

Investigations into Ghana's Macroeconomics Relationship between Inflation and Unemployment. Quantitative Analysis Based on Time Series in the Years 1990-2014.



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ABSTRACT: Indicators of a country's economic well-being include the unemployment rate and inflation rates. The empirical relationship between inflation and unemployment in Ghana's economy is explained and analyzed in this paper. It appears that the most hotly debated statistics in Ghana are the rate of inflation and the rate of unemployment, yet there is lack of knowledge about the connection between unemployment and inflation, it is imperative that we gain this understanding. In addition, the tax rate, compensation for employees, participation in the labor force, and enrolment in tertiary education are all indicators of unemployment. A quantitative framework is used to explain the empirical relationship between inflation and unemployment in Ghana and determine the sensitivity of unemployment to changing inflation levels using co-integration regression, causality, correlation, and sensitivity analyses. The Augmented Dickey-Fuller test of stationarity was adopted, after which the Granger causality method was used to determine causation between inflation and unemployment. The study relied on World Bank data from 1990 to 2014 and found a strong correlation between unemployment and inflation in the Ghanaian economy which is also consistent with Haug and King (2011), whereas Onwioduokit (2006) found a negative correlation. The model's variables are stationary, and the findings of the causality test point to a link between Ghana's high unemployment rate and its high inflation rate. The unemployment will rise by 3.2795 percent if inflation rises by 1 percent. I therefore recommend that the Ghanaian economy maintain a low and stable inflation rate in order to reduce unemployment, equivocally, thanks to the findings of this research. There is evidence to suggest that inflation has a long-term positive impact on and is a direct cause of unemployment in Ghana, so policymakers and the government should put more effort into keeping inflation low in order to address this problem. Since inflation levels can be used to measure unemployment levels to some extent and the R-squared is significantly low in the regression result, the measurement of inflation should be done more accurately to avoid errors. Ghana's Statistical Service must devote more resources to ensuring that the CPI basket includes only relevant items and should be given the appropriate weights. Real-world impact should be reported in relation to other indicators or factors to make it more comprehensible. For example, an increase in unemployment of z percentage points could be explained by an increase in the price of an item purchased on the market rising by y percentage points. Finally, the researcher recommends that other economic indicators, such as employee compensation, tax rate, labor force participation rate, and tertiary school enrollment, be taken into consideration as potential indicators of unemployment in African economies.

KEYWORDS: Inflation rate, Unemployment rate, Economic well-being, Macroeconomics.

1.0 RESEARCH BACKGROUND

The government's main macroeconomic goals are to maintain a stable domestic price level and to ensure full employment. According to the three broad macroeconomic measures of unemployment, inflation and growth of output, macroeconomic performance is evaluated (Ugwuanyi, 2004). For a long time, the Ghanaian economy has been plagued by inflation, despite the numerous economic policies that have been put in place to combat it. In order to maintain progress and boost economic growth, more research into effective and efficient measures to reduce inflation is required. Conscious and intensive government efforts to speed up economic development have characterized Ghana's history. Education, hydropower, transportation, and industrialization are just a few of the fields that have seen notable progress over the years. Inconveniently, these realizations have come at the expense of increasing financial instability, dwindling external reserves, increasing disequilibrium in the balance of payment, and inflation. Good monetary policy relies heavily on controlling inflation. To maintain overall macroeconomic stability, inflation is a concern, but the poor are particularly vulnerable to it because they lack effective inflation hedges. As inflation

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introduces noise into the price system, maintaining price stability is a desirable outcome in and of itself. Unemployment and inflation were previously treated as separate topics in economics prior to the appearance of the so-called Phillips curve in 1958. At a time of full employment (Keynes' definition), inflation is defined as the excess of expenditure over income at that point. He argued that the more money spent, the greater the inflationary gap and the faster inflation. According to the Keynesian economists, a rise in unemployment reduces income, which in turn reduces consumption, which in turn reduces aggregate output. A rise in consumption or investment will result in more jobs. There was another explanation for inflation that was used by monetarists: a rise in money supply that was outpacing economic output. Milton Friedman's "permanent income hypothesis" is the framework in which they view unemployment. To put it another way, according to the Permanent Income Hypothesis (PIH), a reduction in employment and current receipts only has a limited impact on income. Policy options came from all directions. To examine inflation and unemployment at the same time, however, there were no major efforts. For the first time, traditional economic theory began to consider both unemployment and inflation simultaneously only in 1958 after A.W. Phillips introduced his Phillips curve. This postulated that a lower inflation rate would be willing to accept higher levels of unemployment, and vice versa. A number of prominent economists disagreed with the short-term unemployment-inflation trade-off, arguing that the Phillips curve is actually vertical in the long term. These critics included Milton Friedman and Edmund Phelps. The Natural Rate Hypothesis was introduced as a result of this. Phillips' trade-off theory has also been disproved by other economists who have carried out empirical analysis over the years. However, in 1967-1970, most countries, including the United States, Britain, and France, saw their inflation rate double (Ormerod,1995). In Philips Curve, this was a first indication that the downward relationship wasn't always the case. Stagflation is a term coined to describe a situation in which high inflation and high unemployment coexist. The economic crisis affecting the majority of the world's least developed countries is exacerbated by these two interrelated issues. In today's economy, it's impossible to separate the two concepts of unemployment and inflation. Many economists have attempted to decipher the connection between inflation and unemployment over the years. Both short-term and long-term explanations can be given for this relationship. The two have a short-term inverse relationship. According to this correlation, when unemployment is high, inflation is low, and the other way around. In most cases, unemployment is assumed to remain at a constant level regardless of the state of inflation. Rates of inflation are expected to rise when there are fewer people out of work and fall when there are more people in work. Generally speaking, this means that when there are more people out of work, the rate of inflation will be higher than expected. To begin, we need to identify the issue. Every country's social and economic well-being is threatened by unemployment and inflation. Existing research suggests that poverty in developing countries is caused by two interrelated problems: inflation and unemployment. Inflation can be reduced by increasing productivity, according to some economists. Productivity growth is critical for ensuring a sufficient supply of goods and services, which in turn boosts the general well-being of society and advances social progress. Most developing countries aim for economic growth, domestic price stability, and full employment as their macroeconomic objectives. In order to improve the lives of everyone, these objectives are pursued. Price instability and a high unemployment rate have a significant impact on growth rates. Inflation and unemployment could have a negative impact on economic growth. According to Ejembi et al. (2015), there are a variety of theories about the relationship between unemployment and inflation. However, the data used by these economists came from the developed world, specifically the United States and the United Kingdom. We are interested in the macroeconomic relationship between unemployment and inflation in Ghana, which is the focus of this study.

1.2 Purpose of the Research

Research's primary goal is to figure out what role unemployment and inflation play at the national level in Ghana. The study's specific goals are as follows: In order to see if unemployment and inflation are mutually exclusive, For the purpose of determining whether or not Ghana's high inflation rate is causing unemployment, to learn more about the causes of Ghana's high rate of unemployment.

1.3 Aims and Questions for Future Research

The following hypotheses are formulated in the null form for empirical testing in order to achieve the study's goal:

HO1: Unemployment and inflation have no connection.

HO2: In Ghana, inflation does not lead to increased unemployment.

HO3: Unemployment in Ghana is solely due to the country's economic situation.

1.4 The Importance of the Research

Even in developing countries like Ghana, governments strive to increase real output per capita growth in order to improve the quality of life for citizens. In order to boost investment and raise real output, a stable macroeconomic environment is necessary, and inflation is no exception. For accurate forecasts, it is essential to investigate the relationship between Ghana's inflation rate

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and unemployment rate. Consequently, this investigation is required because it will: Citizens should be able to see how inflation affects their standard of living by providing them with relevant information. In order to help policymakers keep inflation and unemployment at a stable level, provide them with relevant information. Add to the existing body of knowledge about the relationship between inflation and unemployment in Ghana by providing specific examples. Contribute to the body of knowledge in the field and lay a foundation for future research.

1.5 The Study's Scope.

Research in this area focuses on comparing inflation and unemployment in Ghana from 1990 to 2014 using data from the World Databank. Additionally, the study aims to test the Philips curve hypothesis in Ghana.

1.6 The Study's Limitations

The following are some of the study's limitations.

It's too small a sample size: This is a quantitative study that uses explanatory research designs. This correlation can only be established with a large sample size. As a result of this, the results may be affected by the use of only data from 1990 to 2014.

The secondary data that would be used for this study contains information that has already been measured. A measurement error in the primary source of measurement will therefore have an impact on the research's findings.'

For a final reason, because the researcher is still a student, he or she was unable to devote as much time as he or she would have liked to study because of a time crunch.

1.7 This section deals with the study's organization.

Five chapters make up the study. There is a brief discussion of the study's background and objectives as well as the research hypothesis and the study's limitations in the first chapter. Chapter 2 provides an overview of relevant academic literature, including journals, books, and other academic publications. Theoretical analysis is part of the package. The study's research methods are discussed in detail in Chapter 3. This chapter examines the presentation and analysis of data. Analysis of World Databank's data for 1990-2014 is done heredata. 's Finally, in chapter five, the findings, conclusions, and recommendations of the study are summarized.

1.8 Term Explanation

As prices continue to rise, this is known as inflation.

Unemployment is the state of not having a job or being unable to find one.

Macroeconomics is the branch of economics that examines how a country's economy as a whole works.

Production and distribution and consumption are all part of an economy's structure.

Consistent increases in the economy's productive capacity are referred to as "economic growth" (and therefore a growth of national income)

2.0 REVIEW OF THE LITERATURE

Literature from sources such as books, journals and magazines is examined in this chapter. Also, the study's theoretical framework is examined in this section. Negative, natural and positive hypothesis, as well as the shift in Phillips curve are all categorized in this chapter.

2.1 Unemployment as a Concept

The term "unemployment" refers to a situation in which a worker or workers are unintentionally unable to find a job (Balami 2006). As a result, despite their willingness and ability to work, these workers have been unable to secure employment. Classical economists have a tendency to define unemployment as a situation in which there is an imbalance between the supply and demand for labor as a result of a change in the real wage. An increase in the number of people looking for work is known as "Classical" or "real wage" unemployment, and it occurs when the real wages for jobs are set above the market clearing level.

The International Labour Organization (2009) defines unemployment as a state of joblessness that occurs when people are unemployed and have actively sought work within the last four weeks. To determine the prevalence of unemployment, the percentage of unemployed workers is divided by the number of workers currently employed.

Types of Joblessness

Economists use a variety of terms to describe unemployment, including cyclical or Keynesian unemployment, frictional unemployment, structural unemployment, and classic unemployment. Seasonal unemployment, hardcore unemployment, and hidden unemployment are some other types of unemployment that are frequently mentioned.

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This is known as "frictional unemployment," and it occurs when a worker is looking for or transitioning between jobs. This type of unemployment is sometimes referred to as "search unemployment," and it can be voluntary, depending on the individual's situation. Because frictional unemployment is a fact of life in every economy, the true unemployment rate is the official unemployment rate minus the rate of frictional unemployment. As a result, changes in the unemployment rate are typically overstated in official statistics.

Unemployment that is cyclical or Keynesian in nature, also known as deficient-demand unemployment, occurs when the economy's overall demand is insufficient to cover the demand for jobs. A labor market that can't provide jobs for everyone because of a mismatch between the skills of the unemployed workers and the skills needed for available jobs is referred to as structural unemployment. Except for the fact that it lasts longer, it's difficult to distinguish structural unemployment from frictional unemployment empirically.

Structural unemployment, which occurs when workers are replaced by machines, may be considered. Alternatively, technological unemployment refers to the steady increase in labor productivity, which means that fewer workers are needed to produce the same level of output each year.

Unemployment that isn't included in the official numbers is known as "hidden" or "covered" unemployment because of the method used to collect the data. According to many countries, only those people who are unemployed and actively seeking a new job are counted as unemployed.

2.2 Inflation as a Concept

Long-term increases in the prices of a wide range of goods and services are what economists refer to as "inflation" (Balami 2006). The rate of increase in the general level of prices over a specific time period is what is used to calculate inflation. An inflationary economy, according to the University of Chicago School of Economics, is fundamentally a monetary one. By Friedman's own words, the only way to cause inflation "is to increase the amount of money in circulation faster than the amount of output." Inflation, according to Hicks, is a "constant rise in the general price level" Inflation, as defined by Johnson, is a long-term increase in the cost of goods and services.' According to Brooman, "the general price level is rising." We can be more precise when we say that "inflation usually refers to a continuing rise in prices as measured by an index like the CPI or implicit price deflator for gross national product," according to Dernberg and McDougall. As a result, demand-pull inflation is seen as a result of an increase in aggregate demand.

2.2.1 Inflation Types: There Are Several

According to Jinghan (2000), it is critical to recognize that the magnitude of a long-term increase in prices can vary widely. With a price increase of less than three percent per year, we have what is known as "creeping inflation." It's known as "walking or trotting inflation" if the annual inflation rate is in the single-digit range. For example, prices rise between 3% and 7% per year or less, depending on the time of year (10 percent). Running inflation occurs when prices rise at a rate of 10% to 20% per year, like a horse running. Price increases of more than 20% to 100% per year are known as hyperinflation and are referred to as "runaway or galloping inflation" in the media. "Cost-push" inflation is caused by rising production costs, which leads to a scarcity of goods and services, while "demand-pull" inflation is caused by rising consumer demands without a corresponding rise in supply. According to Balami (2006) these two types of inflation are the most common.

2.2.2 Inflation's Effects

Those with fixed incomes, such as pensioners and students, can be particularly harmed by inflation, which can lead to trade unrest, a decline in the standard of living, and a reduction in savings and capital formation. Inflation also tends to discourage efficiency, which can lead to an increase in investment and a decline in the standard of living, as well as an increase in investment and an increase in savings and capital formation (Buhari 1987).

As a result of fully anticipated inflation, there will be a market interest rate that is higher than the real rate of interest, but this is not a problem for mild inflation. However, as prices rise, the cost of operating the financial system due to expected inflation will rise. This will eventually lead to a complete breakdown in the monetary system and the return to barter (Balami 2006). As a result of anticipated inflation, there may be a decrease in the demand for real money balances, which reduces the net welfare gained from the convenience of keeping money. Economic growth and development efforts can only be jeopardized by inflation, according to Adamson (2000). The population's frustration becomes a breeding ground for chaos as a result.

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2.3 The Philips Curves.

2.3.1 A Philips Curve That Is Sloping Downwards.

Inflation and unemployment research has gone through two stages since World War II's end, and it is now entering its third. Initially, the rate of price change was accepted as a hypothesis. AW Philips argued that the rate of change in wages is negatively correlated with the rate of change in unemployment. This means that when unemployment is high, wages fall, and when unemployment is low, wages rise.

Due to a roughly constant mark-up factor, wage changes were linked to price changes. This was done by taking into account productivity increases over time.

The short-circuiting of wages by Friedman in Figure 2.1 illustrates this hypothesis. Friedman had followed the standard practice of linking unemployment directly to price change.

In this figure, we see a simple Philips curve.

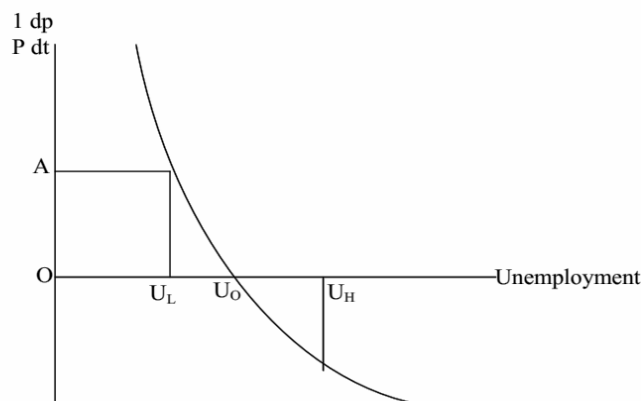


Figure 2.1 An ordinary Philips Curve

This relationship was widely interpreted as a causal relationship that offered a stable trade-off to policymakers. They could aim for U_L , which has a low unemployment rate. As a result, they would be forced to accept an inflation rate that is A . Unemployment and inflation would no longer be a concern if the right measure had been taken to achieve U_L , which could be either monetary, fiscal, or something else. A low inflation rate or even deflation could be the goal of policymakers instead. In that case, they'd have to accept higher U_0 unemployment for zero inflation and U_H unemployment for deflation as a compromise.

2.3.2 Phillips Curve Inversion

Keynes proposed the shifting Phillips curve to explain the Phillips curve. According to Keynes, a shock to the economy can affect either unemployment or inflation without affecting the other. Recently, the dollar depreciated, and oil prices rose due to OPEC supply constraints and high demand for wheat, leading to higher prices and higher unemployment as a result (inflation). These events occurred in the US around 1973. A rise in unemployment without a corresponding drop in inflation was another possibility. Unemployment rose, but prices did not rise, as a result of a large influx of young people and women entering the workforce (inflation).

2.3.3 Hypothesis of the Natural Rate of Unemployment

These ideas led to the development of an alternative hypothesis by E.S. Phelps and Friedman in the late 1960s, which distinguished between the short- and long-term effects of unexpected shifts in aggregate nominal supply. Let's say we start from a stable base and allow for, say, an anticipated increase in total nominal demand. This will come as a pleasant surprise to every manufacturer who will see an increase in demand for their goods. He won't be able to tell if this shift is unique to him or widespread in a market where relative demand for various goods is constantly changing. For him, it's logical to see it as at least partially special, and he'll act accordingly by producing more to meet demand at the higher-than-expected market price. In order to hire more people, he's willing to pay a higher nominal wage than he had previously been. To him, what really matters is how much he is paid in relation to the cost of his product, and he thinks that price has gone up since before. As a result, he may perceive a higher nominal wage to be a lower real wage.

Workers, on the other hand, care less about the specific product they produce and more about the purchasing power of their wages in general. Because it is more expensive to gather information about general prices than the price of a specific product, they and their employers are likely to adjust their price perceptions more slowly. Workers see an increase in nominal wages as an

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increase in real wages, leading to an increase in supply, while employers see a decrease in real wages, leading to an increase in supply. Real wages are higher when expressed in terms of the average of future prices that people expect to pay in the future.

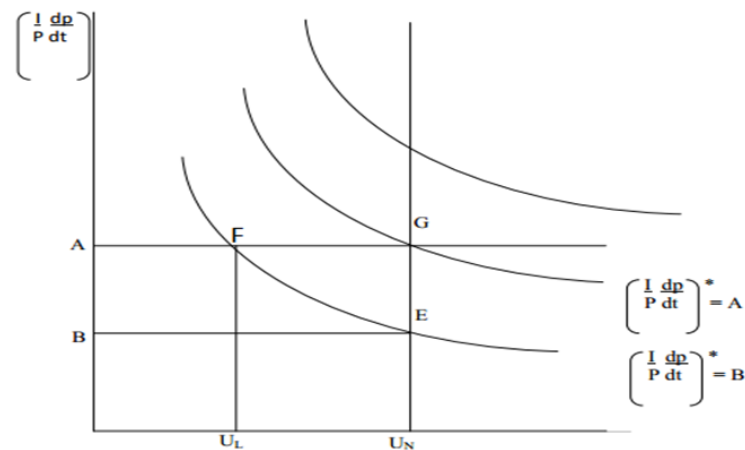


Figure 2.2 Refined Philips Curve

There will be an adjustment to the new reality when nominal aggregate demand and prices continue to grow at a faster rate. First, the initial effect will fade away, then it may even be reversed as workers and employers are trapped in contracts that are not in their best interests. In the long run, employment will return to its pre-unanticipated-acceleration level before the assumed acceleration in total nominal demand. According to this alternative hypothesis, each downward-sloping line of the Figure 2.2 Philips curve is the perceived average rate of price change rather than the average of individual price change perceptions, as shown in Fig. 1, except that it is for an anticipated or perceived inflation rate (the order of the curves would be reversed for the second concept). Let the rate of inflation move from B to A and stay there, starting from point E. A predicted rate of inflation of A would lead to a decline in unemployment to U_L at point F. The short-run curve would rise as a result of changes in expectations, eventually reaching the curve defined for an anticipated inflation rate B. At the same time, unemployment would progress from F to G over time.

2.3.4 Philips Curve with a Positive Slope

There is already a shift into a third stage despite the fact that the second stage has yet to be fully explored or absorbed into the economic literature. Higher inflation has frequently been accompanied by a rise in unemployment, particularly over long periods of time. For periods like these, a simple statistical Philips curve appears to be sloping upward rather than vertically. As a result, the third stage is focused on accommodating this apparent empirical fact. The interdependence of economic experience and political developments will have to be taken into consideration, according to Friedman. This means that it will have to treat at least some political phenomena as endogenous variables rather than exogenous variables in econometric terms (Gordon 1958). It was George Stigler's (1962) analysis of imperfect information and the cost of acquiring information that influenced the second stage, and Gary Becker's (1962) work on the role of human capital in labor contract design influenced the third stage (1964). Another major development is the application of economic analysis to political behavior, which has been pioneered by (Stigler and Becker 1977) as well as by Kenneth (1963), Duncan (1957), Anthony (1957), Buchanan (1962) and others.

Government policymakers have expressed concern about the apparent positive correlation between inflation and unemployment. As quoted by British Prime Minister Callaghan in a speech recently quoted by Friedman:

By cutting taxes and ramping up government spending, we used to believe that the recession would be quickly overcome and jobs would be created. You have my full assurance that this option no longer exists and that, if it did, only worked by increasing the economy's level of inflation, which was then followed by a subsequent increase in unemployment. That's how things have been for the past two decades.

There is no doubt about it: "continuing inflation, particularly in North America, has been accompanied by an increase in measured unemployment rates."

These are remarkable statements, because they go against the grain of nearly every Western government's post-war foreign policy initiative.

The correlation between inflation and unemployment is examined empirically in this section.

The relationship between unemployment and inflation has been studied empirically by a number of different authors. Philips curve was the name given to the general inclusive concept that found a negative correlation between inflation and

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unemployment in 1958. Philips (1958) found that the inflation-unemployment tradeoff can be represented by a single stable curve. When monetary policymakers need to know more about an economy, the Philips curve has played a key role in macroeconomics (Fuhrer et.al, 2008). Because it can cause the two variables to move in opposite directions, it emphasizes the importance of using caution when managing monetary policies.

Researchers using a variety of econometric models have found that inflation and unemployment are linked. Unemployment in Turkey was studied by Berument et al. (2008), who looked at the impact of policy shocks on unemployment. It was found that policy shocks affected unemployment in nine different sectors using Vector Autoregressive techniques. A positive income and money shock has the effect of reducing unemployment. Employers are compelled to produce more when the price of their products rises due to the higher cost of labor, which in turn encourages workers to work. This means that as prices rise, the number of people without jobs will decrease. Shocks to monetary policy tend to have greater and faster effects on general prices than they do on economic activities, according to Golosov and Lucas (2007). At -0.412, the correlation between unemployment and inflation validates the Philips hypotheses; however the causality test results show no causality between unemployment and inflation in Nigeria. Onwioduokit (2006) investigated this relationship in Nigeria and discovered a negative correlation.

From 1952(Q1) to 2010(Q1), Haug and King (2011) found a long-term positive correlation between inflation and unemployment. The magnitude of this relationship is dependent on the assumed frequency of cycles, and it is not concurrent. When cycles are between 8 and 50 years long, and unemployment responds to inflation after 13 quarters, there is the greatest correlation (3 years and 3 months). At the 10% level, only correlations where inflation leads unemployment by 1 to 6 years are significant, and at the 5% level only correlations where inflation leads unemployment by 1 and a half to 5 years and 3 months are significant. It is statistically significant only if inflation leads unemployment by 2 years 3 months or 4 years 6 months. In all significant correlations, the correlation coefficients are positive. They also discovered that these findings are very stable. For shorter cycles, for different time periods, different filters, and different measures of inflation, the same results hold true. ' This long-term relationship was found to be unaffected by different fiscal and monetary policy regimes.

According to Phelps (1968), Friedman (1968), Lucas (1973), and 1970's oil shocks, the validity of the Philips curve is in question. For example, if OPEC were to cut production and raise prices today, some economies could simultaneously experience high inflation and unemployment which contradicts the general notion presented by Philips (1958). Relying on the Philips curve for inflation forecasting and policymaking will have serious ramifications in such an environment. The reason for this is that policymakers would be torn between combating unemployment by expanding aggregate demand or decreasing inflation by compressing aggregate demand. A Philip-based curve for inflation forecasting might deter policymakers, but several studies have found that the rise in US inflation between the 1970s and 1980s was due to a slowdown in productivity and policymakers learning about the persistence of the trade-off between inflation and unemployment. and unemployment (Orphanides 2003, Primiceri, 2006). As evidenced by other studies, monetary policymakers operated with a mis-specified Philips curve that led to high inflation and unemployment (Sargent et.al 2006). Some Philips curves play an important role in monetary policy, and the trade-off between inflation and unemployment as shown by the Philips curve cannot be overlooked, despite these contrasting arguments.

Both monetary and fiscal policies have been employed in Ghana in order to bring inflation down to a manageable level while increasing employment. Unfortunately, policymakers' failure to clearly define the link between the two economic variables explains in part why monetary authorities are unable to control inflation and increase employment. The limited role institutions play during economic shocks in creating employment, according to some studies, may be the cause of the instability and failure to stabilize of these macro variables (Nickell et.al, 2005). Many other factors have also been cited, including the power of workers to bargain (Blanchard, 2006) and cyclical factors such as the profitability of industries (Chen et.al, 2011). Ghana's economy cannot avoid a high unemployment rate because of the country's rapid rural-to-urban migration, the inability of people to look for work that requires their skills, and the job selection preferences of recent graduates. Is Ghana's high unemployment rate a sign of low inflation in the context of the Philips curve? Unless the quantitative dynamic relationships between inflation and unemployment are known, this question cannot be answered simply.

There must be empirical proof of the trade-off between inflation and unemployment before we can begin lowering prices and increasing employment in Ghana. Studies on this trade-off are scarce, which is unfortunate for the Ghanaian economy. Considering that most of the research has been conducted in more developed nations, policymakers in Ghana should use more conservative assumptions about inflation and unemployment or rely on empirical studies that confirm the Philips curve in those countries. In a nutshell, the correlation between inflation and unemployment is country-specific, and thus country characteristics must be taken into account in order to effectively capture their trade-offs. Accordingly, a thorough investigation into the quantitative relationship between inflation and unemployment using time series data on Ghana would not only reveal to policymakers the actual

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Minimum	3.600000	8.726837	34.34212	68.60000	32.50000	0.894830
Std. Dev.	2.589421	12.57524	3.268462	2.038177	3.301853	3.983338
Skewness	-0.002783	1.562625	0.712679	0.167963	-0.669924	0.671268
Kurtosis	1.265325	5.065302	2.818664	1.650285	1.521495	2.064739
Jarque-Bera	3.134507	14.61735	2.150547	2.015184	4.147052	2.788662
Probability	0.208617	0.000670	0.341204	0.365097	0.125742	0.247999
Sum	171.3000	516.5674	961.2365	1779.000	937.9000	132.3843
Sum Sq.Dev.	160.9224	3795.280	256.3883	99.70000	261.6536	380.8076
Observation	25	25	25	25	25	25

According to the 2017 Field Data, Table 4.1 provides a breakdown of the variables used in this model (experiment) to examine the relationship between unemployment and inflation. Unemployment is a dependent variable, while inflation, COE, LFP, TAX RATE, and TSE are independent variables.

A look at the skewness values for the dataset's variables shows that while some of them are skewed to the right while others are skewed to the left. This suggests that the dataset is not normally distributed. It is clear from the kurtosis that the dataset is not normally distributed because the values are either lower (flatter) or higher (steeper). As a result, the Jarque-Bera values indicate that the dataset does not fit into a normal distribution, as they are above zero (0).

The Augmented Dickey-Fuller test was used to ensure that the data used to establish the relationship were normally distributed.

4.2 The Correlation Between Variables.

This table focuses on correlations between the series in this section (inflation, unemployment, compensation of employee, labor force participation, tax rate and tertiary enrolment).

Table 4.2: Results of the Correlation

	UNEMPL OYMENT	INFLATION	COE	LFP	TAX_RATE	TSE
UNEMPL OYMENT	1.000000					
INFLATION	0.605696	1.000000				
COE	-0.278033	-0.129451	1.00			
LFP	0.902792	0.483407	-	1.000000		
TAX_RATE	0.784607	0.473113	-	0.816126	1.000000	
TSE	-0.708102	-0.527260	0.37	-0.700242	-0.872504	1.000000

According to the 2017 Field Data, correlations between unemployment and other economic variables are shown in Table 4.2. There are two types of correlations: strong and weak. The correlation test is used to determine the level of correlation between the dependent and independent variables. While results above 0.5 are considered strong positive or negative correlations, results below 0.5 are considered weak and indicate an absence of strong positive or negative correlations between the variables. The correlation between unemployment and inflation, as shown in the table above, is a strong positive value of 0.605696. As a result, it can be said that unemployment and inflation follow a straight line.

4.3 Stationarity Check

Whether or not inflation and unemployment have a stationary relationship is the subject of this section, which focuses on the Unit Root analysis of the data. To assess unemployment, we use an enhanced Dickey-Fuller test (see Table 4.3).

Table 4.3.

Null Hypothesis: UNEMPLOYMENT1 has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, max lag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.239257	0.0000
Test critical values:	1% level		-3.769597	
	5% level		-3.004861	

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	10% level		-2.642242	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(UNEMPLOYMENT1)				
Method: Least Squares				
Date: 05/18/15 Time: 14:05				
Sample (adjusted): 1993 2014				
Included observations: 22 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMPLOYMENT 1(-1)	-1.568315	0.169745	-9.239257	0.0000
C	0.178515	0.428813	0.416300	0.6816
R-squared	0.810182	Mean dependent var		0.150000
Adjusted R-squared	0.800691	S.D. dependent var		4.505103
S.E. of regression	2.011261	Akaike info criterion		4.321909
Sum squared resid	80.90345	Schwarz criterion		4.421095
Log likelihood	-45.54100	Hannan-Quinn criter.		4.345274
F-statistic	85.36387	Durbin-Watson stat		1.418399
Prob (F-statistic)	0.000000			

Source: Field Data 2017

Table 4.4: Dickey-Fuller enhanced Test for Inflation

Null Hypothesis: INFLATION1 has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, max lag=2)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.958213	0.0000
Test critical values:	1% level		-3.769597	
	5% level		-3.004861	
	10% level		-2.642242	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INFLATION1)				
Method: Least Squares				
Date: 05/18/15 Time: 14:04				
Sample (adjusted): 1993 2014				
Included observations: 22 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION1(-1)	-1.512698	0.190080	-7.958213	0.0000
C	1.044226	3.524090	0.296311	0.7700
R-squared	0.759999	Mean dependent var		-0.446137
Adjusted R-squared	0.747999	S.D. dependent var		32.88089
S.E. of regression	16.50609	Akaike info criterion		8.531844
Sum squared resid	5449.023	Schwarz criterion		8.631030
Log likelihood	-91.85029	Hannan-Quinn criter.		8.555209
F-statistic	63.33315	Durbin-Watson stat		2.046504
Prob (F-statistic)	0.000000			

According to the 2017 Field Data, the results showed that all of the model's variables were stationary at the 1%, 5%, and 10% levels with a second difference (d (1), which is indicated by ADF results at all levels below the critical values in a negative manner. One percent of the time, the null hypotheses are rejected.

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4.4 Results of Regression.

Regression analysis of unemployment and other independent variables is presented in detail in table 4.5 below. (Inflation, compensation of employee, labour force participation, tax rate and tertiary enrolment). Here, you'll find all of the pertinent information about the regression of these two variables.

Table 4.5 shows the number of rows and columns. Long-Term Relationship Co-integration Regression

Table 4.5.

Dependent Variable: UNEMPLOYMENT1				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION1	0.032795	0.018161	1.805791	0.0898
COE1	-0.073550	0.063778	-1.153231	0.2658
LFP1	1.675714	1.150128	1.456981	0.1645
TAX_RATE1	-0.249738	0.343632	-0.726762	0.4779
TSE1	-0.600116	0.557437	-1.076564	0.2976
C	0.149154	0.326481	0.456856	0.6539
R-squared	0.034116	Mean dependent var		0.168182
Adjusted R-squared	-0.267723	S.D. dependent var		2.451897
S.E. of regression	2.760669	Sum squared resid		121.9407
Durbin-Watson stat	2.166921	Long-run variance		2.342387

Field Data 2017 is the source of this information.

There is a correlation between unemployment and inflation, as shown in Table 4.5. As evidenced by a probability value of 0.0898 and a positive coefficient value of 0.032795, the results show that the inflation coefficient is statistically significant at a 10% level. As a result, the unemployment rate would rise by 3.2795 percentage points if inflation rises by one percentage point.

The regression equation can account for a variation in unemployment of 3.41%, as indicated by an R² of 0.034116. There is no autocorrelation at a 1% significance level, according to the Durbin Watson statistic 2.166921 in the table.

4.5 The Relationship Between Cause and Effect

Table 4.6: Granger Causality Tests

Pairwise Granger Causality Tests			
Null Hypothesis:	Obs	F-Statistic	Prob.
INFLATION1 does not Granger Cause UNEMPLOYMENT1	21	5.15256	0.0187
UNEMPLOYMENT1 does not Granger Cause INFLATION1		9.19452	0.0022

Source: Field Data 2017

Inflation and joblessness are the subjects of this section's causation analysis. The Granger causality test was used to determine if inflation or unemployment was responsible for the increase in the unemployment rate. Table 4. 6 above contains the results of Granger causality. In Ghana, unemployment and inflation are linked, according to the study's findings. Both the no causation and no correlation hypotheses are ruled out based on the high F-statistics. The probability 0.0187 is significant at 5% and 10%, while the probability 0.0022 is significant at 1%, 5%, and 10%, indicating that INFLATION is a significant risk. Granger is to blame for a large number of unemployed people. Granger's INFLATION causes the two Null hypotheses to be rejected.

Inflationary Changes Affect Unemployment by 4.6 Percentage Points. We used both the Regression Coefficient and Elasticity to test the sensitivity of unemployment to changes in inflation.

Cointegration regression in Table 4.5 shows that unemployment has a coefficient of 0.032795, or 3.28 percent, when inflation changes. For every one percentage point increase in inflation, unemployment rises by (3.2 percent).

Using elasticity, it is possible to determine the degree to which unemployment is sensitive to changes in the rate of inflation. The mean of the data for both unemployment and inflation is used to calculate the elasticity of the economy as a whole, as shown in the following:

Let us assume x be Inflation and y Unemployment then,

Mean inflation (x) = 20.66269

Mean unemployment (y) = 6.852000

Slope (b= regression coefficient) = 0.032795

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$$\text{Elasticity} = b * \frac{\text{level of inflation}}{\text{level of unemployment}}$$

$$\text{Elasticity} = 0.032795 * \frac{20.66269}{6.852000}$$

$$\text{Elasticity} = 0.09889564$$

According to the above calculations, the average inflation, aforementioned elasticity analysis and unemployment rates from 1990 to 2014 as found in Table 4.2 (see above), together with table 4.5 which also shows the co-integrating regression coefficient as the Slope., the rate of unemployment is not responsive to changes in the inflation rate.

5.0 Summary, Conclusions Recommendation and Suggestions

An empirical relationship between inflation and unemployment in Ghana was examined. Despite the fact that Ghana's inflation and unemployment levels are among the most frequently discussed economic indicators, little is known about how these two complex economic factors interact with one another. A mixed conclusion can be drawn from the existing literature, but there is a lack of specific literature on this topic in Ghana and most African countries. A better understanding of the relationship between unemployment and inflation in Ghana and other African economies will be gained by conducting this research. Accordingly, policymakers can use this information to keep inflation and unemployment at a stable level while reducing them to the absolute minimum, thanks to the findings of this research. Descriptive statistics were used in this study to see if the series were normally distributed. Co-integration Regression test for the existence of long-term relationship of variables in the model, the Granger Causality test for causation, and an Elasticity test for the degree of unemployment responsiveness to inflation were conducted using data on the series from the World Databank between 1990 and 2014 for the correlation test

There is a correlation between unemployment and inflation in Ghana based on the unit root results, and there is also a correlation between unemployment and inflation. According to the results of the Co-integration technique, Ghana's unemployment and inflation are linked in a positive manner. In addition, an increase of 1% in inflation leads to a 3.2795 percent increase in Ghana's unemployment rate, according to the findings. According to Haug and King (2011), there is a positive correlation between inflation and unemployment in Ghana, whereas Onwioduokit (2006) found a negative correlation.

For this reason, it is recommended to policymakers and the government that more effort should be made to keep inflation levels low in order to reduce unemployment in the Ghanaian economy in the long term. R2 is significantly low, which indicates data error, and since inflation levels can be used to measure unemployment to some extent, the measurement of inflation should be done more accurately to avoid errors in the measurement of unemployment. Ghana Statistical Service must devote more time and resources to ensuring that the CPI basket includes the right items. To accurately measure inflation, the CPI basket must be weighted according to its contents. Current rates should not be the only ones used to measure inflation. Real-world impact should be reported in relation to other indicators or factors to make it more comprehensible. For example, an increase in unemployment of z percentage points could be explained by an increase in the price of an item purchased on the market rising by y percentage points. Again, economic indicators, such as compensation of employees, tax rate, labor force participation rate, and tertiary school enrolment, should be examined as possible indicators of unemployment in African economies. In comparison to these other indicators, policymakers frequently place an excessive emphasis on inflation. It is clear, however, that in the majority of African countries, changes in unemployment are not entirely due to inflation. As a result, the general public should pay attention to these other indicators, which have the potential to affect unemployment rates.

The scope of this study was narrowed down to just a few factors affecting unemployment in Ghana, with an emphasis on inflation. The findings show that there are additional factors that contribute to unemployment. Although these theoretical findings may be accurate, they may not reflect the actual state of affairs in the real world. Due to a lack of data, illiteracy and inequality in the distribution of wealth and resources, African countries have a high level of poverty. As a result, it's possible that high inflation has a much greater or smaller effect on unemployment than this study shows. These gaps in knowledge serve as a foundation for future studies. Further research should identify and analyze other factors that may have an impact on unemployment, as well as the extent to which they do so. Future studies should also look at the relationship between inflation and unemployment in Ghana and other developing economies using a larger sample size and collecting primary data.

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