereign debt turns bad. World Bank Policy Research Working Paper No. 5391.

[19] Chirwa, T. G. (2018). The Determinants of Public Debt in the Euro Area: A panel ARDL Approach.

[20] Crafts, N. (2016). Reducing high public debt ratios: lessons from UK experience. *Fiscal Studies*, *37*(2), 201-223.

[21] Di Bartolomeo, G., Tirelli, P., & Acocella, N. (2018). The Comeback of Inflation as an Optimal Public Finance Tool. *38th issue (January 2015) of the International Journal of Central Banking*.

[22] D'Erasmo, P., Mendoza, E. G., & Zhang, J. (2016). What is a sustainable public debt? In *Handbook of Macroeconomics* (2493-2597). Elsevier.

[23] Dottori, D., & Manna, M. (2016). Strategy and tactics in public debt management. *Journal of Policy Modeling*, *38*(1), 1-25.

[24] Duran, M. G. G. (2017). Public Debt and Economic Growth in the Philippines: Evidence of Causality. *Economic and Social Development: Book of Proceedings*, 267-280.

[25] Eichengreen, B., El-Ganainy, A., Esteves, R., & Mitchener, K. J. (2019). *Public debt through the ages* (No. w25494). National Bureau of Economic Research.

[26] Elom-Obed, F. O., Odo, S. I., Elom-Obed, O., & Anoke, C. I. (2017). Public debt and economic growth in Nigeria. *Asian Research Journal of Arts & Social Sciences*, *4*(3), 1-16.

[27] Essien, S. N., Agboegbulem, N., Mba, M. K., & Onumonu, O. G. (2016). An empirical analysis of the macroeconomic impact of public debt in Nigeria. *CBN Journal of Applied Statistics*, *7*(1), 125-145.

[28] Fedeli, S., & Forte, F. (2012). Public Debt and unemployment growth: The need for new fiscal-monetary rules. Evidence from OECD countries. Economia Politica. 29.

[29] Filip, B. F. (2019). Determinants of Public Debt. The Case of the European Union countries. *Theoretical & Applied Economics*.

[30] Fatás, A., Ghosh, M. A. R., Panizza, U., & Presbitero, M. A. F. (2019). The Motives to Borrow. International Monetary Fund.

[31] Gaber, S., & Gruevski, I. (2021). Economic Aspects of Public Debt. *Journal of Economics*, *6*(1), 45-53.

[32] Gargouri, I., Ksantini, M. (2016). The Determinants of Public Debt, *The Romanian Economic Journal 59*.

[33] Globan, T., Matosec, M. (2016). Public Debt-to-GDP Ratio in New EU Member States: Cut the Numerator or Increase the Denominator? *Romanian Journal of Economic Forecasting, 19, (3).*

[34] Gujarati, D. N. (2021). *Essentials of econometrics*. SAGE Publications

[35] Jilenga, M. T., Xu, H., & Gondje-Dacka, I. M. (2016). The Impact of External Debt and Foreign Direct Investment on Economic Growth: Empirical evidence from Tanzania. *International Journal of Financial Research*, *7*(2),154-162.

[36] Koh, W. C., Kose, M. A., Nagle, P. S., Ohnsorge, F. L., & Sugawara, N. (2020). Debt and financial crises. The World Bank.

[37] Krause, M. U., & Moyen, S. (2016). Public debt and changing inflation targets. *American Economic Journal: Macroeconomics*, *8*(4), 142-76.

[38] Liargovas, P. & Psychalis, M. (2021) *Fiscal reforms in the EMU: the Greek response*. European Politics and Society 22:5, pages 757-774.

[39] Matthew, A., & Mordecai, B. D. (2016). The Impact of Public Debt on Economic Development of Nigeria. *Asian Research Journal of Arts & Social Sciences*, 1-16.

[40] Monamodi, N. E., & Choga, I. (2021). An Estimation of the Effect of Tax Revenue Collection on the Public Debt in South Africa. *Review Pub Administration Manag*, *9*, 292

[41] Mourougane, A.J., Botev, J.-M., Fournier, N. Pain and E. Rusticelli, 2016. Can an Increase in Public Investment Sustainably Lift Economic Growth? *OECD Economics Department Working Papers,* No. 1351, OECD Publishing, Paris.

[42] Ncanywa, T., & Masoga, M. M. (2018). Can Public Debt Stimulate Public Investment and Economic Growth in South Africa?. *Cogent Economics & Finance*, *6*(1), 1516483.

[43] Omrane Belguith, S., & Omrane, H. (2017). Macroeconomic Determinants of Public Debt Growth: A Case Study for Tunisia. *Theoretical & Applied Economics*, *24*(4).

[44] Omrane, S.B and Gabsi, F.B., 2017. Public Debt Sustainability in Tunisia: Empirical Evidence Estimating Time-Varying Parameters, *Journal of the Knowledge Economy.* doi:10.1007/s13132-017-0482-0

[45] Onafowora, O., & Owoye, O. (2019). Public debt, foreign direct investment, and economic growth dynamics: Empirical evidence from the Caribbean. *International Journal of Emerging Markets*.

[46] Romero, J. P. B., & Marín, K. L. (2017). Inflation and Public Debt. *Monetaria*, (1), 39-94

[47] Sadik-Zada, E. R. & Gatto, A. (2019). Determinants of the Public Debt and the Role of the Natural Resources: A Cross-Country Analysis. Working paper 004, Economic Theory

[48] Salsman, R. M. (2017). The Political Economy of Public Debt: Three Centuries of Theory and Evidence. Edward Elgar Publishing

[49] Sánchez-Juárez, I., & García-Almada, R. (2016). Public Debt, Public Investment and Economic Growth in Mexico. *International Journal of Financial Studies*, *4*(2), 6.

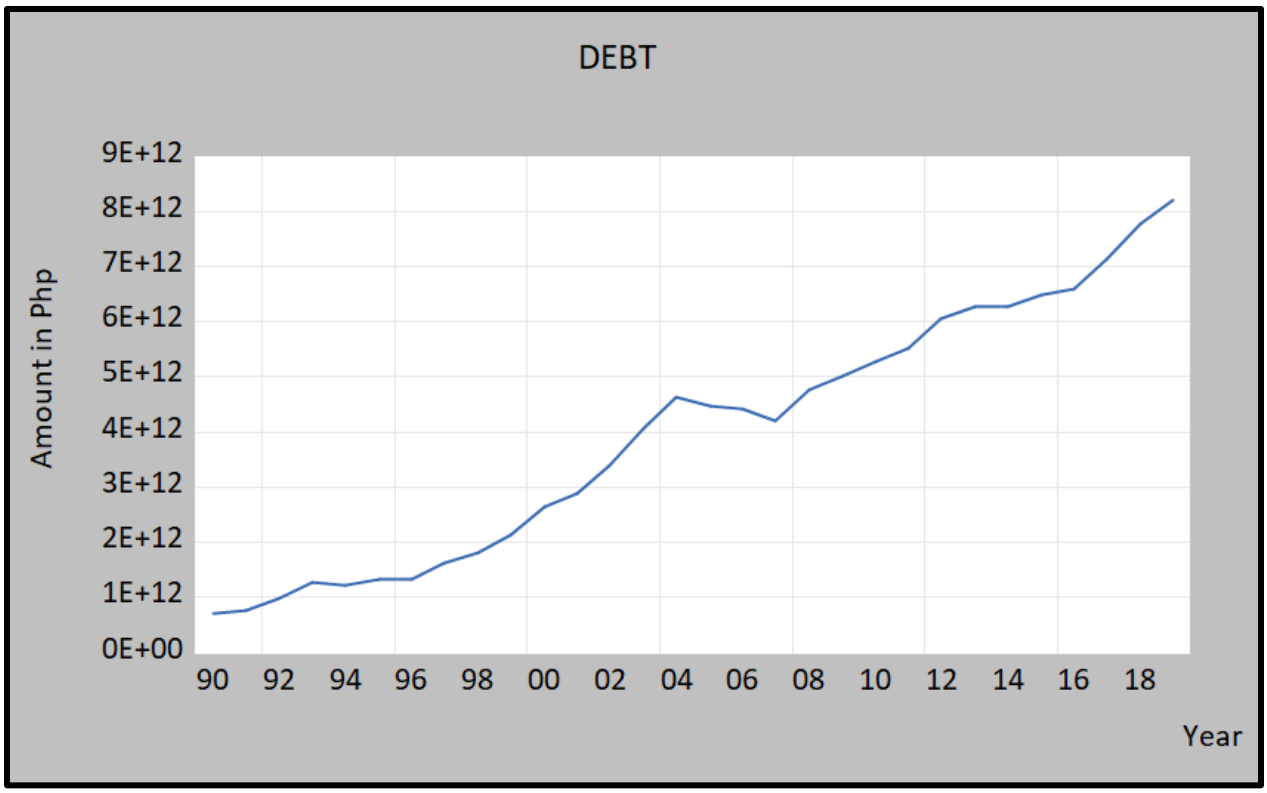
[50] Shrestha, M. B., & Bhatta, G. R. (2018). Selecting Appropriate Methodological Framework For Time Series Data Analysis. *The Journal of Finance and Data Science*, *4*(2), 71-89.

[51] Waheed, A. (2016). Sustainability of public debt: Empirical analysis for Bahrain. *The Journal of Internet Banking and Commerce*, *21*(2).

Appendix A

Dependent Variable – Public Debt raw data in tabular and graphical form

Year	Public Debt (in millions)
1990	701,129,000,000
1991	768,469,000,000
1992	976,387,000,000
1993	1,268,768,000,000
1994	1,227,472,000,000
1995	1,325,539,000,000
1996	1,331,848,000,000
1997	1,624,000,000,000
1998	1,800,413,000,000
1999	2,142,220,000,000.00
2000	2,648,808,000,000.00
2001	2,880,695,000,000.00
2002	3,407,206,000,000.00
2003	4,063,647,000,000.00
2004	4,645,662,000,000.00
2005	4,474,581,000,000.00
2006	4,421,433,000,000.00
2007	4,196,671,000,000.00
2008	4,766,480,000,000.00
2009	5,010,773,000,000.00
2010	5,267,979,000,000.00
2011	5,524,560,000,000.00
2012	6,069,250,000,000.00
2013	6,278,979,000,000.00
2014	6,286,314,000,000.00
2015	6,499,629,000,000.00
2016	6,603,935,000,000.00
2017	7,130,543,000,000.00
2018	7,780,086,000,000.00
2019	8,220,036,000,000.00


DEBT
Amount in Php
9E+12
8E+12
7E+12
6E+12
5E+12
4E+12
3E+12
2E+12
1E+12
0E+00
90
92
94
96
98
00
02
04
06
08
10
12
14
16
18
Year

Appendix B

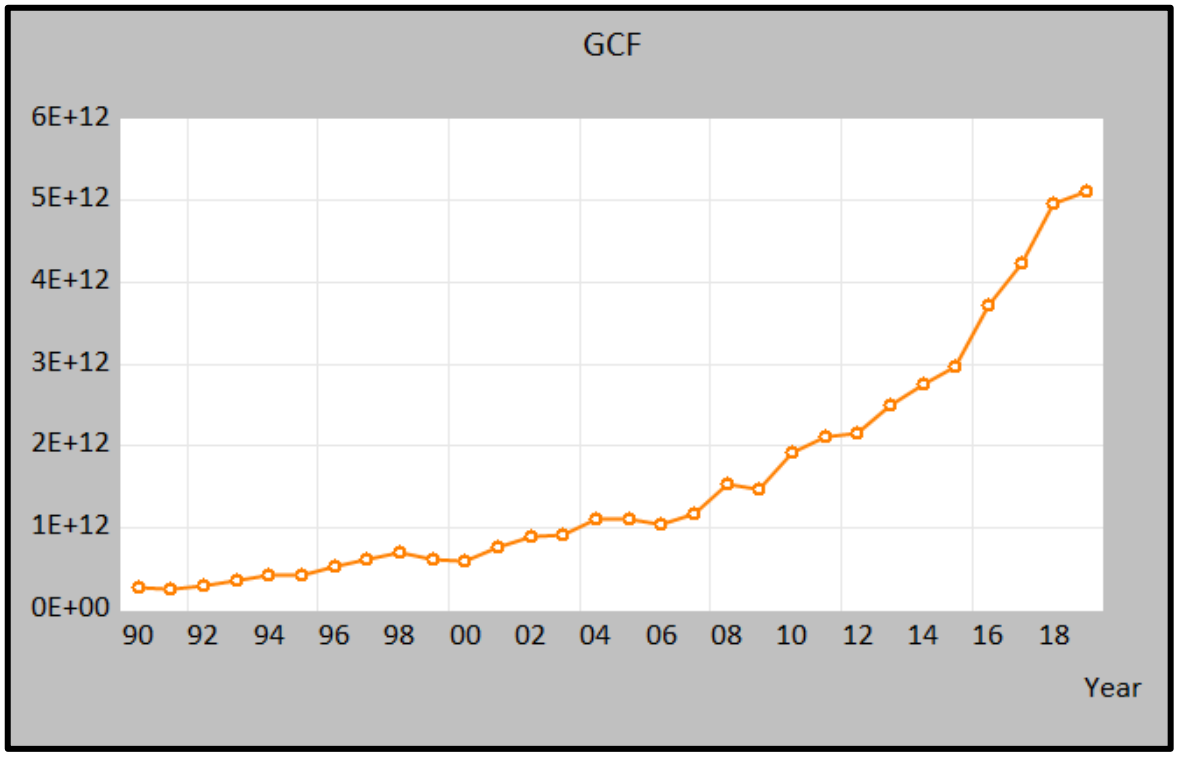
Independent Variables – Gross Capital Formation, Inflation Rate, Foreign Direct Investment, and Trade Balance raw data in tabular and graphical form

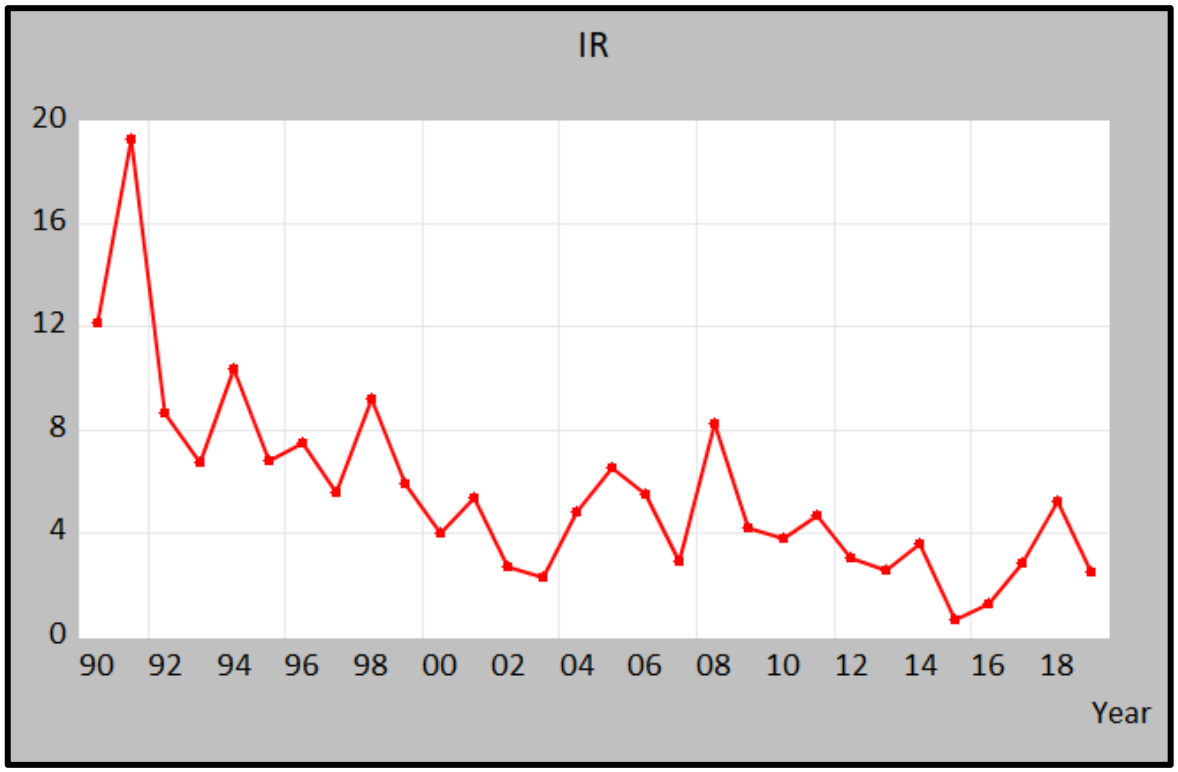
Year	GCF
1990	2.60165E+11
1991	2.52327E+11
1992	2.88401E+11
1993	3.53595E+11
1994	4.07367E+11
1995	4.27896E+11
1996	5.21605E+11
1997	6.01244E+11
1998	6.90544E+11
1999	6.15042E+11
2000	5.79938E+11
2001	7.62429E+11
2002	8.90087E+11
2003	9.21328E+11
2004	1.1037E+12
2005	1.09863E+12
2006	1.04907E+12
2007	1.16098E+12
2008	1.52689E+12
2009	1.46259E+12
2010	1.92141E+12
2011	2.104E+12
2012	2.16353E+12
2013	2.48751E+12
2014	2.76339E+12
2015	2.97582E+12
2016	3.72537E+12
2017	4.23168E+12
2018	4.95911E+12
2019	5.11129E+12

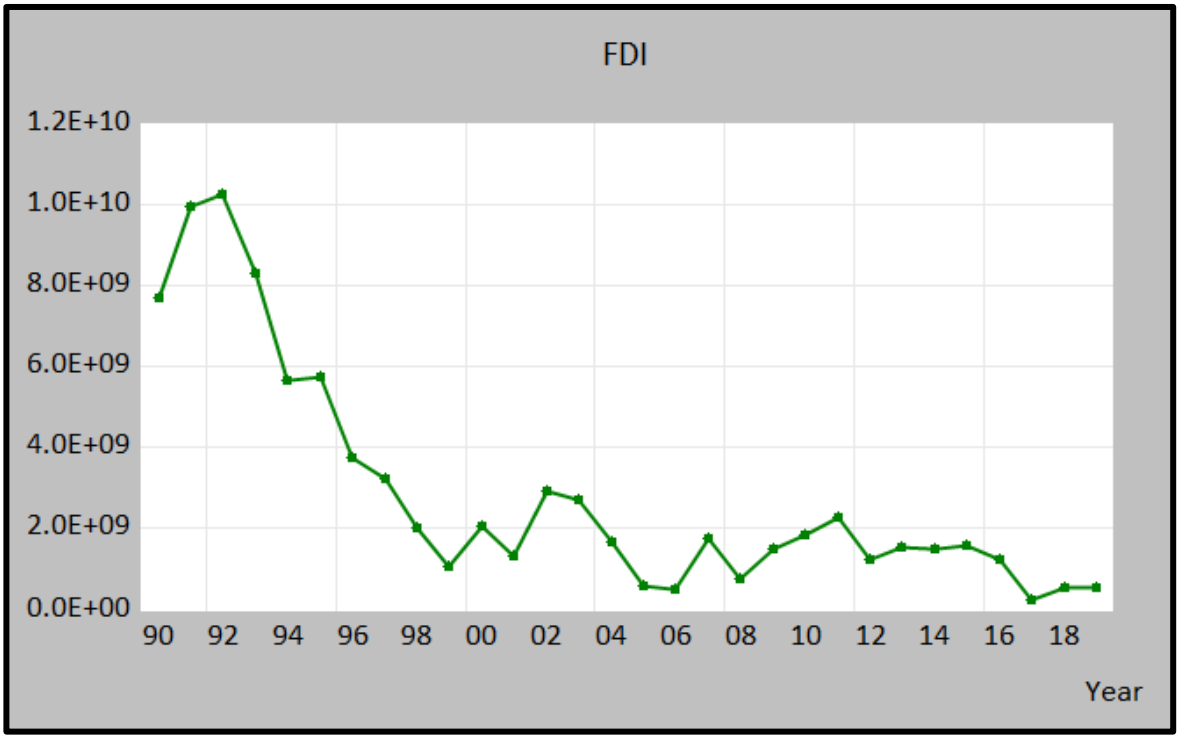
Year	IR
1990	12.18
1991	19.26
1992	8.65
1993	6.72
1994	10.39
1995	6.83
1996	7.48
1997	5.59
1998	9.23
1999	5.94
2000	3.98
2001	5.35
2002	2.72
2003	2.29
2004	4.83
2005	6.52
2006	5.49
2007	2.9
2008	8.26
2009	4.22
2010	3.79
2011	4.72
2012	3.03
2013	2.58
2014	3.6
2015	0.67
2016	1.25
2017	2.85
2018	5.21
2019	2.48

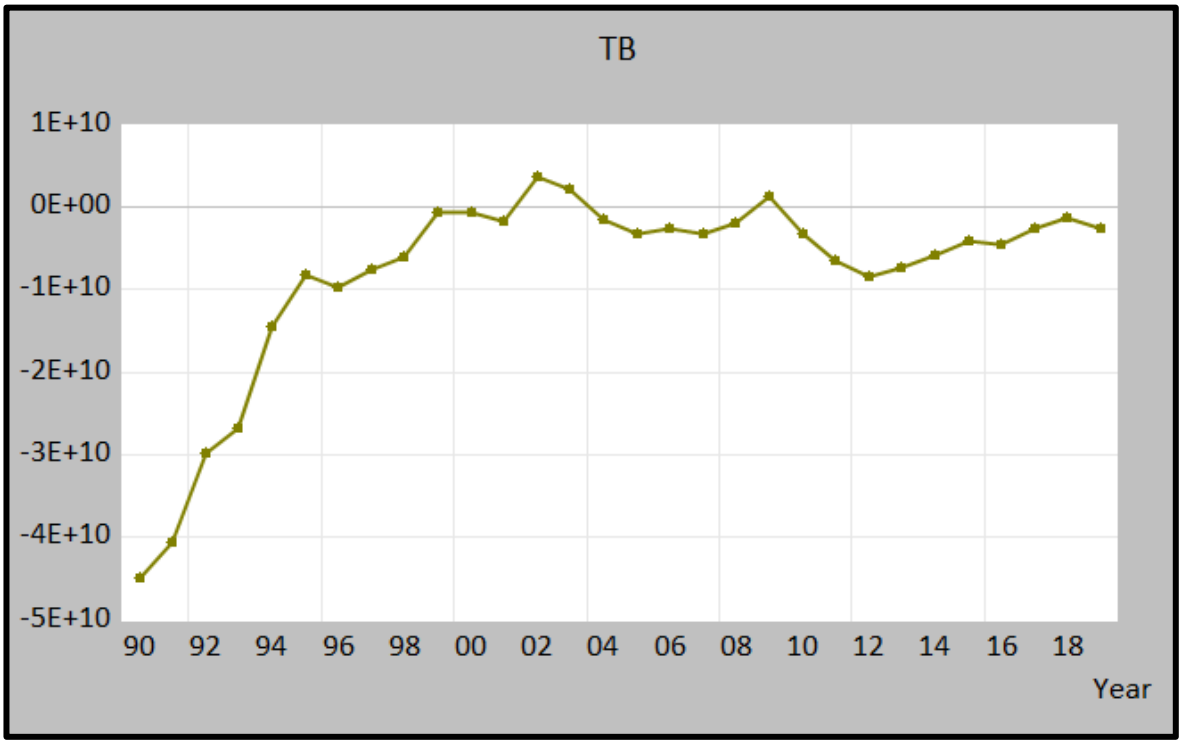
Year	FDI
1990	7,690,000,000
1991	9,950,000,000
1992	10,260,000,000
1993	8,280,000,000
1994	5,640,000,000
1995	5,740,000,000
1996	3,740,000,000
1997	3,220,000,000
1998	2,010,000,000
1999	1,070,000,000
2000	2,060,000,000
2001	1,340,000,000
2002	2,920,000,000
2003	2,710,000,000
2004	1,660,000,000
2005	590,000,000
2006	490,000,000
2007	1,770,000,000
2008	760,000,000
2009	1,490,000,000
2010	1,830,000,000
2011	2,290,000,000
2012	1,220,000,000
2013	1,520,000,000
2014	1,480,000,000
2015	1,590,000,000
2016	1,240,000,000
2017	230,000,000
2018	540,000,000
2019	530,000,000

Year	TB
1990	-44,940,000,000
1991	-40,710,000,000
1992	-29,770,000,000
1993	-26,860,000,000
1994	-14,480,000,000
1995	-8,210,000,000
1996	-9,850,000,000
1997	-7,620,000,000
1998	-6,050,000,000
1999	-740,000,000
2000	-790,000,000
2001	-1,750,000,000
2002	3,720,000,000
2003	2,090,000,000
2004	-1,490,000,000
2005	-3,300,000,000
2006	-2,580,000,000
2007	-3,230,000,000
2008	-2,040,000,000
2009	1,280,000,000
2010	-3,260,000,000
2011	-6,600,000,000
2012	-8,510,000,000
2013	-7,280,000,000
2014	-5,800,000,000
2015	-4,040,000,000
2016	-4,590,000,000
2017	-2,600,000,000
2018	-1,360,000,000
2019	-2,560,000,000


GCF
6E+12
5E+12
4E+12
3E+12
2E+12
1E+12
0E+00
90 92 94 96 98 00 02 04 06 08 10 12 14 16 18
Year


IR
20
16
12
8
4
0
90 92 94 96 98 00 02 04 06 08 10 12 14 16 18
Year


FDI
1.2E+10
1.0E+10
8.0E+09
6.0E+09
4.0E+09
2.0E+09
0.0E+00
90 92 94 96 98 00 02 04 06 08 10 12 14 16 18
Year


TB
1E+10
0E+00
-1E+10
-2E+10
-3E+10
-4E+10
-5E+10
90 92 94 96 98 00 02 04 06 08 10 12 14 16 18
Year

Appendix C

Screenshots of the actual statistical results using the EViews 11 platform

Descriptive Statistics of the independent variables

	GCF	IR	FDI	TB
Mean	1.58E+12	5.633667	2.86E+09	-8.13E+09
Median	1.07E+12	5.020000	1.72E+09	-3.67E+09
Maximum	5.11E+12	19.26000	1.03E+10	3.72E+09
Minimum	2.52E+11	0.670000	2.30E+08	-4.49E+10
Std. Dev.	1.40E+12	3.740781	2.82E+09	1.19E+10
Skewness	1.249019	1.747886	1.509701	-1.985399
Kurtosis	3.526624	7.049950	4.096830	6.017967
Jarque-Bera	8.146907	35.77814	12.89978	31.09420
Probability	0.017019	0.000000	0.001581	0.000000
Sum	4.74E+13	169.0100	8.59E+10	-2.44E+11
Sum Sq. Dev.	5.71E+25	405.8099	2.31E+20	4.09E+21
Observations	30	30	30	30

Descriptive Statistics of the dependent variables

	DEBT
Mean	3.98E+12
Median	4.31E+12
Maximum	8.22E+12
Minimum	7.01E+11
Std. Dev.	2.30E+12
Skewness	0.091535
Kurtosis	1.771077
Jarque-Bera	1.929707
Probability	0.381039
Sum	1.19E+14
Sum Sq. Dev.	1.53E+26
Observations	30

Regression Analysis

Dependent Variable: TD
Method: Least Squares
Date: 06/07/21 Time: 19:23
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.51E+12	5.04E+11	6.960809	0.0000
GCF	1.088182	0.133004	8.181588	0.0000
IR	-1.15E+11	6.12E+10	-1.882082	0.0715
FDI	-272.5591	114.9715	-2.370666	0.0258
TB	-22.33103	28.48214	-0.784036	0.4404

R-squared	0.914175	Mean dependent var	3.98E+12
Adjusted R-squared	0.900443	S.D. dependent var	2.30E+12
S.E. of regression	7.25E+11	Akaike info criterion	57.60880
Sum squared resid	1.32E+25	Schwarz criterion	57.84234
Log likelihood	-859.1321	Hannan-Quinn criter.	57.68351
F-statistic	66.57284	Durbin-Watson stat	0.475744
Prob(F-statistic)	0.000000		

reusch-Pagan Godfrey Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	2.539784	Prob. F(4,25)	0.0650
Obs*R-squared	8.668418	Prob. Chi-Square(4)	0.0699
Scaled explained SS	2.156704	Prob. Chi-Square(4)	0.7070

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/07/21 Time: 19:24
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.29E+23	2.38E+23	1.804268	0.0833
GCF	-7.13E+10	6.29E+10	-1.133991	0.2676
IR	6.25E+22	2.89E+22	2.160717	0.0405
FDI	-7.99E+13	5.43E+13	-1.470119	0.1540
TB	2.09E+11	1.35E+13	0.015501	0.9878

R-squared	0.288947	Mean dependent var	4.38E+23
Adjusted R-squared	0.175179	S.D. dependent var	3.78E+23
S.E. of regression	3.43E+23	Akaike info criterion	111.3721
Sum squared resid	2.94E+48	Schwarz criterion	111.6056
Log likelihood	-1665.581	Hannan-Quinn criter.	111.4468
F-statistic	2.539784	Durbin-Watson stat	1.267943
Prob(F-statistic)	0.064960		

Variance Inflation Factors

Variance Inflation Factors
Date: 06/07/21 Time: 19:23
Sample: 1990 2019
Included observations: 30

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.54E+23	14.45949	NA
GCF	0.017690	4.439971	1.920290
IR	3.74E+21	9.661501	2.887231
FDI	13218.45	11.97612	5.802880
TB	811.2323	9.370243	6.312572