Sri Lankan Journal of Banking and Finance

An endeavor to share knowledge

Volume: 4 Issue: 01 June: 2021

AN EMPIRICAL ANALYSIS ABOUT SECTORAL CONTRIBUTION TO THE ECONOMIC GROWTH: EVIDENCE FROM SRI LANKA

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ABSTRACT

This study aims to investigate the contributions of each sector to the economic growth in Sri Lanka over the period 1980 – 2019. This study adopted the Ordinary Least squared (OLS) method to achieve above objective. Moreover, the Pairwise Granger causality method is used to make sure the causality relationship between the variables. The results of The OLS method suggest that the growth rate of Agricultural sector and economic growth rates of the previous years do not have significant impact on economic growth at 1% or 5% level of significance and Growth Gross domestic capital formation does not have contributed to economic growth at any level. However, the growth rate of Industrial and service sectors have positive and statistically significant impact on economic. Service sector contribute largely followed by industrial sector to the economic growth. That is, one percent increase in service sector output tends to extend the Growth rate by 0.43% while economic growth rate rises by 0.15% together with an increase in the industrial rate of growth. It also found that Agriculture and Industrial sector do not granger cause with economic growth whereas, service sector causes economic growth indicating that service sector influence economic growth greatly than the opposite two sectors.

Keywords – Economic Growth, Sectoral Contribution, Ordinary Least Square Method, Granger Causality Test

1. INTRODUCTION

1.1 Research background

Sri Lanka is facing many kind global and domestic economic and political challenges caused by natural disasters and number of insurrections since its independence. For example, more than twenty-five years (1983-2009) of civil war slowed down the economic growth of Sri Lanka during this period. In early period after the independence, Sri Lanka was known as agricultural based country. That is, before 1977, the main source for income of the households and the economy was agriculture. However, after 1977, the share of agriculture sector for economic growth decreased while share of industry and service sectors became the major sectors in gross domestic product. Generally, GDP growth rate is an important indicator of the economic performance of a country. The following figure shows the history of GDP in Sri Lanka from 1960.

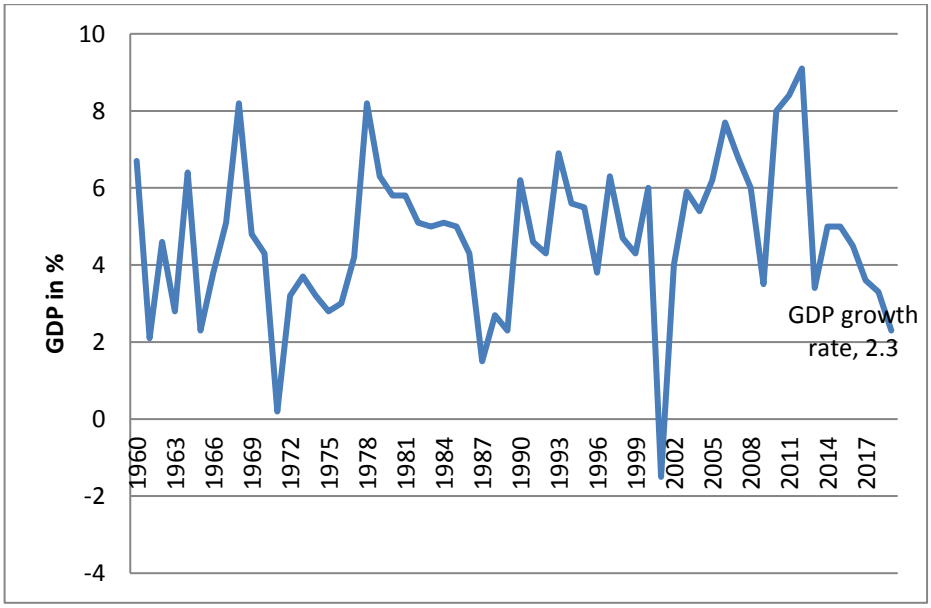

Figure 1: History of GDP in Sri Lanka from 1960 to 2019

Source: Central Bank of Sri Lanka Report (2020)

Before explaining the economic performance of Sri Lanka, History of Sri Lankan Economy can be divided into three basic periods as follow: Closed economy/ food self-sufficiency era (1948–1977), open economic policy era I (1977–1994), and open economic policy era II (1994–present). The economy contracted by 0.8% in 1971, mainly because of the turmoil following a youth uprising in southern Sri Lanka, and the economy continued to experience

slower growth than in the previous decade mainly because of shortages of imported inputs (Athukorala and Jayasuriya 1994). As a result of the marginalization of the private sector in the economy under the governmental policy regime, coupled with rampant inefficiency of public enterprises, the annual average growth rate of per capita gross national product declined from 2.8% in the 1960s to a mere 0.7% during 1970–1977 (Athukorala and Jayasuriya 1994: 28).

As a reaction to the dismal economic outcome of the inward-looking policy, in 1977 Sri Lanka embarked on an extensive economic liberalization process that marked a decisive break with decades of protectionist policies (Snodgrass 1998; Rajapatirana 1988; Athukorala and Rajapatirana 2000). A cycle of growth and conflict followed over the last 3 decades, with only 1 year of negative growth in 2001[1].

From 2002 to 2004, there was a short lived peace process and the economy could benefit from lower interest rates, a recovery in domestic demand, increased tourist arrivals, a revival of the stock exchange, and increased foreign direct investment in the country. In 2002, economic growth reached 4%, aided by strong service sector growth.

Because of the Tsunami devastation at the end of 2004 and the resumption of the civil war in 2005 led to steep increase in defense expenditure. A sharp rise in world petroleum prices combined with economic fallout from the civil war led to inflation that peaked 20%. However, in May 2009 as the civil war ended the economy started to grow at a higher rate of 8.0% in the year 2010 and reached 9.1% in 2012 mostly due to the boom in non-tradable sectors. However, the boom didn't last and the GDP growth for 2013 fell to 3.4% and only slightly recovered to 4.5% in 2014. After growing 5.0% in 2015, growth fell to 4.5% in 2016, 3.6% in 2017, 3.3% in 2018 and 2.3% in 2019 due to the currency crisis which brought an International Monetary Fund programme and there was a flood in 2016, political instability in 2018 and suicide bombings on Easter Sunday in 2019.

During these time periods, different kinds of policy implications were introduced in various disciplines which are fixed in development

[1] In 2001 the economy was hit by a series of adverse external shocks resulting in the negative real GDP growth. The prolonged drought that was started in 2000 and continued in 2001 reduced domestic agricultural output and hampered hydroelectricity generation. The terrorist attack on the Katunayake International Airport in July sharply curtailed tourist arrivals, weakened business confidence, and reduced external trade as a result of the imposition of a high war-risk insurance premium on ships and airlines following the attacks. Intensification of the ethnic conflict further lowered investor confidence (CBSL 2002).

administration, which includes land, water, credit, trade, marketing, food, and other sectors. Let's see the contribution of sectors through the changes of time period.

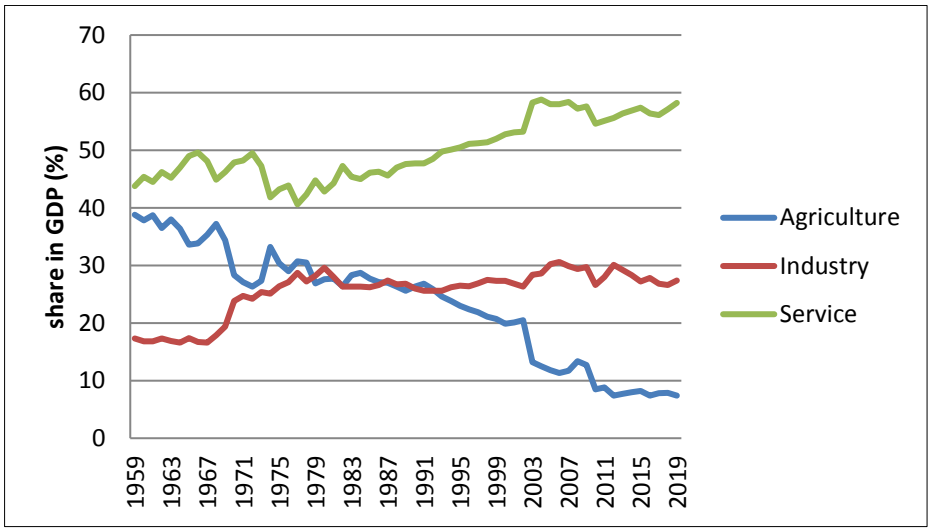

Figure 2: Contribution of Sectors for GDP from 1960 to 2019 (in %)

Source: CBSL Annual Report (Selected years)

The process of sector change accompanying Sri Lanka's economic growth has been largely conventional. Since 1960, the contribution of agriculture has shrunk quite rapidly. Agriculture includes forestry, hunting and fishing as well as cultivation of crops and livestock production. The average value of agriculture sector for GDP of Sri Lanka during the period was 22.24 percent with a minimum of 7.42 percent in 2019 and a maximum of 38.8 percent in 1959.

The industry includes mining, manufacturing, energy production and construction. The major contributor to the increase of industrial sector was manufacturing. The above figure shows that the contribution of industrial sector increased slightly with small fluctuations. The figure reported the minimum value of this sector is 16.6 percent in 1967 and the maximum value is 30.6 percent in 2006. In 2019, this sector contributed approximately 27.4 percent to the GDP.

The share of services sector to GDP increased from early 1960s to 1972 then there was decline in the shares of services for GDP contribution from 1972 to 1977 after that contribution of this sector increase gradually till now. The share of services sector to GDP increased from about 47% in the early 1960s

to over 58% in 2004. The minimum value of this sector contribution was 40.6 percent in 1977 and the maximum value was 58.8 percent in 2004. The share of service sector to the GDP in 2019 was about 58.24 percent. Trade structures contribute to the structural change when a country experiences economic development. Sri Lanka is facing structural change that the dispensation of the country's economic output shifts from agriculture to industry and then to services sector due to the development within interior factors with this structure change.

Each service sector component in this analysis has a very different contribution to the growth rate in the economy and service sector gives the highest contribution for the economic growth in Sri Lanka (Kumarasinghe and Sandaruwan, 2018). The relationship among agricultural, industrial, and service related gross domestic products (GDPs) under an open economic policy setting, different government policy regimes, and major policy eras from 1950 to 2015 (Jayasooriya, 2017).

Any positive growth in the service sector generated positive impacts in the agricultural and industry sectors, because of a spill over link of the latter with the services. The industrial sector of Sri Lanka is of key importance in determining the volume of GDP, and directly contributes to enrichment of the service sector in the economy. Finally, the agricultural sector is not productive enough to generate spillover effects to the other sector of the economy (Handapangoda, 2010).

Above empirical studies show that there is a significant relationship between agriculture, industry, and services sectors. For example, the performance of the processing industries (tea, rubber, and coconut) depends on the production of plantation crop. When a manufacturing sector is developing services related activities such as wholesale and retail trade, transport services and telecommunication and banking and financial services are expanding.

It can be identified Importance of the research as follows:

1. By identifying which sector is most influential to contribute to the GDP in Sri Lanka, the policy makers can take into account this finding when they formulate and implement policy related to economic well-being.

2. The government can target specific sector which will improve the economic performance.

3. The issues of the sector's contribution to the GDP can be identified.

1.2 Research Problem

The economic development of any country is heavily influenced by economic growth and sectoral changes of the economy. Even though several policies have been put in place by Sri Lankan government to strengthen the sectors in order to effectively and efficiently influence to achieve higher growth rates, data of Sri Lanka depict the higher fluctuation over time (See Figure 1 above). At the same time, Figure 2 shows that there is a significant structural change in the economy. Therefore, it is important to examine which sector led to achieving on achieving higher GDP growth in Sri Lanka over the time period 1980 - 2019.

An empirical analysis of the impact of sectoral growth on Sri Lanka's economic growth has not been adequately studied, as has been studied in other countries. Therefore, it has been taken as a research question and examine the sectoral contributions to the economic growth of Sri Lanka over the period 1980 - 2019 has been taken as a research objective.

2. LITERATURE REVIEW

Since last few decades, various studies have been carried out by researches to identify the role of sectors on economic growth. It is important to review the existing studies in order to get an idea about research area, objective, research problem, research gap, methodology, variables and analytical techniques. Also, it can compare the research findings with existing study's findings. Hence, the literature review is integral to the success of academic research. It ensures the research ability of the topic. It is designed to identify related research, to set the current research project within a conceptual and theoretical context. There exist many studies related to sectoral contribution to economic growth which has done globally and domestically. But, we review only a few researches which are most relevant to the study.

Using time series data from 2006 to 2014, Kumarasinghe and Sandaruwan (2016), the service sector gives the highest contribution to the GDP of Sri Lanka and it is about more than 50%. The study mainly focused on growth decomposition methodology developed by Ivanov and Webster (2010). They are able to identify the direct impacts of service sector components on the per capita growth of real GDP. But in this study the authors have not given a considerable concern about other 2 sectors and they have directly focused only the service sector and only data was used for a short period of 9 years.

Using relevant data of a long time period for his analysis and focusing on all three sectors of the economy, Jayasooriya (2017) has examined through his research the impact of structural transformation of Sri Lanka's economy on sectoral interdependencies. Mainly, the researcher has investigated the

relationship among agricultural, industrial, and service-related gross domestic products under an open economic policy setting, different government policy regimes and major policy eras from 1950 to 2015. Secondary data from the Central Bank of Sri Lanka and the Institute of Policy Studies publications were used in this study. Vector Auto Regression has been used including causality analysis, and Gregory-Hansen co-integration, for estimating a long-run relationship in sectoral growth. According to the findings, Agriculture sector growth depends highly on service sector growth but not on industry sector growth. Both the industry and service sectors are interdependent on agriculture sector growth, performing as a driving factor of the economic growth of the country and the policy impact to increase agricultural growth is minimal in Sri Lanka, even after open economic scenario, or at different policy adjustments. In this study it has not investigated the effect of each sector to GDP and mainly focused to examine the relationship among sectors.

Examining the relationship between all sectors and between those sectors and GDP, Handapangoda (2010) has done an investigation under the topic of Interrelationship among the Sectoral Contributions of Agricultural, Industrial and Service Sectors to GDP in Sri Lanka. In this research time series data were used from 1970 to 2006. The key components of the analysis included the estimation of VAR, generalized impulse response functions, variance decomposition and the Granger causality test. The study has found that any positive growth in the services sector generated positive impacts in the agriculture and industry sectors, because of a spill over link of the latter with the services. The analysis further found that the industrial sector of Sri Lanka is of key importance in determining the volume of GDP, and directly contributes to enrichment of the services sector in the economy. Finally, the agricultural sector is not productive enough to generate spillover effects to the other sectors of the economy. Hence, the study has recommended implementation of remedial policy actions to enhance agricultural sector productivity in the Sri Lankan economy. In this study recent data has not been used for the analysis and there is 15 years of gap to the present (2021).

George and Ibiok (2015) examined sectoral contributions to Nigerian gross domestic product using a VAR and Granger causality tests. Quarterly data from 1981-2010 was used in their study. Unit Root test approach was employed to check the stationarity of series. The result has shown bilateral causality between industrial sector and GDP. The unrestricted VAR also suggest that there is a significant and positive relationship between industrial sector and GDP. The authors recommend that the Nigerian government should come up with a strategic plan to diversify their economy using the Agriculture and services sectors since the Nigerian economy only depends on industrial sector to GDP. Chandio (2016) studied the agricultural sub-sectors performance focusing on the agricultural sub-sectors performance to

agricultural GDP in Pakistan by using secondary data from 1998 to 2015. Ordinary Least Square (OLS) method and econometric model was applied to estimate the model parameters. The empirical results indicate that agricultural sub-sectors contribute positively and significantly in the agriculture GDP. The results suggest that the Government of Pakistan should make some intervention in the agricultural sub-sectors by introducing innovative agriculture technologies that could improve the sub-sectors share in the overall agriculture GDP.

Myrdal (1897) demonstrates that 'Agriculture is a panacea for economic growth'. However, he explains that economic prosperity has been the subject of debates among economists and development scholars. Sertoglu, Ugural and Bekun (2017) investigated the contribution of the agriculture sector on economic growth using time series data of 32 years in Nigeria. Unit root test and Cointegration test were used in their analysis of data. They found that agricultural sector and its output had a positive impact on economic growth in the country. They recommended to embark on diversification and enhance more allocation to agricultural sector budgeting in order to improve this sector and contribute more to the economy. Nevertheless, the service sector has completely ignored in this study which might be badly affected to the research output.

Highlighting the importance of the agricultural sector to an economy, Hussain and Khan (2011) examined the relationship between agriculture sector and GDP growth rates in Pakistan using an econometric analysis for the period 1961 – 2007. A linear growth equation was specified by them and employed Ordinary least squares estimation (OLS) technique for the data analysis. The dependent variable was GDP growth rate and independent variable was agriculture growth rate measured as agriculture growth rate % at factor cost in Pakistan. The key finding was growth rate. They identified a positive correlation between agriculture growth rate and GDP growth rate. A one percent increase in the agriculture rate brings about 0.34% increase in GDP growth rate. They concluded that the government of Pakistan should make structural changes in the agricultural sector so as to ensure that agriculture leads overall growth in Pakistan.

Enu et al., (2013) used OLS and time series data to examine the contributions of the agricultural, service and industrial sectors to economic growth in Ghana. They found that increase in agriculture sector, Service sector and industrial sector growth by 1%, GDP growth increases respectively by 0.452849%, 0.376308% and 0.1827%. This indicates that increasing the agriculture sector growth contributes the highest GDP growth potential. Accordingly, the researchers recommend that activating/strengthening the agricultural sector will promote growth in the Ghanaian economy. Dasgupta

and Singh (2005) investigated that will service be the new engine of Economic Growth in India? Six different kinds of simple linear growth equations were estimated by them to achieve above objective. They found that all equations indicated higher correlation between sectoral and overall growth. Unfortunately, only four of those equations relating to manufacturing and services respectively satisfactorily passed the various diagnostic tests. More importantly, the estimated beta coefficient for manufacturing was less than one as Kaldor (1966) had suggested and those for services were however greater than one. They also found that agricultural rates were highly correlated with GDP growth, but the correlation was not as high as that of manufacturing. Although it has been revealed that the agricultural sector sometimes does not have much impact on economic growth, at other times it has made a very significant contribution to economic growth.

Although the majority of the above studies used time series data, Linden and Mahmood (2007) studied the long run relationship between sectors' share and economic growth using panel data of Schengen region from the period 1970 to 2004. The production function was employed this study. Panel data contains more information, more variability, and more efficiency than pure time series data or cross-sectional data and panel data can detect and measure statistical effects that pure time series or cross-sectional data cannot. In their dynamic panel data model, panel cointegration and error correction model was adapted to estimate the parameter. Further, they conducted Granger causality test in panel setting to examine the causality relationship. The dependent variable was GDP per capita growth rate and the independent variables were agriculture share as a percentage of GDP; industry share as a percentage of GDP and service share as a percentage of GDP. They found out that shocks in industry sector share cause turbulence in sector share relationships which slowly correct to equilibrium. Their results of Granger causality test suggested that a unidirectional causality runs from the growth of GDP per capita to agriculture share growth, but a two-way causality runs between industry share growth and growth rate of GDP per capita. The relationship between services share growth and growth rate of GDP per capita was also bi-directional. They concluded that feedback impacts were found between sector shares and the growth rate of GDP per capita. Also the link between GDP per capita growth rate, service, and agriculture shares are complex but industry sector is still the engine of economic growth.

Further highlighting the importance of the industrial sector in relation to the economy, Adediran and Obasan (2010) investigated the role of industrial sector in the economic development of Nigeria. They used an endogenous growth model and Ordinary Least Squares (OLS) technique to analyze the data. The dependent variable of this model was real gross domestic product and the independent variable plus other exogenous variables were

manufacturing output as a proxy for industrial sector, exchange rate, inflation rate, interest rate and government expenditure. Their results showed that there is a positive relationship between the endogenous variable and all the exogenous variables except for exchange rate and government expenditure. The study also indicated that in countries where industrialization is given a primary place, it acts as a catalyst to economic development process. They suggested that there is a need for cooperation between the manufacturing sector and research institutes with a view to making R&D activities more demand driven. Also, there is the need for Nigeria to engineer infrastructure in order to facilitate the local production of machinery and equipment to strengthen the industrial development and so on.

Krishnadutt and Younglee (1993) regressed the growth rate of GDP on share of services in employment. They found a negative and significant coefficient suggesting that relative increase of the services' share in employment is associated with a decline in the output growth rate. Also Kaldor (1966) found a positive and statistically significant correlation between the rate of growth of the manufacturing sector and rate of growth of output. Ahungwa et al., (2014) examined the pattern and contribution of agriculture to the Gross Domestic Product (GDP) of Nigeria within a time frame of 53 years (1960-2012). The results suggest that the share of agriculture to the total GDP had a downward trend, yet maintaining a clear dominance over other sectors from 1960-1975. Further analysis depicted an undulating trend, intertwining with the industrial sector from 1976-1989. The regression results showed that agriculture sector has a positive relationship with GDP and contributes significantly with a coefficient of 0.664, implying that one percentage increase in agriculture output can increase the GDP by 66.4 percent.

Obson and Adediran. (2010) investigated the role of the industrial sector in Nigeria's economic development. The intrinsic growth model was employed and the average minimum variety assessment method is adapted to the analysis. The real GDP, industrial output, exchange rate, inflation rate, interest rate and government spending are employed as the variable of this study. The results showed that there was a positive correlation between the endocrine variable and all external variables except the exchange rate and government spending. The study shows that in countries where industrialization is a priority, it acts as a catalyst for economic development. They suggested that there was a need for cooperation between the manufacturing sector and research institutes to increase research and development activities. Also, there is a need for Nigeria to design infrastructure to facilitate the production of local machinery and equipment to strengthen industrial development.

From the above, it can conclude that the various sectors (agriculture, industry and service) of an economy influence economic growth and development in one way or the other. There are some relationships among the sectors and because of that one sector can be affected by another sector. Considering the conducted studies about sectoral contribution to the GDP so far, can draw the theoretical basis to investigate the sectoral contribution to the GDP in Sri Lanka. If it is possible to identify the relationship among sectors and between sectors and GDP in Sri Lanka it can be used for the policy implementation for economic growth. Few studies were done to investigate the sectoral contribution to the Sri Lankan GDP, but some of them have not used long time period data as well as some of them have only concerned about few sector in the economy. An empirical analysis of the impact of sectoral growth on Sri Lanka's economic growth has not been adequately studied, as has been studied in Pakistan, Nigeria and some other countries. Furthermore, the need for such a study is revealed by the literature review.

3. METHODOLOGY

3.1 Background

To identify the transformative change in the contribution of agriculture, industry and services sectors to gross domestic production, many scholars have paid different methodological, time period and country specific attention. This chapter describes the data, the variables used, as well as the methods used in this study to analyze the data.

3.2 Data and Sources

This study uses secondary data of Sri Lanka over the period 1980 – 2019 covering fifty-nine years data. Growth rates of the agricultural, industrial and service sectors and growth rate of the GDP are used as the variable of this study. All data of variables are extracted from the Central Bank of Sri Lanka annual report.

3.3 Model Framework

The Ordinary Least squared (OLS) method is used to examine the role of agricultural, industrial and service sectors on GDP in Sri Lanka. Also used Gross domestic capital formation growth as a controlled variable

Based on the existing studies, we constructed the regression model as follow:

$$\mathbf{GDPG_t = \beta_0 + \beta_1 A_{t-1} + \beta_2 I_{t-1} + \beta_3 S_{t-1} + \beta_4 GDPG_{t-1} + CF_t + u_t} \quad (1)$$

Where, GDPG: GDP growth rate which is the dependent variable, independent variables are A_{t-1}: Valid lag variables of growth rates of

agriculture sector, I_{t-1}: Valid lag variables of growth rates of industrial sector, S_{t-1}: Valid lag variables of growth rates of services sector, $GDPG_{t-1}$:Valid lag variables of GDP growth rate , CF_t:Growth rate of Gross domestic capital formation and u is white noise error term. All the variables are used in growth rate.

3.4 Econometrics Methods

Before estimating equation (1), we need to check the stationary property of each series. To that aim, we used Augmented Dickey-Fuller (ADF) unit root approaches. Since all variables included in the model are stationary in level, we used OLS method to estimate the equation (1).

Further, we employed Pairwise Granger causality test to find out the causality relationship between the variables. The model is formed as below:

$$\mathbf{GDPG_t} = \boldsymbol{\alpha_0} + \sum_{\mathbf{i=1}}^{\mathbf{p}} \boldsymbol{\pi_i} \mathbf{GDPG_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{p}} \boldsymbol{\beta_i} \Delta \mathbf{AG_{t-i}} + \mathbf{u_t} \quad (2)$$

$$\mathbf{AG_t} = \boldsymbol{a_t} + \sum_{\mathbf{i=1}}^{\mathbf{p}} \boldsymbol{\theta_i} \mathbf{GDPG_{t-i}} + \sum_{\mathbf{i=1}}^{\mathbf{p}} \boldsymbol{\sigma_i} \mathbf{AG_{t-i}} + \boldsymbol{u_t} \quad (3)$$

Using either F-test or Chi squared distribution; we will test the following hypothesis: for equation (2): H_0: growth rate of agriculture does not granger causes GDP growth rate and for equation (3): H_0: GDP growth rate does not granger causes growth rate of agriculture. We will reject H_0, when test statistic greater than the critical value and conclude that growth rate of agriculture granger causes GDP growth rate in equation (2) that is $\sum_{i=1}^{p} \beta_i$ is jointly significant in equation (3). And GDP growth rate granger causes growth rate of agriculture in equation (2), that is $\sum_{i=1}^{p} \theta_i$ is jointly significant in equation (3). If both of these parameters are not significant then no causality exists between these two variables. Likewise, we can do the test for all other variables that included in the model.

Before estimating the Granger causality test, we need to choose appropriate lag length that can be included in the model. Because, the underlying theory and any hypothesized structure indicate to the economist which variable to include in the model and how many lags would be appropriate. Therefore, the method of determining the appropriate lag length is still an important issue in the time series literature since longer lag lengths increase the number of estimated parameters, reduce degrees of freedom and increase data requirements. There have been several methods proposed to deal with the problem of correctly determining the proper lag length for time series model like Vector Autoregressive (VAR), Vector Error Correction Model (VECM) and Autoregressive Distributed Lag (ARDL) etc. Those methods are Likelihood ratio (LR) statistics, Akaike Information Criterion (AIC), Swartz

Information Criterion (SC), Hannan-Quin Information Criterion (HQIC) and Final Prediction Error (FPE). Thus, we will adopt either one or more of these criterions in our analysis according to our results and the requirements. EViews 10 and Excel 2013 are used to analyze the data.

4. RESULT AND DISCUSSION

4.1 Unit root test

A test of stationarity or non-stationarity becomes popular among the researchers when we are dealing with macroeconomic variables. It is crucial to test the stationary of the variables for the accuracy of the study. The order of integration is confirmed using the ADF unit root test approaches. The results of this approach are reported in Table 4.1.

Table 1: Results of ADF Unit Root Test

Variables	ADF Test (Level)	
	t-statistic	P-value
Growth rate of GDP	-6.065	0.000*
Valid lag variables of growth rates of agriculture sector	-5.562	0.000*
Valid lag variables of growth rates of industrial sector	-3.312	0.001*
Valid lag variables of growth rates of services sector	-4.412	0.001*
Growth Gross domestic capital formation	-3.470	0.002*

Note: Significant Level * p<1%, ** p<5%, *** p<10%

ADF test confirmed that all variables are stationary at their level form at 1% level of significance as the probability value of each series is less than 0.01. Since all variables are stationary at level form, we can estimate the equation by Ordinary Least squares (OLS) method. The results of OLS method are given below:

4.2 OLS Estimation

Table 2: Results of OLS (Dependent Variable: GDP Growth Rate)

$GDPG_t$	Coefficient	Standard Err.	t-value	P>|t|
$GDPG_{t-1}$	0.2830	0.1428	1.9811	0.0568***
A_{t-1}	-0.2335	0.1255	-1.8604	0.0726***
I_{t-1}	0.1578	0.1598	-0.9873	0.0314**
S_{t-1}	0.4349	0.2281	1.9063	0.0022*
Cf_t	2.6555	2.1183	1.2535	0.2197
_Con	0.072997	1.1314	0.0645	0.9490
Number of obs. = 39			F - Value = 15.62918	
Prob > F = 0.0000			R- squared = 0.80643	

The economic growth rate of a particular year may be determined by the economic growth rates of the previous years but in this case does not have significant impact on economic growth at 1% or 5% level of significance. Moreover, the growth rate of Agricultural sector does not have significance impact on economic growth at 1% or 5% level of significance. Both variables are significant at 10% level of significance but it does not contribute to the GDP. However, the growth rate of Industry and Service sectors have positive and statistically significant impact on economic growth at 5% level of significant. Service sector contribute largely followed by industrial sector to the GDP. That is, one percent increase in service sector output tend to increase the GDP growth rate by 0.434% while GDP growth rate rises by 0.157% as one percent increase in industrial growth rate. Growth Gross domestic capital formation does not have significant impact on economic growth at any level of significance.

The R2 value is 0.80, which explain around 80% of the variation in GDP growth rate was explained by the growth rate of agricultural, industrial and service sectors Also, the F –statistics confirmed the overall significance of the model. These two measures suggest the goodness of fit of the selected model.

The Wald tests for the regression model which is explained sectoral contribution to the GDP,

$$\mathbf{GDPG_t = \beta_0 + \beta_1 AG_t + \beta_2 IG_t + \beta_3 SG_t + u_t}$$

Here β_1, β_2 and β_3 are denote growth rate of Agriculture Sector growth rate, Industry sector growth rate and Service sector growth rate respectively. The hypothesis of constant returns to scale is then tested by the restriction: $\beta_1 + \beta_2 + \beta_3 = 1$

According to table 2, Results of OLS Shows that the sum of the coefficients appears to be in excess of one, but to determine whether the difference is statistically relevant, should conduct the hypothesis test of constant returns. Also we have to check the following to show the validity of the model

$$\boldsymbol{\beta_1 = \beta_2}, \quad \boldsymbol{\beta_1 = \beta_3}, \quad \boldsymbol{\beta_2 = \beta_3}$$

Even though E-Views reports provides an *F*-statistic and a Chi-square statistic with associated *p*-values here we consider the Chi-square and its *p*-values.

Table 3: Results of Wald test

Null Hypothesis	Test Statistic		Results
	Chi-square	P-value	
C(1)+C(2)+C(3)=1	0.814	0.366	Reject
C(1) = C(2)	4.997	0.025	Accept
C(1) = C(3)	19.734	0.000	Accept
C(2) = C(3)	3.941	0.047	Accept

4.3 Granger Causality Test Results

For the Granger causality model, we used 1 lags as an optimal lag that can be included in the model based on AIC (see the appendix for the results). The results of Granger causality test is given below:

Table 4: Results of Granger Causality Test

Dependent Variables: GDPG		
Hypothesis	**F- Statistics**	**P-Value**
AG does not Granger causes GDPG	1.796	0.169
IG does not Granger causes GDPG	1.996	0.135
SG does not Granger causes GDPG	11.016	0.029**

Note: Significant Level * p<1%, ** p<5% , *** p<10%

Above results depict that Agriculture and Industrial sector do not granger cause GDPG whereas, service sector causes GDPG. Indicating that service sector influence the economic growth greatly than the other two sectors.

Table 5: Results of Granger Causality Test

Hypothesis	F- Statistics	P-Value
GDPG does not Granger causes AG	0.6414	0.5944

Note: Significant Level * p<1%, ** p<5%, *** p<10%

Above results implies that GDPG sector do not granger cause AG.

5. CONCLUSION WITH POLICY IMPLICATIONS

5.1 Conclusion

From the result of the analysis it has identified that the contribution of service sector to GDP is a major driving force in sectoral growth of Sri Lanka even though it is an agriculture based country. According to the OLS estimation, the growth rate of industrial and service sectors has contributed more to the GDP than the growth rate of agricultural sector. It means that the highest contribution is provided by the service sector and the Industrial sector and the lowest contribution given by Agricultural sector. The economic growth rate of a particular year does not have contributed a large impact on economic growth. According to the results, the Growth Gross domestic capital formation does not have contributed to economic growth at any level.

According to the Granger Causality test, it could be seen that the agricultural sector and industrial sector do not granger cause on GDP while the Service Sector granger cause on GDP. This implies a deep mutual linkage between the Service sector and GDP, which confirms that Sri Lankan economy highly depends on the sectoral contribution of Service based on the analysis. Despite the fact that sectorial contributions of Service are the driving force of the Sri Lankan economy a lot still needs to be done in this area.

According to the Rowstow's growth model, when an economy moves through the stages (Expanding the economy) the contribution of the agricultural sector to the GDP decreases and the Industrial sector contribution to the GDP increases. But the recent development experiences show that the Service sector has taken the position of industrial sector when moving through the economic stages. According to the analysis it is possible to identify this nature in Sri Lanka too.

5.2 Policy Implication

The analysis shows that the service sector is the leading sector in Sri Lankan economy. But recently the Sri Lankan government has taken actions to strengthen the Agricultural sector as well as some times industrial sector. But we cannot identify a considerable effort taken by government to strengthen or to expand the Service sector. To achieve a higher GDP growth rate it is really essential to consider Strengthening the service sector too.

When considering about the natural resources that belong to Sri Lanka, it is really rich country in that way. But still a huge portion of resources is being exported as raw materials or very lowly value added products and on the other hand industrial sector contribution to the GDP is not in a favorable situation although it contributes to GDP growth more than agricultural sector. Thus it is really essential to implement new policies to re-structure the Industrial sector to perform efficiently.

Diminishing the Agriculture sector is maybe good for economic growth. But when considering another dimension, it can see that many developed countries are moving to an agricultural protectionism to keep their independence. Currently, Sri Lankan government has taken many actions to protect and expand the agriculture sector and need to continue it.

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