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L.L.M. Madushani[1], M.A.Y.D. Madurapperuma[1]

[1] Department of Business Economics, Faculty of Management and Finance, University of Colombo, Sri Lanka.
Corresponding Author, E-mail: yasantha@dbe.cmb.ac.lk

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The Short and the Long-term Effects of Economic Factors and Population Growth on Unemployment: Empirical Evidence from Sri Lanka

Madushani, L.L.M.
University of Colombo

Madurapperuma, M.A.Y.D.
University of Colombo
yasantha@dbe.cmb.ac.lk

Abstract

This study aims at investigating the determinants of unemployment in Sri Lanka over a period of 1990-2020 by examining the empirical relationship among the unemployment, gross domestic product, inflation, foreign direct investment, population growth, and exports. A macroeconomic factor model is employed using the annual time series data. The Autoregressive Distributed Lag (ARDL) approach is used to test the relationship between the unemployment and its determinants. The study identifies that the gross domestic product, foreign direct investment, population growth, and export have significant impact on unemployment, while inflation shows to be having no significant explanatory power in determining unemployment in the short run. In the case of the long-run relationship, the study finds that the gross domestic product, inflation, foreign direct investment, and population growth have a statistically significant explanatory power of unemployment, while exports show an insignificant result in the long run. The CUSUM and CUSUMQ show that the constructed ARDL model is stable within the 5% of critical bounds.

***Keywords**: Inflation, Gross Domestic Product, Export, Foreign Direct Investment, Population Growth.*

Introduction

In general, the word 'employment' refers to the work of several people in order to earn certain wages or salaries that can be used to satisfy their daily needs and wants. On the other hand, the unemployment is a period of time that every person goes through before engaging in any kind of employment, where individuals are actively making an effort to find a job, and mentally condition themselves to work for any salary that exists in a competitive market at the given time. The term "unemployment" has been defined differently depending on the need and importance of the topic. Firstly, the International Conference of Labor Statisticians (1954) provides a very limited standard definition of unemployment which was irrelevant concerning developing economies since it seems controversial, given the nature of unemployment in developing countries. Secondly, with the relaxation of "*conventional means of criterion of seeking work"* the term unemployment has been looked at in a much broader way. On this basis, it is argued that in the absence of a formal standard definition of unemployment, which would eliminate measurement problems, existing unemployment statistics in various developing countries are only linked to visible unemployment affecting formal and urban areas. However, the following are the interpretations given by various organizations regarding unemployment. The Organization of Economic Cooperation and Development defines unemployment as, "If persons above a specified age not being in paid employment or self-employment but currently available for work during the reference period" (OECD, 2021). The International Labor Organization defines, "Unemployed people as being: without a job, have been actively seeking work in the past four weeks and are available to start work in the next two weeks and out of work, have found a job and are waiting to start it in the next two weeks"(ILO, 2021). Department of Census and Statistics (2019) of Sri Lanka defines it as "Unemployment is persons available and/or looking for work, and who did not work and has not taken steps to find a job during last four weeks and ready to accept a job given a work opportunity within next two weeks". According to the above organizations, the unemployment rate is the most commonly used measure of unemployment, which is the number of people who are unemployed as a percentage of the labour force.

Unemployment is one of the major problems that occurs due to the lack of absorption capacity of developing countries. High unemployment in a country leads to economic problems in the community as a whole. One of the most critical issues that distinguishes

developing countries, especially the countries in South Asia from developed countries is the high unemployment rate evident in the former. The higher excessive unemployment rate negatively affects the economy, creating unstable economic conditions. When the unemployment problem persists for a long time, it adversely affects the society, creating numerous problems, for example financial hardships, homelessness, poverty, crime, frustration, and many other problems like family breakdown and tension, social isolation, loss of confidence and self-esteem. Therefore, it is a paramount duty of every government to focus on creating employment opportunities through various activities by fully utilizing all the resources available in the economy.

The global unemployment rate has increased from 5.4 percent in 2019 to 6.5 percent in 2020 (World Bank, 2020). According to the International Labor Organization, one of the major issues that currently prevails in the world is the high youth unemployment. The total youth unemployment rate remained around 15.5 percent in 2019 and 2020 (World Bank, 2020). The Sri Lankan situation is not an exception, given the world context. The unemployment rate is 5.5 percent, and the rate of unemployment among the youth seeking a job for the first time reported to be 21.5 percent (CBSL, 2020a). Regardless of gender, every young person faces increasing uncertainty at present in the hope of making a satisfactory transition into the labor market. Widespread youth unemployment also prevents countries from gaining competitive advantages through the investments in human capital, thus undermining future prospects (World Bank, 2020).

There are internal as well as external factors that determine unemployment. Market fundamentals, working people and trade unions preferences, bargaining powers, firms, technology, and market power, are the internal factors affecting labour demand and supply. The external forces affecting unemployment are macroeconomic policies and institutional changes related to monetary and fiscal policies and also the goods market. Such interaction of external and internal factors contributed in steadily reducing the rate of unemployment in Sri Lanka during 2002-2017 from 8.8 percent to 4.2 percent (CBSL, 2020b) whereas for the same reference period in Australia, a developed country, reported from 5.9 percent to 5.6 percent (macrotrends, 2021). Moreover, the Sri Lankan unemployment rate is relatively lower among South Asian countries (Economy.com, 2021). Though much prior researches that have investigated unemployment determinants in different countries could be found,

there has been a paucity of research work in relation to the Sri Lankan unemployment dynamics.

Thayaparan (2014) attempted to explain the unemployment using inflation and economic growth in Sri Lanka for the period of 1990-2012 and concluded that there is a significant inverse relationship between inflation and unemployment. Velnampy, Achchuthan and Kajananthan (2014) examined the impact of Foreign Direct Investment (FDI) and economic growth on unemployment in Sri Lanka using the data from 1990-2011. The results reveal that there is a significant impact of economic growth on the unemployment, in the short term, but that there is no long-term relationship between economic growth and unemployment. Further, there is no significant impact of FDI on unemployment, in the short term, but there exists a long-term relationship between FDI and unemployment. The recent work of Weerasiri and Samaraweera (2021) examined the factors influencing youth unemployment in Sri Lanka using the data from a subsample of 3,562 youths derived from the Sri Lankan Labor Force Survey in 2018. Their findings revealed that skill mismatch, including language and digital literacy and geographical mismatch, including the province in which the person resides, influence youth unemployment in Sri Lanka. Although these studies attempt to provide insight about the unemployment of Sri Lanka, inconsistencies of findings and recent macroeconomics influences from FDI and export sector developments indicate further requirement of investigating the antecedents of unemployment dynamics from a broader macroeconomic perspective. Therefore, it is vital to identify the key macroeconomic variables that are likely to explain the unemployment dynamics. Hence, the study incorporates gross domestic product, inflation, foreign direct investment, population growth, and export as determinants of unemployment and extend the period of analysis using a dataset from 1990 to 2020.

Literature review

Theoretical Literature

Unemployment in Sri Lanka has become a serious problem since it has a wider and significant impact in creating socio-economic problems directly or indirectly. If, however, available resources are appropriately utilized, the probability of avoiding the socio-economic problem is likely, considering the findings available in the past literature. A

plethora of literature is available on the subject matter, highlighting different causes and consequences of higher rate of unemployment. Although critics have paid little attention to the criteria affecting unemployment in Sri Lanka, there have been several studies conducted under the title unemployment criteria in many other countries. In literature, some studies used a microeconomic perspective in understanding unemployment, whilst others used macroeconomic factors of unemployment. These studies have covered theoretical and empirical understanding of developed, underdeveloped and developing countries.

In literature, different theories and hypotheses highlight relationships between unemployment rates and certain macroeconomics variables. Remarkably, in 1920's and 1930's, great economists like Pigou in 1929 and Keynes in 1936 formulated several models to explain unemployment. Since then, several scholars have contributed to the field through seminal work. Notably, Philips in 1958 highlighted the fundamental theoretical relationship through the Phillips curve and Okun in 1962 through the framework known as Okun's law highlighted the relationship between rate of unemployment and gross national product of an economy (Oniore, Bernard, & Gyang, 2015). A related work by Mortensen (1970) revealed that unemployment is inversely related to money wage function than inflation, in spite of its association with the Philips curve. He further noted that new entrants always search for a job, and thus unemployment is deemed related to wage offer and job acceptance.

According to Todaro (1969), researchers have drawn less attention to unemployment in the urban labour market in less developed countries. Hence, he developed a simple model bringing the probability of expected income differential to explain the phenomenon of urban unemployment. Later, Todaro (1985) developed a much more complex model by showing the interrelationship of economic variables (as cited in Oniore et al. 2015). In the model, he illustrated that a combination of shortages of capital, intermediate products and raw materials, skilled and human resources at managerial level with poorly functioning and insufficiently organized commodity and loan markets, poor transport and communications, the shortage of foreign exchange and import dominated communication patterns existed among the rich nations. According to Oniore et al. (2015) all these factors were the real causes of unemployment in developing countries.

The Phillips Curve

The Phillips curve shows the inverse relationship between inflation and unemployment (Humphrey, 1985). New Zealand economist A. W. Phillips in 1958 illustrated that higher inflation is associated with lower unemployment while lower inflation is associated with higher unemployment by considering inflation and unemployment data from 1861 to 1913 in the United Kingdom. The belief in the 1960s was that if any fiscal stimulus increased the overall demand of the economy, the demand for labour would increase, and the pool of unemployed workers would decrease. The companies increased their wages to cope with the competition and to attract talented employees.

Even though Henry Thornton (1760-1815) and others expressed an idea about the relationship between price level and employment: “a monetary expansion stimulates employment by raising prices” (p.19), much attention was drawn to this relationship after the development of Phillips curve (Humphrey, 1985). However, macroeconomics models developed in 1960 and 1970 including Phillips curve are criticized due to the fact that they do not capture all the structural interactions of the economy. Thus, Phillips curve is an empirical phenomenon than a theoretical base in approaching unemployment (Fuhrer, 1995).

The Okun’s Law

The Okun’s law is a macroeconomic concept introduced by Arthur Melvin Okun in 1962. Like Phillips curve, Okun’s law is an empirical phenomenon that shows the relationship between unemployment and the gross domestic product (GDP) (Altig, Fitzgerald, & Rupert, 2020). In other terms, an increase in economic activities reduces unemployment, which aligns with Keynesian view of idle capacity during a rescission increases unemployment. Okun’s law has been expressed in two versions (Knotek II, 2007): First-Difference and the second - Gap version. The First-difference version examines the effect of the change in the logarithm of the GNP upon the change in the rate of unemployment. The Gap version examines the gap between the potential output and the actual output in relation to the natural rate of unemployment. Though the coefficients of Okun’s law estimated by using two versions are sensitive to the dataset of the country in the European Union (EU), two versions are considered to be robust in the EU (Economou & Psarianos, 2016).

Empirical literature

Nature of unemployment in Sri Lanka

The unemployment problem in Sri Lanka is mainly concentrated among young seeking employment opportunities. An investigation into the relationship between education and unemployment, considering gender, sector and age, has concluded that the relationship is stronger in relation to the urban youth, but considering the rural youth this relationship seems significantly weaker. Unemployment has been exacerbated by the fact that a significant portion of the population in Sri Lanka is not engaged in any other employment in anticipation of higher-paying government jobs (Dickens & Lang, 1995). However, with the gradual liberalization of economic activities, the expansion of job opportunities in the private sector has reduced the number of people seeking government jobs. In other words, since the late 1970s, the Sri Lankan labour market has been functioning with moderate flexibility to absorb an increasing number of entrants, amidst declining unemployment rate, from 8.8% to 4.2%, particularly during 2002-2017 (CBSL, 2020a). However, an argument could be possibly developed that the labour market has not functioned flexibly enough to reduce the number of unemployed unless the government provided the jobs for graduates under different schemes in 2005 and 2019. This evidence highlights the fact that high unemployment has been the result of unrealistic expectations, seeking public sector job opportunities, and stringent job security regulations. However, comparison of the impact of education on the actual wages of those who have a job and on the lowest acceptable wages of the unemployed could make the unrealistic expectations' hypothesis invalid (Rama, 2003). The overall unemployment rate in Sri Lanka for 2019 was 4.8 percent (CBSL, 2020a), the rate is relatively lower compared to the past. However, despite the decline in the overall unemployment rate, the percentage of unemployment in young adults (25-29 age) and educated individuals is comparatively higher (CBSL, 2020a; Dissanayake & Benfratello, 2010).

Given the available literature in relation to the Phillips curve and the Okun's law' many researchers have considered inflation as a determinant of unemployment using the Phillip curve as a theoretical foundation. The Phillips curve shows a negative empirical relationship between inflation and unemployment. Nevertheless, in some economies the inverse relationship between the general price level of an economy and unemployment does not

seem to hold (Folawewo & Adeboje, 2017). Phillips curve has been empirically established in many instances, Sri Lanka too is not an exception to the general phenomena of Phillips curve and Thayaparan & Namal (2018) illustrated the existence of the inverse relationship between inflation and unemployment in Sri Lanka.

Gross domestic product (GDP) is another antecedent that is most commonly used to explain the unemployment of an economy. According to the Okun's law, there is an inverse relationship between GDP and unemployment. Many researchers confirm the Okun's law (Economou & Psarianos, 2016) except in a few instances, especially in relation to developing countries, for example - Sri Lanka. Thayaparan and Namal (2018) concluded that, Okun's law is invalid, considering the economy of Sri Lanka, as no effect of GDP could be found on unemployment.

Major determinants affecting unemployment other than GDP and Inflation

Theoretical literature introduced two main determinants affecting unemployment. In addition, many researchers have identified three main macro factors that contribute to unemployment. These three factors are population growth, foreign direct investment and exports (Maqbool, Mahmood, Sattar, & M.N.Bhalli, 2013) (Bloom & McKenna, 2015; Folawewo & Adeboje, 2017; Gaston & Rajaguru, 2010; Oniore et al., 2015). Some regions like Africa and many countries such as Syria, Uganda, Malawi are experiencing an unprecedented rapid population expansion, in fact what exists is a natural growth. Past trends in fertility and mortality have led to an increase in the number of young populations in developing countries and an increase in the number of older populations in developed countries (Bongaarts, 2009). The increase in population leads to an increased demand for goods and services, nevertheless, their supply cannot be increased due to the lack of some factors like raw materials, skilled labour and capital etc. As the population grows rapidly, so does the number of persons entering the labour market making it extremely difficult to employ all that enter the labour market. In developing countries, the number of job seekers is expanding so fast that it has not been possible to provide employment to all that seek employment opportunities in spite of the fact that every effort is made to enhance development. Therefore, unemployment, underemployment and disguised employment are

common characteristics in labour markets of the developing world (Irpan, Saad, Shaari, Noor, & Ibrahim, 2016).

Foreign Direct Investments (FDIs) have a positive influence in creating direct as well as indirect employment opportunities in host countries. FDIs are actively utilized in open markets for investors (Chen, 2020). The FDI is used as the indicator of economic interconnection worldwide, and FDI can create more domestic job opportunities (Jayaraman & Singh, 2007). A country's ability to attract inward FDI has the potential to reduce its unemployment rate (Palat, 2014). FDIs are necessary to develop the network between countries, but the increasing FDI inflows correlated to increasing the number of foreign workers as many foreign companies recruit cheap labour from other countries instead of employing domestic labour (Irpan et al., 2016). Further, the higher rate of unemployment can be reduced by attracting more and more FDIs (Akeju & Olanipekun, 2014). However, there is a paucity of research work that explicitly examine the impact of FDIs on unemployment in Sri Lanka.

Trade liberalization creates opportunities for locals to purchase foreign products while local producers sell their products to foreign buyers at a competitive price. In countries where compared to imports, exports (protection) are facilitated and encouraged or exports are manly driven by labour intensive production methods (agriculture), the possibility of reducing unemployment is high (Porto, 2008). In his work, Porto mentioned that increased agro-manufactured export price results in higher wage rates and high labour force participation. Further, Gaston and Rajaguru (2013) conclude that higher export price reduces unemployment rates at the market equilibrium. However, Jin, Lee, and Hwang (2019) demonstrate that there is a positive relationship between level of imports and unemployment where the economy's structure is characterized by high industry and low service ratios. In contrast, there exists a negative relationship between level of exports and unemployment where the economy's structure is characterized by low industry and high service ratios. Thus, the impact of export on unemployment is inconclusive and is likely to depend on the economic development and structure of the given country.

Overarching, ample theoretical and empirical literature has been devoted to studying the empirical relationship between unemployment and major macroeconomic determinants. Thayaparn and Namal (2014) examined the effect of inflation and economic growth on

unemployment in relation to Sri Lanka for the period of 1990-2012. Velnampy, Achchuthan and Kajananthan (2014) investigated the impact of foreign direct investment on economic growth and unemployment in Sri Lanka using the data from 1990 to 2011. Weerasiri and Samaraweera (2021) recently examined the factors influencing youth unemployment in Sri Lanka utilizing data from a subsample of 3,562 youths derived from the Sri Lankan Labor Force Survey in 2018. Their findings revealed that skill mismatch, including language and digital literacy and geographical mismatch, including the province in which the person resides, influence youth unemployment in Sri Lanka. Although these studies attempt to provide some idea of unemployment, none of these studies has incorporated vital macroeconomic variables in the model that may contribute to unemployment in Sri Lanka. Therefore, it is vital and relevant to encapsulate key macroeconomic variables such as GDP, inflation rate, FDI, population growth and exports into a model that is likely to explain the variation of the unemployment in Sri Lanka.

Research methodology

The main objective of this research is to identify the determinants of the unemployment rate in Sri Lanka. In order to achieve the aforementioned objective, develop a simple econometric model was developed subsequent to an extensive and rigorous literature review. Using Multiple Regression Analysis, time-series data collected from various secondary data sources are analysed. Several pre-estimation tests are performed before its application, including stationary, stability and correlation tests. The presence or absence of cointegration between dependent and independent variables makes it possible to investigate the significant long-run and major short-run determinants of unemployment. Also, the nature of the relationship between each identified determinant and unemployment depends on whether the determinants positively or negatively impact unemployment. These analyses provide a better understanding of the determinants of unemployment in Sri Lanka.

Identification of sample period

The study is carried out based on annual time series data covering 31 years from 1990 to 2020. The sample period has been determined after careful consideration and assessment of data availability.

Operationalization and Data Sources

Table 1 shows independent and dependent variables, operational definitions and measurements used in this study. World Development Indicators published by World Bank and Federal Reserve Bank of St. Louis, Annual Report published by Central Bank of Sri Lanka (CBSL), and Labor Force Surveys conducted by the Department of Census and Statistics (DCS) in Sri Lanka are the sources of data used in this study.

Table 1: Variables, Indicators, Measurements, and Data Sources used in the study

Concept	Variable	Indicator	Measurement	Sources
Unemployment	Unemployment Rate	Unemployment, total (% of total labor force) (modeled ILO estimate)	Ratio	World Bank/DCS
Determinants of Unemployment	Gross Domestic Product	Real gross domestic product (annual%)	Ratio	Federal Bank of St. Louis
	Inflation Rate	Inflation, consumer prices (annual%)	Ratio	World Bank/CBSL
	Population growth rate	Population growth (annual %)	Ratio	World Bank
	Foreign Direct Investment	Foreign direct investment, net inflows (% of GDP)	Ratio	World Bank
	Exports	Exportation of goods and services (annual % growth)	Ratio	World Bank

The simple model which explains the factors that influence the unemployment rate in Sri Lanka has been illustrated in the following functional form.

The theoretical model

$$UN = f(GDP, IN, FDI, PG, EX)$$

Where,

UN = Unemployment Rate

GDP = Gross Domestic Product

IN = Inflation Rate

FDI = Foreign Direct Investment

PG = Population Growth

EX = Exports

The ARDL approach to cointegration involves estimating the unrestricted error correction model version of the ARDL model for unemployment and its determinants. The following unrestricted model was constructed to test above purpose.

$$\Delta UN_t = \beta_0 + \alpha_0 UNR_{t-1} + \alpha_1 GDP_{t-1} + \alpha_2 IN_{t-1} + \alpha_3 FDI_{t-1} + \alpha_4 PG_{t-1} + \alpha_5 EX_{t-1} + \sum_{i=1}^{\rho} \beta_{1i} \Delta UN_{t-1} + \sum_{i=1}^{q} \beta_{2i} \Delta GDP_{t-1} + \sum_{i=1}^{q} \beta_{3i} \Delta IN_{t-1} + \sum_{i=1}^{q} \beta_{4i} \Delta FDI_{t-1} + \sum_{i=1}^{q} \beta_{5i} \Delta PG_{t-1} + \sum_{i=1}^{q} \beta_{6i} \Delta EX_{t-1} + €_t \quad (1)$$

The null hypothesis in relation to the above unrestricted model (1) would be tested through the ARDL Bounds Test.

The quoted hypothesis is as follows.

$H_0 : \alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ (There is No Cointegration)

$H_A : \alpha_0 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$ (Cointegration Exists)

Gross domestic product, inflation, foreign direct investment, and exports are likely to have a negative impact on unemployment, while population growth is expected to have a positive impact on unemployment.

Empirical results and analysis

Table 2 represents the order of the integration among the variables. The ADF unit root test provides the results on the stationarity in the time series.

Table 2: Unit Root Test Results

Variables	At Level ADF Statistics		At 1st Difference ADF Statistics		Results
	Without Trend	With Trend	Without Trend	With Trend	
UNR	-3.2593**	-0.8282	-4.4484***	-5.4078***	I(0)
GDP	-4.7646***	-4.9581***	-8.2019***	-8.4002***	I(0)
IN	-4.3267***	-4.8435**	-6.1370***	-6.0159***	I(0)
FDI	-4.7484***	-4.6081***	-6.0699***	-6.0509***	I(0)
PG	-2.7072*	-2.6335	-5.6718***	-5.5832***	I(1)
EX	0.0636	-1.9220	-3.5027**	-3.8402**	I(1)

*Note: *** ,** and * represent statistical significance at 1%, 5%, and 10% respectively.*

Results show that the unemployment series is stationary at level. The probability of the ADF test statistics at level for all the independent variables, except for Population Growth and Exports is significant. Furthermore, the Gross Domestic Product, Foreign Direct Investment and Inflation are stationary at level. As a result, the Population Growth and Exports are non-stationary at level but, the first difference of the two series is stationary.

Since the researchers can observe a combination of stationary variables at level I (0) and first difference I (1), the variables could be used in the ARDL (Autoregressive Distributed Lags) model. According to the data in the study, the researchers select Akaike Information Criterion (AIC) for selecting lag length criteria. That is two-period lag.

Results of the ARDL Bounds Testing Approach

Based on the results of the ADF Unit Root test (stationary test) analysed in the previous section, the ARDL Bounds Testing Approach is used to point out any presence of a long-run relationship between the above variables. In other words, the ARDL Bounds Testing Approach to cointegration involves estimating the unrestricted error correction model version of the ARDL model for unemployment and its determinants.

The results of the constructed ARDL model with a maximum lag length of 2 lag periods were then formed, and it is the Akaike information criterion (AIC) that was relied upon. Furthermore, the constructed ARDL model was seen to be fitted with a R^2 value of 0.99, and adjusted R^2 value of 0.98, and a highly significant F-test statistic.

Therefore, the ARDL Bounds test was used to determine, whether there was a long run relationship between the variables. The test results are presented in Table 3.

Table 3: ARDL Bounds Test Results

F-Statistics	Significance Level	I(0) Bound	I(1) Bound	Cointegration
	10%	2.08	3	Yes
	5%	2.39	3.38	Yes
7.4433	2.5%	2.7	3.73	Yes
	1%	3.06	4.15	Yes

According to Table 3, the F statistics of the ARDL Bounds test is greater than the I (1) bound, and thus it is evident that cointegration exists between the independent and dependent variables. The Bounds test for the above constructed model provides evidence for the existence of a long-run relationship between the variables even at 1% level of significance.

Diagnostic Tests

The following diagnostic tests were then performed on the aforementioned ARDL model to identify the validity of the results.

Serial Correlation / Autocorrelation Test

The Breusch-Godfrey Serial Correlation LM Test is used to test the serial correlation and the Durbin-Watson Statistic is used to test the autocorrelation in this model. Furthermore, the existence of autocorrelation in the aforesaid model is checked by using Correlogram Q Statistics.

Table 4: Results of Serial Correlation LM Test

F Statistics	Probability-F Stat	Probability –Chi. Sq.	Durbin-Watson Stat
0.4507	0.6432	0.5394	2.0144

Figure 1: Results of Correlogram Q Statistics

Date: 08/10/21 Time: 17:15
Sample: 1990 2020
Included observations: 30

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *| . |	. *| . |	1	-0.120	-0.120	0.4769	0.490
. *| . |	. *| . |	2	-0.119	-0.135	0.9630	0.618
. *| . |	. *| . |	3	-0.094	-0.130	1.2744	0.735
***| . |	***| . |	4	-0.359	-0.428	6.0295	0.197
. | . |	. *| . |	5	0.050	-0.155	6.1267	0.294
. | . |	. *| . |	6	0.026	-0.191	6.1531	0.406
. |* . |	. *| . |	7	0.074	-0.129	6.3830	0.496
. |* . |	. *| . |	8	0.075	-0.189	6.6264	0.577
. *| . |	.**| . |	9	-0.148	-0.341	7.6336	0.571
. |* . |	. | . |	10	0.180	-0.045	9.1956	0.514
. |* . |	. | . |	11	0.075	0.014	9.4795	0.578
. | . |	. |* . |	12	0.030	0.082	9.5276	0.657
. | . |	. | . |	13	-0.042	-0.038	9.6274	0.724
. *| . |	. | . |	14	-0.166	0.003	11.275	0.664
. *| . |	. *| . |	15	-0.137	-0.096	12.479	0.642
. |* . |	. |* . |	16	0.121	0.162	13.477	0.638

According to the test results in Table 4, the probability value is greater than 0.05. Thus, the null hypothesis is accepted, and the Durbin-Watson test statistic lies between 1.7 and 2.3. Further, Figure 1 depicts that all the probability values are greater than 0.05. Accordingly, since there is no serial correlation effect or autocorrelation associated with the above model, it can be concluded that this model is a good model.

Normality Test

The Histogram Normality Test is used to test whether the residuals are normally distributed or not. The following Figure 2 shows the results of the Histogram Normality Test run in relation to the aforesaid model.

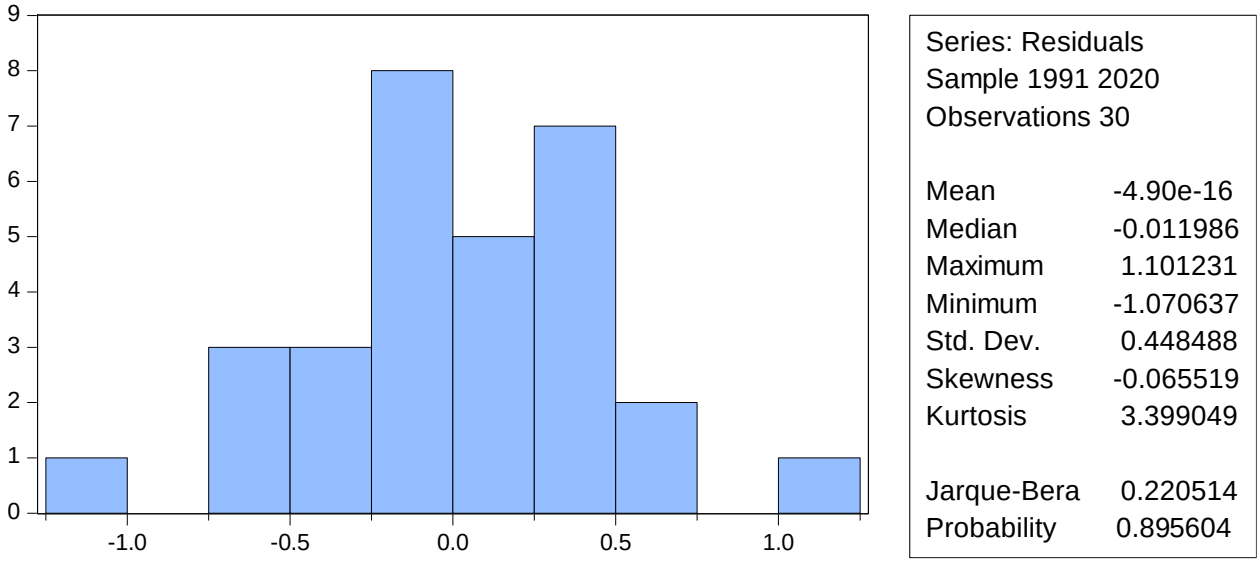

Figure 2: Results of the Histogram Normality Test

Figure 2 shows that the probability of the Jarque-Bera test statistics is greater than 0.05, and it is insignificant at 0.8956. Therefore, the null hypothesis is accepted. Furthermore, the residuals are normally distributed with zero mean. Therefore, it could be concluded that the constructed ARDL model is appropriate.

Heteroskedasticity Test

The Breusch-Pagan-Godfrey test is used to check the heteroskedasticity in this study. The Table 5 given below shows the results of the Heteroskedasticity Test. The model does not have a heteroskedasticity problem because all the probability values are greater than 0.05. This indicates that the model with homoscedasticity data series is appropriate for the empirical test.

Table 5: Results of the Breusch-Pagan-Godfrey Heteroskedasticity Test

F Statistics	Probability-F Stat	Probability –Chi. Sq.
0.6492	0.6903	0.6301

Results of the Stability Test

The following Figures (3 and 4) represent the CUSUM test and CUSUMQ test results. Both blue lines in Figure 3 and 4 that represent CUSUM statistics line and CUSUM of Squares statistics line respectively, and these are within the 5% significant line.

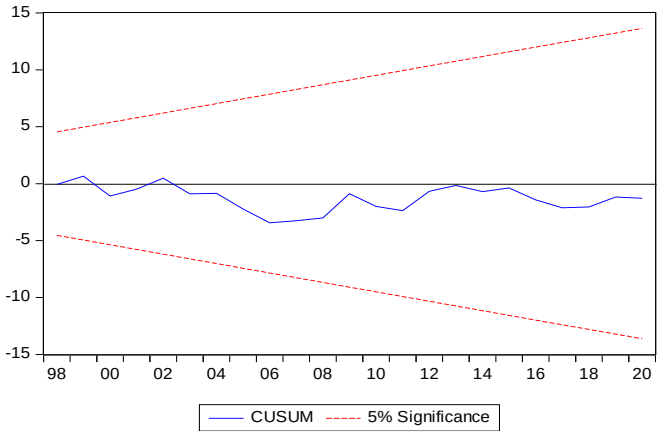

Figure 3: Results of the CUSUM Test

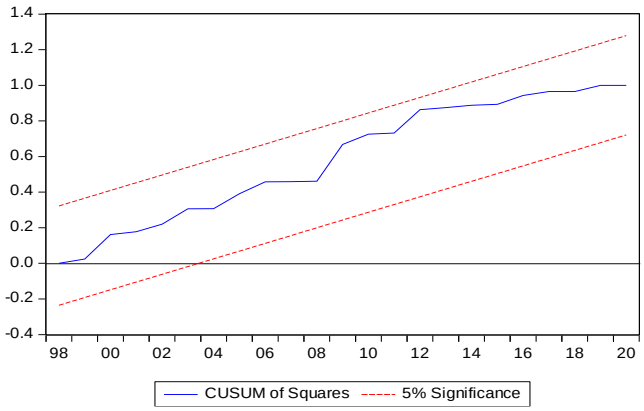

Figure 4: Results of the CUSUMQ Test

The results from the CUSUM test statistics and the CUSUMQ test statistics show that the constructed model is stable at 5% level of significance.

Results of the Error Correction Model

According to the ARDL bound test statistics, it is observed that a long-run relationship exists between the considered variables. Therefore, the Error Correction Model (ECM) is

constructed in order to broadly analyse the results of the short-run and the long-run relationship between variables.

Error Correction Model results for the Short Run

The below Table 6 presents the results of the Error Correction form which denotes the short-run relationship between the variables under consideration.

Table 6: Results of the Short Run Error Correction Form

Regressor	Coefficient		Standard Error	T Statistics	Probability
	Notation	Value			
$\Delta GDP_{(t)}$	β_1	-0.041092	0.013383	-3.070579	0.0078**
$\Delta IN_{(t)}$	β_2	-0.016535	0.013997	-1.181284	0.2559
$\Delta FDI_{(t)}$	β_3	-0.459794	0.116339	-3.952191	0.0013***
$\Delta PG_{(t)}$	β_4	0.057500	0.346100	0.166136	0.8703
$\Delta PG_{(t-1)}$	β_5	-0.964066	0.377556	-2.553439	0.0220**
$\Delta EX_{(t)}$	β_6	0.109857	0.036724	2.991436	0.0091**
$\Delta EX_{(t-1)}$	β_7	0.161259	0.040234	4.007979	0.0011***
$ECT_{(t-1)}$	β_8	-0.226182	0.026483	-8.540767	0.0000***
R^2				0.761415	
Adjusted R^2				0.681886	

*Note: *** and ** represent statistical significance at 1% and 5% respectively.*

The equation for the short run model is as follows.

$$UN_t = \beta_0 + \beta_1\Delta GDP_t + \beta_2\Delta IN_t + \beta_3\Delta FDI_t + \beta_4\Delta PG_t + \beta_5\Delta PG_{(t-1)} + \beta_6\Delta EX_t + \beta_7\Delta EX_{(t-1)} + \beta_8 ECT_{(t-1)} + \nu_t \quad (2)$$

The results in Table 6 show that GDP negatively impacts the unemployment rate, which is significant at 5% in the absolute term. Though inflation negatively impacts the unemployment rate, it is statistically insignificant in the absolute term. Further, FDI shows a negative impact on unemployment rate which is statistically significant at 1% in the absolute term. The population growth rate shows a positive impact on unemployment rate which is statistically insignificant at absolute term, and it shows a negative impact on unemployment rate which is statistically significant at 5% in the first lag. The export shows

a positive impact on unemployment rate which is statistically significant at absolute term, and the first lag.

Moreover, the coefficient of the error correction term is determining the speed of adjustment towards the long-run equilibrium. Accordingly, the coefficient of the ECT is -0.2262, suggesting that almost 22% of the discrepancy between the long run and the short run is corrected within a year. Furthermore, the probability value of error correction term is less than 0.05, and the coefficient of the ECT is negative. These results show that the speed of adjustment to the long run equilibrium is less than 50%, and statistically significant.

Error Correction Model results for the Long Run

The Table 7 given below presents the results of the Error Correction form, which denotes the long-run relationship between the variables in consideration.

Table 7: Results of the Long Run Error Correction Form

Regressor	Coefficient		Standard Error	T-Statistics	Probability
	Notation	Value			
GDP	α_1	-0.341697	0.186939	-1.827849	0.0875*
IN	α_2	0.473215	0.150123	3.152188	0.0066**
FDI	α_3	-4.098159	1.230438	-3.330652	0.0046**
PG	α_4	3.531230	2.057531	1.716247	0.1067*
EX	α_5	0.122889	0.075339	1.631142	0.1237
C	α_0	3.063354	3.501594	0.874845	0.3955

*Note: ** and * represent statistical significance at 5%, and marginal significance at 10%*

The equation for the long-run model is as follows.

$$UN = \alpha_0 + \alpha_1 GDP + \alpha_2 IN + \alpha_3 FDI + \alpha_4 PG + \alpha_5 EX$$

The results of the long-run error correction form portray that while inflation rate and foreign direct investment have a statistically significant long-run relationship, gross domestic product and population growth have a marginally significant long-run relationship with unemployment. However, level of exports has no explanatory power on the unemployment rate in the long-run.

Summary of Empirical Findings

The purpose of this section is to summarize the major determinants affecting the unemployment rate. Further, the magnitude of the impact of each variable under the short-run and the long-run categories are also shown in Table 8.

Table 8: Significant Determinants Affecting the Unemployment Rate in Sri Lanka

Model	Variable	Coefficient	Probability
Short Run	Gross Domestic Product	-0.041092	0.0078**
	Foreign Direct Investment	-0.459794	0.0013***
	1st Lag of Population Growth	-0.964066	0.0220**
	Export	0.109857	0.0091**
	1st Lag of Export	0.161259	0.0011***
Long Run	Gross Domestic Product	-0.341697	0.0875*
	Inflation	0.473215	0.0066**
	Foreign Direct Investment	-4.098159	0.0046**
	Population Growth	3.531230	0.1067*

*Note: ***, ** and * represent statistical significance at 1%,5%, and 10% respectively*

Firstly, the study identifies the gross domestic product, foreign direct investment, first lag of population growth, and exports as the determinants that significantly impact unemployment. At the same time, inflation shows insignificant explanatory power in determining unemployment in the short run.

Secondly, the study attempts to identify long-run determinants of unemployment. Gross domestic product, inflation, foreign direct investment, and population growth demonstrate a statistically significant explanatory power for the unemployment, while export shows insignificant explanatory power in determining the unemployment in the long run.

Accordingly, there is a negative relationship between gross domestic product and unemployment, both in the short-run and in the long-run. Furthermore, when the GDP increases by one percent, the rate of unemployment decreases by 0.04 percent in the short-run, while reducing the rate of unemployment by 0.34 percent in the long-run.

The study identifies the insignificant negative impact of inflation on unemployment in the absolute term in the short run. However, there is a significant positive relationship between

inflation and unemployment in the long-run. In other words, the rise of inflation rate by one percent increases the rate of unemployment by 0.47 percent in the long-run,

Foreign direct investment has a negative impact on unemployment in the short-run as well as in the long-run. Accordingly, when the FDI rises by one percent, the rate of unemployment decreases by 0.46 percent in the short-run and by 4.11 percent in the long-run.

The population growth rate shows a significant negative impact in the lag period of the short run. Accordingly, when the population growth rate increases by one percent in the one period lag, the given condition will decrease the unemployment rate by 0.96 percent in short-run. However, the same has a marginally significant positive impact on the long-run unemployment. Accordingly, in the long run, when the population growth rises to one percent, it increases the rate of unemployment by 3.53 percent.

The level of exports shows a significant positive impact in the absolute term, and in the lag period of the short-run. Accordingly, when the exports increase by one percent in the absolute term, the given percentage change will increase the unemployment rate by 0.11 percent in the short-run, and when the exports increase by one percent in the one period lag, the given percentage change will increase the unemployment rate by 0.16 percent in short-run. Furthermore, there is no significant relationship between exports and unemployment rate in Sri Lanka in the long-run.

Conclusion

In this study, the findings indicate that the growth of GDP significantly reduces unemployment in the short-run, and also in the long-run, while inflation does not affect unemployment in the short-run, but it significantly increases unemployment in the long-run. It further appears that the Okun's law is valid for the Sri Lankan economy, whereas Phillip's curve is not valid in the Sri Lankan economy. Velnampy, Achchuthan and Kajananthan (2014) also came up with similar findings, but they could not find the long-run impact of economic growth on unemployment. Nevertheless, findings of the research are contradictory to the finds of Thayaparn and Namal (2014). They conclude that while inflation significantly reduces unemployment, the gross domestic product positively but insignificantly influences unemployment in the economy. Furthermore, it appears that

Okun's law is invalid in the Sri Lankan economy, whereas Phillip's curve is valid in the Sri Lankan economy. These contradictory results are partly due to different periods (i.e. 1990-2020 and 1990-2012) considered in these two studies.

With regard to the Foreign direct investment (FDI), the findings of the research show that FDI significantly reduces unemployment in the short-run and also in the long-run. However, these findings are slightly contrary to the findings of Velnampy et al. (2014), which show that there is no significant impact of FDI on unemployment, but in relation to the long run, there is a relationship between foreign direct investment and unemployment.

The population growth rate shows a significant negative impact in the lag period of the short-run, and in the long-run there is a marginally significant positive impact on unemployment. Accordingly, the population growth rate will reduce unemployment in the short-run, and increase unemployment in the long-run. The long-run relationship is acceptable since the natural growth of the population results in higher labour force participation in the long-run. At the same time, exports show a significant positive impact in the absolute term, and the lag period of the short-run, while in the long-run there is no significant relationship between exports and unemployment rate in Sri Lanka. In a related vein, Jin, Lee, and Hwang (2019) found that exports are positively related to unemployment where the economic structure is characterized by lower industry ratio and higher service ratio. Interestingly, since Sri Lanka also has a similar economic structure, the positive relationship that emerged between exports and unemployment is robust and highly relevant to the Sri Lankan context. Therefore, since population growth rate and exports have a significant impact on unemployment, these two determinants can also be considered as two important criteria in determining the unemployment rate in Sri Lanka.

In conclusion, among the explanatory variables used in this study, the GDP, FDI, and population growth have a significant explanatory impact on the unemployment rate, both in the short-run and the long-run. Moreover, inflation has a significant explanatory impact on unemployment rate only in the long run, while the level of exports has a significant explanatory impact on unemployment rate only in the short run. Therefore, all the independent variables used in this research are significantly important in determining unemployment in Sri Lanka.

Recommendations

Based upon the findings of this study, it is evident that the impact of all selected explanatory variables is an illustration of the decisive factor in determining the level of unemployment in Sri Lanka at present.

As there is a negative relationship between Sri Lanka's gross domestic product and unemployment rate, the government should focus on enhancing Sri Lanka's gross domestic product. In this regard, achieving macroeconomic stability and the use of various strategies to develop existing industries and also to groom new and creative group of entrepreneurs are vital.

As the literature reveals, FDI is a significant macroeconomic variable that has been already used to reduce unemployment in many other developing countries. However, during the last couple of years, there has been a significant decline in the FDI flows to Sri Lanka. Given the fact that foreign direct investment has a favourable impact towards reducing unemployment in Sri Lanka, policymakers have to play a strategic role and create a conducive atmosphere towards attracting a higher volume of FDI.

Based on the research findings, the level of exports is seen to be having a positive impact towards reducing the unemployment rate of Sri Lanka, yet, concerning the longer run this relationship is insignificant. This is partly due to lower industry ratio compared to the service ratio (Jin et al., 2019). Further, Sri Lankan exports are highly dependent upon imported raw materials, leading to low-value addition and low employment creation in the local economy. In such a context, policymakers have to make a genuine effort in order to create a conducive environment to expand the industrial sector by focusing on much more value-addition in the industrial production. However, since this study has excluded service exports like tourism, which could make a stronger contribution in reducing the rate of unemployment in Sri Lanka. Therefore, future research can consider service exports for empirical testing.

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