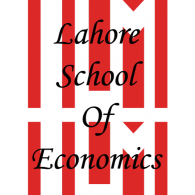
**impact of Inflation and Unemployment on Economic Growth**



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**Abstract**

This abstract discusses the macroeconomic issues of unemployment and inflation and their impact on a nation's economic and social indicators. Unemployment is a critical issue as it negatively affects both economic and social norms, and it indicates that people want to work but are unable to find jobs. Inflation, on the other hand, refers to a general increase in prices for various goods and services over a predetermined period of time. It is essential to keep both inflation and unemployment in the lowest single digits for the stability of macroeconomic policies, which is critical for effective growth and development of the economy. The purpose of this research is to assess the influence that inflation and unemployment would have on economic development. For the purpose of this research, the growth rate served as the dependent variable in the econometric model, while inflation, unemployment, the exchange rate, the money supply, investment, and the savings rate served as independent variables. We used a panel data for 20 years 2002-2021 for 50 countries 25 of which were developing and 25 developing. Fixed Effects model was used. Results show that inflation and unemployment are significant for developed countries but insignificant for developing countries.

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# List of Abbreviations:

ILO - International Labor Organization

GDP – Gross Domestic Product

World Development Indicators (WDI).

ARDL - Autoregressive Distributed Lag

AD – Aggregate Demand

AS – Aggregate Supply

Infl – Inflation

Unemp – Unemployment

ER – Exchange Rate

MS – Money Supply

IR – Interest Rate

Sav – Saving Rate

Inv – Investment Rate

1. Introduction

“Amongst some of the macroeconomic issues, unemployment is critical. When a country faces unemployment, it not only has a negative impact on the economic indicators, but it also has a negative impact on its social norms. Unemployment indicates that people want to work but are unable to do so. According to the "International Labour organization (ILO)," unemployment means that people have been looking for work for the last four weeks but have been unable to find work. A rise in the general level of prices for a range of different products and services over a predetermined period of time is what economists refer to as inflation. Inflation may be broken down into two main categories: demand-pull and cost-pull. In general, demand-pull inflation is the more common of the two. It is referred to as demand-pull inflation when the total cumulative demand for various products and services is higher than the total accumulated supply. On the other hand, it is known as cost-pull inflation when the prices of inputs such as raw materials increase at a faster pace. Both inflation and unemployment are important aspects of macroeconomics that must be taken into consideration for the development of the nation. It is said that the goal of emerging countries is to achieve a higher rate of monetary growth in the shortest amount of time possible. These countries acquire cutting-edge technology from industrialized nations, but they also embrace ineffective methods for achieving better economic development, which ultimately leads to an increase in unemployment. (Shahid, 2014).”

The connection between economic expansion and joblessness is one of the most common themes that emerges from research on unemployment. In an economy where growth takes place, or at the very least, in an environment where the existing unemployment rate does not rise, there should be a decrease in the unemployment rate. This is the foundation of economic growth, and it is what we expect to see. In recent times, the correlation between rising GDP and rising employment rates has been less strong; to put it another way, understanding this connection has gotten more challenging. It has been noticed that there is not one single or constant link between expansion and employment, particularly in the context of the growth of the economy of the nation (Kara et al., 2005).

Both inflation and unemployment are challenging concepts to understand. There have been a lot of attempts made by economists to explain the connection between unemployment and inflation. Long-term effects and short-term effects are the two hypotheses that are currently being considered to account for this association (Sargan et al., 1983). In a short relationship, one of the variables has an inverse connection to the other variable. The Phillips curve is the model that most adequately describes this connection. This curve is a quickly created curve that was developed in a short amount of time. When viewed over a longer period of time, there is no correlation between inflation and unemployment. Keynesians, on the other hand, think that inflation is brought on by an ever-growing money supply throughout time. They protect their clients against the majority of the dangers posed by rising company expenditures. The rise in pricing of commodities is beneficial to businesses, and the government's action of boosting the money supply to satisfy increased demand is beneficial to the economy as a whole. The Phillips curve is a useful tool for better understanding the link that exists between unemployment and inflation. The Phillips curve has a downward sloping slope throughout the short term. The short-run and long-run versions of the Phillips curve seem quite different from one another. Economists are quick to point out that there is no correlation between unemployment and price increases over the course of a lengthy period of time.

“Unemployment and inflation are problems at the heart of every country's social and economic life. Existing literature points to inflation and unemployment as twin problems explaining the nature of poverty in developing countries. It has been argued that continuous improvement in output is the surest way to reduce costs. Increased productivity provides an important basis for the adequate supply of goods and services, thereby improving public welfare and promoting social progress. Inflation increases the cost of the country and creates more financial problems by increasing the cost of goods and services and other factors (Rasheed et al., 1997). It is known that the main factor that increases the prices of various commodities is inflation. Some of the inflation in the economy is due to the decline in the value of money. Inflation lowered the value of the currency by raising prices. Inflation should be evaluated in terms of unemployment in order to determine the position of the statistical agency over time. This research evaluated the changes over time in the role of inflation, unemployment, exchange rate, financing, investment, saving rate and interest rate in the economy and their relationship with unemployment. It is reasonable to anticipate that policymakers will continually aim a lower unemployment rate through these programs because the government can typically reduce unemployment through expansionary fiscal or monetary policy. One of the reasons policymakers don't, is the link between the unemployment rate and the inflation rate. “Over time, economists have tried to make a connection between inflation and unemployment; however, the two jurisdictions are economically linked. The relationship between the two is mutually exclusive; therefore, inflation is low when unemployment is high and vice versa (Umaru & Zubairu, 2012). Inflation and unemployment are always "foreground" in an economy; all economies intend to keep both in the lowest single digits as this creates stability in the country's macroeconomic policies. This stability is very important for the effective growth and development of the economy and for the achievement of economic policy goals and objectives (Orji et al., 2015).”

“Inflation tends to increase whenever there is a shift in the available money supply. Because of this, a rise in the money supply will have a greater impact on the pricing of goods and services across the economy, ultimately leading to an increase in those prices. As a consequence, inflation refers to a rise in the overall level of prices for goods and services. The long-run Phillips curve was traditionally characterized by classical economics as the unemployment rate in the economy. In conclusion, he asserts that there is no connection between inflation and unemployment (Friedman, 1968).

The purpose of this research is to assess the influence that inflation and unemployment would have on economic development over the course of 20 years, from 2002 to 2021, using time series data. For the purpose of this research, the growth rate served as the dependent variable in the econometric model, while inflation, unemployment, the exchange rate, the money supply, investment, and the savings rate served as independent variables. This study is secondary in nature and investigates the factors that affect growth rate, including inflation, unemployment, exchange rate, money supply, investment, savings rate, and interest rate.

Data used would be Longitudinal (Panel) in nature as multiple entities would be observed in multiple points in time. Data would be sourced from credible sources such as the World Bank, Economic Survey Publications and World Development Indicators (WDI). The purpose of the study can be defined Descriptive/Causal with minimal interference of the researcher as the variables being observed are in natural environment therefore non-contrived. The strategy would be surveys and the unit of analysis in this research would the countries.

We found that there was a significant positive relationship between inflation and economic growth, which indicates that countries with higher inflation rates tended to have higher economic growth rates. Additionally, we found that there was a significant negative relationship between unemployment and economic growth, which suggests that countries with higher unemployment rates tended to have lower economic growth rates.

The research paper will further discuss the Literature review of the topic particularly Historical Literature, Theoretical Literature and Empirical Literature. Thereon the paper discusses the Theoretical Framework which encompasses the “Data, Empirical Estimation. Hypothesis and Relevance and Contribution.”

1. Literature Review
   1. Background Information

Economic growth refers to a rise over period in the number of products and services generated per person in the population (Roser, 2021). Every economy faces constantly difficult and serious issues with unemployment and inflation. Particularly in emerging nations, these two macroeconomic factors have a crucial role in shaping economic development. Economic growth is significantly impacted by inflation irrespective of the fact that unemployment has a less substantial influence. Growth is impacted adversely by unemployment but favorably by inflation (Kostov, 2016). The widespread consensus in economics is that a country's GDP growth rate results in higher employment and lower unemployment. One of the most urgent issues is unemployment with its impact on both the economy and society (Kostov, 2016). However, over years, a lot of scholars have pushed the idea that managing unemployment and inflation is crucial for various societies' economic policies in terms of how they respond to economic development (Cashell 2006; Ullah & Umair, 2013). Concerns have been raised particularly in emerging nations. This is so since economic development and growth, which are the top priorities of all economies, are determined by important macroeconomic indicators like inflation and unemployment.

Inflation has a variety of effects on output growth, like increasing the tax on capital, the opportunity cost of capital, higher interest rates, discouraging exports, discouraging savings, inefficient government spending, tax increases, decreasing purchasing power, increasing uncertainty, discouraging investment, which lowers productivity and economic growth (Azam, 2020). “Keynesians contend that inflation and economic growth are positively correlated, while conventional economists contend that inflation has a negative impact on economic growth (Karahan, 2020). Investors see prospects more favorably in high unemployment economies. Hence, analysts and scholars have begun to concentrate on the connection between unemployment, gross capital accumulation, and economic development (Pasara, 2020).” Misguided policies, shifting economic structures, and a lack of education that is responsive to the job market all contribute to unemployment (Pasara, 2020). According to Garidzira (2020), there is a negative relation between unemployment and economic growth. This suggests that higher economic growth leads to more job openings and lower unemployment. Only indirectly, the exchange rate influences development via its effects on the functional income distribution and technical advancement (Lima, 2020). Monetary policy decisions have an impact on the exchange rate and the interest rate under the flexible exchange rate regime. By external competitiveness, changes in the real exchange rate have an impact on economic activity (Krukovi, 2020). A significant factor in China's economic development is thought to be the manufacturing industry and the activities of foreign direct investment (FDI) (Udemba, 2020). According to the findings of Ghosh and Phillips (1998), a rising inflation (over 2.5%) has a detrimental impact on GDP growth. In other words, when inflation increases, GDP growth slows. However, the link between inflation and GDP growth is favorable at lower rates of 2 to 3 percent. The threshold was also discovered by Ghosh and Phillips (1998) to be 2.5 percent. This gap version's coefficients showed that the GDP gap had a negative and substantial influence on unemployment rates. It was observed that a 1% increase in GDP led to a marginal drop in the unemployment rate, which was nearly zero (0.0000000109%). Other research (such as ““Okun, 1962; Prachowny, 1993; Ting & Ling, 2011; Abu, 2017; Soylu et al., 2018””) also shown this to be the case.

In this study, we examine how unemployment and inflation affect economic growth. Therefore, throughout a 20-year period, from 2001 to 2021, panel data from 25 industrialized and 25 developing nations worldwide were gathered in order to undertake this study. The sample of nations represents the features of the key factors influencing economic development and includes the main areas of both industrialized and developing economies. The World Bank will provide all of the datasets. The World Bank Indicators (WDI) are a compendium of all development indicators that have been drawn from globally reputable and acknowledged sources. It provides statistics on development, including regional, national, and international estimates.

* 1. Theoretical Literature

Phillips created the piece of work that is often referred to as "the Phillips curve" in 1958. Phillips (1958) charted 95 years' worth of UK data on wage inflation and unemployment. He found a short-term trade-off among inflation and unemployment. Therefore, he proposed the hypothesis that increasing inflation might be caused by dropping unemployment and that decreasing inflation could be achieved by enabling unemployment to grow. Although this can momentarily enhance employment if the government intends to lower the unemployment rate, increasing aggregate demand might also have inflationary effects on the labor and product markets. In actuality, Phillips postulated that the narrower the labor market becomes and the quicker businesses boost pay to entice scarce employees, the lower the unemployment rate would be. The pressure decreased as unemployment rates rose. The Phillips curve depicts the typical link between pay behavior and unemployment rates over the economic cycle. It showed how quickly wages would rise if a particular unemployment rate persisted over a prolonged period of time.”

“The study of Okun (1962) remains a foundational theory. This rule, which has been updated by a vast deal of economic research, states that a 1% drop in the rate of unemployment would lead to a loss of roughly 3% more productivity (Anning, 2017). In reality, according to Okun's hypothesis, a 1% rise in growth rates over the typical rate of growth would only reduce unemployment by 0.3%. If the causation were reversed, a 1% rise in unemployment would result in a loss of GDP growth of around 3%. According to this equation, GDP growth must match its prospective growth rate in order to maintain a steady unemployment rate. Economic growth and unemployment have a long-term link, according to the findings of the ARDL bounds testing method.”

“John Maynard Keynes created the General Theory of Employment, Interest, and Money in 1936, which served as the foundation for Keynesian economics. Keynesians contend that government involvement is necessary for efficiency to reach its maximum level. According to them, market involvement by the government through expansionary economic policies will increase demand, increase investment, and enable full output. Aggregate demand (AD) and aggregate supply (AS) curves serve as the foundation for the Keynesian model. Since the AS curve in this model has an upward short-term inclination, changes in the demand side of the economy have an impact on both prices and production (Dornbusch, et al, 1996). The positive connection may be the result of contracts made by certain businesses to provide things at a later time and at a predetermined price (Blanchard & Kiyotaki, 1987). The initial positive relationship among inflation and economic growth is brought on by the problem of temporal inconsistency. Producers believe that just their product prices have gone up while those of other producers have stayed the same. In actuality, though, costs have gone up overall and the company is still producing more and more. Since the producer must meet the wants of the customer who signed the contract, manufacturing would not decrease even if the price of items in the economy rose.”

Among the many significant aspects of monetary theory is its emphasis on the long-run supply-side characteristics of the economy rather than short-run dynamics. The originator of the word "monetarism," Milton Friedman, emphasised a number of essential long-term characteristics of the economy, such as the Quantity Theory of Money and the Neutrality of Money (Gokal, 2004). By simply matching the whole amount of economic expenditure to the total quantity of money in circulation, the Quantity Theory of Money established a relationship between inflation and economic growth. According to Friedman, inflation results when the volume or velocity of money increases faster than the rate of economic growth. Friedman disputed the Phillips Curve theory as well. His research was predicated on the idea that in such a society, everything would cost twice as much. In conclusion, monetary theory contends that the expansion of money has a more profound, long-lasting impact on price than it does on growth. Inflation will occur if the money supply is expanding faster than the economy.

The neo-classical growth model was developed (Solow & Swan, 2002). They developed a growth model in which capital expansion (investment) was replaced by technical or scientific innovation as the primary explanation for long-term development. The rate of technological advancement is decided exogenously, which makes it independent from all other variables, including inflation. The neoclassical economics theory of growth is based on the idea that labor and capital have declining returns when used individually, but constant returns when used together (Gokal & Hanif, 2004). Neo-classical growth economists offered their own explanation for how economic expansion and inflation are related. The impact of inflation on economic growth was highlighted by (Mudell, 1963). Because families would keep more other assets in reaction to inflation, he claimed that it might permanently boost the rate of production growth by encouraging capital accumulation. The notion that inflation and economic growth are positively correlated was also endorsed by Tobin (1965). His claim is that inflation forces people to convert their cash into other assets, increasing capital intensity and fostering economic development. Mundell was one of the first to put up a theory separating the excess demand for goods from the process linking inflation and production growth (1963). A rise in inflation or inflation expectations, in accordance with Mundell's theory, instantly diminishes people's wealth. This assumes that people's real-world investments have seen a decrease in rate of return. By investing in assets, which increases their value and reduces the real interest rate, people save more money in order to accumulate the necessary wealth. More savings leads to speedier capital formation and faster economic growth. ”

* 1. Empirical Literature

“A long-term rise in the average cost of a wide range of products and services is referred to as inflation (Balami, 2006). It is determined by how quickly prices have increased overall during a certain time span. Walsh argues that the high correlation among inflation and the growth rate of the money supply supports the quantity-theoretic argument that an increase in the money supply leads in an equal rise in the price level. It is projected that the rates of capital production and inflation would be positively connected, indicating a positive link between the two variables (Mundel & Tobin, 1965). They contend that rising prices reduce people's wealth. In a closed market with monopolistic competition, the inflation rate is affected by excess demand in terms of the link between trade openness and inflation (Dexter et al., 2005). According to Fischer's study from 1993, inflation affects growth, investments, and productivity, whereas governmental deficits diminish capital accumulation as well as productivity growth.”

“Unemployment is the total number of persons who are competent, wanting to work, and willing to offer their services for hire at the going rate yet are unable to find employment (Aminu & Anono, 2012). According to Shahid's (2014) research, unemployment and inflation have a negative influence on Pakistan's economic growth. The later writers also mentioned that in a labor market with flaws, the process of creative destruction might result in long-term unemployment (Aghion & Howitt, 1994). One of the main macroeconomic goals is economic development, which is seen as essential and even the key to ending poverty and unemployment (Obadan, 1997). The unemployment problem, which has effects on both the social and economic spheres, is one of the most significant concerns Jordanian policymakers must deal with. High levels of unemployment indicate a labor market shortage, escalating poverty rates, and the development of immoral living standards (World Bank, 1994).”

“Economic growth is the method through which a nation's real per capita income rises steadily over time, as shown by an increase in the amount of products and services offered there (Jhingan, 2003). It has been argued that owing to the negative rigidity of prices (including wages), the adjustment in relative prices during economic growth may be better accomplished by the upward price action of certain specific items (Tobin, 1972). Numerous studies failed to find strong empirical support for either a favorable or unfavorable link between inflation and economic growth (Wai, 1959; Bhatia, 1960; Dorrance, 1963; Johansen, 1967). As per Fischer, macroeconomic policy preferences like budget deficits and foreign exchange regimes are essential for economic growth (1991). Additionally, Gultekin characterized the connection between inflation and economic growth as negative (1983). Because inflation decreases return on investment, there is an inverse link between inflation and economic growth.

In addition, open economies seek to maintain stable currency rates to prevent being unduly burdened by imports of necessities, as stated by Romer (1993). Whenever the exchange rate increases because to advantageous interest rate differentials, real exchange rate appreciation may also occur from inflation goal regimes (Summa, 2012; Angeriz and Arestis, 2007). It is believed that the real exchange rate would positively affect economic growth since it reflects China's competitiveness in global trade (Yao & Zhang, 2001; Ding, 1998). The tools used to implement this policy (lower tariffs on input resources, higher import taxes or domestically referenced goods, exchange rate fluctuations, and ultimately the abolition of export duties) assist developing economies in gaining the industrial experience necessary to start exporting manufactured goods on an equal footing (Schmitz, 2007). Fixed exchange rates and flexible exchange rates are the two categories of currency rates (Tiwari, 2003). In a system of fixed exchange rates, it is decided by the government. For a long time, economists have maintained that one benefit of flexible exchange rates is that nations gain independence in terms of their capacity to design domestic monetary policy (Melvin, 2017). “

The money supply is the total amount of cash and other liquid assets in an economy on the measurement date. The money supply roughly consists of all cash and deposits that can be used almost instantly (Peter, 2022). "Economists often stress only one factor: expansion of the money supply, when it comes to explaining inflation over the longer run" (Romer, 2006). An increase in inflation (caused by a rise in the money supply) has no impact on the capital stock in a stable state (Sidrauski, 1967). As a result, neither economic growth nor output are impacted. The factors that influence inflation in Nigeria, the budget deficit, money supply, interest rates, and currency rate all have a favorable effect on inflation (Fatukasi, 2011). Money supply and growth are anticipated to be positively correlated (Ajayi & Ojo, 1979). Notifications of unexpected changes in the money supply had a favorable impact on interest rates (Urich & Wachtel, 1981, Grossman, 1981, Roley, 1981).

By stating that "low interest rates tend to lead output, whereas an increase in production likely to be accompanied by higher interest rates," Walsh (2003) supports this finding. Although one body of theoretical research, going back to Tobin (1965) and up to the most current study by Lioui and Poncet (2008), promotes the idea that inflation might encourage investment by exerting pressure on the real interest rate, the actual findings go in the other direction. Continuous rises in the public deficit and expenses have served as the cause of inflation together with the high interest rate and devaluation process (Erçel, 1999). Inflation uncertainty has an impact on both the intra-temporal allocation of resources and the intertemporal allocation of resources via its impact on relative prices in the presence of nominal rigidities (Friedman's, 1977). The amount of worker pay, rent, interest rates, income of a specific firm, tax on created items, and import level are the finest ways to summarize the income approach (McConnel and Brue, 2008).”

“

The Pakistani nation's saving rate's contributing factors was investigated (Khan et al., 1992). The research demonstrates that although foreign capital input discouraged national saves, income, real interest rates, changes in trade, and economic openness all favorably impacted national savings. Even though the neo-classical growth theory predicted that a higher saving rate would only have a short-term favorable effect on the growth of the economy because it would have a negative impact on capital productivity, several empirical studies discovered that the saving rate had a positive impact on long-term growth (““Page, 1994; Cardenas & Escobar, 1998”; “Motely, 1994”; “Krieckhaus”, 2002””). A link between inflation and savings in India was found that was negative (Emara & Kasa, 2020). The results demonstrated that India's high rate of inflation causes a decline in the saving rate. By combining several policy-related, demographic, structural, and political elements that may affect the saving ratio, the method of determining saving rates was evaluated (Edwards, 1996).”

“Allocating money or other resources to a project where you hope to make a profit, break even, or experience some other favourable outcome is referred to as investing. When you invest, you buy things whose value you believe will increase over time, potentially increasing the amount of money you have (Turner, 2022). Theoretically, because of inefficient resource use and skewed investment decisions, inflation has a significant impact on economic growth (Miller & Benjamin, 2008; Paul et. al., 1997). Reported to the authorities were the effects of Nigeria's urban unemployment problem on economic growth, together with investment and the inflation rate as occasional variables (Stephen, 2012). There is no longer a negative association between inflation and real GDP, notwithstanding research on the impact of investment and inflation on economic growth (Taiwo, 2011). In order to reduce inflation in the long and near periods, he offers demand and supply management measures. Low investment levels caused by high inflation have a detrimental effect on economic growth (Barro, 1995). According to Fischer's study from 1993, governmental deficits and inflation both have a negative impact on growth, investments, and productivity.

1. Theoretical Framework
   1. Data

Since this research uses secondary data to examine the impact of inflation and unemployment, all information on the variables that influence unemployment was acquired from various internet sources, such as the World Bank (WDI) and Economic Surveys. In order to examine the impact of Economic Growth across 50 nations—25 developing countries and 25 developed countries—over an extensive period of 12 years, this research will collect data in the form of Longitudinal (panel data). This would allow for a better understanding of how inflation & unemployment affects economic growth differently in industrialized and developing nations. The primary justification for doing this analysis is causal research, which is used to examine the cause-and-effect connections between economic growth, inflation and unemployment. Additionally, there is little interference in this study, reducing bias and making it less time-consuming. The data collection and research methodology used for this work are efficient in terms of time and consistency.

For both developed and developing nations, the goal of our research is to examine the causal link between inflation, unemployment, and economic growth. In addition, we'll consider additional variables including the interest rate, money supply, investment, and savings rate. Because we will be utilizing secondary data for the correlational study and therefore having no impact on the data, there will be very little researcher intervention in this study. Additionally, the research will be carried out in a natural environment where events will develop naturally. Since the data we are utilizing is secondary, no new data will be obtained since the surveys used to get it have already been completed. Furthermore, since developing and developed nations make up our cross-sectional unit, the analysis will be done at the country level. The research will also be a longitudinal panel study because the data will be gathered from 2008 to 2020.

* 1. Empirical Estimation

This research empirically analyses the variables that affect unemployment & inflation especially looking at how economic growth affects unemployment and inflation in both developing and developed nations. This research paper's primary goal is to determine the relationships among the independent and dependent variables for various nations while also specifically examining how the economic growth interacts with numerous factors that impact unemployment and inflation. Additionally, we shall determine the broad relevance of each element and its link to unemployment and inflation in both developed and developing nations in this research. In this essay, we examine 25 developing nations and 25 developed nations during a 20 -year period. The regression equation for the model is shown below:

Y = β0 + β1 Inflit + β2 Unempit + β3 ERit + β4 MSit + β5 Invit + β6 Savit + β7 IRit + µit

Where:

* Infl = Inflation
* Unemp = Unemployment
* ER = Exchange Rate
* MS = Money Supply
* IR = Interest Rate
* Sav = Saving Rate
* Inv = Investment Rate
* = Error Term

Since we will be examining the time and cross-sectional dimensions in our research, it is crucial to comprehend the subscripts given in the equation above. The cross sectional dimension, which will be the country dimension in our data, is provided by the "i" subscript. Furthermore, the time dimension for our data is represented by the subscript "t". Additionally, unit, our error term, comprises any unobserved factors that could have an impact on the dependent variable. We estimate our model's findings objectively by including the error factors.

Economic Growth as a whole refers to the rise, through time, of a nation's or an economy's ability to provide the commodities and services required to promote the well-being of its population in growing numbers (Anyanwu & Oaikhenan, 1995). It can be quantified as per capital real GDP as per World Bank. Inflation is a condition in which there is a rising general price level of a wide range of goods and services over a long period of time and it is measured by the percentage change in the price level. Unemployment is a condition in which people are without jobs and had actively seeked employment within the last four weeks (International Labour Organization, 2009). More money is chasing fewer things as inflation rises. It will be expressed as a percentage, and information from the WDI website will be gathered. According to the Phillips curve, greater inflation rates reduce unemployment and lower inflation rates increase it. Inflation and unemployment have an inverse connection since there is a clear quid pro quo between them.

Interest rates were included as additional independent variable in a study (Faridi & Kausar, 2016). In the long term, it was discovered that there was a substantial and favourable link for Pakistan. In addition, it is said that the interest rate has an impact on business since it affects people's savings and, eventually, consumption (Himarios, 1989). Demanding more foreign items has a direct impact on consumption, which in turn has a negative impact on economic growth.

Increases in exchange rates are equivalent to currency depreciation (Azid et al., 2005). Exchange rate and economic growth are predicted to have a positive association in the aforementioned research by Hameed and Kanwal, Rehman, and Afzal (2009) because depreciation leads to an increase in exports and a reduction in imports. This is due to the fact that when a nation's native currency declines, foreign nations find it more cost-effective to trade with us, increasing our GDP, but domestic nations find it more costly to purchase from outside.

The currency in use is known as the money supply (Mahmood, 2015), and individual consumption functions such as saving rely not just on one's own current income but also on that of the reference group (Duesenberry, 1949). Lastly, investment is the use of money (funds) over the time period attempting to increase the investor's wealth (Kristina, 2010). It is measured by GDP minus final consumption expenditure (total consumption).

* 1. Hypothesis
     1. Null Hypothesis

Inflation has a negative impact on Eco Growth

:

Unemployment has a negative impact on Eco Growth

:

Exchange Rate has a negative impact on Eco Growth

:

Money Supply has a negative impact on Eco Growth

:

Interest Rate has a negative impact on Eco Growth

:

Savings Rate has a negative impact on Eco Growth

:

Investment has a negative impact on Eco Growth

:

* + 1. Alternate Hypothesis

: Inflation has a positive impact on Eco Growth

: Unemployment has a positive impact on Eco Growth

: Exchange Rate has a positive impact on Eco Growth

: Money Supply has a positive impact on Eco Growth

: Interest Rate has a positive impact on Eco Growth

: Savings Rate has a positive impact on Eco Growth

: Investment has a positive impact on Eco Growth

1. Data

Since this research uses secondary data to examine the impact of inflation and unemployment, all information on the variables that influence unemployment was acquired from various internet sources, such as the World Bank (WDI) and Country’s statistical bureau and their central banks. In order to examine the impact of Economic Growth across 50 nations—25 developing countries and 25 developed countries—over an extensive period of 20 years, this research will collect data in the form of Longitudinal (panel data). This would allow for a better understanding of how inflation & unemployment affects economic growth differently in industrialized and developing nations. The primary justification for doing this analysis is causal research, which is used to examine the cause-and-effect connections between economic growth, inflation and unemployment. Additionally, there is little interference in this study, reducing bias and making it less time-consuming. The data collection and research methodology used for this work are efficient in terms of time and consistency.

For both developed and developing nations, the goal of our research is to examine the causal link between inflation, unemployment, and economic growth. In addition, we'll consider additional variables including the interest rate, money supply, investment, and savings rate. Because we will be utilizing secondary data for the correlational study and therefore having no impact on the data, there will be very little researcher intervention in this study. Additionally, the research will be carried out in a natural environment where events will develop naturally. Since the data we are utilizing is secondary, no new data will be obtained since the surveys used to get it have already been completed. Furthermore, since developing and developed nations make up our cross-sectional unit, the analysis will be done at the country level. The research will also be a longitudinal panel study because the data will be gathered from 2001 to 2021. The details have been summarized in table 1.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 1** |  |  |  |
| *Variables Information* | |  |  |
| **Variable** | **Description** | **Measurement** | **Data Sources** |
| EG (Y) | Economic Growth | GDP Growth (annual %) | World Development Indicators |
| Info | Inflation | Inflation, GDP deflator (annual %) | World Development Indicators |
| Unkempt | Unemployment | Unemployment, total (% of total labour force) (modelled ILO estimate) | World Development Indicators |
| ER | Exchange Rate | Official exchange rate (LCU per US$, period average) | World Development Indicators |
| MS | Money Supply | Broad money (% of GDP) | WDI + Respective Central Banks + Government Operated Statistics Bureau |
| Inv | Investment | Gross fixed capital formation (% of GDP) | WDI + Respective Central Banks + Government Operated Statistics Bureau |
| Sav | Savings Rate | Gross domestic savings (% of GDP) | World Development Indicators |
| IR | Interest Rate | Lending interest rate (%) | WDI + Respective Central Banks + Government Operated Statistics Bureau |
| ddummy | Dummy for Developed | =1 for Developed, = 0 for Developing |  |

1. Data Description

First, all pertinent variables in the data have been summarised in order to investigate the effects of Gross Domestic Product (GDP) and other independent variables, including inflation (INFL), unemployment (UNEMP), money supply (MS), saving rate (SR), interest rate (IR), exchange rate (ER), and investment rate (IR). The mean, standard deviation, minimum and maximum values, and the total number of observations for each variable in the data are all included in the tables of summary statistics, referred to as Tables 2a, Table 2b, and Table 2c. While Table 2a addresses information for only developed nations in the data and Table 2c addresses information for only developing countries in the data, Table 2a comprises the latter information for the complete data, which includes both developed and developing countries. In these tables, "N" stands for the total number of observations in the data, "n" for the number of countries in the data, "T" for the number of time periods in the data, and "between" and "within" represent the summary statistics across countries and time periods, respectively.

|  |  |  |  |  |  |  |
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| **Table 2a** |  |  |  |  |  |  |
| *Summary Statistics: Overall* | |  |  |  |  |  |
| **Variable** |  | **Mean** | **Std. Dev.** | **Min** | **Max** | **Observations** |
| GDP | overall | 3.363766 | 4.235838 | -17.0002 | 34.5 | N = 1000 |
|  | between |  | 1.856601 | 0.539368 | 8.690525 | n = 50 |
|  | within |  | 3.815877 | -16.4612 | 30.07445 | T = 20 |
|  |  |  |  |  |  |  |
| Infl | overall | 4.485595 | 7.177571 | -25.9584 | 75.27737 | N = 1000 |
|  | between |  | 3.529118 | -0.40849 | 22.35004 | n = 50 |
|  | within |  | 6.26895 | -26.7483 | 57.41292 | T = 20 |
|  |  |  |  |  |  |  |
| Unemp | overall | 6.999082 | 4.991937 | 0.1 | 31.11 | N = 1000 |
|  | between |  | 4.609738 | 0.4277 | 24.96835 | n = 50 |
|  | within |  | 2.018389 | -2.75427 | 19.95208 | T = 20 |
|  |  |  |  |  |  |  |
| MS | overall | 73.96932 | 55.27998 | 12.97995 | 454.7177 | N = 1000 |
|  | between |  | 53.682 | 21.11398 | 334.0868 | n = 50 |
|  | within |  | 15.13032 | -28.1592 | 194.6002 | T = 20 |
|  |  |  |  |  |  |  |
| Sav | overall | 27.47524 | 17.69473 | -21.0384 | 83.18 | N = 1000 |
|  | between |  | 16.95528 | -6.4328 | 65.53891 | n = 50 |
|  | within |  | 5.57583 | 5.090738 | 52.15074 | T = 20 |
|  |  |  |  |  |  |  |
| IR | overall | 9.444051 | 8.387046 | -1 | 118.3799 | N = 1000 |
|  | between |  | 7.118626 | 1.205 | 44.25975 | n = 50 |
|  | within |  | 4.54219 | -7.42403 | 107.4194 | T = 20 |
|  |  |  |  |  |  |  |
| ER | overall | 356.5282 | 1620.659 | 0.179092 | 14582.2 | N = 1000 |
|  | between |  | 1602.922 | 0.292505 | 11092.43 | n = 50 |
|  | within |  | 325.6471 | -2158.77 | 3846.301 | T = 20 |
|  |  |  |  |  |  |  |
| Inv | overall | 25.51515 | 10.23183 | 3.94866 | 69.57143 | N = 1000 |
|  | between |  | 9.340958 | 12.9618 | 51.9775 | n = 50 |
|  | within |  | 4.369941 | 6.445609 | 55.91258 | T = 20 |

The summary statistics for the whole dataset, which includes data for both developed and developing countries, are presented in Table 2a. There are a total of 50 countries, 1000 observations (N=1000), 20 time periods (T=20), and 1000 observations (N=1000). The average annual percentage growth rate of the gross domestic product (GDP) is 3.364%; the minimum and maximum rates are 4.236% and 34.50%, respectively, and the standard deviation is -17.00%. Between nations, the GDP ranges from -0.539% to 8.691% with a 0.539% standard deviation in between. The average GDP growth over time is 30.074 percent, with a range of -16.461 to -16.461 percent, and a standard deviation of 3.816 percent.

Mean inflation as measured by the GDP Deflator (INFL) is 4.486 percent, with minimum and maximum values of -25.958 and 75.277 percent, respectively, and a standard deviation of 7.178 percent. The minimum INFL is -0.408 percent, the maximum is 22.350 percent, and the standard deviation is 3.529 percent amongst countries. The minimum INFL is -26.748 percent, the maximum is 57.413 percent, and the standard deviation is 6.269 percent among time periods.

The minimum, maximum, and standard deviation for the mean unemployment rate as a percentage of the labor force (UNEMP) are 0.1 percent, 31.110 percent, and 6.999 percent, respectively. The UNEMP ranges from 0.428 percent to 24.968 percent with a standard deviation of 4.610 percent amongst nations. The minimum UNEMP is -2.754 percent, the maximum is 19.95 percent, and the standard deviation is 2.018 percent among time periods.

The median money supply (MS) as a percentage of GDP is 73.696 percent, with the minimum and largest amounts being 12.980 and 454.718 percent, respectively, and a standard deviation of 55.28%. The minimum MS is 21.114 percent, the maximum is 334.087 percent, and the standard deviation is 55.280 percent across all nations. The minimum MS is -28.159 percent, the maximum is 194.600 percent, and the standard deviation is 15.130 percent within time periods.

The mean saving rate as a percentage of GDP (SAV) is 27.475; the minimum and greatest values are -21.038 and 83.180, respectively, and the standard deviation is 17.695. Between nations, the SAV ranges from -6.433 to 65.539 with a standard deviation of 16.955. The minimum SAV is 5.091, the maximum is 52.151, and the standard deviation is 5.576 within time periods.

The mean lending interest rate (IR) is 9.444, while the minimum and maximum values are -1 and 118.380, respectively, and the standard deviation is 8.387. Between nations, the IR ranges from 1.205 to 44.260 with a standard variation of 7.119. The minimum IR is -7.424, the maximum is 107.419, and the standard deviation is 4.542 within time periods.

The average exchange rate (ER) is 356.528, with the minimum and maximum values being 0.179 and 14582.200, respectively, and a standard deviation of 1620.659. Between nations, the ER ranges from 0.293 to 11092.430 with a standard deviation of 1602.922. The ER for each time period ranges from -2158.769 to 3846.301 with a standard deviation of 325.647.

The mean investment rate as a percentage of GDP (INV) is 25.515; the minimum and maximum values are 3.949 and 69.571, respectively, and the standard deviation is 10.232. The smallest INV is 12.962, the maximum is 51.977, and the standard deviation is 9.341 amongst nations. The minimum INV is 6.446, the maximum is 55.913, and the standard variation is 4.370 within time periods.

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| **Table 2b** |  |  |  |  |  |  |
| *Summary Statistics: Developed Countries Data* | | | | |  |  |
| **Variable** |  | **Mean** | **Std. Dev.** | **Min** | **Max** | **Observations** |
| GDP | overall | 2.542198 | 3.826672 | -11.03086 | 26.17025 | N = 500 |
|  | between |  | 1.574208 | 0.5393676 | 8.31288 | n = 25 |
|  | within |  | 3.501377 | -9.825516 | 20.39956 | T = 20 |
|  |  |  |  |  |  |  |
| Infl | overall | 2.903808 | 6.723254 | -25.95842 | 33.7511 | N = 500 |
|  | between |  | 2.009168 | -0.4084908 | 8.947444 | n = 25 |
|  | within |  | 6.427993 | -28.33004 | 30.54919 | T = 20 |
|  |  |  |  |  |  |  |
| Unemp | overall | 5.831666 | 3.16663 | 0.1 | 19.89 | N = 500 |
|  | between |  | 2.679172 | 0.4277 | 12.07515 | n = 25 |
|  | within |  | 1.767171 | -0.7932339 | 15.93676 | T = 20 |
|  |  |  |  |  |  |  |
| MS | overall | 90.27444 | 67.64021 | 14.84806 | 454.7177 | N = 500 |
|  | between |  | 66.23741 | 21.11398 | 334.0868 | n = 25 |
|  | within |  | 18.83767 | -11.85407 | 210.9053 | T = 20 |
|  |  |  |  |  |  |  |
| Sav | overall | 35.78325 | 16.17181 | 13.64556 | 83.18 | N = 500 |
|  | between |  | 15.29901 | 15.82413 | 65.53891 | n = 25 |
|  | within |  | 6.031557 | 13.39875 | 60.45875 | T = 20 |
|  |  |  |  |  |  |  |
| IR | overall | 5.382248 | 6.512113 | -1 | 118.3799 | N = 500 |
|  | between |  | 3.887726 | 1.205 | 20.40462 | n = 25 |
|  | within |  | 5.279081 | -7.57172 | 103.3576 | T = 20 |
|  |  |  |  |  |  |  |
| ER | overall | 33.47758 | 58.22329 | 0.2688284 | 307.9967 | N = 500 |
|  | between |  | 58.49055 | 0.2925045 | 237.5345 | n = 25 |
|  | within |  | 9.953465 | -31.94363 | 103.9397 | T = 20 |
|  |  |  |  |  |  |  |
| Inv | overall | 26.29249 | 10.46363 | 10.46538 | 58.92 | N = 500 |
|  | between |  | 9.962358 | 17.10875 | 51.9775 | n = 25 |
|  | within |  | 3.744057 | 10.78613 | 41.21147 | T = 20 |

The summary statistics for the data of developed countries are shown in Table 2b. There are 20 time periods (T=20), 25 countries (n=25), and a total of 500 observations (N=500). GDP) is growing by 2.542 percent on average each year, with the smallest growth rate being -11.031 percent, the greatest growth rate being 26.170 percent, and the standard deviation being 3.827 percent. Between nations, the GDP ranges from 0.539 percent to 8.313 percent with a 1.574 percent standard deviation in between. The GDP ranges from -9.826 percent at the lowest point in time to 20.400 percent at its highest, with a standard deviation of 3.501 percent.

The average inflation as a percentage of GDP (INFL) is 2.904 percent, with the minimum and maximum values being -25.958 and 33.751 percent, respectively, and a standard deviation of 6.723 percent. The minimum INFL is -0408 percent, the maximum is 8.947 percent, and the standard deviation is 2.009 percent amongst nations. The minimum INFL is -28.330 percent, the maximum is 30.549 percent, and the standard deviation is 6.428 percent among time periods.

The mean unemployment as percentage of GDP (UNEMP) is 5.832 percent whilst the minimum is 0.1 percent, maximum is 19.890 percent and standard deviation is 3.167 percent. Between countries, the minimum UNEMP is 0.428 percent, maximum is 12.075 percent and standard deviation is 2.679 percent. Within time periods, the minimum UNEMP is -0.793 percent, maximum is 15.937 percent and standard deviation is 1.767 percent.

The mean unemployment rate as a percentage of GDP (UNEMP) is 5.832 percent; the minimum rate is 0.1 percent, the maximum rate is 19.890 percent, and the standard deviation is 3.167 percent. The minimum UNEMP is -0.793 percent, the maximum rate is 15.937 percent, and the standard deviation is 1.767 percent within time periods. The minimum UNEMP is 0.428 percent, the maximum is 12.075 percent.

Gross domestic savings as a percentage of GDP (SAV) has a mean value of 35.783, a range of 13.646 to 83.180, and a standard deviation of 16.172. The minimal standard deviation (SAV) is 15.824, the maximum is 65.539, and the minimum SAV is 15.299 between nations. The minimum SAV is 13.399, the maximum is 60.459, and the standard deviation is 6.032 within time periods.

The median lending interest rate as a percentage of GDP (IR) is 5.382; the minimum and greatest values are -1 and 118.380, respectively, and the standard deviation is 6.512. The minimum IR is 1.205, the maximum is 20.405, and the standard variation is 3.888 amongst nations. The minimum IR is -7572, the maximum is 103.358, and the standard deviation is 5.279 within time periods.

The average official exchange rate (ER) as a percentage of GDP is 33.478; the minimum and greatest values are 0.269 and 307.997, respectively, and the standard deviation is 58.491. Between nations, the ER ranges from 0.293 to 237.535 with a 58.491 standard deviation as the minimum and highest. The lowest ER within time periods is -31.944, the highest is 103.940, and the standard deviation is 9.953.

Gross domestic capital creation as a percentage of GDP (INV) has a mean value of 26.292, a range of 10.465 to 58.920, and a standard deviation of 10.464. INV varies between nations with a minimum of 17.109, a maximum of 51.977, and a standard deviation of 9.962. The minimum INV is 10.786, the maximum is 41.211, and the standard deviation is 3.744 within time periods.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 2c** |  |  |  |  |  |  |
| *Summary Statistics: Developing Countries Data* | | | | |  |  |
| **Variable** |  | **Mean** | **Std. Dev.** | **Min** | **Max** | **Observations** |
| GDP | overall | 4.185334 | 4.463691 | -17.00024 | 34.5 | N = 500 |
|  | between |  | 1.775734 | 1.083811 | 8.690525 | n = 25 |
|  | within |  | 4.109911 | -15.63967 | 30.89601 | T = 20 |
|  |  |  |  |  |  |  |
| Infl | overall | 6.067382 | 7.274753 | -18.84496 | 75.27737 | N = 500 |
|  | between |  | 4.022304 | 1.508014 | 22.35004 | n = 25 |
|  | within |  | 6.112211 | -20.88888 | 58.99471 | T = 20 |
|  |  |  |  |  |  |  |
| Unemp | overall | 8.166498 | 6.093445 | 0.4 | 31.11 | N = 500 |
|  | between |  | 5.776463 | 1.6156 | 24.96835 | n = 25 |
|  | within |  | 2.243448 | -1.586852 | 21.1195 | T = 20 |
|  |  |  |  |  |  |  |
| MS | overall | 57.6642 | 31.77891 | 12.97995 | 211.8916 | N = 500 |
|  | between |  | 30.69731 | 21.57036 | 178.0262 | n = 25 |
|  | within |  | 10.17125 | 25.02811 | 91.52961 | T = 20 |
|  |  |  |  |  |  |  |
| Sav | overall | 19.16723 | 15.06601 | -21.03839 | 58.06932 | N = 500 |
|  | between |  | 14.45971 | -6.432795 | 46.4449 | n = 25 |
|  | within |  | 5.085507 | 1.832774 | 37.1017 | T = 20 |
|  |  |  |  |  |  |  |
| IR | overall | 13.50585 | 8.084294 | 3.071874 | 67.08333 | N = 500 |
|  | between |  | 7.346792 | 5.3205 | 44.25975 | n = 25 |
|  | within |  | 3.665464 | -3.362228 | 36.32944 | T = 20 |
|  |  |  |  |  |  |  |
| ER | overall | 679.5789 | 2246.287 | 0.1790917 | 14582.2 | N = 500 |
|  | between |  | 2241.636 | 0.99496 | 11092.43 | n = 25 |
|  | within |  | 460.6577 | -1835.718 | 4169.351 | T = 20 |
|  |  |  |  |  |  |  |
| Inv | overall | 24.73781 | 9.944452 | 3.94866 | 69.57143 | N = 500 |
|  | between |  | 8.811078 | 12.9618 | 51.59814 | n = 25 |
|  | within |  | 4.920679 | 5.66827 | 55.13524 | T = 20 |

Table 2c shows the summary statistics for the data of developing countries. There are a total of 500 observations (N=500), 25 countries (n=25) and 20 time periods (T=20). The mean GDP gross domestic product growth annually in percentage terms (*GDP*) is 4.185 percent whilst the minimum is -17.0 percent, maximum is 34.50 percent and standard deviation is 4.464 percent. Between countries, the minimum *GDP* is 1.084 percent, maximum is 8.691 percent and standard deviation is 1.776 percent. Within time periods, the minimum GDP is -15.640 percent, maximum is 30.896 percent and standard deviation is 4.110 percent.

The mean inflation as GDP Deflator (*INFL*) is 6.067 percent whilst the minimum is -18.845 percent, maximum is 75.277 percent and standard deviation is 7.275 percent. Between countries, the minimum *INFL* is 1.508 percent, maximum is 22.350 percent and standard deviation is 4.022 percent. Within time periods, the minimum *INFL* is -20.889 percent, maximum is 58.995 percent and standard deviation is 6.112 percent.

The mean unemployment as percentage of GDP (*UNEMP*) is 8.166 percent whilst the minimum is 0.4 percent, maximum is 31.110 percent and standard deviation is 6.093 percent. Between countries, the minimum *UNEMP* is 1.616 percent, maximum is 24.968 percent and standard deviation is 5.776 percent. Within time periods, the minimum *UNEMP* is -1.587 percent, maximum is 21.119 percent and standard deviation is 2.243 percent.

The mean Broad Money as percentage of GDP (*MS*) is 57.664 percent whilst the minimum is 12.980 percent, maximum is 211.892 percent and standard deviation is 31.779 percent. Between countries, the minimum *MS* is 21.570 percent, maximum is 178.026 percent and standard deviation is 30.697 percent. Within time periods, the minimum *MS* is 25.028 percent, maximum is 91.530 percent and standard deviation is 10.171 percent.

The mean value for Gross Domestic saving as percentage of GDP (*SAV*) is 19.167 whilst the minimum is -21.038, maximum is 58.069 and standard deviation is15.066. Between countries, the minimum *SAV* is -6.433, maximum is 46.445 and standard deviation is 14.460. Within time periods, the minimum *SAV* is 1.833, maximum is 37.102 and standard deviation is 5.086.

The mean value for Lending interest rate as percentage of GDP (*IR*) is 13.506 whilst the minimum is 3.072, maximum is 67.083 and standard deviation is 8.084. Between countries, the minimum *IR* is 5.321, maximum is 44.260 and standard deviation is 7.347. Within time periods, the minimum *IR* is -3.362, maximum is 36.329 and standard deviation is 3.665.

The mean value for Exchange rate as percentage of GDP (*ER*) is 679.579 whilst the minimum is 0.179, maximum is 14582.200 and standard deviation is 2246.287. Between countries, the minimum *ER* is 0.995, maximum is 11092.430 and standard deviation is 2241.636. Within time periods, the minimum *ER* is -1835.718, maximum is 4169.351 and standard deviation is 460.658.

The mean value for Investment as percentage of GDP (*INV*) is 24.738 whilst the minimum is 3.949, maximum is 69.571 and standard deviation is 9.944. Between countries, the minimum *INV* is 12.962, maximum is 51.977 and standard deviation is 8.811. Within time periods, the minimum *INV* is 5.668, maximum is 55.135 and standard deviation is 4.921.

Variation between the summary statistics of data for developed countries and developing countries could be observed clearly. The mean GDP growth is 4.185 percent in developed countries which are higher than that in developing countries (2.542). The mean inflation as GDP deflator is 2.904 percent in developing countries which is lesser than that in developed countries (6.067). The mean unemployment is 8.166 in developed countries which is higher than that in developing countries (5.832). The mean Broad Money is 90.284 percent in developing countries which is higher than that in developed countries (57.664). The mean value for Savings is 35.783 in developing countries which is higher than that in developed countries (19.167). The mean for Lending Interest rate (IR) is 13.506 in developed countries which is higher than that in developing countries (5.382). The mean Official Exchange rate is 679.579 in developed countries which is higher than that in developing countries (33.47). The mean Gross fixed Capital Formation (Inv.) is 26.29 in developing countries which is higher than that in developed countries (24.73).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3a** |  |  |  |  |  |  |  |  |
| *Correlation Matrix* | |  |  |  |  |  |  |  |
|  | **GDP** | **Infl** | **Unemp** | **MS** | **Sav** | **IR** | **ER** | **Inv** |
| **GDP** | 1 |  |  |  |  |  |  |  |
| **Infl** | 0.1874 | 1 |  |  |  |  |  |  |
| **Unemp** | -0.0671 | -0.0345 | 1 |  |  |  |  |  |
| **MS** | -0.1156 | -0.2273 | -0.1861 | 1 |  |  |  |  |
| **Sav** | 0.0995 | 0.0055 | -0.2462 | 0.0816 | 1 |  |  |  |
| **IR** | 0.0608 | 0.289 | 0.1496 | -0.2556 | -0.301 | 1 |  |  |
| **ER** | 0.0424 | 0.0503 | -0.0268 | -0.1268 | -0.0345 | 0.0827 | 1 |  |
| **Inv** | 0.1052 | -0.0689 | 0.0564 | -0.0317 | 0.5149 | -0.1297 | 0.0183 | 1 |

Table 3a shows the correlation that exists between the different variable of all countries including the developed and developing countries. The highest correlation exists between *GDP* and *Inflation*. The value for correlation is 0.187 which means that a strong (positive) correlation exists between GDP and inflation (which are both independent variables). The lowest correlation exists between *Lending interest rate* and *Gross Fixed capital formation*. The value for correlation is 0.0.026 which means that a weak (positive) correlation exists between annual Lending interest rate and Gross Fixed Capital Formation.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3b** |  |  |  |  |  |  |  |  |
| *Correlation Matrix: Developed Countries* | | | |  |  |  |  |  |
|  | **GDP** | **Infl** | **Unemp** | **MS** | **Sav** | **IR** | **ER** | **Inv** |
| **GDP** | 1.000 |  |  |  |  |  |  |  |
| **Infl** | 0.214 | 1.000 |  |  |  |  |  |  |
| **Unemp** | -0.194 | -0.029 | 1.000 |  |  |  |  |  |
| **MS** | -0.106 | -0.179 | -0.250 | 1.000 |  |  |  |  |
| **Sav** | 0.171 | 0.094 | -0.228 | -0.267 | 1.000 |  |  |  |
| **IR** | -0.052 | 0.174 | 0.291 | -0.120 | -0.119 | 1.000 |  |  |
| **ER** | -0.104 | -0.009 | 0.175 | -0.104 | 0.066 | 0.049 | 1.000 |  |
| **Inv** | -0.077 | -0.145 | 0.191 | -0.231 | 0.574 | -0.067 | 0.377 | 1.000 |

Table 3b shows the correlation matrix of the variables for the data of developed countries. The highest correlation exists between Official Exchange rate and Gross Fixed Capital Formation. The value for correlation is 0.988 which means that a strong (positive) correlation exists between Official Exchange rate and Gross Fixed Capital Formation (which are both independent variables). The lowest correlation exists between Lending Interest rate (IR) and Official Exchange rate (ER). The value for correlation is -0.009 which means that a weak (negative) correlation exists between Lending Interest rate (IR) and Official Exchange rate (ER) which are both independent variables.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3c** |  |  |  |  |  |  |  |  |
| *Correlation Matrix: Developing Countries* | | | |  |  |  |  |  |
|  | **GDP** | **Infl** | **Unemp** | **MS** | **Sav** | **IR** | **ER** | **Inv** |
| **GDP** | 1.00 |  |  |  |  |  |  |  |
| **Infl** | 0.10 | 1.00 |  |  |  |  |  |  |
| **Unemp** | -0.09 | -0.13 | 1.00 |  |  |  |  |  |
| **MS** | 0.00 | -0.20 | -0.06 | 1.00 |  |  |  |  |
| **Sav** | 0.27 | 0.16 | -0.14 | 0.38 | 1.00 |  |  |  |
| **IR** | -0.03 | 0.24 | -0.06 | -0.20 | -0.08 | 1.00 |  |  |
| **ER** | 0.01 | 0.01 | -0.09 | -0.16 | 0.10 | -0.02 | 1.00 |  |
| **Inv** | 0.30 | 0.04 | 0.02 | 0.32 | 0.51 | -0.14 | 0.04 | 1.00 |

Table 3c shows the correlation matrix of the variables for the data of developing countries. The highest correlation exists between Broad Money (MS) and Gross domestic savings (Sav). The value for correlation is 0.377 which means that a strong (positive) correlation exists between Broad Money (MS) and Gross domestic savings (Sav) (which are both independent variables). The lowest correlation exists between Lending Interest Rate (IR) and Official Exchange rate (ER). The value for correlation is 0.007 which means that a weak (positive) correlation exists between Lending Interest Rate (IR) and Official Exchange rate (ER) (which are both independent variables).

Among developed and developing countries highest correlation exists between savings as a percentage of GDP (*SAV*) and lending rate (*IR*) for developed and developing countries. Though the relation is much stronger for developed countries (0.574 for developed and 0.515 for developing). The lowest correlation exists between money supply as a percentage of GDP (*MS*) and GDP growth rate (*GDP*) the dependent variable in case of developed countries. For developing countries, the lowest correlation exists between inflation (*INFL*) and savings as a percentage of GDP (*SAV*). For Developed countries the dependent variable (*GDP*) is negatively correlated with unemployment (*UNEMP*), Money Supply (*MS*), Lending Interest Rate (*IR*), Exchange Rate (*ER*), and Investment (*INV*) and positively correlated with Inflation (*INFL*) and Savings (*SAV*). For Developing countries, the dependent variable (*GDP*) is negatively correlated with unemployment (*UNEMP*), Money Supply (*MS*) and positively correlated with Inflation (*INFL*), Savings (*SAV*), Lending Interest Rate (*IR*), Exchange Rate (*ER*), Investment (*INV*).

Table 4 shows the t-statistic values obtained from the T-test of mean-comparison for all variables in the data using developed countries and developing countries as the two comparison groups at five percent significance level (t-critical=1.96). The null hypothesis, in each variable’s case, is that there is no significant difference between means of the variables in developed countries and developing countries.

|  |  |
| --- | --- |
| **Table 4** | |
| *T-test of Mean-comparison at 95% Confidence Interval: Developed and Developing Countries Data* | |
| **Variable Name** | **T Statistic** |
| GDP | 6.25 |
| Infl | 7.15 |
| Unemp | 7.6 |
| MS | -9.75 |
| Sav | -5.2 |
| IR | 17.5 |
| ER | 6.45 |
| Inv | -5.2 |

However, as Table 4 presents, the means of all the variables in developed countries and developing countries are significantly different from each. Thus, the mean annual GDP per capita growth in developed countries is significantly different from that in developing countries (as 6.25>1.96). The mean inflation in developed countries is significantly different from that in developing countries (as 7.15>1.96). The mean unemployment in developed countries is significantly different from that in developing countries at 5 percent level of significantly (as 7.6>1.96). The mean broad money in developed countries is significantly different from that in developing countries (as 9.75>1.96). The mean value of Gross Domestic Savings in developed countries is significantly different from that in developing countries (as 5.2>1.96). The mean Lending Interest rate in developed countries is significantly different from that in developing countries (as 17.5>1.96). The mean of Exchange rate in developed countries is significantly different from that in developing countries (as 6.45>1.96). The mean Gross Fixed Capital Formation in developed countries is significantly different from that in developing countries (as 5.2>1.96).

At last, the data has been further described by using pie charts (Figure 1a to Figure 1g). Pie charts have been designed by taking the mean of each variable separately for both developed countries and developing countries for the year 2021.

**Figure 1a**

*Pie Chart: GDP growth*

Figure 1a shows that in 2021, average GDP growth higher in developing countries (61%) as compared to developed countries (39%).

**Figure 1b**

*Pie Chart: Average Inflation*

Figure 1b shows that in 2021, average inflation remained lower in developing countries (54%) as compared to developed countries (46 percent).

**Figure 1c**

*Pie Chart: Average Unemployment*

Figure 1c shows that in 2021, average Unemployment remained lower in developed countries (37%) as compared to developing countries (63%)

**Figure 1d**

*Pie Chart: Average Money Supply*

Figure 1d shows that in 2021, average Broad Money remained lower in developed countries (36%) as compared to developing countries (64%).

**Figure 1e**

*Pie Chart: Average Savings*

Figure 1e shows that in 2021, average Savings remained higher in developed countries (63%) as compared to developing countries 37%).

**Figure 1f**

*Pie Chart: Average Lending Interest rate*

Figure 1f shows that in 2021, average Lending Interest rate remained higher in developed countries (65%) as compared to developing countries (35%).

**Figure 1g**

*Pie Chart: Average Investment*

Figure 1g shows that in 2021, average Investment remained lower in developing countries (55%) as compared to developing countries (45%).

Finally, line charts of each variable have been designed for the developed and developing countries in each year separately from year 2002 to 2021. Additionally, the values for each variable over time have also been plotted for Pakistan (Figure 2a to 2g).

**Figure 2a**

*Line Chart: GDP growth*

Figure 2a shows that from year 2002 to 2021, GDP growth remained lower in developed countries as compared to developing countries. However for Pakistan, average GDP growth followed the trend similar to that of developing countries. The graphs shows high volatility. The main outliers in the GDP growth are values of Bhutan and Brunei Darussalam as these show key fluctuations.

**Figure 2b**

*Line Chart: Inflation*

Figure 2b shows that from year 2002 to 2021, inflation remained lower in developed countries as compared to developing countries. However for Pakistan, average inflation was higher than the levels of developing countries. In graph of inflation, there is volatility in few developed countries like Australia while other developing countries showed negative volatility demonstrating a stable trend in all countries. In addition to this, Bangladesh in 2016-17 shows a outlier.

**Figure 2c**

*Line Chart: Unemployment*

Figure 2c shows that from year 2002 to 2021, unemployment remained lower in developed countries as compared to developing countries. However for Pakistan, average unemployment remained well below the trend line of both developed and developing countries in initial years but later it increased. There is high volatility in all developing and developed countries showing trend of increasing level of unemployment. Australia in 2017 demonstrates an outlier. Incase of Australia it spiked to a maximum of 20% in 2017 and it remained highest for Albania.

**Figure 2d**

*Line Chart: Interest rate*

Figure 2d shows that from year 2002 to 2021, interest rate remained lower in developed countries as compared to developing countries. However for Pakistan, average interest rate remained between developed and developing countries. There is low volatility in interest rate showing a trend of stability. For Brazil it remained highest in all years in reference.

**Figure 2e**

*Line Chart: Money Supply*

Figure 2e shows that from year 2002 to 2021, money supply remained higher for developed countries as compared to developing countries. However for Pakistan, average Money supply remained even well below the trend exhibited by developing countries. Brunei, Oman and New Zealand show high volatility while other countries show low volatility demonstrating an overall trend of stable money supply. Oman in 2004 and 2007, New Zealand in 2019 show an outlier.

**Figure 2f**

*Line Chart: Exchange Rate*

Figure 2f shows that from year 2002 to 2021, exchange rate remained higher (and mostly positive) in developed countries as compared to developing countries. However for Pakistan, exchange rate fell between that of developed and developing countries. The developed countries show high volatility and the trend of exchange rate remain stable in developing countries. Developed countries show outliers in different years.

**Figure 2g**

*Line Chart: Investment*

Figure 2g shows that from year 2002 to 2021, investment remained higher in developed countries as compared to developing countries. However for Pakistan, average investment falls below that of both developed and developing countries. The developed countries and Bhutan show outlier.

**Figure 2h**

*Line Chart: Savings*

Figure 2h shows that from year 2002 to 2021, average savings remained lower in developing countries as compared to developed countries. However for Pakistan, average savings remained lower than that in both developed and developing countries. The developed countries show high volatility and stable trend. New Zealand and Australia have outliers in different years.

1. Regression Results

**Table 5:** *Overall Regression***:**

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **(1)** | **(2)** | **(3)** |
| **GDP(FE)** | **GDP(i.Time)** | **GDP(Robust)** |
|  |  |  |  |
| Infl | 0.0657\*\*\* | -0.00761 | 0.0657\*\*\* |
|  | (0.0189) | (0.0175) | (0.0223) |
| Unemp | -0.150\*\*\* | -0.130\*\* | -0.150 |
|  | (0.0576) | (0.0507) | (0.0950) |
| MS | -0.0872\*\*\* | -0.0387\*\*\* | -0.0872\*\*\* |
|  | (0.00773) | (0.00855) | (0.0226) |
| Sav | -1.59e-11 | 7.54e-13 | --1.59e-11\*\*\* |
|  | (1.15e-11) | (1.00e-11) | (2.05e-12) |
| IR | -0.0809\*\*\* | -0.105\*\*\* | -0.0809\*\*\* |
|  | (0.0260) | (0.0242) | (0.0149) |
| ER | -0.000532 | -0.000108 | -0.000532\*\*\* |
|  | (0.000354) | (0.000310) | (7.31e-05) |
| Inv | 1.88e-11 | 4.82e-12 | 1.88e-11\*\*\* |
|  | (1.30e-11) | (1.13e-11) | (2.33e-12) |
| 2003.Time |  | 0.819 |  |
|  |  | (0.622) |  |
| 2004.Time |  | 1.813\*\*\* |  |
|  |  | (0.628) |  |
| 2005.Time |  | 1.634\*\*\* |  |
|  |  | (0.631) |  |
| 2006.Time |  | 2.707\*\*\* |  |
|  |  | (0.634) |  |
| 2007.Time |  | 2.116\*\*\* |  |
|  |  | (0.639) |  |
| 2008.Time |  | 0.137 |  |
|  |  | (0.647) |  |
| 2009.Time |  | -3.560\*\*\* |  |
|  |  | (0.648) |  |
| 2010.Time |  | 0.815 |  |
|  |  | (0.652) |  |
| 2011.Time |  | 0.293 |  |
|  |  | (0.655) |  |
| 2012.Time |  | -0.520 |  |
|  |  | (0.652) |  |
| 2013.Time |  | -0.376 |  |
|  |  | (0.658) |  |
| 2014.Time |  | -0.317 |  |
|  |  | (0.663) |  |
| 2015.Time |  | -0.610 |  |
|  |  | (0.675) |  |
| 2016.Time |  | -0.567 |  |
|  |  | (0.677) |  |
| 2017.Time |  | -0.679 |  |
|  |  | (0.683) |  |
| 2018.Time |  | -0.471 |  |
|  |  | (0.683) |  |
| 2019.Time |  | -1.116 |  |
|  |  | (0.689) |  |
| 2020.Time |  | -7.101\*\*\* |  |
|  |  | (0.732) |  |
| 2021.Time |  | 2.162\*\*\* |  |
|  |  | (0.704) |  |
| Constant | 11.50\*\*\* | 8.282\*\*\* | 11.50\*\*\* |
|  | (0.797) | (0.824) | (1.837) |
|  |  |  |  |
| Observations | 1,000 | 1,000 | 1,000 |
| R-squared | 0.148 | 0.391 | 0.148 |
| Number of countries | 50 | 50 | 50 |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure 3: Hausman (1978) specification test (Overall)**

|  |  |
| --- | --- |
|  | **Coef.** |
| Chi-square test value | 85.257 |
| P-value | 0 |

**Hausman Hypothesis:**

**Ho**: No Differences in coefficients

**H1**: Significant Differences in coefficients

Figure 3 shows the results of the Hausman Test for overall regression. It is evident from the results, with P-value being equal to zero we ca say that we have evidence to reject H0 and that Fixed Effect model can be used. Results for Fixed Effects model for overall regression can be seen in table 5 column 1. Time Fixed effects results are in column 2 and fixed effect robust results are in column 3.

In column 1 significant relation between inflation and GDP Growth can be observed. It is significant at 1% significant level with a positive relation (Balami,2006). As Inflation (GDP Deflator) increases by 1% GDP Growth rate increases by 0.0657%, everything else held constant (Ceteris Paribus-CP).

In column 1 it is be seen that a significant relation exists between unemployment and GDP Growth. It is significant at 1% significant level with a negative relation (ILO,2009). As Unemployment increases by 1% GDP Growth rate decreases by 0.150%, Ceteris Paribus.

In column 1, Money supply and Interest are the only other variables found to be significant at 1% significance level. Money supply depicts a negative relationship with GDP growth. As Money supply (% of GDP) increases by 1% GDP Growth falls by -0.0872, Ceteris Paribus. Interest Rate also has a negative relation with GDP Growth. As Interest Rates increase by 1% GDP Growth falls be -0.0809%, Ceteris Paribus.

Results in column 1 also indicate that savings rate have a negative relation with GDP growth. As Savings (% of GDP) increases by 1% GDP Growth falls by 1.5e-11%, Ceteris Paribus. The size of impact on GDP is very small as represented by a small coefficient. Investment can be seen to have a positive relation with GDP Growth (Kristina,2010). As investment (GFCF as a % of GDP) increases by 1% GDP Growth rate increases by 1.88e-11%, everything else held constant. The size of impact on GDP is very small as represented by a small coefficient. Exchange rate also shares a negative relation with GDP Growth. As Exchange Rate depreciates by $1 GDP Growth falls by 0.000532%, Ceteris Paribus. It should be noted that Savings Rate, Investment and Exchange rate are found to be insignificant in this particular regression.

Column 2 shows regression with time fixed effects. From the table it is evident that the years 2004 to 2007 and year 2009 and 2020,2021 where significant rest were found to be insignificant. The coefficients follow no pattern and have increased and decreased over the years. Time fixed effects were found to be significant.

**Figure 4: Time Fixed Effect (Overall)**

|  |
| --- |
| **Time Fixed Effect Overall** |
| ( 1) 2003.Time = 0 |
| ( 2) 2004.Time = 0 |
| ( 3) 2005.Time = 0 |
| ( 4) 2006.Time = 0 |
| ( 5) 2007.Time = 0 |
| ( 6) 2008.Time = 0 |
| ( 7) 2009.Time = 0 |
| ( 8) 2010.Time = 0 |
| ( 9) 2011.Time = 0 |
| (10) 2012.Time = 0 |
| (11) 2013.Time = 0 |
| (12) 2014.Time = 0 |
| (13) 2015.Time = 0 |
| (14) 2016.Time = 0 |
| (15) 2017.Time = 0 |
| (16) 2018.Time = 0 |
| (17) 2019.Time = 0 |
| (18) 2020.Time = 0 |
| (19) 2021.Time = 0 |
| F( 19, 924) = 19.36 |
| Prob > F = 0.0000 |

Figure 4 shows the time fixed effects for the overall regression. Since the value of Prob>F= 0.0000 we can conclude that the time dummies are significant and needed to be included in the regression which can be seen in column 2 of table 5.

**Figure 5: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model (Overall)**

|  |
| --- |
| **Modified Wald test for groupwise heteroskedasticity in fixed effect regression model** |
|  |
| chi2 (50) = 4423.79 |
| Prob>chi2 = 0.0000 |

**Modified Wald Test Hypothesis**:

**Ho**: Homoskedasticity (Constant Variance)

**H1**: Heteroskedasticity (Non-Constant Variance)

Figure 5 illustrates the test for heteroscedasticity. As Prob>chi=0 we can reject the null hypothesis and denote that heteroscedasticity exists for which we will run Robust Fixed Effects, results for which are shown in column 3.

**Figure 6: Pesaran's test of cross-sectional independence (Overall)**

|  |
| --- |
| Pesaran's test of cross-sectional independence = 44.925, Pr = 0.0000 |
| Average absolute value of the off-diagonal elements = 0.360 |

**Pesaran’s Test Hypothesis:**

**Ho**: Error Terms do not correlate between entities

**H1**: Error Terms correlate between entities

As the Pr value is equal to 0.0000, we can reject the null hypothesis and conclude that there is interdependence among countries. Which is true as due to globalization progressing at such a rapid rate and much of international inter country trade taking place makes countries to be interdependent on each other.

**Table 6:** *Regression (Developed)*

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **(1)** | **(2)** | **(3)** |
| **GDP(FE)** | **GDP(i.Time)** | **GDP(Robust)** |
|  |  |  |  |
| Infl | 0.0815\*\*\* | 0.00700 | 0.0815\*\*\* |
|  | (0.0233) | (0.0233) | (0.0288) |
| Unemp | -0.212\*\* | -0.251\*\*\* | -0.212\*\* |
|  | (0.0873) | (0.0806) | (0.0940) |
| MS | -0.0632\*\*\* | -0.0366\*\*\* | -0.0632\*\*\* |
|  | (0.00796) | (0.00891) | (0.0190) |
| Sav | -1.40e-11 | -3.70e-12 | -1.40e-11\*\*\* |
|  | (1.04e-11) | (9.51e-12) | (1.89e-12) |
| IR | -0.0720\*\* | -0.0675\*\* | -0.0720\*\*\* |
|  | (0.0294) | (0.0272) | (0.0150) |
| ER | -0.0206 | -0.00178 | -0.0206 |
|  | (0.0150) | (0.0138) | (0.0261) |
| Inv | 1.70e-11 | 8.91e-12 | 1.70e-11\*\*\* |
|  | (1.18e-11) | (1.07e-11) | (2.11e-12) |
| 2003.Time |  | 1.765\*\* |  |
|  |  | (0.825) |  |
| 2004.Time |  | 3.210\*\*\* |  |
|  |  | (0.833) |  |
| 2005.Time |  | 2.106\*\* |  |
|  |  | (0.839) |  |
| 2006.Time |  | 3.268\*\*\* |  |
|  |  | (0.839) |  |
| 2007.Time |  | 2.171\*\* |  |
|  |  | (0.845) |  |
| 2008.Time |  | 0.663 |  |
|  |  | (0.857) |  |
| 2009.Time |  | -2.679\*\*\* |  |
|  |  | (0.860) |  |
| 2010.Time |  | 1.939\*\* |  |
|  |  | (0.858) |  |
| 2011.Time |  | 1.695\*\* |  |
|  |  | (0.861) |  |
| 2012.Time |  | 0.807 |  |
|  |  | (0.858) |  |
| 2013.Time |  | 0.438 |  |
|  |  | (0.864) |  |
| 2014.Time |  | 0.624 |  |
|  |  | (0.869) |  |
| 2015.Time |  | 1.100 |  |
|  |  | (0.889) |  |
| 2016.Time |  | 0.831 |  |
|  |  | (0.887) |  |
| 2017.Time |  | 0.264 |  |
|  |  | (0.891) |  |
| 2018.Time |  | 0.531 |  |
|  |  | (0.890) |  |
| 2019.Time |  | -0.232 |  |
|  |  | (0.895) |  |
| 2020.Time |  | -4.346\*\*\* |  |
|  |  | (0.939) |  |
| 2021.Time |  | 2.766\*\*\* |  |
|  |  | (0.901) |  |
| Constant | 10.28\*\*\* | 6.758\*\*\* | 10.28\*\*\* |
|  | (1.073) | (1.149) | (1.963) |
|  |  |  |  |
| Observations | 500 | 500 | 500 |
| R-squared | 0.176 | 0.383 | 0.176 |
| Number of countries | 25 | 25 | 25 |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure 7: Hausman (1978) specification test (Developed)**

|  |  |
| --- | --- |
|  | **Coef.** |
| Chi-square test value | 56.748 |
| P-value | 0 |

**Hausman Hypothesis**:

**Ho**: No Differences in coefficients

**H1**: Significant Differences in coefficients

Figure 6 shows the results of the Hausman Test for overall regression. It is evident from the results, with P-value being equal to zero we ca say that we have evidence to reject H0 and that Fixed Effect model can be used. Results for Fixed Effects model for overall regression can be seen in table 6 column 1. Time Fixed effects results are in column 2 and fixed effect robust results are in column 3.

In column 1 significant relation between inflation and GDP Growth can be observed. It is significant at 1% significant level with a positive relation (Balami, 2006). As Inflation (GDP Deflator) increases by 1% GDP Growth rate increases by 0.0815%, everything else held constant (Ceteris Paribus-CP).

In column 1 it is be seen that a significant relation exists between unemployment and GDP Growth. It is significant at 5% significant level with a negative relation (ILO, 2009). As Unemployment increases by 1% GDP Growth rate decreases by 0.212%, Ceteris Paribus.

In column 1, Money supply and Interest are the only other variables found to be significant at 5% and the later at 5% significance level. Money supply depicts a negative relationship with GDP growth. As Money supply (% of GDP) increases by 1% GDP Growth falls by -0.0632%, Ceteris Paribus. Interest Rate also has a negative relation with GDP Growth. As Interest Rates increase by 1% GDP Growth falls by 0.0720%, Ceteris Paribus.

Results in column 1 also indicate that savings rate have a negative relation with GDP growth. As Savings (% of GDP) increases by 1% GDP Growth falls by 1.4e-11%, Ceteris Paribus. The size of impact on GDP is very small as represented by a small coefficient. Investment can be seen to have a positive relation with GDP Growth. As investment (GFCF as a % of GDP) increases by 1% GDP Growth rate increases by 1.7e-11%, everything else held constant. The size of impact on GDP is very small as represented by a small coefficient. Exchange rate also shares a negative relation with GDP Growth. As Exchange Rate depreciates by $1 GDP Growth falls by 0.0206%, Ceteris Paribus. It should be noted that Savings Rate, Investment and Exchange rate are found to be insignificant in this particular regression.

Column 2 shows regression with time fixed effects. From the table it is evident that the years 2003 to 2007 and years from 2009 to 11 and 2020,2021 where significant rest were found to be insignificant. The coefficients follow no pattern and have increased and decreased over the years. Time fixed effects were found to be significant.

**Figure 8: Time Fixed Effect (Developed)**

|  |
| --- |
| **Time Fixed Effect Developed** |
| ( 1) 2003.Time = 0 |
| ( 2) 2004.Time = 0 |
| ( 3) 2005.Time = 0 |
| ( 4) 2006.Time = 0 |
| ( 5) 2007.Time = 0 |
| ( 6) 2008.Time = 0 |
| ( 7) 2009.Time = 0 |
| ( 8) 2010.Time = 0 |
| ( 9) 2011.Time = 0 |
| (10) 2012.Time = 0 |
| (11) 2013.Time = 0 |
| (12) 2014.Time = 0 |
| (13) 2015.Time = 0 |
| (14) 2016.Time = 0 |
| (15) 2017.Time = 0 |
| (16) 2018.Time = 0 |
| (17) 2019.Time = 0 |
| (18) 2020.Time = 0 |
| (19) 2021.Time = 0 |
| F( 19, 449) = 7.94 |
| Prob > F = 0.0000 |

Figure 8 shows the time fixed effects for the overall regression. Since the value of Prob>F= 0.0000 we can conclude that the time dummies are significant and needed to be included in the regression which can be seen in column 2 of table 6.

**Figure 9: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model (Developed)**

|  |
| --- |
| **Modified Wald test for groupwise heteroskedasticity in fixed effect regression model** |
|  |
| chi2 (25) = 1353.14 |
| Prob>chi2 = 0.0000 |

**Modified Wald Test Hypothesis**:

**Ho**: Homoskedasticity (Constant Variance)

**H1**: Heteroskedasticity (Non-Constant Variance)

Figure 9 illustrates the test for heteroscedasticity. As Prob>chi=0 we can reject the null hypothesis and denote that heteroscedasticity exists for which we will run Robust Fixed Effects which are shown in column 3.

**Figure 10: Pesaran's test of cross-sectional independence (Developed)**

|  |
| --- |
| Pesaran's test of cross-sectional independence = -0.830, Pr = 0.4063 |
| Average absolute value of the off-diagonal elements = 0.288 |

**Pesaran’s Test Hypothesis:**

**Ho**: Error Terms do not correlate between entities

**H1**: Error Terms correlate between entities

As the Pr value is greater than 0.05, we fail to reject the null hypothesis and conclude that there is no interdependence among countries. This could be the case given the set of countries selected for the purpose of this research trade less among them.

**Table 7:** *Regression (Developing)*

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLES** | **(1)** | **(2)** | **(3)** |
| **GDP(FE)** | **GDP(i.Time)** | **GDP(Robust)** |
|  |  |  |  |
| Infl | 0.0272 | -0.0162 | 0.0272 |
|  | (0.0297) | (0.0269) | (0.0223) |
| Unemp | 0.00883 | 0.0299 | 0.00883 |
|  | (0.0799) | (0.0696) | (0.176) |
| MS | -0.167\*\*\* | -0.0832\*\*\* | -0.167\*\*\* |
|  | (0.0181) | (0.0217) | (0.0299) |
| Sav | 0.163\*\*\* | 0.124\*\*\* | 0.163\* |
|  | (0.0354) | (0.0304) | (0.0807) |
| IR | -0.155\*\*\* | -0.155\*\*\* | -0.155\*\*\* |
|  | (0.0525) | (0.0507) | (0.0439) |
| ER | -0.000699\* | -0.000288 | -0.000699\*\*\* |
|  | (0.000367) | (0.000332) | (0.000121) |
| Inv | 0.0879\*\* | 0.0818\*\*\* | 0.0879 |
|  | (0.0351) | (0.0307) | (0.0687) |
| 2003.Time |  | -0.130 |  |
|  |  | (0.893) |  |
| 2004.Time |  | 0.157 |  |
|  |  | (0.908) |  |
| 2005.Time |  | 0.887 |  |
|  |  | (0.911) |  |
| 2006.Time |  | 1.810\* |  |
|  |  | (0.928) |  |
| 2007.Time |  | 1.797\* |  |
|  |  | (0.940) |  |
| 2008.Time |  | -0.662 |  |
|  |  | (0.948) |  |
| 2009.Time |  | -4.104\*\*\* |  |
|  |  | (0.949) |  |
| 2010.Time |  | -0.247 |  |
|  |  | (0.966) |  |
| 2011.Time |  | -1.132 |  |
|  |  | (0.976) |  |
| 2012.Time |  | -1.661\* |  |
|  |  | (0.970) |  |
| 2013.Time |  | -0.792 |  |
|  |  | (0.986) |  |
| 2014.Time |  | -0.887 |  |
|  |  | (1.000) |  |
| 2015.Time |  | -1.741\* |  |
|  |  | (1.023) |  |
| 2016.Time |  | -1.436 |  |
|  |  | (1.031) |  |
| 2017.Time |  | -1.124 |  |
|  |  | (1.046) |  |
| 2018.Time |  | -1.046 |  |
|  |  | (1.057) |  |
| 2019.Time |  | -1.268 |  |
|  |  | (1.073) |  |
| 2020.Time |  | -8.533\*\*\* |  |
|  |  | (1.208) |  |
| 2021.Time |  | 2.190\* |  |
|  |  | (1.146) |  |
| Constant | 10.85\*\*\* | 7.609\*\*\* | 10.85\*\* |
|  | (2.313) | (2.075) | (5.007) |
|  |  |  |  |
| Observations | 500 | 500 | 500 |
| R-squared | 0.236 | 0.474 | 0.236 |
| Number of countries | 25 | 25 | 25 |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Figure 11: Hausman (1978) specification test (Developing)**

|  |  |
| --- | --- |
|  | **Coef.** |
| Chi-square test value | 80.382 |
| P-value | 0 |

**Hausman Hypothesis**:

**Ho**: No Differences in coefficients

**H1**: Significant Differences in coefficients

Figure 9 shows the results of the Hausman Test for overall regression. It is evident from the results, with P-value being equal to zero we ca say that we have evidence to reject H0 and that Fixed Effect model can be used. Results for Fixed Effects model for overall regression can be seen in table 6 column 1. Time Fixed effects results are in column 2 and fixed effect robust results are in column 3.

In column 1 an insignificant yet positive relation between inflation and GDP Growth can be observed (Balami, 2006). As Inflation (GDP Deflator) increases by 1% GDP Growth rate increases by 0.0272%, everything else held constant (Ceteris Paribus-CP).

In column 1 it is be seen that an insignificant yet positive relation exists between unemployment and GDP Growth (ILO, 2009). As Unemployment increases by 1% GDP Growth rate increases by 0.212%, Ceteris Paribus.

In column 1, Money supply is found to be significant at 1% and Interest Rate is also significant at 1% significance level. Money supply depicts a negative relationship with GDP growth. As Money supply (% of GDP) increases by 1% GDP Growth falls by -0.167%, Ceteris Paribus. Interest Rate also has a negative relation with GDP Growth. As Interest Rates increase by 1% GDP Growth falls by 0.155%, Ceteris Paribus.

Results in column 1 also indicate that savings rate have a positive and significant (at 1%) relation with GDP growth (Duesenberry, 1949). As Savings (% of GDP) increases by 1% GDP Growth increases by 0.163%, Ceteris Paribus. Investment can be seen to have a positive and significant (at 5%) relation with GDP Growth (Kristina,2010). As investment (GFCF as a % of GDP) increases by 1% GDP Growth rate increases by 0.0879%, everything else held constant. Exchange rate also shares a negative and significant (at 10%) relation with GDP Growth. As Exchange Rate depreciates by $1 GDP Growth falls by 0.0879%, Ceteris Paribus. It should be noted that Savings Rate, Investment and Exchange rate are found to be significant only in this particular regression.

Column 2 shows regression with time fixed effects. From the table it is evident that the years 2006,2007,2009,2012,2015,2020 and 2021 where significant rest were found to be insignificant. The coefficients follow no pattern and have increased and decreased over the years. Time fixed effects were found to be significant.

**Figure 12: Time Fixed Effect (Developing)**

|  |
| --- |
| **Time Fixed Effect Developing** |
| ( 1) 2003.Time = 0 |
| ( 2) 2004.Time = 0 |
| ( 3) 2005.Time = 0 |
| ( 4) 2006.Time = 0 |
| ( 5) 2007.Time = 0 |
| ( 6) 2008.Time = 0 |
| ( 7) 2009.Time = 0 |
| ( 8) 2010.Time = 0 |
| ( 9) 2011.Time = 0 |
| (10) 2012.Time = 0 |
| (11) 2013.Time = 0 |
| (12) 2014.Time = 0 |
| (13) 2015.Time = 0 |
| (14) 2016.Time = 0 |
| (15) 2017.Time = 0 |
| (16) 2018.Time = 0 |
| (17) 2019.Time = 0 |
| (18) 2020.Time = 0 |
| (19) 2021.Time = 0 |
| F( 19, 449) = 10.74 |
| Prob > F = 0.0000 |

Figure 12 shows the time fixed effects for the overall regression. Since the value of Prob>F= 0.0000 we can conclude that the time dummies are significant and needed to be included in the regression which can be seen in column 2 of table 7.

**Figure 13: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model (Developing)**

|  |
| --- |
| **Modified Wald test for groupwise heteroskedasticity in fixed effect regression model** |
|  |
| chi2 (25) = 882.62 |
| Prob>chi2 = 0.0000 |

**Modified Wald Test Hypothesis**:

**Ho**: Homoskedasticity (Constant Variance)

**H1**: Heteroskedasticity (Non-Constant Variance)

Figure 10 illustrates the test for heteroscedasticity. As Prob>chi=0 we can reject the null hypothesis and denote that heteroscedasticity exists for which we will run Robust Fixed Effects which are shown in column 3.

**Figure 14: Pesaran's test of cross-sectional independence (Developing)**

|  |
| --- |
| Pesaran's test of cross-sectional independence = -1.253, Pr = 0.2102 |
| Average absolute value of the off-diagonal elements = 0.270 |

**Pesaran’s Test Hypothesis:**

**Ho**: Error Terms do not correlate between entities

**H1**: Error Terms correlate between entities

As the Pr value is greater than 0.05, we fail to reject the null hypothesis and conclude that there is no interdependence among countries. This could be the case given the set of countries selected for the purpose of this research trade less among them.

# Comparison between Developed & Developing Countries

The results of developed and developing countries show some similarities and differences in the factors that affect GDP growth.

Inflation and unemployment have a significant effect on GDP growth for developed countries but insignificant impact on GDP growth in case of developing countries. The direction of the relation is different for the case of unemployment. In developed countries unemployment has a negative yet significant relation with GDP growth however in developing countries it has a positive yet insignificant relation in developed countries. The coefficient for inflation is larger in case of developed countries (0.0815) almost four folds as compared to the coefficient for inflation in developing countries (0.0272). The coefficient for unemployment is also larger in case of developed countries (-0.212) as compared to developing countries (0.00883).

Both developed and developing countries have significant negative relations between money supply and interest rates with GDP growth. However, the magnitude of the effect is higher in developing countries compared to developed countries. The negative effect of money supply on GDP growth is much stronger in developing countries (-0.167%) compared to developed countries (-0.0632%). The same holds for interest rates, where the negative effect on GDP growth is -0.155% in developing countries and -0.0720% in developed countries.

In terms of savings rate, there is a positive and significant relation with GDP growth in developing countries, while the effect is insignificant in developed countries. However, the coefficient for it is very small in case of developed countries (1.04e-11). On the other hand, investment has a positive and significant effect on GDP growth developing countries but insignificant impact in case of developed countries. The magnitude in developing countries is much higher as compared developed countries.

Lastly, exchange rate has a negative and significant effect on GDP growth in developing countries but negative and insignificant in developed countries. The coefficient is much larger incase of developed countries (-0.0206) as compared to developing countries (-0.000699).

In terms of time fixed effects, both developed and developing countries show a significant relation between certain years and GDP growth, although the years differ. This suggests that certain economic conditions or events in specific years have a significant impact on GDP growth. Overall, while there are some similarities between the factors affecting GDP growth in developed and developing countries, there are also some notable differences in terms of magnitude and direction of the relation. These findings can have important implications for policymakers in both types of countries, as they need to consider these factors when designing economic policies to promote growth.

1. Relevance & Contribution

This specific study went far further than its predecessors and included data from fifty different nations to represent the causal link between unemployment and inflation on economic growth. 25 of them are fully developed, while the other 25 are still in the development stage. Data from the years 2008 to 2020 have been taken into account. This vast data set supports the assertion of elaborateness and exceptionality and relies on the measurement of eight variables that is unmatched in prior research.

Inflation causes an increase in the pricing level of a nation and produces additional financial problems as a result of an increase in the cost of commodities and services as well as a number of other variables.  It has been determined that inflation is the primary factor that contributes to an increase in the overall price level of a variety of goods. The cause for the loss in the value of money is a component of the economic condition that is referred to be inflation. Because of inflation, many difficulties have arisen as a result of the rise in overall prices and the decline in the purchasing power of money.

The rise in the value of inflation over time has to be analyzed in relation to the rate of unemployment so that statistically meaningful conclusions can be drawn about the phenomena of connection. Through the course of this study, the research examined the transformative influence that inflation has had over the course of time in the economy as well as its connection to unemployment.

As the globe becomes more globalized, it is essential to do in-depth research on how to boost employment and reduce inflation since these are one of the key macroeconomic indicators. Every politician, policymaker, researcher, and businessperson, whether they are in established or emerging nations, is worried about unemployment and inflation and how it affects growth because it is a global phenomenon that, if ignored, would rock the globe.

If unemployment exists and inflation keep rising, the nation's output would be much below potential, which might be disastrous in the long term. No prior study has examined such a vast array of nations together, and no prior research has measured this wide a range of variables for unemployment and inflation and economic expansion. In this rapidly changing environment, this study will be seen as being very relevant.

1. Future Policy & Implications

The results of this study suggest that policymakers need to focus on identifying economic sectors with linkages capacity in the 50 selected countries to create more job opportunities and stimulate economic activity. These efforts will lead to a reduction in unemployment and prices of commodities, ultimately improving the overall economy.

Inflation needs to be tackled differently for developed and developing countries according to the results in this research. For developed countries a combination of monetary and fiscal policies can be used to induce economic growth however developing countries need to focus on development and factors such as Savings Rate, Interest Rate and Exchange Rate management.

For Developing countries, policy makes should find a golden balance between inflation and economic growth as poverty levels may increase sharply if higher inflation is set as a target. The policies and level of intervention would differ from country to country, therefore tailoring and structural reforms are needed that suits a particular economy. Developing countries, they should diversify their dependance on many sectors rather than focusing on just one or two. This would also allow them some cushion from external shocks.

To address the issue of surging unemployment rates, policymakers should prioritize the implementation of labor-intensive production methods over capital-intensive ones. By doing so, they can avoid eliminating jobs that could be performed by individuals, leading to a reduction in unemployment rates. It is also important to ensure that savings rates, interest rates, and investment rates are steady, as this is crucial for reducing unemployment and inflation.

However, the study has some limitations that could have affected the accuracy of the results. For instance, it would have been better to include more countries over a more extended period of time and with a larger number of observations to provide better results. Although including more years would increase the number of observations and make the results more accurate but there may be presence of short-term relations, therefore shorter time period regressions may also yield better results.

The study's limited independent variables could also have resulted in biased results, as some of them could be related to each other. More variable could be added to increase the degree for which the variables explain the changes in the GDP Growth (i.e., R2). Variable such as education, infrastructure, Corruption, level of technology etc. Future studies should use instrumental variables to improve accuracy, and they should include additional independent variables to obtain more accurate results.

A stratified approach in classifying countries according to region, income levels, development levels (such as under developed countries, emerging economies etc.) could also depict the results in a better manner.

The accuracy of the data collection method used in the study could also be improved. For instance, using moving averages to estimate missing values could lead to inaccuracies, as it does not consider the real value of that year. Future studies should prioritize improving data collection and using a longer time span to compile information before starting the regression analysis to enhance accuracy.

1. Conclusion

In conclusion, we aimed to assess the influence of inflation and unemployment on economic development over the course of 20 years, from 2002 to 2021, using time series data. Various tests such as the Modified Wald Test, Pesaran's test of cross-sectional independence were done to ensure accuracy and dependency of the results we found. Dummy variable for dependent countries was used to find the effects of variable based on the classification which showed a brighter and clearer picture.

We found that there was a significant positive relationship between inflation and economic growth, which indicates that countries with higher inflation rates tended to have higher economic growth rates. This is consistent with previous research that has found a positive relationship between inflation and economic growth (Bleaney and Nishiyama, 2002).

Additionally, we found that there was a significant negative relationship between unemployment and economic growth, which suggests that countries with higher unemployment rates tended to have lower economic growth rates. This is consistent with previous research that has found a negative relationship between unemployment and economic growth (Aghion et al., 2005).

When we analysed the data separately for developing and developed countries, we found that the positive relationship between inflation and economic growth was stronger in developed countries than in developed countriess. Additionally, we found that the negative relationship between unemployment and economic growth was stronger in developed countries than in developing countries, which indicates that developed countries may be more sensitive to changes in unemployment rates.

Inflation and Unemployment were found to have an insignificant yet positive relationship with GDP growth in developing countries. On the other hand, money supply and interest rate were found to have a significant negative relationship with GDP growth, indicating that controlling inflation and maintaining stable interest rates are important for promoting economic growth in developing countries like Pakistan.

Savings rate and Investment were found to have significant positive relationship with GDP growth, respectively. The positive relationship between Ssavings rate and GDP growth implies that encouraging savings can lead to increased investment and growth. Meanwhile, the negative relationship between exchange rate and GDP growth indicates that a depreciation in the exchange rate can lead to an increase in exports, which may promote economic growth. The time-fixed effects analysis revealed that certain years were significant in terms of their impact on GDP growth, while others were not. This suggests that external factors such as global economic conditions, political instability, and natural disasters may have a significant impact on the economic growth of developing countries.

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# Appendix:

# Table 1: *List of Countries*

|  |  |
| --- | --- |
| **Developed Countries** | **Developing Countries** |
| Austria | Afghanistan |
| Belgium | Algeria |
| Denmark | Angola |
| Finland | Bangladesh |
| France | Belize |
| Germany | Benin |
| Greece | Bhutan |
| Ireland | Bolivia |
| Italy | Burkina Faso |
| Luxembourg | Burundi |
| Netherlands | Cabo Verde |
| Portugal | Cambodia |
| Spain | Cameroon |
| Sweden | Central African Republic |
| United Kingdom | Chad |
| Bulgaria | Comoros |
| Croatia | Congo, Democratic Republic |
| Cyprus | Congo, Republic |
| Czech Republic | India |
| Estonia | Côte d'Ivoire |
| Hungary | Djibouti |
| Latvia | Egypt, Arab Republic |
| Lithuania | El Salvador |
| Malta | Eritrea |
| Poland | Ethiopia |

**Table 2:** *Regression : Random Effects Model*

|  |  |  |  |
| --- | --- | --- | --- |
|  | **(1)** | **(2)** | **(3)** |
| **VARIABLES** | **GDP(Overall)** | **GDP(Developed)** | **GDP(Developing)** |
|  |  |  |  |
| Infl | 0.0825\*\*\* | 0.0987\*\*\* | 0.0176 |
|  | (0.0192) | (0.0240) | (0.0293) |
| Unemp | -0.106\*\* | -0.218\*\*\* | -0.0422 |
|  | (0.0429) | (0.0756) | (0.0464) |
| MS | -0.0280\*\*\* | -0.0195\*\*\* | -0.0553\*\*\* |
|  | (0.00446) | (0.00435) | (0.0100) |
| Sav | -1.09e-11 | -1.04e-11 | 0.100\*\*\* |
|  | (1.20e-11) | (1.08e-11) | (0.0217) |
| IR | -0.0477\*\* | -0.0588\*\* | -0.0314 |
|  | (0.0227) | (0.0287) | (0.0346) |
| ER | -8.90e-05 | -0.00789 | -0.000254\* |
|  | (0.000156) | (0.00537) | (0.000138) |
| Inv | 8.37e-12 | 1.05e-11 | 0.117\*\*\* |
|  | (1.29e-11) | (1.17e-11) | (0.0279) |
| Constant | 6.323\*\*\* | 5.871\*\*\* | 3.403\*\*\* |
|  | (0.609) | (0.734) | (1.140) |
|  |  |  |  |
| Observations | 1,000 | 500 | 500 |
| Number of countries | 50 | 25 | 25 |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1