OIL PRICES AND UNEMPLOYMENT RELATIONSHIP IN SWEDISH ECONOMY

Ezatullah Najimi[1], Md. Abu Naim Shorkar[2]

[1]School of Economics, Shanghai University, Shanghai, CHINA.

[1]ezat.najimi@icloud.com, [2]naim.shorkar@outlook.com

ABSTRACT

The purpose of this paper is to figure out whether there is any relationship between the price of oil and the unemployment rate and to examine how the price of oil affects the unemployment rate considering the Swedish economy. The main objective is to see if a change in the oil price will cause a change in unemployment. I perform linear regression analysis relating current changes in the variables unemployment as independent variable and prices of oil as a dependent variable to conclude if there exists a relationship and ARDL model and Granger Causality has been applied to test the volatility of oil prices causes changes in the unemployment rate. To find out the relationship between these two variables, I have used Swedish unemployment and oil prices data from 1983 to 2017. The result has been received from the linear regression test on current changes that showed a relationship between the price of oil and unemployment in Sweden. In the linear regression relating to current changes in these variables, a positive relationship was indicated. The ARDL and Granger Causality test certifies the impact of oil prices on the unemployment rate.

Keywords: Unemployment, Oil Prices, Sweden, ARDL.

INTRODUCTION

Oil has the most significant role in our daily life especially when it comes to transportation. Oil, because of its vast usage in different areas for various purposes and its extreme demand for driving numerous operations and its effect on the economy of the globe, is a unique commodity with scarce resources. The Middle East is the largest oil extraction region of the world, where most of the countries of the region have been witnessed the existence of terrorists, civil war and conflict of different local parties, battle and military interventions of the world's superpower countries, and dictatorships. Hence the region (Middle East) provides most of the world's oil supply, which, therefore, affects the political relationship of those oil-dependent countries with Middle East countries. Consequently, the limited resource of oil to Middle East countries made the political instruments which need to be treated carefully to maintain the good political and economic relations with those of oil-exporting countries. As the economy of the countries especially those which are dependent on oil-exporting counties, through the history have been faced huge economic crises due to oil prices shocks and dragged down large economies into great recessions.

Most of the researchers focused their studies concerning the relation of these two variable unemployment and oil prices consider the US economy. In this paper, I am investigating the relationship between these two variables considering the Sweden economy by using the Swedish unemployment rate and the oil prices to figure out whether the oil prices can affect the unemployment rate of Sweden or not as different countries use different masseur of

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

unemployment. Although most of the countries of the world are dependent on oil with deferent degrees of dependency which therefor will present the sensitivity of countries in response to oil price shocks, the more dependent a country to oil the more the economy of the country will be effect by the oil prices shocks. Based on a survey, on average an American consumer uses more oil than an average Swedish consumer. This shows the U.S is more dependent on oil and will be more sensitive to oil price shocks consequently U.S economy will be more effected compare to the Swedish economy.

The Swedish government, to keep its economic growth requires to deal with numerous issues including being alert of oil price volatility and its future effects on the Swedish economy. To maintain its economic growth and not to be affected by the oil prices shocks the government and policymakers have to make their decision based on the oil prices and its trend. Of course, oil prices are not the only factor to be considered while making a decision or implementing macroeconomic policies but an important factor of an economy cannot be ignored as well. Likewise, other industrial countries, Swedish industry is also oil-dependent, and the oil price volatility will affect the industry and the increase of oil prices or decrease of oil supply which then increases the oil prices can have a major effect on their production cost and even production level which consequently affect the unemployment rate.

Due to the increment of taxes on gasoline made by the government, have been threatened by many large Swedish industries to stop their operation in Sweden. As the increment of the taxes increases the oil price prices which therefore increases the cost of production so the companies will shift their production to other countries which have relatively lower production costs, consequently that effects the unemployment rate in Sweden to increases. This paper investigates the relationship between unemployment and oil prices considering the Swedish economy. It's important to know this relationship; Sweden likewise the other industrial countries are sensitive in response to changes in oil price and to the decision of OPEC which affects the supply of oil price; The decision to lower the oil supply increases oil price, consequently affects the production level and other economic variables including unemployment mainly to be increased a year later of the current volatility in oil supply.

LITERATURE REVIEW

A researcher has made several studies investigating the relationship of these two variables unemployment and oil prices to figure out the existence of any significant measurable relationship of oil prices on the unemployment rate and overall economy as general using different approaches and model considering the various economy of the world and contrasting results have been reported. James D. Hamilton was one of the first persons who investigated the relationship between oil prices and how it can affect the macroeconomic variables. He reported a positive relationship between the oil price increment and economy recessions of the U.S. since World War II through his investigation in 1983. Though he did not argue that an increase in oil price was the only reason for the recessions but presented a statistically significant relationship. He predicted that the U.S economy was dragged down into recession ninth months after the oil price shock. To study the relationship, he has developed three different hypotheses in his paper for investigating the correlation.

Hypothesis 1: The correlation represents a historical coincidence; that is, the factors truly responsible for recessions just happened to occur at about the same time as the oil price increases.

Hypothesis 2: The correlation results from an endogenous explanatory variable; that is, there is some third set of influences that caused both the oil price increases and the recessions.

Hypothesis 3: At least some of the recessions in the United States before 1973 were causally influenced by an exogenous increase in the price of crude petroleum (Hamilton, 1983).

Hamilton (1983) for his empirical work of the paper he used the data form the period 1984-1972. Consequently, he rejected the null hypothesis for his fist hypothesis of the paper concludes that there was a positive relationship between oil price increment and the recessions. Therefore, he ascertained that there must be a systematic relationship as long as there was no evidence certifying the historical coincidence.

After examining the second hypothesis of the study he found out the existence of no other factors he was considering that could be the reason for oil increment and thus the economic recessions. To examine the above mention hypothesis, he considered six different economic variables that could also be the reason for the recessions: Real GNP, unemployment, implicit price deflator, for non-farm business income, hourly compensation per worker (wages), import prices and money supply. None of these variables individually or collectively showed any behavior that could be the reason for the oil increment by examining all these variables one year before the oil price shock. By rejecting the first two hypotheses, Hamilton had enough evidence to support the third hypothesis, that oil price shock was the reason behind some recessions during 1984-1972. Although there was not sufficient evidence to certify that the recession was only caused exactly by the increment of the oil price. "Nor is it to assert that this correlation should be viewed as an immutable structural relation. Changes in expected inflation, the response of monetary policy to oil shocks, or the regime in which oil prices are determined could be expected to give rise to a different dynamic pattern" (Hamilton, 1983).

Oil Consumption

The world's most populated countries like China and India have more demand for oil consumption putting more pressure on oil demand than before as their population is getting increased and which thus increases the scope of oil demand. Oil consumptions in China and India on average per person is 1.7 and 0.7 barrel respectively, compare that with the U.S and Sweden, on average per person consumes 25 and 13 barrels respectively. It is expected that the oil consumption of India and China will be increased as their economy grow up, therefore the oil production has to be increased accordingly to meet the extra demand for oil that will be created by the growth of these two fast-growing economies otherwise will push the oil prices upward.

There are total 65 oil-producing countries of wish oil production of 54 countries have reached to its high capacity and the remaining 5 other countries are expected to reach their maximum level of oil production capacity in next 20 years, finally, the world total production of oil will reach to its maximum level in next 20 years. To maintain the price level high, the Middle East countries which still can increase oil production but keeping the level of production limited.

As the oil resources are scares but with increasing demand, the countries are trying to develop other alternatives to be substituted or at least to reduce the oil consumption, like wind power, solar power, tidal power, hydropower, methanol, and ethanol (Energimyndigheten, 2003). But compared to the oil prices the usage of the other alternatives is costly to be substituted for oil consumption.

Unemployment

Unemployment can be categorized into four following types:

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

i. Cyclical, ii. Frictional, iii. Seasonal, iv. Structural

Cyclical unemployment depends and varies with recessions and expansions in the economy. Cyclical unemployment has a positive relationship with a recession of an economy, as it increases during a recession but a negative relation with economic expansion increases during the expansion of the economy. Frictional unemployment created by normal unemployment though those people who leave their jobs and enter jobs which thus creates frictional unemployment. This type of unemployment is not permanent. Seasonal unemployment created by the changes in weather and varies as the season changes. For example, those who are working as a ski trainer will only be working during the winter season and will be counted as unemployed in another season which seasonal unemployment.

Structural unemployment is mainly created and increase with development of the new technology and due to higher level of international completion; as the new technology is to be replaced for those labour and will definitely have higher output efficiency and thus those jobs will be disappeared consequently people start looking for other jobs or starting improving their skills (Foundations of Macroeconomics, 2003). When there is only structural, seasonal and frictional unemployment that unemployment is a natural unemployment rate and full employment in the economy exists when there are only these three types of unemployment (Bade & Parkin, 2003). The unemployment rate of an economy can be obtained by dividing the number of people unemployed to the size of the labour force of an economy.

Unemployment in Sweden

During the 1990s the unemployment reached a high level in Sweden during its history. Compare to other countries, during 1980 when the inflation rate was extremely high and thus salary and prices were increasing at a higher level. Therefore, higher salaries made the Swedish industries less competitive and consequently Swedish production was decreased by almost 10% from 1990 to 1992. And the interest rate was increased which decreased the investment and saving rate went up, therefore, the increase in savings decreases the consumption of domestic products. At that time the politician implemented macroeconomic policies targeting higher inflation instead of unemployment level (Anders Forslund, 2003).

Figure 1. Unemployment rate in Sweden 1983-2017

The unemployment rate was dropped by 0.4 % in the year 2016 from the previous year. The rate was being decreased slowly after 2013 when it was measured 8% at that time. The lowest after the year 2000 was recorded in 2007 which reached 6.1 percent at that time. But at the beginning of the European crisis in 2009, the unemployment rate was again increased and reached to 8.3 and continued to be increased for the following years and reached 8.6 percent.in the year 2011, the unemployment rate was again slightly decreased due to a 13 percent decrease in the working-age population. The unemployment rate in Sweden is estimated to continue decreasing in the following years as well. It is forecasted to drop to 6.66 percent by the year 2020.

Equilibrium Unemployment Model

The Shapiro & Stiglitz (1984) model was modified by Alan Carruth Mark Hooker and Andrew Oswald (C, H & O) in the year 1998 to create an equilibrium unemployment model by adding a role for input prices (Carruth, 1998). In the C, H & O model, equilibrium unemployment, U* is a function of five variables, as shown in the following equation:

U* = U*(r, po, b (μ), e, d),
r = interest rate
Po = price of oil
b (μ) = level of unemployment benefits
e = on the job effort
d = probability of successfully shirking at work

Based on the above model, an increase in any of the five variables has a positive effect on equilibrium unemployment, except d, increase of which has a negative effect on U*.

Based on their arguments as the increase in oil prices increases the cost of production and will thus cause less profit to the company. To get back to the equilibrium point one of the variables has to be changed. As the interest rates mainly fixed internationally, labour wages have to be changed. Since unemployment and wages have inverse relation by no-shirking condition, U* must rises. Therefore, the only way that employees will accept the lower wages. So unemployment will increase as the oil prices increases.

EMPIRICAL WORK

Data

To investigate the relationship between these two variables and to figure out whether the changes in oil prices can affect the unemployment rate consider the Swedish economy I have used the quarterly data of oil prices and unemployment from 1983 through 2017. The oil price I have been using for this investigation is an average price taken from the U.S. markets. The currency is in US dollars. The price of oil also has been adjusted for inflation. Figure 7.1 shows the real oil prices and the unemployment rate of Sweden from the year 1983 until 2018.

During the beginning of the 1980s, the price was quite high, but at the end of 1985, the drop was extensive. After 1999 it stayed at a relatively even level except for some small ups and downs. After a big increase in 1999-2000, it has again stayed at a relatively even level. In the graph below it is shown how the price of oil and unemployment follow each other up to 1992 where unemployment increased drastically.

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

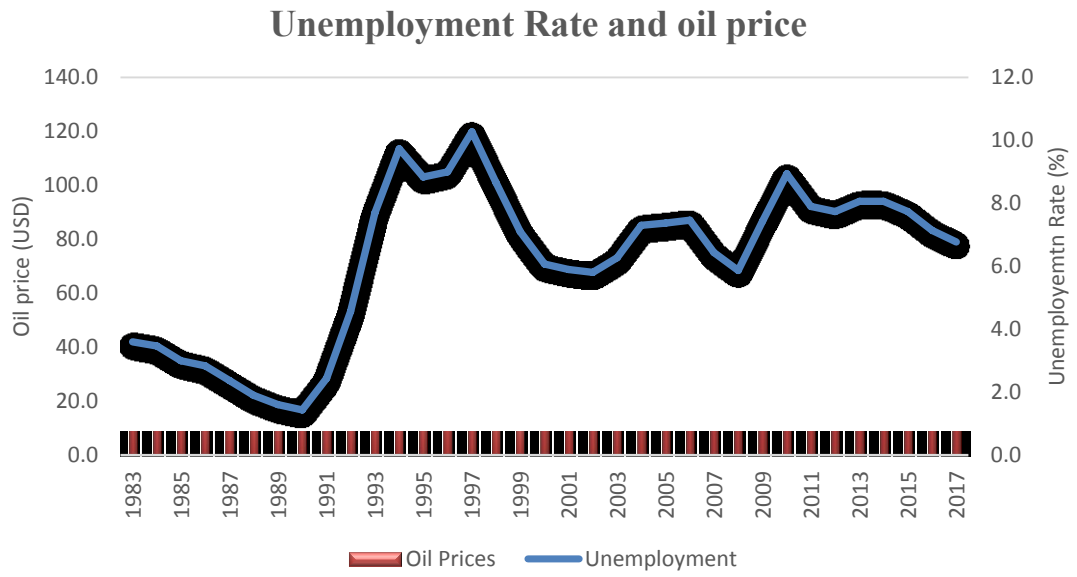


Figure 2. Unemployment rate and the real oil price 1983-2017

Variables

The Oil price and unemployment rate are the Variables in this study where the Oil price is used as an independent variable and unemployment is used as a dependent variable.

Linear Regression

To figure out any relationship between these two variables unemployment as a dependent variable and oil price as an independent variable, simple linear regression has been conducted using the E-view software, the following is the estimated regression equation:

$$\Delta Ut = \propto + \beta \Delta OilPt + \gamma 1D1 + \gamma\ 2D2 + \gamma\ 3D3 + \varepsilon t$$

Where,
Ut = unemployment rate, OilPt = Oil prices, D1 = second quarter, D2 = third quarter
D3 = fourth quarter

Dependent Variable: UNEMP
Method: Least Squares
Date: 11/10/18 Time: 00:30
Sample: 1983Q1 2017Q1
Included observations: 137

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.140112	0.481348	10.67858	0.0000
OILP	0.025602	0.006365	4.022318	0.0001
@QUARTER=2	-0.022925	0.575735	-0.039819	0.9683
@QUARTER=3	-0.041543	0.575847	-0.072143	0.9426
@QUARTER=4	0.010438	0.575615	0.018134	0.9856

R-squared	0.109206	Mean dependent var	6.212409
Adjusted R-squared	0.082212	S.D. dependent var	2.495162
S.E. of regression	2.390397	Akaike info criterion	4.616609
Sum squared resid	754.2475	Schwarz criterion	4.723178
Log likelihood	-311.2377	Hannan-Quinn criter.	4.659916
F-statistic	4.045587	Durbin-Watson stat	0.029585
Prob(F-statistic)	0.003977		

The results of this estimation are shown in table 7.2. To figure out whether there is a relationship between unemployment and the price of oil I set up two hypotheses.

Null hypothesis: there is no relationship between oil prices and unemployment, $\beta = 0$

Alternative hypothesis: there is a significant relationship between oil prices and unemployment that is $\beta \neq 0$.

The p-value for the ΔoilP coefficient estimate is 0.0001 which means that we can reject the null hypothesis at the 1% significance level (0.01>0.0001). By rejecting the null hypothesis, it can be concluded that there is a relationship between the change in the oil price and the change In the unemployment level. That relationship is estimated to be positive.

HYPOTHESES

Considerable connection found between Unemployment and oil prices:

H1: Oil price lags have no impact on the unemployment rate.

H2: Oil price lags have an impact on the unemployment rate.

MODEL

The econometric model of ARDL – Auto Regressive Distributed Lag model is used to examine the relationship between the dependent and independent variables and their respective lags.

$Unemp = \beta 0 + \beta 1 * oilpt\text{-}1 + \beta 2 * oilpt\text{-}2 + \alpha 1 * unempt\text{-}1 + \alpha 2 * unempt\text{-}2 + \varepsilon$
Unemp = Unemployment rate
Oilp = oil prices

RESULT AND DISCUSSION

Graphical Analysis

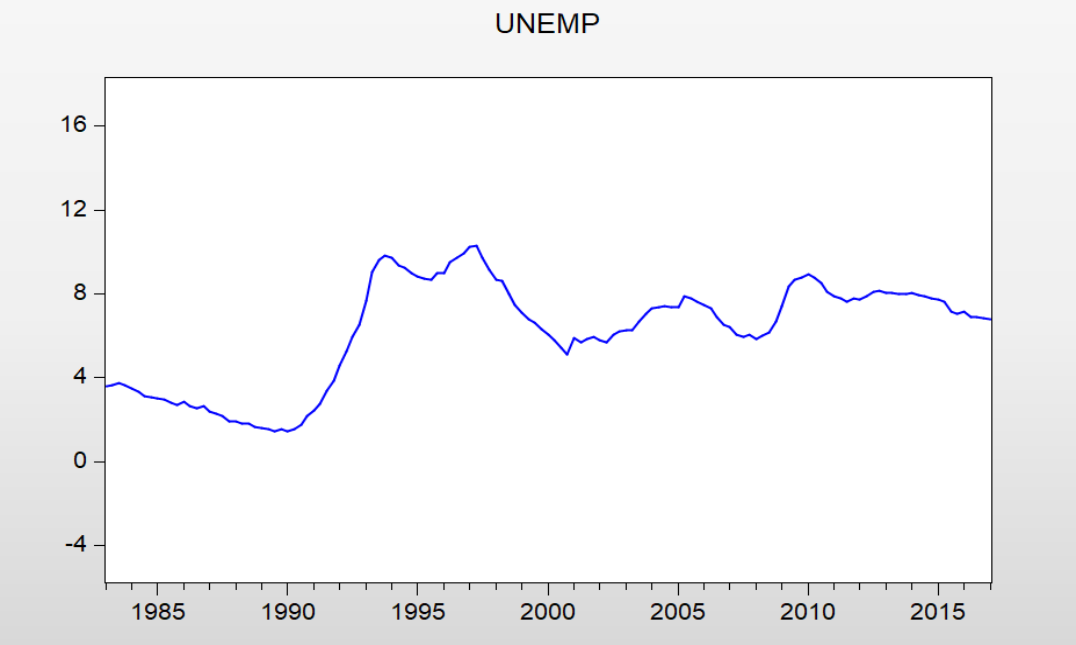


Figure 1: Unemployment rate of Sweden form the first quarter of 1983 till first quarter of 2017.

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

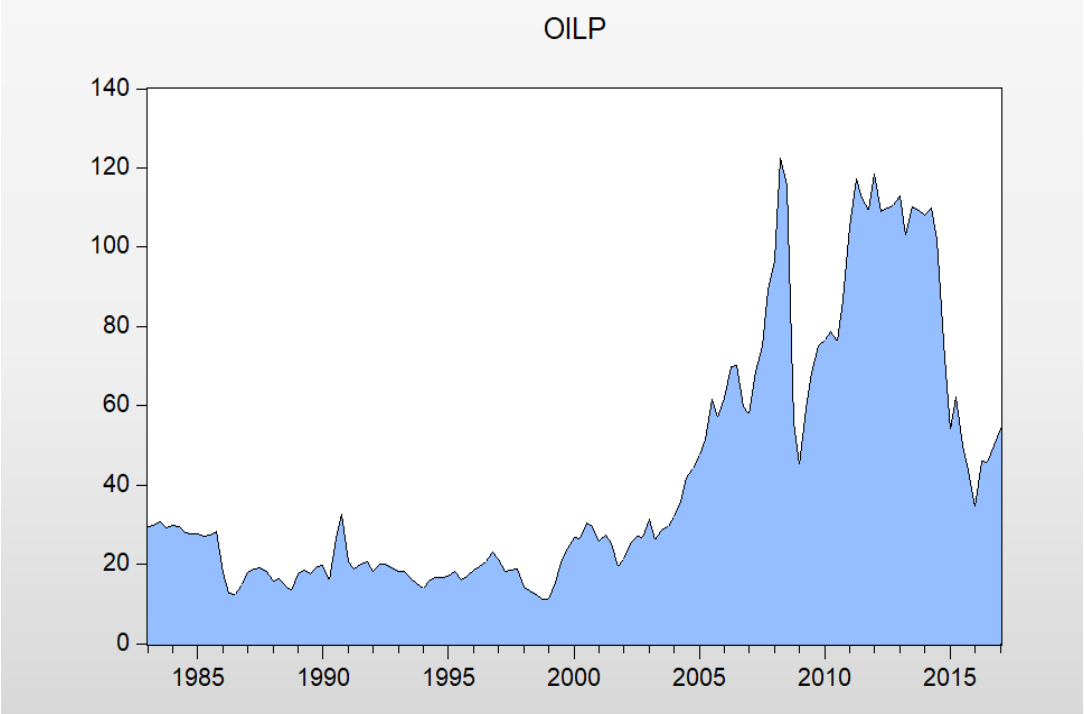


Figure 2: Oil prices in U.S. Dollar form the first quarter of 1983 till first quarter of 2017.

Unit Root Test (ADF Test)

To know whether the variables have unit root (is non-stationary viable) or have no unit root (is stationary variable), a formal investigation of unit root, Augmented Dickey-Fuller (ADF) test is conducted using the student version of E-view software which shows:

Table 1. Augmented Dickey-Fuller Unit Root Test on D(OILP)

Null Hypothesis: D(OILP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.441873	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

After running the ADF – test the results show the OILP is getting rid of unit root at first difference.

Table 2. Augmented Dickey-Fuller Unit Root Test on D(UNEMP)

Null Hypothesis: D(UNEMP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.149969	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

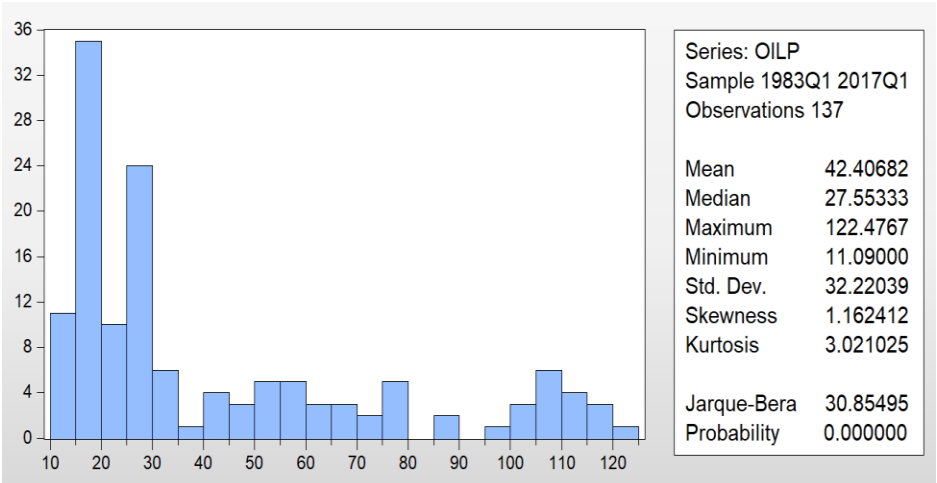
After running the ADF – test the results show the UNEMP is getting rid of unit root at first difference.

DESCRIPTIVE ANALYSIS

Table 3. Descriptive Analysis

	DOILP	DUNEMP
Mean	0.181874	0.023284
Median	0.463333	-0.050000
Maximum	25.80333	1.333333
Minimum	-59.71667	-0.600000
Std. Dev.	8.176309	0.330564
Skewness	-2.936069	1.176048
Kurtosis	24.11018	5.258439
Jarque-Bera	2720.691	60.25313
Probability	0.000000	0.000000
Sum	24.73483	3.166667
Sum Sq. Dev.	9025.025	14.75182
Observations	136	136

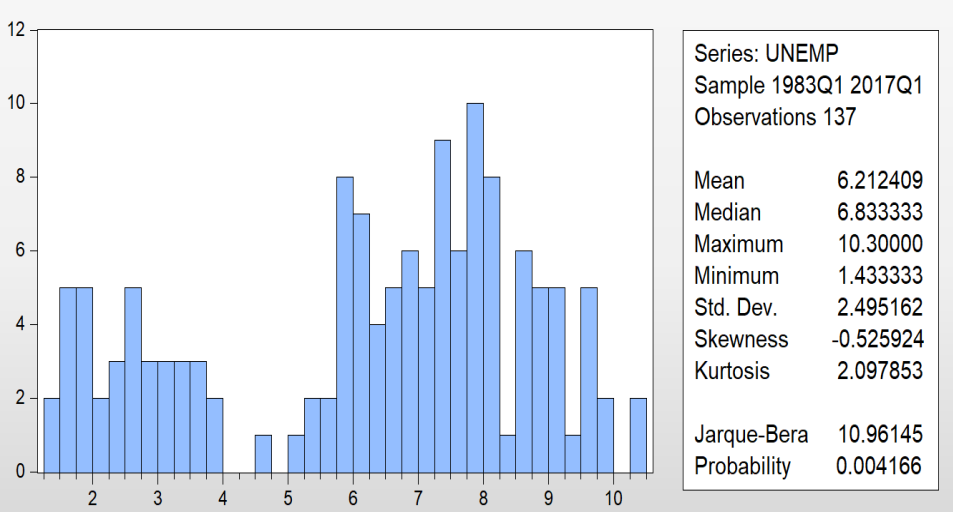
In order to test normality, I run the Jarque-Bera test using the E-view software.



The output shows a p-value (0.00000) of OILP which is less than 0.05, therefore I reject H0 concluding that the variable is not normally distributed. Further, the Skewness value of OILP

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

shows that OILP is positively skewed meaning that it has a long tail toward small value in the right. Moreover, as the value of kurtosis is greater than 3 which shows the distribution is peaked (leptokurtic).



The result of the UNEMP JB-test shows p-value (0.004166) which is lower than 0.05, therefore, rejecting Ho concluding that data of UNEMP is not normally distributed. Furthermore, the Skewness value of UNEMP is close to zero. And the value of kurtosis is smaller than 3 which shows the distribution is flat (platykurtic) relative to normal.

Table 4. Lag length selection

VAR Lag Order Selection Criteria
Endogenous variables: DUNEMP
Exogenous variables: C D(OILP) D(OILP(-2)) D(OILP(-3)) D(OILP(-4))
Date: 11/08/18 Time: 14:10
Sample: 1983Q1 2017Q1
Included observations: 128

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-41.09615	NA	0.120322	0.720252	0.831660	0.765518
1	-3.186387	72.26548*	0.067592	0.143537	0.277226*	0.197856
2	-1.289130	3.587002	0.066653*	0.129518*	0.285488	0.192889*
3	-1.004803	0.533114	0.067406	0.140700	0.318952	0.213125
4	0.309739	2.444225	0.067081	0.135785	0.336319	0.217263
5	0.631147	0.592597	0.067802	0.146388	0.369203	0.236919
6	0.651877	0.037897	0.068854	0.161689	0.406786	0.261273
7	1.017577	0.662831	0.069549	0.171600	0.438978	0.280237
8	1.453666	0.783598	0.070175	0.180411	0.470071	0.298102

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

As the lags of series play an important role in time-series data, therefore, before conducting ARDL, to figure out the relevant order of lag, the Vector auto Regression Model (VAR) was conducted using the E-view software, consequently, the result suggests 2 lag.

In time series, lags of series play a significant role. Before conducting ARDL, to determine the relevant order of lag, VAR (vector autoregression model) was employed which in the above-given table suggests 2nd lag by HQ, AIC, FPE criteria and 1st lag by SC LR criteria.

Autoregressive Distributive Lag Model (ARDL)

Table 5. Autoregressive Distributed Lag Model (ARDL)

Dependent Variable: DUNEMP
Method: Least Squares
Date: 11/08/18 Time: 14:17
Sample (adjusted): 1983Q4 2017Q1
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005808	0.021348	0.272071	0.7860
D(UNEMP(-1))	0.553657	0.087153	6.352702	0.0000
D(UNEMP(-2))	0.163741	0.086412	1.894893	0.0603
D(OILP(-1))	-0.004513	0.002686	-1.680443	0.0953
D(OILP(-2))	0.001516	0.002698	0.561874	0.5752

R-squared	0.469498	Mean dependent var	0.022388
Adjusted R-squared	0.453049	S.D. dependent var	0.332952
S.E. of regression	0.246238	Akaike info criterion	0.071564
Sum squared resid	7.821687	Schwarz criterion	0.179693
Log likelihood	0.205183	Hannan-Quinn criter.	0.115504
F-statistic	28.54152	Durbin-Watson stat	2.019988
Prob(F-statistic)	0.000000		

After determining the appropriate lag length through VAR, ARDL test was conducted. The above table of ARDL shows that there will be a significant impact of oil price on unemployment at Lag 1 since the p-value is less than 0.05. Further table also show that the data has no auto correlation since the value of Durbin-Watson statistic is 2.

Granger Causality Tests

Table 6. Granger Causality tests

Pairwise Granger Causality Tests
Date: 11/08/18 Time: 17:39
Sample: 1983Q1 2017Q1
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DOILP does not Granger Cause DUNEMP	134	1.42850	0.0343
DUNEMP does not Granger Cause DOILP		0.26966	0.7641

To get an overall understanding of whether Oil prices impact unemployment rate, granger causality test was conducted. Since the p-value of null hypothesis “DOILP doesn’t Granger

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp

Causes DUNEMP" is less than 0.05 thus I reject null, concluding that Oil prices during this time Granger Cause unemployment. And therefore, this result is satisfying my study.

CONCLUSIONS

Increase in oil prices which increases the cost of production and thus lower the profit of a company even the oil prices shocks cause companies to stop production inside the boundaries and start their production where it has lower production cost, consequently that push-up the unemployment of the country. Therefore, these two variables can have significantly affected the economy of a country thus many researchers have investigated the relationship of these variables considering different economies of countries and concluded that changes in the price of oil cause changes in the unemployment level. Different tests conducted on various models by several researchers have altogether supported the existence of this significant relationship.

In this paper I have investigated the relationship between these two variables using the Swedish unemployment and oil price data by conducting several econometrics models through student version of E-View software; the results show a significant relationship between these two variables. The relationship has been found between the oil price and unemployment shows how influential the price of oil is to the Swedish economy. The linear regression relating to current changes in these variables indicates a positive relationship between them. And the ARDL model shows there will be a significant impact of oil prices on unemployment. Conducting the Granger Causality test shows that DOILP Granger Causes DUNEMP. Therefore, concluding the paper certifying the existence of a significant relationship of oil prices and unemployment.

CONFLICTS OF INTEREST

The authors are contributed equally and declare no conflict of interest.

REFERENCES

[1]. Hamilton, J.D. (1983). Oil and the Macroeconomy since World War II, *Journal of Political Economy*, pp. 228-248

[2]. Vetenskapliga argument I energidebatten (1995). *Energiutskottet* , *No.1*

[3]. Bade, R, & Parkin, M. (2003). *Foundations of Macroeconomics*, Boston: Pearson, Addison Wesley.

[4]. Forslund, Anders, & Holmlund, Anders (2003). *Arbetslöshet och arbetsmarkandspolitik*. IFAU

[5]. Shapiro, Carl., & Stiglitz, Joseph E. (1984). Equilibrium Unemployment as a Worker Discipline Device. *American Economic Review*, *74*, pp. 433-444

[6]. Bean, C. R. (1994). European unemployment: a survey, *Journal of Economic Literature*, *32*, pp. 573–619

[7]. Carruth, A.A., Hooker, M.A., & Oswald, A.J. (1998). Unemployment Equilibria and Input Prices: Theory and Evidence from the United States, *Warwick Economic Research Paper Series (TWERPS)*, No.*496*. University of Warwick, Department of Economics.

[8]. Hooker, M.A. (1999). *Oil and the Macroeconomy Revisited.* Board of Governors of the Federal Reserve System (U.S.)

[9]. Dornbusch, R, Fischer, S, & Startz R. (2004). *Macroeconomics.* Boston: McGrawHill

[10]. Gujarati, Damodar N. (2003). *Basic Econometrics, Fourth Edition.* Boston: McGraw-Hill

[11]. Dufour, Jean-Marie, & Renault, Eric (1998). Short run and long run causality in time series: Theory, *Econometrica*, *66(*5), pp. 1099-1125

SOURCES OF THE DATA

[1]. FRED Graph Observations, Federal Reserve Economic Data 1983 - 2017

[2]. Link: https://fred.stlouisfed.org

[3]. Help: https://fred.stlouisfed.org/help-faq

[4]. Economic Research Division, Federal Reserve Bank of St. Louis

Leena and Luna International, Chikusei, Japan.
(株) リナアンドルナインターナショナル, 筑西市,日本
ISSN: 2186-845X ISSN: 2186-8441 Print
www.ajmse. leena-luna.co.jp