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Oil Prices and REER with Impact of Regime Dummies

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Abstract:

This study is basically explores the long run relationship between REER, IRD and Oil Prices, with the use of dummies and interaction terms for exchange rate regimes in Pakistan. By using Hatemi – J residual based cointegration test. Test has modified by including level shift, level shift with trend and regime shift. The data span is from the period of 1982m01-2014m03 in case of Pakistan. Also negative relationship between IRD and REER is due to indirect relationship between inflation and nominal interest rate that leads to fall in exchange rate. Long run relationship has concluded from cointegration test between variables.

Keywords: Hatemi-J residual based cointegration, Cointegration test, Level Shift, Regime Shift and Interaction terms

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1. Introduction

Oil is very important reserve to consume and to fulfil the energy demand of world; as oil reserves are accumulated on specific regions of the earth. So lots of countries of world have to import it for fulfilling its energy demand. The price of oil plays very important role in this context. Due to have little reserves and have different political, geographical and environment conditions of the world, prices of oil imports shoot up due to internal and external shocks. That's why oil prices have great impact on the Exchange rate of any country, because oil prices are officially measured in term of dollar and when the dollar price appreciate and depreciate due to different shocks cause oil prices to increase. In the last five decades Pakistan Exchange rate regime is moving toward relaxed policies. Pakistan faced budget deficit in 1982.

Pakistan fell into a budget deficit in 1982, due to becoming strong of US dollar caused by remittances. As the pegging of rupee to US $ deviated the economic activities. That's why Pakistani rupee controlled on floating basis as compared to traded currency. In 1998 to solve problems of the financial crisis in Pakistan, different exchange rate system has adopted such as, pegging US $, floating interbank rate and combined of both. With the Pakistan economy improving from the crisis in 1999, the three exchange rates were combined and pegged to the U.S. within a definite band. This band was removed in 2000. Now, Pakistan is sustaining a floating rate. Under this exchange rate system, each bank keeps its own rate conditional on its short and long situations. In this system of Exchange rate state bank of piston can authorize any person or financial institution to cater with exchange market.

One of the old studies that has done on exchange rate and purchasing price parity (PPP) by Chisti and Hasan (1993), Akram (2002) tested the nonlinear relationship between exchange rate and oil prices, Cashin et al (2004) estimated the study on 58 countries for 44 commodities against REER. Tufail and Qurtulain (2011), Quresr Mignon and Penot (2005), Shabaz et al (2013), Jamali et al (2011), Khan and Ahmed (2011), Maliki et al (2014) for 8 countries using panel data, Ebraimi and Shokri (2013) examined the oil price and REER, Beckman and Czudaj (2012) tested four hypothesis of oil prices and nominal Exchange rate. Haider et al (2009) used the PP and HB Samuelson model. Trung and thi (2011) find the cointegration relationship between oil prices and REER.

In this study we have used Hatemi- J (2008) residual based cointegration method to check the long run relationship between oil prices and exchange rate within managed floating

and floating regimes and interest rate differential (IRD) and exchange rate within managed floating and floating regimes. Dummies of managed floating and floating exchange rate with interaction of oil price have added in the model. The models have tested one for REER vs oil price and other REER vs IRD with dummies and interaction term.

The main purpose of this study is to test the long run relationship between REER regime of Pakistan vs dummies and interactive term with impact of oil price and IRD (Interest Rate Differential); also new methodology has used to estimate these models.

After brief introduction second section comprised of literature review section III data and methodology, section IV results and discussion and finally conclusion and references are given.

2. Literature Review

In the study of Trung and Thi (2011), monthly data has been used. Cointegration technique has been used to test the long run relationships by using monthly data. There is long run relationship between the oil price, inflation, exchange rate and economic activity. Oil prices and REER has impact on economic activity. Economic activity effect Vietnam by currency than oil prices. Inflation is helpful rather harmful, Engle Granger cointegration and dynamic OLS producer also used on the same model.

In the paper of Haider et al (2009) the purchasing price parity (PPP) and HB Samuelsson (HBS) model has used. In this study there is emphasis on the stable exchange rate importance for any economy. In the paper PPP and HB model has been used to determine exchange rate, but there are controversies between two theories. So in this paper both are used to reevaluate at empirical grounds. By using time series data this paper shows that PPP doesn't hold for Pakistan because of no any cointegration relationship between price and exchange rate. HBS model also not favor in producing in case of Pakistan but relationship between non traded good price and exchange rate is very high. So HBS model is in favor of appreciating real exchange rate in Pakistan.

Beckman and Czudai (2012) tested the four hypotheses H0, H1, H2 and H3, that are nominal effective exchange rate and nominal oil price are cointegrated and prices and nominal oil prices are cointegrated. To test these hypotheses Markov Switching VECM technique has been used with the help of data since 1974 to 2011. In this research it is concluded that due to depreciation oil prices increases also due to dollar exchange rate cause

to increase in inflation. Finding of this paper shows that exchange rate cause to change in oil prices and inflation. Effective exchange rate also shows the same pattern but real oil price effected by appreciating of dollar. The causality between oil prices and exchange rate is time varying.

In the paper of Ebraimi And Shokri (2013) economic activity of Iran is tested which is effected by the oil prices and due to fluctuation in REER, in the study Structure vector autoregressive (SVAR) model has used to evaluate this concept with the help of monthly data. In the results given the paper it is concluded that oil prices and REER have strong relationship with economic activity of Iran, both influence the economic activity to increase or decrease.

Another study by Aziz (2009) examined the effect of oil prices and real interest rate on REER on 8 countries, using monthly panel data. In the study oil importing and oil exporting countries have observed separately, to check the significances of oil prices and exchange rate (ER) in two groups of countries. Also the relationship between oil price and exchange rate has checked by using panel cointegration test. It is found that all three variables that are used in the study are non-stationary for all the countries in the groups and there is long run relationship between three variables. This paper generally gives indication of positive influence of real oil prices and real interest rate on REER, but interesting thing is that there is no evidence that high oil price have significant impact to appreciate the ER.

Maliki et al (2014), has evaluate the relationship between oil price and nominal exchange rate (ER) for Algeria by using VAR with help of monthly data. In this research author has simply used Johansen cointegration technique to test the long run relationship between the variables after checking the stationarity of the two variables, oil prices and exchange rate. This study is on concluded that there is no cointegration relationship between these two variables.

Khan and Ahmed (2011), shows the impact of oil price shocks and food prices on economy of Pakistan. In this study Structural Vector Auto Regressive (SVAR), generalized impulse response function has used to test the impact by using monthly data. The study finds that IRF shows oil shocks cause inflation. Generalized Impulse Response Function (GIRF) shows exchange rate is one of most important factor to fluctuate the oil prices and food prices.

According to Chishti and Hasan (1993) Pakistan exchange rate suffers different ups and down due to external shocks to open economy. As it is known that exchange rate is important in stability of economy. This was the one of newest work in context of exchange rate and purchasing price parity (PPP) in case of Pakistan. The model that is estimated to check the long run between exchange rate and PPP include real and monetary variables. The results gained from the cointegration and ECM shows that monetary and real factor effects to disturb the real exchange rate (REER). Which further come back to equilibrium by autonomous forces.

According to Jamali et al (2011) in 2009 it was experienced that whole world's GDP decline, due to decline in the international trade and other economic indicators shows declining trend. It is said that it is because of permanent oil shocks that cause the whole world economy to get threatened. Oil prices increases cause to decrease the purchasing power of importing countries. So oil importing countries suffers more due to high oil prices. In this research Pakistan economy growth is tested that is effected by oil prices by supply and demand side factors and concluded that high oil price has negative impact on real GDP of Pakistan.

In the study of Cashin et al (2004) 44 real commodities are tested against real exchange rate for the 58 countries. Using data since 1986 to 2002 the long run relationship has checked between these two variables. Also in the test of exogeneity it is experienced that lots of commodities shows adjustment toward equilibrium and it is said that long run REER is not constant and is variable with time which depend on real commodities.

Shabaz et al (2013), paper studies the relationship between oil prices and exchange rate in the context of time- frequency domain. The previous studies have not checked this concept. In this study Wavelet analysis has done by using time series data to evaluate this concept by using ARDL technique in case of Pakistan. Wavelet analysis shows that continuous power spectrum. Also XWT indicated covariance between oil prices and exchange rate. Mainly it was concluded that there is causal and reverse causal relationship between oil price and real exchange rate (REER), and it changes accurse the time scale of the Pakistan.

In the study of Akram (2002) nonlinear relationship has tested a previous studies has only focuses on the linear relationship, that could be wrong functional form for this relationship. In the study in case of Norway it is said that oil price and exchange rate has

nonlinear relationship has negative relationship and it is change with the changing in trend in oil prices. The oil prices have strong impact on exchange rate when it is low. Oil price has significant impact only in short run not in long run. Finally in this study it is said that no n linear function estimate the results most efficiently.

Tufail and Qurat ul Ain (2011) analyzed the relationship between current account and exchange rate with the impact of oil price for D-8 countries, by using the time series data. In the study recursive VAR has been used to check the relationship between the oil price and exchange rate. In case of all oil importing countries J-curve phenomenon holds. In case of Pakistan the oil price causes to depreciate the exchange rate not only in short run but also in long run. But for oil exporting countries due to strengthen of current account, exchange rate appreciates in long run with increase in oil prices. Finally it was concluded that oil exporting countries should diversify their export to stabilize the exchange rate.

In the paper of Quere Mignon and Penot (2005), same concept of oil prices and exchange rate has estimated, it was found that the long run relationship between the oil prices and exchange rate and have causal relationship between oil and dollar. While estimating the Error Correction Model (ECM) it has examined that there is slow adjustment toward equilibrium. In this research also theoretical modeling has done by adding the regime impact of China as it is playing big role in oil and exchange rate market. So it has found that due to china emergence in this market there is negative relationship between dollar and oil prices. As we know that oil is measured in us dollar all over the world. In 2002 the oil prices increased too much with depreciation in dollar values. The most of previous research has found the positive relationship between oil prices and exchange rate, as oil prices increases dollar appreciated.

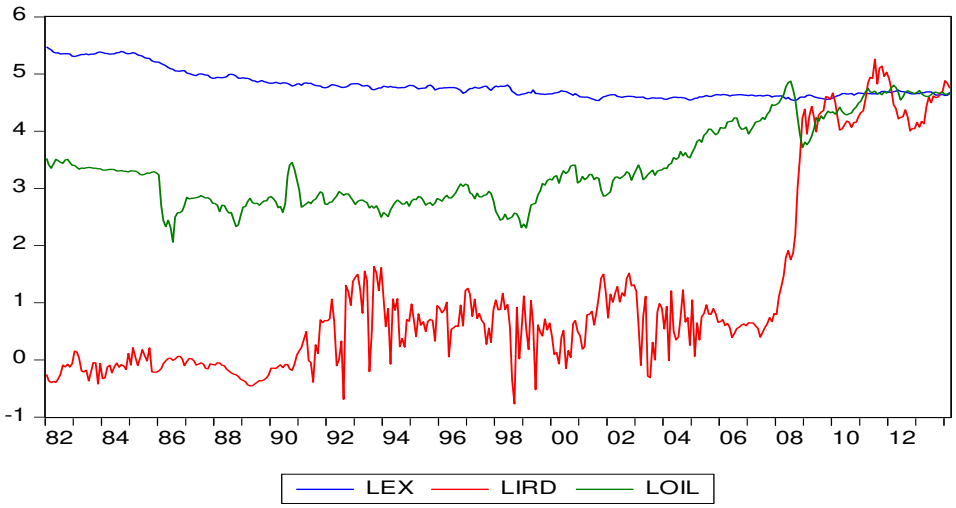
3. Data

Our data set consist of monthly time series data for Pakistan. The data source include International Financial Statistics and Quandl database referring to World Bank. The data span is from the period of 1982m01-2014m03. The choice of starting point of the data has been chosen to take into the account two of the recent exchange rate regimes including Managed Floating and Floating exchange rate regimes respectively. Data in this regard is taken for Real Effective Exchange Rate (REER), Dubai Crude Oil Prices and Call Money Rates for both Pakistan and USA for the calculation of Interest Rate Differential (IRD). Calculation of interest rate differential is given as

$$IRD_t = CMR_{Pak} - CMR_{USA} \qquad (1)$$

The reason for taking REER as a measure for exchange rate is because of the reason that it takes into the account basket of exchange rates. This REER is constructed as an index from basket of exchange rates with CPI adjustments. Dubai Crude Oil is taken into the account because of the reason that Pakistan being the major importer of oil prices and dependent on oil and oil related products from Arab countries and Middle East. Figure-1 below shows the series plotted during the time period for which data is taken. It can be seen from the plot that during the said period REER is running smoothly from period of 1982m01-2014m03.

Figure-1: Graphical Representation of Series for Study



In the meantime oil prices show variation during the crisis of 2007-08. These shocks were because of unstable demand during this period becoming one of the factor responsible for global financial crisis. Interest rate differential is also seen to move smoothly with minor jumps and shocks occurring with the passage of time because of factors like inflation and money supply being the major ones.

In order to analyze the underlying long run relationship between REER, IRD and Oil Prices, it is important to note that time series observations under the study are integrated of the same order.

4. Econometric Methodology

Following variables to be integrated of same order by using Bealieu and Miron (1992) seasonal unit root test and augmented Dickey Fuller Test, we apply Hatemi-J (2008) residual

based cointegration method. The objective behind using this methodology is to check for the long run relationship with the use of dummies and interaction terms for exchange rate regimes in Pakistan. This test is a modified form of Engle and Granger (1987) residual based cointegration. The modifications done include level shift, level shift with trend and regime shift. Models used in this study are mentioned below

$$Y_{1t} = \alpha + \beta' X_t + \varepsilon_t \quad (2)$$

$$Y_{1t} = \alpha_0 + \alpha_1 D_{1t} + \alpha_2 D_{2t} + \beta_0{}' X_t + \beta_1{}' D_{1t} X_t + \beta_2{}' D_{2t} X_t + \varepsilon_t \quad (3)$$

In both the cases α_1 and α_2 are termed as in the level shift model, whereas intercept effect is obtained by $\beta_1{}'$ and $\beta_2{}'$.While applying Hatemi-J (2008) method, when dummy is zero for regime this lead to the estimation of Engle and Granger (1987) model.

5. Results and Discussion

Referring to the nature of data Bealieu and Miron (1992) seasonal unit root has been applied with different specifications as followed by the test.

We found that all variables are integrated of order one except the case of real effective exchange rate which was found stationary at level with inclusion of both the dummies (See-Table:-1). Exchange rate regime dummies as used for managed floating and floating exchange rate regime for Pakistan are found to be insignificant in all the cases.

As the results above indicate that variables are stationary at first difference, the next step in this regard is the application of residual based cointegration test. Hatemi-J (2008) approach of cointegration has been used in this regard with inclusion of dummies for exchange rate regimes and interaction term showing the independent variable in particular regime. In this regard fixed and managed floating exchange rate regimes are used in case of Pakistan. Table-2 below shows the results without intercept. Reason for exclusion of intercept is to deal with the problem of collinearity due to the dummies used. From the results, it can be seen that real effective exchange rate and Dubai crude oil prices have positive and significant relationship. This positive relationship can be attributed to the fact that with increase in oil prices, exchange rate appreciates in the context of oil commodity prices but for non-oil commodity prices these prices are found to be causing depreciation in exchange rate. This positive relation is in accordance with the findings of Aziz (2009). The impact of oil prices change with the inclusion of dummy and interaction term within the regime. With

interaction term for managed floating exchange rate, the impact reduces in size showing that it transferred from the introduction of dummies causing change in intercept and interaction causing change in slope. Results show that overall impact of oil prices to be 0.031 times stronger to the impact of oil prices during managed floating exchange rate regime. Opposite results are obtained with inclusion of floating exchange rate regime in the form of interaction term in place of managed floating exchange rate regime.

Table-1: Bealieu and Miron Seasonal Unit Root Test

Hypotheses	$\Delta REER$	$\Delta LOIL$	$\Delta LIRD$	$\Delta REER$**(d1)**	$\Delta REER$**(d2)**	**REER (d1,d2)***
t:π_1	-5.48	-6.68	-5.19	-5.16	-5.16	-1.89
t:π_2	-5.22	-6.31	-6.01	-5.18	-5.18	-5.71
F:$\pi_3 = \pi_4$	25.88	36.53	38.58	25.51	25.51	32.43
F:$\pi_5 = \pi_6$	29.47	56.53	20	31.8	31.80	38.54
F:$\pi_7 = \pi_8$	24.46	43.96	28.39	24.59	24.59	31.75
F:$\pi_9 = \pi_{10}$	37.69	33.76	44.60	37.13	37.13	51.89
F:$\pi_{11} = \pi_{12}$	17.69	24.07	32.16	20.31	20.31	22.15
Dummy (Managed Floating)				-1.47		1.77
Dummy (Floating)					1.47	1.88

(Critical values for comparison are taken from Frances and Hobijn (1997) at 5 percent level of significance with different specifications,* represents variable stationary at level)

In case of floating exchange rate regime impact is stronger within regime by 0.031 times to the impact of overall oil prices. In both the cases R-square showing that model is strongly defining real effective exchange rate. Value of R-square in both the cases is found to be significantly high .i.e. 0.9997 (99.97 percent). Based on order of integration of residual, it is decided that whether there is present a long run relationship, which is evident from the

results. There is present a long run relationship based on the findings of ADF and Bealieu and Miron (1992). This led to the conclusion that there is present a long run relationship between real effective exchange rate and oil prices. In order to establish a join distribution of REER and Dubai Crude Oil Price, we estimate error correction system for each of the regime.

Table-2: Regression Results of REER versus Dubai Crude Oil Price

Variables	Regime 1 and 2	Regime 1 and 2
	Dummy1,2 and 1 interaction term	Dummy1,2 and 2 interaction term
Oil Price	0.244	0.212
t-stats	19.59	11.11
D1	5.35	5.35
t-stats	69.62	69.62
D2	5.21	5.21
t-stats	107.25	107.25
Mfoil	-0.031	
t-stats	-1.25	
Floil		0.031
t-stats		1.25
Trend	-0.0027	-0.0027
t-stats	-31.02	-31.02
Intercept		
t-stats		
R-square	0.9997	0.9997
Adjusted-R square	0.9997	0.9997
Error Term (ADF)	I(0)	I(0)
Serial Correlation LM (Test)	White Noised (1-lag)	White Noised (1-lag)
Error Term (B&M)	I(0)	I(0)
Serial Correlation LM Test	White Noised	White Noised

An unrestricted vector autoregressive of the change in oil price up to the maximum length of twelve lags by following general to specific criteria in accordance with Hendry (2004) is estimated depending on nature of data, out of which exchange rate is said to be affected by its first and second lag along with the impact from sixth and eighth lag of oil price followed by fifth lag of Dubai crude oil prices during floating exchange rate regime. We found regime dummies to be significant when both dummies along with interaction term for oil prices during floating exchange rate regime is used. We further found that level lags are significant and in accordance to the theory as discussed by (Engle and Granger, 1987), confirming the long run relationship for both the cases as discussed. Further from the results of diagnostics in both the cases we found that there is no problem of autocorrelation as tested in accordance with the Breusch Godfrey Serial Correlation LM test. In each of the case

calculated value of chi-square is found to be low in comparison to the critical value. While there is present problem of heteroskedasticity because of higher calculated values, similarly for both the cases residual is not normally distributed because of high value of Jarque Berra.

Table-3: Error Correction Mechanism for Residual Based Cointegration

Variables	Regime 1 and 2	Regime 1 and 2
	Dummy1,2 and 1 interaction term	Dummy1,2 and 2 interaction term
d.lex(-1)	0.27	0.27
t-stats	5.33	5.35
d.(lex(-2)	-0.131	-0.12
t-stats	-2.57	-2.52
d.loil(-6)	0.024	0.025
t-stats	2.55	2.68
d.loil(-8)	0.021	
t-stats	2.30	
d.floil(-5)		-0.11
t-stats		-2.42
Lex(-1)	-0.013	-0.013
t-stats	-2.40	-2.53
Loil(-1)	0.0017	0.006
t-stats	0.88	1.84
Mfoil(-1)	0.0044	
t-stats	1.29	
Mfoil(-5)	0.009	
t-stats	2.03	
Floil(-1)		-0.004
t-stats		-1.39
Seas(7)		
t-stats		
Seas(10)		
t-stats		
Intercept		
t-stats		
D1		0.047
t-stat		2.01
D2		0.057
t-stats		2.30
R-square	0.1463	0.1399
Adj-Rsq	0.1233	0.1190
LM-Test (Corr)	0.13 | 13.45	0.10 | 15.75
Heteroskedasticity	84.88	68.64
Norm Test	75.95	67.70

Similarly looking at the relationship between real effective exchange rate and interest rate differential in managed floating and floating exchange rate regime, from (Table-4) we found both positive and negative relationship with the change in dummies. With the use of

dummy in the model for managed floating exchange rate regime, there is a positive relationship between REER and IRD. This mixed behavior of interest rate was also found by, Hakkio (1986). This relationship can be due to the factors like inflation .e.g. inflation effecting the interest rate and exchange rate. Inflation shock can lead to negative relationship between interest rate differential and exchange rate. In the context of Pakistan negative association is because of the fact that higher energy (oil) prices and money supply which led to high inflation rate. This higher inflation is built into inflation expectation resulting in the nominal interest rate to rise. And if this inflation for the case of Pakistan exceeds the foreign inflation, this will lead to the fall in exchange rate. Positive interest rate of the home currency will result in increase of the number of home currency deposits. Thus higher interest rate means that higher the rates of return, thus demand for home currency is found to be increasing. These situations lead to an appreciation of home currency relative to foreign currency. These results are in accordance with the study of, Tafa (2015). Looking at the long run relationship based on the residual generated after the regression run in each of the case, we found no long run relationship as far as the results of ADF are concerned. According to the theory of Engle and Granger (1987) we found results of ADF for residuals to be showing the first difference. On the other hand depending on the nature of data we applied Bealieu and Miron (1992) seasonal unit root test to check for the order of integration of residuals and we found the evidence of long run present as residuals were found to be integrated at level zero (stationary at level). Based on these results we conclude that there is present a long run relationship between REER and IRD.

Table-4: Regression Results (REER vs IRD)

Variables	Regime 1 and 2	Regime 1 and 2
	Dummy1,2 and 1 interaction term	Dummy1,2 and 2 interaction term
Lird	0.07	-0.026
t-stats	15.48	-1.76
D1	6.04	6.04
t-stats	141.00	141.00
D2	6.12	6.12
t-stats	97.47	97.47
Mird	-0.102	
t-stats	-7.12	
Flird		0.102
t-stats		7.12
R-square	0.9996	0.9996
Adjusted-R square	0.9996	0.9996
Error Term (ADF)	I(1)	I(1)
Serial Correlation LM (Test)	White Noised	White Noised
Error Term (B&M)	I(0)	I(0)
Serial Correlation LM Test	White Noised	White Noised

Similar to that of the case of REER versus Oil Price, joint distribution is established between REER and IRD by estimating the error correction mechanism for each of the regime. An unrestricted vector autoregressive of the change in oil price up to the maximum length of twelve lags by following general to specific criteria in accordance with (Hendry, 2004) is estimated depending on nature of data, out of which exchange rate is said to be affected by first, second and eighth lag of interest rate differential in general while for interest rate differential during both the regimes (managed floating and floating) is found to have impact with only first and second lag. We also found seasonal impact in the mechanism to be affecting the exchange rate. In accordance with the theory as discussed by Engle and Granger (1987), we found level lags to be significant showing the evidence of presence of long run relationship. Results for diagnostics show that in both the cases there is present no problem of autocorrelation as is confirmed from the results of Breusch Godfrey Serial Correlation LM test. It can be seen that in each of the case calculated value of chi-square is found to be low in

comparison to the critical value. Also there is present problem of heteroskedasticity because of higher calculated values, similarly for both the cases residual is not normally distributed because of high value of Jarque Berra.

Table-5: Error Correction Mechanism for Residual Based Cointegration

Variables	Regime 1 and 2		Regime 1 and 2	
	Dummy1,2 and 1 interaction term		Dummy1,2 and 2 interaction term	
d.li			0.015	
t-stats			4.98	
d.fird			-0.014	
t-stats			-2.82	
d.mird	0.015			
t-stats	4.99			
d.(lex(-1)	0.203		0.204	
t-stats	4.07		4.07	
d.lird(-1)				
t-stats				
d.lird(-2)			0.01	
t-stats			3.07	
d.lird(-8)	-0.006		-0.006	
t-stats	-2.66		-2.53	
d.lird(-9)	-0.005		-0.0049	
t-stats	-2.13		-2.05	
d.mird(-1)	0.0149			
t-stats	4.26			
d.mird(-2)	0.100			
t-stats	3.09			
d.fird(-1)			-0.0128	
t-stats			-2.39	
d.fird(-2)			-0.0136	
t-stats			-2.68	
Seas(10)	-0.008		-0.008	
t-stats	-2.69		-2.67	
l.lex	-0.0005		-0.0005	
t-stats	-2.22		-2.22	
l.lird	0.00124		0.0034	
t-stats	2.45		1.53	
l.mird	0.0021			
t-stats	1.00			
l.fird			-0.0021	
t-stats			-1.00	
R-square	0.1862		0.1896	
Adj-Rsq	0.1640		0.1607	
LM-Test (Corr)	0.016	8.651	0.013	9.088
Heteroskedasticity	83.07		122.21	
Norm Test	88.58		9.40	

6. Conclusion

There are numerous studies which are done on relationship between oil price and exchange rate. They have concluded almost the same results. In this study we have used a same variable but estimated with different technique, by using monthly data since 1982m01 to 2014m03, this paper has also examine the effects of two regime dummies in the data.

Firstly we have used the Bealieu and Miron (1992) seasonal unit root and ADF test to check level of integration of variables, secondly we use the Hatemi – J (2008) residual based cointegration methods, by introducing dummies of exchange rate regime and interactive dummies for particular variables. REER and Dubai oil prices have positive relationship causing appreciation of exchange rate. The impact of oil price changes with inclusion of dummies and interactive term with in regime. Residual based cointegration results shows that there is long run relationship between REER and oil prices. Similarly, from estimating the relationship between REER and IRD with inclusion managed floating exchange rate with in regime, we found that there is mixed (positive and negative) behavior of IRD with REER as showed by Hakko (1998), caused by inflation. In case of Pakistan negative relationship is due to indirect relationship between inflation and nominal interest rate that leads to fall in exchange rate and positive interest rate shows that home currency's demand increase related to foreign currency. Also there is long run relationship between IRD and REER has concluded from cointegration test.

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