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The Effect of Macroeconomic Indicators on the Debt of Local Government Units in the Philippines

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Abstract

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Fiscal soundness is every government's goal to achieve since it implies good governance and strong macroeconomic fundamentals. However, the turn of events in recent years has shaped priorities that affected the fiscal balance of most countries around the world, such as the occurrence of the COVID-19 pandemic in 2020. Following the use of the random effects model, the study provided statistical support that inflation, interest rates, the fiscal position of the local government unit, and regional GDP affect the fiscal soundness at the local level, as a group. Moreover, the effect of devolution on the back of the Mandanas-Garcia case and the effectiveness of the new administration's development plan are yet to be seen and are subject to a follow-up study.

Keywords: fiscal soundness, local government units, Philippines, debt
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Chapter 1. Overview of the Research Problem

This chapter discusses the background of the study, the purpose of the research, the relevance of the study, and the scope and limitations.

The Philippines was labeled as Asia's rising tiger after posing growth of 6 to 7 percent annually, even when many nations went into recession on the back of the financial crisis in 2008. Having stable macroeconomic fundamentals helped the country upgrade its sovereign credit rating to BBB+ with a stable outlook by most of the credit rating agencies which increased investors' confidence level and allowed it to borrow at minimal interest cost. Nonetheless, despite strong economic growth over the years, the government cannot deny the fact of a widening fiscal deficit.

Philippine leaders of the past brought various development plans to the table. The earlier administrations focused on agriculture, then the succeeding put attention on the service sector, and infrastructure development, to name a few. Yet, regardless of who is in position, the country continued to incur a deficit as its expenditure is always larger than its revenue, resulting in programming a borrowing plan for both domestic and foreign markets.

Progressing into 2020, the world stopped when a pandemic occurred, shocking nations with its gravity by infecting and killing millions of people. Leaders from all over decided to impose lockdowns to contain the spread of the virus, and the Philippines was said to have the longest lockdown in COVID-19 history. The country's economy contracted in 2020 as COVID-19 continued to dampen business activity. The pandemic brought thousands of Filipinos to joblessness following the

closure or downsizing of business operations. The lockdown restrictions severely restrained economic activity.

In response to the adversities brought by the pandemic, the Philippines implemented key economic bills: “Bayanihan to Heal As One Act” and “Bayanihan to Recover As One Act” which allowed the national government to strengthen its healthcare system by expanding medical resources and executing social protection programs and services to affected individuals; Corporate Recovery and Tax Incentives for Enterprises Act (CREATE) that proposed an across-the-board reduction of corporate income tax from 30 percent to 25 percent to attract key investors and enable job creation in a competitive business environment; and Financial Institutions Strategic Transfer (FIST) that allowed financial institutions to free up capital for expansion of investment and lending activities. However, government spending accelerated amid muted growth due to the stoppage of economic activities and was realigned following the 4-pillar socioeconomic strategy of the administration, which was:

Pillar 1: Emergency Support for Vulnerable Groups

Pillar 2: Resources to Fight COVID-19

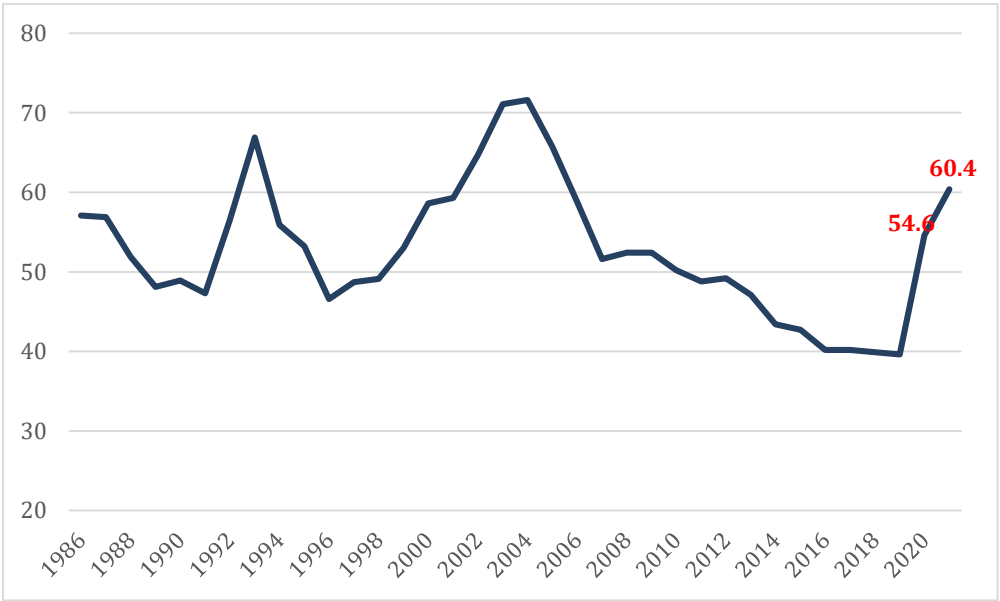
Pillar 3: Fiscal and Monetary Actions

Pillar 4: An Economic Recovery Plan

In anticipation of spending outpacing revenue collection, the national government upscaled its borrowing from both domestic and foreign debt markets. Moreover, the country was able to retain its investment grade of “BBB+” reflecting

its strong fiscal and monetary position to mitigate the economic challenges brought by the pandemic.

Graph 1.1. Philippines: Historical outstanding national government debt as a percentage of the GDP from 1986 to 2021



Data Source: National Government Debt Indicator, Bureau of the Treasury

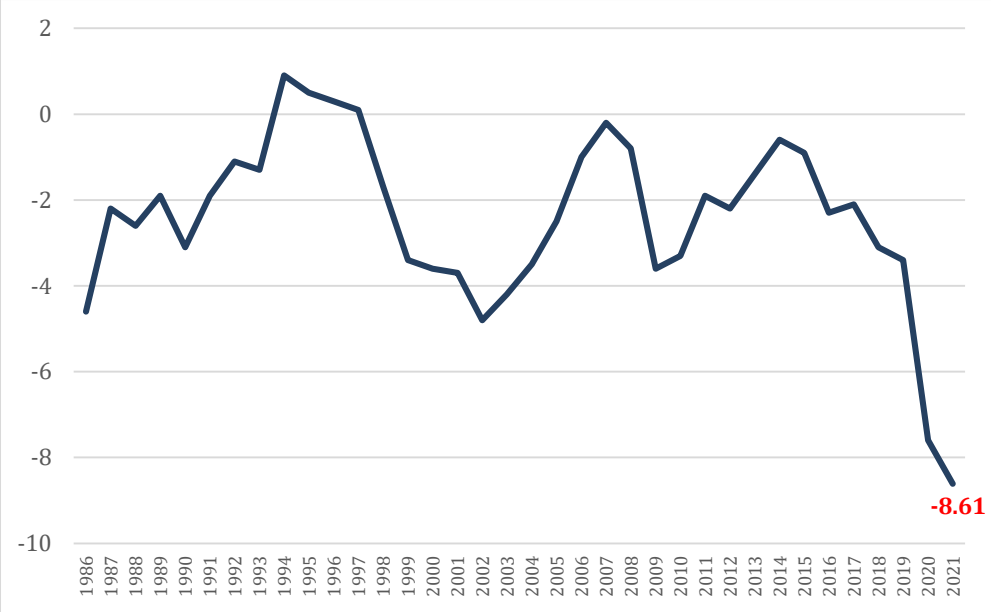
The impact of higher financing requirements and idling growth elevated the country's debt-to-GDP. The graph showed a sharp increase in the debt-to-GDP ratio in 2020, thus, the government expects a gradual increase through 2021 and 2022 as the country continues to tap capital markets with a bias towards the domestic market to fill in the financing requirement for the fiscal year. Nevertheless, there is a likelihood of a return to a downward debt trajectory if the GDP growth and fiscal deficit levels resume their pre-pandemic long-run averages in 2023.

Moreover, on the local level, the Local Government Code gave the local government units (LGUs) entitlement to financial transactions. The local governments in the Philippines had their fair share of financing activities, seeking to suffice the needs of the people. As the current administration's economic managers push through inclusive growth, it is better to study the capacity level of the local units in the country, if they can keep up with the pacing of the national government recovery plan.

In an Asian Development Bank (ADB) report, the Philippines has been doing well in terms of fiscal consolidation before the 2008 global financial crisis. The country maintained its fiscal deficit as a percent of gross domestic product (GDP) at roughly around its target over the years, with mid-year adjustments done by the Development Budget Coordination Committee (DBCC) depending on the economic performance of the country. As an export-oriented nation, accompanied by robust growth backed by strong remittance inflows, the Philippines managed to spend more on infrastructure and social protection to mitigate the shocks of the 2008 crisis.

Nevertheless, in the post-2008 global financial crisis, fiscal pressure grew as calamities struck the country resulting in the need for restructuring which later contributed to the larger fiscal deficit.

Graph 1.2. Philippines: Historical surplus/(deficit) as a percentage of the GDP from 2986 to 2021



Data Source: National Government Cash Operations Report, Bureau of the Treasury

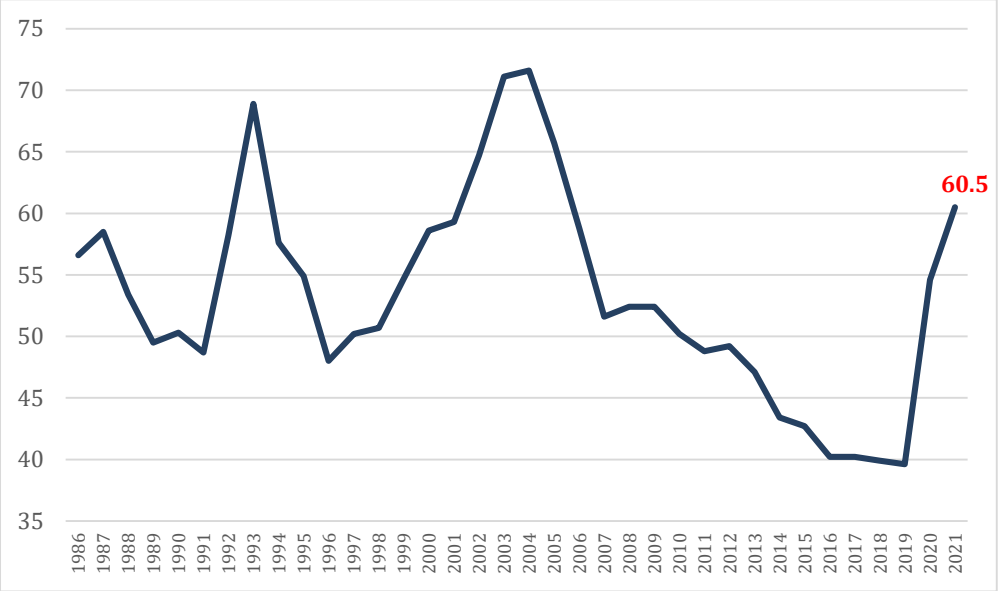
The Philippines has been operating under a deficit for the past 3 decades, yet under manageable levels. However, provided with limited fiscal space, public spending on infrastructure, education, and health has been underfunded and this prevented the government to address societal issues such as poverty and increasing inequalities (Usui, 2011).

As written in Philippine history, the first loan granted to the Philippines under the Malolos Congress in 1898 was worth 20 million pesos and this was to prop up the national budget and needed to be repaid in 40 years with a 6 percent interest per annum.[1] The country has been operating under a deficit since the First Philippine

[1] Agoncillo, Teodoro. (1960). *Malolos: The Crisis of the Republic*

Republic, and it took a century for the national debt to reach 6.1 trillion pesos in 2016; then 5 years and one pandemic later, the national government debt doubled to 13.7 billion under the presidency of Rodrigo Duterte.[2] (Africa, 2020)

Graph 1.3. Philippines: Historical national government outstanding debt as a percentage of GDP from 1986 to 2021



Data Source: National Government Debt Indicator, Bureau of the Treasury

The national government over the years experienced both overspending and underspending under different leaderships. During the Gloria Macapagal-Arroyo administration, habitual overspending subject to corruption allegations was the issue. National debt ballooned when Arroyo came into power in 2001 to 4.2 trillion from 2.4 billion 8 years prior.[3] Despite this growing debt, projects directed to the benefit

[2] IBON Foundation
[3] National Government Debt Indicator, Bureau of the Treasury

of the Filipinos were not seen and in line with the issue of corruption, billions of pesos could have been going into some people's pockets and were used to fund the luxurious lifestyle of the president. However, as defended by the administration's finance secretary Margarito Teves, the Philippines incurred debt to pay for principal maturing obligations made by the administrations before Arroyo's, as well as to service interest payments. Moreover, the Arroyo leadership also assured having a cash buffer for emergencies annually.

Meanwhile, under the leadership of the late Benigno "Noynoy" Aquino III, the Philippines experienced an actual fiscal deficit much lower than the target due to serious underspending. This reflected a lack of better infrastructure for the future, more job opportunities, better compensation, and less hunger in the near term.

Under the Rodrigo Duterte regime, the national debt even grew larger in support of the administration's infrastructure flagship program which was its key socioeconomic policy to address poverty, boost economic growth, and cut the congestion in Metro Manila. The program would also address the country's infrastructure gap, hence continuing the projects of the administrations prior. Furthermore, in 2020, a pandemic challenged the world, with the Philippines reported as the country with the longest lockdown in the history of COVID-19 bringing the government to implement stimulus packages to address its impacts, namely the *Bayanihan I* and the *Bayanihan II* acts. These legislations required the national government to strengthen its healthcare system through the expansion of medical resources and the execution of social protection programs and services for affected

individuals. Thus, this enlarged the country's debt as the government tapped both the domestic and foreign markets for financing, on top of the loans granted by international creditors (i.e. The World Bank).

The challenge being faced by the Philippines is the viability of fiscal consolidation to minimize the long-term economic impact of the pandemic-induced crisis. The pandemic-induced recession resulted in revenue losses and increasing debt. According to a Department of Finance estimate, the total tax revenue loss of the country amounted to 785.6 billion pesos or 4.4 percent of the GDP, almost 4 times lower than what was expected to be the tax revenue in 2020. Moreover, around 1 trillion pesos on average per year was projected to be a revenue loss from 2021 to 2024. The loans incurred to finance the pandemic-related measures and the budgetary support to cover the deficit increased the government's financing cost.

The Philippines is under new leadership as Filipinos elected Ferdinand "Bong Bong" Marcos Jr., the son of the country's previous dictator of 30 years (1966-1986)[4]. This entails the adoption of a new development plan in a post-COVID-19 era which may lean towards a dynamic recovery plan for the domestic economy over the medium term.

Local Government Units (LGUs) in the Philippines

A local government has no share in sovereignty and is completely inferior to the central government, besides, it is the lowest level of the voted territorial body within a state. Nevertheless, these government entities have two tasks: first, to deliver

[4] Ferdinand Marcos, ruler of the Philippines, Britannica

local public services, and second, to employ national welfare policies. As administrations change, the role of the local governments in the Philippines has evolved as well since the 1980s, gravitating toward involving the communities in local policymaking.[5]

The national government supervises these local units through the Department of Interior and Local Government and the Bureau of Local Government Finance for financial oversight.

The local government's revenue is from the property, local business, and community taxes and different fees, accounting for 32.5 percent of the LGU budget. They also have the privilege to, according to the IMF, "determine their sources of income, subject to guidelines and limitations the Congress may provide, consistent with the basic policy of local autonomy."[6]

Thus, this paper will focus on the conditions considered by the country's local leaders to achieve fiscal soundness and more variation, as well as observe the capacity of the LGUs to steer toward recovery following the pandemic-induced crisis.

The study seeks to know the answer to the following inquiries:

1. What conditions should be considered in acting upon achieving fiscal soundness at the local government level?
2. What makes fiscal adjustments a success in the sense of stabilizing the debt?

[5] Local Governments and Devolution in the Philippines by Dr. Maria Ela Atienza, University of the Philippines
[6] The Hunger Projects with UNDEF

3. What will be its impact over the medium term, provided the change in leadership, leaning toward the adoption of a new development plan?

The study aims to determine the effect of economic drivers on the fiscal soundness of local governments in the Philippines. Therefore, this is the hypothesis:

Ho: Certain macroeconomic indicators have no significant effect on the local government's fiscal soundness

H1: The inflation rate affects the local government's debt levels

H2: Interest rates of domestic banks affect the movement of debt in the local government

H3: Local governments' deficit/(surplus) affect the units' debt levels

H4: Regional GDP affects the movement of debt in the local government

Ha: Certain macroeconomic indicators have a significant effect on the local government's fiscal soundness

The study of fiscal consolidation is commonly tackled in OECD nations, particularly in the European region. Thus, creating models that fit only developed states. Moving on, fiscal soundness in developing states has become more of a long-standing matter on the back of unsustainable fiscal measures.

With the growing financing needs of most developing countries on the back of the pandemic, governments consider adjusting their fiscal policies in working toward recovery from the crisis. This study aims to help the local governments in the

Philippines when beginning their adjustment efforts by analyzing their fiscal stance and debt levels to the regional economic condition. This can be realized through an econometric analysis, determining the significance of the economic condition to the consolidation efforts of the LGUs.

Overall, the country should have strong macroeconomic fundamentals to realize the objectives of the national government. Reducing the underlying fiscal deficit allows the national government, as well as the local, to have room to maneuver the economy toward recovery in the aftermath of COVID-19. Thus, the research is essential for the local government units to assess their capacity in bringing their budgetary deficit to its pre-pandemic levels, as such the debt levels.

The study seeks to be an added value to the pool of literature about fiscal soundness at the local government level, concentrating on a developing nation in South East Asia. The proposed study serves the local officials as their reference in acting upon lowering their deficit levels and obtaining a sustainable debt moving forward. It will further provide help in understanding why there is a need for fiscal soundness even at the local level of the government, despite the presentation that the local governments in the country showed good fiscal position over the years, equating to zero debt yet experiencing a deficit.

Furthermore, the study can become a guide for future researchers who wish to study the same topic of interest and who can further develop models for developing nations.

As the study aims to measure the effect of the economic drivers on fiscal soundness in the Philippines, secondary data from various national government

databanks will be examined. The paper will focus on the macroeconomic variables such as the fiscal deficit and the level of debt, as well as the inflation rate, the monetary policy stance of the central bank as measured by the policy rate, and the LGUs' position in the business cycle as determined by the regional GDP.

The indicators used in the study were meant for the national level on the back of the intent that it would be the same as the local level.

The initial data gathered showed records from 1986 onwards since from 1965 to the earlier part of 1986, the Philippines was under the dictatorship of Ferdinand Marcos. The country was subject to issues of corruption, plunder, crony capitalism, and human rights abuses. Hence, government transactions during the time of Marcos and before his regime were not recorded.

However, the Bureau of Local Government Finance in the Philippines began recording financial transactions of the local governments in 1993, while the regional economic data of the country started in the year 2000. Meanwhile, the Philippine Statistics Authority does not have a database for the regional Consumer Price Index, hence, only provided the nominal value of regional inflation in various classifications. A standard computation for the regional inflation in the Philippines was absent, hence the inflation used in the study was the annual inflation of the whole country which may have affected the significance of the variable inflation to the model.

Gathering reliable data was one of the major constraints this research paper dealt with.

Chapter 2. Review of Related Literature

This chapter presents the various studies, literature, concepts, and theories conducted by different individuals and research institutions that were used as bases in this study.

2.1. Theoretical Framework

When a nation is experiencing an economic downturn, according to the Keynesian school of thought, the government should increase demand to stimulate growth hence, supporting expansionary fiscal policy, where government spending is a vital component of aggregate demand. Nonetheless, this approach would increase the fiscal deficit of the country, implying that the total spending of the government is larger than the total revenues it collected exclusive of borrowings (Sharma & Mittal, 2019). Keynesian economists are certain that deficit has a positive influence on the economy by emphasizing the crowding-in effect and supporting deficit spending in times of economic contraction. Deficit spending could increase the size of the market resulting in heightened optimism and profitability and could boost investment that further stimulates demand and attain full employment.

The neoclassical school argued that deficit spending harms economic development, causing an increase in real interest rates when governments borrow from the domestic capital market diffuses to the crowding-out of private investments.

Meanwhile, the Ricardian equivalence theory suggested that deficit does not have a direct effect on the economy. The theory implies boosting an economy through debt-financed government spending will not be effective as the debt needs to be

repaid in the form of future taxes. The Ricardian view believed the people will save on the back of their expectation of increased taxes in the future to pay off the nation's debt, thus, offsetting the increase in aggregate demand from the robust government spending.

Emerging markets pose a shallow financial depth that drives the government to finance through borrowing.

In 2020, the world experienced a sudden shutdown brought on by the COVID-19 pandemic and exhibited how unprepared it was in terms of global health shocks. Fiscal sustainability was questioned when the pandemic began as nations, particularly the global south, turned to deficit spending to address its adversities. The Philippines, an emerging economy from South East Asia, relied heavily on borrowing on the back of lower tax revenue as the country was placed under lockdown for 17 months, the longest in the history of lockdowns due to COVID-19.

Following the progression of the pandemic, the country incurred a record-high fiscal deficit and wider outstanding national government debt. To limit the long-term economic scarring of the COVID-19-induced crisis, the Philippines' Department of Finance is completing a fiscal consolidation strategy that will help the country to outgrow the pandemic-induced debt by safeguarding job-generating infrastructure investments to compensate government spending on its operational expenses.

Fiscal consolidations were designed based on the country's fiscal policy and were used in times of economic recessions (Agnello, Castro, & Sousa, 2013). The primary goal of fiscal policy is to balance the government's financing needs with the

investment demand from the private sector and to have a sustainable balance of payments. However, fiscal policy may be designed inappropriately on the back of miscalculations regarding the acquisition of resources by the public sector (Blejer & Cheasty, 1991). Moreover, variables that are significant in consolidation episodes are fiscal deficit and the level of national government debt, as well as economic factors such as degree of openness, inflation rate, interest rate, and GDP-per-capita (Agnello, Castro, & Sousa, 2013).

According to Von Hagen and Strauch (2001), for a successful fiscal consolidation, the cyclical positions of the domestic and international economy, the initial debt level, and the fiscal policy stance of the country are as well significant determinants of fiscal consolidation for these affect the consolidation strategy of the government.

Macroeconomic environment and political economy settings are vital in fiscal consolidation, provided that fiscal policies were formulated based on the two conditions. Furthermore, fiscal consolidation literature explains its composition, whether it should be under-trimming the state expenditure or increasing the revenue (Molnar, 2013). In line with expenditure cuts, politically-sensitive budgetary items, such as transfers, subsidies, and wages were the crucial component of an effective consolidation.

According to Agnello et al., the size and composition of the austerity measure are the factors affecting the consolidation process. Concerning the timing of the measure, gradual consolidation tends to be more successful than sharp or "cold shower" consolidation, nevertheless, in a recessionary environment, the latter could

be more effective (Barrios, Langedijk, & Pench, 2010). Furthermore, in achieving long-term debt sustainability, governments showcase their commitment through severe fiscal policy adjustments (Agnello, Castro, & Sousa, 2013).

As governments lean towards economic growth, spending-driven fiscal consolidation appears to be more successful than fiscal adjustments such as tax reforms. The effect of fiscal policy on the economy, according to Blanchard and Perotti (2002), in terms of positive government spending, increases output and private consumption also creating a crowding-out effect over private investment, while positive tax efforts harm output and private consumption.

Existing kinds of literature lack the analysis of how the economic environment, monetary policy, the country's position in the business cycle, and the international economic environment as the determinants, in which fiscal consolidations occurred., resulting in no indication of which circumstances fiscal adjustments were made and to which consolidation episodes tend to be a success. Furthermore, budgetary adjustments are likewise valuable in fiscal consolidation as these tend to predict the start and the success of the consolidation efforts (Von Hagen & R., 2001).

A successful consolidation is deemed to be successful if the decrease in the budget deficit happened following a target, a certain minimum amount in a certain number of years (Von Hagen & R., 2001).

2.2 Conceptual Framework

Illustrated below is the three-way process in determining the effect of the economic factors on the fiscal consolidation of local governments in the Philippines:

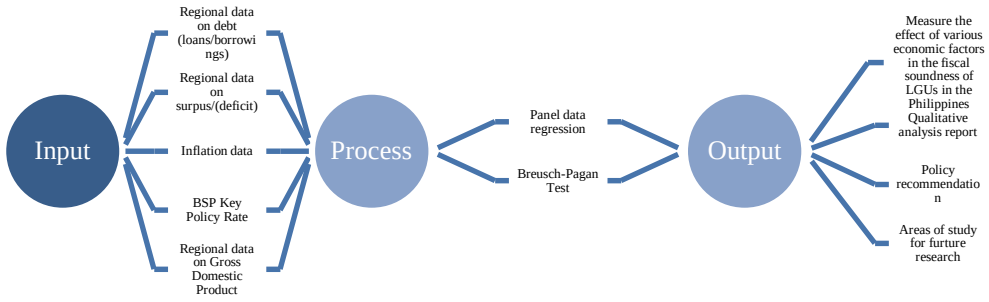


Figure 2.1. Research Concept

The concept of the research served as a guide in conducting the study. The input variables correspond to the economic factors that determine the fiscal soundness of the local governments: deficit, outstanding debt, inflation rate, interest rate (*Bangko Sentral ng Pilipinas*' monetary policy stance), and the locale's position in the business cycle as determined by the regional GDP.

The process used in the research was panel data regression analysis to study the conditions needed to be considered in achieving fiscal soundness at the local level, as well as the Breusch-Pagan test to test the presence of heteroskedasticity in the model.

Lastly, the study seeks to measure the effect of the regional inflation rate, BSP monetary policy setting, LGU's fiscal position, and the regional GDP on the efforts to achieve LGUs' fiscal soundness in the country. The results will serve as the basis for policy recommendations for local officials, as well as a guide for people who wish to study the field in the future.

Chapter 3. Research Methodology

This chapter presents the data requirements and their sources, the methods of research, and the treatment used to determine the effect of the inflation rate, monetary policy stance, fiscal stance, and LGUs position in the business cycle have no significant effect on the fiscal soundness, measured by the initial debt of the local government units in the country for various years.

The sharp increase in fiscal deficit and outstanding debt in recent years, as backed by the funding requirement for COVID-19, put interest in the topic of adjusting the fiscal position of governments around the world. Thus, this research sought to analyze the effect of certain economic drivers on the effort to achieve fiscal soundness at the local government level in the Philippines. In addition, the result of the 2022 national election will shape the development plan of the country over the medium term.

3.1. Sources of Information and Research Design

The study used panel data to analyze the relationship of each independent variable namely, inflation, interest rate, GDP, and fiscal position to fiscal soundness, across the provinces in the Philippines, as well as the cities in the National Capital Region. In providing answers to each research problem and providing an analysis of the significance of the independent variables to the dependent variable, descriptive analysis was used in line with the required statistical tests and interpretation.

The descriptive method of research was used in the study to summarize the

sets of quantitative information. The study involves conducting statistical methods to test, analyze, and interpret the results of the dataset gathered from various government institutions in the Philippines, dealing with the relationship between variables, and testing hypotheses, principles, or theories that have universal validity.

The study utilized secondary data to validate the effect of the identified economic factors on the LGUs' fiscal soundness, this particularly pertains to the fiscal position, level of debt, inflation rate, key policy interest rate, and regional GDP.

The research used both quantitative and qualitative ways in analyzing and explaining the results. It has a causal design to measure the effect a particular change will have on the existing expectations. A causality study often assists in the understanding of the existing phenomenon by proving a causal link between variables and eliminating other possibilities.[7]

Meanwhile, as the Philippines went through a change in leadership, the development plan of the incumbent administration was taken into consideration in formulating policy recommendations.

3.2. Statistical Treatment

To further analyze and interpret the results of the data and information gathered, statistical treatments were utilized, particularly estimations tools such as the panel data regression model (Molnar, 2013).

[7] Beach, D. & Pedersen, R.B., *Causal Case Study Methods: Foundations and Guidelines for Comparing, Matching, and Tracing*

In testing the independent variables measured by the inflation rate, key policy interest rate, surplus/(deficit), and regional GDP, if they affect the dependent variable, debt level, the model utilized as shown below:

$$Y = B_o + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + e_t$$

$$Debt = B_o + B_1Inflation + B_2Interest + B_3Position + B_4GDP + e_t$$

Equation. Econometric model measuring the effect of the inflation rate, interest rate, and LGU's business cycle position on the debt level of the local governments in the Philippines

Where:

B_o = Constant term of intercept

B_1, B_2, B_3, B_4 = Partial regression coefficient; each regression coefficient represents the amount of deviation

e_t = Random error term which contains the myriad other factors that can influence the economic condition of the country but are not considered in the model

Dependent Variable:

Debt = Initial debt level

Independent Variables:

Inflation = Inflation Rate (local inflation rate)

Interest = Interest Rate (*Bangko Sentral ng Pilipinas* policy stance)

Position = LGUs' fiscal position determined by its surplus/(deficit)

GDP = Local governments' position in the business cycle (GDP)

Panel Data Regression Analysis

To analyze the variation of fiscal soundness along time dimensions, panel data regression was used. The random-effects model considered the individual variations of the variables, as well as time-reliant variations. The mentioned model disregards biases from unobserved variables.

$$Y_{it} = b_0 + b_1X_1 {}^{+} b_2X_2 + ... + b_tX_t + u_{it}$$

Where Y was the variable intended to predict, X was the variable used to predict the Y, a was an intercept, b was the slope, and u was the regression residual.

Hausman Specification Test

To verify the use of the random effects model in the study, the Hausman specification test (or the Durbin-Wu-Hausman test) was conducted to determine whether a correlation was present between the unique errors and the regressors in the model. The Wu-Hausman statistic is as follows[8]:

$$H = (b_1 - b_0)' \big(\mathrm{Var}(b_0) - \mathrm{Var}(b_1) \big)^{\dagger} (b_1 - b_0),$$

Where † is the Moore-Penrose pseudoinverse, or the calculation of the "best fit" (least squares) explanation to a system of linear equations that lacks an explanation. Under the null hypothesis of this test, the statistic has the asymptomatically chi-squared distribution equivalent to the rank of matrix $\mathrm{Var}(b_0) - \mathrm{Var}(b_1)$. On the other hand, rejecting the null hypothesis would mean that b_1 is

[8] Greene, William H. (2021). *Econometric Analysis (7th ed.)*. Pearson. Pp. 379-380, 420

inconsistent. Hence, not rejecting the null hypothesis implies that the random effects model should be used in the study on the back of greater efficiency.

Heteroskedasticity Test

To check the presence of heteroskedasticity in the model, the Breusch-Pagan test was conducted. Heteroskedasticity implies an unequal scatter of error terms in the model, and one of the causes is having a wide range of values with significant differences between the smallest and largest values.

$$\varepsilon_i^2 = \alpha_0 + \alpha_1 X_{i1} + \ldots + \alpha_p X_{ip} + u_i$$

Otherwise, the Breusch-Pagan test can be computed by estimating the auxiliary regression $\hat{\varepsilon}_i^2 = \delta_0 + \delta_1 \hat{Y}_i$, where $\hat{Y}$ is the predicted values from the regression model $\hat{Y}_i = \hat{\beta}_0 + \hat{\beta}_1 X_{i1} + \ldots + \hat{\beta}_p X_{ip}$.

Following the auxiliary regression, hold the R-squared, $R^2_{\hat{\varepsilon}^2}$, then compute for the F-statistic, $F = \dfrac{\dfrac{R^2_{\hat{\varepsilon}^2}}{1}}{\dfrac{\left(1 - R^2_{\hat{\varepsilon}^2}\right)}{n-2}}$ or $\chi^2 = nR^2_{\hat{\varepsilon}^2}$.

Chapter 4. Discussions and Analysis of Results

Inclusive in this chapter are the presentation, interpretation, and analysis of the findings and results of the study that answer the problems stated in the first chapter. Statistical results will also be discussed and presented for hypothesis testing. The content of this chapter will serve as the basis for the conclusion and recommendation of this study.

Philippine local governments were annually guaranteed by the national government of sufficient budget in responding to calamities, emerging from the Local Disaster Risk Reduction and Management Fund (LDRRMF) and the Local Development Fund. The local governments could realign their respective budgets, as well as borrow from domestic banks or government financial institutions to bridge their financing gap.

During the time of COVID-19, the Bureau of Local Government issued borrowing guidelines[9] for the local units to follow:

- Local government units must acquire the approval of the local chief executive of the *Sanggunian* (municipal council), the legislative body of the local governments in the Philippines.
- 20% of the annual local government's annual budget could be used for debt repayment which must be checked and given a Certificate of Net Debt Service Ceiling and Borrowing Capacity by the Bureau

[9] Credit Financing for COVID-19 Programs, Bureau of Local Government Finance

of Local Government, and must also be approved by the Monetary Board of the *Bangko Sentral ng Pilipinas* (Philippine Central Bank) of its effect on the monetary aggregates and the country's balance of payments.

- The borrowed funds must be allocated to health-related projects.

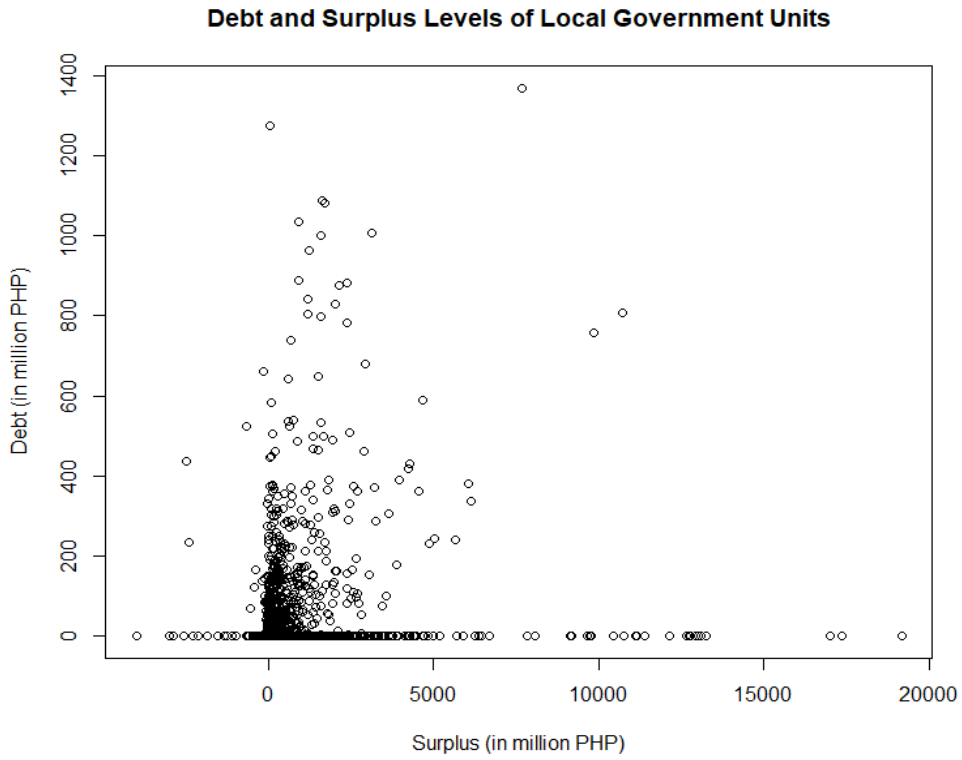
The study focused on the local government's ability to maintain its debt at manageable levels on the back of uncertainties, like COVID-19. According to Von Hagen and Strauch (2001), the cyclical position of the economy, initial debt level, and the government's fiscal policy were determinants of fiscal soundness. Hence, the dataset used in the study was gathered from the: Philippines' Bureau of Local Government Finance for the annual debt incurred by the LGU; *Bangko Sentral ng Pilipinas* for the interest rate represented by the key policy rate; and the Philippine Statistics Authority for the regional GDP and annual average inflation rate.

The paper utilized a panel dataset, observing the debt levels and fiscal positions of the 82 provinces and 16 cities in the Philippines, regional GDP, and BSP key policy rates from 2000 to 2020. The dataset collected exhibited unbalanced panel data due to the creation of new provinces and cities by dissecting the existing large ones over the years.

Graph 4.1 shows the data pattern between the debt levels and surplus of the local governments in the Philippines from 2000 to 2020. Debt accumulation at the country's local government level was not significantly high compared to the national level. Hence, most of the local governments did not incur any debt or borrowed at

very low amounts over the past 20 years whether they were operating in deficit as shown below. Nonetheless, the local governments' surpluses offset the deficit recorded in certain years, as reflected in the data gathered from the BLGF database.

Graph 4.1 Philippines: Local Government Units' Debt and Surplus Levels from 2000 to 2020, in million PHP



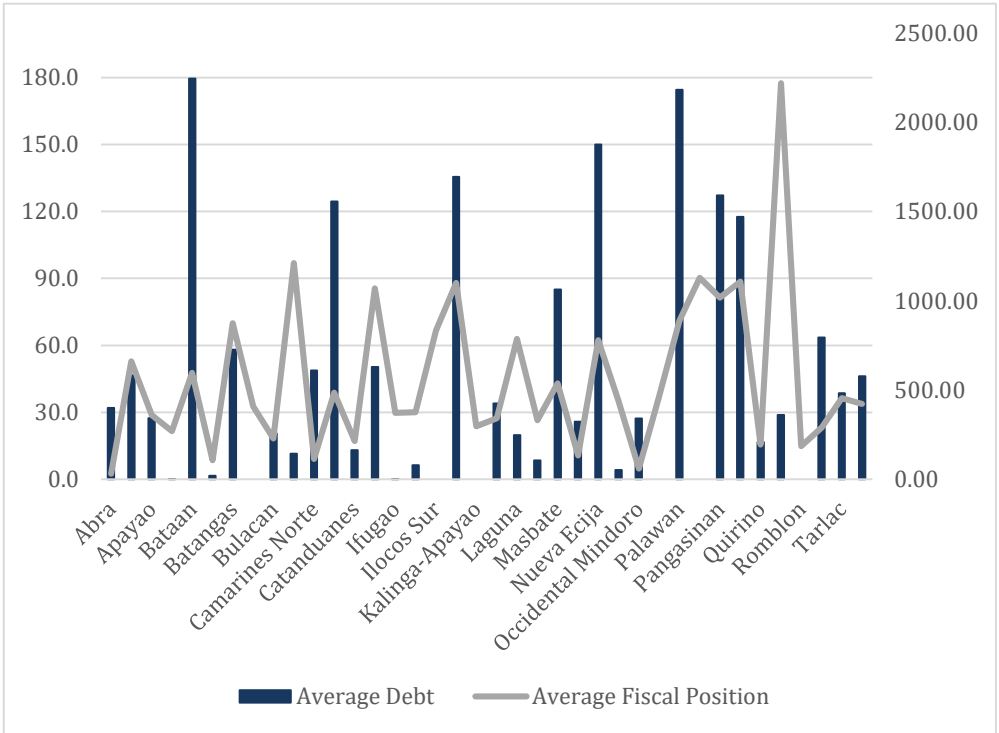
Source: Statement of Receipts and Expenditures, Bureau of Local Government Finance

Luzon was the most packed island and the economic and political center of the Philippines. According to the recent census, in 2021, it consists of more than half of the whole country's population. The island was large in agriculture, whereas most

rural areas depend on producing crops, raising livestock, and fishing. Furthermore, most provinces have been dependent on tourism as a source of income and job generation activities.

Graph 4.2 shows the average debt and surplus recorded in the largest island of the country, Luzon, in the last 20 years. As reflected, there were data gaps in terms of debt since the provinces of Benguet, Ilocos Sur, Kalinga-Apayao, Oriental Mindoro, Pampanga, and Romblon did not incur debt over the recent years. Meanwhile, the local governments' average fiscal positions in Luzon were in surplus despite operating under a deficit in certain years.

Graph 4.2 Philippines: Mean debt and surplus levels of the local governments in Luzon from 2000 to 2020, in million PHP

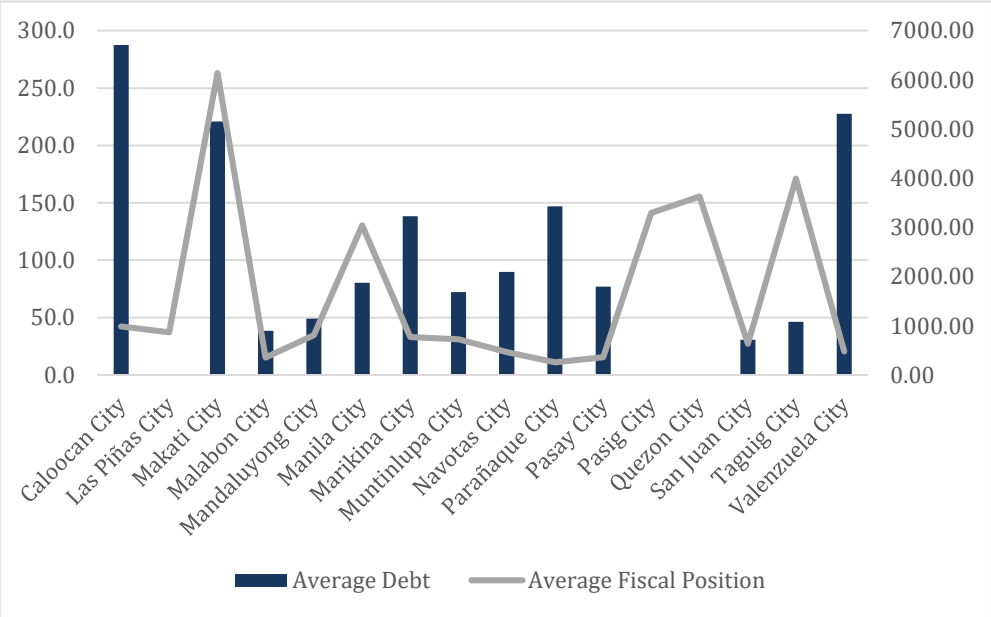


Source: Statement of Receipts and Expenditures, Bureau of Local Government Finance

Graph 4.3 shows the average debt and surplus of the National Capital Region (NCR), deemed as the economic center of the country, as many companies settled in the country's capital. Pasig City and Quezon City were the two local governments in the NCR that did not incur any debt in the last 20 years. Furthermore, the abovementioned cities including Makati City were the large income-generating local governments since many companies and businesses were located around the area.

The local government units in the region were classified as cities, which generate a minimum annual income of PHP 1.5 million, as stated in Republic Act No. 4477. In 2000, there were only 11 cities under the NCR, yet up to date, there were now 16 cities with further classification from first to fifth-class cities depending on their average annual income in the last four fiscal years. Nevertheless, Manila City and Quezon City were special-class cities and do not fall into any of the city classifications according to Presidential Decree No. 465.

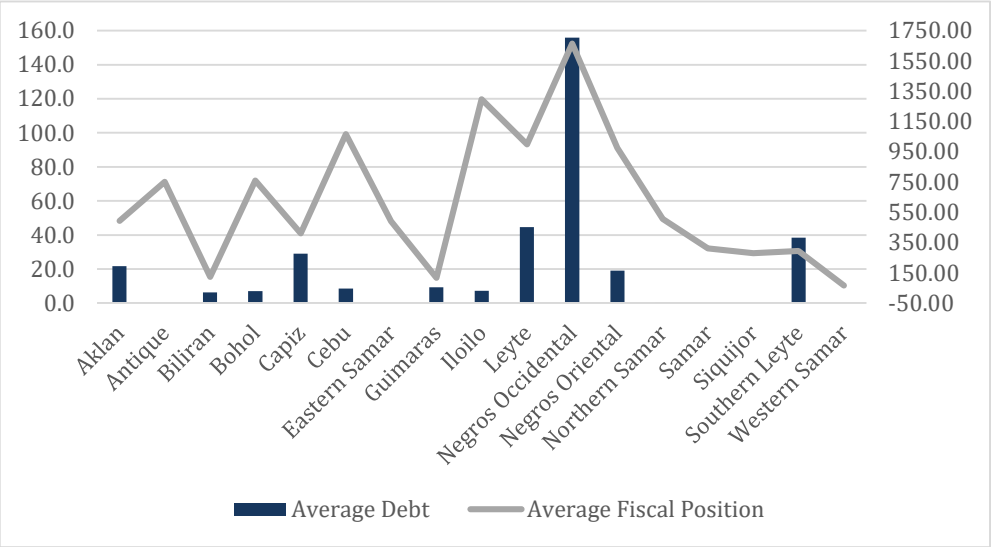
Graph 4.3. Philippines: Mean debt and surplus levels of the local governments in the National Capital Region from 2000 to 2020, in million PHP



Source: Statement of Receipts and Expenditures, Bureau of Local Government Finance

Graph 4.4 reflects the average debt and surplus levels of the provinces in Visayas. The local governments of Antique, Eastern, Northern, and Western Samar, and the province of Samar did not record any debt for the past 20 years according to the database of BLGF. However, the province of Western Samar's data was only for 2000 and was later removed from the database then the province of Samar emerged. The Visayas region was known for its tourism where many it houses some of the country's famous beaches, such as Boracay.

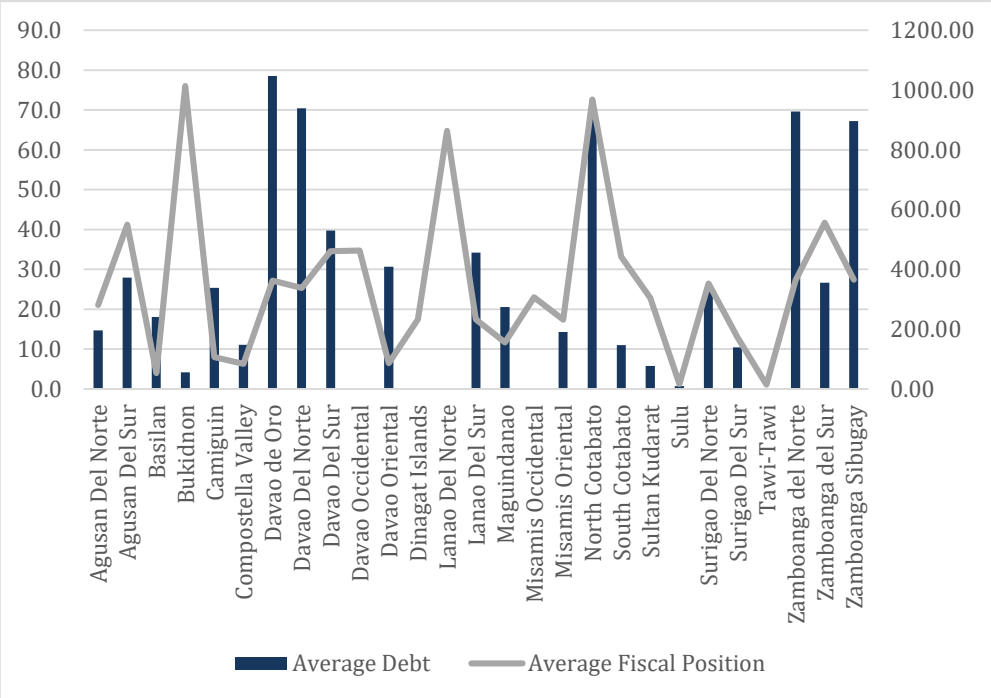
Graph 4.4 Philippines: Mean debt and surplus levels of the local governments in Visayas from 2000 to 2020, in million PHP



Source: Statement of Receipts and Expenditures, Bureau of Local Government Finance

Graph 4.5 shows the small local governments in Mindanao, the second largest island in the Philippines, did not incur debt in the last 20 years. Despite the continuous rehabilitation of certain locales due to the unending military campaign on the island, it accounts for an average of 12 percent regional GDP supported by its agriculture, fishing, industry, service, and forestry sectors.

Graph 4.5 Philippines: Mean debt and surplus levels of the local governments in Mindanao from 2000 to 2020, in million PHP



Source: Statement of Receipts and Expenditures, Bureau of Local Government Finance

4.1. Conditions to be considered in achieving fiscal soundness at the local government level in the Philippines

The Hausman specification test was conducted to determine whether a fixed effect model or random effect model will be used in analyzing the effect of certain economic indicators on the level of debt of the local government units in the Philippines.

Table 4.1 shows the Hausman specification test with a p-value of 0.2291, implying not rejecting the null hypothesis. The hypothesis for the test could be stated as follows[10]:

Ho: Estimates are both consistent, yet, random effects are efficient

Ha: Estimates for fixed effects are consistent, yet, estimates for random effects are not

Table 4.1 Test for model appropriateness

Hausman Test
Chi Square = 5.6233, df = 4, p-value = 0.2291
Alternative Hypothesis: one model is inconsistent

Source: Bureau of Local Government Finance database, Bloomberg – *Bangko Sentral ng Pilipinas* key policy rates, Philippine Statistics Authority database

Based on the results using a linear panel model for the estimation of parameters, the conclusion stated through the equation as specified:

$$\textbf{Debt} = 78.512 - 0.956\textbf{Inflation} - 4.214\textbf{Interest} + 0.004\textbf{Position} - 1.516\textbf{GDP} + e_t$$

$$\underset{7.41}{} \qquad \underset{-0.38}{} \qquad \underset{-2.61}{} \qquad \underset{2.23}{} \qquad \underset{-2.58}{}$$

Where:

Debt = dependent variable, incurred debt of the local governments

Inflation = Annual Consumer Price Index

[10] Wu-Hausman test: Choosing between Fixed and Random Effects, Spur Economics

Interest = Central Bank key policy rates

Position = Surplus or deficit of the local governments

GDP = Regional GDP

Table 4.2 shows the regression results for the fixed effects, and random effects models, as well as the pooled effects model. Nevertheless, the random effects regression results were analyzed in this paper.

The two-tail p-values test the hypothesis of the study. The overall p-value of the model was 7.1726e-10, indicating that the coefficients were different than zero.

Inflation, as an independent variable, has no significant influence on the local government's debt levels considering the 0.704208 p-value at a 95 percent confidence level. The link between inflation and debt has been studied over the years and made known that high debt levels cause inflationary pressures. Hence, this paper continued to show the negative relationship between debt and inflation at the local level in the Philippines, where a point increase in inflation would reduce the real value of the local government's debt by 95.6 percent.

According to Berkovich, et.al (2021), high inflation could serve as a "soft default" on the current government debt as the real value of the debt asset changes in price under new inflation expectations.

The explanatory variable, interest, has a greater significance on the debt levels of the local government given the 0.009085 p-value, though has a negative effect on minimizing debt on the back of an increase in the cost of borrowing.

The local government units in the Philippines borrow from private banks and government financial institutions in the form of loans. Nevertheless, the results

showed that a unit increase in interest rates would result in a decline in local government debt accumulation by 421.4 percent given that higher interest rates would discourage borrowing from financial institutions.

GDP showed a significant effect on the movement of the local government debt with a p-value of 0.009978 and displayed a negative relationship with debt. A unit increase in regional GDP would result in a decline in local government debt by 151.6 percent as the local units could allot a fair share of its revenues to debt interest payments.

Lastly, the explanatory variable, the position has shown significance on the debt movement of the local governments with a p-value of 0.025797. The variable has a positive relationship with the debt, with a unit increase in the local government's fiscal position would result in an increase in debt by 0.4 percent.

Table 4.2 Estimation results fixed effects and random effects regressions

	Dependent Variable: Debt (in million PHP)					
Variables	**Fixed Effect**		**Random Effect**		**Pooled Effect**	
	Estimates	**Pr(>|t|)**	**Estimates**	**Pr(>|t|)**	**Estimates**	**Pr(>|t|)**
Inflation (%)	-1.1782349	0.639982	-0.9560500	0.704208	-0.3639083	0.89380
Interest (%)	-4.2811532	0.008345 **	-4.2136444	0.009085 **	-4.0083967	0.02133 *
GDP (growth %)	-1.6268506	0.006083 **	-1.5160460	0.009978 **	-1.2044127	0.05366 .
Position (in million PHP)	0.0028922	0.164290	0.0044029	0.025797 *	0.0083362	6.601e-06 ***
Intercept			78.5116005	1.249e-13 ***	69.7443826	2.073e-12 ***
R Squared		0.023069		0.024008		0.028685

Adjusted R Squared		-0.029599		0.022046		0.026733
F-statistic (p-value)		5.8846e-09		7.1726e-10		7.8284e-12

Source: Bureau of Local Government Finance database, Bloomberg – *Bangko Sentral ng Pilipinas* key policy rates, Philippine Statistics Authority database

Note: Values recorded in the table represent panel regression coefficients. $p < 0$ '***', $p < 0.001$ '**', $p < 0.01$ '*', $p < 0.05$ '.', $p < 0.1$ ' ', $p < 1$

The Breusch-Pagan test was used to determine the presence of heteroskedasticity in the model. Thus, the result exhibited the presence of heteroskedasticity on the back of unequal variance among the variables. The hypothesis for the test is as follows:

Ho: Homoskedasticity

Ha: Heteroskedasticity

Conditions:

P-value > 0.05 = Do not reject Ho

p-value < 0.05 = Reject Ho

Table 4.3 Test for Heteroskedasticity

Breusch-Pagan Test
p-value < 2.2e-16

Source: Bureau of Local Government Finance database, Bloomberg – Bangko Sentral ng Pilipinas key policy rates, Philippine Statistics Authority database

The presence of heteroskedasticity made it difficult to trust the model, therefore, the author controlled heteroskedasticity to come up with a more accurate model. Table 4.4 showed that interest rate was the only explanatory variable that was deemed to be statistically significant in adjusting the debt levels of the local governments in the Philippines. Regional GDP could somehow affect the fiscal adjustments made at the local level.

Table 4.4 Controlling for Heteroskedasticity

Variables	**Original Estimates**	**Consistent Estimates**	**Consistent Estimates, Type 3**
Inflation (%)	0.704248	0.714288	0.714904
Interest (%)	0.009153 **	0.002209 **	0.002328 **
GDP (growth %)	0.010049 *	0.061918 .	0.064057 .
Position (in million PHP)	0.025908 *	0.163511	0.178471
Intercept	1.837e-13 ***	7.796e-08 ***	1.043e-07 ***

Source: Bureau of Local Government Finance database, Bloomberg – Bangko Sentral ng Pilipinas key policy rates, Philippine Statistics Authority database

Note: Values recorded in the table represent the t-test of coefficients. $p < 0$ '***', $p < 0.001$ '**', $p < 0.01$ '*', $p < 0.05$ '.', $p < 0.1$ ' ', $p < 1$

Hypothesis Testing

In the overall p-value of the model of 7.1726e-10, the independent variables as a group were statistically significant. This led the researcher to reject the null hypothesis which stated that the variables have no significant effect on the debt of local government units in the Philippines.

Conclusion: Reject the Null Hypothesis

There was statistical evidence to reject Ho which stated that certain economic, fiscal, and monetary factors such as fiscal position, inflation, interest rates, and GDP have no significant effect on the fiscal soundness of the Philippines' local government units.

4.2. Fiscal adjustments in the local government

Internal revenue allotment (IRA) is the local government's share of revenues from the national government, in which every local government classification receives its fair share of allotment. The Local Government Code of 1991 set the computation of IRA based on the LGU's land area and population. Much of the revenue a local government must spend was sourced from the IRA, however, there were local government units that acquire additional revenue from property taxes and government fees.

There has not been much of an adjustment in the local government fiscal policy since the enactment of the Local Government Code, however, in 2018, Batangas Governor Hermilando Mandanas and former Bataan Governor Enrique Garcia Jr., filed a petition to the Supreme Court of the Philippines stating that the IRA should be sourced from 40 percent of the collection of all national taxes by the Bureau of Internal Revenue and the Bureau of Customs. The Supreme Court granted and a year later, reaffirmed the petition of the two governors.

According to the Supreme Court, their interpretation of the "just share" of local government units under Section 6, Article X of the 1987 Constitution was based on all national taxes and not only limited to national internal revenues as stated

in Section 284 of the Local Government Code of 1991. Below is an excerpt from the Supreme Court Ruling on the Mandanas-Garcia Case:

"Republic Act No. 7160, Section 284 states that provincial, city and municipal governments must receive 40 percent of the total national internal revenue taxes collected by the central government." Moreover, the 1987 Constitution, Article X, Section 6 states that "local governments shall have just share, as determined by law, in the national taxes which shall be automatically released to them."

The computation of IRA was adjusted gradually following the reaffirmation of the Supreme Court in 2019:

a) The first year of effectivity, 30 percent;

b) The second year of effectivity, 35 percent; and

c) The third year of effectivity and thereafter, 40 percent.

In line with this fiscal adjustment, concerns arose as there were local governments that do not have enough capacity to absorb the additional revenue which may result in underspending. Local governments were expected to implement big-ticket projects and programs, such as local infrastructure, agriculture, social welfare, health care, and livelihood, passed on to them by the national government through Executive Order No. 138.

The ruling over the Mandanas-Garcia case gave the LGUs administrative autonomy to identify its priority programs, allowing them to regulate their economic expansion.

The Mandanas Ruling was an opportunity for decentralization in the Philippines that might help improve the country's social service. Nonetheless, the

development goals of the national government and the local government must be aligned and the service delivery gaps must be mitigated for a successful fiscal and absorptive capacity. (The World Bank, 2021)

The international financial institution further provided recommendations for the Philippines in managing this fiscal change at the local level:

1. The adjusted IRA should be geared towards the local government's response to COVID-19 to reduce budget execution risks;
2. Offer capacity-building support to LGUs to better their implementation capacity;
3. Provide targeted support to poorest and least-capable LGUs to address inequality; and
4. Strengthen citizen participation in budgeting and execution processes, public hearings on the budget, social audits, and monitoring of local service provision, to demand accountability.

4.3. Fiscal soundness over the medium-term

The country elected its 17th president in May 2022, declaring Ferdinand "Bong Bong" Marcos Jr. as the nation's leader until 2028. As mentioned in the first chapter, every administration had published a development plan that acted as the blueprint of every regime. The Marcos Jr. era, which took office in June, promised the Filipinos "sound fiscal management" and tax administration improvements to enhance revenue generation to provide quality services.

Thus, below were the interim plans of the current administration to maintain robust economic development and improve the lives of Filipinos amid the aftermath of COVID-19 in the 6 years to come:

1. Ensure food security, reduce transport costs and energy costs to protect purchasing power and minimize socioeconomic scarring;
2. Address health and strengthen social protection to reduce vulnerability and provide a cushion from the adversities of the pandemic;
3. Enhance bureaucratic efficiency and sound fiscal management, and guarantee a resilient and innovative financial sector for strong macroeconomic fundamentals;
4. Improve infrastructure and promote trade and investments for job generation;
5. Encourage research and development, increase employability, and enhance the digital economy for more quality jobs;
6. Pursue a green and blue economy to establish sustainable communities;
7. Uphold public order and safety, peace, and security; and
8. Strengthen market competition by reducing barriers to entry and limits to entrepreneurship.

The medium-term effects of the development plan of the current administration on the fiscal soundness of the local governments in the Philippines are yet to be seen.

Chapter 5. Summary, Conclusions, and Recommendations

This chapter presents the summary of the study and its findings. The conclusions and recommendations discussed were based on the abovementioned and this also holds the areas for future research.

Fiscal soundness is every government's goal to achieve since it implies good governance and strong macroeconomic fundamentals. However, the turn of events in recent years has shaped priorities that affected the fiscal balance of most countries around the world, such as the occurrence of the COVID-19 pandemic in 2020. The Philippines, one of the nations that struggled with its health protocols, suffered from incurring significant debt from borrowing, in both domestic and foreign currencies.

Given the numerous studies about the fiscal soundness of different nations across the world, the local governments, particularly in the Philippines were not been subject to any research in determining the effectiveness of certain economic factors on the locale's fiscal management. Thus, this paper aimed to identify and present the effects of the fiscal position, inflation, interest rates, and regional GDP on the debt of local government units in the Philippines from 2000 to 2020. The research utilized secondary data extracted from the databases of the Bureau of Local Government Finance, Bloomberg, and the Philippine Statistics Authority.

The study focused on 82 provinces in the Philippines and 16 cities in the National Capital Region.

A descriptive research design was used in this study and for the statistical treatment, panel data regression was conducted to measure the effect of the independent variables on the dependent variable. Furthermore, qualitative analysis was applied for two of the problems sought to be answered in this research on the back of limited data from the Philippine national government databank and the new administration.

The local government units in the Philippines were autonomous from the national government, reflecting that the economic factors defined in the study were not all significant in achieving lower debt levels.

The average fiscal position of the local units in the country was on the positive side on the back of large surpluses that offset the deficit in certain years. Debt, on the other hand, was not as significant since the local governments in the country have always been subject to low spending efficiency according to the Department of Finance.

Following the conduct of all necessary interpretations, analysis, and statistical tests, the author concludes that fiscal position, inflation rate, interest rates set by the central bank, and regional GDP have significance in the fiscal soundness of the local government units in the Philippines. In the overall p-value of the random effects model of 7.1726e-10, the independent variables as a group were statistically significant, implying a piece of evidence to reject the null hypothesis stating inflation rate, monetary policy stance, fiscal stance, and LGUs position in the business cycle have no significant effect on the fiscal soundness, measured by the initial debt of the local government units in the country for various years.

After controlling the model's heteroskedasticity, interest rate remained the highly significant economic factor that affect the debt levels of the local governments, knowing that local units borrow from banks and government financial institutions where interest rates were regulated by the Bangko Sentral ng Pilipinas. Meanwhile, GDP could potentially affect the reduction of debt provided an economic expansion would support debt interest repayment.

Furthermore, the fiscal adjustments at the local level started in 2020, a year after the reaffirmation of the Mandanas-Garcia case which argued that the internal revenue allotment of the local governments must be sourced from all national taxes as derived from the "just share" clause in the Philippine Constitution. In 2022, the IRA programmed for local government rose to 4.8 percent of the country's GDP from 3.5 percent in 2021, since the LGUs will begin to receive their full 40 percent share in the national taxes collected by the national government. According to the World Bank, the ruling would help the country improve its decentralization with proper coordination between the local and national governments.

The medium-term effects of the sound fiscal management of the current administration are subject to future research given that the incumbent leader has only served 4 months in office and its development plan is yet to be finalized by its economic development team. Hence, the interim economic development plan of the president as mentioned in his recent State of the Nation Address was laid out in the discussion of results.

Moving forward, the findings of this study served as the bases of the recommendations which should be achievable by the government agencies involved in the conduct of it, specifically in the recording of data.

The independent variables used in the study were exogenous as to why additional variables should be considered in the future: policy-based variables, such as social welfare, and the political affiliation of the governors ruling the provinces or mayors for the cities in the capital region.

One of the constraints of this paper was gathering detailed reliable data, given that the country does not have a single database where all national government data can be posted for the public's viewing. Furthermore, leadership in the local government of the Philippines changes every 3 years while the national government changes every 6 years. The full-effectivity of the devolution is yet to be put in numbers in the following year, indicating if local governments became efficient following the transfer of responsibilities provided the additional revenue allotment by the national government.

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Appendix

1. Fixed Effects Model

```
Oneway (individual) effect Within Model

Call:
plm(formula = Debt ~ Position + Inflation + Interest + GDP, data = data,
    model = "within", index = c("LGU", "Year"))

Unbalanced Panel: n = 99, T = 1-21, N = 1995

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-299.4297  -36.6433  -11.1863    9.3466 1135.0251

Coefficients:
            Estimate Std. Error t-value Pr(>|t|)
Position   0.0028922  0.0020787  1.3913 0.164290
Inflation -1.1782349  2.5186748 -0.4678 0.639982
Interest  -4.2811532  1.6213161 -2.6405 0.008345 **
GDP       -1.6268506  0.5923694 -2.7463 0.006083 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    25375000
Residual Sum of Squares: 24790000
R-Squared:      0.023069
Adj. R-Squared: -0.029599
F-statistic: 11.1692 on 4 and 1892 DF, p-value: 5.8846e-09
```

2. Random Effects Model

```
Oneway (individual) effect Random Effect Model
   (Swamy-Arora's transformation)

Call:
plm(formula = Debt ~ Position + Inflation + Interest + GDP, data = data,
    model = "random", index = c("LGU", "Year"))

Unbalanced Panel: n = 99, T = 1-21, N = 1995

Effects:
                   var  std.dev share
idiosyncratic 13102.38   114.47 0.849
individual     2327.36    48.24 0.151
theta:
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 0.0785  0.5402  0.5402  0.5353  0.5402  0.5402

Residuals:
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
-246.28  -40.32  -24.28   -0.04   -3.68 1203.75

Coefficients:
              Estimate Std. Error z-value  Pr(>|z|)
(Intercept) 78.5116005 10.5932246  7.4115 1.249e-13 ***
Position     0.0044029  0.0019750  2.2293  0.025797 *
Inflation   -0.9560500  2.5182636 -0.3796  0.704208
Interest    -4.2136444  1.6151419 -2.6088  0.009085 **
GDP         -1.5160460  0.5883901 -2.5766  0.009978 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    26762000
Residual Sum of Squares: 26119000
R-Squared:      0.024008
Adj. R-Squared: 0.022046
Chisq: 48.5716 on 4 DF, p-value: 7.1726e-10
```

3. Hausman Test

```
        Hausman Test

data:  Debt ~ Position + Inflation + Interest + GDP
chisq = 5.6233, df = 4, p-value = 0.2291
alternative hypothesis: one model is inconsistent
```

4. Pooling Model

```
Pooling Model

Call:
plm(formula = Debt ~ Position + Inflation + Interest + GDP, data = data,
    model = "pooling", index = c("LGU", "Year"))

Unbalanced Panel: n = 99, T = 1-21, N = 1995

Residuals:
    Min.  1st Qu.   Median  3rd Qu.     Max.
-229.683  -46.693  -31.598  -13.216 1260.480

Coefficients:
             Estimate Std. Error t-value  Pr(>|t|)
(Intercept) 69.7443826  9.8589334  7.0742 2.073e-12 ***
Position     0.0083362  0.0018450  4.5182 6.601e-06 ***
Inflation   -0.3639083  2.7256929 -0.1335   0.89380
Interest    -4.0083967  1.7398638 -2.3039   0.02133 *
GDP         -1.2044127  0.6238048 -1.9308   0.05366 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    31670000
Residual Sum of Squares: 30761000
R-Squared:      0.028685
Adj. R-Squared: 0.026733
F-statistic: 14.6923 on 4 and 1990 DF, p-value: 7.8284e-12
```

5. Breusch-Pagan Lagrange Multiplier

```
        Lagrange Multiplier Test - (Breusch-Pagan)

data:  Debt ~ Position + Inflation + Interest + GDP
chisq = 420.87, df = 1, p-value < 2.2e-16
alternative hypothesis: significant effects
```

6. Breusch-Pagan Test

```
        Breusch-Pagan test

data:  Debt ~ Position + Inflation + Interest + GDP
BP = 751.06, df = 4, p-value < 2.2e-16
```

7. Original coefficients

```
t test of coefficients:

              Estimate Std. Error t value  Pr(>|t|)
(Intercept) 78.5116005 10.5932246  7.4115 1.837e-13 ***
Position     0.0044029  0.0019750  2.2293  0.025908 *
Inflation   -0.9560500  2.5182636 -0.3796  0.704248
Interest    -4.2136444  1.6151419 -2.6088  0.009153 **
GDP         -1.5160460  0.5883901 -2.5766  0.010049 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

8. Heteroskedasticity consistent coefficients

```
t test of coefficients:

              Estimate Std. Error t value  Pr(>|t|)
(Intercept) 78.5116005 14.5607349  5.3920 7.796e-08 ***
Position     0.0044029  0.0031587  1.3939  0.163511
Inflation   -0.9560500  2.6110517 -0.3662  0.714288
Interest    -4.2136444  1.3749387 -3.0646  0.002209 **
GDP         -1.5160460  0.8116145 -1.8679  0.061918 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

9. Heteroskedasticity consistent coefficients, type 3

```
t test of coefficients:

              Estimate Std. Error t value  Pr(>|t|)
(Intercept) 78.5116005 14.7060313  5.3387 1.043e-07 ***
Position     0.0044029  0.0032712  1.3460  0.178471
Inflation   -0.9560500  2.6169480 -0.3653  0.714904
Interest    -4.2136444  1.3821043 -3.0487  0.002328 **
GDP         -1.5160460  0.8182385 -1.8528  0.064057 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

10. HC standard errors of the coefficients

```
     (Intercept)    Position Inflation Interest       GDP
HC0    14.56073 0.003158729  2.611052 1.374939 0.8116145
HC1    14.57902 0.003162695  2.614330 1.376665 0.8126335
HC2    14.63245 0.003213855  2.613992 1.378487 0.8149074
HC3    14.70603 0.003271195  2.616948 1.382104 0.8182385
HC4    14.81958 0.003391472  2.613473 1.385525 0.8229667
```

국문초록

필리핀 지방정부의 부채에 대한 거시경제지표의 영향

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글로벌행정전공

재정 건전성은 좋은 거버넌스와 강력한 거시경제 펀더멘털을 의미하기 때문에 모든 정부가 달성하고자 하는 목표이다. 그러나 최근 몇 년 동안 사건의 전환은 2020 년 COVID-19 대유행의 발생과 같이 전 세계 대부분의 국가의 재정 균형에 영향을 미치는 우선순위를 형성했다. 본 연구는 무작위 효과모형을 사용한 후, 집단적으로 물가, 금리, 지방정부 단위의 재정상태, 지역 GDP 가 지방수준의 재정건전성에 영향을 미친다는 통계적 지원을 제공하였다. 또한 만다나-가르시아 사건을 배경으로 한 이양 효과와 새 정부의 개발계획의 실효성은 아직 미지수이며 후속연구 대상이다.

키워드: 재정건전성, 지방정부단위, 필리핀, 부채

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