Does unemployment rate lead GDP growth or the other way around ? Malaysia's case

Liyana, Anis and Masih, Mansur

INCEIF, Malaysia, Business School, Universiti of Kuala Lumpur, Kuala Lumpur, Malaysia

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Does unemployment rate lead GDP growth or the other way around ? Malaysia's case

Anis Liyana[1] and Mansur Masih[2]

Abstract

The lead-lag relation between the unemployment rate and GDP per capita in a country remains unresolved. Okun's original work states that a one-percentage point reduction in the unemployment rate would produce approximately 3% more output. But that may not be true at all stages of growth in an economy. The main aim of this paper is, therefore, to test the direction of Granger-causality between these two variables. Malaysia is taken as a case study. The standard time series techniques are employed for the analysis. The empirical findings tend to indicate that the unemployment variable is relatively more exogenous or leading and the GDP variable is relatively more endogenous or lagging. These findings have clear policy implications in that the pro-active policy by the Government to reduce unemployment rate at least in the context of Malaysia can help boost economic growth in order to obtain a sustainable rise in living standard.

Key Words

Unemployment rate, GDP, lead-lag relation, Malaysia

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[1] INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia.

2 **Corresponding author**, Senior Professor, UniKL Business School, 50300, Kuala Lumpur, Malaysia.

Email: mansurmasih@unikl.edu.my

1. Motivation/Significance of the Study:

Historically, Malaysian's real economy after the independence in 1957 was a success story. The main contributor of GDP at that time was the agriculture and mining sector which served as a major source of employment. Apart form that, the export-oriented strategy that was introduced in 1968 right up to 1990 also helped to boost the country's economic growth. Nevertheless, its economy has yet to regain that dynamism evident that occurred before the 1997-98 Asian financial Crisis. Even prior to the recent Eurozone debt crisis, which Malaysia navigated quite successfully, economic growth in the new millennium was at least two percentage points below during the decade of 1986-96.

One of the main socio-economic problems facing the Malaysian nation is high rate of population increase, which poses a challenge and competition in employment of labor force. The total population in Malaysia recorded in 2011 is 28.9 million compared to 8.1 million in the 1960. The rapidly rising population is reflected by the increasing number of people searching for jobs. So, what does this might imply? This might imply that more resources are being used up to increase the level of welfare.

Therefore, one theory seems to predict that the economic growth must be rapid enough to provide employment for new job seekers in order to keep the average income level from stagnation or declining. On the other hand, as Okun reasoned, a high rate of unemployment in a certain country is typically associated with idle resources. Hence, in such situation, one would expect that the real GDP or output to be below its potential. Therefore, we can say that the issue of the direction of causality between the two economic variables—unemployment and GDP---- still remains unsolved.

In the sixties and seventies, the relationship between GDP growth and unemployment rate was clear and undisputed (Walterskirchen, 1999). However, during the eighties

and nineties, most politicians and mainstream economists have been arguing that this relationship is very unstable, hence illustrate the limitations of Okun's law. However, the experience of the US in the nineties seems to not support this view.

This study is meant to contribute further to the literature since empirical study of the causality between unemployment variable and GDP is limited. Hence we would like to fill up the gap by looking at employment trend in Malaysia for the period starting from 1998 using LRSM technique. Section 2 and 3 in this paper indicate the major objective of the study followed by theoretical answers to the issue. Section 4 and 5 discuss the literature review and the methodology used to analyze our data. Empirical results and discussion are in section 6. Lastly, conclusion, policy implications, and suggestions for future research are given in the last section.

2. Main Objective(s) / Issues(s):

Essentially, the purpose of this paper is to test the lead-lag relationship between real GDP per capita as a representation of economic growth and unemployment rate in Malaysia since it is always thought of as two sides of the same coin. To achieve this objective, certain control variables have been selected which includes inflation and exchange rate. Thus, we also seek to find empirical evidence on the linkages among all variables. Therefore, the exact pattern, interaction, and which variables are dominant can assist various parties in making decisions.

3. Theoretical Framework / Answer(s):

Macroeconomic theory provides us with relatively few models linking the unemployment rate to GDP growth (Noor et. al., 2007). According to Okun's Law, the long-run relationship between GDP growth and unemployment should be a negative one. This theory stated that for every one point increase in the unemployment rate, a country's GDP will be at roughly three percentage points of

negative growth in real GDP. Nevertheless, in another version, Okun's observations suggested that both past and current output can affect current unemployment. Thus, there is no clear cut answer as Okun's Law only serves as a "rule of thumb". On the other hand, according to Phillips Curve, the theory predicts that in the short run, when inflation is high, unemployment will be low. In the long run, however, both these variables are not correlated.

The relationship between exchange rate and unemployment is expected to be positive. For example, higher exchange rate volatility will influence higher unemployment rate vice versa. On the other hand, rising unemployment highlights the slower economy and a possible devaluation of a country's currency due to lower confidence and declining demand.

Therefore, all variables that are taken into this study seem to have theoretical relationships. Based on GDP formula; GDP = C + I + G+ (EX - IM), the components of GDP can be broken down into total consumption (C), total investment (I), total spending by government (G), and net exports (EX – IM). Theory predicts that exchange rates and inflation can influence these components. For example, local currency depreciation would likely to lead to enhancement of foreign investment flow into that country's economy. Nevertheless, we should not leave it to pure theoretical argumentation and let empirical data determine as to whether this intuition is correct as there is no exact answer to the lead-lag relationship between these variables.

4. Literature Review

In one study, the researcher seeks to investigate the movement of unemployment rate and the long and short term relationships between unemployment rate and growth rate. Sample was collected in European countries from the period of 1977-2008 using annual balanced panel data. Results indicated the validity of Okun's Law and the significant relationship between unemployment rate and GDP growth rate vary between countries.

According to Walterskirchen (1999) who conducted a research to investigate the relationship between GDP employment, and unemployment in UE, his findings indicated that there is a strong negative linear correlation between real output growth and the change in unemployment rates. Thus, he mentioned that the prejudice that Okun's Law lost its explanatory power cannot be maintained after thorough empirical analysis. Method that was adopted was time series-analysis for individual EU countries and international cross-country analysis.

On the other hand, Berument and Dogan, (2006) studied whether or not macroeconomic policy shocks have different effects on overall unemployment. Their empirical observation illustrated that monetary policy instruments do not affect the total unemployment in Turkey but income policies, and unemployment itself, might be the main factors that affect the behavior of total unemployment. VAR model is used to estimate the effects of real GDP, price, exchange rate, and interbank interest rate as explanatory variables on unemployment for a period from 1988:01 to 2003:04.

In another study, the effect of unemployment rate on per capita real GDP in Iran for the period 1971 to 2006 using Auto-Regressive Distributed Lag (ARDL) is examined. According to the results, unemployment rate has a significant and negative effect on per capita real GDP in both long and short run. Other control variables which are Consumer Price Index (CPI), physical capital, and ratio of government expenditure to GDP are also statistically significant in influencing GDP in the long run.

Another study seeks to determine the impact of exchange rate volatility in industrial countries on unemployment. The study focused on time-series data in which 17 industrial countries are selected as sample from the period of 1982 to 2003. Using GARCH as method to analyze the variables, his results indicated that higher exchange rate volatility significantly increases the unemployment rate in the following year. However, the magnitude of the effect is small.

A study was also conducted on 20 industrial countries to analyze the impact of inflation volatility on unemployment. Inflation volatility is measured by the average SD of the annual percentage changes in the Gross Domestic Product (GDP) deflator. Results suggested that all estimates for the inflation volatility variables are statistically significant. Therefore, this study depicted that increased volatility is associated with a rise

in unemployment rate. The effects appear to be small in a short run but medium in the long run. Thus, his study contradicted with the theory that when inflation is high, unemployment will be low.

Based on previous empirical findings, it can be understood that even data did not give the clear cut answer to our questions. Knowing the existence of these relationships alone does not seem to answer our question. Results are there but the results seem to be contradictory and using different methods. Thus we have taken data from Malaysia to address the issue by applying the eight steps techniques that will be discussed in the following section.

5. Methodology Used

In testing the relationship between real GDP per capita and unemployment, we adopted the standard time series technique as it is an improvement on the Ordinary Least Square (OLS) technique. It tests theory and also tests causality. Besides that, in this technique, we kept the variables non-stationary unlike the OLS method that assumed all variables must be stationary. Non stationary means that the mean, variance, and covariance with its lags are not constant. Therefore, to test the lead-lag relationship we would apply the following procedures.

The first step involves determining the stationary of variables used. In the level form, all the variables are transformed into log while in the differenced form, each variable is created by taking the difference of their log forms. For instance, DCPI = LCPI – LCPI(-1). In the original level form, the variables should be I(1), which implies non-stationary and in the difference form the variables should be I(0) in which means it is stationary. Augmented Dickey-Fuller (ADF) test is then conducted for both level and difference form to test the stationarity. In addition, we also applied an additional test to test the stationary of variables which is Phillips-Perron (PP). This test takes care of both autocorrelation and heteroscedasticity problem.

In the second step, the order of vector auto regression (VAR), which is the number of lags to be used is determined. We also run the diagnostic test to check for serial correlation between variables. The next step deals with testing whether the variables are moving together in the long run. We adopted two cointegration test which are Johansen test and Engle-Granger test. However, knowing this relationship cannot tell us which variable is causing which (leader/follower). Hence, we will go to step four (LRSM) first in testing the long run coefficients of the variables before we proceed to find out the exogeneity and endogeneity of the variables in step five that is vector error correction model (VECM).

The sixth step (Variance decomposition-VDC) will decompose the variance of forecast error for each variable into proportions attributable to shocks from each variable in the system, including its own shock (variable-specific shock). We first apply the orthogonalized VDCs and then the generalized method to get the results. The variable that is least endogenous is the one whose variation is explained mostly by its own past. Step seven (Impulse response function-IRF) basically gives the same information as step 6 except that it is presented in graphical forms. The last step in this time series technique is persistent profile. It illustrates the period to which the variables will return to equilibrium when the whole system is shocked (system-wide shock).

The type of data used in this study is time series data which was collected quarterly starting from the period of 1998:Q1. The total number of observations involved is 61. The source of the data is collected using Datastream software. There are four variables used in this study. The definition of each variable is described below. The definition is taken online from 'Trading Economics' website.

i. **Real GDP Per Capita (GDP)** - The value of all goods and services produced in a country in a given year divided by the average population for the same year.

ii. **Unemployment Rate (UNEM) –** The number of people actively looking for a job divided by the labour force.

iii. **Inflation (CPI) –** Refers to general rise in prices measured against a standard level of purchasing power. Inflation is measured by Consumer Price Index (CPI), which is the standard measurement of inflation used in the US.

iv. Exchange Rate (EXC) – The current market price for which one currency can be exchanged for another.

6. Interpretations/Discussions

6.1 Testing Stationary of Variables

We begin the empirical testing by determining whether the variables used are stationary or not. Results for both level and difference form are summarized as below:

Variable	Test Statistic	Critical Value	Implication
Variables in level Form			
LUNEM	-2.9601	-3.5005	Variable is non-stationary
LGDP	-2.2545	-3.5005	Variable is non-stationary
LCPI	-2.5979	-3.5005	Variable is non-stationary
LEXC	-2.6455 (AIC) -2.3018 (SBC)	-3.5005	Variable is non-stationary
Variables in Difference Form			
DUNEM	-7.4346	-2.9215	Variable is stationary
DGDP	-4.4547	-2.9215	Variable is stationary

DCPI	-5.6084	-2.9215	Variable is stationary
DEXC	-3.0611 (AIC) -4.9602 (SBC)	-2.9215	Variable is stationary

Based on the results, we refer the highest value of AIC and SBC in order to compare the test statistic with the 95% critical value of ADF statistic. In some cases, the highest values are different for AIC and SBC but this is not an issue as in all cases, the implications are consistent. For example, this happened to variable LEXC. The null hypothesis is rejected when the test statistic is bigger than the critical value and vice versa.

In addition to the ADF test, we also run the PP test and results are presented as in the table below:

Variables	**P-value**	**Implication (at 10%)**
Variables in Level Form		
LUNEM	0.010	Variable is stationary
LGDP	0.007	Variable is stationary
LCPI	0.810	Variable is non-stationary
LEXC	0.004	Variable is stationary
Variables in Difference Form		
DUNEM	0.000	Variable is stationary
DGROWTH	0.000	Variable is stationary
DCPI	0.000	Variable is stationary
DEXC	0.000	Variable is stationary

According to the table, it can be observed that only one variable is non-stationary in the level form which is CPI, whereas in the difference form all variables are stationary. Although results in the level form in PP test are not in favor to what we wanted, but we would be based on the ADF test and therefore proceed to the next step.

6.2 Determination of the Order of the VAR Model

In the second step, we determined the order of (VAR), by taking variables in their log differenced form. At first, a relatively high order of VAR that is 6 is selected. Based on statistical analysis, results showed that Akaike Information Criterion (AIC) recommends order 6 but Schwarz Bayesian Criterion (SBC) favours zero lag.

	Choice Criteria	
	AIC	**SBC**
Optimal Order	**6**	**0**

Nevertheless, we decided to assume lag 2 as the order of VAR as the number of observation in this study is short. Order 6 is not possible to be chosen as this would lead to losing more degrees of freedom. Next, we examined if there exists serial correlation in each variable. The results are shown in the next table.

Variable	**Chi-Sq p-value**	**Implication (at 10%)**
DUNEM	0.309	There is no serial correlation
DGDP	0.522	There is no serial correlation
DCPI	0.461	There is no serial correlation
DEXC	0.020	There is serial correlation

As indicated by the table, diagnostic test depicted that most of the variables are correct, except for DEXC. Therefore, we would proceed to the test of cointegration in the next step.

6.3 Testing Cointegration

Once we have already determined that the variables are in I(1) which means non-stationary, and select the order of VAR, we will now proceed to test the long run relationship between all variables. As depicted in the table below, the test statistic is lower than the critical value at one cointegrating vector for both Maximal Eigenvalue and trace criteria. This means that each variable contains information for the prediction of other variables.

Criteria	Statistic	Critical Value	Number of cointegrating vectors (r)
Maximal Eigenvalue	23.0417	25.4200	1
Trace	35.2420	42.3400	1

In addition, we also did the Engle-granger test to test the stationary of the error term. The difference with Engle-Granger test is that it can only identify one cointegration whereas Johansen test can identify more than one cointegration. Looking at the highest AIC, the test statistic seems to be higher than the critical value, which means the variable is stationary, which implies that the gap is narrower. Hence we shall reject null hypothesis that said there is no cointegration. The result of Engle-Granger test is summarized as below.

Criteria	Statistic	Critical Value
AIC	-4.8081	-4.3283

Basically, results in both tests intuitively suggest that the relationship among variables is not spurious, and that they are equilibrium in the long run. Therefore, the evidence of cointegration has implications for portfolio diversification by the investors, and for the extend of effectiveness of government's short run monetary, fiscal, and exchange rate stabilization policies. Other than that, cointegration also has implications for the coordination of the policies of the multinational firms.

6.4 Long Run Structural Modelling (LRSM)

Next, we shall then proceed to test the long-run coefficients of the variables against the theoretically expected values in the exact-identifying stage and over-identifying stage to check whether the variables are statistically significant or not. Since the main focus of this study is to identify the causal linkages between GDP growth and unemployment, we do normalization on the GDP variable by making it equal to one. For example, A4=1. When we imposed the exact

identifying restriction and calculate the test statistic, it is found that only Consumer Price index (CPI) variable is significant.

Variable	Coefficient	Standard Error	t-ratio	Implication
UNEM	0.044443	0.036604	1.21416	Variable is not significant
GROWTH	-	-	**-**	-
CPI	0.27688	0.13831	2.00188	Variable is significant
EXC	0.0071906	0.055846	0.12876	Variable is not significant

Thus, we then impose the over-identifying restriction by making the not significant variables A1 = 0; and A3 = 0. Based on the table below, it can be observed that the Chi-Square p-value for both variables is more than 10%, thus we accept the null hypothesis which stated that our restriction is correct.

Variable	Chi-Sq p-value	Implication
DUNEM	0.244	Variable is not significant
DEXC	0.898	Variable is not significant

From the above analysis, we arrived at the following cointegrating equation:

GROWTH - 0.044443UNEM + 0.27688CPI + 0.0071906EXC -0.0014331TREND $\rightarrow$I(0)

Nevertheless, this cointegrating equation reveals nothing about the causality, that is, which variable is the leader and which one is the follower. Hence, we will proceed to the next step to answer this question.

6.5 Vector Error Correction Model

In this fifth step, firstly we shall assume that all variables are endogenous (dependent) before running the test. After examining the error correction term, $e_{t-1,}$ for each variable, and checking whether it is significant, we found that there is only one dependent variable, GDP, as depicted in the table below. This tends to indicate that UNEM, CPI, and EXC are the drivers and GDP responds to those variables. The significant error correction term also implies that if there is a shock, GDP will absorb the shock and then get back to equilibrium following the ECM (long run combination of all non stationary variables).

Variable	**ECM (-1) t-ratio p-value**	**Implication**
LUNEM	0.925	Variable is exogenous
LGDP	0.000	Variable is endogenous
LCPI	0.645	Variable is exogenous
LEXC	0.315	Variable is exogenous

The VECM produces a statistic that may be of interest to investors because they can better predicts the expected results of their investments by focusing on the exogenous variables. This is because inflation and exchange rate could influence foreign direct investment (FDI) flow that can affect their bond or stock price. In addition, regulators and policymakers would be interested to know the variables they should target in order to result in the movement of the follower variable. Thus, results imply that policymakers can closely monitor their economic growth in order to stimulate a robust economy. The ECM also helps us to differentiate between short term and long term components. The long term information is preserved in the error correction term. The impact of each variable on other variables in the short run is given by the F test of the joint significance/insignificance of the lags of each of the differenced variables.

The coefficient e_{t-1} can also tell us the speed it will take to get back to long term equilibrium if that variable is shocked. For example, the coefficient of unemployment is 0.925. Thus, when a shock is applied to this variable, it would take about 1.08 quarter for the variable to restore the equilibrium.

6.6 Variance Decomposition (VDC)

In VECM, we have established that UNEM is the exogenous variable. Nevertheless, we have yet to find the relative exogenous/endogenous between variables. Thus, we first apply the orthogonalized VDCs and chose the horizon 17 for analysis. Results are shown in the table below. The strongest variable will depend on itself to get back to equilibrium.

Orthogonalized VDCs Forecast at Horizon = 17

	EXC	CPI	UNEM	GDP
EXC	94.61%	0.51%	1.84%	3.04%
CPI	0.19%	99.1%	0.41%	0.31%
UNEM	3.02%	0.36%	95.05%	1.57%
GROWTH	0.37%	7.23%	20.66%	71.75%

Based on the statistical results, CPI is the most exogenous variable with 99.1% contributed from its own shock compared to other variables. The highlighted diagonal pattern is the relative exogeneity; CPI being the most exogenous, and GDP being the least exogenous, therefore most endogenous. This is seen by how much the variable is explained by its own past.

However, the orthogonalized version assumes that when a particular variable is shocked, all other variables in the system are 'switched off'. In fact, it also depends on the particular ordering of the variables in the VAR. This result may not be accurate. Although it is easier to do but it can sometimes give a wrong or biased results, which is bias towards the first variable in the cointegrating model. Realizing this fact, we apply the generalized VDCs method as this version does not make such an assumption of all other variables 'switched off'. It also does not depend on the particular ordering of the variables.

Referring to the table below, the contribution of their own shocks towards explaining the forecast error variance of each variable is as follow: UNEM (76.40%), GDP (76.13%), CPI (97.62%), and EXC (93.36%).

Generalized VDCs Forecast at Horizon = 17

	EXC	CPI	UNEM	GROWTH
EXC	93.36%	0.87%	5.53%	0.24%
CPI	0.19%	97.62%	2.15%	0.04%
UNEM	2.39%	0.37%	76.40%	20.83%
GROWTH	0.31%	6.02%	17.55%	76.13%

Based on the reason explained earlier, we shall rely on generalized method to rank the relative exogeneity as this method is closer to the real world. These results strengthen our earlier findings in the VECM steps that unemployment rate leads rather than lag real GDP per capita.

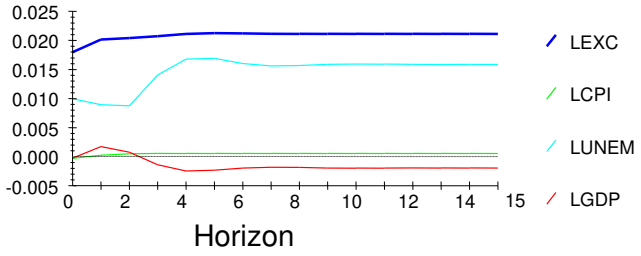
Variable Relative Exogeneity

No	**Rank**
1	**CPI**
2	**EXC**
3	**UNEM**
4	**GDP**

6.7 Impulse Response Functions (IRF)

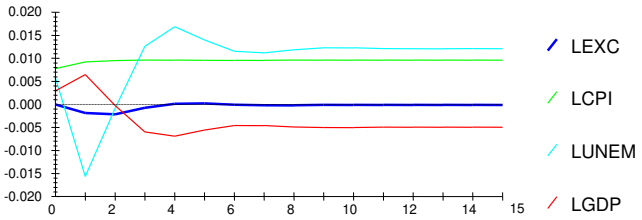
The IRF basically provides the same information as VDC except that in VDC, the results are generated in numerical forms but in IRF, results are in figural forms. Another difference between IRF and VDC is that in VDC, we are looking at the strength of a variable when we shock that variable, whereas in the IRF step, we want to see the strength of impact to other variables using graphical forms. Graphs below summarized how each variables impacts one another.

Orthogonalized Impulse Response(s) to one S.E. shock in the equation for LEXC



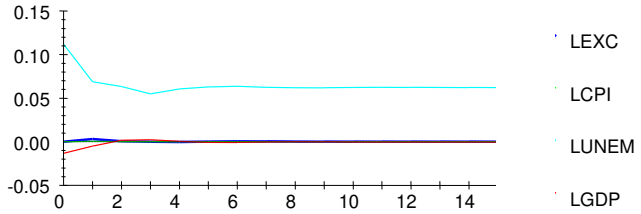
Horizon

Orthogonalized Impulse Response(s) to one S.E. shock in the equation for LCPI



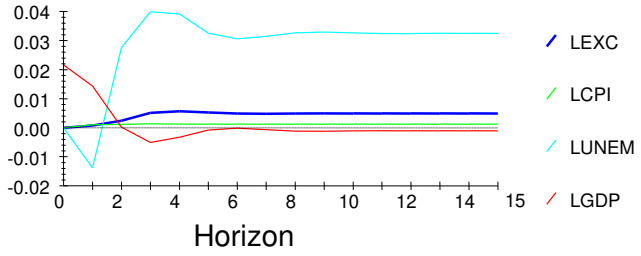
Horizon

Orthogonalized Impulse Response(s) to one S.E. shock in the equation for LUNEM



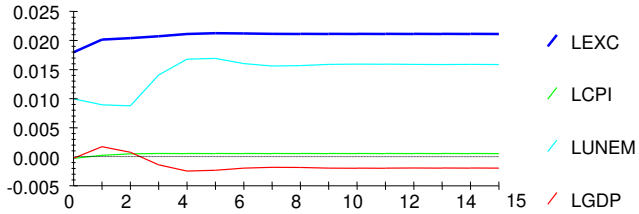
Horizon

Orthogonalized Impulse Response(s) to one S.E. shock in the equation for LGDP



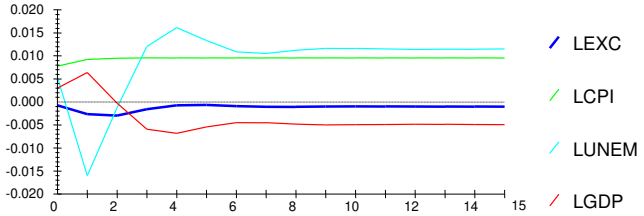
Horizon

Generalized Impulse Response(s) to one S.E. shock in the equation for LEXC

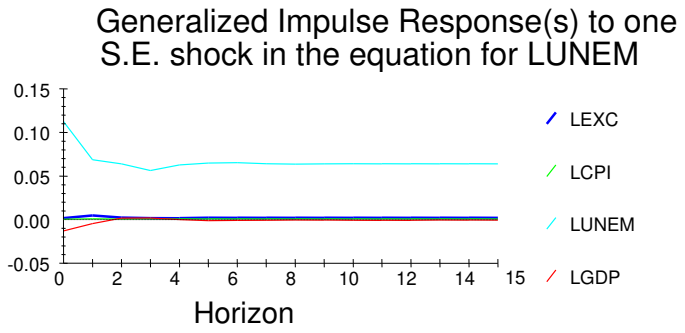


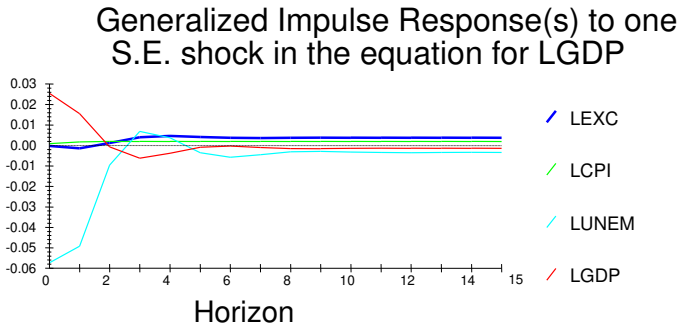
Horizon

Generalized Impulse Response(s) to one S.E. shock in the equation for LCPI



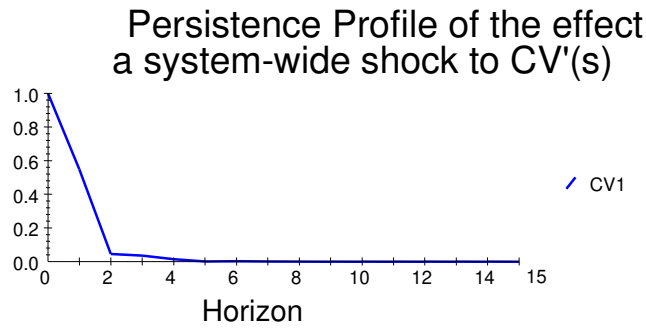
Horizon





6.8 Persistence Profile

The IRFs through VDCs illustrates a situation of a variable-specific shock. However in this step, the whole cointegration situation is shock in which the shock comes from outside source. The graph will indicate how long it will take for the equilibrium to be restored. Based on the graph, it would take approximately five periods/quarters for the cointegrating relationship to get back to equilibrium following a system-wide shock.



7.0 Conclusions

The focus of this study is to test the possible direction of causality between unemployment rate and real GDP per capita in Malaysia. Thus, in a developing county like Malaysia, it seems that unemployment variable is relatively more exogenous or leading and the GDP variable relatively more endogenous or lagging. We also bring in other control variables which are exchange rate changes and inflation. Results seem to favor theory/intuition and other empirical findings which indicated there is a negative correlation between the two variables. This implies that it is more likely than not that one of the keys to economic growth is to reduce the unemployment. Answering to our objective, the empirical analysis also seems to suggest that inflation and exchange rate are also the drivers that could impact real GDP per capita in Malaysia. Finding of relationship between inflation and unemployment seems to contradict with Phillips theory that said in the long run, there is no relationship between those variables. Other than that, results tend to be in line with theories.

Based on the ranking of exogeneity in step six, inflation seems to influence all other variables, the second leader is exchange rate, followed by unemployment, and lastly GDP. There are several interpretations to this finding. Based on knowledge and intuition, higher inflation means that inflation is more volatile, which implies greater uncertainty. This would lead to reduced GDP, because it lowers consumerism, promote unemployment, and reduce import and export. The movements of exchange rate could also affect demand, output, investment, and employment rate. Higher exchange rate volatility is likely to induce firms to delay job creation since volatility of exchange rates raise the uncertainty of future earnings.

Appreciated exchange rate might lead to a fall in net exports (as the foreign price of Malaysia exports will become more expensive), and consequently, a reduction in demand and outputs may cause job losses as business seek to control costs. This would eventually lower the GDP growth. Similarly, currency depreciation may be associated with reduction in production costs relative to those of its foreign counterparts. FDI would flow to that country because the foreign assets currently appear to be cheap relative to their expected future income. This would increase employment opportunity as firms seek for more workers. Hence, according to our intuition and this empirical evidence, we are more likely to imply that increased inflation and exchange rate might reduce workers' instability and therefore affects their job performance. In addition, rising inflation and volatile exchange rate could lead firms to cut costs such as the need to ensure their workers have the necessary skills and training to perform their job effectively. This in turn could restrict the country's economic growth.

7.1 Policy Implications

The lead-lag relationship between GDP and unemployment is very important for policy makers in order to obtain a sustainable rise in living standards. Thus, efforts have to focus on increasing full potential and to reduce unemployment to the minimum rate so that the economic growth can further be expanded.

This study also seeks to benefit various stakeholders such as firms, jobseekers, investors, and as important especially for policy makers to make decision on growth policies to boost the country's growth and competitiveness in Malaysia. Thus, policymakers can hit the endogenous variable as it can adjust to the leading variables.

Government can be creative in creating new jobs and intensive techniques. Thus, the knowledge of the relationship between unemployment and growth is regarded as benchmark for policymakers to monitor their policies as rising inflation, high exchange rate volatility, and unemployment are the obstacles to a persistence and sustainable economic growth.

7.2 Limitations

One of the weaknesses of this study is that the data used are not long enough as it involved only 61 observations due to unavailability of consistent data for all variables. Besides, our technique that was applied still made the linear line assumption that is not correct. Thus, there is a need for a technique that is free from any restrictive assumptions. In addition, the causality only involves a few economic variables and there are other variables that can be included that might give different results.

7.3 Suggestions

The relationship between GDP and unemployment rate can further be scrutinized by investigating the unemployment rate in several industries. To compare with this study and in order to find more evidence, it might also be worthwhile to study separately the relationship between inflation and exchange rate on unemployment in other Asian countries.

References

Andrei, D. B., Vasile, D., Adrian, E. (2009),The Correlation between Unemployment and Real GDP Growth. A Study Case on Romania, *Annals of Faculty of Economics*, University of Oradea, Faculty of Economics, 2(1), 317-322

Berument, H., Dogan, N., and Tansel, A. (2006), Economic Performance and Unemployment: Evidence from an Emerging Economy. *International journal of Manpower,* 27(7), 604-623.

Bisping T. and Patron, H. (2005), Output Shocks and Unemployment: New Evidence on Regional Disparities, *International Journal of Applied Economics*, 2(1), 79-89.

Ewing B. T., Levernier, W. and Malik, F. (2002), The Differential Effects of Output Shocks on Unemployment Rates by Race and Gender, *Southern Economic Journal*, 68(3), 584-599.

Farsio, F. and Quade, S. (2003), An Empirical Analysis of the Relationship between GDP and Unemployment. *Humanomics*, 19(3), 1 - 6

Freeman, D. G. (2000), Regional Tests of Okun's Law, *International Advances in Economic Research*, 6(3), 557-570.

Johansen, S. (1991), Estimation Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models, *Econometrica,* 59(6), 1551-1580.

Masih, M., Al-Elg, A., and Madani, H. (2009), Causality between Financial Development and Economic Growth: An Application of Vector Error Correction and Variance Decomposition Methods to Saudi Arabia. *Applied Economics,* 15(2), 1691-1699.

Meidani, A. A. N, and Zabihi, M., (2011), The Dynamic Effect of Unemployment Rate on Per Capita Real GDP in Iran. *International Journal of Economics and Finance,* 3(5), 170 – 177

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

Zaleha M. N., Norashidah M.N., and Judhiana A. G. (2007), The Relationship between Output and Unemployment in Malaysia: Does Okun's Law Exist? *International Journal of Economics and Management.* 1(3), 337-344.