Twin Deficit Hypothesis in Selected Low Income Countries

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PAPER INFO	ABSTRACT
	This study expressed the association between fiscal deficit and current account deficit in low income countries (LIC) by using the panel data for the period from 2000 to 2016. The augmented Dickey Fuller test is applied in order to show the co-integration between the variables. The study emphases to show the association between twin deficit hypotheses. The results of the models showed that relationship between Current Account Balances (CAB), Fiscal Deficit (FD), Real Effective Exchange Rate (REER), Gross Fixed Capital Formation (GFCF), GDP Per Capita Growth (GDPPCG) and Trade. The REER has negatively affects the CAB. However, FD, GFCF, GDPPCG and trade have positive effects on the CAB. From the policy prospective, in order to decrease the fiscal deficit, the authorities should extremely follow the policy measures that would be able to decline the current account deficit.

1. Introduction

Low income countries (LIC) are those countries whose GNI (Gross National Income) is less than $1,026 according to World Bank. GNI measures the country's income within country and abroad. GNI is the dollar value of a country's income which divided by its nation population. Its income is the summation of the value added by all domestic producers and product taxes not involved in the output valuation and income receipts from foreign countries. LIC countries are the poor economies and facing the poo health facilities, low life expectancy, unusual infant and morality rate and high illiteracy rate.

Many low income countries (LIC) are facing the problem of fiscal deficit and current account deficit. Fiscal Deficit defines as the difference between revenue and expenditure. Current Account Deficit defines as the difference between imports and export. Wambui (2016). The relationship between fiscal deficit and current account deficit is called twin deficit hypothesis. Wambui (2016). The low income economies are facing the twin deficit hypothesis for last few decades.

There are three major reasons of current account deficit which facing the low income countries. First, these countries import the producer goods as well as consumer goods. Second, these countries have facing the low savings rate and low exchange rate due to changing in the prices of commodities internationally, for instance due to change in rough oil prices largely affects the low income economies in the form of worsening the current account deficit. Third, these countries depend on internal loans and external loans which contribute to worsening the current account balance. Wambui (2016).

Reasons of large fiscal deficit in low income countries, budget deficit causes to increase government debt, which may lead to capital flight. Due to burden of debt, insufficient collection of taxes, heavy govt. spending on infrastructure leads to increase the recurrent fiscal deficit. Increases in the fiscal deficit make upward pressure on domestic interest rates. Nevertheless, govt. revenues remain less than planned expenditures because inappropriate tax collection policies, narrow tax base and corruption in revenue collection. Epaphra (2017).

The purpose of this study is to scrutinize the association among fiscal deficit and current account deficits in low income countries in order to make the suitable macro-economic plans. In other words, the purpose of the study is to test the accuracy of twin deficit hypothesis in these countries. Specifically, the objective of the study is to regulate the effect of fiscal deficit on the current account deficit, and the effect current account deficit to fiscal deficit in LIC. The general objective is to measure the communication among the fiscal deficit and current account deficit in LIC.

Following are the various objective of the study which is describes as under:

1. To determine the association among FD and CAD in the long run.

2. To determine the connection between FD and CAD in the short run.

3. To examine the link between FD and CAD in Low Income Countries.

2.   Review of Literature

Twin deficit hypothesis may be considered as one of the reason of every low income countries. Many researchers have tried to remove these deficits. In this portion we are going to discuss the empirical review of literature. The findings of these studies are mixed. Some researchers support the relationship between fiscal deficit and current account deficit and some rejected this relationship.

Aragaw (2021) examined the relationship twin deficit hypothesis and economic growth in selected African countries by given the data from 1988 to 2018. The researcher applied the granger causality and dynamic panel threshold test. The granger causality results shows no causality travelled from fiscal deficit to current account deficit and vice-a- versa. On the other hand, the dynamic panel threshold result shows that fiscal deficit is less than 0.152% and lower current account deficit growth enhancing.

Jackson and Jabbie (2020) explored the association the twin deficit hypothesis as an indication of government failure in Sierra Leone by given the data from 1980 to 2018. They applied the different econometrics techniques i.e. Fully Modified Ordinary Least Square, Granger causality and Wald Test. They pointed out that there is a positive relationship between current account deficit and fiscal deficit. The granger causality test expressed the strong and a unidirectional causality found among fiscal deficit and current account deficit.

Damalie and Daniel (2019) expressed the validity of the twin deficit hypothesis in the context of Uganda. They used the data from 1980 to 2017 by applying the Johansen cointegration, VECM and granger causality tests. The result of Johansen cointegration test indicates that there is long-run relationship found between variables. The empirical findings of VECM shows that budget deficit has negatively affects the current account deficit in short-run and long-run. However, the results of granger causality represents that there is a reverse causality travelled from current account deficit to fiscal deficit.

Epaphra (2017) explored the association among fiscal deficit and current account deficit for the Tanzania economy. This study used the data from 1966 to 2015 & collected the data from bank of Tanzania. He apply VEC and granger causality test & pointed out the positive association between fiscal deficit and current account deficit. The ganger causality test represents that the unidirectional relationship among fiscal deficit and current account deficit.

Imoh and Ikechukwu (2015) examined the twin deficits in Sub Saharan Africa by using the panel data from 1970 to 2013. They applied the Generalized Method of Moments econometrics techniques in order to estimate the relationship between fiscal deficit and current account deficit in the context of Sub Saharan Africa. They concluded that there is a perfect association between these two variables in sub Saharan Africa. The result of GMM shows that there is a positive effect of fiscal deficit on current account deficit.

Lwanga and Mawejje, (2014) expressed the relationship between budget deficit and other macroeconomics variables a case study of Uganda. They used time series data from 1999 to 2011 by applying the VAR-VECM techniques. This study shows that unsustainable fiscal deficit affect the public financial sectors of the economy of Uganda. They also pointed out that fiscal deficit is responsible for spreading the negative current account deficit and increase the interest rates in the context of Uganda.

Ekpenyong (2014) examined the twin deficit hypothesis as case study of Sub-Saharan Africa using the panel data from 1970 to 2010. Used the econometrics methodology Hausman and Granger causality tests and find out positive relationship between fiscal deficit and current account deficit. On the other hand, a unidirectional causality travelled from current account deficit to fiscal deficit with no feedback from budget deficit to current account deficit.

Bakarr (2014) explored the twin deficit hypothesis for Sierra Leone over the period of 1980 to 2012. This study collected the data from International Monetary Fund, International Financial Statistics. He applied the Bound Test, Granger Causality test & concluded that in long run, BD, real Gross Domestic Product and government unstableness have positive impact on CAD. While in short run BD and war dummy were the important variables which influencing CAD. The granger causality tests disclose that, unidirectional causality runs from BD to CAD and from CAD to real GDP, along with no judgment result.

Arize and Malindretos (2008) expressed the link between trade and fiscal deficit for the case of eight African economies over the data from 1973 to 2005. Applying granger causality tests on vector correction techniques and find out the positive long-run relationship between fiscal deficit and current account deficit. This study also finds out unidirectional causality running from current account deficit to budget deficit.

Egwaikhide et al. (2002) examined the twin deficit hypothesis covering the 16 African countries (including WAEMU economics) period from 1970–1999. They apply the OLS & granger causality tests in order to analyze co-relationship between two deficits. They found that the exists a positive and significance association between fiscal deficit and current account deficit for all economies except Mali, Guinea Bisau, Gambia, Cameroon and Cote d'Ivoire. The granger causality test shows that twin deficit hypothesis for Nigeria, Ghana, Burkina Faso and Benin & bilateral causality for Togo. In case of Kenya unilateral causality travelled from current account deficit to fiscal deficit.

This study tries to fulfill the gap between FD and CAD in the low income countries on the basis of controversy that exists in empirical literature review on Twin Deficit Hypothesis. After review the some research papers regarding the association between fiscal deficits and current account deficits there are the mixed effects between internal and external deficits. Different researcher used the different econometric techniques in order to investigate the relationship between these two variables and used different types of data. The purpose of this study is to provide further evidence on twin deficit hypothesis, particular in the context of low income countries.

3. Model, Data & Methodology

A reliable formation of statistic and methodology of foundation of variables are necessary for the accuracy of research analysis. Mostly, by employing authentic evaluation methods for the empirical investigation, accurate data sources are to be necessary. After analyzed the empirical studies of

different national and international researcher on twin deficit hypothesis, a number of research regarding the twin deficit hypothesis have been acknowledged to explain the relationship of twin deficit hypothesis along with the different macro-economic variables.

3.1 Model Specification

This section has an objective to evaluate the twin deficit hypothesis in the context of low income countries by applying the Panel data over the period from 2000 to 2016. The study tries to investigate the relationship between CAB, FD, REER, GFCF, GDPPCG and trade.

Model

$$CAB = f(FD, REER, GFCF, GDPPCG, TRADE) \tag{3.1}$$

The econometric form of the functional form can be expressed as:

$$CAB = \beta_0 + \beta_1 FD + \beta_2 REER + \beta_3 GFCF + \beta_4 GDPPCG + \beta_5 TRADE + \varepsilon \tag{3.2}$$

Where:

CAB   = Current Account Balance (% of GDP)

FD   = Fiscal Deficit (% of GDP)

REER = Real Effective Exchange Rate (index (2010 = 100))

GFCF = Gross Fixed Capital Formation (annual %)

GDPPCG = GDP per capita Growth (annual %)

Trade = Trade (% of GDP)

3.2 Data

Obtainability of trustworthy and sufficient data is the most important for the significant investigation. The soundness of consequences depends on adequate and reliable data. We have performed our extreme effort regarding the accumulation of trustworthy and sufficient data fixed for our study. The aims of this study are examined by using the panel data over the period from 2000 to 2016. Relevant data is collected from World Bank Indicator (WDI).

3.3 Methodology: Panel ARDL

In order to investigates the relationship between budget deficit and current account deficit we would apply the different econometric techniques. The first step we would apply the Augmented Dickey Fuller (ADF) test in order to check the stationarity of the variables. Secondly, we would apply the panel ARDL test to estimates the long run and short run relationship between dependent and independent variables.

4.   Econometrics Analysis

The statistically assessments the models and delivers the mathematical consequences by apply the different approaches and econometrics techniques. This portion is the most important part for analyzed the different econometrics test.

4.1 Descriptive Statistics Analysis

Descriptive statistics analysis the first part of the econometrics analysis which represents the summary of descriptive statistics of key variables. Data of all the variables accumulated from World Development Indicator (WDI) from 2000 to 2016.

Table 4.1

Descriptive Statistics of Key Variables for LIC (2000-2016)

	CAB	FD	REER	GFCF	GDPPCG	TRADE
Mean	-8.35	-0.04	112.67	21.33	1.60	65.83
Median	-7.08	-0.23	103.54	7.55	2.19	56.65
Maximum	12.14	20.73	827.17	2357.68	20.71	311.36
Minimum	-80.05	-21.66	67.07	-46.22	-31.34	25.04
Std. Dev.	10.99	5.55	62.04	161.41	4.53	38.02
Skewness	-2.61	0.43	8.66	14.09	-2.30	3.93
Kurtosis	14.74	5.53	91.61	204.17	20.82	22.81
Jarque-Bera	1493.08	64.46	73712.39	373089.70	3061.69	4107.75
Probability	0.00	0.00	0.00	0.00	0.00	0.00
Sum	-1811.51	-9.55	24449.55	4628.06	346.31	14285.29
Sum Sq. Dev.	26090.02	6660.21	831262.70	5627765.00	4434.45	312283.30
Observations	217.00	217.00	217.00	217.00	217.00	217.00

Table 4.1 represents the mean, median, maximum, minimum standard deviation, kurtosis and Jarque-Bera are etc. represents CAB, FD, REER, GFCF, GDPPCG and Trade in the columns 2, 3, 4, 5, 6, and 7 separately. On the average, CAB, FD, REER, GFCF, GDPPCG and Trade are -8.35, -0.04, 112.67, 21.33, 1.60 and 65.83 for Low income countries.

On the other side, following are the maximum and minimum value of Current Account Balance is stayed within 12.14 (Gambia) and -80.05 (Liberia) in low income countries over the period of 2000-2016.

Likewise fiscal deficit remained between 20.73 (Gambia) & -21.66 (Burkina Faso), real effective exchange rate 827.17 (Congo, Dem. Rep.) & 67.07 (Malawi), gross fixed capital formation 2357.68 (Sierra Leone) & -46.22 (Malawi, GDP per-capita growth 20.71 (Sierra Leone) & -31.34 (Liberia) and trade are remained between 311.36 (Liberia) & 25.04 (Congo, Dem. Rep.).

The value of the Kurtosis of all the variables (CAB, FD, REER, GFCF, GDPPCG and trade) in low income countries are leptokurtic.

4.2 Correlation Analysis

Correlation analysis represents the relationship between dependent and independent variables. Data of all the variables accumulated from World Development Indicator (WDI) from 2000 to 2016.

Table 4.2

Correlation Matrix of Key Variables for LIC (2000-2016)

	CAB	FD	REER	GFCF	GDPPCG	TRADE
CAB	1.00					
FD	-0.06	1.00				
REER	0.05	-0.11	1.00			
GFCF	-0.08	-0.05	0.01	1.00		
GDPPCG	0.02	-0.22	-0.12	0.06	1.00	
TRADE	-0.52	0.36	-0.06	-0.02	0.02	1.00

Table 4.2 represents the correlation matrix of key variables for low income countries over the period from 2000 to 2016. CAB has a positive correlation between REER and GDPPCG while there is a negative correlation among FD, GFCF and Trade. FD has a positive correlation with trade. Negative correlation found among REER, GFCF & GDPPCG. REER has a positive correlation with GFCF on the other hand there is a negative correlation between GDPPCG and Trade. GFCF has a positive correlation with GDPPCG. However, there is a negative correlation with Trade. GDPPCG has a positive correlation with the Trade. The Positive correlation is exists between Trade with FD, REER, GFCF and GDPPCG.

4.3 Panel Unit Root Tests

Panel unit root is the test in which we check the stationarity and order of integration of different economic variables used in this study. This study applies the three tests i.e. ADF (Augmented Dickey Fuller) test, LLC (Levin, Li and Chu) test and third one is IPS (Im Pesaran Shin). Augmented Dickey Fuller (ADF) is generally used to assessment the penal data. The ADF test used along with serial correlation & hold the higher compound set of time series techniques. ADF tests the null hypotheses of unit root or non-stationary against the alternative hypothesis of none of unit root or stationarity. The following Table 4.3 represents the panel unit root test of all the variables i.e. CAB, FD, REER, GFCF, GDPPCG and trade.

Table 4.3

Results of Panel Unit Root Tests

Variable	Method	I(0)		I(1)		Result
		Test Statistics	Probability	Test Statistics	Probability	
CAB	LLC Test	-2.26098	0.0119	-	-	I(0)
	IPS Test	-1.61474	0.0532	-	-	I(0)
	Fisher-ADF Chi-square	37.8183	0.0630	-	-	I(0)
	Fisher-PP Chi-square	40.1216	0.0380	-	-	I(0)

Table 4.3 (Continued)

FD	LLC Test	0.48415	0.6859	-4.07226	0.0000	I(1)
	IPS Test	0.34648	0.6355	-6.10465	0.0000	I(1)
	Fisher-ADF Chi-square	24.3185	0.5578	93.5129	0.0000	I(1)
	Fisher-PP Chi-square	43.0423	0.0191	175.350	0.0000	I(1)
REER	LLC Test	-3.64183	0.0001	-	-	I(0)
	IPS Test	-2.99857	0.0014	-	-	I(0)
	Fisher-ADF Chi-square	47.6301	0.0060	-	-	I(0)
	Fisher-PP Chi-square	38.7229	0.0518	-	-	I(0)
GFCF	LLC Test	2.35717	0.9908	-9.10681	0.0000	I(1)
	IPS Test	-6.17048	0.0000	-13.3173	0.0000	I(1)
	Fisher-ADF Chi-square	85.6043	0.0000	176.739	0.0000	I(1)
	Fisher-PP Chi-square	413.682	0.0000	291.656	0.0000	I(1)
GDPPCG	LLC Test	-5.26348	0.0000	-	-	I(0)
	IPS Test	-6.16572	0.0000	-	-	I(0)
	Fisher-ADF Chi-square	85.7533	0.0000	-	-	I(0)
	Fisher-PP Chi-square	163.245	0.0000	-	-	I(0)
TRADE	LLC Test	-2.41533	0.0079	-7.52117	0.0000	I(1)
	IPS Test	-1.77835	0.0377	-6.75537	0.0000	I(1)
	Fisher-ADF Chi-square	39.812	0.0407	93.9447	0.0000	I(1)
	Fisher-PP Chi-square	32.6247	0.1733	132.77	0.0000	I(1)

The results of the panel unit root tests are shows in table 4.3. According to the analysis through three different tests (ADF, LLC and IPS) some variables i.e. GDPPCG and REER are found stationary at level I(0). While on the other hand some variables i.e. FD, GFCF and Trade are found stationery at first difference I(1).

4.4 Long Run Analysis

The long run analysis represents the long run relationship between CAB dependent and FD, REER, GFCF, GDPPCG and trade variables. Table 4.4 long run ARDL estimates of twin deficit model. There are positive relationship between CAB and FD, GFCF, GDPPCG and trade except REER.

Table 4.4

Long Run ARDL Estimates of Twin Deficit Model

Dependent Variable: CAB				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Probability**
FD	0.7624	0.1288	5.9208	0.0000
REER	-0.0137	0.0046	-2.9934	0.0033
GFCF	0.0058	0.0184	0.3128	0.7550
GDPPCG	0.3678	0.1498	2.4545	0.0155
TRADE	0.0827	0.0215	3.8469	0.0002
C	0.3331	0.1268	2.6266	0.0093

Fiscal deficit is the first independent variables. The coefficient variable FD is positive and significant for low income countries. 1% increase in FD than 0.76 % CAB will increase for LIC, 5.09%. Possible reason of fiscal deficit is that if a rise in budget deficit as a result current account balance will also be increased. Our results are compatible with Anantha (2017), Damalie and Daniel (2019), Bakarr (2014); Tufail et al (2014), Chowdhury and Saleh (2007), Parikh and Rao (2006).

The second independent variable is real effective exchange rate. The coefficient variable REER is negative and significant for low income countries. 1% increase in REER than -0.01 % CAB will decrease for LIC. Our possible result is that there is a negative relationship between real effective exchange rate and current account deficit. An increase in real effective exchange rate will worsen the current account deficit. These results are supported by Tufail et al (2014), Iram et al. (2011), Even and Zubaidi (2006),

In against our results; Ramu (2017) finds out that an increase exchange rate leads to increase the current account balance. These finding also pointed out by Van Bon (2014) and Bakarr (2014), Tandon (2014), Parikh and Rao (2006).

The third independent variable is GFCF. The coefficient variable of GFCF is positive and significant for low income countries. 1% increase in GFCF than 0.005% CAB will increase for LIC. The possible result is that a raise in investment cause to increase in CAB. This result is supported by Ramu (2017), Chowdhury and Saleh (2007), Parikh and Rao (2006).

GDP per capital growth is the fourth independent variable. The coefficient variable GDPPCG is positive and significant for LIC. 1% increase in GDPPCG than 0.36% CAB will be increase for LIC. The possible result is that a rise in GDPCG as a result CAB will be increased. This result is also compatible with Bakarr (2014), Tufail et al (2014).

Last dependent variable is the trade. The coefficient variable Trade is positive and significant for LIC. 1% increase in Trade than 0.08 % CAB will increase for LIC. Trade is the most import tools to remove the external imbalances. Our possible result is that there is an increase in trade leads to an increased current account deficit. This result is compatible with Tufail et al (2014), Chowdhury and Saleh (2007).

In against our result Van Bon (2014) concluded that a negative relationship between trade and current account deficit.

4.5 Short Run Analysis

The short run analysis represents the short run relationship between CAB dependent and FD, REER, GFCF, GDPPCG and trade variables. Table 4.5 short run ARDL estimates of twin deficit model for LIC. In this model we will discuss the error correlation model (ECM). The main objective of ECM is

to examine the speed of adjustment. Error correction model shows that how quickly or gradually the variables are converting near to equilibrium. Negative value of error correction model presented statistically significant outcomes.

Table 4.5

Short Run ARDL Estimates of Twin Deficit Model

Dependent Variable: CAB				
Variable	Coefficient	Std. Error	t-Statistic	Probability
COINTEQ01	-0.6060	0.1250	-4.8475	0.0000
D(FD)	-0.3752	0.3005	-1.2488	0.2142
D(REER)	-0.0481	0.0630	-0.7629	0.4470
D(GFCF)	0.0357	0.0228	1.5674	0.1196
D(GDPPCG)	0.1351	0.1002	1.3482	0.1801
D(TRADE)	-0.0726	0.1381	-0.5258	0.6000
C	-0.0203	2.0701	-0.0098	0.9922

The Table 4.5 shows that the short run ARDL estimates for Low Income Countries. The dependent variable is current account balance (CAB). The dependent variable CAB in the prior-equation which represents in the above table 4.5 the value of ARDL Estimates of Twin Deficit Model for LIC is -0.6060. Equation for LIC -0.6060 shows that long-run equilibrium observed short-run shock which is corrected within six month.

5. Conclusions and Policy Recommendations

5.1 Conclusions

This study finds out the long run and short run association between FD and CAD over the period from 2000 to 2016 in the context of low income countries. The study also applies the different econometrics techniques to estimate the long-run and short-run association between CAD, FD REER, GFCF, GDPPCG and trade for low income countries.

FD has positively affects the current account deficit. Reduction in the internal and external deficits is mandatory for the economic growth. If a rise in govt. expenditure budget deficit will be increased. Govt. has no choice other than borrowing. Increase in borrow leads to fiscal deficit. If the govt. borrows increase as a result the market demand of loan and interest rate will be increased. A rise in market interest rate will decrease the private investment.

REER rate has negatively affects the current account deficit for LIC. Real effective exchange rate plays a very import role to explain the CAD. The currency value of low income countries is very low as compared to U.S dollar. Nominal exchange rate affects the current account deficit. If the real effective exchange rates fall, than mostly low income countries face the experience a decline in international price of export. Decrease the demand for exports will increase the value to exports as a result this will improve the current account deficit.

GFCF is positively affects CAD. National savings less than nation investment as a result current account deficit will be increased. For widening the economic growth and productivity is feasible with gross fixed capital formation.

The relationship between GDP per capita growth and current account deficit is also positive and significance for LIC. In these countries the low level of income leads to increase the current account balance. As a result due to low income leads to increase the imported goods and services and exports of goods and services decreases i.e. cause to increase the current account deficit.

Trade is the last independent variable which represents the relationship with current account deficit. Trade also positively affects the current account deficit for LIC. The imports are greater than exports in LIC therefore they faced the disequilibrium in trade. Due to this misbalance they faced the huge current account deficit.

5.2 Policy Recommendations

Following are the some recommendations regarding to reduce the huge current account deficit in low income countries.

- The recommendations to decrease the budget deficit are that govt. should spread the area of taxes, decrease the expenditures. In order to reduce the fiscal deficit the government should promote the economic growth. If a rise in economic growth as a result government tax will be increased in the shape of direct and indirect tax, corporation tax, income tax etc. High growth rate will decrease the fiscal deficit. If the fiscal deficit decrease current account deficit will also be decrease.

- The government should improve the exchange rate in order to remove the current account deficit. Due to devaluation of currency exports become cheaper and imports become expensive. The government should improve the value of currency by high interest rate, decline inflation, encourage the exports, discourage the imports, correct the balance of payment and favorable terms of trade etc.

- The government should increase the saving and investment in order to decrease the current account balance. In order to increase the savings and investment the government of low income countries should control the poverty, high birth rate, and high level of inflation. Government should also improve the infrastructure to encourage the saving and investment in the country.

- In order to increase the per capita growth govt. should increase the income level. If there is an increase in income leads of increase the capital inflows and precautionary saving while on the other hand decrease the imported goods and services leads of worsening the current account balance.

- The government should expand the value of exports at increasing their trades and boost the import substituted industry. By increasing the export and decreasing the import will enhance the domestic production, employment and earnings which as a result widening the export performance and worsening the imports volume. If above said strategies implemented in the better way it will decrease the fiscal deficits and improve the current account deficit in the country.

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APPENDIX: List of countries which data are taken from WDI.

Sr. No.	Country Name	Sr. No.	Country Name
1	Benin	8	Mali
2	Burkina Faso	9	Nepal
3	Congo, Dem. Rep.	10	Sierra Leone
4	Gambia, The	11	Tanzania
5	Liberia	12	Togo
6	Madagascar	13	Uganda
7	Malawi		