

IMPACT OF INFLATION, FOREIGN DIRECT INVESTMENT AND POPULATION GROWTH ON ECONOMIC GROWTH: AN ANALYSIS OF SRI LANKA ECONOMY

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Abstract

Economic growth of a country is determined by several factors. Managing the factors that affect the economic growth is essential. Recently economy of Sri Lanka has been facing economic crisis. It is necessary to identify which factor affect most and how it is influences on economic development of a country in order to decision making. Inflation, foreign direct investment and population growth plays major role in economic growth of the country. This study investigated effects of inflation, foreign direct investment and population growth on economic growth in Sri Lanka during the time frame of 1973 to 2022. Annual data garnered from world development indicator (WDI). The data is examined using engle granger cointegration test and error correction model. The results found that the inflation has a significant adverse influence on economic growth of the country while foreign direct investment has a substantial optimistic impact in long run.

Key words: Economic growth, Inflation, foreign direct investment, population growth, error correction model

1. Introduction

A country's ultimate objective is to attain economic growth, even though it has several goals. Economic growth is the increase in total production of a country over a specified time period. Production and services of a country can be quantified by its GDP (gross domestic product). GDP denotes to the market value of finished goods and services generated by an economy within a precise period of time, especially a fiscal year (Anup Kumar Srivastava, 2023). Several factors contribute to determining GDP. The aggregate value of consumer expenditure, investment, government expenditure, and net exports is used to measure the GDP of the country. These factors help increase the GDP. However, there are several factors that block the GDP growth rate. It is necessary to understand the relationship and degree of influence of such factors on GDP. Recently, Sri Lanka has been suffering from an economic crisis, especially a higher inflation rate (double digit). It affected the economic activity of the country. In order to recover from this crisis, decision-makers suggested several options, such as taking control of the inflation rate, mitigating unemployment, and attracting foreign direct investment. This increases the country's GDP. Therefore, understanding the influence of such a factor on the GDP of the country is vital. In this study, the researcher aims to analyze the influence of inflation, unemployment, foreign direct investment, and population growth on the GDP growth of Sri Lanka.

Inflation refers to a continued increase in the price level, which leads to a low level of production (Moyotole Daniel EZUEM, 2023). Also, inflation is known as a decrease in the purchasing power of money. After COVID 19, the inflation rate of an economy became an argument. The concept of lower levels of inflation changed to flexible levels of inflation (Liyanage, 2023). Contradictory arguments exist about the association between the inflation rate and economic growth. Many studies concluded that high inflation is a threat to economic growth, while some researchers argue that an inflation rate below the optimal level stimulates nation's economic growth (Osei, 2023). Understanding the correlation between inflation and the economic growth of the country is crucial for making informed decisions.

Unemployment denotes individuals who are competent in doing work and seeking employment but are unable to find a job. As per Okun's law, a 1% reduction in the unemployment rate results in a 4% advancement in economic growth. At the same time, there are also underemployment cases. Some have more potential but work for less to fulfill their basic needs rather than survive in poverty. On the other hand, some are earning more than they deserve. This contributes significantly to the nation's economic expansion as well. This unemployment varies with population growth. Growth in number of individuals leads to rise in the joblessness rate.

Foreign direct investment (FDI) refers to investments made by non-resident investors in a particular country (Mohammed Rashid, 2023). It is an important forms of global equity movements that support the GDP of countries. In emerging nations like Sri Lanka, decision-makers, legislators and the government place more focus on FDI to manage the GDP of the country (Kengatharan, 2022).

Therefore, fluctuations in inflation, unemployment, foreign direct investment, and population growth affect the economic growth of the country, either negatively or positively.

Year	Economic growth	Inflation rate	Foreign Direct Investment	Unemployment rate	Population growth
2012	8.632181377	7.542913732	941116591.2	3.88	0.751749909
2013	4.05174633	6.908450348	932551317.6	4.19	0.543830441
2014	6.377978897	3.179002282	893628980.3	4.16	0.508369831
2015	4.205955475	3.768367831	679655644.2	4.52	0.456782306
2016	5.05362489	3.958888466	897049375.9	4.24	0.415306726
2017	6.460681271	7.704137679	1372723043	4.05	0.378824726
2018	2.310084255	2.135037737	1614044009	4.32	0.755904689
2019	-0.220483887	3.528393582	743466231.5	4.67	0.611875946
2020	-4.624515817	6.153945084	433869416	5.36	0.53062656
2021	3.512224555	7.014780712	592289969.9	5.24	1.075449957
2022	-7.823977326	49.72110211	898295213.8	6.71	0.11277264

The economic growth rate has been decreasing for the last 10 years in Sri Lanka. especially in 2022, the economic growth rate has reported a negative value of -7.82%. On the other hand, the inflation rate has increased to a double digit in 2022 (49%). Unemployment had a significant increase in 2022, and the population growth rate also fluctuated during the recent year, and it had a significant increase in 2021.

According to classical economic theory, considerable relationship exists between inflation and economic growth. High inflation promotes economic growth to a certain extent, while excessive inflation might prevent it. On the other hand, neoclassical economists argue that inflation has adverse influence on economic development, and Keynesian economics suggests a more nuanced correlation between inflation and economic growth; mild inflation might stimulate demand, which helps to increase economic growth (Ella Silvia, 2023).

The bad impact of unemployment exists on country's economic growth. The relationship between unemployment and GDP is explained by Okun's Law. To increase GDP by more than 3% on the middle, a lower level of unemployment is required (Ijaz Uddin1, 2022). Unemployment causes a decrease in productivity level and an individual's income, so it will lead to the poverty problem. (Zahra, 2023)

Even though various strategies have been implemented by Sri Lanka, it has been unable to attain price stability and economic growth at the desired level (S. Shiyalini, 2021). Sri Lanka is in need of making timely and relevant decisions to overcome the economic crisis since it has been facing fluctuations in its economic activity. It is essential to understand the association between the inflation rate, unemployment, population growth, and economic growth in order to manage economic activity efficiently. Therefore, the aim of this research is to examine the relationship and impact of the inflation rate, foreign direct investment, unemployment rate, and population growth on economic growth between 1973 and 2022.

2. Literature review

Association between income inequality, economic growth, inflation, and unemployment investigated the in west Java province by (Muhammad Fauzan, 2023) for the period from 2005 to 2020. This study employed income inequality and inflation as predictor variables and economic growth as a response variable. This research used panel data analysis and regression analysis. The results show the substantial and adverse influence of income inequality, inflation, and unemployment on economic growth. Moreover, the research identified a notable impact of income inequality on unemployment, whereas economic growth and inflation have a noteworthy boosting influence on unemployment.

Nexus between economic growth and inflation was analyzed by (Osei, 2023) with the intention of finding the ideal level of inflation that stimulates economic development. The threshold econometric methodology was used to investigate the existence of optimal inflation in Ghana. GDP was used as a substitution for economic growth, while CPI served as a substitute for the inflation rate. This study found that the optimal inflation rate in Ghana is 9.5%. below 9.5% of inflation stimulates economic growth, while above this level threatens economic growth. Moreover, the findings suggest that a percentage increase below the threshold level would increase economic growth by 2.16% at the 5% significant level. On the other hand, a rise in inflation above 9.5% causes a decrease in economic growth of 2.99% at a significant level of 5%.

Impact of exports, inflation, and government expenditure on economic growth was examined by (Marselina, 2023) using ASEAN-7 countries. The data was gathered from 2015 to 2019. Gross domestic product (GDP) was used as an indicator variable of economic growth and exports; the CPI ratio (proxy of inflation) and government expenditure were used as independent variables. The panel data analysis method with the RE model (Random Effect Model) was employed to analyze the influence of predict variables on target variables. The study discovered a positive and notable correlation between exports and government expenditure on economic growth in ASEAN-7 countries, and inflation has a noteworthy harmful influence on economic growth in ASEAN-7 countries.

(Tafa, 2022) investigated the influence of population growth on economic growth in Ethiopia. This research was conducted for the period 1980–2020. The autoregressive distributive lag (ARDL) model approach was used to analyze the data. Real gross domestic product (RGDP) was used as a dependent variable, and total population and foreign direct investment were used as independent variables. According to the founding, Ethiopian population size (POP) can be influenced by real gross domestic product, but the population number (POP) cannot influence real gross domestic product.

The short-run and long-run association between inflation and economic growth is explained by (Rasha Istaiteyeh, 2023). Data was collected from Jordan for the period from 1977 to 2021. GDP was used to measure the economic growth of the country. A two-variable VAR model with three lags was taken in to consideration to understand the relationship between inflation and economic growth. This analysis found a positive relationship between inflation and economic growth in the short run but no relationship in the long run.

(Ijaz Uddin1, 2022) scrutinized the effect of corruption, unemployment and inflation on economic growth. Data gathered from 79 emerging nations for the period from 2002 to 2018. Target variable is gross domestic product (GDP) per capita while unemployment, corruption, inflation, governance used as independent variable. The result shows the negative effect of corruption, unemployment, and political stability on GDP per capita while inflation, government efficiency, and rule of law have an optimistic correlation with GDP per capita.

3. Methodology

The objective of this study is to analyze the effect of inflation, unemployment, foreign direct investment, and population growth on the economic growth of a country. The secondary data during the timeframe from 1973 to 2022 was gathered to examine the connection between variables except the unemployment rate. Available data for unemployment was taken into consideration from 1990 to 2022 to analyze the impact on economic growth. Data was collected from the World Development Indicator (WDI).

With the support of previous research, the researcher finalized the dependent variable, independent variable, and proxy of both. GDP growth rate was utilized as a representation of economic growth while consumer price growth rate used as a proxy of inflation (Muhammad Fauzan, 2023), foreign direct investment (net inflows (BoP, current US\$)) used to test FDI, and annual population growth rate employed

This study used the error correction model (ECM) to inspect the influence of the explanatory variable on the targeted variable. This analysis consists of two stages: first, checking the stationarity of the variable, and second, identifying the relationship and degree of relationship between dependent variables.

Different types of methods are used to check the stationarity of time series variables, such as the augmented Dicky Fuller test, the Philip Perron test, and the KPSS test. . (Anup Kumar Srivastava, 2023) This analysis used the Augmented Dickey-Fuller test (ADF) to test the stationarity of variables. The Engle-Granger-Granger co-integration method was used to study the relationship between inflation, unemployment, population growth, and the economic growth rate.

The following error correction model derived to investigate the relationship between dependent and independent variable.

$$\Delta \text{GDP}_t = \alpha + \beta_1 \Delta \text{GDP}_{t-1} + \beta_2 \Delta \text{INF}_t + \beta_3 \Delta \text{FDI}_t + \beta_4 \Delta \text{POPGRO}_t + \gamma (\text{GDP}_{t-1} - \beta_0 - \beta_5 \text{INF}_{t-1} - \beta_6 \text{FDI}_{t-1} + \beta_7 \text{POPGRO}_{t-1}) + \epsilon_t$$

Where,

Δ	= First difference (change from the previous period).
GDP_t	= Gross Domestic Product in time period t
INF_t	= Inflation rate in time period t
FDI_t	= Foreign direct investment in time period t
POPGRO_t	= Population growth in time period t
β_1	= Coefficients of changes in GDP in short run
β_2	= Coefficients of changes in inflation rate in short run
β_3	= Coefficients of changes in foreign direct investment in short run
β_4	= Coefficients of changes in population growth in short run
γ	= Coefficient of the error correction term, capturing the adjustment process

towards the long-run equilibrium
 $\beta_0 \beta_5 \beta_6 \beta_7$ = Coefficients representing the long-run equilibrium relationship between GDP, Inflation, FDI, and Population Growth.
 ϵ_t = is the error term, representing the short-run disturbances

4. Analysis and interpretation

Unit root test for Stationary

Unit root test is used to test stationarity of variables, so that the final results would be spurious (Madurapperuma, 2016). It is essential to check the stationarity of time series data to avoid spurious results. Augmented Dicky–Fuller (ADF) test helps to find the stationarity of time series data. The secondary data is considered integrated of order zero I (0) if it exhibits stationary at level. If data are not stationary at level, differentiation is required in order to make it stationary (Alemayehu Temesgen Befikadu, 2022). The models listed below are used to estimate the general form of ADF.

$$Y_t = \delta Y_{t-1} + \epsilon_t$$

Table 1 : Summary of ADF test for unit root test

Variable	Exogenous	T-test	Critical			P –Value
			1%	5%	10%	
D(GDPG)	Constant	-11.40370	-3.577446	-2.923780	-2.59925	0.0000
	Constant, Linear Trend	-11.43581	-4.161144	-3.506374	-3.183002	0.0000
D(INF)	Constant	-6.525035	-3.574446	-2.923780	-2.599925	0.0000
	Constant, Linear Trend	-6.538517	-4.161144	-3.506374	-3.183002	0.0000
D(POPGRO)	Constant	-4.429030	-3.584743	-2.928142	-2.602225	0.0009
	Constant, Linear Trend	-4.3715640	-4.175640	-3.513075	-3.186854	0.0059
D(FDI)	Constant	-5.431413	-3.584743	-2.928142	-2.602225	0.0000
	Constant, Linear Trend	-5.411307	-4.175640	-3.513075	-3.186854	0.0003
UNEMP	Constant	-2.711760	-4.273277	-3.557759	-3.212361	0.2388
D(UNEMP)	Constant, Linear Trend	-6.210542	-4.284580	-3.562882	-3.215267	0.0001

If $\delta = 1$, equation transforms into random walk indicating a non-stationary process. If the variables are not stationary at level, it suggests there is a possibility of non stationarity in the series. To eliminate this problem difference can be used. (Madurapperuma, 2016). Simply reverting Y_t on its (one period) lagged value Y_{t-1} and defining whether or not the projected is statistically equivalent to one is the fundamental principle behind the ADF unit root test for non-stationarity. Here, the preceding equation can be adjusted further by deducting Y_{t-1} from each side to get:

$$Y_t - Y_{t-1} = (\delta - 1) Y_{t-1} + \epsilon_t$$

Simply,

$$\Delta Y_t = \delta Y_{t-1} + \epsilon_t$$

Where Δ is the difference operator and $\Delta = (\delta - 1)$. The study evaluated the final equation rather than the first one, which is more practical. It subsequently conducted a test comparing the null hypothesis, $\delta = 0$, with the alternative hypothesis, $\delta \neq 0$. The series under discussion is non-stationary and there is a unit root problem if $\delta \neq 0$. In this case, $\delta=1$. Based on the Dickey-Fuller critical values of the tau statistic, the null hypothesis of $\delta = 0$ was either accepted or rejected. The following model is tested using the error term white noise and the ADF unit root test procedure

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \delta Y_{t-1} + \sum_{j=1}^n \delta_j \Delta Y_{t-j} + \epsilon_t$$

The above table 1 shows the outcomes from Augmented Dicky–Fuller (ADF) test of properties.

Table 1 explains the summary of ADF test at first difference. It indicates that all variables are stationary when considered at first difference. T-test value is lesser than critical value and p-values <0.05. P value of GDP growth rate is 0.0000 at first difference, P value of Inflation at first difference is 0.0000, P- value of population growth is 0.0009 at first difference and the P –value of Unemployment rate is 0.0001 at first difference. All null hypothesis are rejected that variable have unit root and alternative hypothesis are accepted at first difference. All variables are stationary at first difference.

Co-integration test

The co-integration test examines the magnitude and direction of a link between two variables. The long-term association between time series variables can be examined with the use of the co-integration test. Nobel laureates Robert Engle and Clive Granger first put forward the concept in 1987, following the publication of the spurious regression hypothesis by British economists Paul Newbold and Granger.

Cointegration tests identify situations in which one or more non-stationary time series are combined in a way that they are unable to long-term diverge from equilibrium.

There are two types,

1. Engle-Granger Method
2. Johansen Test

The Engle-Granger Two-Step method

The Engle-Granger Two-Step technique begins by using the static regression to create residuals, which are then tested for the existence of unit-roots. To check if time series units are stationary, it employs one of three methods, typically Augmented Dickey-Fuller test (ADF) is used. The Engle-Granger method shows stationarity of error when the time series is cointegrated. Johansen test is employed to test cointegrating relationships between several non-stationary time series dataset. Unlike the Engle-Granger test, the Johansen test allows for the identification of more than one cointegrating relationship. Though, since a lesser sample size would yield unreliable outcome, it is subject to exponential characteristics (such as large sample size). Errors that are passed over to the next step can be prevented by using the test to figure out the cointegration of multiple time series.

This study used Engle-Granger Two-Step method to understand the correlation between targeted and independent variables.

Error Correction Model

The common approach for modeling time series equations is to use the error Correction Model (ECM). The ECM divides the long run from the short run and allows one to work with non-stationary data series.

There are two different approaches.

1. Two-steps ECM Engle and Granger procedure (1987, first approach in time)
2. One-step ECM

For the Engle and Granger test, the long-run relationship, or "co-integrating regression," is first calculated using OLS. The residual in the estimated equation is then tested to see if it is stable. It suggests the presence of a stationary cointegrating relationship when it is stationary.

Analysis of the stationary at first difference should come first. Run the OLS and error tests for both the short and long terms after that. The researcher first examined the short-term link between the independent and dependent variables before figuring out the long-term association.

Table 2: Summary of short run relationship of variables using statistical techniques such as ordinary least squares (OLS).

Dependent Variable: D (GDPG)

Variable	Coefficient	T – statistics	P –Value
D(FDI)	5.23E-09	2.823539	0.0071
D(INF)	-0.143184	-2.763385	0.0083
D(POPGRO)	3.980266	1.708813	0.0945
RESID0GDO (-1)	-0.595659	-3.900598	0.0003
R- squared	0.493575	Adjusted R square	0.447536

The above table shows short run relationship between dependent and independent variables. FDI has significant and positive relationship with GDP growth rate since $P = 0.0071$, inflation has significant and negative relationship with GDP growth rate $P = 0.0083$. Population growth has insignificant positive correlation with GDP growth $P > 0.05$. Coefficient of residual value at first difference is negative that is -0.595659 and it is significant P value is $0.0003 < 0.05$. So that Long run adjustment is possible.

Table 3 – ADF test for residuals

Variable	Exogenous	Critical value			t-Statistics	Prob.
		1%	5%	10%		
RESIF0GDP	Constant	-3.914184	-3.571310	-2.922449	-2.599224	0.0039

Based on the about table, error is significant at level $P = 0.0039 < 0.05$. Null hypothesis rejected and alternative hypothesis accepted that residual became stationary at level. Therefore Long relationship exists between variables.

Based on the above table, the FDI has insignificant positive correlation with GDP growth rate, $p = 0.2828 > 0.05$. P value $= 0.0119$ of indicate the significant correlation between inflation and economic growth and the coefficient -0.12896 describe negative relationship. Population growth has substantial and affirmative correlation with GDP advancement in long run since P value $= 0.0231 < 0.05$ and coefficient is 2.676051 . R squared value of 0.229133 indicates that 22.91% of GDP growth influenced by Inflation rate and population growth of the country.

Table 4 : Summary of long run relationship using statistical techniques such as ordinary least squares (OLS).

Dependent Variable: GDPG

Variable	Coefficient	t- Statistics	Prob.
FDI	1.48E-09	1.086705	0.2828
INF	-0.128963	-2.619385	0.0119
POPGRO	2.676051	2.35967	0.0231
R- Squared	0.229133		
Adjusted R –squared	0.178859		

5. Conclusion

The ultimate objective of the country is to attain continued economic growth. In order to attain this objective, a country should make more decisions considering macro-economic factors. Aim of this research to investigate the effect of inflation, unemployment, foreign direct investment, and population on economic growth of Sri Lanka. Secondary data was gathered from the World indicator (WDI) for the period from 1973 to 2022. To comprehend the relationship between dependent and independent variables, this study utilized co-integration and error correction model. ADF unit root test is used to test the stationarity of variables. The stationarity of variables is tested using the ADF unit root test. Every variable is stationary at the first difference, according to the findings of the ADF test.

Based on the findings from the co-integration test and error correction model, in the short run, FDI has a noteworthy positive correlation with GDP, which supports the findings of (Mohammed Rashid, 2023) whereas in long run, inconsequential positive correlation found between FDI and the economic growth of Sri Lanka.

Moreover, this study concluded that there is a significant adverse relationship between inflation and the economic growth of Sri Lanka in both the short and long term. This study supports the findings of (Muhammad Fauzan, 2023), (Siddik, 2023) (Rasha Istaiteyeh, 2023) and (Madurapperuma W. , 2023). Population growth has a significant positive relationship with GDP in long run and an insignificant correlation in the short run.

The findings of this study suggest that Sri Lanka should take inflation under control since it has a significant negative impact on the GDP growth rate. And policymakers should take decisions to attract foreign direct investment, which leads to the economic growth of the country in the long run.

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