CHAPTER 4

Empirical Results

4.1 The Results of Unit Root Test

This study analyzed the effects of macroeconomics variables on Education, the author used the primary school enrolment rate and secondary enrolment rate as the proxies of human capital in Myanmar. In this paper, the author used the research methodology applied in this study are the unit root tests to determine the stationary level of the variables, Chow break point test to determine the structural change of the macroeconomic variables, the Autoregressive distributed lag (ARDL) Bound testing to test the long run co-integration of the variables and the Error Correction Model (ECM) to test the short run relationship of the variables. The author used the long-run diagnostic tests which are the Q-statistic test and the LM test to test the serial correlation, the heteroscedasticity test, normality test and finally the stability test that are the CUSUM and CUSUMSQ test to determine the stability of the model.

To test the stationary level of the dependent variable and the independent variables, the author tested the time series of the variables by using the Augmented Dicky-Fuller(ADF) test and Phillips-Perron(PP) test.

4.1.1 Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test

Firstly, Augmented Dickey-Fuller test is used to analyse the order of integration between the variables. The null hypothesis of the ADF test is that there is a unit root problem and the alternative is there is not unit root problem. If the data have the unit root problem, these time series data are not stationary. In order to conclude whether there is the unit root or not, the calculated test statistics and the critical value are compared. If the 5% critical value is greater than the calculated test statistics, the null hypothesis of the ADF test is failed to reject and also means that the time series

data are not stationary. And alternatively, if the 5% critical value is less than the calculated test statistics, the null hypothesis is rejected and these time series data are stationary. Table 4.1 shows the result of ADF test and PP test at level and 1st difference.

Table 0.1: Augmented Dickey-Fuller unit root tests and PP unit root test

	level	Deterministic Regressors	ADF test statistics	ADF 5% critical value	Results	PP test statistics	PP 5% critical value	Results
LNEDU_PRI	I(0)	Trend and intercept	-2.413379 (0.3652)	-3.580623	Non-stationary	-2.218575 (0.4628)	-3.568379	Non-stationary
		Intercept but no trend	-1.298665 (0.6170)	-2.963972	Non-stationary	-1.394249 (0.5717)	-2.963972	Non-stationary
	I(1)	Trend and intercept	-4.784666 (0.0004)***	-4.309824	Stationary	-4.964051 (0.0021)***	-3.574244	Stationary
		Intercept but no trend	-4.874183 (0.0005)***	-2.963972	Stationary	-4.849052 (0.0005)***	-2.963972	Stationary
LNEDU_ SEC	I(0)	Trend and intercept	-2.005863 (0.5747)	-3.568379	Non-statioanry	-2.010155 (0.5724)	-3.568379	Non-statioanry
		Intercept but no trend	-0.132128 (0.9368)	-2.963972	Non-stationary	-0.1394994 (0.9366)	-2.963972	Non-stationary
	I(1)	Trend and intercept	-5.013721 (0.0019)***	-4.309824	Stationary	-5.597434 (0.0005)***	-3.632896	Stationary
		Intercept but no trend	-5.104199 (0.0003)***	-2.963972	Stationary	-5.103785 (0.0003)***	-1.952910	Stationary
LNGDPPC	I(0)	Trend and intercept	-2.298847 (0.4214)	-3.574244	Non-stationary	-1.862276 (0.6487)	-3.568379	Non-stationary
		Intercept but no trend	-1.006468 (0.7369)	-2.971853	Non-stationary	-1.201047 (0.6607)	-3.670170	Non-stationary
	I(1)	Trend and intercept	-4.144543 (0.0150)**	-3.580623	Stationary	-6.395901 (0.0001)***	-3.574244	Stationary
		Intercept but no trend	-3.957214 (0.0052)***	-2.971853	Stationary	-5.400510 (0.0001)***	-3.679322	Stationary
LNPRI_TR	I(0)	Trend and intercept	-5.0340569 (0.0020) ***	-3.587527	Stationary	-2.390142 (0.3768)	-3.568379	Non-stationary
		Intercept but no trend	-2.453631 (0.1365)	-2.963972	Non-stationary	-2.931157 (0.05536)**	-3.670170	Stationary
	I(1)	Trend and intercept	-2.390557 (0.3760)	-3.580623	Non-stationary	-4.969026 (0.0021)***	-3.574244	Stationary

Table 4.1: Augmented Dickey-Fuller unit root tests and PP unit root test (Continued)

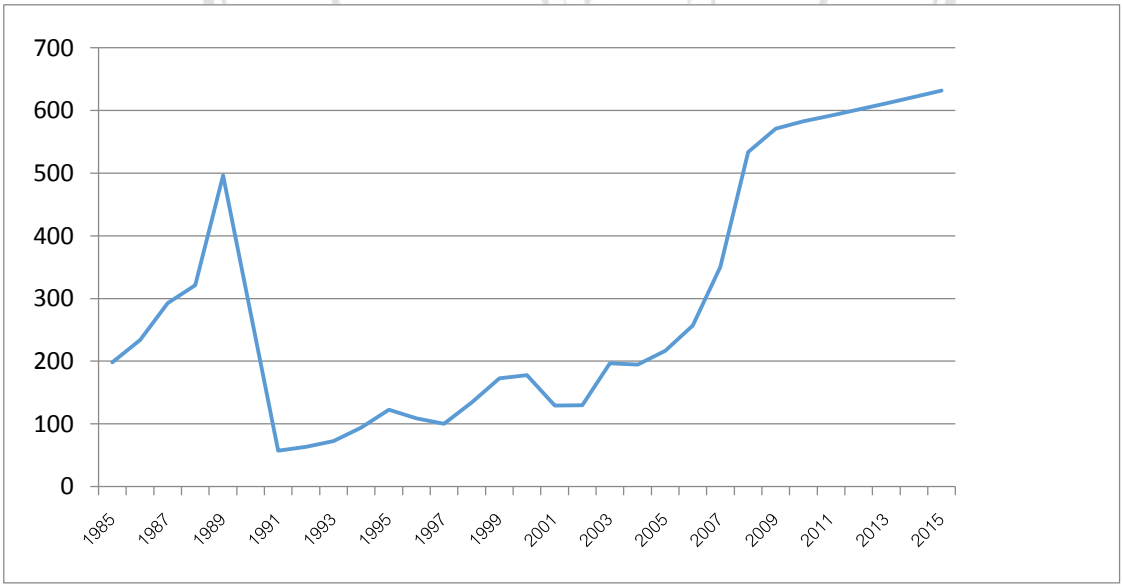
Variables	Level	Deterministic Regressors	ADF test statistics	ADF 5% critical value	Results	PP test statistics	PP 5% critical value	Results
LNSEC_TR	I(0)	Trend and intercept	-11.56946 (0.0000)***	-3.568379	Stationary	-8.657468 (0.0000)***	-3.568379	Stationary
		Intercept but no trend	-2.982762 (0.0480)***	-2.963972	Stationary	-2.951401 (0.0513)**	-3.670170	Stationary
LNEDUEX	I(0)	Trend and intercept	-0.197093 (0.9893)	-3.603202	Non-Stationary	-3.385052 (0.0725)*	-3.568379	Stationary
		Intercept but no trend	-1.630782 0.4527	-2.986225	Non-Stationary	-1.832858 (0.3581)	-3.670170	Non-stationary
	I(1)	Trend and intercept	-3.848590*** (0.0305)	-3.603202	Stationary	-12.30291 (0.0000)***	-3.574244	Stationary
		Intercept but no trend	-6.653245 0.0000***	-2.971853	Stationary	-11.70352 (0.0000)	-3.679322	Stationary
RGDP	I(0)	Trend and intercept	-2.325647 (0.4084)	-3.568379	Non-stationary	-2.269658 (0.4366)	-3.568379	Non-stationary
		Intercept but no trend	-2.298122 (0.1790)	-2.963972	Non-stationary	-2.213556 (0.2058)	-3.670170	Non-stationary
	I(1)	Trend and intercept	-6.794563 (0.0000)***	-3.574244	Stationary	-6.985145 (0.0000)***	-3.574244	Stationary
		Intercept but no trend	-6.863460 (0.0000)***	-2.967767	Stationary	-6.969872 (0.0000)***	-3.679322	Stationary
INF	I(0)	Trend and intercept	-5.221282 (0.0011)***	-3.574244	Stationary	-3.891203 (0.0261)***	-3.580623	Stationary
		Intercept but no trend	-0.800195 0.8030	-2.976263	Non-stationary	-3.441709 (0.0172)**	-3.670170	Stationary

Source: Author

According to the table 4.1, LNEDU_PRI, LNEDU_SEC, LNGDPPC, LNPRI_TR, LNEDU-EX and RGDP are not stationary at level, but these variables are stationary at 1st difference. The rest two variables (LNSEC_TR) and INF are stationary at level. All of the variables are mixed stationary level according to the ADF and PP unit root test, therefore the author used the ARDL bound testing approach to long-run co-integration between the variables.

4.1.2 Chow Breakpoint test

Chow breakpoint test is used to analyse the structural break of the times series data. The structural break of the independent variables impacts on the dependent variables, so the null hypothesis of the chow break point test is that there is the structural break in the model which means that the parameters are instability in the regression analysis (M.H.Kazi, 2008). Table 4.3 and Table 4.4 shows the chow breakpoint test of the regressors which impact on the regressands in the analysis.



Note: F-Stast: 5.5916, Prob: (0.0007)***
Source: World Development indicators

Figure 0.1: Chow test for the parameters stability test for GDPPC

Figure (4.1) shows the trend of the GDPPC for Myanmar during the studied period 1985-2015. According to the figure, 1991 is the significantly decrease. Therefore the author used the chow break point test for analysing the structural break of the variable. The probabilities value of F-statistics is significant at 1% level for all years

from 1991, so the null hypothesis of the chow break point test is accepted these years. The results indicate that there is structural break in 1991, and this structural break can affect in the parameters of the variables which means that the estimation result can be overestimated or underestimated. Therefore, the dummy variable for structural break which is known as break point dummy variable is used as the exogenous variable in the models. This dummy variable takes the value 1 from 1991 when the structural break starts to 2015 and the value 0 for the years before 1999 (M.H.Kazi, 2008).

Under the military regime, Myanmar is closed economy and cut the connection to the outside world, so trade is also nationalized. After 1988 periods, the new government transformed the market-oriented economy from the Burmese way to socialism. In order to transform the market-oriented economy, the new government took the three main transitions which are the macroeconomic stability, liberalization of price and markets and the rebuilding of the privatization and allowance to enter the new enterprises and private firms. During that period, the economy experienced many serious conditions like high inflation rate, price jump, and create trade liberalization which causes instability of exchange rate. There are structural break in the variables during these time periods because of the Myanmar's economic transitions and political instabilities. (Discussions papers of Institute of Development Economies)

4.2 Lag-length selection and ARDL Bound Testing Approach to co-integration

After testing the stationary level of the variables, the author used the ARDL bound testing approach to test long-run co-integration. The author determines the lag length criteria of the variables. Table 4.3 and Table 4.4 show the best lag length criteria for the variables, so we chose the two lag length structure for the maximum lag-length for the models according to the Akaike Information Criterion (AIC).

Table 0.2: Lag-length selection of the variables for Model 1

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-148.4739	NA	0.001706	10.65337	10.93626	10.74197
1	-39.02786	166.0561	1.14e-05	5.588128	7.568350	6.208309
2	12.00672	56.31401*	56.31401*	4.551261*	8.228815*	5.703025*

Note: *refers to the lag order of the selected criterion.
Source: Author

Table 0.3: Lag-length selection of the variables for Model 2

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-148.4739	NA	0.001706	10.65337	10.93626	10.74197
1	-39.02786	166.0561	1.14e-05	5.588128	7.568350	6.208309
2	12.00672	56.31401*	56.31401*	4.551261*	8.228815*	5.703025*

Note: *refers to the lag order of the selected criterion.
Source: Author

After determining the lag length structure, the author used the ARDL bound testing approach introduced by Pesaran and Shin (1995) in order to analyse the co-integration between the primary school enrolment rate, secondary school enrolment rate which are the dependent variables of the two models and the public school expenditure as the percentage of GNI, primary school teachers, secondary school teachers, GDP per capita, inflation, and real GDP growth rate. Firstly, the author estimate the dynamically relationship between the dependent variables and the independent variables based on the general test result by taking lag on OLS estimation. According to the above equations, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ is the short run multiplier, $\delta_1, \delta_2, \delta_3, \delta_4, \delta_5, \delta_6, \delta_7$ is the long run multiplier, α_0 is the constant and μ_0 is the error term.

After estimating the dynamics relationship between the variables, ARDL bound test is used to determine whether there is long-run co-integration between the variables or not. The null hypothesis of the ARDL dynamics regression analysis is $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$ that there is no long-run relationship between the variables and the alternative is $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0$ that there is long-run relationship between the variables.

If the calculated F statistic exceeds the critical value of the upper bound proposed by Pesaran and Shin (1995), the null hypothesis is failed to accept, which means that there is the long run co-integration between the variables. If the calculated F statistic is lower than the critical value of the upper bound, there is no long-run co-integration between the variables, so the null hypothesis is accepted. Table 4.6 shows the ARDL bound test co-integration analysis.

Table 0.4: ARDL Bounds Test Co-integration for Model 1 and 2

Model	F-Statistics	Upper Bound	Lower Bound	Co-integration
F(EDU_PRI/GDPPC, EDUEX,PRI_TR,RGDP,INF)	13.58973	3.38*	2.49*	H0: Rejects (Co-integration exits)
		3.76**	2.81**	
		4.63***	3.5***	
F(EDU_SEC/GDPPC, EDUEX,SEC_TR,RGDP,INF)	11.41539	3.38*	2.49*	H0: Rejects (Co-integration exits)
		3.76**	2.81**	
		4.63***	3.5***	

Note: *,**,*** means that the 10%, 5% and 1% significant level.

Source: Author's Calculation

The null hypothesis is that there is no long-run co-integration. And the lag length structure of these models is based on the AIC criteria, and the numbers of observations are 29 observations. The calculated F statistics are computed with restricted constant and trend which means that the intercept term is restricted and linear trend.

According to the table 4.5, the calculated F statistics of the first model 13.58973 is higher than the critical value of the upper bound at 1% significance level, so the null hypothesis is rejected. This indicates that there is a long run relationship between the primary school enrolment rate and the independent variables which are gross domestic income per capita (GDPPC), public education expenditure, primary school teachers, inflation rate, and the real GDP growth rate. As per the second model, the calculated F-statistics (11.41539) is greater than the critical value of the upper bound 1% significant level, so the null hypothesis fails to accept which means that there is the long-run co-integration between the secondary school enrolment rate and the explanatory variables which are gross domestic income per capita (GDPPC), public education expenditure, secondary school teachers, inflation rate, and the real GDP growth rate.

4.2.1 Estimation of Long-run Coefficient

After testing the ARDL bound test co-integration analysis, we can confirm that there is long run relationship between primary enrolment rate and its determinants. Also, there has long run relationship between secondary enrolment rate and its determinants. As per Table 4.3 and Table 4.4, the maximum lag length structure of the two models is lag 2 (AIC) which can be described as the lag structure (2,2,1,0,2,1). Table 4.6 shows the estimated long-run parameters among the primary school enrolment rate and the independent variables.

Table 0.5: Estimated long run coefficient using the ARDL model and the lag selection (2,2,1,0,2,1) by the Akaike Information Criterion for model 1

	Dependent variables is LnEDU_PRI			
Explanatory variables	Coefficient	T-Statistic	Std.Error	Probability
LnGDPPC	0.343097	2.437653	0.140749	0.0299
LnEDUEX	0.556086	3.075051	0.180838	0.0089
LnPRI_TR	-0.260390	-1.400730	0.185896	0.1847
INF	-0.001212	-1.417161	0.000855	0.1800
RGDP	0.024202	2.226842	0.010868	0.0443
DUMMY	0.801624	2.666120	0.300670	0.0194

Note: R2= 0.978794, Adjusted R2 =0.954325, F-statistic=40.00215, Pro (F-stat)=0.0000, Durbin-Watson=2.109865

*, **, *** indicates that the significant level of the long run parameters at 10%, 5% and 1% level and the calculed statistics are with restricted and linear trend.

Source: Author's Calculation

Long-run parameters of the variables for model 1are estimated and the above test results indicate that the four explanatory variables (education expenditure, GDP per capita, real GDP growth rate and the structural break dummy variable) have significant long run relationships with primary school enrolment rate and their significance level are different in the long run. Therefore, 1% increase of the education expenditure can cause almost 0.55% increase of the primary school enrolment rate in Myanmar. The other papers pointed out that the education expenditure and the primary school enrolment rate has positive relationship which means that increase of the expenditure in the education sector can increase the primary school enrolment rate in

the developing countries and the under developed countries. (E.O.Erhijakpor, December, 2007), (S.Dauda, Auguest 4,2011) and (Emmanuel Carsamer, July 2015)

The two other explanatory variables, GDP per capital and the real GDP growth rate have positive relationships with the primary school enrolment rate. The author used the GDP per capita as the income level of the family and real GDP growth rate as the growth of Myanmar economy. The estimated parameter (0.343097) of the GDPPC describe that a 1% increase in the GDPPC caused 0.34% increase of primary school enrolment rate in Myanmar. (E.O.Erhijakpor, December, 2007) and (Emmanuel Carsamer, July 2015) described that the increase of the GDP per capita is one of the important factors to increase the primary school enrolment. Real GDP growth rate has the significant effect on the primary school enrolment rate in Myanmar, 1% increase in the real GDP growth rate leads to 2.4% increase of primary school enrolment rate. (Emmanuel Carsamer, July 2015) and (E.O.Erhijakpor, December, 2007) stated that the income level and the economic size of the country are the factors to improve the primary school enrolment rate because increasing income level of the people means that people are more affordable to enroll their children which leads to increase school enrolment rate. The findings of this paper suggest that the increasing of the government expenditure and the income level of the people can increase the primary school enrolment rate of Myanmar.

The structural break dummy variable is used in the regression analysis after analyzing the structural break of the variables by using chow breakpoint test. The probability of the structural break dummy variable has positive significant at 1% to 5% significant level which means that the break dummy variable will affect to the estimated result of the variables, so the structural break and shocks have impacts on the educational enrolment rate (Hailegiorgis Bigramo Allaro, 18 January,2011).

With respect to the other macroeconomic variable, inflation rate as the economic instability is negatively related to the primary school enrolment rate, but not significant. This finding can suggest that the stability of economic performance cannot effect to the primary school enrolment rate. The increase of primary school teachers is negatively related with the primary school enrolment rate but these two are not a

significant relationship which means that the change of the primary school teachers will not effect on the primary school enrolment rate in the long run.

4.2.2 Estimations of the short run error correction model

The author applied ECM in order to test the short run relationships of the variables for the above two models. The short run error correction model shows the speed of the adjustment to the long run equilibrium. Table 4.9 shows the estimated short run parameters of Model 1.

Table 0.6: Estimation of the short run result for Model 1

Dependent Variable LNEDU_PRI				
Variable	Coefficient	Std.Error	t-Statistics	Prob
D(LNEDU_PRI(-1))	0.164783*	0.098419	1.775910	0.0991
D(LNEDU_EX)	0.091470***	0.016429	5.567446	0.0001
D(LNEDU_EX(-1))	-0.120896***	0.019674	-6.144859	0.0000
D(LNGDPPC)	0.050612***	0.006732	7.518502	0.0000
D(LNPRI_TR)	-0.127375**	0.057683	-2.208194	0.0458
D(LNRGDP)	0.003801***	0.000971	3.914675	0.0018
D(LNRGDP(-1))	-0.005576***	0.001312	-4.249251	0.0009
D(INF)	0.000110	0.000235	0.466403	0.6486
D(DUMMY)	0.440361***	0.042887	10.267954	0.0000
C	2.827892***	0.383654	7.370949	0.0000
CointEq(-1)	-0.545971***	0.074025	-7.365483	0.0000
Cointeq=LNEDU_PRI-(0.5561*LNEDUEX+0.3431*LNGDPPPC-0.2604*LNPRITR+0.0242*RGDP-0.002*INF+0.8016*DUMMY-0.0115*@TREND				

Note: *, **, *** indicates that 10%,5% and 1% significant level of the short run parameters.

Source: Author's Calculation

Table 4.5 provides that the estimated short run parameters of the variables, and the negative sign and the probability is the 1% significant which means that there has short run relationship between the variables. The coefficient (0.54) of the co-integration equation indicated that the speed of the adjustment will be converged to the long run equilibrium after the shock period. The value 0.54 means that the approximately 54% of the disequilibria in primary school enrolment rate in the previous period can restore to the long run equilibrium in this year.

The estimated short run parameters describes that the primary school enrolment rate in the previous year, the education expenditure in the current year, GDPPC in the current year, real GDP growth rate in the current year, the inflation rate in the current and the break dummy variable are positively relationship in the short run and statistically significant at the different significance level. The coefficient of primary school enrolment rate in the previous year is positively relationship to the current year of the primary school enrolment rate.

If the education expenditure in the current year and GDPPC in the current year increased by 1%, the primary school enrolment rate can increase 0.09% and 0.05% accordingly. These findings suggest that the increasing of the spending of government budget in the education sector, the increasing of the individual income level and good economic conditions leads to increase the primary school enrolment rate in the short run and also increase the incentive to enrol their children.

However, the education expenditure in the previous year, the real GDP growth rate in the previous year and the primary school enrolment rate in the current has negative relationship. The reason is that most of the Myanmar parents faced with the financial problem to enrol the children, therefore the parents considered for the opportunity costs of enrolling their children (Cho, January 22, 2013). The number of primary school teachers has the negative effect to the primary school enrolment rate in both short run and long run result. In this way, the important factors to enhance the primary school enrolment rate are to create the job opportunities for the parents, to subsidize the low-income families by the government and also to increase the education expenditures.

Table 0.7: Estimated long run coefficient using the ARDL model and the lag selection (2,2,1,0,2,1) by the Akaike Information Criterion for model 2

	Dependent variables is LnEDU_SEC			
Explanatory variables	Coefficient	T-Statistic	Std.Error	Probability
LnGDPPC	0.485745	2.864820	0.169555	0.0133
LnEDUEX	0.115823	0.778609	0.148756	0.4502
LnSEC_TR	-1.35690	-3.292106	0.412169	0.0058
INF	-0.002298	-1.449675	0.001585	0.1708
RGDP	0.041034	3.370477	0.012175	0.0050
DUMMY	0.853442	2.581191	0.330639	0.0228

Note: R2 = 0.997824
Adjusted R2 = 0.995313
F-statistic = 397.4405
Pro (F-stat) =0.0000
Durbin-Watson=2.507989
*, **, *** indicates that the significant level of the long run parameters at 10%, 5% and 1% level and the calculated statistic are with restricted and the linear trend.
Source: Author's Calculation

The test results of Model 2 indicate that education expenditure, GDP per capita, real GDP growth rate and the structural break dummy variables have positive significant relationships to the secondary school enrolment rate. The estimated parameters describe that 1% increase in the GDPPC, and real GDP growth rate can increase 0.48% and 0.041% of the secondary school enrolment rate in Myanmar respectively.(E.O.Erhijakpor, December, 2007) and (Emmanuel Carsamer, July 2015) indicated that the increasing income level leads to increase the secondary school enrolment. According to the theory, the parental income and the parent's educational background, these are the important factors to invest their children education, and this paper find out the income level and the secondary school enrolment rate is the positive relationship, so that the increasing income level can cause to increase the secondary school enrolment rate of Myanmar. These findings are very similar to the previous paper, (Emmanuel Carsamer, July 2015) and (E.O.Erhijakpor, December, 2007) stated that the two macroeconomics variables the income level and the economic size of the country are the important contributors in order to improve the secondary school enrolment rate.

One of the important explanatory variables, education expenditure as the percentage of GNI (EDU_EX) is the positively related to the secondary school

enrolment rate, however the results are not significant. The other papers stated that the education expenditure and the secondary school enrolment rate are the positively relationship (E.O.Erhijakpor, December, 2007), (S.Dauda, Auguest 4,2011) and (Emmanuel Carsamer, July 2015). These papers pointed out that the increase of the education expenditure will increase the secondary school enrolment rate in the developing countries and the under developed countries.

The structural break dummy variables as one of the explanatory variables was used in the regression analysis after analysing the structural break of the variables by using the chow breakpoint test. The probability of the structural break dummy variable is positively significant at 1% to 5% significant level which means that the break dummy variable will affect to the estimated result of the variables, so the structural break and shocks can affect to the educational enrolment rate (Hailegiorgis Bigramo Allaro, 18 January,2011).

Table 0.8: Estimation of the short run parameter of the variables for the secondary school enrolment rate

Dependent Variable(LNEDU_SEC)				
Variable	Coefficient	Std.Error	T-Statistic	Prob
D(LNEDU_SEC(-1))	-0.312147**	0.111313	-2.804238	0.0249
D(LNEDU_EX)	0.042829**	0.017022	2.516064	0.0258
D(LNEDU_EX(-1))	0.055163***	0.017786	3.101505	0.0084
D(LNGDPPC)	0.145888***	0.009497	15.360653	0.0000
D(LNSEC_TR)	-0.503663**	0.127933	-3.936919	0.0017
D(LNSEC_TR(-1))	0.080449	0.056333	1.428104	0.1768
D(RGDP)	0.012964***	0.001712	7.570486	0.0000
D(INF)	-0.001140***	0.000323	-3.525281	0.0037
D(DUMMY)	0.433972***	0.041524	10.451054	0.0000
C	7.390268	0.809290	9.131793	0.0000
CointEq(-1)	-0.499939***	0.054818	-9.119993	0.0000
Cointeq=LNEDU_PRI-(0.5561*LNEDUEX+0.3431*LNGDPPPC-0.2604*LNPRITR+0.0242*RGDP-0.002*INF+0.8016*DUMMY-0.0115*@TREND				

Note: *, **, *** indicates that 10%,5% and 1% significant level of the short run parameters.
Source: Author's Calculation

Table 4.11 shows the estimated short run result of the macroeconomics variables and the secondary school enrolment rate. The short run coefficient of the equation (0.499) is the expected negative sign which means that there is the quick

adjustment to the long run equilibrium. Therefore, 49% of the disequilibrium of the previous year's shock can come back to the equilibrium in the current year. The estimated short run coefficient of the secondary school enrolment rate in the previous year is negatively relationship to the current school of secondary school enrolment rate. There are many costs constraints for the parents to enroll their children. The low-income households' parents would like to be sent their children to work for earnings rather than to send them to attend the secondary school (Cho, January 22, 2013).

The education expenditure in the current year and the previous year, the current year of the GDPPC and the growth rate of RGDP are positively significant to the secondary school enrolment rate in the short-run. Therefore, 1% increase in the previous and the current year of the education expenditure, the current year of the GDPPC and the real GDP growth rate lead to increase 0.042%, 0.05%, 0.14% and 1.2% of the secondary school enrolment rate respectively. The secondary school teachers and the inflation rate of the current year are negatively relationship to the secondary school enrolment rate. However, the secondary school teachers are not significant.

Inflation rate as a proxy for economic instability has negative relationship to the secondary school enrolment rate in the short run. The high inflation can cause the secondary school enrolment rate to decrease. The reason is that even if the income level of the people, the high inflation rate can decrease the purchasing power of the people. The investment of the children education is similar to the consumption goods, so people consume the necessary things instead of their children to enrol the school. Therefore, the stability of the macroeconomic sectors and the sustainable macroeconomics policies are the important factors to achieve the economic and social developmental goals. In order to achieve the developed economic and social sectors, the country need to have the sound macroeconomic policies, good institution and the effective management system (S.Dauda, Auguest 4,2011).

In the short run, the government needs to increase the education expenditure, and also to increase the individual's income level and the growth rate of the GDP in order to increase the secondary school enrolment similar to the long run results. These findings suggest that the government's education expenditure, the

families' income and the growth rate of the economy are the main contributors to increase the secondary school enrolment.

4.3 Diagnostics tests of the parameters

To determine the stability of the model, some diagnostic tests are used. Breusch-Godfrey test is used to test the serial correlation of the variables which means whether the error terms of the variables are serially correlated or not. The heteroskedasticity test is used to test the heteroskedasticity problem between the variables, and Ramsey RESET test is used to test the functional form of the regression. The CUSUM and the CUMUM of squared test is used for testing the stability of the model. Table 4.11 provides the stability test of the parameters.

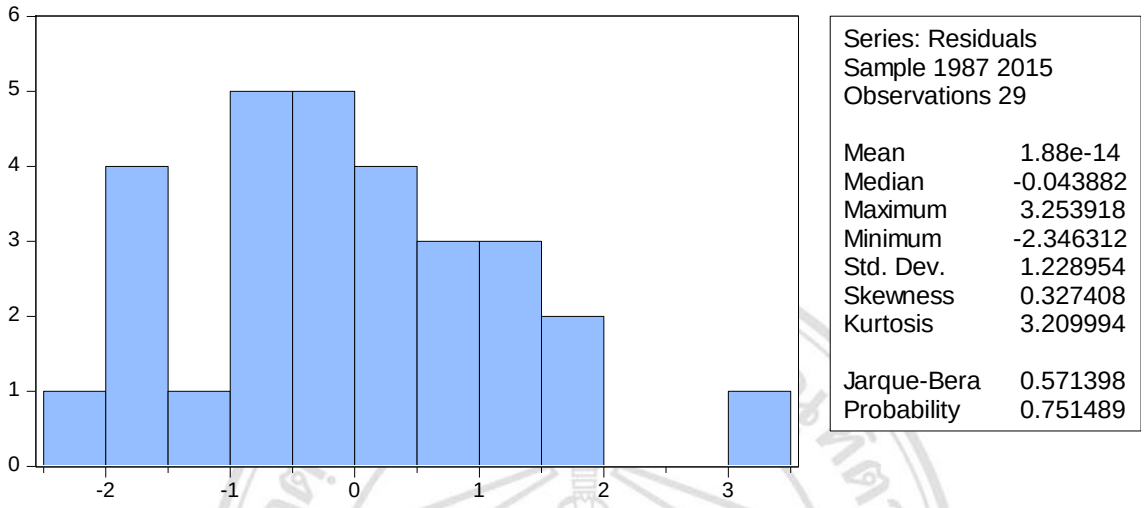
Table 0.9: Diagnostic tests of the parameters for the primary school enrolment rate and its determinants

Diagnostic tests	F-statistic	Probability
Breusch-Godfrey LM test	0.171071	0.6792
Ramsey RESET test	3.558201	0.0837
Heteroskedasticity test	15.81556	0.3944

Note: *** provides that the 5% significant level of the parameters test
Source: Author's calculations

The serial correlation test called Breush-Godfrey LM test is used to test the serial correlation of the residuals. The null hypothesis of the Larange multiplier test is there is no serial correlation between the errors terms of the variables. The p value (0.6793) of the LM test shows that the null hypothesis is accepted which means there is no serial correlation. In order to analyse the omitted variables and the functional forms, the Ramsey RESET test is used, so the null hypothesis of this test is that the model is appropriate functional form and specified correctly. If p value is not significant, the null hypothesis is failed to reject. The model is appropriate and correct, for the p value of the Ramsey RESET test is 0.0837 which is greater than 5%. The heteroskedasticity test is analysed to check the heteroskedasticity problem in the regression. The null hyopothesis of the heteroskedasticity test is that the heteroskedasticity problem does not exist in the regression model. The p value is also to determine whether the null hypothesis is

accepted or rejected. The p value (0.3944) is not significant, so the null hypothesis is accepted which means that there is no heterskedasticity problem.

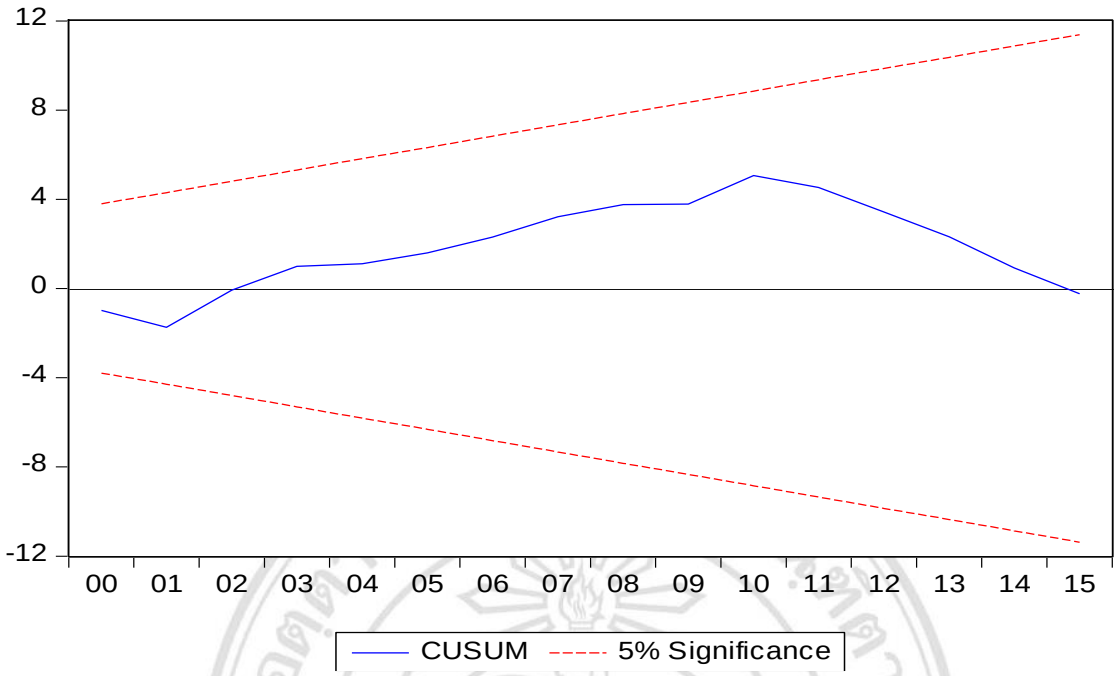


Source: Author's calculation

Figure 0.2: Histogram and Normality test for model 1

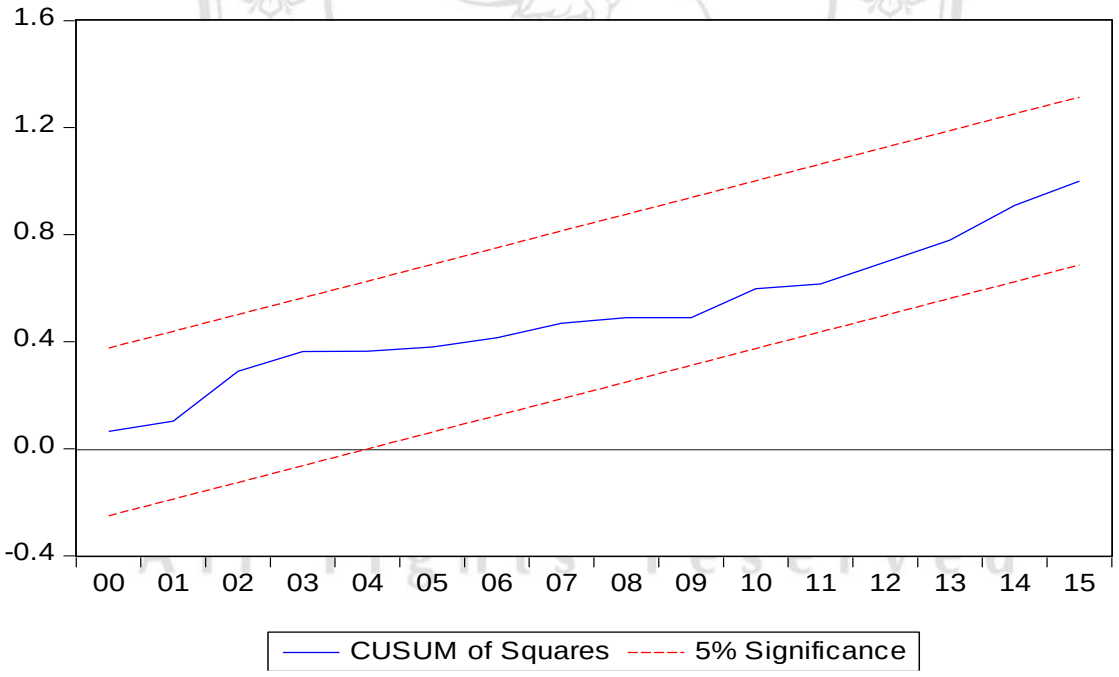
This figure shows the normality of the regression model, and the normality test is used whether the error terms of regression model is normally distributed or not. In this figure, the histogram is bell-shaped, and the probability value of the Jarque-Bera test is not significant, so the null hypothesis of the normality test is failed to reject. The author can conclude that the error terms are normally distributed.

After testing the diagnostics tests, (CUSUM) test and (CUSUMSQ) test is applied to test the stability of the long run and short run parameters. If the short run and long run parameters are stability, the plot of the cumulative sum of recursive residuals (CUSUM),and the cumulative sum of squares of recursive residuals (CUSUMSQ) do not exist beyond the 5% critical bounds which means these plots are between the critical bound. Figure 2 and 3 are shows the stability of the parameters between the primary school enrolment rate and the macroeconomics variables.



Source: Author's Calculation

Figure 0.3: CUSUM of Squares for the model 1



Source: Author's Calculation

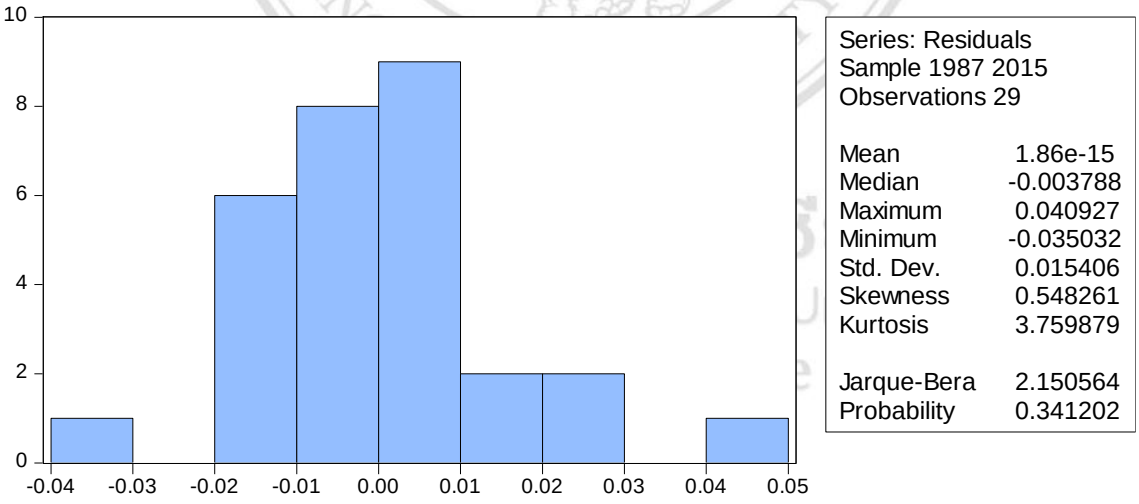
Figure 0.4: CUSUM test for the model 1

Table 0.10: Diagnostic tests of the parameters for the secondary school enrolment rate and its determinants

Diagnostic tests	F-statistic	Probability
Breusch-Godfrey LM test	3.606256	0.0576***
Ramsey RESET test	4.60071	0.0531***
Heteroskedasticity test	10.93987	0.7568***

Note: *** provides that the 5% significant level of the parameters test
Source: Author's calculations

Table 4.13 shows the diagnostics test for the scThe p value (0.0576) of the LM which means 5.7% is greater than 5% significant level, so the null hypothesis is fail to reject which provides there is no serial collection between the error terms of the variables. The Ramsey RESET test is applied, for this regression model has the omitted variables and the corrected functional forms. The p value is not significant, so the author can conclude that the functional forms of the models are correct. Another diagnostics test is heteroskedasticity test whether there is heteroskedasticity problem or not. The p value (75%) of the heterskedasticity test is also insignificant and greater than the 5% significant level, so the author can conclude that there is no heterskedasticity problem in the regression model.

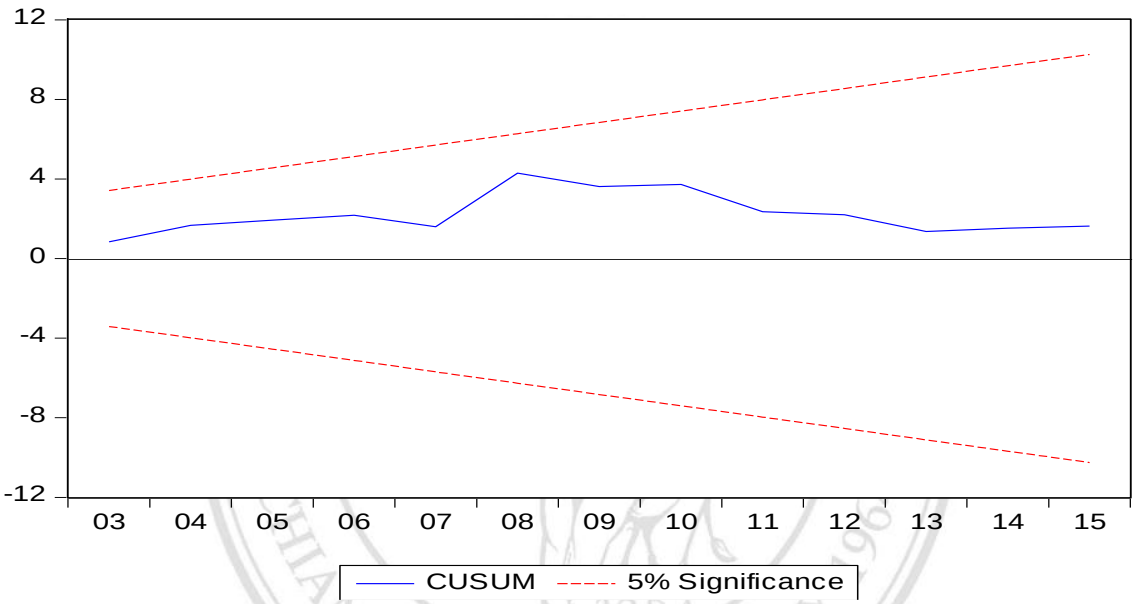


Source: Author's Calculation

Figure 0.5: Histogram and Normality test

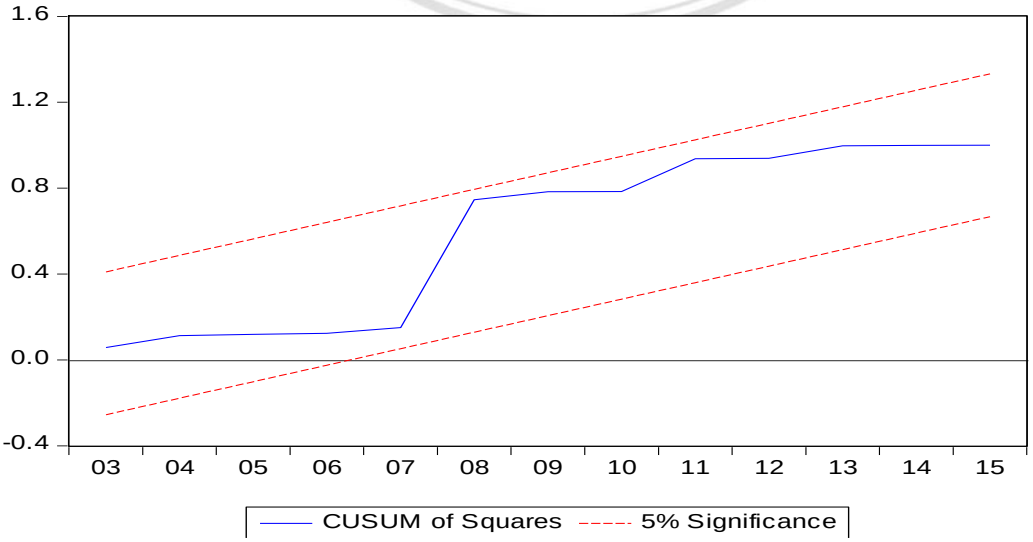
This figure shows the normality of the regression model, and the probability value of the Jarque-Bera test is not significant. For that reason, the errors terms of the

regression model is normally distributed. After testing the diagnostics tests, (CUSUM) test and (CUSUMSQ) test is used to test the stability of the long run and short run parameters. Figure 4 and 5 are shows the stability of the parameters between the secondary school enrolment rate and the macroeconomics variables. The plot of CUSUM and CUSUMSQ are between the 5% critical bound, so the short run and long run parameters of the regression model are stable.



Source: Author's Calculation

Figure 0.6: CUSUM test for model 2



Source: Author's Calculation

Figure 0.7: CUSUM squares test d=for model 2