ALLEGHENY COLLEGE

ECONOMICS 620
SENIOR PROJECT

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Determinants of Economic Growth In Developing and Developed Countries

Department *of* Economics



(04.03.2020)

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(Determinants of Economic Growth In Developing and Developed Countries)

Submitted to the Department of Economics of Allegheny College in partial fulfillment of the requirements for the degree of Bachelor of Arts.

I hereby recognize and pledge to fulfill my responsibilities as defined in the Honor Code and to maintain the integrity of both myself and the College community as a whole.

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ACKNOWLEDGEMENTS

I would like to thank all the professors in the Economic Department for always guiding me and being there for me. A special thanks to professor Onyeiwu for providing me constant feedback on my work and for encouraging and motivating me to put my best effort forward. I am also grateful to Sarah Holt and Beth Ryan for offering me moral support whenever I would be working in Quigley until late. Professor Finaret encouraged me to major in Economics and without him I wouldn't have done it, thank you Professor Finaret!

Finally, I thank my family, my backbone, for all the love and support they have given me in the past 21 years of my life. To my parents, I thank you for giving me the opportunity to attend such a wonderful institution as Allegheny College and for always pushing me to be my best. You never stopped encouraging me to be myself and for that I will always be in debt to you for your love and support. Thank you for everything, I am truly appreciative.

Abstract

This paper examines the determinants of economic growth in developed and developing countries. The main goal is to explore the impact of the inflation rate and the real interest rate on GDP growth. However, there are other control variables also included in the regression model. In order to investigate the relation, we will be using cross-sectional data from the year 2017. The sample consists of 98 countries, equally divided between developing and developed. Unlike the previous literature review, this paper seeks to distinguish what drives or hinders economic growth in developing or developed countries. After conducting the multicollinearity test and dropping one of the highly correlated variables, government expenditure, the results from regression analysis for the combined data (i.e developing and developed) showed that investment and real interest rates were statistically significant variables, while the variable foreign direct investment was weakly significant. The results from developing countries showed none of the variables were statistically significant, whereas, for the developed countries, the variable foreign direct investment was statistically significant and variables real interest rate and investment were weakly significant. There was no evidence of heteroskedasticity found. Concludingly, the empirical analysis suggested that determinants of economic growth affect developing and developed countries differently.

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Chapter One: Introduction-

The countries in the world are classified into different categories based on their growth rates and income thresholds. The three main classes are developed, emerging and developing countries. According to the World Bank, the economies are divided into four main income groups: high, upper-middle, lower-middle, and low. For this purpose, it uses gross national income (GNI) per capita data in U.S. dollars, converted from the local currency. As of July 2019, countries with GNI greater than $12375 are considered high-income countries, $3996-$12375 are upper-middle countries, $1026-$3995 are low middle and a $GNI below 1026 would make a country low income. Then, based on these thresholds and economic growth rates of the countries, the economies are categorized as developing and developed.

Economic growth is influenced by several economic determinants. In this research, I will be investigating the determinants of economic growth in developing and developed countries. Economic growth has always been an important indicator that displays a big picture of the economy. However, we see that some countries grow faster than others. To explore more on the grounds of these growth differences, I will be constructing a comparison between developing and developed economies' growth determinants. The paper uses multiple regression analysis with cross-sectional data for the year 2017, for 98 countries, equally divided between developing and developed countries to test the proposed hypothesis.

Economic growth is an important phenomenon. There are multiple ways to measure economic growth like the Gross National Product (GNP), Human Development Index (HDI), Gross

Domestic Product (GDP), and Human Capital Index (HCI). However, GDP growth is viewed as a more common indicator of economic growth as economists believe that it considers the overall condition of the economy by including the output of all sectors. In literal terms, GDP is the "monetary value of all finished goods and services made within a country during a specific period." Growth in GDP can be seen as a measure of welfare and economic success. Economic growth is considered a significant indicator when it comes to distinguishing between developing and developed countries. However, one key point that has been missed out in most of the literature review is that developing countries have a higher GDP growth than developed countries. According to the IMF World Outlook Database, U.S GDP has been growing for the past 20 years, however, its GDP growth as can be seen in Figure 1 is declining over the past two decades. This shows that even though the US has a high GDP but its GDP growth is decreasing: the annual average US GDP growth rate has declined from 4.3% in 1969, to 3.0% in 1990, to 2.6% by the 2nd quarter of 2011.

One way to interpret this contrast between the GDP growth of developing and developed nations is to consider the catch-up-growth effect. Developing countries have the potential to grow faster because they are in a position to pursue "catch-up growth" by applying technologies previously invented in developed countries, whereas, developed countries are already operating at, or close to, the technological frontier, and as a result, have no one to catch up with. Therefore, it will not be surprising to see developing countries with higher GDP growth than the developed countries. However, one thing to be mindful of is that the developing countries will only be able to catch up to the developed countries when there are favorable settings for government policies and private sector choices. In a poor economic environment, the GDP growth will not be high.

Chapter Two: Literature Review-

There have been previous studies conducted to examine the impact of multiple economic determinants on economic growth. However, according to my research, no prior study has yet constructed an investigation on the comparison between economic growth determinants in developing and developed countries. My contribution to the literature review would be to construct that comparison. The findings from these studies depict various outcomes about the significance of economic growth determinants.

Kryeziu and Durguti (2019) examined the relationship between inflation and economic growth to analyze the impact of it on economic growth. The study uses panel data from 1997 to 2017 for 17 European countries with a total of 357 observations. A linear multiple regression model is applied which uses inflation rate, the deficit to GDP, government bond yields and unemployment as explanatory variables whereas GDP growth is the dependent variable. The findings show there is a positive correlation between the GDP growth rate and the inflation rate. The inflation rate also has a positive correlation with a deficit to GDP, but this correlation is not significant. From the findings, it can be inferred that the inflation rate is statistically significant with a confidence interval of 99.9 percent. An increase of one percent in the inflation rate ratio would cause economic growth to rise by 22.4 percent. However, one key point to remember here is that the inflation rate will not always have a positive impact on economic growth. After a certain level, an increase in the inflation rate will slow economic growth.

Furthermore, Kasidi and Mwakanemela (2013) also investigated the relationship between GDP and inflation. According to the authors, during the 1970s, countries with high inflation, especially the Latin American countries began to experience a decrease in growth rates which caused the emergence of the views stating that inflation has negative effects on economic growth. Using the correlation coefficient and co-integration technique for the years 1990-2011, it was revealed that inflation has a negative impact on the economic growth of Tanzania and that there was no co-integration between inflation and economic growth. It can be inferred from the study that there is no statistically significant long-run relationship between inflation and economic growth in Tanzania. However, in my opinion, if the testing was performed for a shorter period of time, the results might have displayed the opposite picture as in some cases demand-pull inflation has a positive effect on economic growth.

Inflation is however, impacted greatly by real interest rate. Zaman (2014), investigated the relationship between inflation and nominal interest rate, using time series data from 1973-2010. The paper is based on the hypothesis of Fisher Effect that states as inflation rises, the real interest falls or nominal interest increases. Using ADF and PP approach, the results indicate that both variables are found non-stationary at 1 % and 5% significance level and after taking their 1st difference both were stationary at 1 % and 5% significance level. Using cointegration techniques likes Engle-Granger cointegration test (residual based) and Johansen cointegration test, it is obtained that there exists a relationship for long run or co-integration relationship in nominal interest rate and inflation rate at 5% significance level for period of 1973-2010.

Another important determinant that can have a significant effect on GDP is investment. According to Stiinte(2017), public investments have a significant impact on the economic growth of the Republic of Macedonia. Public investments are part of national income and play an important role in the redistribution of assets. The author, Aziri (2017), hypothesized that an increase in public investment would have a positive effect on economic growth. The article uses simple linear regression with GDP as the dependent variable and public investments and public spending as independent variables. The findings showed that with an increase of one percent in public spending, the GDP increased by 0.35%. The variable was also found to be statistically significant. However, the authors concluded that not every public investment is efficient. Investment needs to be profitable in the long term to generate economic growth. That explains why the Republic of Macedonia has high public investment but a low growth rate.

One of the important forms of investment is Foreign Direct Investment (FDI). Gui (2017), examined the impact of FDI on Africa's economic growth based on panel data of 50 African countries from the period 1980 to 2009. According to Guellec and Ralle (2003) investment in physical capital, technology, human capital, and public capital are the main determinants of economic growth, therefore the link between FDI and economic growth can be established through human capital and technologies. The results showed that there is a positive relationship between FDI and economic growth. However, one main point raised by the author is that not enough efforts have been made to attract foreign investors in Africa which is one main reason for lack of economic growth. I will, however, argue that FDI can only be attracted when there is a strong private sector. Since most of the African countries are still ruled by governments which

place little or no power in the hands of private sectors, this is making economic growth even harder in the region.

Furthermore, volume of exports can also prove to be influential for economic growth. Jetter (2017) discusses how a resource curse can damage an economy but export diversification can lessen its harm. However, oil-rich countries continue to grow rapidly even though they only export natural resources with little or no diversification and countries like Botswana, that exports diamonds, is also enjoying a growth rate with no export diversification. Jetter proposes that the market in which we are exporting holds a high significance: exporting to an oligopolistic and monopolistic market would generate higher profits margins as opposed to in the competitive market. The paper used the AEC (average export concentration) index which introduces the technical derivation of such an index on the country level and growth regression for up to 157 countries from 2000 to 2010. The findings show that a one standard deviation increase towards exporting in more concentrated markets would lead to a 0.885 percentage point increase in the country's rate of economic growth. In conclusion, exporting into a highly competitive market would generate weaker economic performance and vice versa. However, I believe other control variables like interest rate and value of goods and services imported should also be taken into account in order to generate better analysis.

To further investigate the impact of exports and imports on GDP, Jan, Ahmed and Saeed (2019) performed statistical testing to find the long-run relationship between exports, imports and economic growth in Pakistan. The authors hypothesize that exports have a positive impact on economic growth because it generates economies of scale, enhances efficiency through

competition and promotes the diffusion of technical knowledge. However, Pakistan's exports are highly concentrated on a few things like rice, leather, and textiles. The study uses a simple regression model and the results reveal a positive coefficient of 3.24 for exports and a negative coefficient of 0.11 for imports, proving the hypothesis right. However, to produce better analysis net export variable should have been taken into account as well.

Moreover, unemployment has been regarded as one of the traditional determinants of economic growth. Nigeria had to face the consequences of poor unemployment rates which included but were not limited to low GDP and crime and violence and political instability after the oil boom in the 1970s. The authors, Asoluka, Njoku, and Ihugba (2011) analyzed the relationship between economic growth and unemployment in Nigeria from 1985 to 2009 by explaining that a higher employment rate would mean more income, and hence higher demand and higher output leading to more growth. However, it depends on what sector employment is greater. The authors conclude that agriculture, which is the main source of gainful employment in the country, contributed 36.7 percent of the total labor force between 1991 and 2006. Hence, the agricultural sector should be used as a medium for reducing unemployment in Nigeria. However, I would conclude that not all developing countries can use the agriculture sector to reduce unemployment as some countries are more strong in the manufacturing sector as well.

To gather more precise results on the relationship between economic growth and unemployment, I looked at Velev (2018) research. In this paper, he investigated the impact of economic growth on unemployment for 28 European countries. The study runs a regression analysis on quarterly data from 2000Q1–2017Q3 to examine the relationship between economic growth and

unemployment and it is also focused on Okun's law. The results show evidence that the error terms are positively autocorrelated (Durbin-Watson test statistics) and the results from the LM Test show that we cannot reject the null hypothesis of the existence of a second-order autocorrelation. Findings show that the current unemployment rate will decrease by 0.14 if economic growth goes up by 1%. From this paper, it can be inferred that there is a relationship between unemployment and economic growth which also follows up on my hypothesis.

According to the Keynesian theory of economic development, economic growth can be controlled through government spending and expenditure. However, Wagner (1890) believes that economic growth is the main driver of fiscal policy. Makhoba, Kaseeram, and Greyling (2019) assess the impact of fiscal policy on South Africa's economic growth using a time series data from 1960 to 2017 with a VAR model of 58 observations, followed up on the work of the VAR model proposed by Sims (1980). Macroeconomic variables used include government expenditure, government revenues, public debt, gross fixed capital formation and economic growth (GDP). The findings of the study show that over the long-run, government expenditure has a negative effect on economic growth, while government revenues and gross fixed capital formation have a positive and significant impact on economic growth in South Africa. The former impact makes sense as government expenditure is the size of the government and a higher government expenditure would mean a weaker private sector and that does not attract foreign investors.

Furthermore, Wu, Tang, and Lin(2010) also examined the impact of government expenditure on economic growth using panel data from 1950-2005 for 182 countries. The hypothesis proposed by the authors is that government spending has a significant effect on economic growth. Using both cross-sectional and time-series data, the panel Granger causality test (1969) was performed. Findings from the whole sample showed that government expenditure and economic growth Granger cause each other; thus, the results support the hypothesis that Wagner's law holds and that the government plays a role in economic growth. The results are contrary to those of Makhoba (2019). One critique on this paper is that the study does not specify the types of government spending and takes various government activities as a whole. For further analysis and study, government spending activities should be distinguished in order to generate more efficient results.

GDP is not only affected by government expenditure but also government revenue. To investigate the effect of government revenue and government spending on the economic growth of Romania, Roşoiu (2015) used a vector autoregressive (VAR) model for the period 1998q1 - 2014q1. Variables used in the model include government expenditures, government revenues, GDP, harmonized indices of consumer prices and interest rate. The results show that the GDP increases in both cases when there is a revenue shock and expense shock by the government. It can be concluded that government expenditure and revenue both have a positive relationship between economic growth. However, I believe, to produce better results types of expenditure, e.g capital, consumption, and transfer payments should be taken into account.

Exchange rate has been found to be an important determinant of GDP. Cakrani (2014) in this article investigates the impact of the real exchange rate on Albania's economic growth using a cointegration approach for the period 2002Q1-2011Q4. The real exchange rate is constructed as an index against the euro. The cointegration method examines the long term relationship between real income per capita, which is used as the indicator for economic growth, and the explanatory variables: investments as a percent of GDP, government spending as a percent of GDP and trade openness. The results from Cointegration showed that the variables have a long-term relationship between them. A VEC model was also applied which showed that only trade openness had a relatively significant impact on the level of real income per capita in Albania. However, as the coefficient was very small, it suggested an insignificant impact of real exchange rate on economic growth in Albania in the long term. This means that the real exchange rate does not have any impact on Albania's growth. However, the article failed to take into account other variables that have an impact on the real exchange rate like the interest rate. For further analysis, all necessary variables should be taken into account.

Contrary to the results of Cakrani (2014), Habib, Mileva, Stracca (2017) found a relationship between real exchange rate and GDP. The author investigates the unsettled relationship between real exchange rate and growth per capita using an identification strategy based on instrumental variables using five-year average data for a panel of over 150 countries from 1970-2010. The country-specific instruments used are global capital flows interacted with the individual country's financial openness and the growth rate of official reserves. The results show exchange rates do matter for growth in developing economies, but substantially less so in advanced ones, which confirms and strengthens the conclusions of Rodrik (2008). One of the most important

limitations of this study is that using the exchange rate as a policy lever could be useful only in the early stages of economic development, while it becomes irrelevant in the long term as countries get richer.

Since the exchange rate is impacted by interest rates, it is important to see the relationship between interest rate and economic growth. Jelilov (2016) in the paper examined the impact of interest rates on economic growth from the year 1990 to 2003 in Nigeria. According to Hakkio (2000), interest rates have remained extremely high with devastating impacts on the cost of borrowing and investment in Nigeria. Since interest rate is an extremely important monetary policy, high rate has been the bane of discouragement for the foreign investment in the country. Using the ordinary least square regression method the results showed that interest rate has a slight impact on economic growth: A percent change in the investment would lead to 0.057 percent change in growth. Thus, the interest rate is statistically significant. In an effort to encourage economic growth in Nigeria, the government should lower the interest rate which will increase investments and lead to economic growth.

What are the key determinants of economic growth in developing and developed countries? Themba and Nicholas (2016) performed a qualitative assessment in order to examine the key macroeconomic determinants of economic growth in developing and developed countries. This article's main contribution to the literature review was to differentiate what drives or hinders economic growth in developing or developed countries. The study uses fourteen empirical studies to investigate the determinants of economic growth. From the findings, it was inferred that foreign aid, foreign direct investment, fiscal policy, investment, trade, human capital

development, demographics, monetary policy, natural resources, reforms and geographic, regional, political and financial factors are the main determinants of economic growth in developing countries. In developed countries, physical capital, fiscal policy, human capital, trade, demographics, monetary policy, and financial and technological factors had a more significant impact on economic growth. However, one of the important limitations of this paper is that it does not compare the developing countries that are at the same stage of development, hence producing biased results.

Other than the economic determinants mentioned above, corruption is also a major factor that can halt economic growth in both developing and developed countries. Shera, Dosti and Grabova (2014) investigated the impact of corruption on 22 developing countries using panel data analysis for the period 2001 to 2012. Corruption is becoming a more common problem and includes activities like nepotism, secretly funding of political parties, bribery in public procurement, and misappropriation of public funds by public officials as well as for private interests. The empirical analysis shows real GDP growth as a dependent variable and Index corruption, population growth, government expenditures, level of secondary education enrollment, investment, trade as a percentage of GDP, inflation, and capital formation as independent variables. The results show that corruption has a significant negative impact on economic growth, an increase in the corruption index with a unit reduces GDP by 1.89 %. The empirical findings also show that inflation, government spending, population growth adversely affect economic growth and other variables such as education, investment, trade and capital formation increase positive affect. In order to achieve economic growth, it is necessary to have leaders that are honest and loyal to the development of the economy. To fight corruption, citizens

and the government should be made aware of the moral education and values and norms of the society.

Another important thing that hinders economic growth is political instability. Okafor (2017), examined the impact of political instability on economic growth on the member countries of the Economic Community of West African States (ECOWAS). The study used panel data for 15 ECOWAS countries from 2005-2012 to test the hypothesis that political instability has a negative effect on economic growth. The findings showed that terrorism, poor governance, social unrest, youth unemployment, crude death and natural resource rent have negative relationships with economic growth. However, as these countries are not at the same level of economic development, it might not be accurate to form a basis of judgement on these results, yet, political instability has always been proved dangerous for economic growth but severity of the issue depends on many other factors too like strong leadership in government etc.

What are the main determinants of economic growth in developing and developed countries? Answers are unclear in the literature review, but I will explore the issue in the empirical section.

Chapter Three: Empirical Analysis

In this section, I will be discussing the data, model specifications and regression analysis results.

3.1 : Dataset

In this chapter I will be using cross sectional data from the year 2017, for 98 countries that are equally divided between developing and developed economies. Economic growth is impacted by a number of economic determinants but in building the regression analysis for this model only the most important and traditional determinants are taken into consideration. There are numerous ways of measuring economic growth but for the purpose of this study we take into account the growth of Gross Domestic Product (GDP). The data for the analysis is sourced from the World Development Indicators (WDI) of the World Bank, International Financial Statistic (IFS) of International Monetary Fund Data (IMF), World Economic Outlook Database October 2019 of IMF and The World Factbook of Central Intelligence Agency for the year 2017.

3.2 : Model Specification and variables

To investigate the determinants of economic growth in developing and developed countries we will be running three multiple regression analyses for the sake of better understanding. The first regression would run the data for both developing and developed countries to see which independent variables have a significant impact on economic growth. A dummy variable called ddummy which takes on the value of one for developed countries and the value of zero for developing countries will be used to be able to differentiate between the countries. Next, two separate regression analyses would be run for developed and developing countries to examine what drives and hinder economic growth in developing and developed countries. It is important

to run three separate regression analyses because first, we will investigate what are the determinants of growth in GDP in both developing and developed countries. If we do not run this regression then we would not be able to see the combined impact of the determinants of GDP growth in both classes of countries. The combined regression analysis will give us an overview of what variables cause an increase in GDP growth. Next, we will run two separate regressions for developing and developed countries so that we can see the impact of the determinants on the economic growth of developing and developed countries individually. This will help us make a comparison of what determinants are most significant and appropriate for the GDP growth when it comes to developed and developing countries. It is important to run three regression analyses so that we can differentiate between the causes of GDP growth in both classes of countries. To address the main hypothesis of the study, I represent the regression model below:

$$GDP_i = \beta_0 + \delta_{01} ddummy + \beta_1 inf_i + \beta_2 unemp_i + \beta_3 inv_i + \beta_4 rev_i + \beta_5 trade_i + \beta_6 Exp_i$$
$$+ \beta_7 ler_i + \beta_8 FDI_i + \beta_9 realirate_i + \beta_{10} cacc_i + u_{i,} \qquad i = 1,2,3,4,5,\ldots.98$$

We aim to explore deeper into the differences in GDP growth which is the annual percentage change in GDP, between developing and developed countries by investigating the determinants of it. For the research paper, I propose the following hypothesis:

The variable inflation (inf) will have a positive relationship with GDP growth while the real interest rate (realirate) will have a negative relationship with GDP growth. However, we expect that the inflation rate will promote GDP growth to a certain level. When the inflation rate becomes too high, it will harm the GDP growth.

Inflation and real interest rate are important determinants of economic growth. To understand their relationship with GDP growth, it is first necessary to understand the relationship between inflation and real interest rate. The Central Bank tries to manipulate the nominal interest rate to keep the inflation low and close the output gap (i.e the differences in potential output and real output). Fisher's equation establishes this relation i.e the real interest rate is equal to nominal interest minus the inflation rate. This equation forms the theoretical framework for studying the relationship between the nominal interest rate and the rate of inflation. By changing the nominal interest rate, the Central Bank is able to control the real interest rate which is used by the public. The real interest rate impacts the inflation rate by changing the size of the components of aggregate expenditure: consumption, investment, government spending, and net exports. As the real interest rate goes up, people start to save more as the opportunity cost of spending money is higher. Increased savings and less spending leads to reduced consumption which causes demand-pull inflation to fall. Additionally, a higher interest rate discourages borrowing as the cost of borrowing is greater than the return rate which leads to reduced investment and more savings and hence lowers the inflation. Furthermore, the increased interest rate causes the currency to appreciate which makes imports cheaper and exports more expensive, hence the net exports will fall whilst lowering the inflation rate. Finally, government spending is not too sensitive to the changes in the interest rate. Therefore, policymakers manipulate the components of aggregate expenditure by changing the nominal interest rate to bring the inflation rate close to the targeted rate of inflation. Hence, we can see how significant the inflation rate and real interest rates can be for economic growth.

In order to understand the impact of inflation on economic growth, it is first important to look into the types of inflation. The three main types of inflation are, demand-pull, cost-push and built-in inflation. Demand-pull inflation results when the increase in the aggregate demand for goods and services is faster than the economy's capacity. Secondly, when the cost of production increases, the goods become more expensive which leads to cost-push inflation. Thirdly, built-in inflation is when workers start demanding higher wages due to speculations about the price increase. This starts the spiral of wage: workers asking for wage increases which increases the cost of production hence leading to cost-push inflation. Popular opinion is that demand-pull inflation is good for the economy in the short run as it shows that the economy's demand for more goods and services meaning that their income per capita and standard of living is rising, Herbertsson (1996). However, cost-push inflation can be harmful to the economy as the input prices might be increasing with no change in people's income. The data for this study, due to limited resources, did not take into account what type of inflation the country was experiencing. We assume that inflation is due to the increased demand for goods and services in the economy. This can prove to be profitable for the businesses as they increase their output capacity to fulfill the increasing demands of the economy through employing the unused labor and using unexploited resources. Increased output means higher GDP growth. Therefore, I expect inflation to have a positive impact on economic growth because inflation indicates that the economy is moving. However, increasing inflation will not always be good for the economy as many researches have proved that the inflation rate has a negative impact on GDP growth, Kasidi, and Mwakanemela (2013).

Furthermore, with inflation, it becomes easier for debtors to repay their debt. This causes more transactions of borrowing and lending in the economy, increasing the overall spending in the economy leading to high growth in GDP. Furthermore, according to A. W. Phillips, higher inflation can help reduce unemployment. The inverse relationship between inflation and unemployment rate is shown in the Phillips Curve in figure 2. The diagram has a downward sloping curve which indicates that with an increase in the inflation rate, unemployment would fall. Lower unemployment would then mean more labor in use, hence more output being produced in the economy and more income for the people to spend leading to growth in GDP. However, the Phillips Curve was in question due to the stagflation in the 1970s i.e higher inflation and higher unemployment. Hence the monetarist economist argued that there was no trade-off between inflation and unemployment in the long-run. On the other hand, I expect the real interest rate to have a negative impact on GDP growth because higher real interest causes savings to increase, and consumption and investments to fall. This affects the overall output of the economy hence lowering the GDP growth. It is an important determinant of GDP growth as a fraction of savings and investments heavily rely on it.

3.2.0 : Dummy Variable (ddummy)

The dummy variable is used in the regression analysis for combined data i.e 98 countries. The dummy variable called ddummy takes on the value of one for developed countries and the value of zero for developing countries. When analysing the results for the combined data, this variable will help differentiate between developing and developed countries to produce a better understanding.

3.2.1 : Dependent Variable

The dependent variable used in this study is the Gross Domestic Product (GDP) growth. It is calculated in percent change so it shows the yearly change in a country's GDP. To measure how fast or slow the economy is moving, GDP growth has proved to be a good estimate. A higher number would show greater GDP growth and vice versa. I have used GDP growth as a measure of economic growth as it is a more common way of measuring economic growth, used by both developing and developed countries. However, the limitations of using GDP as a measure of economic growth are that it does not take into account the non-market activities, effects of a natural disaster, leisure and it does not adjust for population or wealth. For this research purpose, I will not be focusing on these limitations of GDP. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

3.2.1 : Independent Variables:

There are two independent variables used for the purpose of this study. The details are given in this section.

i) Inflation rate (inf)

One of the independent variables of this paper is inflation. It is measured in average consumer price, percent change. Inflation is the general increase in the average prices of goods and services of a country over a period of time. We use this measure to understand the impact of rise in price levels on the GDP of a country. I expect the coefficient of this variable to be positive meaning that increase in inflation would cause the GDP growth to increase. However, I suspect that this will not always be the case: the relationship will be positive to a certain level and after that it

would slow down the economic growth because extreme inflation can have adverse effects on the economy as purchasing power of the currency decreases with high rate of inflation. But how much inflation is too much? According to Fischer (1993) an increase in average inflation of 10 percent per year would reduce the real GDP growth rate from 0.2 to 0.3 percent per annum. Additionally, Barro (1995) used a sample of 100 countries from the year 1960 to 1990 to find out the impact of inflation on the economic performance. The results showed that an increase in the inflation by 10 percentage points lowers the real GDP per capita by 0.2-0.3% points per year. Therefore, we can conclude that inflation only affects the GDP negatively when it is high. As of now, I am not certain of the threshold, but if time and resources permit, I will be calculating the threshold on my own. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

ii) Real Interest Rate (realirate)

The other independent variable is the real interest rate. It is adjusted for inflation and is expressed in percent per annum for this paper. A higher interest rate would cause the GDP to fall as the investors would be discouraged to borrow money. Additionally, a higher interest rate would also increase the savings. This would lower the investments in the economy and hence affect the GDP growth adversely. I expect the sign for realirate to be negative. Data is sourced from the WDI of the World Bank, IFS of IMF and The World Factbook of the Central Intelligence Agency for the year 2017.

3.2.2 : Control Variables

In this section, I will be discussing the control variables used in the regression analysis.

i) Unemployment (unemp)

One of the control variables used in this research paper is the unemployment rate measured as a percentage of total labour force. It tells what population of the total labour force is unemployed. I, thus, expect the coefficient of this variable to be negative which means that increase in unemployment would cause the GDP growth to fall. As more and more people become unemployed, the income per capita falls which not only results in less revenue for the government in the form of taxes but also reduces the demand for goods and services produced domestically which can happen to be detrimental for the economy. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

ii) Investments (inv)

This variable is measured as a percent of GDP. Investments are an important part of the growth cycle of the economy as it increases the competitiveness of the economy and improves productivity. Therefore, we expect the coefficient of investments to be positive meaning an increase in investments would cause the GDP growth to rise. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

iii) General Government Revenue (rev)

This variable is also measured as a percent of GDP and it consists of taxes, social contributions, grants receivable, and other revenue. Revenue increases the government's net worth, which is the

difference between its assets and liabilities. This variable can be interpreted in two different ways: increased government revenue would cause the gdp growth to halt as it would mean that the government is collecting a high rate of taxes which would leave less money for people to spend. Hence, this might lead to reduced consumer spending and which would then lead to lowered production of goods and services, therefore, slowing GDP growth. However, if the increased government revenue is due to other factors like more exports and taxes from FDI, then the revenue may not have a significant impact on GDP growth. For this paper, I expect the coefficient to be negative assuming the government is collecting a high amount of taxes. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

iv) Merchandise Trade (trade)

The variable trade is measured as a percent of GDP and tells us the sum of merchandise exports and imports divided by the value of GDP. Increased trade would also have a positive impact on economic growth of an economy. According to Jan, Ahmad, and Saeed (2019) a higher coefficient would show more trade openness which would cause economies of scale, enhance efficiency through competition and promote the diffusion of technical knowledge. Therefore, we expect the coefficient of trade to be positive. Data is sourced from World Development Indicators (WDI) of the World Bank.

v) General Government Total Expenditure (Expd)

Measured as a percent of GDP, this variable consists of total expense and the net acquisition of nonfinancial assets. A positive and higher coefficient of government expenditure would indicate that the government sector is strong in contrast to the private sector. This would affect the GDP

growth adversely as foreign investors tend to invest more in countries with a strong private sector due to the fact that private-sector is more profit-driven and more efficient than the public sector as corruption, political instability, favoritism are major problems when it comes to the public sector. Therefore, increased government spending would cause the GDP growth to slow down. However, if we see this from the other perspective, things could turn out to be quite the opposite: increased government spending in capital like construction of roads, bridges or hospitals, would lead to increased employment opportunities which in return would lead to more consumer spending causing more transactions and greater production of goods and services leading to an increase in GDP growth. For this paper, we expect the coefficient to be negative assuming a higher government expenditure would mean a weaker private sector. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

vi) Exchange Rate (er)

Exchange rate is expressed in National Currency per SDR, period average. To get a better understanding of the results, I will be logging this variable (ler). Exchange rate appreciation can damage the economy as the exports become expensive and imports become cheaper. It can harm the economy especially if the country is importing capital goods and exporting agricultural products which would lead to a deficit in balance of trade. However, currency depreciation will cause the imports to become expensive and exports cheaper. This will favor the economy as increased exports would mean increased domestic production and better growth opportunities. Also, due to expensive imports people would start switching to domestic products which will have a positive impact on the output production and hence the gdp growth. A strong exchange rate is considered a sign of economic strength but Eurozone countries like Greece, Portugal and

Greece experienced lower economic growth in the 2000's due to overvalued currency, Tejwan Pettinger (2017). Therefore, I expect the sign of this variable to be negative as it should be low in order to promote economic growth. Data is sourced from International Financial Statistic (IFS) of International Monetary Fund Data (IMF) and The World Factbook of the Central Intelligence Agency for the year 2017.

vii) Foreign Direct Investments (FDI)

The variable FDI is expressed as net inflow, percent of GDP. It shows the value of inward direct investment made by non-resident investors in a country or in simpler terms it is an investment in the form of controlling ownership in a business in one country by an entity based in another country. If the FDI inflow share is greater than the outflows, a country is to experience economic growth. China and India, the two fastest growing economies have the highest share of FDI inflows. In 2013 the FDI flow into China was $24.1 billion, resulting in a 34.7% market share of FDI into the Asia-Pacific region. In 2015, India emerged as the top FDI destination surpassing China and the US by attracting FDI of $31 billion compared to $28 billion and $27 billion of China and the US respectively. Therefore, I expect the coefficient of this variable to be positive meaning it will have a positive impact on GDP growth. Data is sourced from the WDI of the World Bank.

viii) Current Account Balance (cacc)

Current account is all transactions other than those in financial and capital items. The major classifications are goods and services, income and current transfers. The variable is explained as a percent of GDP. It acts as an indicator for a country's international competitiveness. Hence, a

higher positive current account balance would have a favourable impact on GDP growth as it will show that the country is not a net borrower from the rest of the world. Hence, I expect the coefficient to be positive. Data is sourced from The World Economic Outlook Database October 2019 of IMF.

3.3 : Results

In this section, the results from running the regression analysis for combined (i.e both developed and developing), developing and developed countries will be presented.

3.3.1 : Results from Combined Data:

Table 1 presents the regression analysis results from running combined data of 98 countries. The results show that only two variables, investment (inv) and real interest rate (realirate) are statistically significant at 5% level with p-values of .022 and .037 respectively. For investment, the findings show that a one percent increase in investments will increase the GDP growth by 6.83%. The coefficient sign is as I had expected, investments have a positive relationship with GDP growth. For real interest rate, a one percent increase in the interest rate will cause the GDP growth to increase by 7.2 percent. The result for this variable is inconsistent as I had predicted a negative coefficient sign showing that an increase in real interest rate would discourage borrowing and hence have a negative impact on the GDP growth. Additionally, the R-squared is 24 percent which means only 24 percent of the variation in the dependent variable is explained by the independent variables. This is low considering we have 10 explanatory variables.

3.3.2 : Results for Developed Countries:

The results from running the regression analysis, in Table 2, for developed countries, with 49 observations, show that none of the independent variables is statistically significant. However, the variable inv is weakly significant with a p-value of 10%. This means that an increase of one percent in investments would cause the GDP growth to increase by 8.7%. However, since the variable is weakly significant, we do not consider it to have any major impact on GDP growth. The R-squared is also low showing that only 31% of the total variation in GDP growth is explained by the independent variables. However, the variation is greater than the results from combined data.

3.3.3 : Results for Developing Countries:

From running the regression analysis of the developing data the results in Table 3 show that none of the variables are statistically significant. Additionally, only 28 percent of the variation in GDP growth is explained by the independent variables which is extremely low. One reason for the large number of insignificant variables and low R-squared values can be multicollinearity, Ramu Ramanathan(1992). Given this situation, I will be performing a multicollinearity test.

3.4 : Multicollinearity test:

After running the regression analysis and finding out that the results were contrary to the expectations, I performed a multicollinearity test to see which variables are highly correlated. Multicollinearity is a state where one independent variable can be linearly predicted from the others with a substantial degree of accuracy. There are multiple reasons why it can happen:

repetition of a variable, one variable composed of another variable which is also being used in the regression model or an inaccurate use of dummy variables. The consequences of multicollinearity include high standard errors which in return affect the p-values and generate inaccurate coefficients. In order to test for multicollinearity I ran the score called Variance Inflation Factor (VIF). A VIF value of greater than 10 and a 1/VIF value of less than 0.1 shows that the variables are highly correlated. The results are presented in Table 4.

As it can be seen from Table 4, the variables rev and expd are highly correlated at the values of 16.43 and 15.32 respectfully. This proves that multicollinearity is problematic and in order to get accurate results one of the highly correlated variables needs to be removed from the regression model.

3.5: New Regression Model and Results:

Since, two control variables, rev and expd, were highly correlated, I will be removing the variable general government expenditure (expd) from the regression model to get more reliable results, all other things remaining constant. The new regression model is presented below:

$$GDP_i = \beta_0 + \delta_{01} ddummy + \beta_1 inf_i + \beta_2 unemp_i + \beta_3 inv_i + \beta_4 rev_i + \beta_5 trade_i + \beta_6 ler_i + \beta_7 FDI_i + \beta_8 realirate_i + \beta_9 cacc_i + u_{i,} \quad i = 1,2,3,4,5,\ldots.98$$

I will be following the same regression approach: running three separate regression analysis for combined data, developing countries and developed countries.

3.5.1: New Results

This section displays and analyzes the results from running the new regression analysis after removing the highly correlated variable, expenditure (Expd).

4.4.1 Results from Combined Data:

Table 5 represents the results from running the new regression analysis for 98 countries, after removing the variable Expd. It can be seen from the table that the results have improved with two strongly significant variables (inv and realirate) and one weakly significant variable (FDI). The inv and realirate are statistically significant with p-values of 0.013 and 0.029. FDI is weakly significant with a p-value of 0.08 at 5% significance level. This means that one percent increase in inv will cause the GDP growth to increase by 7.5%. The findings match with my expectations of inv having a positive coefficient. Furthermore, the findings for realirate are contrary to my expectations as I had expected realirate to have a negative coefficient. The results show that with one percent increase in realirate, the GDP growth will increase by 7.4%. Additionally, our weakly significant variables shows that a one percent increase in FDI will cause the GDP growth to rise by 4.4%. The coefficient sign is consistent. The R-squared shows that 23.3% variation in the GDP growth is explained by independent and control variables of the regression.

3.5.2 : Heteroskedasticity test:

One of the assumptions of multiple regression is that the variance of the error term, given any value of the explanatory variables, is constant across observations. Heteroskedasticity (the

violation of homoskedasticity) occurs when the variance of the error term is not the same across all observations in the sample. If, for example, the variance of the error term increases/decreases with the observed values of the explanatory variables, heteroskedasticity exists. To test for heteroskedasticity, I performed the White test, and (b) the Breusch-Pagan test. Using these two tests we can formally test whether the squared residuals of a regression model are constant for all observations.

From Table 6, we can interpret that at the 5% significance level, we fail to reject the null hypothesis (H0) in favor of the alternative hypothesis (H1); the p-value of 0.4362 > 0.05 provides little evidence against the null hypothesis (i.e., homoskedasticity). Since there is no evidence for heteroskedasticity, we will not be computing heteroskedasticity- robust standard errors which are then used to recalculate the t-statistics using the original regression coefficients.

The findings from Table 7 show that at 5% significance level, we fail to reject the null hypothesis (H0) in favor of the alternative hypothesis (H1); the p-value of 0.6744 > 0.05 provides little evidence against the null hypothesis (i.e., homoskedasticity).

3.5.3 : Results for Developing Countries:

The results from running regression analysis for 49 developing countries are presented in Table 8. The findings show that none of the variables is statistically significant. The R-squared is also low showing that only 27% of the variation in the GDP growth is explained by the explanatory variables. The results were surprising as I had expected inv and realirate to be statistically

significant at 5% level of significance. Therefore, we can see that even after removing the highly correlated variable, government expenditure (Expd), the results for developing countries have not improved.

3.5.4 : Heteroskedasticity test for Developing Countries:

From table 9, we can interpret that at the 5% significance level, we fail to reject the null hypothesis (H0) in favor of the alternative hypothesis (H1); the p-value of 0.4328 > 0.05 provides little evidence against the null hypothesis (i.e., homoskedasticity).

The findings from Table 10 show that at 5% significance level, we fail to reject the null hypothesis (H0) in favor of the alternative hypothesis (H1); the p-value of 0.5705 > 0.05 provides little evidence against the null hypothesis (i.e., homoskedasticity).

3.5.5 : Results for Developed Countries:.

The findings in table 11 from regression analysis of 49 developed countries show that FDI is statistically significant at 0.052 while inv and realirate are weakly significant at p-values of 0.067 and 0.085 respectively. This shows that with an increase in one percent inv, the GDP growth will grow by 9.4%. The coefficient signs match what I had expected. Furthermore, one percent increase in FDI would cause the GDP growth to rise by 5.3%. A positive FDI coefficient is what I had expected. Additionally, a one percent increase in realirate would cause the GDP growth to increase by 20.9%. The positive coefficient sign for realirate is contrary to my expectations as I had hypothesized it to be negative. We can see that removing the highly correlated variable has

slightly improved the results by making three variables slightly more significant which were not significant at all before.

3.5.6 : Heteroskedasticity test for Developed Countries:

The results from the White Test for developed countries in Table 12 show that the p-value of 0.4328 > 0.05 provides little evidence against the null hypothesis (i.e., homoskedasticity). So at a 5% significance level, we fail to reject the null hypothesis (H0) in favor of the alternative hypothesis (H1).

The results from the Pagan Test for developed countries in Table 13 show that the p-value of 0.3994 > 0.05 provides little evidence against the null hypothesis (i.e., homoskedasticity). Therefore, there exists no evidence for heteroskedasticity.

3.6: Shortcomings of the study:

The main limitation of this study is that the 49 developing countries included in this research are not at the same stage of development. Some countries like China and India are growing at a faster rate (i.e GDP growth of 6.757 and 4.404 in 2017) than countries like Jamaica and Haiti which had a GDP growth of 0.658 and 1.173 in 2017. The differences in the level of development are not taken into consideration which may have caused biased results. Similarly, Rwanda which was destabilized in the early 1900s because of the geneocide has been seeing an average GDP growth of 7.29 percent from 2014 to 2019. However, it will be wrong to compare a

fast growing economy like that of Rwanda's with The Bahamas which has seen an average GDP growth of only 0.72 percent since 2014 (the data is sourced from IMF Outlook). Additionally, one thing that this study did not look into is the relationship between the independent and control variables for e.g there might be a connection between real interest rate and foreign direct investment which might have had a combined effect on the GDP growth. In order to examine the relationship between the variables we should have interacted the two variables. Results might have been different if the individual relationship between the explanatory variables had been taken into account. Unfortunately, given the constraint of limited resources and time, I was not able to classify the countries based on the same stage of development and take into account the relationship between the explanatory variables. Additionally, it is extremely important to choose the right dataset and year for the investigation of your study question. The data year i.e 2017 taken for this study purpose might not have been representative of the economic conditions of the countries. Many times, it is hard to determine the cause of GDP growth using only one year. GDP growth is a process that can be highly inconsistent from year to year. There are chances that one determinant might have a different impact on GDP growth varying from country to country in a given year. Every country has its own weaknesses and strengths which directly affects the GDP growth through different macroeconomic indicators. Therefore, the use of data based on only one year can be misleading and biased. To produce improved results, panel data can be used. That would help compare the performance of the country i.e GDP growth in a wide range of time and help gain a better understanding of what determinants have an impact on growth of GDP. For further study and analysis, taking these measures would produce more accurate results.

Chapter Four: Discussion of Empirical Results

The hypothesis formed for this study stated that real interest rate should have a negative while inflation should have a positive impact on GDP growth but to a certain level. As shown in the results, the variable inflation was not statistically significant in any of the regression analysis, meaning that inflation had no impact on the GDP growth. According to Barro (1995), small estimated effects of inflation on growth rates are misleading. The inflation rate affects the growth rates in the long term rather than short term. Destabilization of prices becomes a crippling issue in the long term as businesses and households are thought to perform poorly in high and unpredictable inflation periods. Therefore, the insignificance of the variable, inflation rate, is because the rise or fall in the inflation rate in 2017 had not yet affected the GDP growth of that year. The effects of inflation rate are observed in the long term as also discussed by Barro (1995). Therefore, using a sample of only one year for the inflation rate was not representative, thus giving an insignificant coefficient.

The variable that has been constantly statistically significant throughout our study is investments (inv). There are different types of investment in a country ranging from public investments to foreign investments. The variable investment used in this study is the gross capital total value of the gross fixed capital formation (GFCF). In simpler terms, GFCF measures the net increase in fixed capital. It is a component of the expenditure method of calculating GDP. One thing to keep in mind here is that it does not account for depreciation of fixed capital and also does not include land purchases. Investments are a significant part of the economy and play a crucial role in the development of it. India's finance minister announced that their economy is not doing well

because GFCF has decreased from 34.024 in 2013 to 31.270 in 2019, IMF (October 2019). Therefore, it can be inferred that investment is an important determinant of economic growth which, hence, was also proven by the results from our regression analysis.

Furthermore, the variable real interest rate was statistically significant for the combined data. However, the sign was contrary to my expectations. Real interest rates are nominal interest rates minus the inflation rate. The theory behind real interest rates having a negative sign for the economy to grow is that higher rates of interest discourages borrowing. Investors are not motivated to borrow money due to higher opportunity cost which then leads to reduced investments. Additionally, at higher rates of interest, people tend to save more in the banks to get a higher return on their deposits. Therefore, increased savings leads to lesser consumption of goods and services which affects the consumption component of GDP, hence lowering the GDP growth. However, the results from regression analysis show that a higher interest rate would lead to an increase in GDP growth. According to my research and understanding, the reason behind the unexpected sign of real interest rate i.e positive instead of negative, is that the fraction of savings, done by the nonbank public in periods of higher interest rate, is spent on investments in the economy which then leads to increased GDP growth. Also, since, inflation and real interest rate have a direct relationship, i.e when there is high inflation, real interest are increased to control the inflationary pressures (Khumalo, Emmanuel, and Assensoh-Kodua, 2017), higher real interest rate in the economy would mean that the inflation is getting under control. This would lead to stability of prices in the economy and hence GDP growth. However, inflation control through high interest rates will only be effective when the inflationary pressures are high. Mild inflation rate, as also discussed in my hypothesis, tends to have a positive impact on GDP

growth. But as seen from the results, inflation rate was not statistically significant so we can not be certain of its effect on interest rate and GDP growth. The results were surprising.

4.1 : Other factors affecting Economic Growth:

There are various factors that affect the economic growth of different countries. However, these reasons are more theoretical and it can be extremely hard to find statistics for such determinants which is why they were not included as the control variables in the empirical analysis. A few factors that affect economic growth are discussed in this chapter.

4.1.1 : Colonialism:

The fact that has been ignored by most of the studies, is that most of the developing countries have had a colonial history. Colonialism had some adverse effects on the economy, ranging from cultural, political, religious to social and economical. Powerful countries like French, Britain, Portugal, and the Netherlands would colonize countries with rich resources and weak leaders. According to Ocheni (2012), the colonizers used and exploited the natural resources of those countries, making high profits from them but those profits were used for the development of their own countries whereas the colonized countries suffered immense losses. In addition to that, black slavery was made common practice. Slaves were taken from colonized countries and were made to do hard labor without getting any economical reward which tells us that the income inequality we see today in the world did not happen overnight, Robinson (2017). It traces back to 500 years when European colonialism started in the African countries. Furthermore, the hardships did not end with the colonizers leaving the country; it made things harder for the colonized countries as after decades of being ruled by some other country they were then left to

run the country on their own with little or no knowledge about their economy, Acemoglu and Robinson (2012). The transition from being a follower to becoming a ruler was not easy. After years of being exploited for slavery and resources with minor economic development in their countries, the colonized countries had forgotten how to rule themselves. This created a development gap between those countries as the colonized country had to start all over again to overcome the harm done to the economy by the colonizers, Nwanko (2012). Additionally, in the 1950s structural adjustment programs were introduced to the countries experiencing economic crises, in which people sitting in Washington decided what measures and policies economically suffering countries need to take to overcome the crisis. This forced countries, in some cases, to implement programs that were not suitable for the economy. Due to these reasons, most of the developing countries still lack the expertise to develop on their own and lag economic growth. However, according to Grier (1999), the countries that were held under the rule for long periods than other countries tend to perform better, on average, after independence. This was due to the work done in the country by the colonizers which gave the government a base to start from. Most of the work done by the colonizers was on infrastructure and education which helped the colonized countries produce skillful labor and fill the development gap with that after getting independence.

4.1.2 : Resource Curse:

A question that has been in debate for years is that are natural resources a curse or a blessing? We have seen in the past how many African and South Asian countries were exploited for their natural rich resources. Mulwa and Marira (2016), investigated the impact of natural resources, using 47 African countries, on Africa's economic growth. The results showed that the share of

mineral resources has a negative relationship with GDP growth, while the share of oil production has a positive relationship with growth. Africa has a high number of rich resources, however, many of the resources are either undiscovered due to lack of technology and equipment or due to lack of properly implemented development policies and strategies. According to Broad (1995), a country rich in resources has a high potential of pursuing economic growth. The resources can be used to enhance the balance of trade through exports which would generate revenue and help stabilize the economy. But why is then that resources have proved to be a resource curse for African countries but not for countries with rich oil resources? One way to explain the resource curse in Africa is through the Dutch Disease. According to Mulwa's (2016) Dutch Disease hypothesis, "the natural resource curse in Africa can, to a certain extent, be explained by market-based mechanisms because relative price levels and non-resource GDP are positively and significantly related." As Africa continues to explore its natural resources, there is a serious threat that due to corruption, political instability, and poor governance and leadership, and interference from the international market, the resources might have negative consequences on economic growth. On the other hand, oil-rich countries like Saudi Arabia and Kuwait, continue to achieve better growth due to strong leadership roles, economic stability and high demand for oil.

4.1.3 : Corruption and Political Instability:

Corruption and Political instability can have negative consequences on Economic Growth. In a study, Nwankwo (2014), investigated the impact of corruption on the GDP of Nigeria. His results showed that the corruption in Nigeria has increased over the past years which has harmed

the GDP. Corruption is usually caused when government officials abuse their powers by manipulating the policies and development projects in their favor rather than the country. This leads to reduced domestic investment, discourages foreign direct investment, inflates government spending, and shifts government spending away from education, health, and infrastructure maintenance toward less efficient public projects. Therefore, corruption hinders economic growth. Additionally, political instability is also a major hindrance to economic growth. Jong (2008), using a dynamic panel system Generalized Method of Moments model, found out that the political regime has a robust and significant negative effect on economic growth. Political unrest can reduce the government's efficiency as the government focus is divided between the country and the instability issues. For a government to function productively, it is extremely important to have a healthy political environment in which government officials have the authority to make the right decisions for the economy to grow. Furthermore, political instability also acts as an indicator of an unattractive investment environment which discourages both domestic and foreign investors from investing in the economy. As seen from our regression analysis results, investment is an extremely important determinant of economic growth. Hence, if the investments are adversely affected, the GDP growth will be lowered too.

Chapter Five: Conclusion and Policy Recommendations

The goal of this study was to explore the impact of inflation and the real interest rate on GDP growth. Through the use of cross-sectional data that consisted of 98 countries and the use of other control variables like investments, unemployment, current account balance, foreign direct investments, government revenue, and trade, we conducted our regression analysis. The impact of the inflation rate on GDP growth has always been contentious. Some research papers have found out that inflation has a positive impact on GDP growth and some concluded that it has a negative relationship. However, I believe that inflation has a positive effect on a certain level but after that the relationship becomes negative. But how much inflation is too much? The answer remains unsettled. The results from our regression analysis showed that when running the test for combined data i.e both developing and developed countries, the variables investment, and real interest rate were both statistically significant. However, the real interest rate had a positive coefficient meaning that with an increase in real interest rate, the GDP growth increases too. The result was surprising, as I had expected a negative relationship due to the nature of the real interest rate which causes the investments to go down as borrowing becomes expensive and savings to increase. It was an unexpected and inexplicable result. For investments, the results showed that with a one percent increase in investment, the GDP growth increases by 7.5%. The result was as I had expected. For developing countries, none of the variables were statistically significant, showing that none of the variables included in the regression model have an impact on GDP growth. The results from developed countries showed that the variable FDI was statistically significant, with an increase of one percent in FDI, the GDP growth increases by 5.3%. The sign is consistent with the expectations. However, the variables real interest rate and

investment were weakly significant. It was surprising to see that the variable inflation rate was not statistically significant in any of the regression analysis. The result was highly unexpected. For all the regression results, there was no evidence of heteroskedasticity found i.e variance of the error term was the same across all observations. From the results we can see that when testing is done for both developing and developed countries, the GDP growth is impacted by investments and real interest rate. Whereas, when run separately the developing countries' GDP growth is impacted by none of the determinants and for developed countries, only FDI has a positive impact on GDP growth. Therefore, we can see that it was important to run three regression analyses to first see what was the combined effect of these variables on the GDP growth of both types of countries and then what was the effect of these variables on the countries individually.

5.1: Policy Implications

From the study, it can be inferred that in order to promote economic growth in developing and developed countries, different determinants need to be focused upon. For developing countries, we are not certain what determinants would be more beneficial as the regression analysis showed none of the independent and control variables were statistically significant. Therefore, it will be hard to decide which instruments and determinants to use in order to promote economic growth in developing countries. For developed countries, the focus should be on increasing the real interest rate, investments, and FDI as the results exhibited a positive impact on the GDP growth. Developed countries are usually more advanced in technology and have higher investments, both domestic and foreign, as it is more economical to invest in these countries. However, in order to

achieve a higher GDP growth, the countries should attract investors by easing the restrictions like more convenient ways of opening business, flexible labor markets, property rights, and lower taxes. This will lead to increased investments and FDI in the country. However, it is hard to say anything about the real interest rate and whether the countries should increase or decrease it in order to enhance economic growth because even though the variable was statistically significant, the sign was unexpected. The result is inexplicable as the variable sign was contrary to our expectations. Therefore, we can see that the determinants affect the growth rate of developing and developed countries differently and hence different policy measures need to be taken in order to promote economic growth in these countries.

There are numerous lessons that developing countries can learn from developed countries. First of all, focusing on investments should be a major priority for the developing countries. Many countries like Finland, Japan and the UK have higher investments which is causing them to achieve higher economic growth. However, one concept to be mindful of is that developed countries tend to invest more in developing countries. According to Gottschalk (2003), it is more rewarding to invest in developing countries because it eliminates poverty and promotes global development. However, I believe, the reason why developed countries invest in developing nations is because of the abundance of human capital both skilled and unskilled. The developed countries are able to take the advantage of cheap labor, low tax sites and less expensive raw materials resulting in higher profits for them. Therefore, a lesson for developing countries would be to take this opportunity to foster economic growth in their countries by not letting foreign countries exploit their resources and labor. Additionally, developing countries should ease the

restrictions to attract more foreig investors. According to the World Bank, in 2016, developing countries accounted for a growing share of global foreign direct investment (FDI) inflows and outflows, 40 percent and 20 percent respectively and “policies and actions by developing country governments play a key role in ensuring that FDI creates better-paying jobs and increases competitiveness of the host economies”. Therefore, the leaders of the developing countries should attempt to lure the Multi-National companies by offering them a flexible and more rewarding business and economic environment. This will help developing countries promote economic performance.

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Appendix

List of Figures:

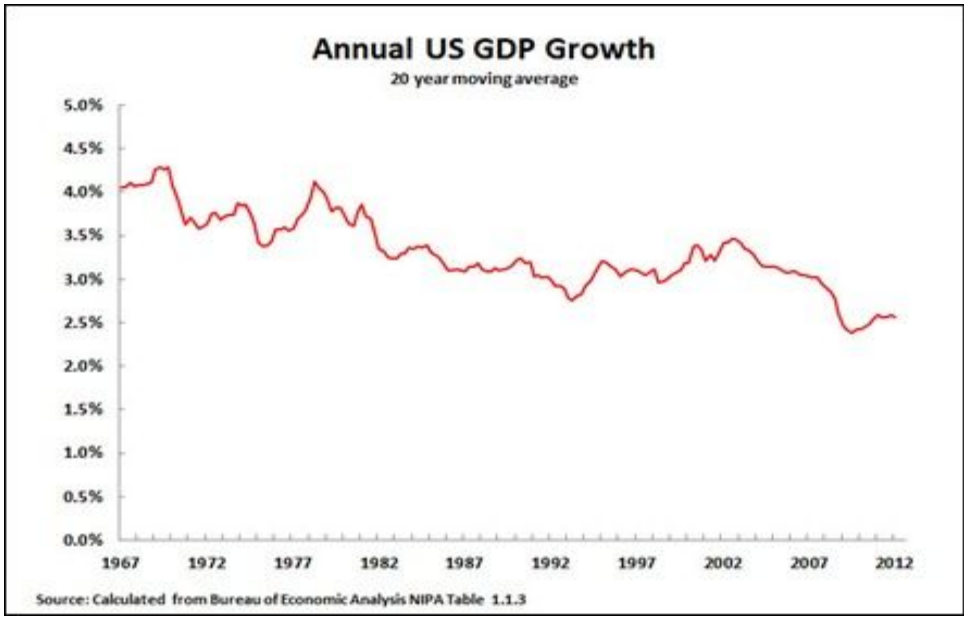


Figure 1 – 20 year moving average of US annual GDP growth

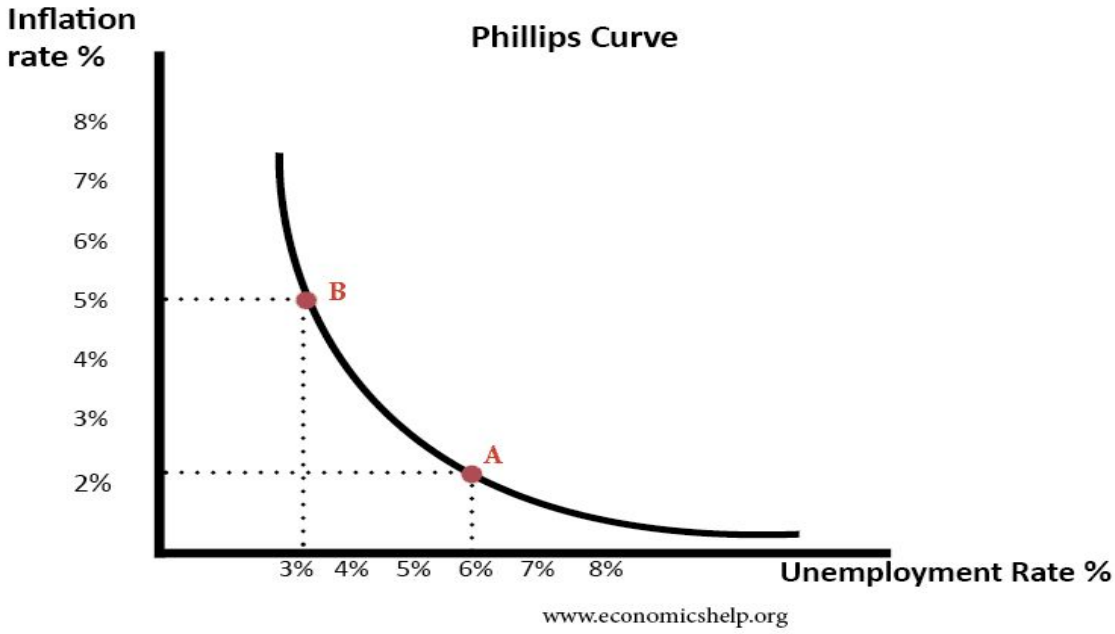


Figure 2- Phillips Curve

List of Tables:

```
. regress GDP ddummy umep inv rev FDI realirate cacc infl trade Expd ler
```

Source	SS	df	MS	Number of obs =	98
				F(11, 86) =	2.47
Model	108.06226	11	9.82384178	Prob > F =	0.0097
Residual	341.768979	86	3.9740579	R-squared =	0.2402
				Adj R-squared =	0.1430
Total	449.831239	97	4.63743545	Root MSE =	1.9935

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddummy	-.5006685	.6807625	-0.74	0.464	-1.85398	.8526425
umep	-.0079186	.0448791	-0.18	0.860	-.0971352	.0812981
inv	.0683983	.0294154	2.33	0.022	.0099224	.1268742
rev	.0679509	.0702531	0.97	0.336	-.0717077	.2076096
FDI	.0366813	.0277704	1.32	0.190	-.0185243	.0918869
realirate	.0718284	.0339	2.12	0.037	.0044374	.1392194
cacc	-.0394585	.0396678	-0.99	0.323	-.1183154	.0393984
infl	-.0380992	.0451278	-0.84	0.401	-.1278103	.0516118
trade	.0004567	.0052026	0.09	0.930	-.0098858	.0107992
Expd	-.079709	.0753861	-1.06	0.293	-.2295716	.0701537
ler	.071637	.0978493	0.73	0.466	-.122881	.266155
_cons	2.008828	1.462308	1.37	0.173	-.8981444	4.915801

Table 1- Results for Combined Data

Source	SS	df	MS	Number of obs =	49
				F(10, 38) =	1.72
Model	59.5803353	10	5.95803353	Prob > F =	0.1118
Residual	131.679177	38	3.46524151	R-squared =	0.3115
				Adj R-squared =	0.1303
Total	191.259513	48	3.98457318	Root MSE =	1.8615

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
umep	.0430066	.0827225	0.52	0.606	-.1244564	.2104695
inv	.0867242	.0508223	1.71	0.096	-.0161601	.1896085
rev	.1021596	.0817896	1.25	0.219	-.0634148	.267734
FDI	.0411497	.029242	1.41	0.167	-.0180477	.1003471
realirate	.1914224	.1197104	1.60	0.118	-.0509186	.4337635
cacc	-.0246718	.0564209	-0.44	0.664	-.1388899	.0895463
infl	.2183553	.1870013	1.17	0.250	-.160209	.5969196
trade	.0045958	.0055506	0.83	0.413	-.0066408	.0158325
Expd	-.0907775	.0975216	-0.93	0.358	-.2881996	.1066447
ler	.0726031	.1343371	0.54	0.592	-.1993481	.3445544
_cons	-1.233171	2.648835	-0.47	0.644	-6.595457	4.129114

Table 3- Results for Developed Countries

. regress GDP umep inv rev FDI realirate cacc infl trade Expd ler

Source	SS	df	MS	Number of obs =	49
				F(10, 38) =	1.52
Model	67.0127049	10	6.70127049	Prob > F =	0.1695
Residual	167.321315	38	4.40319251	R-squared =	0.2860
				Adj R-squared =	0.0981
Total	234.33402	48	4.88195876	Root MSE =	2.0984

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
umep	-.066202	.0671708	-0.99	0.331	-.2021822	.0697782
inv	.0533084	.0412894	1.29	0.204	-.0302777	.1368944
rev	-.1059244	.1568826	-0.68	0.504	-.4235167	.2116679
FDI	.2045591	.1573305	1.30	0.201	-.1139399	.5230581
realirate	.0276265	.0435053	0.64	0.529	-.0604453	.1156983
cacc	.0597785	.0807862	0.74	0.464	-.1037646	.2233217
infl	-.0883767	.0541923	-1.63	0.111	-.1980833	.0213299
trade	-.0183151	.0216308	-0.85	0.402	-.0621045	.0254742
Expd	.1102021	.1432952	0.77	0.447	-.1798838	.4002881
ler	.1252148	.1455444	0.86	0.395	-.1694244	.4198541
cons	2.938822	1.946152	1.51	0.139	-1.000956	6.8786

Table 2- Results for Developing Countries

. vif

Variable	VIF	1/VIF
rev	16.43	0.060850
Expd	15.32	0.065291
ddummy	2.86	0.350007
ler	1.58	0.631185
cacc	1.55	0.643089
trade	1.40	0.713787
realirate	1.40	0.715139
infl	1.39	0.719007
FDI	1.36	0.734831
umep	1.20	0.830042
inv	1.15	0.869587
Mean VIF	4.15	

Table 4- Multicollinearity test

```
. regress GDP ddummy umep inv FDI realirate cacc infl trade rev ler
```

Source	SS	df	MS		
Model	105.108899	10	10.5108899	Number of obs	= 98
Residual	344.72234	87	3.96232575	F(10, 87)	= 2.65
				Prob > F	= 0.0071
Total	449.831239	97	4.63743545	R-squared	= 0.2337
				Adj R-squared	= 0.1456
				Root MSE	= 1.9906

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ddummy	-.7203692	.6525017	-1.10	0.273	-2.017287	.5765486
umep	-.0168325	.0444815	-0.38	0.706	-.1052443	.0715792
inv	.0751214	.0297858	2.52	0.013	.0159188	.1343239
FDI	.0447375	.0259685	1.72	0.088	-.0068777	.0963527
realirate	.0742155	.0334375	2.22	0.029	.0077549	.1406761
cacc	-.0265285	.0380075	-0.70	0.487	-.1020726	.0490156
infl	-.0342102	.0455034	-0.75	0.454	-.1246533	.0562328
trade	.000988	.0051508	0.19	0.848	-.0092498	.0112258
rev	-.0155563	.0255562	-0.61	0.544	-.066352	.0352394
ler	.0974394	.093135	1.05	0.298	-.0876766	.2825554
_cons	1.792617	1.383753	1.30	0.199	-.9577417	4.542976

Table 5-New Combined Data Results

```
. imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(64)     =     65.16
         Prob > chi2  =    0.4362

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	65.16	64	0.4362
Skewness	10.66	10	0.3842
Kurtosis	0.02	1	0.8892
Total	75.84	75	0.4511

Table 6- White Heteroskedasticity for combined regression

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of GDP

         chi2(1)      =     0.18
         Prob > chi2  =   0.6744
```

Table 7- Pagan Heteroskedasticity for combined regression

```
. regress GDP umep inv FDI realirate cacc infl trade rev ler
```

Source	SS	df	MS	Number of obs =	49
				F(9, 39) =	1.64
Model	64.4084453	9	7.15649392	Prob > F =	0.1371
Residual	169.925575	39	4.35706603	R-squared =	0.2749
				Adj R-squared =	0.1075
Total	234.33402	48	4.88195876	Root MSE =	2.0874

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
umep	-.0524319	.0644004	-0.81	0.420	-.1826941	.0778303
inv	.0563121	.0408884	1.38	0.176	-.0263925	.1390166
FDI	.1534089	.141832	1.08	0.286	-.1334734	.4402912
realirate	.0342731	.0424142	0.81	0.424	-.0515178	.120064
cacc	.0309805	.0712077	0.44	0.666	-.1130507	.1750116
infl	-.0790663	.0525453	-1.50	0.140	-.1853493	.0272167
trade	-.0197869	.0214329	-0.92	0.362	-.063139	.0235651
rev	.00713	.0545027	0.13	0.897	-.1031121	.1173721
ler	.1015451	.1415059	0.72	0.477	-.1846777	.3877678
_cons	3.255949	1.891976	1.72	0.093	-.5709336	7.082831

Table 8- New Developing Countries Data Results

```
. imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(48)     =     49.00
         Prob > chi2  =    0.4328

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	49.00	48	0.4328
Skewness	17.29	9	0.0444
Kurtosis	0.94	1	0.3311
Total	67.23	58	0.1904

Table 12- White Heteroskedasticity for developing countries regression

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of GDP

         chi2(1)      =     0.32
         Prob > chi2  =   0.5705
```

Table 13- Pagan Heteroskedasticity for developing countries regression

```
. regress GDP umep inv FDI realirate cacc infl trade rev ler
```

Source	SS	df	MS		
Model	56.5778021	9	6.28642246	Prob > F	0.0953
Residual	134.681711	39	3.4533772	R-squared	0.2958
				Adj R-squared	0.1333
Total	191.259513	48	3.98457318	Root MSE	1.8583

Number of obs	=	49				
F(9, 39)	=	1.82				
Prob > F	=	0.0953				
R-squared	=	0.2958				
Adj R-squared	=	0.1333				
Root MSE	=	1.8583				

GDP	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
umep	.0357814	.0822164	0.44	0.666	-.130517	.2020799
inv	.0942451	.0500899	1.88	0.067	-.0070713	.1955616
FDI	.0527963	.0263848	2.00	0.052	-.0005721	.1061646
realirate	.2088627	.1180325	1.77	0.085	-.0298807	.447606
cacc	-.0084959	.0535861	-0.16	0.875	-.116884	.0998922
infl	.2465659	.1842129	1.34	0.188	-.1260399	.6191717
trade	.0058025	.0053879	1.08	0.288	-.0050955	.0167006
rev	.0322123	.0322393	1.00	0.324	-.0329978	.0974225
ler	.0956642	.1318067	0.73	0.472	-.1709399	.3622684
_cons	-2.549456	2.235965	-1.14	0.261	-7.072122	1.97321

Table 11-New Developed Countries Data Result

```
. imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(48)     =     49.00
         Prob > chi2  =    0.4328

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	49.00	48	0.4328
Skewness	14.09	9	0.1190
Kurtosis	0.10	1	0.7579
Total	63.19	58	0.2982

Table 9- White Heteroskedasticity for developed countries regression

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of GDP

         chi2(1)      =     0.71
         Prob > chi2  =   0.3994
```

Table 10- Pagan Heteroskedasticity for developed countries regression

Listing of Data:

i) Combined Data for 98 Countries.

Countries	GDP	umep	inv	rev	FDI	realirate	cacc	infl	trade	Expd	er	ddummy
Australia	2.423	5.575	24.195	35.015	3.3	3.3	-2.565	1.972	34.6	36.706	1.21	1
Canada	2.979	6.333	23.546	39.94	1.7	0.1	-2.808	1.603	52.4	40.25	1.8	1
Chile	1.255	6.674	21.587	22.756	2.1	2.1	-2.147	2.183	48.4	25.371	899	1
denmark	2.266	5.717	21.611	52.607	0.7	0.447	7.955	1.058	59.5	51.158	9.16	1
Finland	3.043	8.575	22.97	53.378	6.4	0.547	-0.73	0.839	54.5	54.182	0.877	1
France	2.26	9.433	23.366	53.609	1.5	0.811	-0.722	1.163	44.6	56.38	0.776	1
Germany	2.465	3.75	20.747	45.662	2.3	0.318	8.071	1.711	71.4	44.42	0.754	1
Greece	1.505	21.45	12.509	48.351	1.8	5.978	-2.39	1.138	44	47.294	0.586	1

Hong Kong	3.849	3.119	22.043	22.809	36.8	1.3	4.64	1.481	333.7	17.327	10.81	1
Hungary	4.137	4.156	22.518	44.728	-9.1	-2.9	2.286	2.408	156.4	46.93	300	1
Iceland	4.404	2.825	21.934	43.877	-28.6	4.5	3.778	1.761	48.4	43.346	148	1
Ireland	8.136	6.733	33.39	25.783	17.4	0.79	0.491	0.251	67.6	26.063	0.797	1
Israel	3.575	4.225	21.504	37.81	5.1	2.3	2.68	0.242	37.7	38.761	5	1
Italy	1.684	11.267	17.62	46.522	0.5	1.8	2.597	1.326	49.1	48.912	0.696	1
Japan	1.936	2.817	23.904	34.25	0.4	1.2	4.156	0.468	28.2	37.417	155	1
Netherlands	2.911	4.854	20.593	43.709	11.6	0.522	10.82	1.299	147.5	42.445	1.9	1
Newzeland	2.621	4.7	23.321	37.318	1.1	2.3	-2.901	1.854	38.6	36.172	1.95	1
Norway	2.323	4.216	27.822	54.332	1.5	1.638	5.651	1.875	46.9	49.408	11.47	1
Russia	1.63	5.2	24.092	33.268	1.8	8.993	2.053	3.683	37.5	34.733	80.89	1
Belgium	1.735	7.1	24.649	51.301	-7.8	0.723	0.727	2.224	166.9	52.131	0.781	1

Spain	2.983	17.225	21.104	37.916	0.5	1.558	1.844	1.956	51.3	40.994	0.641	1
Sweden	2.412	6.683	25.772	49.434	4.5	0.655	2.792	1.867	56.8	47.951	11.85	1
Switzerland	1.864	3.088	23.516	34.129	10	2.4	6.669	0.534	83.7	32.93	1.37	1
Uk	1.823	4.425	17.218	36.574	4.5	1.24	-3.335	2.683	40.7	38.407	1.08	1
US	2.37	4.35	20.623	30.777	1.8	2.4	-2.252	2.136	20.3	35.248	1.39	1
South Korea	3.16	3.683	32.288	21.826	1.2	1.2	4.633	1.944	68.7	19.638	1567	1
Austria	2.551	5.525	25.138	48.284	3.7	0.6	1.951	2.23	82.4	48.984	100.8	1
Croatia	2.921	5.525	20.928	48.284	3.7	8.4	3.47	1.129	73.9	45.321	9.18	1
Cyprus	4.469	11.05	20.63	38.876	48.7	1.55	-8.36	0.681	55.3	37.123	89	1
Estonia	5.749	5.763	26.575	38.627	5.8	-0.3	3.156	3.651	116.3	39.007	0.9	1
Jordan	2.116	18.125	19.303	25.687	5	6.6	-10.566	3.324	68.8	29.353	0.98	1
Kuwait	-3.482	1.322	29.073	58.207	0.1	-9.9	8.037	1.507	73.3	51.88	0.42	1

Luxembourg	1.546	5.823	18.994	44.407	-10.5	0.5	4.984	2.111	60.3	42.974	98.9	1
Malta	6.724	4	19.261	39.188	32.3	2.7	10.489	1.261	65.2	35.763	92.9	1
Oman	0.346	3.3	27.504	31.813	4.1	-1.5	-15.555	1.6	84.1	45.773	0.53	1
Poland	4.937	4.888	19.818	39.701	2	3.4	0.114	1.975	89	41.23	5.24	1
Portugal	3.506	8.867	17.227	42.414	4.5	3.1	0.449	1.556	63.7	45.357	96.8	1
Qatar	1.58	0.1	44.6	30.515	0.6	-3.3	3.849	0.395	58.9	33.453	5.05	1
Singapore	3.7	2.175	28.163	19.19	28	2.7	16.373	0.576	207.1	13.795	1.91	1
Slovak Repblic	3.188	8.133	22.548	39.399	6.2	0.9	-1.991	1.393	176.2	40.196	97.7	1
Turkey	7.471	10.904	30.993	31.418	0.3	7.25	-5.553	11.144	45.8	33.617	5.06	1
Trinidad and Tobago	-1.857	4.825	3.8	21.877	0.4	3.9	4.978	1.884	68	33.142	9.4	1
UAE	0.491	2.5	31.61	29.155	2.7	1.2	7.281	1.967	154.1	30.572	5.09	1

Uruguay	2.591	7.925	15.186	29.694	4.7	8.7	0.781	6.218	28.9	32.398	39.76	1
Brunei Darussalam	1.327	9.3	34.805	25.956	3.9	0.5	16.367	-0.171	71.4	36.579	1.91	1
Czech Republic	4.353	2.89	25.873	40.512	5.2	2.1	1.654	2.451	160	38.944	32.41	1
Latvia	4.636	8.715	22.205	35.603	3.8	0.8	0.707	2.894	102.3	36.423	0.8	1
Lithuania	4.14	7.073	17.857	32.829	2.5	0.3	0.879	3.718	130.5	32.304	3.95	1
Slovenia	4.833	6.6	20.051	39.089	2.5	1	6.129	1.432	153.8	39.784	0.9	1
China	6.757	3.9	44.643	28.28	1.4	1.4	1.367	1.558	33.8	32.179	9.37	0
Afghanistan	2.665	1.6	17.717	25.25	0.3	12.6	4.745	4.976	41.4	25.878	94.32	0
Albania	3.821	13.756	23.505	27.749	7.9	4.9	-7.501	1.987	58.3	29.137	165.14	0
Bangladesh	7.584	4.4	30.896	10.22	0.7	3.8	-2.12	5.611	35.5	13.56	111.53	0

India	4.404	2.6	30.941	19.817	1.5	5.1	-1.835	3.602	28.2	26.832	90.29	0
Angola	-0.15	7.1	24.13	17.486	-6.1	-10.5	-0.278	29.844	40.2	23.806	230.05	0
Uganda	5.008	1.7	25.14	15.112	3.1	16.1	-4.988	5.629	32.7	18.911	5007.06	0
Nigeria	0.806	17.462	15.474	6.608	0.9	6	2.758	16.502	20.2	12.008	424	0
El-Salvador	2.305	6.8	16.319	21.542	2	2.38	-2.011	1.014	65.5	23.939	1.39	0
Guatemala	2.76	3.6	12.064	10.796	1.3	9.7	1.572	4.425	38.9	12.107	10.19	0
Pakistan	5.219	6.018	16.094	15.524	1.1	5.9	-4.139	4.148	26	21.303	146.22	0
Romania	6.991	4.927	23.382	27.998	2.8	0.9	-3.189	1.344	73.8	30.834	5.62	0
Argentina	2.669	8.35	18.757	34.478	1.8	-2.4	-4.915	25.675	19.5	41.181	22.9	0
Morroco	4.201	10.2	32.588	26.557	2.4	2.25	-3.63	0.754	64	30.05	13.44	0
Srilanka	3.42	4.4	36.45	13.813	1.6	3.16	-2.644	6.581	36.7	19.176	211.37	0

Honduras	4.93	4.462	24.161	26.491	5.5	15.7	-1.771	3.934	86.6	26.899	32.57	0
Gerogia	4.83	13.9	32.41	29.199	11.3	7.25	-8.836	4.623	65.7	32.33	3.48	0
Bolivia	4.195	4	22.059	30.551	1.9	4.8	-5.25	2.82	45.7	38.598	9.58	0
Malawai	4	5.5	13.355	25.248	4.4	21.8	-11.029	11.541	54.4	32.567	1012.5	0
Niger	4.895	0.3	39.951	21.151	4.2	4.2	-15.652	2.386	38.9	26.808	805	0
Madagascar	4.285	1.7	18.879	14.755	3.5	44.4	-0.485	8.281	49.5	17.175	4320.5	0
Egypt	4.077	12.245	15.274	21.761	3.1	-2.6	-6.086	23.537	37.1	32.19	24.66	0
Burundi	0.001	1.5	7	14.024	0	18.2	-12.32	16.643	29.2	21.803	2397	0
Ecudor	2.368	4.62	26.28	32.049	0.6	7.83	-0.357	0.417	37.5	36.511	1.39	0
Mongolia	5.337	10	31.37	28.54	13.1	11	-10.11	4.623	92.2	32.33	3382.81	0
Armenia	7.519	18.689	19.29	21.241	2.2	12	-2.426	1.031	55.8	26.027	669.3	0

The Bahamas	0.067	10.1	26.348	17.185	4.9	2.5	-12.409	1.553	30.3	22.671	1.39	0
Belize	1.437	8.987	17.648	29.304	1.4	7.3	-7.027	1.148	74.8	34.89	2.77	0
Central African Republic	4.528	6.9	13.521	12.8	0.3	2.95	-7.823	4.461	24.6	13.862	805.1	0
Costa Rica	3.397	9.293	18.832	13.812	4.9	8.6	-2.93	1.626	42.8	20.022	786.87	0
Dominican Republic	4.667	5.509	22.472	13.977	4.5	10.8	-0.166	3.28	34.8	17.238	65.91	0
Zambia	3.524	11.6	41.003	17.475	3.3	2	-3.916	6.577	61.8	25.188	13.2	0
Eswatini	2.025	22.7	12.702	28.027	-1.3	7.7	6.95	6.221	77.8	36.642	18.47	0
Ghana	8.143	11.9	22.003	13.941	5.5	20	-3.396	12.372	44.9	18.002	6.03	0

Guinea-Bissau	5.927	4	9.23	18.276	1.2	-0.8	0.285	1.058	45.2	19.714	805.1	0
Guyana	2.134	12	17.236	30.509	6	13.7	-6.829	1.944	86.3	34.83	286.32	0
Haiti	1.173	13.4	28.977	17.739	4.5	-0.6	-1.042	14.738	58	17.503	89.8	0
Jamaica	0.658	11.7	20.329	29.049	6	7.9	-2.573	4.383	48.1	28.597	177.43	0
Kenya	4.863	2.8	17.465	18.276	0.9	2.8	-6.19	7.985	28.5	26.133	143.38	0
Maldives	6.912	5.8	20	27.015	10.4	8.7	-21.892	2.272	56.5	30.094	21.33	0
Mali	5.419	1.4	20.11	20.046	3.6	3.1	-7.277	1.764	46.9	22.906	805.1	0
Mexico	2.117	3.421	22.957	24.684	2.8	0.6	-1.738	6.041	72.7	25.749	26.24	0
Namibia	-0.868	23.4	16.243	30.949	3.4	0.3	-5.046	6.147	81.5	35.619	18.46	0
Panama	5.321	6.13	41.708	19.976	7.7	5.4	-7.933	0.876	53	21.839	1.39	0
Peru	2.474	6.876	20.512	18.301	3.3	13	-1.245	2.804	40.4	21.236	4.52	0

Rwanda	6.12	17.4	23.829	22.855	3	9.2	-6.802	4.837	37.4	25.402	1152.94	0
Tajikistan	7.1	6.9	24.651	29.667	2.6	24.2	2.225	7.31	55.5	35.632	11.85	0
Tunisia	1.825	15.33	19.311	24.518	2	4.86	-10.247	5.309	87.6	30.421	3.35	0
Uzbekistan	4.462	5.8	29.007	24.72	3	14	2.545	13.876	37.9	22.932	11425.19	0

ii) Data for 98 Countries Developed Countries:

Countries	GDP	umep	inv	rev	FDI	realirate	cacc	infl	trade	Expd	er
Australia	2.423	5.575	24.195	35.015	3.3	3.3	-2.565	1.972	34.6	36.706	1.21
Canada	2.979	6.333	23.546	39.94	1.7	0.1	-2.808	1.603	52.4	40.25	1.8
Chile	1.255	6.674	21.587	22.756	2.1	2.1	-2.147	2.183	48.4	25.371	899
denmark	2.266	5.717	21.611	52.607	0.7	0.447	7.955	1.058	59.5	51.158	9.16
Finland	3.043	8.575	22.97	53.378	6.4	0.547	-0.73	0.839	54.5	54.182	0.877
France	2.26	9.433	23.366	53.609	1.5	0.811	-0.722	1.163	44.6	56.38	0.776
Germany	2.465	3.75	20.747	45.662	2.3	0.318	8.071	1.711	71.4	44.42	0.754
Greece	1.505	21.45	12.509	48.351	1.8	5.978	-2.39	1.138	44	47.294	0.586
Hong Kong	3.849	3.119	22.043	22.809	36.8	1.3	4.64	1.481	333.7	17.327	10.81
Hungary	4.137	4.156	22.518	44.728	-9.1	-2.9	2.286	2.408	156.4	46.93	300

Iceland	4.404	2.825	21.934	43.877	-28.6	4.5	3.778	1.761	48.4	43.346	148
Ireland	8.136	6.733	33.39	25.783	17.4	0.79	0.491	0.251	67.6	26.063	0.797
Israel	3.575	4.225	21.504	37.81	5.1	2.3	2.68	0.242	37.7	38.761	5
Italy	1.684	11.267	17.62	46.522	0.5	1.8	2.597	1.326	49.1	48.912	0.696
Japan	1.936	2.817	23.904	34.25	0.4	1.2	4.156	0.468	28.2	37.417	155
Netherlands	2.911	4.854	20.593	43.709	11.6	0.522	10.82	1.299	147.5	42.445	1.9
Newzeland	2.621	4.7	23.321	37.318	1.1	2.3	-2.901	1.854	38.6	36.172	1.95
Norway	2.323	4.216	27.822	54.332	1.5	1.638	5.651	1.875	46.9	49.408	11.47
Russia	1.63	5.2	24.092	33.268	1.8	8.993	2.053	3.683	37.5	34.733	80.89
Belgium	1.735	7.1	24.649	51.301	-7.8	0.723	0.727	2.224	166.9	52.131	0.781
Spain	2.983	17.225	21.104	37.916	0.5	1.558	1.844	1.956	51.3	40.994	0.641
Sweden	2.412	6.683	25.772	49.434	4.5	0.655	2.792	1.867	56.8	47.951	11.85
Switzerland	1.864	3.088	23.516	34.129	10	2.4	6.669	0.534	83.7	32.93	1.37

Uk	1.823	4.425	17.218	36.574	4.5	1.24	-3.335	2.683	40.7	38.407	1.08
US	2.37	4.35	20.623	30.777	1.8	2.4	-2.252	2.136	20.3	35.248	1.39
South Korea	3.16	3.683	32.288	21.826	1.2	1.2	4.633	1.944	68.7	19.638	1567
Austria	2.551	5.525	25.138	48.284	3.7	0.6	1.951	2.23	82.4	48.984	100.8
Croatia	2.921	5.525	20.928	48.284	3.7	8.4	3.47	1.129	73.9	45.321	9.18
Cyprus	4.469	11.05	20.63	38.876	48.7	1.55	-8.36	0.681	55.3	37.123	89
Estonia	5.749	5.763	26.575	38.627	5.8	-0.3	3.156	3.651	116.3	39.007	0.9
Jordan	2.116	18.125	19.303	25.687	5	6.6	-10.566	3.324	68.8	29.353	0.98
Kuwait	-3.482	1.322	29.073	58.207	0.1	-9.9	8.037	1.507	73.3	51.88	0.42
Luxembourg	1.546	5.823	18.994	44.407	-10.5	0.5	4.984	2.111	60.3	42.974	98.9
Malta	6.724	4	19.261	39.188	32.3	2.7	10.489	1.261	65.2	35.763	92.9
Oman	0.346	3.3	27.504	31.813	4.1	-1.5	-15.555	1.6	84.1	45.773	0.53
Poland	4.937	4.888	19.818	39.701	2	3.4	0.114	1.975	89	41.23	5.24
Portugal	3.506	8.867	17.227	42.414	4.5	3.1	0.449	1.556	63.7	45.357	96.8

Qatar	1.58	0.1	44.6	30.515	0.6	-3.3	3.849	0.395	58.9	33.453	5.05
Singapore	3.7	2.175	28.163	19.19	28	2.7	16.373	0.576	207.1	13.795	1.91
Slovak Repblic	3.188	8.133	22.548	39.399	6.2	0.9	-1.991	1.393	176.2	40.196	97.7
Turkey	7.471	10.904	30.993	31.418	0.3	7.25	-5.553	11.144	45.8	33.617	5.06
Trinidad and Tobago	-1.857	4.825	3.8	21.877	0.4	3.9	4.978	1.884	68	33.142	9.4
UAE	0.491	2.5	31.61	29.155	2.7	1.2	7.281	1.967	154.1	30.572	5.09
Uruguay	2.591	7.925	15.186	29.694	4.7	8.7	0.781	6.218	28.9	32.398	39.76
Brunei Darussalam	1.327	9.3	34.805	25.956	3.9	0.5	16.367	-0.171	71.4	36.579	1.91
Czech Republic	4.353	2.89	25.873	40.512	5.2	2.1	1.654	2.451	160	38.944	32.41
Latvia	4.636	8.715	22.205	35.603	3.8	0.8	0.707	2.894	102.3	36.423	0.8

Lithuania	4.14	7.073	17.857	32.829	2.5	0.3	0.879	3.718	130.5	32.304	3.95
Slovenia	4.833	6.6	20.051	39.089	2.5	1	6.129	1.432	153.8	39.784	0.9

iii) Data for 49 Developing Countries:

Countries	GDP	umep	inv	rev	FDI	realirate	cacc	infl	trade	Expd	er
China	6.757	3.9	44.643	28.28	1.4	1.4	1.367	1.558	33.8	32.179	9.37
Afghanistan	2.665	1.6	17.717	25.25	0.3	12.6	4.745	4.976	41.4	25.878	94.32
Albania	3.821	13.756	23.505	27.749	7.9	4.9	-7.501	1.987	58.3	29.137	165.14
Bangladesh	7.584	4.4	30.896	10.22	0.7	3.8	-2.12	5.611	35.5	13.56	111.53
India	4.404	2.6	30.941	19.817	1.5	5.1	-1.835	3.602	28.2	26.832	90.29
Angola	-0.15	7.1	24.13	17.486	-6.1	-10.5	-0.278	29.844	40.2	23.806	230.05
Uganda	5.008	1.7	25.14	15.112	3.1	16.1	-4.988	5.629	32.7	18.911	5007.06
Nigeria	0.806	17.462	15.474	6.608	0.9	6	2.758	16.502	20.2	12.008	424
El-Salvador	2.305	6.8	16.319	21.542	2	2.38	-2.011	1.014	65.5	23.939	1.39
Guatemala	2.76	3.6	12.064	10.796	1.3	9.7	1.572	4.425	38.9	12.107	10.19

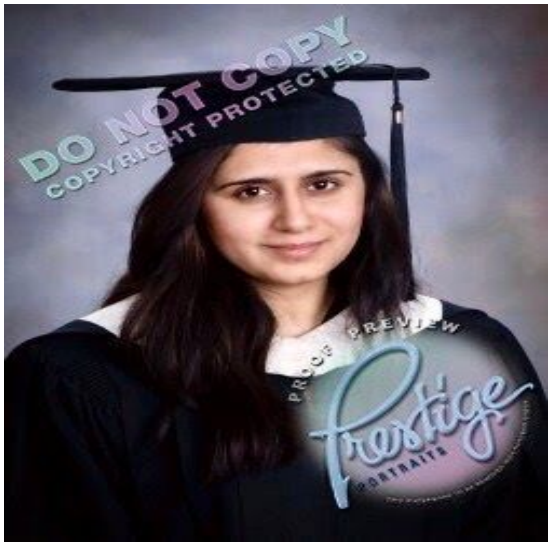
Pakistan	5.219	6.018	16.094	15.524	1.1	5.9	-4.139	4.148	26	21.303	146.22
Romania	6.991	4.927	23.382	27.998	2.8	0.9	-3.189	1.344	73.8	30.834	5.62
Argentina	2.669	8.35	18.757	34.478	1.8	-2.4	-4.915	25.675	19.5	41.181	22.9
Morroco	4.201	10.2	32.588	26.557	2.4	2.25	-3.63	0.754	64	30.05	13.44
Srilanka	3.42	4.4	36.45	13.813	1.6	3.16	-2.644	6.581	36.7	19.176	211.37
Honduras	4.93	4.462	24.161	26.491	5.5	15.7	-1.771	3.934	86.6	26.899	32.57
Gerogia	4.83	13.9	32.41	29.199	11.3	7.25	-8.836	4.623	65.7	32.33	3.48
Bolivia	4.195	4	22.059	30.551	1.9	4.8	-5.25	2.82	45.7	38.598	9.58
Malawai	4	5.5	13.355	25.248	4.4	21.8	-11.029	11.541	54.4	32.567	1012.5
Niger	4.895	0.3	39.951	21.151	4.2	4.2	-15.652	2.386	38.9	26.808	805
Madagascar	4.285	1.7	18.879	14.755	3.5	44.4	-0.485	8.281	49.5	17.175	4320.5

Egypt	4.077	12.245	15.274	21.761	3.1	-2.6	-6.086	23.537	37.1	32.19	24.66
Burundi	0.001	1.5	7	14.024	0	18.2	-12.32	16.643	29.2	21.803	2397
Ecudor	2.368	4.62	26.28	32.049	0.6	7.83	-0.357	0.417	37.5	36.511	1.39
Mongolia	5.337	10	31.37	28.54	13.1	11	-10.11	4.623	92.2	32.33	3382.81
Armenia	7.519	18.689	19.29	21.241	2.2	12	-2.426	1.031	55.8	26.027	669.3
The Bahamas	0.067	10.1	26.348	17.185	4.9	2.5	-12.409	1.553	30.3	22.671	1.39
Belize	1.437	8.987	17.648	29.304	1.4	7.3	-7.027	1.148	74.8	34.89	2.77
Central African Republic	4.528	6.9	13.521	12.8	0.3	2.95	-7.823	4.461	24.6	13.862	805.1
Costa Rica	3.397	9.293	18.832	13.812	4.9	8.6	-2.93	1.626	42.8	20.022	786.87
Dominican	4.667	5.509	22.472	13.977	4.5	10.8	-0.166	3.28	34.8	17.238	65.91

Republic											
Zambia	3.524	11.6	41.003	17.475	3.3	2	-3.916	6.577	61.8	25.188	13.2
Eswatini	2.025	22.7	12.702	28.027	-1.3	7.7	6.95	6.221	77.8	36.642	18.47
Ghana	8.143	11.9	22.003	13.941	5.5	20	-3.396	12.372	44.9	18.002	6.03
Guinea-Bissau	5.927	4	9.23	18.276	1.2	-0.8	0.285	1.058	45.2	19.714	805.1
Guyana	2.134	12	17.236	30.509	6	13.7	-6.829	1.944	86.3	34.83	286.32
Haiti	1.173	13.4	28.977	17.739	4.5	-0.6	-1.042	14.738	58	17.503	89.8
Jamaica	0.658	11.7	20.329	29.049	6	7.9	-2.573	4.383	48.1	28.597	177.43
Kenya	4.863	2.8	17.465	18.276	0.9	2.8	-6.19	7.985	28.5	26.133	143.38
Maldives	6.912	5.8	20	27.015	10.4	8.7	-21.892	2.272	56.5	30.094	21.33
Mali	5.419	1.4	20.11	20.046	3.6	3.1	-7.277	1.764	46.9	22.906	805.1
Mexico	2.117	3.421	22.957	24.684	2.8	0.6	-1.738	6.041	72.7	25.749	26.24

Namibia	-0.868	23.4	16.243	30.949	3.4	0.3	-5.046	6.147	81.5	35.619	18.46
Panama	5.321	6.13	41.708	19.976	7.7	5.4	-7.933	0.876	53	21.839	1.39
Peru	2.474	6.876	20.512	18.301	3.3	13	-1.245	2.804	40.4	21.236	4.52
Rwanda	6.12	17.4	23.829	22.855	3	9.2	-6.802	4.837	37.4	25.402	1152.94
Tajikistan	7.1	6.9	24.651	29.667	2.6	24.2	2.225	7.31	55.5	35.632	11.85
Tunisia	1.825	15.33	19.311	24.518	2	4.86	-10.247	5.309	87.6	30.421	3.35
Uzbekistan	4.462	5.8	29.007	24.72	3	14	2.545	13.876	37.9	22.932	11425.19

ABOUT THE AUTHOR



Ukasha Javed is an Economics Major at Allegheny College who is also completing minors in Computer Science. She is a Pakistani who believes in making a difference in the world through acknowledging the light in others. She has worked as a manager's assistance at Admissions office and at JS Bank and is currently an RA at Allegheny College. She has also performed summer research with a faculty from the Economics department. She aims to keep working hard to make her parents and professors, who have put a lot of faith in her, proud.