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The Impact of Exchange Rate and Unemployment Rate on the Real Gross Domestic Product Growth Rate in Ghana

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Abstract
Unemployment Rate and Exchange Rate are perhaps the two most important challenges that face the Ghanaian economy in recent time. This study seeks to examine the effect of the Exchange Rate and Unemployment Rate on the Real Gross Domestic Product Growth Rate in Ghana. The study used secondary data collected from World Bank, International Labour Organization and International Monetary Fund covering the period 1999–2018. Real Exchange Rate and Unemployment Rate were the independent variables whilst Real Gross Domestic Product Growth Rate was the dependent variable. The findings of the study were arrived at using the quantitative research method. The extent and nature of relationship between the various variables under study were identified using Pearson correlation, regression and hypotheses. The study found out that Unemployment Rate exhibited insignificant negative relationship towards Real Gross Domestic Product Growth Rate, while Real Exchange Rate was positive and also insignificant relationship on Real Gross Domestic Product Growth Rate. Based on the linearity of the multiple linear regression model, the independent variables contribute to 15.0% of the overall LN_GDP. The study then concludes that based on the effect of Exchange Rate and Unemployment Rate on RGDPGR in the findings, Government and other stakeholders should take steps such as creating new local industries and factories, and invest in existing ones to increase domestic produce which will in turn decrease Unemployment Rate and increase Exchange Rate.
Keywords: Gross Domestic Product, Unemployment Rate, Exchange Rate, Pearson correlation, Linear Regression.
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1. Introduction

Countries all over the world, in spite of their history, geographical location or political status aims to achieve and maintain high economic growth coupled with low and/or high values of macroeconomic variables such as real GDP, Inflation, Exchange Rates, FDI, stock prices, Unemployment Rate among others to influence growth and development of the country (Tetteh-Bator, E., Adjei Adjieteh, M., Chun Jin, L. & Asenso, T., 2018).

Gross Domestic Product (GDP) is the monetary value of all the finished goods and services produced within the borders of a country at a specific time period. GDP is the primary indicator used in examining the financial health status of a country as a whole. The issues of GDP have become the most vital amongst macro-economic variables and data on GDP is regarded as the important index for assessing the national economic development and for judging the operating status of economy as a whole (Tetteh-Bator et al.,2018).

Exchange Rate also known as Foreign Exchange Rate or Forex Rate is the price of a nation's currency in terms of another currency. The Exchange Rate of the Ghana cedi against, for example, the British pound sterling is quoted as the number of Ghana cedis required to purchase one British pound sterling. An unexpected change in the Ghana cedis/British pound sterling would have an impact on the profitability of firms operating in the tradable sector of the economy, exporters and importers as well as the economy of the whole country. The unstable nature of Exchange Rate has been the focus of many researchers. Previous studies suggest that variations in an Exchange Rate has the potential to affect a country's economic performance. Many researchers attribute Exchange Rate volatility to the fact that it is empirically difficult to predict future Exchange Rate values (Taylor,2001).

Unemployment Rate is the share of labour force over a country's population that is jobless, expressed as a percentage. When the economy is in recession and jobs are scarce, the Unemployment Rate of a country can be expected to rise while when the economy is growing at a rate and jobs are relatively enough, the rate can be expected to fall. Similarly, it indicates a growing economy which is usually accompanied by higher inflation rate and may call for increase in interest rates. Unemployment Rate is calculated as a percentage by dividing the number of unemployed individuals by all individuals currently in the labour force. In the measure of Unemployment Rate, it considers unemployed people as those who are willing and available to work, and who have actively sought work within the past four weeks. Those with temporary, part-time or full-time jobs are considered employed. Many people who are not able to work (due to a disability, for example), or have become discouraged after looking for work without success, are not considered unemployed under some system of measuring Unemployment Rate. The

high unemployment in Ghana constitutes underutilization of both human and natural resources in the country, affecting the production of goods and services within the economy which has an effect on the country's GDP (Tetteh-Bator et al., 2018).

The problem the research seeks to address is the fact that stakeholders of the country are increasingly unable to manage the macroeconomic indicators so as to ensure an increasing or at least a constantly growing GDP rate. This has over the years from one regime to another brought the Ghanaian economy to its knees.

2.0 Literature Review

2.1 Exchange Rate

An Exchange Rate is the price of one currency, given in terms of another. The movement of a currency's value relative to others has a profound effect on economies exposed to this currency (Onwukwe, C. E., & Nwafor, G. O., 2014). Given the linked nature of modern economies, Exchange Rate movements have the power to intensively affect businesses, governments, and people around the globe. Exchange Rate control could be very costly, and even become pointless, when speculators attack a currency, even under government protection (Amoah, 2015).

2.2 Unemployment Rate

Unemployment Rate is the proportion of a country's labour force that is jobless, over its total population, expressed as a percentage. When the economy is in recession and jobs are scarce, the Unemployment Rate of a country can be expected to rise while when the economy is growing at a rate and jobs are relatively enough, the rate can be expected to fall. (Yarquah, A., John & Baafi-Frimpong, S., 2012; Baah-Boateng, A, W. P., & Oduro, A. D., 2013)

2.3 Gross Domestic Product (GDP)

Gross Domestic Product is the value of all final goods and services produced within a country or an area during a period. It is often considered the best standard of measuring national economic conditions (Mankiw & Taylor 2007).

2.3.1 Relationship between Real Exchange Rate and GDP

Amoah (2015) established that Real Exchange Rate is inversely related to GDP in the long term. This implies that the long run effect of increases in Real Exchange Rate generates decreases in GDP while a decrease Real Exchange Rate brings about an increase in GDP.

2.3.2 Relationship between Unemployment Rate and GDP

Soylu, Ö. B., Çakmak, I., & Okur, F. (2018) established that in the Eastern European countries, Unemployment and GDP are directly related. This implies that when Unemployment increases, economic growth (GDP) will also increase and when Unemployment decreases, Economic growth (GDP) will also decrease. This is however, not so in many of the developed and developing countries.

3.0 Research Methodology

3.1 Research Design and Approaches

The study adopted the quantitative design. The desktop approach was used and therefore sourced data from the official websites of five organisations. Twenty years annually consolidated data (1999-2018) of Real Gross Domestic Product Growth Rate, Real Exchange Rate and Unemployment Rate were extracted from World Bank http://data.worldbank.org/country/ghana Accessed on 21st May 2019. The time series data were also taken from the official websites of International Monetary Fund (IMF): https://www.imf.org, International Labour Organization: https://www.ilo.org, Bank of Ghana (BOG) Statistical Bulletin and Ghana Statistical Service. All accessed on 21st May 2019

The main tools used in analyzing the data was Statistical Package for the Social Science(SPSS) and Microsoft Excel.

3.2 Multiple Linear Regression

Multiple linear regression was used in this study to model the relationship among the dependent variable (LN_GDP) and the independent variables (LN_EXR and LN_UNR) with the help of SPSS and the research data.

Multiple Linear Regression Equation

$$LN\_GDP_t = \beta_0 + \beta 1 LN\_EXR_t + \beta_2 LN\_UNR_t + \varepsilon_t \quad (3.1)$$

Where;

LN_GDP_t : Natural Logarithm of Real Gross Domestic Product Growth Rate at time t.

LN_EXR: Natural Logarithm of Real Effective Exchange Rate.

LN_UNR: Natural Logarithm of Unemployment Rate.

ε_t: is error term that constitutes the effect of other variables.

β_0: is the intercept (constant)

β_1 and β_2: are the proportionate change in the gross domestic product due to the respective macroeconomic

variables.
t: time period 1999, 2000, …, 2018.

3.3 *Definition of Variables*
Dependent Variable
In order to examine the impact of Exchange Rate and Unemployment Rate on the Real Gross Domestic Product Growth Rate of Ghana, Gross Domestic Product is used as the dependent variable. This variable is consistent with (Agalega & Antwi, 2013) and (Amoah, 2015) studies where GDP was used as dependent variable in modeling GDP using Vector Autoregressive model. This variable is defined as the value of all final goods and services produced within a country or an area during a period.
Independent Variable
With regards to the independent variable, I used both Exchange Rate (EXR) and Unemployment Rate (UNR) as the independent variables. Exchange Rate (EXR) is defined as the price of one currency, given in terms of another. Unemployment Rate (UNR) is defined as the share of the labour force over a country's population that is jobless, expressed as a percentage of the entire population.

3.4 Pearson Correlation
Pearson correlation which is a parametric correlation is used in this study to measure the strength and direction of the relationship that exists among the microeconomic variables employed.

4.0 Data Interpretation
4.1 Regression Results
Table 4.1 present regression results for the selected major macroeconomic indicator studied in the years 1999-2018 where LN_GDP is the dependent variable. The results show that LN_UNR affects LN_GDP negatively. LN_UNR β coefficient is -0.750, which means that one-unit increase in LN_UNR decreases LN_GDP by 0.750 units whilst LN_EXR is held constant. LN_EXR has a positive β coefficient of 0.769. This means that one-unit increase in LN_EXR will lead to an increase in LN_GDP by 0.769 units, holding LN_UNR constant. According to the model, LN_UNR has a P-value of 0.083 and LN_EXR also has a P-value of 0.165, both variables have P-values greater than 0.05 which means they are statistically not significant to the model.

Table 4.1: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	-.370	2.499		-.148	.884	-5.640	4.900			
	LN_UNR	-.750	.407	-.390	-1.845	.083	-1.609	.108	-.381	-.408	-.390
	LN_EXR	.768	.529	.307	1.452	.165	-.348	1.884	.295	.332	.307
a. Dependent Variable: LN_GDP											

4.2 Correlation Analysis
Table 4.2 shows the Pearson Correlation Analysis which examines the relationship among the selected macroeconomic variables. From the table it is observed that the Real Gross Domestic Product Growth Rate (LN_GDP) is negatively correlated with Unemployment Rate (LN_UNR), hence the null hypothesis is accepted. LN_GDP is also positively correlated with Exchange Rate, LN_EXR, therefore, the null hypothesis is rejected. The above results also show an insignificant negative relationship between LN_GDP and LN_UNR with a correlation coefficient of -0.381. Correlation result between LN_GDP and LN_EXR indicate that there is an insignificant positive relationship between the two variables with a correlation coefficient of 0.295. The correlation results between LN_UNR and LN_EXR shows a significant positive relationship with a correlation coefficient of 0.031, hence, the null hypothesis is rejected.

Table 4.2: Correlations

		LN_GDP	LN_UNR	LN_EXR
Pearson Correlation	LN_GDP	1.000	-.381	.295
	LN_UNR	-.381	1.000	.031
	LN_EXR	.295	.031	1.000
Sig. (1-tailed)	LN_GDP	.	.049	.103
	LN_UNR	.049	.	.448
	LN_EXR	.103	.448	.
N	LN_GDP	20	20	20
	LN_UNR	20	20	20
	LN_EXR	20	20	20

4.3 Linearity of The Model

Table 4.3 presents the figure of the whole equation. R^2 represents the prediction level of variance in GDP by UNR and EXR which is Adjusted $R^2 = 0.150$. This means that 15.0% of GDP can be predicted by UNR and EXR.

Table 4.3: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.489[a]	.239	.150	.4323824	.239	2.675	2	17	.098

a. Predictors: (Constant), LN_EXR, LN_UNR

4.4 Trend in The Variables

Figure 4.1 shows time series plot for the annual LN_GDP in Ghana over the sampled twenty-years period. It shows that the data has a fluctuating trends, though generally increasing, it increased to a point and then decreases drastically.

Figure 4.1: A plot of LN_GDP

Figure 4.2 on the other hand, shows a plot of the time series trend for the annual LN_UNR in Ghana over the sample period. It shows that the data does not follow a particular trend, hence making it a random type of data.

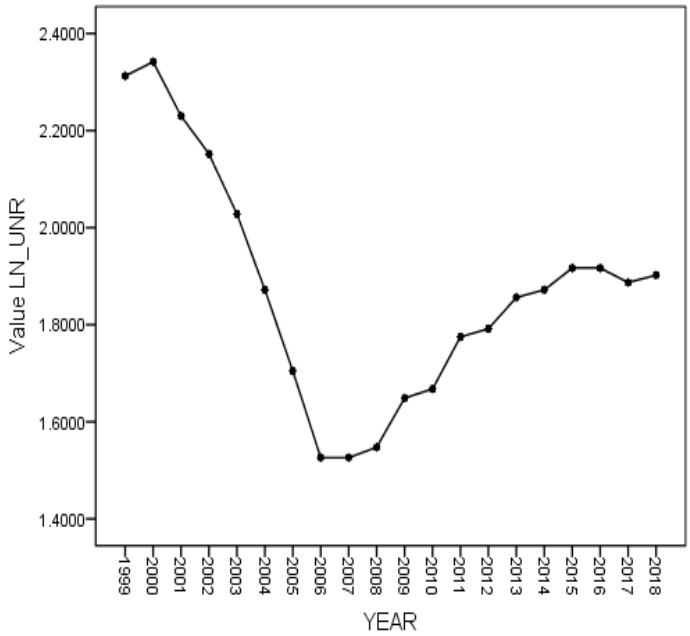

Figure 4.2: A plot of LN_UNR

The time series trend for the annual LN_EXR in Ghana over the sampled period, as indicated in Figure 4.3, shows a similar high fluctuating trend. The trend exhibits a general decreasing trend until 2018 when it registered a significant increase from the previous year's.

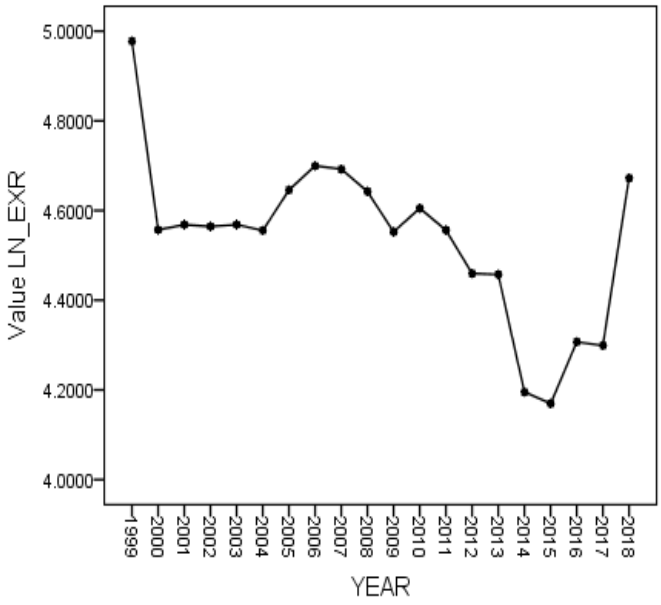

Figure 4.3: A plot of LN_EXR

*4.4 The Impact **o**f Unemployment Rate On the Real Gross Domestic Product Growth Rate of Ghana.*

From the findings, the coefficient of Unemployment Rate is -0.390 with a P-value of 0.083. This indicates an insignificant negative relationship between LN_UNR and LN_GDP which means, holding all other variables constant LN_GDP will fall by approximately 0.390 units for a unit increase in LN_UNR. This is consistent with studies by Mosikari (2013). From the definition of unemployment rate in this study, the problem of unemployment is as a result of insufficient jobs or employment opportunities. The number of trained personnel (employees) increases rapidly from year to year which seems not to match the increment in the number of employment avenues or job opportunities generated in the economy. The deficit of this mismatch is captured as unemployed personnel.

4.5 The Impact of Exchange Rate on The Gross Domestic Product of Ghana

From the findings, the coefficient of Real Exchange Rate is 0.307 with an P-value of 0.165. This shows an insignificant positive relationship between LN_EXR and LN_GDP which means, holding all other variables

constant, a unit rise in LN_EXR will cause LN_GDP to rise by approximately 0.307 units. Exchange Rate is defined in this study as the price of one currency in terms of another, importation is one of the major causes of increased Exchange Rate. It would have been expected that GDP and exchange rate would relate inversely since increase GDP is likely to generate increase exportation and decrease importation. Due to this positive relationship between exchange rate and GDP, the study revisited the nation's factors production. As an agrarian country, the study directed its lenses on agriculture and noticed that the major cause of this adverse relationship is the high importation of various agriculture inputs, implements and equipment. Except for cocoa farmers, most of these implements and equipment are allocated to people who can afford to pay for them and not necessarily those who need them for production. This ability to pay principle of distribution machinery and other inputs might have caused the wastage and thus drove the indicator adversely. When imported inputs are channeled to the appropriate users, the economy can achieve the desired inverse relation between Exchange Rate and GDP growth rate.

4.6 The Impact of Exchange Rate on The Unemployment Rate of Ghana.

From the findings, the corelation between LN_EXR and LN_UNR is 0.031. This shows a positive relationship between LN_EXR and LN_UNR which means, for every unit increase in LN_EXR, LN_UNR will also increase by 0.031.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

The study found out that the independent variables thus, Exchange Rate (LN_EXR) and Unemployment Rate (LN_UNR) contribute approximately 0.15 to Real Gross Domestic Product Growth Rate in Ghana. From the findings, LN_EXR positively and insignificantly affects the Real Gross Domestic Product Growth Rate in Ghana for the period of this study. On the other hand, LN_UNR affects the LN_GDP negatively and insignificantly for the period of this study. These relationships indicate that a unit increase in LN_EXR will cause LN_GDP to also increase but a unit increase in LN_UNR will cause LN_GDP to decrease.

5.2 Conclusions

This study has shown that Real Exchange Rate has a positive but insignificant effect on the real gross domestic products growth rate in Ghana. This agrees with research done by Amoah (2015), Razzaque, Bidisha and Khondker (2017) and Mwinlaaru and Ofori (2017) where a positive relationship was found to exist between Exchange Rate and real gross domestic product growth. This notwithstanding, an increasing real GDP should influence a decrease Exchange rate rather than increase it. LN_UNR's negative insignificant effect on the Real Gross Domestic Product Growth Rate in Ghana is technically normal. This also agrees with the study by Soylu et al. (2018) where a positive relationship was found to exist between GDP and Unemployment Rate. They further explained that, 0.08% fall in Unemployment Rate will lead to a rise in the GDP by 1%.

5.3 Recommendations

Based on these findings, the study recommends that the Government and other stakeholders should take steps such as creating new local industries and factories, and invest in existing ones to increase domestic produce which will in turn increase Real Gross Domestic Product Growth Rate. Agriculture inputs should be directed to the appropriate users or placed in pools at various locations so as to minimize wastage, smuggling, prestigious possession of these equipment by non-farmers. This will also help increase GDP as well as decrease Exchange Rate and Unemployment Rate. The study also recommends that further research be conducted on the same topic with different economic variables and extend the years of the sample.

REFERENCES

Agalega, E. & Acheampong, P. (2013), "The Impact of Macroeconomic Variables on Gross Domestic Product: Empirical Evidence from Ghana", *International Business Research, Vol. 6 No. 5.*

Amoah, E. (2015), Modeling GDP Using Vector Autoregressive (VAR) Models: An Empirical Evidence from Ghana. Dissertation submitted to the school of graduate studies, university of Ghana.

Baah-Boateng, A, W. P., & Oduro, A. D. (2013). Determinants of moonlighting in Ghana: An empirical investigation. *African Review of Economics and Finance, 4 (2), 176–202.*

International Labour Organization (2018), available online at https://www.ilo.org, (Accessed on 21st May 2019)

International Monetary Fund (IMF) (2018), Development Indicators Trend, available online at https://www.imf.org, accessed on 21st May 2019

Mankiw & Taylor (2007). Macroeconomics. *New York: Worth Publishers*.

McLeod, D. & E. Mileva (2011) Real Exchange Rates and Growth Surges. *Fordham Economics Discussion Paper Series, dp2011-04*.

Mosikari (2013), The Effect of Unemployment Rate on Gross Domestic Product: Case of South Africa.

Mediterranean Journal of Social Science, Vol 4 No.6.

Mwinlaaru, P. Y. & Ofori, I. K. (2017), Real Exchange Rate and economic growth in Ghana, Department of Economics, University of Cape Coast.

Onwukwe, C. E. & Nwafor, G. O. (2014). A Multivariate Time Series Modeling of Major Economic Indicators in Nigeria. *American Journal of Applied Mathematics and Statistics, 2(6), 376-385.*

Razzaque, M. A., Bidisha, S. H. & Khondker, B. H. (2017), Exchange Rate and Economic Growth: An Empirical Assessment for Bangladesh. *Journal of South Asian Development 12(1), 42–64.*

Soylu, Ö. B., Çakmak, I., & Okur, F. (2018), Economic growth and unemployment issue: Panel data analysis in Eastern European Countries. *Journal of International Studies, 11(1), 93-107. doi:10.14254/2071-8330.2018/11-1/7*

Taylor, J. (2001), The Role of Exchange Rate in Monetary Policy Rules‖. *American Economic Review Papers and Proceedings, 91, 263-267.*

Tetteh-Bator, E., Adjei Adjieteh, M., Chun Jin, L. & Asenso, T. (2018), Vector Autoregressive Models for Multivariate Time Series Analysis; Macroeconomic Indicators in Ghana. 8. 2225-0522. *https://www.iiste.org*

World Bank (2018), World Development indicators, available online at http://data.worldbank.org/country/ghana (Accessed on 21st May 2019)

Yarquah, A., John & Baafi-Frimpong, S. (2012). Social Cost of Educated Youth Unemployment in Ghana and Its Implications for Education. 14. Available online at *https://www.scribd.com* (Accessed on 21st May 2019)

APPENDIX

Table 4.1: Coefficients[a]

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a. Dependent Variable: LN_GDP

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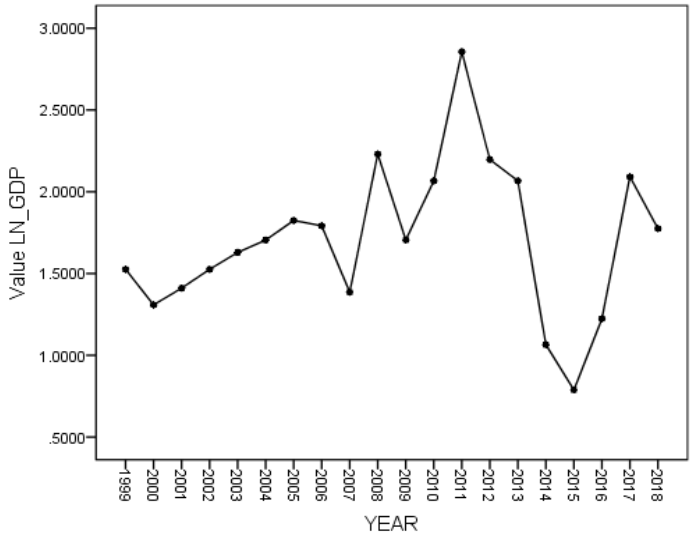

Figure 4.1: A plot of LN_GDP

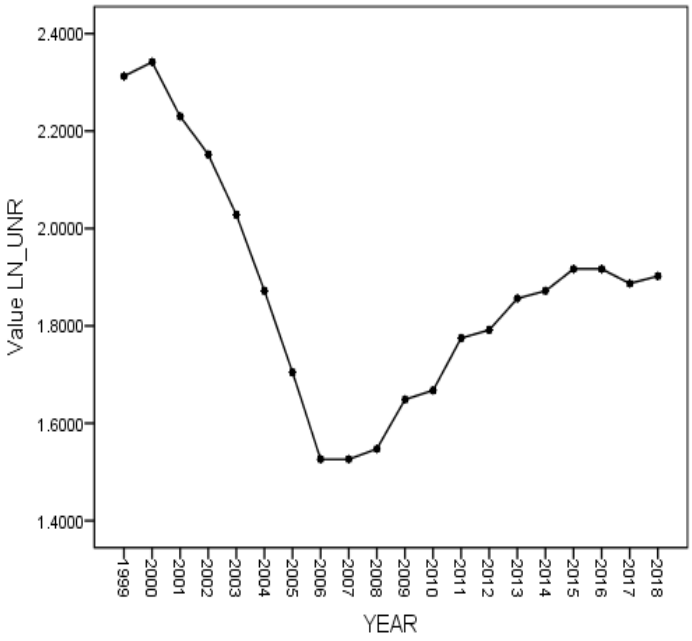

Figure 4.2: A Plot of LN_UNR

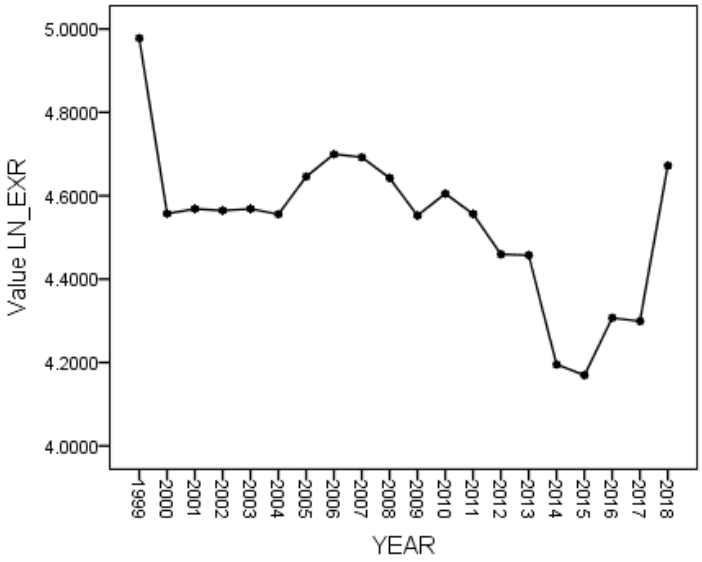

Figure 4.3: A plot of LN_EXR

Research Data from 1999-2018

YEARS	LN_GDP	LN_UNR	LN_EXR
1999	1.526056	2.312535	4.977561
2000	1.308333	2.341806	4.557208
2001	1.410987	2.230014	4.568496
2002	1.526056	2.151762	4.564432
2003	1.629241	2.028148	4.568568
2004	1.704748	1.871802	4.555455
2005	1.824549	1.704748	4.64589
2006	1.791759	1.526056	4.699698
2007	1.386294	1.526056	4.692421
2008	2.230014	1.547563	4.642437
2009	1.704748	1.648659	4.552276
2010	2.066863	1.667707	4.60517
2011	2.85647	1.774952	4.556201
2012	2.197225	1.791759	4.459786
2013	2.066863	1.856298	4.45725
2014	1.064711	1.871802	4.195366
2015	0.788457	1.916923	4.169236
2016	1.223775	1.916923	4.307061
2017	2.091864	1.88707	4.299025
2018	1.774952	1.902108	4.67252