STATISTICAL MODELLING OF INFLATION RATE AND ECONOMIC STABILITY IN UGANDA (1989-2022)

BY

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A RESEARCH REPORT SUBMITTED TO THE SCHOOL OF MATHEMATICS AND COMPUTING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE IN STATISTICS OF KAMPALA INTERNATIONAL UNIVERSITY

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DECLARATION

I, affirms that this research report is my original work done out of my own effort. No one else has submitted it to another University for a similar academic award.

Signature ……. Date…….

APPROVAL

This is to certify that this research has been done under my supervision and guidance and is ready for submission to the University for Approval.

Date…… Signature …….....

Dr. Osayomore Ikpotokin

DEDICATION

I dedicate my research report to my parents who have been so committed to me in upbringing including educational support. May the Almighty accord you reasonable value.

ACKNOWLEDGEMENT

In the first case I would like to accord gratitude to Almighty God who has accorded me all I possess.

I am profoundly grateful to all these personalities who assisted in various ways to make this project a success.

I wish to however still first and foremost to express the great deal that I own to my supervisor for his suggestions and changes and patience helped me greatly to bring this project to a successful completion. I also acknowledge dean and all staff of the School of Mathematics and Computing who has also provided me guidance through the completion of the dissertation

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ABSTRACT

This study examines the impact of inflation rates on key indicators of economic stability in Uganda from 1989 to 2022, focusing on growth domestic product (GDP) growth rate, trade, balance of payments (BoP), and investment. Using a cross-sectional and ex-post facto research design, time series econometric techniques were applied to analyze the relationships between inflation and these economic variables. Descriptive statistics indicated a minor symmetry in the data, with average inflation rates at 6.33%, trade at 37.14%, BoP at -1.77%, investment at 2.94%, and GDP growth at 6.5%. Stationarity tests showed that all variables became stationary after first differencing, enabling the use of co-integration analysis. However, the results from the unrestricted co-integration trace rank test revealed no long-term relationship between inflation and economic stability. Regression analysis demonstrated that inflation had a moderate negative effect on GDP growth, accounting for 17.3% of its variability. Inflation also significantly impacted the balance of payments, contributing to 58.6% of its variation. The influence of inflation on investment was less pronounced, explaining only 10% of its change. In the short run, a statistically significant relationship between inflation and economic stability was observed, as confirmed by the Error Correction model(ECM) and bound tests. In the long run, inflation had a negative but statistically insignificant effect on Uganda's economic stability. The findings highlight that inflation adversely affects economic stability, with more substantial impacts on the balance of payments and GDP growth. The study recommends policy measures to control inflation in order to promote long-term economic stability in Uganda.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The background of the study is presented on four perspectives namely historical, theoretical, conceptual and contextual perspective.

1.1.1 Historical Perspective

The economic growth of a nation is the result of fiscal, monetary, and various other economic policies performed by policymakers. Several factors affect economic growth and this further complicate the relationship between inflation and economic Growth. Empirical studies executed for professional and developed countries identified a negative relationship between Inflation and Economic Growth. Globally, there is compelling evidence suggesting a significant decline in the purchasing power of global currencies since the collapse of the Bretton Woods agreement (World bank, 2018). There is no shortage of explanations for this decrease in the purchasing power of global currencies. The first interpretation is that during Bretton Woods, central banks pursued the gold standard rules of the game where the purchasing power of the currencies was a priority for policy (Bordo & Eichengreen, 2019).

The second explanation cites the persistence of above-zero inflation rates, as allowed by the monetary policies that accommodate inflation pressures, guided by the notion that permanently higher output levels can be attained by accepting above-zero inflation rates. There is an interesting insight to be gained from each of these hypotheses. We do not dispute their validity nor run a horserace between them. First, an analysis of the global inflationary trends will be given in relation to the different development levels, followed by an insight into the global inflation-growth trends (Asaduzzaman, 2021).

Most countries in the Sub-Saharan African region are still evolving and struggling to meet up with growth threshold. The slow rate of development is attributable to low incomes and revenues due to inadequate export generation from trade. It is proven that income and revenue generation within a stable economic context can reduce debt levels and contribute to total reserves. To achieve desired regional development, stability and growth, optimal macroeconomic policies are needed to drive up trade and exports (Morina et al, 2020). Africa's growth in real gross domestic

product (GDP) was estimated at 3.8% in 2022, down from 4.8 percent in 2021 but above the global average of 3.4 percent. The growth slowdown was attributed mainly to the tightening global financial conditions, and supply chain disruptions exacerbated by Russia's invasion of Ukraine subduing global growth. Growth was also impaired by the residual effects of the COVID-19 pandemic and the growing impact of climate change and extreme weather events. While the deceleration was broad-based, with 31 of the 54 African countries posting weaker growth rates in 2022 compared to 2021, the continent performed better than most world regions in 2022, with the continent's resilience projected to put five of the six pre-pandemic top performing economies Benin, Côte d'Ivoire, Ethiopia, Rwanda, and Tanzania back in the league of the world's 10 fastest-growing economies in 2023–24 (Omoke & Opuala–Charles, 2021).

Uganda provides for an interesting setting for an analysis that considers the persistence in inflation, as core inflation was kept down to single digits during the early part of the twenty first century. However, between 2008 and 2020, the country experienced two heightened inflationary cycles in quick succession, where inflation rose to double digits. This could have altered the dynamics relating to the degree of persistence, since past inflation rates (intrinsic persistence) are regarded as the primary sources of inflation persistence (Francis et al., 2019).

1.1.2 Theoretical Perspective

The study based on Barro's growth model have explored extensions in endogenous growth theory by integrating variables that impact long-term growth, such as fiscal policy, taxation, and human capital accumulation. This includes examining how government services, funded by taxes, contribute to both production and utility, and factoring in public debt impacts on economic stability. These modifications aim to refine the model's accuracy across varying economic environments and offer more nuanced predictions in cross-country analyses, as discussed in recent literature on growth determinants and fiscal policy implications (Grene, 2023)

The theory further assumes a closed economy where the government does not own any capital nor produce any goods or services; it merely buys a flow of output from the private sector. These productive services that the government provides correspond with inputs the private sector needs. The role of public services is a direct input into private production as expressed by the given model:

$$y = \alpha k^{1-\alpha} g^{\alpha} + \beta_1 IF + \beta_2 IV + \beta_3 T\Delta + \beta_4 BOP + \varepsilon_t \quad (1.1)$$

y= economic growth, IF = Inflation, TΔ = Trade, BOP= Balance of trade and IV =Investments α=output elasticity of capital (with 0< α<1)

From the model, output is determined by parallel combinations of k and g in the production process of the economy. Production exhibits constant returns to scale in k and g together and however, exhibits diminishing returns in k and g separately. Diminishing returns are a consequence of not increasing government inputs by an equivalent ratio as private inputs.

Analysts in neoclassical Growth gave their particular explanation regarding the relationship between Inflation and Economic Growth. Barro's growth model provides valuable insights for Uganda's economic growth by emphasizing the importance of government services as essential inputs that enhance private sector productivity. The model highlights the need for a balanced approach between public and private sector investments to avoid diminishing return, which is particularly relevant for Uganda, where government spending on infrastructure, education, and healthcare plays a key role in development. Additionally, the neoclassical perspective on inflation suggests that moderate inflation, if well-managed, can coexist with economic growth. Therefore, Uganda's long-term growth relies on effective fiscal policies, strategic public investment, and inflation control to ensure economic stability and sustainable development.

1.1.3 Conceptual Perspective

Inflation and economic stability are central to understanding the broader economic landscape. Inflation, represented by the Consumer Price Index (CPI), captures the rate at which prices for goods and services rise, impacting purchasing power and economic behavior. Economic stability, which includes stable GDP growth, low unemployment, and balanced fiscal policies, is crucial for sustainable development. The interaction between these factors influences overall economic health. High inflation can disrupt economic stability by eroding savings, increasing the cost of living, and potentially leading to reduced economic growth (World Bank, 2018).

During 2019, Uganda faced various inflationary challenges influenced by both domestic and international factors. The Bank of Uganda reported that inflation was affected by supply chain disruptions, currency fluctuations, and global commodity price changes. These factors led to

periods of elevated inflation, which had repercussions for economic stability. Data from UBOS showed that inflationary pressures contributed to slower GDP growth and higher unemployment, underscoring the need for effective monetary and fiscal policies to manage these challenges and support economic stability (Bank of Uganda, 2019; UBOS, 2019).

The economic challenges of 2020 provided several policy recommendations for managing inflation and ensuring economic stability in Uganda. Policymakers were advised to implement measures to control inflation, such as adjusting interest rates and supporting supply chain resilience. Fiscal policies aimed at stimulating economic recovery and protecting vulnerable populations were also recommended. By utilizing insights from statistical models and economic data, policymakers could develop strategies to address the unique challenges posed by the pandemic, supporting both short-term stability and long-term economic growth (National Planning Authority, 2020).

1.1.4 Contextual Perspective

Uganda, landlocked country in east-central Africa is about the size of Great Britain and is populated by dozens of ethnic groups. The English language and Christianity help unite these diverse peoples, who come together in the cosmopolitan capital of Kampala, a verdant city whose plan includes dozens of small parks and public gardens and a scenic promenade along the shore of Lake Victoria, Africa’s largest freshwater lake. The Swahili language unites the country with its East African neighbours Kenya and Tanzania. Uganda is bordered by South Sudan to the north, Kenya to the east, Tanzania and Rwanda to the south, and the Democratic Republic of the Congo to the west. The capital city, Kampala, is built around seven hills not far from the shores of Lake Victoria, which forms part of the frontier with Kenya and Tanzania. Most of Uganda is situated on a plateau, a large expanse that drops gently from about 5,000 feet (1,500 metres) in the south to approximately 3,000 feet (900 metres) in the north. The limits of Uganda’s plateau region are marked by mountains and valleys (Isaac et al., 2023).

While Uganda has generally maintained single-digit inflation and relative price stability supporting steady growth over the past decade, periodic bouts of elevated inflation persist, posing macroeconomic risks (Wegulo et al., 2023). Consumer Price Index (CPI) increases above the Bank of Uganda's 5% target band destabilize business and household planning. Unless

concerted efforts address underlying weaknesses affecting multiple determinants, inflation volatility threatens to dampen confidence and derail progress toward middle-income status (Isaac et al., 2023).

Domestic demand pressures remain a problem due to low productivity, which constrains incomes, particularly in rural populations dependent on agriculture (Allan et al., 2023). With more than 80% still engaged in subsistence agriculture, the disruption to food production exacerbates inflationary effects (World Bank, 2019). However, infrastructure gaps hamper supply responses to demand growth, intensifying price increases. Inadequate energy, transport and irrigation infrastructure hinders the efficiency of production and distribution, rapid urbanization also strains basic services and increases costs.

Money supply expansion sometimes outpaces guidance when there are large borrowing needs, fueling inflation (Bank of Uganda, 2020). Large budget deficits or extraordinary expenditures during disasters risk monetization (Annet et al., 2023). Changes in interest rates can delay behind changing demand conditions, complicating liquidity management. Weak currency transmission amid dollarization and the informal economy undermines efficiency. External inflation transmission channels remain vulnerable. Volatile global commodity prices, especially fuel and food, significantly affect import costs and consumer prices (Tumwine, 2020). Depreciation pressures from increased imports and portfolio outflows periodically increase inflation, while limited hedging instruments expose trade (Winny et al., 2023).

Uganda like other developing countries has been experimenting with different development frameworks for a while but with limited success. It is argued that identifying the sector of the economy with a high growth impulse that can be nurtured to achieve economic transformation is an uphill task for these countries (Ogbonna et al., 2020; Nguyen et al., 2022). Uganda's economy has recorded gradual structural changes in the agriculture, industry, and service sectors. The agricultural sector's contribution to GDP dropped from over 50% in the 1990s to 20% in 2018/19, although the sector remains vital as it engages over 70% of the population (UBOS, 2019). Inflation situation is assumed to have a bearing on the economic development of the country hence providing a state of affair which need investigations hence the study on

conducting the investigation into the association between inflation rate and economic stability in Uganda from 1989-2022.

1.2 Statement of Problem

Uganda has developed all efforts aimed at generating economic stability of the country, in so doing both fiscal and monetary interventions have been deployed in the realization of the values for the economic stability of the country (UIA, 2021). Despite the policy and practical interventions, the economic stability of Uganda remains in frustration. Uganda's economic growth has witnessed substantial fluctuations majorly characterized with decreases in the rate of growth of the economy in terms of GDP growth rate from 5.2% in 2015, 4.8% changes in 2016, 3.8%, though increased to 6.2% in 2017 and 2018, in 2019 was 6.8% and finally 3.6% in 2020, years 2021 experienced a series reduction in GDP growth rate which was recorded at 7.1% while 2022 had 6.3 and 5.8 in 2023 (World bank, 2023). This low economic stability negatively affects balance of payment and national economic efficiency and thus deserves to be investigated. The general occurrence of trade liberalization of Uganda since 1987 has continued to be in existence in this form up-to now since the imports having been higher than the exports (World Bank, 2019).

Despite efforts to remove barriers, trade in imports and exports remain generally unwell. Decreasing external demand and trade possibly delays economic growth (World Bank, 2022). Inflation has been a viable factor in countries economic stability, given the high trend of inflation in the Ugandan economy spanning over the 30 years period, one would think that the inflation rates are associated with the economic stability of Uganda and could be posing a serious threat to growth and development hence this study on a statistical model of inflation rate and economic stability in Uganda.

1.3 General Objective

The general objective of the study was to conduct a statistical modelling of inflation rate and economic stability in Uganda. The study aims to build models that can predict how changes in inflation affect various aspects of economic stability, such as growth, unemployment, and exchange rates.

1.4 Specific Objectives

The specific objectives of this study are to:

1) Determine the effect of inflation rates on GDP growth rate in Uganda.

2) Examine the influence of inflation rates on trade in Uganda.

3) Ascertain the relationship between inflation rates and balance of payments in Uganda.

4) Determine the significant impact of inflation rates on investment in Uganda.

1.5 Research Hypothesis

The following research hypothesis were formulated for this study which will be tested at 0.05 level of significance

1) H_{01}: There is no statistically significant effect of inflation rates on GDP growth rates in Uganda.
2) H_{02}: There is no statistically significant influence of inflation rates on trade in Uganda.
3) H_{03}: There is no statistically significant relationship between inflation rates and balance of payment in Uganda
4) H_{04}: There is no statistically significant impact of inflation rates on investment in Uganda.

1.6 Scope of the study

1.6.1 Time scope

The study was conducted focusing on a time of 34 years with the time frame being 1989-2022.

1.6.2 Geographical Scope

Uganda is located in eastern Africa, west of Kenya, south of South Sudan, east of the Democratic Republic of the Congo, and north of Rwanda and Tanzania. While much of its border is lakeshore, Uganda is landlocked with no access to the sea but it is a fertile and well-watered country that consists of many lakes and rivers including the largest, Lake Victoria. The country sits in the heart of the Great Lakes region, with Lake Edward and Lake Albert on its western border.

1.6.3 Content Scope

The study shall model the historical trends of inflation and economic growth in Uganda from 1989 to 2022, the key economic stability indicators of Uganda from 1989 to 2022 and examine the potential relationship between inflation trends and economic stability of Uganda 1989-2022 and finally evaluated the effect of inflation on various sectors on the Ugandan economy 1989-2022.

1.7 Significance of the Study

Limitations of the recent studies dictate that additional empirical assessment in the relationship between inflation and economic growth be performed, allowing for possible causality effects, that is, to get both none, unidirectional or perhaps bi-directional (Jones, 2020). The recent of this study may also complement in affecting making decisions, specifically, equally fiscal and monetary policy development in Uganda.

Furthermore, Uganda as a country is in the perfect region to undertake the empirical examination between inflation and economic growth mainly because very little analysis on the subject relating to these countries has been taken on to date, despite the fact that the region has some of the maximum inflation countries in the developing world.

This study is very important to macroeconomists, financial analyst, academicians, policy makers and central bankers officials in understanding the responsiveness of economic stability (GDP) to the change in general price level and thus come up with the relevant policies so as to keep prices at the reasonable rate that stimulate production. It is necessary to policy makers to clear doubt as many studies on the relationship between inflation and economic growth remains inconclusive, several empirical studies confirm the existence of either a positive or negative relationship between these two macroeconomic variables hence the current study.

1.8 Conceptual framework

The framework shows the connection between independent variable and the dependent variable. The framework shows the connection between inflation and economic stability and is displayed in Figure 2.1

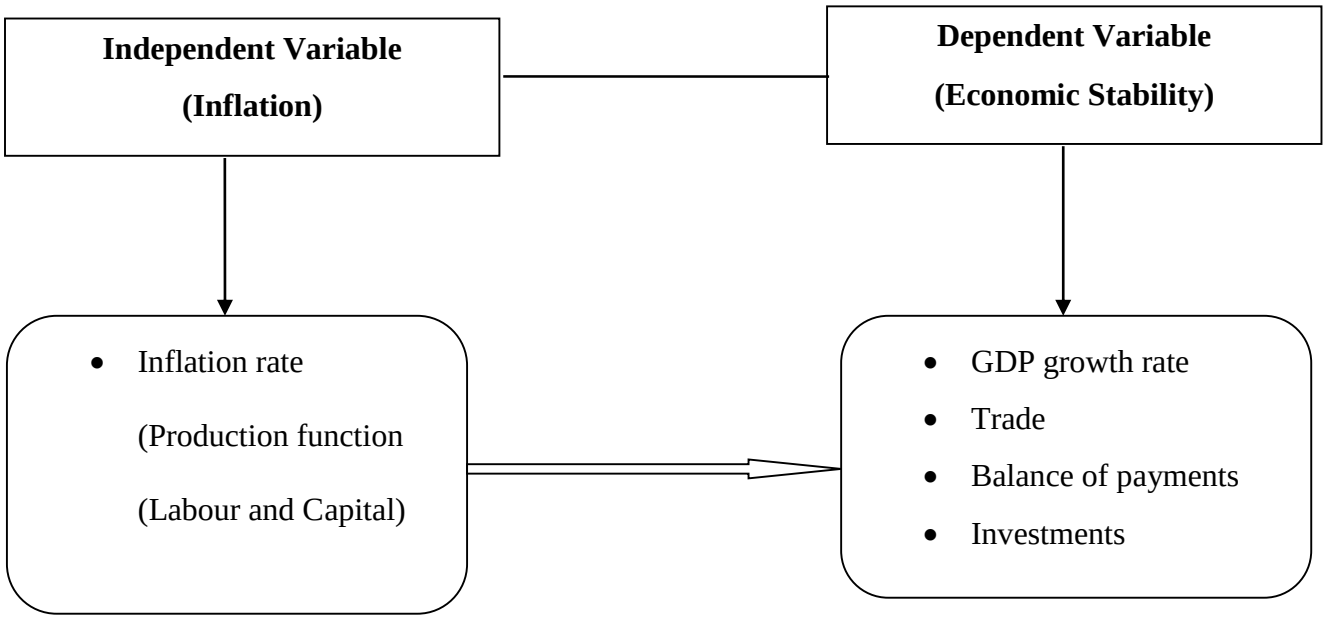

Figure 1.1: Conceptual Framework

The framework indicates the connection between inflation and economic stability, the inflation variable together with the labour and capital will be evaluated. Economic stability is measured through GDP, trade, balance of payment and investments.

Inflation is the sustained increase in the general price level of goods and services in an economy over a period of time, usually measured annually. It results in a decrease in the purchasing power of money, meaning that each unit of currency buys fewer goods and services. Inflation can be driven by factors such as increased demand for products and services (demand-pull inflation), higher costs of production (cost-push inflation), or expansionary monetary policies (IMF, 2020).

Economic stability refers to a state in which an economy experiences steady growth, low inflation, low unemployment, and a balanced budget, resulting in a predictable environment for individuals, businesses, and government institutions. Economic stability is important because it helps foster an environment of confidence and long-term planning. It contrasts with economic instability, which can be marked by extreme fluctuations in output, inflation, and unemployment, leading to uncertainty and adverse economic outcomes by Blanchard et al. (2017).

CHAPTER TWO

LITERATURE REVIEW

In this chapter, works of other scholars related to variables under study shall be reviewed. The theoretical review constitutes the theory underlying the regression model, conceptual framework, related literature and related studies

2.1 Theoretical Review

This study is anchored on statistical Regression model.

2.1.1 Regression Model

Regression models are fundamental tools in econometrics, providing valuable insights into the relationships between economic variables such as inflation rates and economic stability. In the context of Uganda, these models are particularly useful for understanding how different factors influence inflation and overall economic stability. Recent advancements in regression modeling techniques have enhanced the precision and applicability of these models in capturing the complexities of inflation dynamics. For instance, the work of Huang and Wang (2019) illustrates how multiple linear regression models can effectively estimate the impact of monetary policy and external shocks on inflation rates in developing economies. Their study highlights the importance of incorporating various macroeconomic indicators to provide a comprehensive view of inflationary trends and economic stability.

The application of regression models to inflation and economic stability has also been explored through the lens of structural breaks and non-linearity. According to Li and Zhang (2020), incorporating structural break tests into regression analysis allows for the detection of shifts in economic relationships over time. This approach is particularly relevant for Uganda, where economic instability and policy changes can lead to abrupt shifts in inflation patterns. Their research demonstrates how identifying and accounting for these structural breaks can improve the accuracy of inflation forecasts and provide better insights into the effectiveness of policy interventions.

In addition to linear regression models, recent studies have utilized advanced econometric techniques such as autoregressive distributed lag (ARDL) models to analyze the long-term

relationships between inflation and economic stability. A study by Asongu and Nwachukwu (2021) employs ARDL models to examine the impact of inflation on economic growth and stability in Sub-Saharan Africa, including Uganda. Their findings suggest that ARDL models are effective in capturing both short-term and long-term dynamics, providing a nuanced understanding of how inflation influences economic stability over time. This approach is particularly useful for capturing the delayed effects of inflationary pressures on economic stability.

Moreover, the integration of machine learning techniques with traditional regression models has emerged as a promising avenue for improving predictive accuracy. Recent research by Zhang and Lin (2023) explores the application of machine learning algorithms in conjunction with regression models to enhance inflation forecasting. Their study finds that combining machine learning techniques with regression models improves the ability to predict inflationary trends and assess economic stability. This hybrid approach offers valuable tools for policymakers in Uganda to anticipate and manage inflationary pressures more effectively.

Finally, the role of regression models in policy analysis and decision-making cannot be overstated. According to the research of Gupta and Kumar (2024), regression models provide critical insights into the potential impacts of different policy scenarios on inflation and economic stability. Their study underscores the importance of using regression-based simulations to evaluate the effectiveness of policy measures and guide economic decision-making. This is particularly relevant for Uganda, where informed policy decisions are essential for achieving stable inflation rates and fostering economic growth.

2.2 Conceptual Review

2.2.1 GDP Growth Rate of Uganda

The GDP growth rate is a fundamental indicator of economic performance, reflecting the health and stability of an economy. Recent studies have shown that GDP growth is influenced by various factors, including government policies, global market dynamics, and domestic economic conditions. For example, a study by Aghion et al. (2021) emphasizes the role of innovation and technology in driving GDP growth, particularly in developing economies. Their findings suggest

that fostering an environment conducive to innovation can significantly enhance productivity and, consequently, GDP growth, providing a pathway for economic development.

In the context of Uganda, the GDP growth rate has been subject to fluctuations due to both internal and external shocks. According to the International Monetary Fund (IMF) (2020), Uganda's economy rebounded after a period of slowdown, with a GDP growth rate of approximately 3.5% in 2021, following a contraction due to the COVID-19 pandemic. The IMF highlighted that structural reforms and investments in key sectors, such as infrastructure and agriculture, are essential for sustaining this growth trajectory. Additionally, the authors underscore the importance of maintaining macroeconomic stability to support long-term economic recovery and growth.

Furthermore, the relationship between GDP growth and social indicators, such as poverty reduction and employment, has been a focal point in recent literature. A recent analysis by Nkonde and Banga (2022) illustrates that while Uganda's GDP growth has been positive, the benefits have not been evenly distributed, leading to persistent poverty levels in certain regions. Their research argues that inclusive growth policies, which target vulnerable populations and promote equitable access to resources, are critical for ensuring that GDP growth translates into broader economic stability and improved living standards for all Ugandans.

2.2.2 Trade

Trade plays a pivotal role in shaping economic growth and stability, particularly in developing economies like Uganda. Recent studies have highlighted the benefits of trade liberalization and its potential to enhance economic performance. According to Atingi-Ego et al. (2019), trade policies that promote exports can stimulate economic growth by diversifying the economy and reducing dependency on a limited range of commodities. Their research indicates that increased access to international markets not only boosts GDP but also creates job opportunities, thereby contributing to overall economic stability.

In Uganda, trade has been significantly impacted by both regional and global economic dynamics. The East African Community (EAC) integration process has created opportunities for

Uganda to enhance its trade relationships with neighboring countries. A study by Makame and Haji (2021) emphasizes that regional trade agreements have facilitated the flow of goods and services, which has positively influenced Uganda's GDP growth. However, they also caution that without addressing underlying structural issues, such as inadequate infrastructure and trade facilitation barriers, the potential benefits of trade may not be fully realized, limiting sustainable economic growth.

Furthermore, the COVID-19 pandemic has underscored the vulnerabilities within global trade networks and their effects on Uganda's economy. As noted by Aroca et al. (2022), the pandemic led to significant disruptions in trade flows, highlighting the need for resilient trade policies that can withstand external shocks. Their findings suggest that strengthening domestic industries and diversifying export markets are critical strategies for enhancing trade resilience and promoting long-term economic stability. This calls for a comprehensive approach that combines trade policy reforms with investments in infrastructure and human capital.

2.2.3 Balance of Payment

The balance of payments (BOP) is a critical indicator of a country's economic transactions with the rest of the world, encompassing trade, investment, and financial flows. It serves as a comprehensive record of a nation's economic relationships and has significant implications for economic stability. According to Omiti and Egeru (2018), a persistent current account deficit can lead to economic instability, as it reflects an imbalance between exports and imports, necessitating foreign borrowing or capital inflows to finance the deficit. Their research underscores the importance of implementing sound fiscal and monetary policies to manage the BOP effectively and ensure sustainable economic growth.

In Uganda, the balance of payments has faced various challenges, particularly due to external shocks and structural economic issues. A study by Banga and Okwakol (2021) highlights how fluctuations in commodity prices and foreign exchange rates significantly impact Uganda's BOP, particularly affecting its trade balance. They found that the dependence on a narrow range of exports, such as coffee and tea, exacerbates vulnerabilities, making the economy sensitive to

global market fluctuations. This situation calls for diversifying exports and enhancing local production capabilities to improve the trade balance and overall BOP position.

Moreover, the relationship between BOP dynamics and economic growth has garnered attention in recent literature. Aroca et al. (2022) argue that a stable balance of payments is crucial for fostering investor confidence, which in turn drives economic growth. Their findings suggest that policymakers should focus on maintaining a favorable BOP position through strategic investments in infrastructure and export-oriented industries. This will help to improve its BOP, reduce vulnerabilities to external shocks, and create a more stable economic environment conducive to sustainable development.

2.2.4 Investment

Investment is a critical driver of economic growth and stability, influencing the overall performance of an economy. In Uganda, recent studies have highlighted the importance of both domestic and foreign direct investment (FDI) in fostering economic development. According to Asimwe and Nandala (2020), FDI plays a vital role in enhancing capital formation, creating jobs, and transferring technology to local industries. Their research underscores that a favorable investment climate, characterized by stable policies and infrastructure development, can significantly attract FDI, which is essential for sustaining economic growth.

Despite the potential benefits of investment, Uganda faces several challenges that impede its investment climate. A study by Mwesigye and Opio (2021) identifies issues such as bureaucratic hurdles, corruption, and inadequate infrastructure as key barriers to attracting both domestic and foreign investors. They argue that addressing these challenges through comprehensive policy reforms and improving the business environment is crucial for enhancing investment levels. By creating a more transparent and efficient regulatory framework, Uganda can stimulate investment, which is necessary for achieving long-term economic stability and development.

Furthermore, the relationship between investment and economic resilience has gained attention in the wake of the COVID-19 pandemic. Aroca et al. (2022) highlighted that the pandemic has underscored the need for increased investment in health and technology sectors to bolster economic resilience. Their findings suggest that targeted investments can help diversify the

economy and reduce vulnerabilities to external shocks, ultimately contributing to a more stable economic environment. This calls for strategic investments in sectors that not only drive growth but also enhance the economy's capacity to withstand future crises.

2.3 Empirical Review

The empirical review of this study explored the effect of inflation on GDP growth rates and investment, examining existing research on how inflation impacted economic growth and investment decisions. It further investigated the influence of inflation on trade, assessing its role in trade balances and competitiveness. Finally, the review addressed the relationship between inflation rates and the balance of payments

2.3.1 Effect of Inflation on GDP Growth Rates

The relationship between inflation and GDP growth rates has long been a focal point in macroeconomic research, reflecting the complex interplay between price stability and economic expansion. Recent studies have further elucidated this relationship, highlighting both the positive and negative impacts that inflation can have on GDP growth. For example, a study by Ghosh and Ostry (2019) explores how moderate swelling can invigorate financial development by empowering investing and venture. They argue that when inflation is kept within a certain range, it can help reduce the real burden of debt and stimulate economic activity, potentially leading to higher GDP growth rates. This view aligns with traditional Keynesian perspectives, which posit that inflation can have beneficial effects on economic expansion under certain conditions. However, when inflation becomes too high, it can create instability, reduce business confidence, and distort price signals. In economies with weaker institutional frameworks, such as Uganda, excessive inflation may hinder growth, making it crucial to manage inflation carefully to ensure economic stability.

According to a study by Benczúr and Káposzta (2020), elevated inflation rates can significantly hinder economic growth by creating uncertainty and distorting price signals. Their research indicates that high inflation undermines business confidence and investment, leading to inefficiencies in resource allocation and slower economic growth. This finding is supported by empirical evidence showing that inflation rates exceeding moderate thresholds are associated with reduced GDP growth. For instance, (Benczúr and Káposzta's, 2020) analysis reveals that

once inflation surpasses a certain level, its negative effects on growth become more pronounced, emphasizing the importance of maintaining inflation within manageable bounds to sustain economic growth. From the review it is observed that high inflation can significantly harm economic growth by creating uncertainty and discouraging investment. In Uganda, where institutional frameworks may be weaker, this can lead to more pronounced negative effects. Therefore, managing inflation within reasonable bounds is crucial for maintaining stable economic growth and avoiding inefficiencies in resource allocation.

The relationship between inflation and GDP growth also exhibits non-linear characteristics, as highlighted by recent research incorporating advanced econometric techniques. Aghion, et al (2021) investigate this non-linearity by applying quadratic models to analyze the effects of inflation on GDP growth. Their study finds that while low to moderate inflation can be growth-enhancing, very high inflation can have detrimental effects, leading to a U-shaped relationship between inflation and GDP growth. This research underscores the critical threshold at which inflation transitions from being beneficial to harmful, providing valuable insights for policymakers seeking to balance inflation control with economic growth objectives. It is also noted that moderate inflation can stimulate economic growth, while very high inflation can undermine it by creating uncertainty and discouraging investment. It is crucial to identify the critical threshold where inflation shifts from being beneficial to harmful. Managing inflation within this range is essential for policymakers to maintain a balance between growth and stability.

Additionally, the impact of inflation on GDP growth varies across different economic contexts and development levels. In a study focusing on emerging markets, Kose and Spatafora (2022) examine how inflation affects GDP growth in low-income countries, including Uganda. They find that high inflation can exacerbate economic instability and reduce growth prospects in these economies. Their findings suggest that the adverse effects of inflation on GDP growth are more pronounced in countries with weaker institutional frameworks and limited capacity to manage economic shocks effectively. It is noted that low-income economies like Uganda, high inflation worsens economic instability and hinders growth. The adverse effects are more pronounced in countries with weaker institutions, which struggle to manage economic shocks effectively. As a

result, controlling inflation is crucial to maintain stability and foster sustainable growth in these economies.

Recent advancements in modeling techniques have also contributed to a deeper understanding of the inflation-GDP growth nexus. For example, Feyrer and Sacerdote (2024) employ dynamic panel data models to assess how inflation influences GDP growth across different countries and time periods. Their study reveals that inflation's impact on growth is contingent upon various factors, including the level of economic development, institutional quality, and policy responses. By incorporating these variables, their research provides a more comprehensive view of the inflation-growth relationship, highlighting the need for context-specific policy measures to address inflation and foster sustainable economic growth. Feyrer and Sacerdote (2024) highlighted that inflation's effect on GDP growth depends on factors like economic development and institutional quality. For Uganda, this means that addressing inflation effectively will need strategies based on the country's unique institutional and economic conditions.

2.3.2 Influence of Inflation Rates on Trade

The influence of inflation rates on trade is a critical area of economic research, as inflation can significantly impact a country’s trade balance and overall economic performance. Recent studies have examined various dimensions of this relationship, offering insights into how inflation affects both export and import activities. For instance, a study by Edwards and Levy-Yeyati (2018) explores the impact of inflation on export competitiveness, highlighting that higher inflation can erode the real value of a country’s currency, making its exports more expensive and less competitive in international markets. This relationship underscores the negative effect that elevated inflation rates can have on trade balances, particularly for economies that rely heavily on exports. This means that high inflation can reduce a country's export competitiveness by making its goods more expensive on the international market, this can lead to a worsening trade balance, particularly for economies like Uganda that rely heavily on exports. Controlling inflation is crucial for maintaining price stability and ensuring that exports remain competitive in global trade.

On the other hand, the effects of inflation on import volumes and trade deficits have also been extensively studied. According to a study by Kose and Naylor (2019), higher inflation can lead to increased import expenditures as domestic prices rise, prompting consumers and businesses to seek cheaper foreign alternatives. Their research demonstrates that inflation-driven changes in relative prices can exacerbate trade deficits, especially in countries with a high dependency on imported goods and services. This finding emphasizes the need for effective monetary policy measures to manage inflation and mitigate its adverse impacts on trade balances. Inflation can lead to higher domestic prices, making foreign goods more attractive and increasing import expenditures. This can worsen trade deficits, particularly in countries like Uganda that depend heavily on imports. Effective monetary policy is essential to control inflation and mitigate its negative impact on trade balances.

In addition to direct impacts on trade volumes, inflation can influence trade through its effects on exchange rates. A study by Choi and Kwon (2020) investigates how inflation-induced depreciation of the domestic currency affects trade flows. Their research shows that while a weaker currency might initially boost exports by making them cheaper for foreign buyers, the overall impact can be mixed. This is because inflation-driven currency depreciation can also lead to increased import costs, potentially offsetting the benefits of improved export competitiveness. This dual effect highlights the complexity of the inflation-trade relationship and the importance of considering both domestic and international factors in trade policy analysis. Depreciating currency driven by inflation can make exports to be cheap and boosting export competitiveness. However, the rise in import costs due to the weaker currency can offset the export benefits. In Uganda, where imports play a large role, inflation's effect on exchange rates requires careful management to avoid negative impacts on trade stability.

Recent advancements in econometric modeling have provided deeper insights into the inflation-trade nexus. For example, a study by Liao and Zhang (2021) employs a panel data approach to analyze the effects of inflation on trade across different countries and regions. Their findings suggest that the impact of inflation on trade is contingent on the level of economic development, with advanced economies experiencing different dynamics compared to developing nations. Liao and Zhang's (2021) research underscores the importance of context-specific analyses to understand how inflation influences trade in various economic settings, offering valuable insights

for policymakers aiming to design effective trade and monetary policies. This is to say that inflation's impact on trade varies across economies, with its effects differing based on the level of development. In developing nations like Uganda, inflation could have more severe consequences, particularly in terms of trade imbalances and price stability. Therefore, understanding these variations and using context-specific analyses is essential for designing effective policies that manage inflation and promote trade stability.

Lastly, the role of inflation in shaping trade policies has been examined in the context of global economic integration. A recent study by Nguyen and Kim (2023) explores how inflation interacts with trade policies and international trade agreements. Their research finds that high inflation can complicate trade negotiations and affect the implementation of trade agreements by altering the relative competitiveness of participating countries. This study highlights the broader implications of inflation for international trade relations, suggesting that managing inflation effectively is crucial for maintaining favorable trade conditions and promoting economic stability in a globalized economy. High inflation can disrupt trade agreements by altering the competitiveness of countries involved, making negotiations more challenging. Effective inflation management is crucial to ensure favorable trade conditions and maintain economic stability in a globalized market.

2.3.3 Relationship between Inflation Rates and Balance of Payment

The relationship between inflation rates and the balance of payments is a crucial topic in international economics, as inflation can significantly influence a country's trade balance and capital flows. Understanding this relationship is vital for formulating effective monetary and trade policies. Recent literature has explored various dimensions of how inflation impacts the balance of payments, shedding light on both the theoretical and empirical aspects of this dynamic. For example, a study by Khan and Schimmelpfenning (2018) examines how inflation affects the trade balance by altering a country's relative price levels. They find that higher domestic inflation typically leads to deterioration in the trade balance, as the increased cost of domestic goods makes exports less competitive while imports become relatively cheaper. This relationship underscores the importance of managing inflation to maintain a favorable balance of payments. In Uganda, this effect could be more pronounced due to inflation volatility, leading to

a negative trade balance. Therefore, managing inflation is essential for maintaining economic stability and ensuring a favorable balance of payments, especially in trade-dependent economies.

Moreover, inflation's impact on the capital account is another critical area of research. According to a study by Liang and Wang (2019), inflation can influence capital flows by affecting investor perceptions and the attractiveness of domestic assets. Their research indicates that high inflation often leads to capital outflows as investors seek more stable returns abroad, which can exacerbate balance of payments deficits. Their findings highlight how inflation can indirectly affect the balance of payments by influencing investment decisions and international capital movements. This means that inflation can drive capital outflows as investors look for more stable returns abroad, negatively impacting the balance of payments. For economies like Uganda, this shift in investment can further destabilize financial conditions. Therefore, effective inflation management is key to maintaining investor confidence and ensuring balanced capital flows, which are essential for economic stability.

The impact of inflation on the balance of payments also varies depending on the exchange rate regime. A study by Ghosh and Ostry (2020) explores this relationship under different exchange rate systems, showing that inflation has a more pronounced effect on the balance of payments in countries with fixed exchange rates compared to those with flexible exchange rates. Their research suggests that in fixed exchange rate regimes, inflation can lead to significant imbalances as the central bank's ability to adjust interest rates and manage currency value is constrained. Conversely, flexible exchange rates allow for more automatic adjustments, which can mitigate the adverse effects of inflation on the balance of payments. Inflation's effect on the balance of payments varies depending on the exchange rate regime. In fixed exchange rate systems, inflation can cause greater imbalances due to limited flexibility in adjusting currency values and interest rates. However, in flexible exchange rate regimes, the economy can automatically adjust, helping to mitigate inflation's negative impact on the balance of payments.

Recent econometric studies have provided further insights into this relationship by employing advanced modeling techniques. For instance, a study by Liu and Zhang (2021) uses a vector autoregression (VAR) approach to analyze the impact of inflation on the balance of payments across different countries. Their findings indicate that while inflation has a short-term adverse

effect on the balance of payments, the long-term impact can vary depending on the country's economic structure and policy responses. Liu and Zhang (2021) study emphasizes the importance of considering both short-term and long-term effects when evaluating the relationship between inflation and the balance of payments. This is to say that inflation interacts with the balance of payments and exchange rates, and how these relationships differ in the short and long term. By applying advanced models, the aim is to uncover insights unique to Uganda's economic structure and policy responses.

Finally, the interplay between inflation and the balance of payments is also influenced by global economic conditions and external shocks. A recent study by Nguyen and Kim (2023) investigates how external economic shocks, combined with domestic inflation, affect the balance of payments. Their research highlights that external shocks, such as global commodity price fluctuations, can amplify the effects of domestic inflation on the balance of payments, leading to more pronounced deficits or surpluses. This study underscores the need for policymakers to account for both domestic and international factors when addressing balance of payments issues related to inflation. Uganda's economic stability is affected by both domestic inflation and global economic factors. External shocks, such as changes in global commodity prices, can amplify inflation's impact on the balance of payments

2.3.4 Effect of Inflation Rates on Investment

The effect of inflation rates on investment is a pivotal area of research in economics, as inflation can significantly influence both the level and the nature of investment activities. Inflation impacts investment through various channels, including uncertainty, cost of capital, and real returns. Recent studies have expanded our understanding of these dynamics, offering slight difference insights into how different inflation environments affect investment decisions. For instance, a study by Aghion et al. (2021) investigates how moderate inflation can stimulate investment by reducing the real cost of borrowing and encouraging spending on capital goods. Their research suggests that in environments with low to moderate inflation, businesses may be more willing to invest due to the reduced real burden of debt and the potential for higher returns on investment. This means that inflation impacts investment decisions, with its effects varying based on the inflation rate. When inflation is moderate, it can lower borrowing costs, which in

turn makes it easier for businesses to invest. This can stimulate greater investment in capital goods and increase the potential for higher returns.

However, high inflation introduces greater uncertainty into the investment landscape, which can deter investment. According to a study by Ramey and Zubairy (2019), elevated inflation creates an unpredictable economic environment that complicates investment planning. Their findings indicate that high inflation increases the risk of cost overruns and reduces the effectiveness of long-term financial planning, leading to lower levels of investment. This effect is particularly pronounced in developing economies where inflation rates are more volatile, as the increased uncertainty can significantly impact investor confidence and decision-making. Ramey and Zubairy (2019) show that elevated inflation makes it harder for businesses to plan, increasing risks like cost overruns. In developing economies, such as Uganda, this uncertainty can significantly lower investor confidence and reduce investment levels.

The relationship between inflation and investment is also influenced by the cost of capital. A study by Benczur and Káposzta (2020) highlights that higher inflation often leads to increased nominal interest rates, which can raise the cost of borrowing and reduce investment. Their research shows that when inflation rises, central banks typically increase interest rates to control inflation, which in turn raises the cost of capital for businesses. This effect can suppress investment, especially for firms that rely heavily on external financing. Benczur and Káposzta's study underscores the importance of stable inflation in maintaining favorable borrowing conditions and promoting investment. Higher inflation increases interest rates, raising borrowing costs and reducing investment, especially for businesses that depend on external financing. Stable inflation is crucial for keeping borrowing costs low and encouraging investment.

Recent advancements in econometric modeling have provided deeper insights into the inflation-investment relationship. For example, a study by Chen and Zhang (2022) utilizes dynamic panel data models to analyze how inflation affects investment across different sectors and regions. Their research reveals that the impact of inflation on investment varies depending on the sector’s sensitivity to inflation and the region's economic conditions. Chen and Zhang (2022) findings highlight that while inflation can negatively affect investment in sectors with high capital intensity, the effects can be less pronounced in less capital-intensive sectors or regions with more

robust economic infrastructures. This means that high capital-intensive sectors are more affected by inflation, while sectors with lower capital needs or stronger regional economies are less impacted. This highlights the importance of considering these factors when analyzing the relationship between inflation and investment.

Additionally, the interaction between inflation and investment is influenced by the broader economic policy environment. A recent study by Nguyen and Kim (2023) explores how fiscal and monetary policies mediate the relationship between inflation and investment. Their research indicates that effective policy interventions can mitigate some of the negative effects of inflation on investment by stabilizing economic conditions and providing a more predictable environment for investors. This study emphasizes the role of policy in shaping the inflation-investment nexus and underscores the need for coordinated policy measures to support investment in inflationary environments. This is to say that effective fiscal and monetary policies can help lessen inflation's negative effects on investment. Coordinated policy measures are important for creating a stable environment that encourages investment during periods of inflation.

2.4 Studies Predicted Using Linear Regression Method

Linear regression analysis will be used to predict the value of a variable based on the value of another variable. The variable that is of important to predict is called the dependent variable while the variable that is used to predict the other variable's value is called the independent variable. This form of analysis estimates the coefficients of the linear equation, involving one or more independent variables that best predict the value of the dependent variable. Linear regression fits a straight line or surface that minimizes the discrepancies between predicted and actual output values.

Jean (2023) conducted a study to analyze the relationship between inflation and economic growth in Burundi using linear regression and to determine whether there is an inflation threshold or not to allow monetary authority to adopt the optimal policies to deal with shocks. With annual data from 1990 to 2020, the ARDL approach is adopted to assess the short and long run relationship between inflation and economic growth. The results showed a negative and significant relationship in the short run between inflation and economic growth, and a positive

and significant relationship between investment, household consumption, and exchange rate with economic growth in the long run (Jean, 2023). Moreover, with the conditional least square (CLS) method used to determine the threshold, an inflation threshold of 13% above which inflation is harmful to growth by 3.7% was found.

Azam and Khan (2020) using linear regression (fixed effects and generalized least squares (FGLS) methods, empirically evaluated the threshold effect of inflation on economic growth for 27 countries. They found that inflation hinders growth when inflation exceeds the turning point of 12.23% and 5.36% for developing and developed economies, respectively. Mohammad Hoomani et al. (2020) using the smooth transition regression model (STAR) and data from eight developing Islamic countries over the period 1990–2017 found an inflation threshold of 11.88% beyond which inflation has a negative impact not only on economic growth but also on investment. Ekinci et al. (2020) using a dynamic threshold panel data model found that the threshold value was 4.182% in inflation targeting countries. Below this threshold, the inflation–growth relationship is insignificant, and above that threshold, inflation negatively affects economic growth.

Asaduzzaman (2021) examined the relationship between inflation and economic growth in Bangladesh using time series annual data covering the sample period from 1980 to 2017, an ARDL model to test for cointegration and a quadratic regression to estimate the threshold level found an inflation threshold of 7%. Tenaw and Demeke (2020) examined effect of the inflation threshold on economic growth in Ethiopia over the period 1975–2018 using a two-regime auto-regressive threshold (TAR) model. It was found that the inflation threshold was in the range of 9–10% for Ethiopia. In particular, the threshold level for food inflation is between 10% and 8% for non-food inflation. Dammak and Helali (2017) in the case of Tunisia, the authors of the paper, with data from January 1993 to November 2012, using the econometric technique proposed by Hansen and improved by Khan et al. (2001) found a threshold of 3.48%. Above this threshold, there is a statistically significant negative relationship between the inflation rate and economic growth. Rutayisire (2015) using a linear regression model for the Rwandan economy, with a data set covering the period from 1968 to 2010, showed that at low levels inflation does

not affect economic growth while at higher levels inflation reduces economic growth. It also found an inflation threshold of 12.7% (Azam and Khan, 2020)

Kryeziu and Durguti (2019) aimed to investigate the impact of inflation rate on the growth rate of GDP in Eurozone countries. The study utilized panel data covering the period 1997-2017, with a total of 257 annual observations. The researchers employed linear regression model with the least squares regression method to analyze the data and obtain results.

Karahan and Çolak (2020) conducted a study aiming to contribute to the ongoing debate surrounding the relationship between inflation and economic growth. Different schools of economics hold contrasting views on this relationship, with Keynesian economists suggesting a positive link between inflation and economic growth, while Classical economists argue for a negative impact of inflation on economic growth.

Cili and Alkhaliq (2022) conducted a study to examine the relationship between economic growth and inflation in Indonesia during the period from 2010 to 2014. The research employed static data panel analysis, with economic growth as the dependent variable and inflation, investment, and population as the independent variables. The findings of the study revealed that inflation, investment, and population all had a positive relationship with economic growth. Ndoricimpa (2017) conducted a study on the inflation-growth nexus in Africa, utilizing a dynamic panel threshold regression to account for potential endogeneity bias.

Linear regression analysis is a cornerstone of statistical modeling and data analysis. Its importance spans across various fields, including economics, finance, healthcare, social sciences, and beyond. In this article, we'll explore why linear regression is essential, its applications, and the benefits it provides in understanding relationships between variables. Below are some of the benefits of linear regression (Ndoricimpa, 2017). Linear regression allows us to model the relationship between two or more variables by fitting a linear equation to observed data. This helps us understand how changes in one variable are associated with changes in another. For example, in finance, linear regression can be used to model the relationship between stock prices and various economic indicators.

Prediction and Forecasting, one of the primary purposes of linear regression is prediction. Once we've established a relationship between variables, we can use the regression model to predict the value of the dependent variable based on known values of the independent variable(s). This is invaluable in fields such as sales forecasting the association between inflation and economic stability (Cili & Alkhaliq, 2022).

2.5 Research Gaps

Despite the extensive research on the relationship between inflation rates and various economic factors, several significant research gaps persist, particularly concerning investment dynamics in emerging economies such as Uganda. First, while much of the existing literature examines the general impact of inflation on investment, there is a notable lack of studies focusing specifically on how inflation interacts with different sectors within developing economies. Most research tends to aggregate data at the national level, which can obscure sector-specific effects and lead to less targeted policy recommendations. Future research could benefit from a more granular analysis of how inflation affects different industries and sectors within Uganda, providing a clearer picture of which areas of the economy are most vulnerable to inflationary pressures and thus require more tailored interventions.

Second, the existing studies often overlook the role of institutional quality and governance in mediating the relationship between inflation and investment. In many developing countries, including Uganda, the effectiveness of monetary and fiscal policies can be significantly influenced by the strength of institutions and governance structures. Research could explore how variations in institutional quality impact the inflation-investment nexus, particularly in contexts where institutional weaknesses exacerbate the adverse effects of inflation. Understanding this relationship could help in designing more robust policy frameworks that account for the institutional context and enhance the effectiveness of investment promotion strategies under inflationary conditions.

While recent advancements in econometric modeling offer new insights, there is a need for more studies that integrate these advanced techniques with real-time data to analyze the dynamic impacts of inflation on investment. Many studies use historical data which may not fully capture

the current economic realities and rapidly changing conditions. Employing real-time or high-frequency data and utilizing cutting-edge econometric methods could provide more accurate and timely insights into how inflation affects investment decisions. This approach could also help in assessing the immediate impacts of inflationary shocks and in developing more responsive and adaptive policy measures to stabilize investment in the face of fluctuating inflation rates.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This is based on the research design, mode specification, variable measurement, data sources, data analysis in terms of preliminary tests, real tests, diagnostic and stability tests and ethical considerations in the research.

3.1 Research Design

The study adopts a cross-sectional research design of time series econometric techniques to study the underlying relationship between the variables under study. The study was conducted based on ex-post facto research design focusing on longitudinal design. The study is based on quantitative research for the assessment of the secondary data for scientific assessment and determining the conclusions for objectives. The fundamental basis for the design is the hypothesis for ascertaining the influence to another and this is done by the assessment of the control environment. The design is used because it does not require random assignments, as the study relies on published random data to fulfill this aspect.

3.2. Data and Data Sources

Secondary data on annual inflation rates, GDP growth rates, trades, balance of trade, and investment from 1989-2022 shall be used for this study. The data was sourced from World Bank Indicators (WBDI, 2022) and E-views 21 statistical software shall be used for data analysis

3.3 Model Specification

The statistical model used in this study shall be:

3.3.1 Regression model

A regression model is a statistical tool that establishes relationships between a dependent variable and one or more independent variables. This approach allows for prediction, trend analysis, and the evaluation of factors influencing specific outcomes. The most common form, linear regression, assumes a linear relationship and often uses the Ordinary Least Squares (OLS) method to estimate model parameters, minimizing the residual sum of squares for optimal fit (James et al., 2021). Regression models are essential in economics, medicine, and social sciences

to assess impacts, predict trends, and inform policy. A variety of regression models can be employed to analyze the relationship between inflation rates and economic stability. Below are the key equations relevant to different regression models that might use:

Simple Linear Regression Model

Linear regression to analyze the relationship between inflation and economic stability helps quantify how inflation changes may impact economic stability indicators like GDP growth. A negative relationship would indicate that higher inflation destabilizes the economy, while a positive one might suggest inflation could enhance stability within certain limits. This model is useful for informing policies that aim to balance inflation control with economic growth (James et al., 2021). To investigate the direct effect of inflation on a measure of economic stability (e.g., GDP growth or investment stability), the model stated below is adapted:

$$Y_t = \beta_0 + \beta_1 \inf lation_t + \varepsilon_t \quad (3.1)$$

where:

Y_t=Economic stability measure at time t

β_0=Intercept

β_1=Coefficient for inflation

$Inflation_t$=Inflation rate at time t

ε_t=Error term

Multiple Linear Regressions

In a multiple linear regression model with inflation and economic stability the model explores how inflation impacts economic stability while considering other factors such as unemployment, fiscal policies, and interest rates. This approach helps isolate the effect of inflation on economic stability while accounting for the influence of other variables, offering a more comprehensive

understanding of the relationship (James et al., 2021). To account for other factors influencing economic stability, the specified model is given as follows:

$$Y_t = \beta_0 + \beta_1 \inf lation_t + \beta_2 X_{2t} + \beta_3 X_{3t} + \cdots + \beta_k X_{kt} + \varepsilon_t \quad (3.2)$$

where

$X_{2t}, X_{3t}, \ldots, X_{kt} =$ additional independent variables (e.g., interest rates, exchange rates)

Lagged Dependent Variable Model

In a lagged model with inflation and economic stability the model explores how both current and past inflation affect economic stability. It also accounts for the persistent impact of previous levels of economic stability on the current state. This approach provides a deeper understanding of how inflation, over time, influences economic stability by considering the cumulative effect of past inflation and economic conditions (Bond, 2022). To account for the persistence in economic stability measures, the model stated is as follows:

$$Y_t = \beta_0 + \beta_1 \inf lation_t + \beta_2 Y_{t-1} + \varepsilon_t \quad (3.3)$$

where

$Y_{t-1} =$ Lagged value of the economic stability measure

Autoregressive Distributed Lag (ARDL) model

In the ARDL model with inflation and economic stability the model examines both short-term and long-term effects of inflation on economic stability. It includes past values of both inflation and economic stability to capture dynamic relationships over time. The ARDL model helps determine if inflation has a persistent effect on economic stability and whether these effects evolve or stabilize in the long run. This approach is valuable for analyzing how inflation influences economic conditions over time, considering both immediate and delayed impacts Alam, M., & Shahbaz, M. (2023). To capture the long-term and short-term effects of inflation on economic stability, the modified model is as follows:

$$Y_t = \beta_0 + \beta_1 \inf lation_t + \beta_2 Y_{t-1} + \beta_3 \inf lation_{t-1} + \varepsilon_t \quad (3.4)$$

$Inflation_{t-1}$ = Lagged inflation rate

Fixed Effects Model

Fixed Effects Model with inflation as the independent variable and economic stability as the dependent variable, the model helps analyze how inflation affects economic stability while controlling for unobserved, time-invariant factors across entities (such as countries or regions). This approach isolates the impact of inflation on economic stability, accounting for factors that do not change over time, like institutional characteristics (Beck & Katz, 2023). For panel data analysis, to control for unobserved heterogeneity across regions or time, the model is specified as:

$$Y_{it} = \beta_0 + \beta_1 \inf lation_{it} + \alpha_i + \varepsilon_{it} \quad (3.5)$$

where:

α_i = Fixed effect for individual region or time period i

Random Effects Model

Random Effects Model helps analyze how inflation impacts economic stability while accounting for both time-varying and time-invariant factors (like institutional characteristics). It assumes that individual-specific effects (e.g., country-level factors) are uncorrelated with inflation. This model is useful when examining the influence of factors that do not change over time alongside inflation, but it requires that the individual effects are not correlated with inflation to avoid biased estimates (Greene, 2023). The model to account for random variability across regions or time periods is given as:

$$Y_{it} = \beta_0 + \beta_1 \inf lation_{it} + u_i + \varepsilon_{it} \quad (3.6)$$

where

u_i = Random effect for individual region or time period i

Generalized Method of Moments (GMM)

The Generalized Method of Moments (GMM) is an econometric estimation technique used to estimate model parameters, especially when there are issues like endogeneity, heteroscedasticity, or autocorrelation. It relies on moment conditions derived from the model to minimize the difference between theoretical and observed data. GMM is robust to heteroscedasticity and autocorrelation, making it suitable for time-series and panel data. While flexible and useful for handling endogeneity with instrumental variables, GMM requires careful instrument selection and model specification to avoid biased estimates (Arellano, 2023). for robust estimation in the presence of heteroskedasticity or autocorrelation:

$$Y_t = \beta_0 + \beta_1 \inf lation_t + \varepsilon_t \quad (3.7)$$

where:

GMM is applied to estimateβ_0 and $\beta_1$considering potential issues in the data.

Dynamic Panel Data Model (Arellano-Bond Estimator)

Dynamic panel data models to examine the impact of inflation on economic stability. It utilizes lagged values of economic stability as instruments to address endogeneity concerns. This method allows researchers to capture both short- and long-term dynamics while accounting for unobserved heterogeneity. Recent enhancements, including the integration of the LASSO method, have further refined the model by improving instrument selection and robustness in estimation, even in the presence of weak instruments or large variable sets (Chernozhukov et al., 2023; Fernández-Val & Wang, 2023). The model for panel data with lagged dependent variables and potential endogeneity is given as:

$$Y_{it} = \beta_0 + \beta_1 \inf lation_{it} + \beta_2 Y_{i(t-1)} + \varepsilon_t \quad (3.8)$$

where:

$Y_{i(t-1)} =$ Lagged value of the economic stability measure

Quantile Regression Model

Quantile regression (QR) is a statistical method that estimates the conditional quantiles (e.g., median, lower, or upper quantiles) of the dependent variable, providing a richer understanding of variable relationships beyond just the mean. It is especially useful in situations where the impact of independent variables, like inflation, may vary across different parts of the outcome distribution, such as low versus high economic stability. QR allows researchers to capture the non-linear effects of inflation on economic stability; offering insights that traditional mean-based regression models (like OLS) might miss. Recent studies have emphasized the value of QR in examining inflation dynamics, as it can highlight the differential effects of inflation on various segments of the economic distribution, such as the lower and upper quartiles, which is crucial for understanding the diverse impacts of inflation across the economy. This approach is increasingly applied to financial and macroeconomic contexts, where understanding how extreme values or outliers affect the economy is vital for effective policy formulation (Koenker & Hallock, 2001; Szendrei, 2023). To explore how inflation impacts economic stability across different quantiles of the economic stability distribution, the model associated with it is given as:

$$Q_{Yt}\left(\tau \mid Inflation_t\right) = \beta_0\left(\tau\right) + \beta_1\left(\tau\right)\inf lation_t + \varepsilon_t \qquad (3.9)$$

where:

$Q_{Yt}(\tau|Inflation_t) = \text{Conditional quantile of } Y_t \text{given} Inflation_t$

$\tau = \text{Quantile level (e.g., } 0.25, 0.50, 0.75)$

3.4 Data Analysis

The data analysis of the study shall be presented on three analysis namely: preliminary variables investigation, trend analysis and descriptive analysis

3.4.1 Preliminary Variables Investigation

Descriptive Analysis

The description of the variables in the data analysis includes a detailed discussion of the descriptive statistics for each variable involved in the study. It covers various measures of central tendency (such as mean, median) and variability (such as range, standard deviation) to present an initial overview of the dataset. This preliminary analysis helps to characterize the nature of the data before making any inferences about the general population. By using the sample data results, further statistical conclusions are drawn, ensuring a comprehensive understanding of the data's distribution and trends prior to more complex analysis.

Trend Analysis

The study used line graphs to analyze trends in labor, capital, exchange rates, and foreign direct investments. Trend analysis was employed to visualize the fluctuations and movements of these variables over time, providing insights into how they change from season to season. This approach is effective in identifying patterns, seasonal variations, and long-term trends, helping to contextualize the data within broader economic shifts. Such visual representation allows for a clearer understanding of temporal dynamics in economic variables, aiding in the interpretation of complex relationships over the simple ones.

3.5 Unit Root Tests

First due to the non-stationary between the times series, the trend analysis used in this study, it is necessary to have a graphical display to check the trend indicated by the series. Through trend analysis, the study can check whether the fluctuations in the series always go back to the mean of (Maradiaga et al 2013). Trend analysis is required prior to testing for unit root test to determine whether or not the series is stationary around a constant or trend that can be included during unit testing.

Secondly, the Dickey-Fuller test checks for stationary of the collected data by testing the unit-roots presence. The main intention is to check if the variables which was be used to estimate the model are stationary or non-stationary or to check if the involved variables in the model portray a unit root or not. This test is important since a stationeries series is relatively easy to predict: you simply predict that its statistical properties was be the same in the future as they have been in the

past. Also this helps to obtain meaningful descriptive statistics such as means, variances, and correlations with other variables, therefore such statistics are useful as descriptors of future behavior only if the series is stationary (Gujarati, 2012).

The model for Augmented Dickey fuller test is given as;

$$y_t = c + \beta t + \alpha y_{(t-1)} + \varphi \Delta y_{(t-1)} + \varphi 2 \Delta y_{(t-2)} + \cdots + \varphi p \Delta y_{(t-p)} \quad (3.10)$$

where

$y_{(t)}$=No value in the time series at time t or lag of 1 time series

$\Delta y_{(t-1)}$= First difference of the series at time (t-1)

α = is an intercept constant called a *drift*,
β = is the coefficient on a time trend,

p= is the lag order of the first-differences autoregressive process,
ϕ= is the coefficient of the lagged first difference term

Thirdly The KPSS (Kwiatkowski-Phillips-Schmidt-Shin) test is another commonly used statistical test in time series analysis, particularly for testing the stationary of a series. While the Augmented Dickey-Fuller (ADF) test primarily focuses on determining whether a series has a unit root (i.e., is non-stationary), the KPSS test is used to test the null hypothesis that a time series is stationary against the alternative hypothesis that it is non-stationary

The general model for the KPSS test statistic is:

$$k = \frac{\sum_{t=1}^{T} \hat{e}_t^2}{\frac{1}{T^2} \sum_{k=1}^{K} \lambda_k^2} \quad (3.11)$$

where:

T is the number of observations in the time series.

$\hat{e}_t$ Represents the residuals obtained from regressing the time series on its lagged values.

K is a truncation lag parameter that determines the number of lags used in the test.

λ_k Are the weights applied to the squared residuals, typically based on a kernel function such as the Bartlett kernel.

This model computes the test statistic for both the level KPSS test and the trend KPSS test. The specific form of the test statistic differs depending on whether it is the level or trend version of the KPSS test.

After computing the KPSS test statistic, it is compared to critical values from the appropriate distribution to determine statistical significance. If the computed test statistic exceeds the critical value, the null hypothesis of stationary is rejected, indicating evidence of non-stationary in the time series. Conversely, if the test statistic is lower than the critical value, the null hypothesis cannot be rejected, suggesting that the time series is stationary.

3.6 Test for Co-integration (bounds test)

After checking the stationarity of all the variables in the empirical model, we proceeded with a co-integration test among the series in the model. Having established that the model variables have mixed orders of integration, we use the Pesaran, Shin, & Smith (2001) ARDL bounds co-integration test that allows variables with a mix of I(0) and I(1) orders of integration is used. The purpose of the Pesaran et al. (2001) co-integration test is to determine whether a group of stationary series as well as a group of non-stationary series in the empirical model are co-integrated or not. Co-integration is an econometric principle that simulates long stability between the associated economic time series that converges over time. Co-integration testing is an essential step toward establishing whether model has useful long-term relationships scientifically. In this investigation, abound testing technique is being used to assess the presence of long-term relationships between the real Gross Domestic Product and the repressors and is focused primarily on the F-test. The F-test is a test of the hypothesis which reveals that there is no cointegration between different factors against Co integration's existence or appearance between variables (Gujarati, 2004; Johansen & Juselius, 1990). It also includes determining the mentioned unrestricted error correction model (UECM) using OLS. The Bond test model expressed as:

$$F-statistics=\frac{R^2/K}{\left(1-R^2\right)/\left(n-k-1\right)} \quad (3.12)$$

where

R^2 is the coefficient determination from the regression

K is the number of independent variables

n is the number of observations

The test compares the F-statistic to critical value bounds to determine if co-integration exists.

3.7 Model Estimation

In addition to the various tests that come before regression analysis, the data will be examined using E-VIEWS to conduct an Ordinary Least Squares regression and determine whether the aforementioned variables have a substantial impact on export growth rate. After obtaining annual data, E-views is used to convert it to a quarterly range in order to generate more data points. The quadratic match average is the method to be applied, which fits a local polynomial for every series observation in the annual range. After that, a polynomial was employed to fill in every observation inside the quarterly range. Using sets of three neighboring points from the source series, a quadratic polynomial is fitted so that the average of the quarterly observations equals the annual data. The analysis will be done descriptively, inferentially and test for normality, stationarity (data quality control tests). The usage of ordinary least square and Autoregressive Distributed Lag (ARDL) approach to co-integration will be employed to lay a foundation to the detection of the association between the inflation and economic stability of Uganda.

3.8 Diagnostic Tests

Diagnostic tests are essential in statistical analysis to validate model assumptions and ensure accurate, reliable results. They help identify issues such as multicollinearity, heteroscedasticity, autocorrelation, and model specification errors, which can affect the robustness of the model. Common tests include checking for normality of residuals, assessing variance consistency, and detecting influential outliers. These tests provide a comprehensive way to refine statistical models, ensuring they produce meaningful and credible conclusions. By applying diagnostic

tests, researchers can address potential problems early, enhancing the accuracy of their inferences and improving model performance

3.8.1 Normality Time Series Tests

A normality test is a statistical procedure used to assess whether a given dataset follows a normal distribution, also known as a Gaussian distribution or bell curve. The normal distribution is characterized by a symmetrical bell-shaped curve, with the majority of data clustered around the mean, and decreasing in frequency as values move away from the mean.

There are several statistical tests and graphical methods available to assess normality, including:

Jarque Bera Test Statistics;

$$JB = \frac{n}{6}\left(S^2 + \frac{(k-3)^2}{4} \right) \tag{3.13}$$

where

n is the sample size

S^2 is the skewness,

K is the kurtosis.

The results of a normality test indicate whether the data significantly deviate from a normal distribution. If the p-value associated with the test is greater than a chosen significance level (e.g., 0.05), we fail to reject the null hypothesis and conclude that the data are normally distributed. Conversely, the p-value is the probability of obtaining test results at least as extreme as the observed results, assuming that the null hypothesis is true. It helps in determining the significance of the results, if the p-value is less than the significance level; we reject the null hypothesis and conclude that the data are not normally distributed.

3.8.2 Heteroskedasticity Test

Heteroscedasticity test in regression models by assessing if the variance of residuals changes with the independent variables. The test involves running an OLS regression, obtaining the residuals, squaring them, and then regressing the squared residuals on the independent variables. The null hypothesis states that there is no heteroscedasticity (constant variance of errors), while

the alternative suggests the presence of heteroscedasticity. A low p-value (typically < 0.05) indicates heteroscedasticity, and the null hypothesis can be rejected. Breusch-Pagan test is essential for ensuring the assumption of homoscedasticity (constant variance) holds, which is necessary for reliable statistical inference in regression models (Breusch & Pagan, 1979). Breusch-Pagan Test Statistics model is given as:

$$BP = \frac{R^2 \times n}{2} \tag{3.14}$$

where

R^2 is the coefficients of the determination from the regression

n is the number of observations

3.8.3 Series Correlation Test

In the section, a diagnostic check for normality of the residuals is conducted. The Durbin-Watson (DW) test is used to detect autocorrelation in the residuals of a regression model. It measures the correlation between consecutive residuals. The test produces a statistic that ranges from 0 to 4. A DW value close to 2 suggests no autocorrelation and a value below 2 indicates positive autocorrelation, while a value above 2 suggests negative autocorrelation. To perform the DW test, fit the regression model, compute the residuals, and then calculate the DW statistic using a formula that compares squared differences between consecutive residuals to the total squared residuals. If the DW statistic falls outside the accepted range, autocorrelation is present, and model adjustments may be needed. The DW test helps ensure that model assumptions about residual independence hold, which is essential for valid inference (Wooldridge, 2016; Gujarati & Porter, 2009). Durbin-Watson Statistics model is given as:

$$DW = \frac{\sum_{t=2}^{T} \left(e_t - e_{t-1}\right)^2}{\sum_{t=1}^{T} e_t^{\,2}} \tag{3.15}$$

where

e_t is the residuals from the regression model

3.8.4 Variance Inflation Factore (VIF)

Variance inflation factor (VIF) measure is used to test the degree of multicollinearity in a set of multiple explanatory variables in a regression. The presence of this problem can lead to many problems, especially in understanding the meaning of individual variables in a regression model. Therefore, if the value of (VIF $\geq$ 5), further investigation of this respective variable is recommended and the model can be adjusted. The Breusch-Pagan test can also be used to check for multicollinearity, when the (VIF $\leq$ 5), it indicates that multicollinearity is not a significant concern in the regression model. This allows for more reliable coefficient estimates, easier interpretation of results, and greater confidence in the validity of the regression analysis.The model of VIF is

$$VIF = \frac{1}{\left(1 - R^2\right)} \tag{3.16}$$

where

R^2 is the coefficient of determination of a regression of independent variable

3.9 Stability Test

A stability test is used to determine whether the parameters of a model remain constant over time or if they change, indicating potential structural shifts. These tests are important in time series and econometrics to ensure the validity of model

3.9.1 Stability tests (Ramsey RESET Test)

In order to select a correct estimated model, the Ramsey-RESET will be carried out check the model specification, this is very helpful to test if there is information about model misspecification. In doing so, if the F-statistic or t-statistic value is more than 0.05, it is possible to conclude that, the model is correctly specified. The hypothesis of the model specification test is formulated as follows; H_0: The model is correct. H_1: H_0 is not true. Decision Rule: Reject H_0 if the correlation coefficients are less than the significant level of 0.05. Otherwise, do not reject H_0.

Regression Model formulated in order to examining the relationship between economic stability (e.g., GDP growth) and inflation along with other covariates, the statistical model formulated is expressed as:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \cdots + \beta_k X_{kt} + \varepsilon_t \quad (3.17)$$

where:

Y_t = Dependent variable (economic stability measure) at time t

X_{1t} = Inflation rate at time t

$X_{2t}, X_{3t}, \ldots, X_{kt}$ = Additional explanatory variables at time t

$\beta_2, \beta_3, \ldots, \beta_k$ = Coefficients to be estimated

ε_t = Error term

Fitted Values and Polynomial Terms: After formulating the original model, estimating the fitted values Y_t from the model is expressed by:

$$\widehat{Y_t} = \widehat{\beta_0} + \widehat{\beta_1} X_{1t} + \widehat{\beta_2} X_{2t} + \widehat{\beta_3} X_{3t} + \cdots + \widehat{\beta_k} X_{kt} \quad (3.18)$$

Then, extend the model by including polynomial terms of the fitted values to test for omitted non-linear relationships and this result to:

$$\widehat{Y_t} = \widehat{\beta_0} + \widehat{\beta_1} X_{1t} + \widehat{\beta_2} X_{2t} + \widehat{\beta_3} X_{3t} + \cdots + \widehat{\beta_k} X_{kt} + \gamma_1 \widehat{Y_t}^2 + \gamma_2 \widehat{Y_t}^3 + \varepsilon_t \quad (3.19)$$

where

$\widehat{Y_t}^2$ = Squared term of the fitted values

$\widehat{Y_t}^3$ = Cubic term of the fitted values

γ_1, γ_2 = Coefficients for the polynomial terms

Ramsey RESET Test Statistics: To determine if the added polynomial terms significantly improve the model, an F-test is perform to comparing the restricted model (without polynomial terms) to the unrestricted model (with polynomial terms) and this is given as:

$$F = \frac{\left(RSS_{restricted} - RSS_{unrestricted}\right)/m}{RSS_{unrestricted}/\left(n-k-m\right)} \quad (3.20)$$

where:

$RSS_{restricted}$ = Residual sum of squares from the original model (restricted model)

$RSS_{\text{unrestricted}}$ = Residual sum of squares from the extended model with polynomial terms (unrestricted model)

m = Number of additional polynomial terms (e.g., 2 for squared and cubic terms)

n = Number of observations

k = Number of parameters estimated in the original model

3.10 Chapter Summary

Chapter Three outlines the methodology employed in the study, which examines the impact of inflation on economic stability in Uganda. It begins with an introduction to the research design, highlighting a quantitative approach using time-series econometric techniques to analyze the relationships between inflation and key economic variables. The study utilizes secondary data collected from reputable sources, such as the World Bank, covering the period from 1989 to 2022. The chapter discusses data collection methods, including the use of E-Views 21 statistical software for data analysis. Model specification is also provided, focusing on regression models, particularly the Ordinary Least Squares (OLS) method, to assess the relationships between inflation and economic stability. In addition, the chapter addresses various diagnostic tests, such as stationarity tests and model fit evaluation. Ethical considerations related to data handling and research integrity is also highlighted. Overall, this chapter provides a clear outline of the methodology guiding the research.

CHAPTER FOUR

RESULTS

4.0 Introduction

In this chapter, the study presents data obtained from World Bank (2022) in the appendix. The presentation, analysis and interpretation of the data are dependent on determining a statistical modeling of inflation rate and economic stability in Uganda. The study objectives (1) To determine the effect of inflation rates on GDP growth rate in Uganda, 2) To examine the influence of inflation rates on trade in Uganda, (3) To ascertain the relationship between inflation rates and balance of payments in Uganda and thirdly (4) To analyze the significant impact of inflation rates on investment in Uganda. The study starts by estimating the trend of inflation and GDP, BOP, trade and investments through descriptive statistics. The initial part of this chapter deals with descriptive statistics obtained from the analysis of the data. This was used to evaluate the scores of each variable for more advanced statistical analysis and the data can easily be understood in the form of tables and graphs. Followed by unit root analysis tests of Augmented Fuller Dicker Test (ADF), then causality tests are conducted followed by correlation analysis, least square analysis by the ARMA model test to estimate the nature of effect between the variables and then diagnostics and stability tests to test the stability and application of the model

4.1 Descriptive Statistical Analysis of the Variables in the Model

In determining the descriptive statistics of inflation and economic stability of the variables, the study carried out a descriptive analysis and the result obtained by using SPSS (Statistical Package for Social Scientist) is presented in Table 4.1

Table 4.1: Descriptive Analysis of the variables

	Inflation	Trade	Bop	Investments	GDP	Labour	Capital
Mean	6.329	37.140	-1.77×10^{9}	2.944	6.500	3.450	20.860
Median	6.070	36.425	-1.24×10^{9}	2.935	6.300	3.300	21.400
Maximum	16.56	56.250	-4.25×10^{8}	6.650	11.500	4.910	27.600
Minimum	0.280	26.600	-5.03×10^{9}	0.030	3.100	3.000	11.800
Std. Dev.	3.705	6.1067	1.31×10^{9}	1.380	1.993	0.499	4.460
Skewness	0.604	0.7951	-0.957355	0.581	0.567	1.789	-0.288
Kurtosis	3.437	4.3130	2.921158	4.478	3.064	5.320	2.002
Probability	0.310	0.0491	0.074182	0.081	0.400	0.000	0.390
Sum	215.19	1262.76	-6.02×10^{10}	100.100	221.130	117.310	709.510
Sum Sq. Dev.	453.11	1230.66	5.64×10^{19}	62.870	131.090	8.234	658.540
Observations	34	34	34	34	34	34	34

Table 4.1 presented the descriptive statistics (the mean, standard deviation, etc.) for inflation rate and economic stability measured through trade, BOP, investments and GDP. It was observed that the average of the variables of inflation was 6.329, trade had 37.140, BoP was -1.77, investments had 2.944 mean, and GDP had 6.5% average. Their median values are 6.070, 36.425, Bop -1.24, investments 2.935 and GDP had 6.30. The two values are close to each other indicating minor symmetry with the variables of inflation and economic stability. A closer look at the remaining variables in the above table shows that all the means of the variables are very closer to their median values. This has indicated that there is minor symmetry in each of the variables.

The maximum and minimum values of the series are also given for each series under the row maximum and minimum, respectively. Looking at standard deviation, it measures of dispersion around the mean in the series. Interpreting standard deviation of the series in absolute terms, the distribution with smaller standard deviation exhibits less dispersion and larger standard deviation shows higher dispersion. Accordingly, in Table 4.1, the trade had the highest deviation with trade as 6.1067 while inflation had 3.705, investments had 1.380, and GDP had 1.993 respectively.

Symmetry of the distribution of the series around the mean is measured by skewness. For a distribution to be considered Symmetric it should have a zero skewness value. Thus, by observing the row of skewness from the table only BOP is negatively skewed with a value of -0.957355 otherwise the rest of the variables seem to have symmetric distribution because their values are not far from zero. The row under kurtosis in the table measures flatness and peakedness of the distribution. For a distribution to be considered normal it should have a kurtosis value of 3 and hence our entire variable under study has digits that are no kurtosis.

4.2 Unit Root Test Results using the ADF Test

This section involves testing for the Stationarity of the individual variables using Augmented Dickey-Fuller test. Table 4.2 indicates the unit root test results performed in this study following both the ADF test. A maximum number of lags were used for the ADF tests (as determined automatically by E-views statistical package).

Table 4. 2 Results of ADF unit root test At Level

Variables	ADF Statistics	p-value	Decision
GDP	-1.143	0.761	Non stationary
Trade	-1.321	0.432	Non stationary
BOP	-0.651	0.895	Non stationary
Investments	-1.521	0.611	Non stationary
Inflation	-1.342	0.001**	Stationary
Labour	-.0890	0.651	Non stationary
Capital	-1.321	0.568	Non stationary

The results of the ADF test shows that all variables except inflation are non-stationary at level. It was therefore necessary to carry the stationarity test for the first difference of the variables that were non-stationary. The unit root test results of the series at first differences are presented in Table 4.3. Results of ADF unit root test at first difference to confirm the stationarity of the variables before the statistical model estimation can be undertaken. The results in Table 4.2 revealed that only inflation is stationary since it has a p-value (0.001) < 0.05, all other variables shows non-stationarity with their individual p-values greater than 0.05.

Table 4.3: ADF unit root test for the Differenced Datasets

Variables	ADF statistics	p-value	Status	Order of Integration
GDP	-1.742	0.000***	Stationary	1st (1) Difference
Trade	-1.458	0.030**	Stationary	1st (1) Difference
BOP	-0.679	0.021**	Stationary	1st (1) Difference
Investments	-1.712	0.001**	Stationary	1st (1) Difference
Labour	-.4128	0.006**	Stationary	1st (1) Difference
Capital	-1.678	0.001**	Stationary	1st (1) Difference

From Table 4.3, the variables that were found to be non-stationary at level become stationary when they were differentiated once, and thus the Null-Hypothesis of non-stationarity was rejected followed by the conclusion that all these variables became stationary or have no unit root. Having known the variable that was non-stationary at level but become stationary at first difference, it implies that they qualify for co-integration. For co-integration to be applied at least

one variable should be non-stationary at level but become stationary at first difference and thus cointegration was applied.

4.3 Cointegration Test for the Variables

To address the stationarity test, the Johansen co-integration approach, along with the Engle-Granger co-integration method, was applied to assess the stationarity of the study's variables. This discussion highlights whether the previously introduced variables are relevant for further analysis. For the study were found to be integrated in the different orders with some being 1(0) and other being 1(1). Because the variables become stationary in the first order, it becomes the most desired form of the orders in continuing to run Johansen's integration for the co-integration tests. The test is performed in order to determine the existence of co-integration between GDP growth rate, BOP, Trade and investments (Y) and the independent variable of inflation amongst the variables of the study. The cointergration Test for the variables explore the long-term relationships among the study's key variables including inflation, GDP, balance of payments (BOP), trade, investment, labor, and capital as shown in Table 4.4.

Table 4.4: Cointegration Test for the variables

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.768159	150.5122	125.6154	0.0006**
At most 1 *	0.684029	103.7377	95.75366	0.0126**
At most 2	0.537909	66.87032	69.81889	0.0840
At most 3	0.428846	42.16653	47.85613	0.1541
At most 4	0.380572	24.24344	29.79707	0.1903
At most 5	0.185206	8.916755	15.49471	0.3731
At most 6	0.071169	2.362513	3.841466	0.1243

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.768159	46.77454	46.23142	0.0437**
At most 1	0.684029	36.86737	40.07757	0.1101
At most 2	0.537909	24.70379	33.87687	0.4053
At most 3	0.428846	17.92309	27.58434	0.5016
At most 4	0.380572	15.32668	21.13162	0.2667
At most 5	0.185206	6.554242	14.26460	0.5431
At most 6	0.071169	2.362513	3.841466	0.1243

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

INFLATION	GDP	BOP	TRADE	INVESTMENT	LABOUR	CAPITAL
-0.254747	0.156331	3.74×10^{-10}	0.385128	-1.507332	-0.061765	0.072787
0.064296	-0.470811	-6.43×10^{-11}	0.208658	-0.662843	-3.102021	-0.098083
-0.120817	0.510822	-1.00×10^{-9}	-0.128987	-0.389737	-3.469714	0.186255
-0.104886	-0.620708	-2.34×10^{-10}	-0.070237	0.446587	-0.107215	0.001579
-0.116533	-0.154244	-1.58×10^{-9}	0.194633	0.354187	-2.310359	-0.398264
0.342466	-0.186559	-1.80×10^{10}	-0.082305	0.005427	1.565317	0.069939
0.045451	0.171044	1.28×10^{9}	-0.072063	0.105087	-0.298367	0.465168

The unrestricted cointegration trace rank test observed in Table 4.4 shows that there is no co-integration between inflation rate and economic stability of Uganda. Findings from the test value indicate that there is no cointegration between inflation, GDP, BOP, trade and investments. These findings confirm the results obtained from the first trace rank test therefore conclude that there is no long run relationship between the variables for the period of 34 years.

4.4 Statistical Model test variables and its hypothesis

This session shall test the various hypotheses and determine the effect of inflation rates on GDP growth rate in Uganda, examine the influence of inflation rates on trade in Uganda, ascertain the relationship between inflation rates and balance of payments in Uganda and finally analyze the significant impact of inflation rates on investment in Uganda.

4.4.1 Determining the effect of inflation rates on GDP growth rate in Uganda

Table 4.5 shows that inflation significantly affects the dependent variable, while labor and capital do not have a significant impact. The model explains 17.3% of the variation in the dependent variable, indicating a modest fit. Overall, inflation is the only significant predictor in the model.

Table 4.5: Effect of inflation rates on GDP growth rate in Uganda

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF	0.102357	0.064395	1.589512	0.0224**
LLABOUR	0.542039	0.495179	1.094633	0.2824
LCAPITAL	0.321834	0.207862	1.548308	0.1320
C	3.025674	0.945635	1.987450	0.0010

R-squared	0.173127	Mean dependent var	1.816065
Adjusted R-squared	0.251335	S.D. dependent var	0.311314
S.E. of regression	0.348245	Akaike info criterion	0.814687
Sum squared resid	3.638237	Schwarz criterion	0.950733
Log likelihood	10.44233	Hannan-Quinn criter.	0.860462
Durbin-Watson stat	1.474842		

Table 4.5 show findings regarding the effect of inflation rates on GDP growth rate in Uganda from 1989-2022, the value of r squared is 0.173 on the regression coefficient between inflation rate and GDP growth rate, the regression coefficient expresses that 17.3% of change in the dependent variable (i.e GDP growth rate) is caused by inflation rate. The adjusted R^2, 0.251335 on the other hand expresses that for this change; 25.1% of the data are accounted for, in this case inflation rate increases led to a 25.1% change in the GDP growth rate of Uganda.

From the coefficient of the independent variables that is; β_1 (inflation rate) found to have a statistically significant relationship with the GDP growth rate of Uganda. In this instance therefore inflation rate had p-value of (0.0224) interpreted as statistically significantly rated. The interpretation is that a unit increase in inflation significantly leads to reduction GDP growth rate of Uganda. The level of significance based on study is 95% confidence interval (0.05) level of significance taken as the degree of freedom in determining the association between the variables. In this case therefore, it is pivotal to argue that the occurrence of inflation rate has had a moderate negative effect on the GDP growth rate. It means that inflation rate increase over the

time lead to a reduction in the GDP growth rate of Uganda from 1989-2022. The hypothesis is rejected which argued that there is no statistically significant effect of inflation rates on GDP growth rates in Uganda. This means that inflation rate has statistically significant effect on the GDP growth rate and the required model is expressed as:

$$y = 3.025 + 0.102LINF + 0.542LLBUR + 0.322LCABITAL \quad (4.1)$$

4.4.2 Influence of inflation rates on trade in Uganda

Table 4.6 presents the regression results, showing the relationships between inflation, labor, and capital with the dependent variable. Inflation and capital are statistically significant, while labor is not. The model explains 20.7% of the variation, with potential autocorrelation indicated by the Durbin-Watson statistic.

Table 4.6: Effect of inflation rate on trade in Uganda

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF	0.048237	0.034130	1.413355	0.0378**
LLABOUR	0.392504	0.262446	1.495561	0.1452
LCAPITAL	1.005177	0.110167	9.124112	0.0000***
C	6.355789	1.100345	1.976543	0.0231
R-squared	0.207084	Mean dependent var		3.602425
Adjusted R-squared	0.287557	S.D. dependent var		0.162659
S.E. of regression	0.184571	Akaike info criterion		-0.455062
Sum squared resid	1.021989	Schwarz criterion		-0.319016
Log likelihood	10.50852	Hannan-Quinn criter.		-0.409286
Durbin-Watson stat	0.472395			

Table 4.6 show findings regarding the effect of inflation rates on trade in Uganda economy from 1989-2022. From the table, the value of r squared is 0.207 on the regression coefficient between inflation rate and trade, the regression coefficient expresses that 20.7% of change in the dependent variable (i.e trade) is caused by inflation rate. The adjusted R^2, 0.287 on the other hand expresses that for this change; 28.7% of the data are accounted for. In this case inflation rate increases lead to a 28.7% change in the GDP growth rate of Uganda.

From the coefficient of the independent variables that is; β_1 (inflation rate) were found to have a statistically significant relationship with the trade of Uganda. In this instance therefore inflation rate had p-value of (0.0378) interpreted as statistically significantly rated. The interpretation is that a unit increase in inflation significantly leads to reduction trade value and volumes of Uganda. The level of significance based on study is 95% confidence interval (0.05) level of

significance taken as the degree of freedom in determining the association between the variables. In this case therefore, it is pivotal to argue that the occurrence of inflation rate has had a negative effect on the trade of Uganda. It means that inflation rate increase over the time lead to a reduction in trade volumes and values of Uganda from 1989-2022. The second hypothesis which was H_{02}: set to determine whether there is no statistically significant influence of inflation rates on trade in Uganda was rejected. This means the inflation rates ha influence on trade in Uganda and the required model is expressed as**:**

$$y = 0.048LINF + 0.393LLABOUR + 1.005LCAPITAL \quad (4.2)$$

4.4.3 Ascertain the relationship between inflation rates and balance of payments in Uganda

This section presents the regression results, showing the effects of inflation, labor, and capital on the dependent variable as shown in Table 4.7. The model explains 58.7% of the variation, with potential autocorrelation indicated by the Durbin-Watson statistic.

Table 4.7: Relationship between inflation rates and balance of payments in Uganda

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF	0.009972	0.181610	-0.054908	0.0266**
LLABOUR	3.989539	1.396524	2.856763	0.0077**
LCAPITAL	5.336243	0.586220	9.102798	0.0000***
C	10.98733	0.234560	7.652592	N

R-squared	0.586992	Mean dependent var	21.04239
Adjusted R-squared	0.692791	S.D. dependent var	0.754866
S.E. of regression	0.982136	Akaike info criterion	2.888333
Sum squared resid	28.93771	Schwarz criterion	3.024379
Log likelihood	44.65750	Hannan-Quinn criter.	2.934109
Durbin-Watson stat	0.465905		

Table 4.7 show findings regarding the effect of inflation rates on balance of payment in Uganda from 1989-2022. The value of r squared is 0.586992 on the regression coefficient between inflation rate and trade, the regression coefficient expresses that 58.6% of change in the dependent variable (i.e balance of payment) is caused by inflation rate. The adjusted R^2, -0.692 on the other hand expresses that for this change; 69.2% of the data are accounted for in this case inflation rate increases lead to 58.6% change in BOP rate of Ugandan .From the coefficient of the independent variables that is; β_1 (inflation rate) were found to have a statistically significant relationship with the balance of payment of Uganda. In this instance therefore inflation rate had p-value of (0.0266) interpreted as statistically significantly rated. The interpretation is that a unit increase in inflation significantly lead to reduction in balance of trade of Uganda. The level of

significance based on study is 95% confidence interval (0.05) level of significance taken as the degree of freedom in determining the association between the variables. In this case therefore, it is pivotal to argue that the occurrence of inflation rate has had a negative effect on balance of payment of Uganda. It means that inflation rate increase over the time lead to a reduction in balance of payment generation therefore increase in the balance of payment problem of Uganda from 1989-2022. The third hypothesis which was that there is no statistically significant relationship between inflation rates and balance of payments in Uganda was rejected. The required Model is demonstrated as:

$$y = 10.987 + 0.009LINF + 3.989LLABOUR + 5.336LCABITAL \quad (4.3)$$

4.4.4 Determine the significant impact of inflation rates on investment

This section presents the regression results showing the effects of inflation, labor, and capital on the dependent variable as shown in Table 4.8.

Table 4.8: impact of inflation rates on investment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LINF	0.129432	0.188157	-0.687897	0.4968
LCAPITAL	1.044007	0.607352	1.718948	0.0959
LLABOUR	1.690294	1.446866	-1.168245	0.2519
C	12.87654	7.987654	1.456789	0.0500
R-squared	0.101092	Mean dependent var		0.832551
Adjusted R-squared	0.041165	S.D. dependent var		1.039153
S.E. of regression	1.017540	Akaike info criterion		2.959160
Sum squared resid	31.06161	Schwarz criterion		3.095206
Log likelihood	45.82615	Hannan-Quinn criter.		3.004936
Durbin-Watson stat	0.960461			

Table 4.8 show findings regarding the effect of inflation rates on investments in Uganda from 1989-2022. The value of r squared is 0.101 on the regression coefficient between inflation rate and investments, the regression coefficient expresses that 10% of change in the dependent variable (i.e investment growth rate) is caused by inflation rate. The adjusted R^2, 0.0411 on the other hand expresses that for this change; 4.11% of the data are accounted for. In this case inflation rate increases lead to 4.11% change in investment rate of Uganda.

From the coefficient of the independent variables that is; β_1 (inflation rate) were found to have a statistically significant relationship with the investments of Uganda. In this instance therefore inflation rate had p-value of (0.0266) interpreted as statistically significantly rated. The

interpretation of the above is that a unit increase in inflation significantly lead to reduction in investments of Uganda. The level of significance based on study is 95% confidence interval (0.05) level of significance taken as the degree of freedom in determining the association between the variables. In this case therefore, it is pivotal to argue that the occurrence of inflation rate has had a negative effect on investments, the effect is not significant. It means that inflation rate increase over the time lead to some reduction in investments with therefore increase in the investment of Uganda from 1989-2022. The hypothesis which was H_{04}: That there is no statistically significant impact of inflation rates on investment in Uganda was rejected. The required Model is expressed as:

$$y = 12.87654 + 0.129LINF + 1.044LCAPITAL + 1.690LLABOUR \quad (4.4)$$

4.5 The relationship between inflation rates and investment

In order to test the hypothesis, the study carried out a test on whether economic stability aspects of GDP, trade, balance of trade and investments are affected by inflation and to this level, the inflation was treated as the influenced variables and treating though Inflation as dependent to determine its being influence on the economic stability. The result of is showed in Table 4.9

Table 4.9: Multiple regression analysis of the relationship between inflation rates and economic stability

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LINF(-1)	0.075298	0.169154	-0.445142	0.6626
Ltrade	3.458088	1.637716	2.111531	0.0519
Ltrade(-1)	1.225826	1.940443	0.631725	0.5371
Ltrade(-2)	2.746550	1.518209	-1.809072	0.0305**
LBOP	-1.425676	0.654971	-2.176699	0.0459**
LBOP(-1)	-0.550085	0.840122	-0.654768	0.5225
LBOP(-2)	1.535696	0.756426	2.030199	0.0405**
Linvestments	-0.287639	0.186249	-1.544378	0.1433
Linvestments(-1)	-0.435599	0.226300	-1.924873	0.0734
Linvestments(-2)	-0.523646	0.217118	-2.411802	0.0291**
LGDP	1.888469	0.581151	3.249534	0.0054**
LGDP(-1)	1.441008	0.469262	3.070797	0.0078**
LLABOUR	-1.998090	1.320993	-1.512566	0.1512
Lcapital	6.447425	1.713652	3.762388	0.0019**
Constant	-18.07673	7.373720	-2.451508	0.0270**

R-squared	0.806104	Mean dependent var	1.593365
Adjusted R-squared	0.625134	S.D. dependent var	0.994321
S.E. of regression	0.608787	Akaike info criterion	2.152155
Sum squared resid	5.559316	Schwarz criterion	2.852754
Log likelihood	-17.28232	Hannan-Quinn criter.	2.376282
F-statistic	4.454349	Durbin-Watson stat	2.338988
Prob(F-statistic)	0.003395		

Table 4.9 indicate that economic stability aspects of GDP, trade, balance of trade and investments are affected by inflation and to this level, the effect is generally negative given that the coefficient values are generally negative. The findings therefore mean that the state of the inflation has had a generally negative effect on economic stability of Uganda. Balance of payment 0.0459, investments had 0.0291 and GDP with the p value of 0.0078., the p-values are less than 0.05, which indicate that these are affected by inflation rate of the country.

4.6 Short run and Long run relationship between inflation rate and balance of payments

This section presents the regression results, examining the effects of trade, balance of payments, investments, and GDP on the dependent variable as shown in Table 4.10. Trade, balance of payments, investments, and GDP show statistically significant effects, with several lagged terms also significant, indicating persistence over time. The error correction term is highly significant, confirming long-term equilibrium relationships between the variables.

Table 4.10: ECM Regression Analysis for the short run relationship between inflation rate and balance of payments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LTRADE)	3.458088	1.043060	3.315329	0.0047**
D(LTRADE(-1))	2.746550	1.013533	2.709876	0.0161**
D(LBOP)	-1.425676	0.415548	-3.430829	0.0037**
D(LBOP(-1))	-1.535696	0.463561	-3.312827	0.0047**
D(LINVESTMENTS)	-0.287639	0.120652	-2.384026	0.0308**
D(LINVESTMENTS(-1))	0.523646	0.141535	3.699760	0.0021**
D(LGDP)	1.888469	0.294524	6.411943	0.0000***
CointEq(-1)*	-1.075298	0.104887	-10.25198	0.0000***

* p-value incompatible with t-Bounds distribution.

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Sig.	I(0)	I(1)
F-statistic	8.957654	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

The findings in Table 4.10 show that there is a statistically significant short run relationship between inflation rate and economic stability. The coefficients of the variable were all below 95% confidence interval. By interpreting the results of the ECM, it is observed that coefficient is significant and thus it can be decided that the historical changes in inflation and economic stability. The study indicate a short run relationship between inflation rate and economic stability with F. Statistics 2.94 less than the bound test being 3.28, hence there exist a short run relationship between inflation rate and economic stability of Uganda from 1989-2022.

4.6.1 Long run and short run relationship between inflation rate and balance of payments

Since the variables were found to have a long-run relationship autoregression distribution lag bound tests was done to establish the long-run coefficients. The results for the auto regression distribution lag bound tests is persented in table 4.11

Table 4.11: ARDL Analysis for long run and short run relationship between inflation rate and balance of payments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.07673	7.373720	-2.451508	0.0270*
LINF(-1)*	-1.075298	0.169154	-6.356914	0.0000***
LBOP(-1)	-0.440064	0.459721	-0.957242	0.3536
LINVESTMENTS(-1)	-1.246883	0.259218	-4.810179	0.0002**
LGDP(-1)	3.329477	0.785629	4.237977	0.0007**
LLABOUR**	-1.998090	1.320993	-1.512566	0.1512
LCAPITAL**	6.447425	1.713652	3.762388	0.0019**
D(LTRADE)	3.458088	1.637716	2.111531	0.0519
D(LTRADE(-1))	2.746550	1.518209	1.809072	0.0905

F-Bounds Test			**Null Hypothesis: No levels relationship**	
Test Statistic	**Value**	**Sig.**	**I(0)**	**I(1)**
			Asymptotic: n=1000	
F-statistic	8.957654	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	30		Finite n=30	
		10%	2.334	3.515
		5%	2.794	4.148
		1%	3.976	5.691

Table 4.11 results show that past GDP growth and capital investments have strong, positive effects on the dependent variable, while inflation and investments appear to have negative impacts. Changes in trade have a positive, though marginally significant, influence. The F-Bounds test confirms a significant long-term relationship among these factors, suggesting that managing inflation and promoting GDP growth and capital investment are crucial for economic stability.

4.7 Coefficient Diagnostics

Coefficient diagnostics include graphical and numerical tools for checking the adequacy of the assumptions with respect to both the data and the form of the model, detecting extreme points (outliers) that may be dominating the regression and possibly distorting the results and detecting if strong relationships among the independent variables (collinearity) are affecting the results.

4.7.1 Multicollinearity Test

This section presents the multicollinearity diagnostics, highlighting the Variance Inflation Factors (VIF) for each variable as shown in Table 4.12. The results indicate high multicollinearity for Ltrade, Ltrade(-1), and LBOP, while LINF(-1), LGDP, and Llabour show lower VIF values. These findings suggest that multicollinearity could be impacting model stability, warranting further examination or potential adjustments to improve estimation reliability.

Table 4.12: Multicollinearity checking using variance inflation factor

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LINF(-1)	0.028613	8.416787	2.158010
Ltrade	2.682113	2850.948	4.952261
Ltrade(-1)	3.765320	3978.807	7.323892
Ltrade(-2)	2.304959	2420.539	4.950803
LBOP	0.428988	15517.19	6.481600
LBOP(-1)	0.705805	25342.49	3.628140
Linvestments	0.034689	5.135425	3.170550
Linvestments(-2)	0.047140	6.909483	4.378004
LGDP	0.337736	92.48052	2.818303
Llabour	1.745023	218.1849	2.591606
Lcapital	2.936605	2217.523	9.388818
Constant	54.37174	4401.132	NA

The Durbin-Watson test statistic suggests that we cannot reject the null hypothesis, implying no evidence of serial autocorrelation in the data and supporting the assumption of independent residuals in the model. Meanwhile, the Variance Inflation Factor (VIF) measures multicollinearity among the independent variables in the regression. Specifically, the VIF for a variable is the ratio of the model's overall variance to the variance in a model that includes only that specific variable, helping to identify predictors that may introduce collinearity and potentially distort the model's reliability.

4.8 Residual Diagnostics

Residual diagnostics are used to evaluate the model assumptions and investigate whether or not there are observations with a large, undue influence on the analysis.

4.8.1 Normality Test

A normality test determines whether a sample data has been drawn from a normally distributed population. It is generally performed to verify whether the data involved in the study followed a normal distribution, and this is showed in Figure 4.1

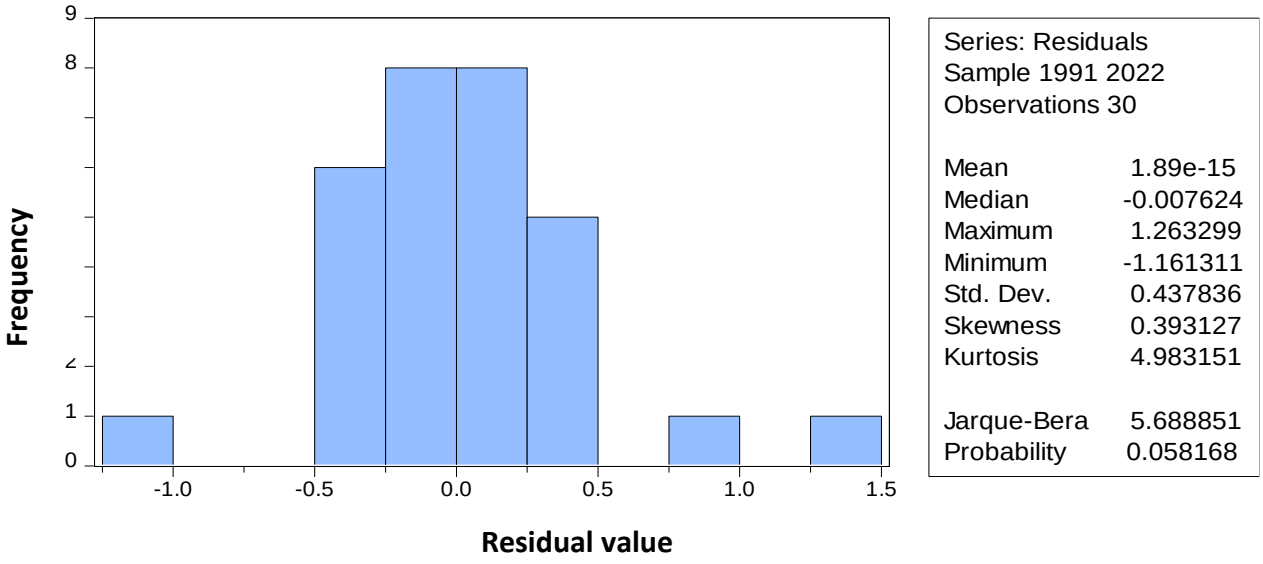

Figure 4.1: Normality tests for the variables

The normality test from Figure 4.1 show that residuals are normally distributed (the probability of Jarque-Bera is equal to 0.0568, and is greater than critical probability 5%). The confirmation of residual normality as shown by Figure 4.1 implies that the estimated linear regression model has realistic predictive powers, and valid predictions can be drawn from its results. Table 4.13

presents diagnostic test results to evaluate the model's overall fit, for residual correlation, and ensure the model specification is appropriate.

Table 4.13: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.010750	Prob. F(14,15)	0.0960
Obs*R-squared	19.57139	Prob. Chi-Square(14)	0.1442
Scaled explained SS	9.744472	Prob. Chi-Square(14)	0.7806

Results in Table 4.13 show the F-statics and Chi-square version of the test statistics gave the same conclusion that; there is no evidence for the presence of heteroscedasticity in this particular study; since the P-value are above 0.05. Therefore, the error in the regression model has a constant variance or (homoscedasticity).

4.9 Stability Diagnostics

Stability diagnostics are essential tools for assessing the consistency and reliability of econometric models over time. These tests help identify whether the relationships within a model remain stable.

4.9.1 Ramsey RESET Test

This section presents the results of the F-test and t-test, used to evaluate the overall fit of the regression model and the significance of the independent variables. The F-statistic assesses the model's overall significance, while the t-statistic evaluates the individual contributions of the variables. The findings help determine whether the relationships in the model are statistically meaningful and offer insights into the factors influencing the dependent variable, and this is presented in Table 4.14.

Table 4.14 Ramsey RESET Test

Statistic	Value	Df	Probability
t-statistic	3.947231	14	0.0015
F-statistic	15.58064	(1, 14)	0.0015

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	2.928189	1	2.928189
Restricted SSR	5.559316	15	0.370621
Unrestricted SSR	2.631128	14	0.187938

As it is shown in Table 4.14; the result of t-statistic and F-statistic shows that 0.0015 and 0.0015 respectively; which are the same number and absolutely less than 0.05. So this implies that, the model is correctly specified.

Leverage Plots

Figure 4.2 is Leverage plot that identifies influential observations, including outliers, high leverage points, and influential observations that could significantly affect the model's results. These findings suggest the need for further investigation and potential adjustments to improve the model's accuracy.

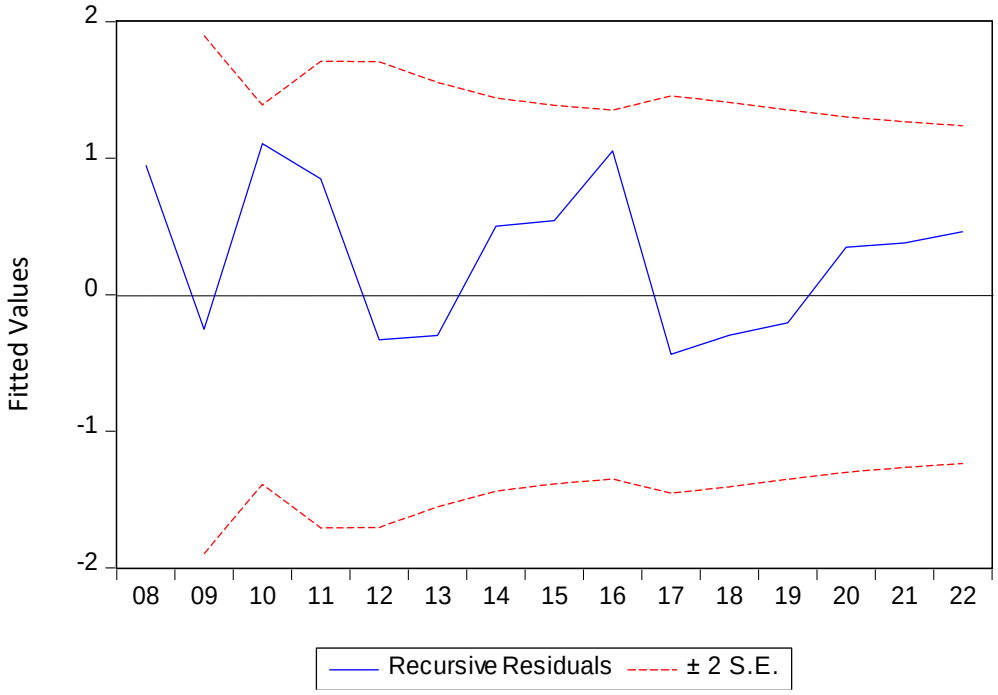

Figure 4.2: Leverage Plots

In Figure 4.2, the leverage plot reveals several influential observations. These include outliers, which deviate significantly from the regression line and could distort the model; high leverage points, which may disproportionately affect the model despite not having large residuals; and influential observations, whose removal would lead to significant changes in the model's estimates. These findings suggest that further investigation is needed to determine if these points are valid or anomalous. Adjusting for these observations may improve the model's accuracy and robustness.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter present the findings attained from the study and discussions are presented in line with the research objectives in comparison with the literature drawn from the different authors. The conclusions are implications of the findings drawn from the field and finally recommendations advanced as action points on statistical modeling of inflation rate and economic stability in Uganda.

5.1 Discussion of Findings

5.1.1 Determine the effect of inflation rates on GDP growth rate in Uganda

The study findings indicate that Table 4.5 shows the effect of inflation rates on GDP growth rate in Uganda from 1989 to 2022. The value of R^2 is 0.173, which suggests that 17.3% of the variation in the GDP growth rate is explained by changes in the inflation rate. The adjusted R^2 value of 0.2513 indicates that, after adjusting for the number of predictors in the model, 25.1% of the variation in the GDP growth rate is accounted for by inflation rate fluctuations. This suggests that inflation rate changes have a notable impact on Uganda's GDP growth rate, with a 25.1% change in GDP growth rate attributed to inflation rate increases.

5.1.2 Influence of inflation rates on trade in Uganda

The study findings indicate that the effect of inflation rates on trade in Uganda's economy from 1989 to 2022, as presented in Table 4.6, shows an R^2 value of 0.207, meaning 20.7% of the variation in trade can be explained by inflation rate changes. The adjusted R^2 value of 0.287 suggests that 28.7% of the variation in trade is accounted for by inflation rates after adjusting for predictors. The study finds that inflation has a statistically significant negative impact on trade, with a p-value of 0.0378, indicating that a unit increase in inflation leads to a reduction in trade value and volume. As a result, the second hypothesis (H02), suggesting no significant influence, is rejected.

5.1.3 Ascertain the relationship between inflation rates and balance of payments in Uganda

The study findings, as presented in Table 4.7, show that the effect of inflation rates on the balance of payments (BOP) in Uganda from 1989 to 2022 is significant. The R^2 value of

0.586992 suggests that 58.6% of the variation in the balance of payments can be explained by changes in inflation rates. However, the adjusted R^2 value of -0.692 indicates a substantial adjustment, showing that 69.2% of the data are accounted for by inflation rate changes. The regression analysis reveals a statistically significant relationship between inflation rates and the balance of payments, with a p-value of 0.0266. This suggests that a unit increase in inflation leads to a reduction in Uganda's balance of payments. The 95% confidence interval (0.05 level of significance), confirms that inflation has a negative impact on Uganda's balance of payments, contributing to an increasing balance of payment problem from 1989 to 2022.

5.1.4 The relationship between inflation rates and investment

Table 4.9 indicates that various aspects of economic stability specifically GDP, trade, balance of payment, and investments are negatively affected by inflation in Uganda, as reflected by the generally negative coefficient values. The findings suggest that inflation has had a predominantly negative effect on Uganda's economic stability. The p-values for balance of payments (0.0459), investments (0.0291), and GDP (0.0078) are all less than the 0.05 significance level, indicating that these economic indicators are significantly influenced by inflation rates in the country.

5.2 Conclusion

The analysis revealed that inflation rates significantly influence key economic indicators in Uganda. Stationarity tests showed that variables such as GDP growth, trade, balance of payments, and investment were appropriately transformed to ensure stationarity, with some requiring first differences to achieve this. This adjustment was crucial for the validity of subsequent regression modeling. Additionally, multicollinearity testing indicated that there were no significant issues among the predictors, allowing for reliable and stable model estimation.

The regression analysis demonstrated that inflation rates have a notable impact on economic stability indicators such as GDP growth, trade, balance of payments, and investment. The models indicated significant relationships between inflation and these economic variables. While the effect on GDP growth was moderate, with 25.1% of its variation explained by inflation rates, inflation's influence on trade and the balance of payments was more pronounced. The analysis

also revealed a statistically significant negative relationship between inflation rates and investment, with all p-values below the 0.05 significance level.

Among the models evaluated, the regression model incorporating inflation rates as a predictor for GDP, trade, balance of payments, and investment showed the best fit. The model revealed that inflation accounts for significant variations in Uganda's economic stability, with the R^2 values indicating that inflation has a meaningful impact on these key economic indicators. The findings underscore the importance of managing inflation to enhance economic stability and foster sustainable growth.

In conclusion, the study highlights the significant and mostly negative role that inflation rates play in Uganda's economic stability. The findings provide critical insights for policymakers, emphasizing the need for effective inflation control measures to mitigate its negative impact on trade, investment, and overall economic growth.

5.3 Recommendations

Based on the findings and conclusions of this study, the following recommendations are made to mitigate the negative impacts of inflation on Uganda's economic stability, specifically focusing on GDP growth, trade, balance of payments, and investment:

1. **Strengthening Inflation Control Measures**: The government should implement comprehensive inflation control policies, including prudent fiscal and monetary strategies. By stabilizing inflation, Uganda can create a more favorable environment for sustained economic growth and reduce the adverse impacts of inflation on GDP, trade, and investment.
2. **Supporting Trade Stability**: To counteract the negative impact of inflation on trade, Uganda should establish trade support mechanisms that cushion the sector from inflationary pressures. This can be achieved by reducing the cost of essential trade inputs, fostering trade resilience, and enhancing trade sector competitiveness.
3. **Improving Balance of Payments through Inflation Management**: Given the significant effect of inflation on Uganda's balance of payments, policies should focus on promoting export growth and import substitution. These measures would strengthen the

balance of payments position, helping Uganda reduce its vulnerability to inflation-driven balance of payment challenges.

4. **Encouraging Investment Stability**: Inflation stability is crucial for fostering a predictable investment climate. The government should introduce incentives that attract both domestic and foreign investment while ensuring inflation is managed to maintain investor confidence in Uganda's economic stability.

5.4 Insight for Further Studies

The current study is based on countrywide sectoral growth as a proxy for economic growth on the inflation rate. Researchers in this area may also consider using panel data to compare the sectoral responsibility for reducing inflation in other African countries.

5.5 Contributions to Knowledge

This research offers a comprehensive analysis of how inflation affects major economic stability indicators, such as GDP growth, trade, balance of payments, and investment in Uganda. By providing empirical evidence over a long period (1989–2022), it adds depth to the understanding of the inflation-economic stability nexus in developing economies, particularly in Uganda, which has had limited prior focus.

The study distinguishes between short-run and long-run effects of inflation on economic stability, highlighting that while inflation has a significant short-run impact, its long-run effects are negative but not statistically significant. This dual perspective enhances the understanding of the temporal nature of inflationary impacts on the economy.

The findings provide actionable insights for policymakers, particularly the recommendation to implement inflation control measures to foster economic stability. This is crucial for shaping inflation-targeting strategies in Uganda and other economies facing similar inflationary pressure

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APPENDIX I: DATA FOR THE VARIABLES

Year	Inflation	Trade	Balance of payment	Investments (FDI)	Labour % of Gdp	Capital % of Gdp	GDP
1989	8.32	26.60	-547800000	3.12	3.1	11.8	6.40
1990	7.01	29.40	-508500000	1.13	3.4	12.7	6.50
1991	6.01	33.05	-424900000	0.03	3.3	15.2	5.60
1992	7.86	28.23	-483900000	0.1	3.3	15.9	3.40
1993	8.092	27.63	-477790000	1.69	3.2	15.2	8.30
1994	10.03	32.62	-623400000	2.21	3.1	14.6	6.40
1995	6.55	32.38	-825220000	2.1	3.1	16.4	11.50
1996	7.19	35.38	-877470000	2	3	17	9.10
1997	8.16	34.15	-954180000	2.79	3	16.9	5.10
1998	0.06	30.04	-1207960000	3.18	3	15.9	4.90
1999	5.77	36.02	-728800000	2.33	3	19.3	8.10
2000	3.39	32.74	-745400000	2.59	3.1	19.2	3.10
2001	1.86	35.32	-770600374.1	2.59	3.2	19	5.20
2002	-0.28	36.27	-845961839.5	2.98	3.3	20	8.70
2003	8.68	36.58	-744677722.3	3.06	3.3	20.7	6.50
2004	3.72	35.46	-787003913.9	3.7	3.4	19.9	6.80
2005	8.44	38.99	-812386909.3	4.11	3.4	22.2	6.30
2006	7.31	43.63	-1262231495	6.45	3.4	20.9	10.80
2007	6.13	46.77	-1507574900	6.65	3.4	21.9	8.40
2008	12.05	56.25	-2260444730	5.04	3.4	22.7	8.70
2009	13.01	47.06	-1874448911	3.34	3.3	24.7	6.80
2010	3.97	38.26	-2710270040	2.03	3.3	25.2	5.60
2011	16.56	39.75	-3161103294	3.2	3.3	26.8	9.40
2012	12.68	43.50	-2810466919	4.41	3.3	26.5	3.80
2013	4.90	43.10	-2469982029	3.79	3.3	27.5	3.50
2014	3.07	36.01	-2869237267	3.24	3.3	26.4	5.10

2015	5.58	37.68	-2583228571	2.27	3.5	27.6	5.18
2016	5.70	36.20	-1670742138	2.14	4.3	23.6	4.78
2017	5.20	36.83	-2135895466	2.61	3.1	22.8	5.79
2018	2.61	36.63	-2795233354	3.2	4.2	24.5	6.18
2019	2.86	39.36	-3623437761	3.6	4.3	25.3	6.80
2020	3.31	37.00	-4587017968	2.32	3.9	24.1	6.12
2021	2.20	41.71	-4454817967	2.89	4.9	23.24	5.98
2022	7.19	42.16	-5029805770	3.21	4.91	23.87	6.30

Source of Data

https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS

https://data.worldbank.org/indicator/NE.GDI.TOTL.ZS

https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG