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Investigating the Influence of GDP and Unemployment Rates on Inflation: An Analysis of the US Economy from 1960 to 2022

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ABSTRACT: *This study investigates the impact of inflation on GDP and the unemployment rate in USA, spanning the years 1960 to 2022. Utilizing a longitudinal approach, data for the study is sourced from secondary references. The findings reveal that inflation has an insignificant effect on both GDP and unemployment. Independent variables i.e. GDP and Unemployment Rate causes 10.8 % change in dependent variable i.e. Inflation. The correlation analysis reveals a weak and insignificant relationship between inflation and GDP, indicated by a value of -0.323. Similarly, the correlation between inflation and unemployment is also insignificant, with a negative value of -0.063. In simpler terms, the data suggests that decreasing inflation could contribute to increasing GDP, and vice versa for unemployment*

KEY WORD*: GDP, Unemployment, Poverty, Inflation*

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I. INTRODUCTION AND LITERATURE REVIEW

According to Human Development Index (HDI) report, In 2021, the United States had an HDI value of 0.921, ranking 21st out of 191 countries in the Very High human development category.From 1990 to 2021, the United States' HDI increased by 5.6%, rising from 0.872 to 0.921. During this period, life expectancy at birth in the U.S. increased by 1.8 years, mean years of schooling went up by 0.7 years, and expected years of schooling increased by 0.9 years. Additionally, the country's Gross National Income (GNI) per capita grew by approximately 64.1% over the same period.

The Human Development Index (HDI) measures a country's overall progress in three key areas: health, education, and standard of living.

This study explores the relationship between inflation, unemployment, and poverty. The dynamics of inflation and unemployment vary across different economies, as observed by Slesnic (1993). Some economies experience a correlation between high inflation and high unemployment, while others show a moderate relationship between high inflation and unemployment, and some exhibit high inflation with low unemployment (Blank, R.M., 1993).

Similarly, certain countries face situations where their economies have moderate to low inflation coupled with moderate to low unemployment, while others grapple with moderate to low inflation but moderate to high unemployment levels. This diversity highlights the varied presence of inflation in different economies.

Given the pervasive nature of inflation in economies worldwide, it becomes a important research objective for investigation. The study aims to critically examine the impact of inflation on unemployment. As a research student in higher studies, identifying and understanding these variables offer valuable insights into economic problems, particularly focusing on the issues of inflation and unemployment and their interrelationship.

The study aspires to contribute by shedding light on the main reasons behind these phenomena, providing critical analysis.

Study Objectives:

- Investigate and understand the impact and significance of inflation on the overall economic landscape of USA.
- Analyze and assess the contribution and implications of Gross Domestic Product (GDP) in shaping the economic conditions in USA.
- Evaluate the relationship between inflation and unemployment, seeking to understand how fluctuations in inflation rates may influence the employment scenario in the US economy.

II. LITERATURE REVIEW

Our research explores the connection between inflation, GDP, and unemployment. In our country, inflation is a significant concern, with two main types: demand-pull and cost-push. Many experts argue for a positive link between inflation and unemployment, noting rising rates in both. This study covers the period from 1960 to 2022. (Slesnic, 1993).

Inflation, the decrease in the value of money, poses significant challenges, adversely affecting a country's economic growth. Several researchers, such as Gokal and Hanif (2004), suggest a negative correlation between inflation and economic growth.

Recession poses a significant challenge as rising unemployment rates have far-reaching consequences, impacting various aspects of life. The societal repercussions include health issues, household tensions, increased suicide cases, diminished capabilities, disillusionment, and a surge in violence and crime (The effects of unemployment on society and the economy, 2009-2015). This phenomenon is intricately linked to inflation, with integration analysis in the study revealing essential insights. The reciprocal relationship between inflation and unemployment is further emphasized, and various alternatives are explored to gauge the risk associated with changes in unemployment, such as examining its impact on the employment rate (Metin, 1998).

Framework for research

Dependent Variable: - Inflation

Independent Variable: - Unemployment Rate and Gross Domestic Product (GDP)

Hypothesis for research

Null Hypothesis (H0): The inflation rate has no significant impact on the percentage of GDP and the unemployment rate in the US economy.

Alternative Hypothesis (H1): The inflation rate has a significant impact on the percentage of GDP in the US economy.

Inflation

Inflation, as defined by Catao and Terrones (2003), refers to the persistent increase in prices over time, accompanied by a decline in the purchasing power of money, affecting both goods and services

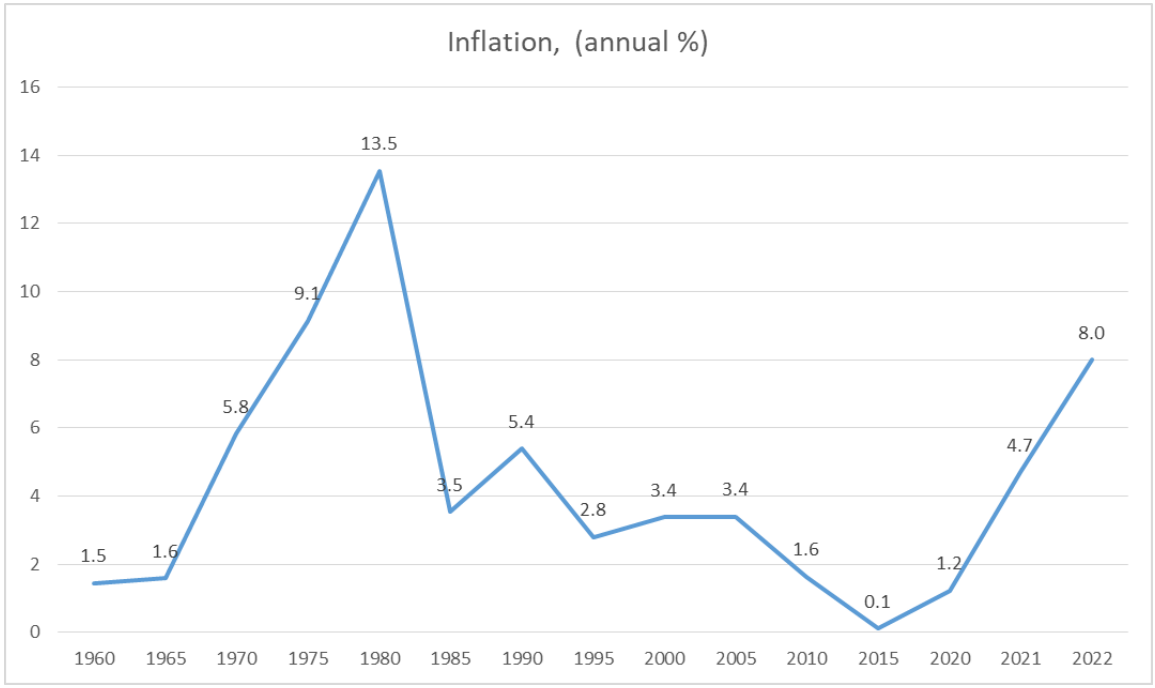


Fig: - Inflation Rate Chart

Unemployment

Metin (1991) defines unemployment as a significant phenomenon in economies, negatively impacted by inflation. The research study employs multivariate co integration analysis to establish crucial findings. The study highlights the substantial influence of the scale of budget deficit on inflation. Furthermore, it emphasizes the reciprocal relationship between inflation and unemployment in economic domains. The economic outlook

concerning unemployment is assessed by considering the unemployment risk in the population and the level of protection individuals have against income unemployment risk. In this context, alternatives for unemployment risk changes are explored through variations in the employment rate.

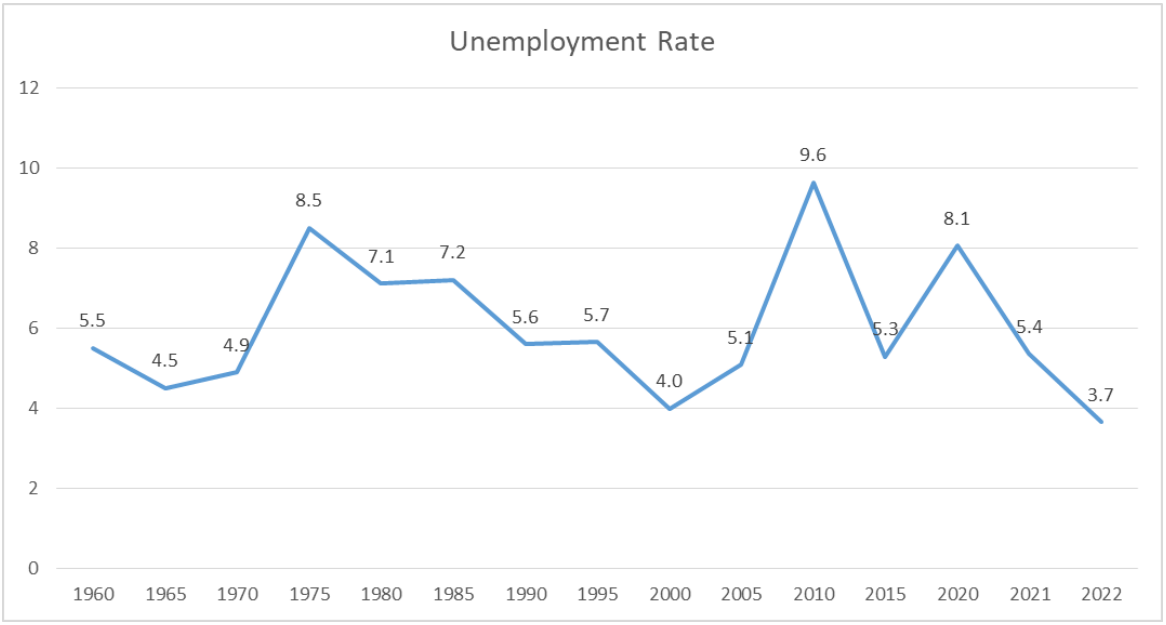


Fig: - Unemployment Rate Chart

GDP (Gross Domestic Product)

Zafar and Mustafa (1998) establish a statistically positive correlation among macroeconomic factors contributing to the economic growth of India. Their findings indicate that budget deficit adversely impacts the GDP while simultaneously exerting a positive influence on inflation. The research delves into how private and public investments act as controls on inflation and create job opportunities, serving as mechanisms to regulate unemployment. Consequently, it is observed that economic prosperity is achievable through well-defined guidelines, supportive strategies, and effective initiatives for both development and the management of inflation and unemployment (Kemal, 1989). In a study on the Nigerian economy, Zenneth (2007) uncovers that efforts to alleviate unemployment have repercussions on economic factors such as inflation, a deficit economy, and a low GDP growth rate. The same research explores the role of fiscal policy in mitigating these challenges.

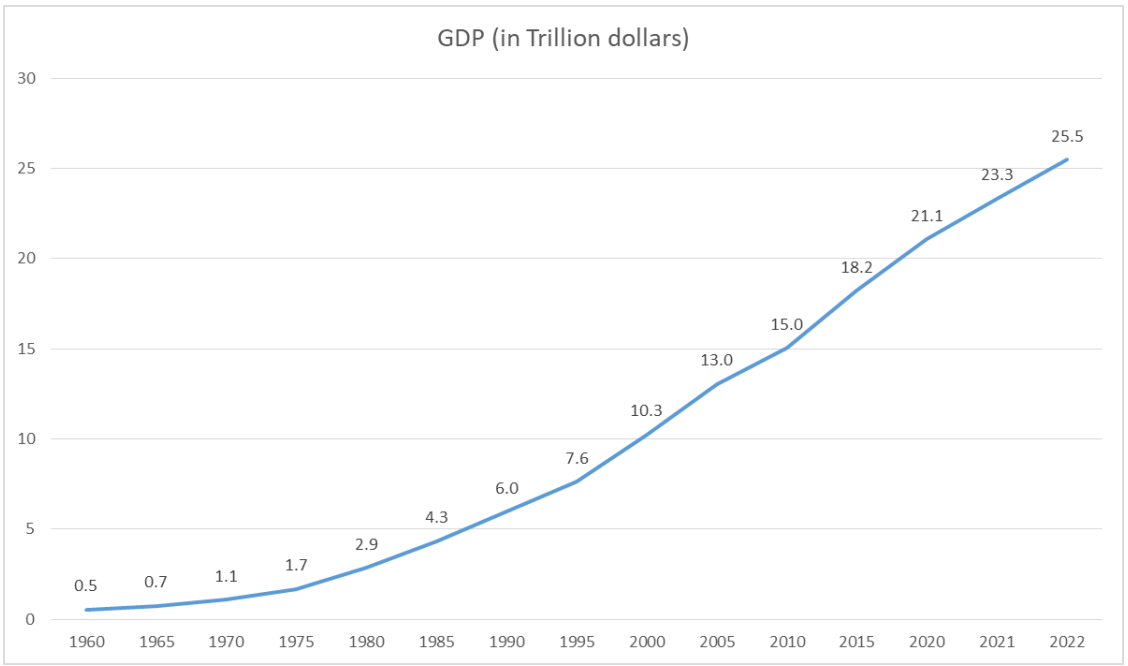


Fig: - GDP Rate Chart

, manufacturing and agricultural sectors. The crisis had cost more than US$50 billion. In order to overcome from such crisis the government of Malaysia has taken several mega-projects in order to implement the balanced growth recovery Plan. As a result of these measures, the economy has recover quickly and now become stable and registering positive signs. For instance, the Real GDP turned around from a -7.5 per cent to 5.4% in 1998-99 (Athukorala & Waglé, 2011).

Malaysia is one of the developing countries that belief that inflow of FDI will increase their growth and makes the country developed. The government of the country has a positive attitude towards the inflow of FDI since 1980 and have kept an open policy towards inflow of foreign investment in the country. It has made FDI to play an important role in the capital formation of the country and in taking the economy in the trajectory of development. The net FDI inflow in Malaysia in the year 1990 was close to a quarter of the Gross Fixed Capital Formation and contributed to 8% of the GDP. According to global records of ASEAN economics, it has been stated that Malaysia has one of the member countries of ASEAN that have attracted maximum amount of FDI in the country. Since independence of Malaysia in the year 1957, the country has taken advantages of its tangible and intangible assets to bring FDI in the country. The tangible assets refers to the resources and abundant labour force and intangible assets refers to the benefits it provides to the foreign multinationals by maintaining stable macroeconomic conditions, liberalised trade regime and a resourceful legal structure. Karim (2011) have shown that bi-directional casual link between the economic growth and FDI in Malaysia which implied that FDI inflow has contributed to the growth of Malaysia (Gee and Karim, 2011).

Malaysia is a growing economy with relatively much open economic policy towards global trade and investment. The country has a consistent record of growing GDP rate from 1970 to 2005 of around 7%. In 2007, the GDP was calculated to be $357.9 billion and was recorded by the World Bank as 29th largest economy in the globe with respect to the purchasing power parity. However, the country has also faced several crises situation due to its openness to the world, for example, the 1970 oil crisis, the 1980s downturn in the electronic industry and the 1997 Asian financial crises. The impact of these crises were felt in a large scale , however, the country could still maintain a consistent growth rate due to continuous flow of FDI in the country, especially in the manufacturing sector that contributed to 31.4% of GDP share in 2005 (Iamsiraroj and Ulubaşoğlu, 2015).

The flow of FDI has been the main driver of growth in Malaysia. The Investment Incentives Act 1968 was introduced in Malaysia to increase the flow of FDI. Further, the policy reforms, the setting of free trade economic zones in 1970, the export incentives provided in the open policy 1980, all have increased the flow of FDI enormously. Furthermore, the government has provided liberal incentives in form of giving permission for having a larger share of ownership in foreign equity under the Promotion of Investment Act (PIA), 1986. As a result of such liberal policies, the flow of FDI has grown at a rate of 38.7% during the period 1986 and 1996. The major area of investment by the foreign companies was in electronic, chemicals, metal, minerals, food products, plastic and scientific equipments (Lall,2013).

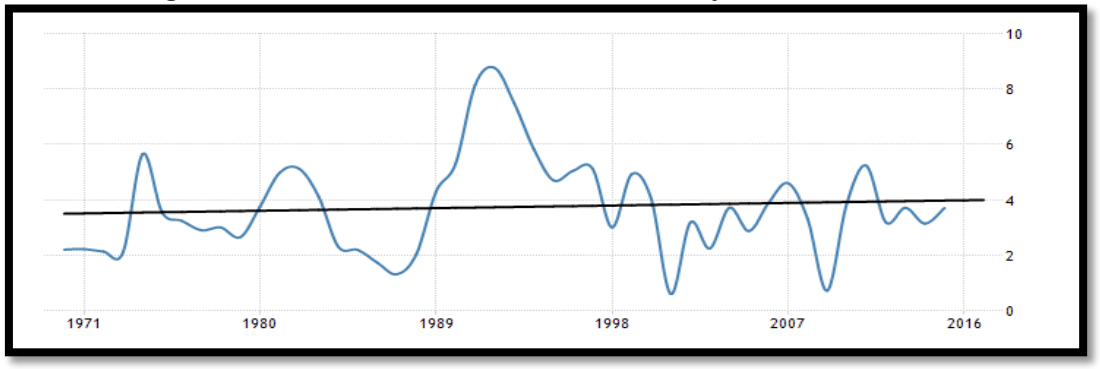
The flow of FDI has slowed down in the year 2007 as shown by the table below where the country's rank has reduced from 67 to 71 in the inward FDI performance index. However, the inward FDI potential index has improved from 41 to 40.

Table 1: FDI Index

	Inward FDI performance index		Inward FDI potential Index	
Economy	2005	2007	2005	2007
Malaysia	67	71	41	40

Source: UNCTAD, 2008

Figure 1:Net Inflow of FDI as a %of GDP in Malaysia from 1976 to 2016



Source: World Bank

According to the World Bank data, the FDI net inflows as a percentage of GDP was 3.14 in 2014 in Malaysia. There has been several up and down in the inflow of FDI but overall there has been a steady flow besides few global crises situations like that of 2008 United States recession which is shown by the trend line across the data set. The highest inflow was in 1982 and 1994 and the lowest was in 2008 and 2001 (Blonigen and Piger, 2014).

While one of the important literatures analyzed the relationship between FDI and economic growth of the country, (Chowdhury and Mavrotas ;2006); (Büthe and Milner;2014) (Borensztein et al., 1998 for details), some others were concerned about identifying the factors that affects the inflow of FDI of the country. For instance, a paper by Athukorala (2011) found that the era of 1990's also witnessed a sustained economic growth through increase in productivity, industrial upgrading, improvement in information technology, since more emphasis was given on the government policies which in turn helps to vibrant small and medium-scale industrial sectors. Further, Busse & Hefeker (2007), discusses the other important determinants of the inflow foreign direct investment like the stable government, absence of conflict in the internal system or environment of the host country and basic rights of democracy. It was concluded by them that inflow of FDI increases if the institute of the country support it. The quality of the institution increases the flows of the FDI in the country and bad quality institute reduces the inflow of the FDI. Further, stability in the macroeconomic indicators of the country is an important factor that determines the affect of FDI on the economic growth of the country.

With this, the primary objective of the paper is to identify the factors that can either directly or indirectly affects inflow of FDI in Malaysia. Also how such inflow of FDI can affect the export concentration index (represented as HHI index) of the country. That is, whether such inflows of FDI are concentrated within a set of industries that dominates Malaysian export or not. Therefore, structure of the paper is organized as follows. Section 1.1 of the paper introduces the concept and tried to justify the possible reasons behind the study through a brief review of literature. Section 1.2 clearly mentioned the basic research objectives of the paper. Section 1.3 clarifies the data and methodology of the paper. Finally, section 1.4 interprets the result and concludes

1.2 Research Objectives

The objective of the research is exploring the relationship between inflation, GDP, and unemployment rates in US economy.

1.3 Research Methodology and Data Analysis

Data has been sourced from the WORLD BANK for the period 1960-2022. The 62-year timeframe offers a comprehensive view for analyzing inflation, GDP, and unemployment at the national level. Utilizing correlation, regression analysis, and an ANOVA model, the research aims to draw statistical conclusions, providing numerical insights into the observed phenomena.

Year	GDP (in Trillion dollars)	Unemployment Rate	Inflation
1960	0.54	5.5	1.46
1961	0.56	6.7	1.07
1962	0.61	5.5	1.20
1963	0.64	5.7	1.24
1964	0.69	5.2	1.28
1965	0.74	4.5	1.59
1966	0.82	3.8	3.02
1967	0.86	3.8	2.77
1968	0.94	3.6	4.27
1969	1.02	3.5	5.46
1970	1.07	4.9	5.84
1971	1.16	5.9	4.29
1972	1.28	5.6	3.27
1973	1.43	4.9	6.18
1974	1.55	5.6	11.05
1975	1.68	8.5	9.14
1976	1.87	7.7	5.74

1977	2.08	7.1	6.50
1978	2.35	6.1	7.63
1979	2.63	5.8	11.25
1980	2.86	7.1	13.55
1981	3.21	7.6	10.33
1982	3.34	9.7	6.13
1983	3.63	9.6	3.21
1984	4.04	7.5	4.30
1985	4.34	7.2	3.55
1986	4.58	7	1.90
1987	4.86	6.2	3.66
1988	5.24	5.5	4.08
1989	5.64	5.3	4.83
1990	5.96	5.6	5.40
1991	6.16	6.8	4.23
1992	6.52	7.5	3.03
1993	6.86	6.9	2.95
1994	7.29	6.12	2.61
1995	7.64	5.65	2.81
1996	8.07	5.45	2.93
1997	8.58	5	2.34
1998	9.06	4.51	1.55
1999	9.63	4.22	2.19
2000	10.25	3.99	3.38
2001	10.58	4.73	2.83
2002	10.93	5.78	1.59
2003	11.46	5.99	2.27
2004	12.22	5.53	2.68
2005	13.04	5.08	3.39
2006	13.82	4.62	3.23
2007	14.47	4.62	2.85
2008	14.77	5.78	3.84
2009	14.48	9.25	-0.36
2010	15.05	9.63	1.64
2011	15.60	8.95	3.16
2012	16.25	8.07	2.07
2013	16.84	7.37	1.46
2014	17.55	6.17	1.62
2015	18.21	5.28	0.12
2016	18.70	4.87	1.26
2017	19.48	4.36	2.13
2018	20.53	3.9	2.44
2019	21.38	3.67	1.81
2020	21.06	8.05	1.23

2021	23.32	5.35	4.70
2022	25.46	3.65	8.00

Our quantitative analysis, based on 62 years of data (1960-2022) encompassing GDP, unemployment, and inflation rates in the USA, was conducted using SPSS software. The results offer crucial insights into the interplay between GDP, unemployment, and inflation. Below, we present key findings along with critical explanations for better understanding.

Table 1- Correlation between GDP, Inflation and Unemployment

Correlations

Correlations				
		GDP	Unemployment_Rate	Inflation, consumer prices (annual %)
GDP	Pearson Correlation	1	-.063	-.323**
	Sig. (2-tailed)		.625	.010
	N	63	63	63
Unemployment_Rate	Pearson Correlation	-.063	1	.083
	Sig. (2-tailed)	.625		.519
	N	63	63	63
Inflation, consumer prices (annual %)	Pearson Correlation	-.323**	.083	1
	Sig. (2-tailed)	.010	.519	
	N	63	63	63
**. Correlation is significant at the 0.01 level (2-tailed).				

Explanation

The provided model explores the correlation among Inflation, GDP, and Unemployment. As indicated by the Pearson Correlation results, all three variables exhibit negative values, signifying a negative correlation. Specifically, the correlation between Inflation and GDP yields an insignificant result with a modest value of -0.323. Similarly, the correlation between Inflation and Unemployment is also deemed insignificant, showing a negative value of -0.063. These findings suggest that in order to boost the country's GDP, a decrease in the Inflation rate may be necessary, and conversely, a reduction in Unemployment could contribute to this objective.

Table 2-Model fit between Inflation, GDP and Unemployment

Model Summary

Model Summary									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.329[a]	.108	.078	2.67313	.108	3.640	2	60	.032
a. Predictors: (Constant), Unemployment_Rate, GDP									
b. Dependent Variable: Inflation, consumer prices (annual %)									

Explanation

R square value

The R-squared value, indicating the proportion of variation in Inflation explained by the dependent variable (GDP and Unemployment) during the period 1960-2022, is 10.8%. This means that 10.8% of the variability in Inflation can be attributed to changes in GDP and Unemployment.

R value

The R-value, reflecting the strength and direction of the model, is 32.9%. This suggests that approximately 32.9% of the correlation between observed and predicted values of Inflation is accounted for by the model, indicating a reasonably strong relationship.

Adjusted R square

The Adjusted R-squared value, which considers the addition of more variables to the model, indicates that only 7.8% of the variation in Inflation is explained by the model after incorporating additional variables.

Standard Error of estimates

The Standard Error of Estimates, representing the standard deviation of the error term, is approximately 2.67%. This value is crucial for assessing the precision or reliability of the independent variable. A lower standard error indicates a more accurate fit of the model to the data, and in this case, it suggests that the average distance of data points from the fitted line is around 2.67%.

Table 3- Significance level or F value
ANOVA

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.021	2	26.010	3.640	.032[b]
	Residual	428.737	60	7.146		
	Total	480.758	62			
a. Dependent Variable: Inflation, consumer prices (annual %)						
b. Predictors: (Constant), Unemployment_Rate, GDP						

Explanation
In the provided analysis:

The p-value associated with the F-value is reported as 0.032.
The interpretation is that this p-value is less than 0.05, indicating statistical significance.
The model is considered a good fit, and the likelihood of obtaining the observed results by chance is less than 5%.
The model is suggested to contribute to 3.2% of the observed variation, as mentioned.
Additionally, the ANOVA results support the conclusion that there is a significant relationship between the independent variable (Inflation) and the combined effect of the dependent variables (GDP and Unemployment Rate). The p-value of 0.032 in the ANOVA results further affirms the statistical significance, suggesting that the relationship is unlikely to be due to random chance.

Table 4- Coefficient Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.151	1.390		2.986	.004
	GDP	-1.262E-13	.000	-.319	-2.611	.011
	Unemployment_Rate	.109	.212	.063	.514	.609

Explanation
Estimated coefficients provide valuable insights into the impact of changes in the independent variables on the dependent variable in the model:

GDP Coefficient (-0.319):
For every one percent increase in GDP, the model predicts, on average, a decrease of approximately 31.9 percent in the inflation rate. This suggests an inverse relationship, indicating that higher economic output tends to be associated with lower inflation, while holding other variables constant.

Unemployment Coefficient (0.063):
For every one percent increase in the unemployment rate, the model predicts, on average, an increase of about 6.3 percent in the inflation rate. This positive coefficient implies that higher unemployment rates are associated with higher inflation, holding other variables constant.
The beta value for Unemployment Rate (0.063) suggests that a one-unit increase in the unemployment rate is associated with a 0.063-unit increase in inflation.
The beta value for GDP (-0.319) indicates that a one-unit increase in GDP is associated with a decrease of 0.319 units in inflation.

In order to observe the factors that affect the inflow of FDI of the country, the paper is going to use the factors that can directly or indirectly affects the inflow of FDI of the country. The variables taken to represent the factors are GDP growth rate, volume of tax calculated, time spend on governance and amount of inflation. The variables are first defined and then how they can directly or indirectly affect FDI is discussed.

1.4 Findings and Interpretation
After using SPSS software to test our hypotheses, we found that our initial idea (H1) was not supported, and the null hypothesis (H0) was confirmed. This means that there isn't a significant relationship between Inflation and GDP based on our analysis of data collected from 1960 to 2022. The results, obtained through secondary research, suggest that there is indeed a meaningful connection between Inflation and GDP.

The significance level of our model is 3.2%, and the R-value is 39.2%, indicating that our data fits well into the model. About 10.8% of the changes in Inflation can be explained by the factors we studied, namely GDP and Unemployment. The study's coefficient results indicate that a 1% increase in output could lead to a 31.9% decrease in Inflation. The Pearson correlation also confirms a negative relationship between Inflation and the studied independent variables (GDP and Unemployment).

In simple terms, our research suggests that, contrary to our initial hypothesis, there is indeed a significant connection between Inflation and GDP. The model we used is effective, explaining a good portion of the changes in Inflation, and our findings indicate that increasing economic output could potentially lead to a decrease in Inflation

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