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# The Impact of Savings in Economic Growth: An Empirical Study Based on Botswana

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## ABSTRACT

The purpose of this paper is to investigate the role of savings in Economic growth in Botswana. Botswana is one of the most successful resource-rich countries in the world. The study applied the Harrod –Domar growth model to the Economy of Botswana. In this study test is based on Auto Regressive Distributed Lagged (ARDL) model by Pesaran, Shin and Smith (1999) to check the existence of a long run relationship between Gross Domestic Product and Gross Domestic savings in Botswana. This study further used DOLS approach in order to identify dynamic long run co integration between GDP and its independent variables. The study tested the stationarity and co integration of Botswana's time series data for the period of 1980 to 2013. The test found out that there is significant relationship between Savings and Economic growth and the study supported Harrod Domar growth Model. Policies are suggested to accelerate Economic growth in the country.

**Keywords:** Savings, Economic Growth, Botswana, ARDL, DOLS, & Harrod Domar.

## INTRODUCTION

The Economic growth of a country can be referred to as the economy's capacity to increase the productivity of services and goods in comparison with previous time period (Finance map of world, 2013). Savings has long been considered as an engine for economic growth. A study has been conducted in China (Chow, 1993) evidenced that countries that had made sustained accumulation of fixed capital have been able to achieve higher and sustained economic growth and development than other countries. The accumulation of fixed capital can only be possible through sufficient savings. Developing countries are always constrained by inadequate savings and investment, for instance economic development in Sub-Saharan Africa has been constrained by inadequate savings and investment, (Wollasa. L.Kumo, 2011), This is one of the reasons behind Africa is still known as "the world's poorest continent" (Gimbari, June 2, 2002)

Savings creates capital formation and it further leads to technical innovation and progress which helps with the economies of large-scale production and increases specialization, which helps to accelerate the productivity of labour, it further resulting increased GDP. Thus savings leads to fuller utilization of available scarce resources in an efficient way, increase in the size of national output, income and employment, thereby solving the problems of inflation, unemployment and balance of payment, poverty, inequality; and making the economy free from the burden of foreign debt and leads to state of better welfare. The vicious circles of poverty in developing countries can also be broken through sufficient savings, and it is the main key to economic development as well. Additionally, it is notable that the slow rate of development in third world countries are usually attributed to the low levels of national savings, that constraint their capacity to invest in capital formation. This leads to lower level of economic growth and development than other countries that contribute enough savings. So saving is usually considered as the main source of economic growth. Previous studies especially

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Loayaza (2002) considered that on average Sub-Saharan Africa saves less than 15 percent, while East Asia saves more than 30 percent of Gross National Disposable Income (GNDI).

In this study we use Harrod Domar model to test the theory in the economy of Botswana. Harrold Domar model is suitable model to be used to show such relationship because the theory describes the mechanism by which more savings leads to more economic growth because savings leads to investment and it leads to capital formation, which generates economic growth, so savings is most important factor for economy to grow and develop.

Roy Harrod (1939) and Evsey Domar ( 1946) suggested that if a developing country wants to achieve economic growth, the government in that country need to encourage savings. The framework for economic growth given by Harrod and Domar, has been an important influence to government policies in some other developing countries. There for the main objective of this paper is to examine whether there is any significant relationship between savings and economic growth in Botswana.

The model shows mathematically that growth is directly related to savings.

Let **Y** represent output, which equals income, **s** is the savings rate, and. ***k*** stands for capital output ratio, and by using these variables we can construct the following model of economic growth.

$$G = (\Delta Y/Y) = (s / k) \quad (1)$$

$$\Delta Y / Y = s / k \cdots \cdots \cdots \cdots (2)$$

Increasing the savings rate will increase the growth rate of output; these are the means to achieve growth in the Harrod–Domar model. Its implications were that capital formation depends on the level of Savings, which generates economic growth. Less economically developed countries do not have sufficient incomes to enable high rates of saving, and therefore accumulation of the capital stock through investment is low. The model implies that economic growth depends on policies to increase investment, by increasing saving, and using that investment more efficiently through technological advances.

## Objective of the Study

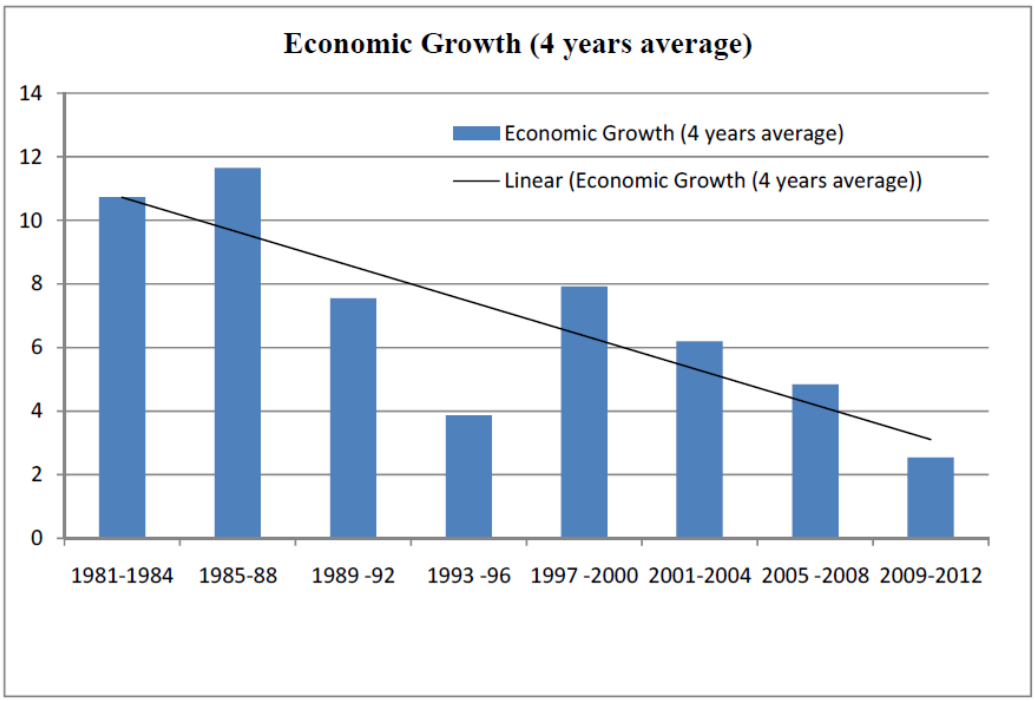
1. To investigate the significant relationship between savings and growth in Botswana
2. To test the Harrold- Domar model in the economy of Botswana

## Background of Botswana Economy

Botswana is one of the countries in Sub-Saharan Africa and it is landlocked country situated in the Center of southern Africa, sharing borders with South Africa, Namibia, Zimbabwe and Zambia. With a population of around 2 million, Botswana was one of the poorest countries in the world at the time of independence in 1966 (Second Common Country Assessment for Botswana, 2007). It has grown rapidly over the past forty years, and has been transformed from a low-income to an upper-middle income country within three decades. Diamonds has been the basis of Botswana's economy, which has driven very high rates of economic growth. Gross Domestic Product per capita more than doubled, at current prices, from 3203 US dollars (USD) in 2000 to USD 6877 in 2008 but slipped to USD 5822 in 2009, reflecting the impact of the global slump on demand for diamonds and other minerals again 2012 it increased to 8680 US dollars (African Economic Outlook, 2011). Despite the impressive progress in per capita income at current prices, rates of poverty ( 30.3 % in 2003), unemployment (17.80 % in 2010), inflation ( 7.6 % in 2012 )and inequality is still high (Gini index 63 in 1993) in Botswana. Income distribution is very unequal, with the richest 20% of households

earning around 70% of total household income (Jefferis, 2011). Growth performance of Botswana heavily depends on the diamond sector. Botswana's over dependence on diamond exports is a challenge for sustainable economic growth. In addition to these challenges Botswana's growth rate has also been deteriorating over a long period of time.

**Table1.**




**Source:** *World Bank, World Trade Indicators 2013*

Although in 1988 and 1989 GDS was very high, compared to the following years it was 50 % in 1988 and 49 % in 1989, after that it started to decline especially during the period of 2008 to 2013. For example the Gross Domestic Savings as a percentage of GDP was 29% in 2008, which became 20% in 2009. During the same period GDP also deteriorated from 3% in 2008 to -7 % in 2009 and all this time capital formation rate was also very low and it has fluctuated quiet sharply from year to year so it is clear that the deterioration in savings affects capital formation and it caused to low level of GDP also.

**Table2.**

| YEAR | GDP | GDS |
|---|---|---|
| 2005 | 4,55664575 | 44,492096 |
| 2006 | 7,95953106 | 44,079055 |
| 2007 | 8,68234066 | 44,719847 |
| 2008 | 3,90146671 | 29,628547 |
| 2009 | -7,84100187 | 20,533088 |
| 2010 | 8,59413556 | 24,944424 |
| 2011 | 6.18281988 | 31,461101 |
| 2012 | 4,31416573 | 23,247880 |
| 2013 | 5,82703081 | 29,092863 |

**Source:** *World Bank, World Trade Indicators 2013*

## Relevance of the Study

Botswana has been chosen as a case study for this paper. Despite its excellent economic performance, Botswana faces a number of serious development challenges of high rates of unemployment and high levels of poverty. 30.3% of the population (2003) lives below Poverty line (Central Intelligence

Agency, 2013). Unemployment was estimated at 17.8 0 % in 2010 and it was only 15.5 % in 2006 and it is closely connected to poverty. Inflation in 2012 is slightly higher than 2010, According to the database with World Bank it was 6.94 % in 2010, and 7.6 % in 2012. In addition to these major challenges Economic growth has also gradually trended downwards and the capital formation rate has dropped from 28% in 1998 to 18% in 2005, well below the vision target of 40% (Second Common Country Assessment for Botswana Final Report-2007). For sustainable development, Botswana has to diversify its growth opportunities and need to have huge investment to exploit the growth oppertunities. Since it is a landlocked country, for their trade it heavily depends on neighbouring countries and road transport. So investment for better infrastructure facilities and communication system is really important. In this situation huge and intensive effort is needed to accelerate investment in Botswana. Significant portion of that can be financed by domestic Savings.

## LITERATURE REVIEW

### Empirical Literature Review

A number of studies have been conducted so far to study the relationship between savings and economic growth in many developing countries, but most of them are connected to Latin American, Sub-Saharan and East Asian countries.

Lean H.H & Song. Y (2009) choose the whole country and 4 representative provinces as their sample to analyse the relationship between economic growth and savings in china by using Johansen cointegration and granger causality. The study found that there is bilateral causality exists between the household savings and economic growth in short run and in the long run unidirectional causality exist from the economic growth to savings growth. Liu and Guo (2002) investigated relationship between the GDP and savings using the quarterly data from 1990 to 2001 in china and found that GDP granger causes the household saving growth. Tang & Chau (2009) conducted a study based on the relationship between savings and growth in Malaysia by using nonparametric cointegration test and DOLS method. They found that savings and economic growth is cointegrated and positively related in the long run so the study indicates savings is an engine to economic growth through its impact on capital formation. In the case of Cambodia, Seng Sothan (2014) investigated the causality between domestic savings and economic growth. The study does not find any casualty runs from either GDS to Growth or Growth to GDS, so the study concluded that GDS and Economic growth are independent of each other in Cambodia.

Romm A.T (2005) used Johansen VECM estimation technique to study the relationship between Growth and Savings in South Africa. The study confirmed that private saving rate has direct as well as indirect effect on economic growth.

Olajide. S. Oladipo (2009) employed the Toda and Yamamoto methodology to analyse the direction of causal relationship between savings and economic growth in Nigeria between 1970 and 2006 the findings revealed that a unidirectional causality between savings and economic growth. But the result from the study was different from what others had been proved in this area, Nurudeen (2010) found out causality run from economic growth to saving, implying that economic growth proceeded and Granger causes saving. Adeleke AM (2014) revealed that there is bi-directional causality exists between Savings and Economic Growth in Nigeria. Bakare (2011) used OLS Multiple Regression analytical method in the economy of Nigeria to examine the relationship between capital formation and economic growth, the test proved that the growth rate of national income will positively related to savings and capital formation, so the study emphasised the need for the Government to encourage the Savings to promote sustainable growth in the economy.

The study by Festus. T. K (2011) found investment has a statistically significant positive impact on short run and long run economic growth in Namibia.

C Mphuka (2010) investigated the causality between savings and economic growth in Zambia using bivariate vector auto- regression (VAR) estimation procedure. The test indicated that economic growth granger cause savings, even though the article argues that savings may influence the economic growth indirectly, because the savings will cause to accumulate capital and to inject the technologies from developed countries, in fact the technologies are the key to the economic growth.

Robson Mandishekwa (2014) studied the casual relationship between investment and economic growth based on Zimbabwe, but the findings revealed that there is no causality from any direction between two variables. However the study does not deny any other relationship between the investment, savings and economic Growth.

Nicholas M Odhiambo (2008, 2009) conducted a study in Kenya in 2008 and another one in South Africa in 2009 to study the relationship between savings and economic growth in these two countries. They used causality and co-integration test to analyze the relationship between the variables and the study proved that there is a positive relationship between savings and economic growth.

Ibrahim A. E and Francis (2000) analyzed savings process in sub-Saharan Africa with the experiences of Kenya, Zimbabwe and Botswana, the study showed that in SSA causality runs from growth to the investment while savings granger causes the increase in Investment, the study also mentioned that Botswana is a country with lower private saving rate.

Anorou.E & Ahmad.Y (2001) investigated the relationship between savings and economic growth in 7 African countries, Congo, Cote d'ivoire, Ghana, Kenya, Nigeria, South Africa and Zambia using vector error correction model. The result indicated that there is a long run relationship between economic growth and saving. Also they found that savings granger causes growth in Congo and there is bi-directional causality in South Africa and Cote d'ivoirea.

Mohan (2006) addressed the relationship between domestic savings and economic growth for various economies with different income levels. The study used time series data on almost 20 countries with different income levels to investigate the relationship between the domestic savings and economic growth for various economies. Empirical results suggest that the economic growth rate Granger causes growth rate of savings in 13 countries. On the other hand the opposite results prevailed in two countries, Indonesia and Singapore, savings granger caused economic growth. In five countries, a bi-directional causation was found. In LICs the direction were mixed. In most of LMCs, the causality is from economic growth to savings growth. In all HICs except Singapore, the causality is from economic growth to growth of saving. Overall result shows that causality is from economic growth to domestic Savings; the main conclusion of the study is that income class of a country plays an important role in determining the direction of causality.

## Theoretical Literature Review

On the theoretical side, a number of researches have studied about the relationship between savings and Economic growth in Sub-Saharan African countries and East Asian countries.

Steven L and Nelson C.M (2011) Rick Harbaugh (2004) mentioned that China's high saving rate is the engine for its economic growth. Markin (2006) also reported that high level of saving and investment is always good for a country because it will accumulate the capital stock and hence increase the economic growth.

UNDP (2010), Botswana has high levels of income inequality, evidenced by a poverty rate that's about ten percent in cities and nearly four and a half times that in rural areas. Savings rate and investment are very low in Botswana compared to other developing countries.

Sache (2004) argued that law national savings rate in African countries leads to low or negative economic growth rates, further he suggested that a big push from public investment is needed to improve the productivity of the African countries.

Hugues Kamewe-Tsafack (2010) reported that low saving rate is hindrance to the economic growth and in sub-Saharan Africa, saving rate is very low compared to other developing countries and main reason for this low savings is the low interest rate and high inflation. These negative interest rates encourage people to invest their money in tangible goods instead of investing it in the productive financial sector.

Even though most of the researchers agree and argue for capital formation and this capital formation is mobilized in the form of savings so savings is an accelerating factor for economic growth, Keynes considered that to some extent savings are a constraint for economic growth (paradox of thrift) but Daniel L Thorton's study (2009) Provides the evidence that a higher savings rate does not mean less consumption, but it could result in more capital investment and ultimately, a higher rate of economic growth. However at the same time, he did not exclude the possibility that a higher savings rate can slow economic growth in the short run. But he believes that negative effect of higher saving rate on short run economic growth has been offset by the positive effect of other factors.

Krieckhaus, (2002,) stated that countries, characterized by less efficient capital markets, have ample dependency on domestic savings to finance their development projects.

The relevant literature generated a mixed view regarding the relationship between savings and Economic growth. Some of the researches explain that savings cause to economic growth; however some other certain works argue that economic growth granger causes savings. Different countries also have different effect of saving; income source of a country does play an important role in determining the direction of causality. In most developing countries, the economic growth Granger causes the private saving, where as in most developed countries the private savings leads to economic growth. However all the researches related to capital formation, savings, and economic growth agreed that savings has positive impact on economic growth, it can either be direct or an indirect way.

## METHODOLOGY

### Source of Data

Time series data on savings and economic growth covering the time period from 1980 to 2013 is used to analyse the relationship between the savings and economic growth in this paper. The secondary data is collected from World Bank Data and Bank of Botswana. The variables that are included in this paper are Gross Domestic Product, Gross Domestic Savings, Gross Capital Formation, Export, Inflation rate and labour force. This data are processed using E-views for windows econometric package.

### Model Specification

The model in this study used the original version of Harrod Domar model; it usually represents the following form.

$$G = (\Delta Y/y) = (s / k) \quad (1)$$

This equation shows positive relationship between National Income (Economic growth) and Savings rate. Equation one can be rewritten and extend with other variables that determines economic growth.

$$GDP = \Delta Y/y = f(GDS, GCF, EXPO, INFL, LBR) \quad (2)$$

Where:

GDP =Economic Growth, GDS= Gross Domestic Savings, GCF = Gross Capital Formation,

EXPO = Export, INFL = Inflation Rate. LBR = Labour Force.

Linear form of Equation 2 expressed as

$$GDP = \theta 0 + \theta 1\ GDS + \theta 2\ GCF + \theta 3\ EXPO + \theta 4\ INFL + \theta 5\ LBR \quad (3)$$

Econometrically, including random term, then the model will be expressed as:

$$GDP = \theta 0 + \theta 1\ GDS + \theta 2\ GCF + \theta 3\ EXPO + \theta 4\ INFL + \theta 5\ LBR + \mu t \quad (4)$$

Where $\mu t$ = Error Term.

### Estimation Technique

This empirical investigation consist of 3 main steps

1. Augmented Dickey Fuller Test
2. Auto Regressive Distribution Lag Test
3. Dynamic Ordinary Least Square (DOLS) estimation

## EMPIRICAL RESULTS AND INTERPRETATION

### Unit Root Test (Stationarity Test)

The variables Gross Domestic Savings, Gross Capital Formation, Export, Inflation rate, Labour Force and Economic growth (GDP) must be tested for stationarity before running the co- integration test. Augmented Dickey-Fuller Unit root test was applied to the data series. The results of the stationarity tests at level show that most of the variables are non-stationary; the next step is to difference the variables once in order to perform stationary tests on differenced variables. The results of the stationarity tests on differenced variables are presented in Tables 3.

**Table3.** *Augmented Dickey-Fuller Unit root test*

| | With intercept | | Without intercept | |
|---|---|---|---|---|
| Variables | Levels | Ist diff | Levels | Ist diff |
| GDP | -3.8680* | | -2.1890** | |
| GDS | -2.0154 | 4.9026* | -0.3242 | -4.9846* |
| GCF | -2.9162 | -5.9328* | -0.7214 | -6.0200* |
| EXPO | -1.9531* | -5.1516* | -0.2384 | -5.2514* |
| INFL | -3.0954 | | -1.5591 | -8.4747* |
| LBR | -5.6733 | | -0.6354 | -1.8815*** |

*Significance level at 1%, 5% and 10 % as *, ** and *** respectively*

Table 3 shows 3 out of 6 variables were stationary after first differencing with the specification that has intercept and the rest of the 3 variable were stationary at levels. The specification without intercept has 5 variables stationary after first differencing, one stationary at levels.

### Auto Regressive Distribution Lag Test (ARDL)

Unlike other cointegration tests, an ARDL bounds testing approach to cointegration do not require

same order of integration for all variables. However, since the bounds test is developed on basis that the variables are I(0) or I(1), prior to applying the bounds test procedure, the implementation of unit root tests might still be necessary in order to ensure that all the variables satisfy the underlying assumption. Moreover, ARDL cannot be used for I(2) variables. Hence, Augmented Dickey Fuller (ADF) test is applied to examine the order of integration.The unit root tests make sure that there is no I(2) variable. Therefore, an ARDL procedure of cointegration test can be applied for this study.

ARDL cointegration analysis Cointegration test is applied to examine the existence of some long run equilibrium relationship among variables included in the model. When variables are co integrated, it means, they do not drift too much apart and are tied together by some long run equilibrium relationships.

**Table4.** *ARDL Bound Test for Cointegration*

| Estimated equation | GDP =f(GDS,CPI,EXPO,INFL,LBR) | | | |
|---|---|---|---|---|
| Calculated value | | | | |
| F-statistic | 16.44040 | | | |
| Critical value | | | | |
| Significance level | Lower Bound | Upper Bound | | |
| 5% | 3.12 | 4.25 | | |
| 10% | 2.75 | 3.79 | | |
| Variables | Coefficient | Std. Error | t-Statistics | P-value |
| GDS | 0.143610 | 0.066333 | 2.164994 | 0.0736 |
| GCF | 0.420697 | 0.070708 | 5.949741 | 0.0010 |
| EXPO | 0.485753 | 0.132328 | 3.670827 | 0.0104 |
| INFL | 0.618996 | 0.257130 | 2.407324 | 0.0528 |
| LBR | -1.883680 | 1.501972 | -1.254138 | 0.2564 |
| C | 47.414892 | 81.324235 | 0.583035 | 0.5811 |
| @TREND | 0.906888 | 0.534953 | 1.695265 | 0.1410 |
| | | | | |
| **Diagnostic Tests** | | | | |
| R-Squared | 0.98 | | | |
| Adjusted R - squared | 0.91 | | | |
| Durbin – Watson stat | 2.35 | F-statistic | | P-value |
| J-B Normality | | 0.35 | | 0.84 |
| Breusch-Godfrey LM | | 1.7593 | | 0.184 |
| Breusch-Pagan-Godfrey | | 1.17 | | 0.457 |
| Ramsey RESET | | 3.397 | | 0.193 |

Table 4 shows ARDL bound test for cointegration. The model is specified in its original form where GDP is the dependent variable and GDS, GCF, EXPO INFL and LBR are independent variables. The test shows there was a long-run relationship between GDP with GDS, GCF, EXPO INFL and LBR at 5%, which was evident in calculated F-statistic of 16.44 greater than the upper bound critical value of 4.25 , there for reject the null hypothesis of no co integration, there by concludes that there was a long-run relationship between GDP and all the other variables.

Furthermore, the diagnostic tests presented in the table show that there is no evidence of diagnostic problem with the model. Measuring the explanatory power of the model by their adjusted R squared showing that 92 % of the variation in the GDP can be explained and the J-B Normality test (p-value = 0.84) entail that the variables in the ARDL model were normally distributed. The Breusch-Pagan-Godfrey shows the absence of Heteroskedasticity and no serial correlation with Breusch-Godfrey LM test.

The estimation results for the co integration model pointed out all the variables have positive influences on Gross Domestic product except labour force but it is insignificant. The overall measure

of capital formation and savings act as a major booster of output growth in Botswana, A 1% increase in these variables accelerate GDP by 0.42 % and 0.14 % respectively. The result supported the Harrod Domar model which proved that growth rate of income will directly or Positively be related to the savings ratio and the capital formation.

The result also got a positive relationship between economic growth and exports. This goes to confirm that exports are an injection of income in the economy and it is at its most significant level at 1 percent. Lastly, the result also find evidence that the inflation rate has a positive impact on Economic growth that supported Philip's curve which proved that a creeping inflation about 2% per annum stimulate economic growth.

### Dynamic Ordinary Least Square (DOLS)

**Table6.** *DOLS model with GDP as the dependent variable*

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDS | 0.243957 | 2.354824 | 2.354824 | 0.0430 |
| GCF | 0.860299 | 0.107543 | 7.999621 | 0.0000 |
| EXPO | 0.565286 | 0.207799 | 2.720357 | 0.0236 |
| INFL | 0.654145 | 0.420237 | 1.556608 | 0.1540 |
| LBR | -7.162941 | 2.194912 | -3.263429 | 0.0098 |
| C | 293.6961 | 120.5479 | 2.436344 | 0.0376 |
| @TREND | 2.886206 | 0.776890 | 3.715076 | 0.0048 |
| | | | | |
| R-squared | 0.899150 | Mean dependent var | | 6.435657 |
| Adjusted R-squared | 0.783894 | S.D. dependent var | | 4.907966 |
| S.E. of regression | 2.281577 | Sum squared resid | | 72.87832 |

In this study DOLS approach was also applied in order to identify dynamic long run cointegration between GDP and its independent variables, DOLS estimation shows that in the long run GDS stimulate GDP around 24 % and it's most significant at 5% level. GCF, EXPORT has 86% and 56% stimulation effect respectively with 1 percent significant level.

$R^2$ is about to 0.90, this indicates a good fit situation of the series. The value of the adjusted $R^2$ for the model is 78 % it implies that Savings, Capital formation Export and Inflation rate explained about 78% systematic variation on gross Domestic Product over the period of time in the economy of Botswana, while the remaining 22% variation is explained by other determinant outside the model.

## POLICY SUGGESTION

Policy makers should focus on increasing the level of domestic private savings because the crucial problem for developing countries are the lack of investments which restricts economic growth, and it will also serve to the problem of unemployment and poverty. The empirical result also shows that saving is the channel through which capital formation is transmitted to accelerate the economic growth in Botswana. The first policy implication of the study is that, efforts have to be made to raise the savings in a sustainable manner and should take appropriate strategy to divert savings in to productive Investment. The second policy suggestion is that government should take appropriate measurement to encourage export.

## SUMMARY

This paper uses data from 1980 to 2013 to find the relationship between gross domestic savings and economic growth in Botswana, Actually this study is motivated by poverty rate, inequality, unemployment rate, large decline in economic growth in Botswana. The paper reviewed the literature and found that Harrod-Domar model has scarcely been used to test the relationship between capital

formation and economic growth. The study used the ARDL technique to model GDP and second it used the DOLS model. The empirical study found that the data were stationary and co- integrated and showed that there is a significant relationship between savings and economic growth in Botswana. The results supported the Harrod-Domar model which proved that saving rate positively or directly related to the GDP. Policies have been identified to boost capital formation and savings to promote sustainable growth.

## CONCLUSION

The key point of this paper is that there is a significant relationship between Savings and economic growth in Botswana. The paper concludes however, that the Harrod-Domar model is applicable to the economy of Botswana. So the government should adopt an appropriate approach to encourage savings and foster economic growth.

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