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THE RELATIONSHIP BETWEEN OIL PRICES AND THE REAL EFFECTIVE EXCHANGE RATE IN THAILAND

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Abstract. This research article aims at examining the nature of the relationship between the real effective exchange rate and oil prices in Thailand for the period 1997 to 2019. It is expected that bilateral exchange rates have more fluctuation under a floating exchange rate than under a fixed exchange rate. The monthly data of real oil prices and real effective exchange rate have been employed for the analysis. The results indicate that these two series do not have co-integration and causality connections. However, a raise in the instability in oil prices brings to a raise in rate of exchange instability. These findings have important policy implications for the government.

Keywords: Oil-Price Volatility; Real Effective Exchange Rate; Volatility-Spillover; Bi-variate Generalized Autoregressive Conditional Hetero-scedastic analysis

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1. Introduction

In the literature of economics, it is broadly renowned that shocks in oil-prices can inflict economic influences on oil importing economies and on oil exporting economies (Plenkina, Andronova, Deberdieva, Lenkova & Osinovskaya, 2018; Masood, Tvaronavičienė, & Javaria, 2019; Godil, Sarwat, Sharif, & Jermsittiparsert, 2020). Moreover, due to an increase in the price of oil, there will be money send from oil importing economy's to oil exporting economy's (Krugman, 1980; Humbatova, Tanriverdiev, Mammadov, & Hajiyev, 2020; Alkhathlan, Alkhateeb, Mahmood, & Bindabel, 2020). Many researches have concentrated on the consequence of real-oil-prices on real-exchange-rate, empirically (Ustiuzhanin, Liman, Kiselitsa, Shilova, & Leyman, 2019; Humbatova, Garayev, Tanriverdiev, & Hajiyev, 2019).

However, earlier outcomes on the association between the crude-oil price and exchange rate emerge to be confusing. Amano and Van Norden (1998) estimate that there prevails a constant relation among oil prices shock and the "real effective exchange rate" of the United State for the duration of the post-Bretton-Wood span. They find that oil-prices can be the main base of consistent shocks' of the exchange rate. Chaudhuri and Chaudhuri and Daniel (1998) indicate that oil price is the foremost basis of the fluctuations in US real rates of exchange. Akram (2004) presents a nonlinear inverse association among oil-prices and the exchange-rates in Norway. A rise in the prices of oil brings to a rise in the rate of exchange. Chen and Chen (2007) identify a relation among

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real-oil-prices and real-exchange-rates in the group of seven (G7) economy's. A raise in the prices of oil brings to a real 'reduction. Moreover, real-oil-prices can predict the upcoming real-exchange-rates fluctuations. Huang and Feng (2007) identify that a big Asian economy that is reliant on oil-importing, and they finds that real prices of oil shocks bring to little appreciations of the durable real-exchange rates in China. Lizardo and Mollick (2010) present that prices of oil take a vital part in the exchange-rates monetary-model, for example, oil-prices define fluctuations in the United State dollar value's towards main currencies', significantly. Their findings specify that an increase in the real oil-prices' causes appreciations of oil-importing countries' currencies; however, cause is a depreciation of the United State dollar towards net oil-exporting economies currency's. Hasanov and Samadova (2010) use ECM model and tests of co-integration to analyze the influence of real-oil prices on real-exchange rates in Azerbaijan and identify that, in the long term, real-oil prices inflict a direct impact on the real rates of exchange. Reboredo (2012) tests co movements among oil-price and exchange-rates and he observe that co movements among price of oil and a currencies' range are usually feeble. Ghosh (2011) investigates the association among crude-oil prices and exchange-rates employing everyday data in India. The findings of his research specify that a rise in oil-prices variations cause's rupee depreciation against US-dollar. Turhan, Hacihasanoglu, and Soytas (2013) identify an increase in prices of oil cause's a currency's appreciations of rising countries towards the dollar of U.S. Beckman and Beckmann and Czudaj (2013) study the association among "trade-weighted effective exchange rate" of United State and the prices of oil. They employ "Markov-switching" VECM to analysis the relationship among prices oil and real-effective exchange rates and nominal effective-exchange rates. They find that real-effective exchange rates and nominal-effective-exchange rates shown an identical format to shocks in the oil-prices, for example, an expansion in real prices of oil brings to appreciations of the rate of exchange. (Zhang, 2013) show the subsistence of long term equilibrium association among real-oil-prices and real-effective-exchange rates of the U.S$ when breaks in structure are capture in to relation by using monthly data. A small number of empirical researches have concentrate on the effect of instability in oil-prices on exchange-rates. Rickne (2009) using list of thirty three oil exporting's economies are restricted on politico and official institution's and he determine that the co movement's among oil-prices and real-exchange rates. Particularly, country's currencies with powerful bureaucracies' are not as much of influenced by variation in price of oil. Englama, Duke, Ogunleye, and Isma'il (2010) study the linkage among oil-prices and instability in exchange-rates in Nigeria. The findings of their research indicate that instability in rate of exchange is directly affected by instability in price of oil. Ghosh (2011) identify the results representing that negative and positive shock's have comparable impacts on instability in rate of exchange. Since July 1997, Thailand has changed from regime of fixed rates of exchange to floating rates of exchange. The acceptance of flexible exchange-rates regime has causes movements in bi-lateral nominal-exchange-rates that are traded in the nation. Consequently, the real-effective-exchange rates and the index of "trade-weighted", has been significantly influenced. For that reason, it should be predictable that volatility of real oil-prices of may not influence the real-effective exchange rates, but might subsist instability spillover from oil to markets of Foreign Exchange's (Martin-moya et al., 2020; Missaglia & Sanchez, 2020; Morantes Quintana et al., 2020).

The major goal of this research is to examine whether prices of oil improbability influenced the real-effective exchange rates within the regime of flexible rates of exchange. The data of months for the real-effective-exchange-rates and real-oil-prices of between January 1995 and July 2020 are employed. The 2-stage methodology is applied, which includes a bi-variate $GARCH$ method and the usual "Granger-Causality test". The key findings are that uncertainty of real-oil-prices does not cause depreciation or appreciation of real-effective-exchange-rates, but uncertainty (instability) of real 'prices of oil does cause's volatility (uncertainty) of the real 'rates of exchange to raise. Un-certainty of the real 'rates of exchange can inflict a significant and inverse effect on the state exports and influence deficits in trade. The current research is planned as follows': 2nd part explains the data and estimation technique, which presents a causality test and bivariate $GARCH$ model. 3rd part shows results and discussion. The final part presents concluding explanation.

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2. Methodology

This part of the paper explains the data and technique for estimation are employed in this research.

2.1. Data

The data of Months are employed in this research for CPI "Consumer Price Index", the index of the real-effective-rates-of-exchange, and crude-oil-prices. The series of prices of Brent crude oil measured in per-barrel dollar is collected from EIA "Energy Information Administration". The CPI "Consume 'Price Index" and the real-effective-rates-of-exchange indexes are collected from Thailand's Bank. The data contains the period between January 1995 and July 2020[1] with 295 observation's[2]. The real prices of oil are computed by multiplying the prices of crude-oil by the rate of exchange dollar and diminishing by CPI. Fluctuations in real-effective rates-of-exchange (r^{RERE}) and real-prices-of-oil (r^{PO}) are the changing rates in the proportion of real-effective-rates-of-exchange indexes and real-prices-of-crude-oil.

Table (1) shows the descriptive statistic of real-oil fluctuations and changes in the real-effective-rates-of-exchange. The average monthly changing rate in price of oil is 1.343 where's the monthly average changing rate in the real-rates of exchange is −0.049. The normality test of Jarque Bera rejected the null hypo-thesis of a "normal distribution" of these 2 sequences; representing that OLS method is never appropriate.

Elliott, Rothenberg, and Stock (1992) presented modified-Dickey Fuller ($DF'GLS$) test which is employed to find out stationary of the changing rates in the real effective rates-of-exchange and real-prices-of-oil. The modified Dickey-Fuller test is considered to be dominant than the traditional tests of a unit 'root. The findings of the stationary tests indicate stationarity of two series' is because of the null hypo-thesis rejection of the sequence' restrain unit 'roots. The stationary possessions of the 2 sequence enable 1 to execute the method of a bi-variate $GARCH$ method (Table 1).

Table 1. Summary statistic's and unit'roots test

	r^{RERE}	r^{PO}
Mean	-0.049	1.343
St,dev	2.734	8.090
Skew-ness	-1.107	-0.228
Kurto-sis	17.782	4.672
Jarque Bera statistics	2150.056 (Pro=0.000)	5.502 (Pro=0.046)
$DF.GLS$ with constant	−6,215 (0) (Pro=0.000)	−7.188 (0) (Pro=0.000)

r^{RERE} the stand's for the changing rate in real-effective rates of exchange, and r^{PO} the stand's for the changing rate in real prices of oil. The possibility of accepting the null-hypo-thesis of normality is shown in parenthesis

2.2. Estimation Technique

To analysis the relationship among real effective rate's of exchange and real price's of oil, there are three processes can be employed. They are as follows:

2.2.1. Co-Integration Test

The prices of oil sufficiently capture the overriding source of consistent real-rates of exchange fluctuations due to the presence of co-integration among real-rates-of-exchange and the prices-of-oil. The alternative procedure for co integration testing presented via Pesaran, Shin, and Smith (2001) which is called a conditional $ARDL$ "auto regressive distributed-lag" methodology and ECM "Error-Correction-Mechanism". The $ARDL$ (p,q) methodology is established as:

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$$\Delta L_t^{RERE} = \mu + \sum_{i=1}^{p} a_i \, \Delta L_{t-i}^{RERE} + \sum_{j=1}^{q} \beta_i \, \Delta L_{t-j}^{PO} + e_t \quad (1)$$

where Δ represent 1st-differences, $LREER$ shows the logarithm of real-effective rates of exchange index', LOP is the logarithm of real' prices of oil. The "lags orders" are p and q, correspondingly. These are possibly similar or dissimilar. The gridiron investigate can be employed to choose a parsimonious model that is without of serial'-co-relation, to find out the most favorable number's of lagged 1st-differences in the particular autoregressive distributed lag model. The computed F' statistics for detection of co-integration can-be accomplished, by addition of the two variable's lagged level into equation.(1) as revealed in equation. (2).

$$\Delta L_t^{RERE} = \mu + \gamma_1 L_{t-1}^{RERE} + \gamma_2 L_{t-1}^{PO} + \sum_{i=1}^{p} a_i \, \Delta L_{t-i}^{RERE} + \sum_{j=1}^{q} \beta_i \, \Delta L_{t-j}^{PO} + e_t \quad (2)$$

The estimated F' statistics are contrasted through "critical values". The co-integration exits, if the estimated F' statistics is higher then the critical F' statistics of upper-bound. Co-integration does not exist, if the estimated F' statistics is lower then the F' statistics of lower-bound. The finding is uncertain if the estimated F' statistics is between the upper and lower bounds F' statistics. Different other methods that can be employed for co-integration test, reparaeterization of the method in to the correspondent VEC "vector error correction" are nope essential. Moreover, the testing of bound's can-be employed to the varied order of integration resulted from test's of unit'root, except for $I\ (2)$ series. Table (1) shows that the outcomes from the integration order of the 2 series do not beat 1.

2.2.2. Non Causality Test

The test for causative association among variables' develops by Toda and Yamamoto (1995) as a substitute to the usual Granger (1969) Causality tests. In a bi-variate VAR (Vector-Auto Regressive) model, this non-causality-test get in with $'k'$ lag can be implemented on those series which are stationary at level. The k' "optimal lag length" can 'be established via SIC "Schwartz information criterion". The examination is conducted in a VAR method of sort $k^* = k + d_{maxi}, where\ d^{maxi}$ is the maxi-mum expected series integration order'. Rambaldi and Doran (1996) shows that the test effectiveness, by employing the modified-wald statistic's for non-linear and linear constraints does-not based on the series integration order', particularly the series sequence is $I(0),\ I(1)\ or\ I(2)$. The variables' included in the model whether or not Granger causes one another are tested, where all of these coefficient's are zero jointly. For non causality test, the VAR model is stated as:

$$L_t^{RERE} = \alpha_0 + \sum_{i=1}^{k} a_i \, L_{t-i}^{RERE} + \sum_{j=k+1}^{k+d_{max}} \alpha_j \, L_{t-j}^{RERE} + \sum_{i=1}^{k} \beta_i \, L_{t-i}^{PO} + \sum_{j=k+1}^{k+d_{max}} \beta_j \, L_{t-j}^{PO} + \mu_{1t} \quad (3)$$

$$L_t^{Po} = \alpha_1 + \sum_{i=1}^{k} \gamma_i \, L_{t-i}^{Po} + \sum_{j=k+1}^{k+d_{max}} \gamma_j \, L_{t-j}^{PO} + \sum_{i=1}^{k} \delta_i \, L_{t-i}^{RERE} + \sum_{j=k+1}^{k+d_{max}} \delta_j \, L_{t-j}^{RERE} + \mu_{2t} \quad (4)$$

In the VAR-model, the stochastic term is presumed to be "white noise". Subsequently, the more lag variable's are integrated into the model and the causality test is carried out as a result of testing for zero coefficients constraints of every lagged variable's—equation' (3) is applied to check whether real-prices-of-oil (L^{PO}) granger cause's real' effective rates of exchange (L^{RERE}) whereas the equation' (4) is applied to check whether the real-effective-rate-of-exchange (L^{RERE}) Granger cause's real-prices of oil (L^{PO}). The major benefit of this examination is that one does not require recognizing a theory whether the variables are co-integrated as much as the series integration's order doesn't surpasses the lagged length's of the specific VAR method.

2.2.3. Two Step's Estimation

The two-step's estimation is applied to describe the association among the prices of oil and the real-rate of exchange instabilities. In the 1st step, a bi-variate Generalized-auto regressive hetero-skedastic model with CCC-GARCH "Constant Conditional Correlation" model projected via Bollerslev (1990) is applied to create real-rates-of-exchange instability and prices-of-oil instability. In the 2ndstep, this constructed series' in addition to changing-rate in the real-effective-rates-of-exchange and the changing rate in real prices of oil series applied in the usual Granger (1969) causality tests. Pagan (1984) critiques' this estimation for the reason that it makes the generated series' of uncertainty or volatility. The model may be miss specified when these constructed sequence are applied as a regressors in Granger Causality test. However, major benefit of the two-step estimation is that it allows the capacity to set up causative relation among variable's[3].

The system equation's in a $CCC - GARCH\ (1,1)$ model contains the 5 equation's and these specified as:

$$r_t^{RERE} = \alpha_{1,0} + \sum_{i=1}^{p} a_{1,i} r_{t-i}^{RERE} + \sum_{i=1}^{p} b_{1,i} r_{t-i}^{PO} + e_{1,t} \quad (5)$$

$$r_t^{PO} = \alpha_{2,0} + \sum_{i=1}^{p} a_{1,i} r_{t-i}^{PO} + +e_{2,t} \quad (6)$$

$$h_t^{RERE} = \mu_1 + \alpha_{1,1}\varepsilon_{t-1}^{2,RERE} + \beta_{1,1} h_{t-1}^{RERE} \quad (7)$$

$$h_t^{PO} = \mu_2 + \alpha_{2,1}\varepsilon_{t-1}^{2,PO} + \beta_{2,1} h_{t-1}^{PO} \quad (8)$$

$$h_t^{RERE,PO} = \rho_{12}(h_t^{RERE})^{1/2}\,(h_t^{PO})^{1/2} \quad (9)$$

Here, r^{RERE} indicates the percentage of changes in the real-effective-rates-of-exchange, and r^{PO} denotes the percentage of changes in real-prices-of-oil, h^{RERE} is the "Conditional variance" of the real-effective-rates-of-exchange, h^{PO} indicates the "Conditional variance" of real-prices-of-oil, and $h^{RERE,Po}$ denotes the Conditional co-variance of these variables. The stable Conditional cor-relation is ρ_{12}. The "system equations" can be evaluated simultaneous-ly.

The test of normal granger causality is specified as:

$$y_t = \alpha + \sum_{i=1}^{k} \alpha_i y_{t-i} + \sum_{i=1}^{k} \beta_i x_{1,t-i} + \sum_{i=1}^{k} \gamma_i x_{2,t-i} + \sum_{i=1}^{k} \varphi_i x_{3,t-i} + \mu_t \quad (10)$$

Here, the dependent variable is denoted by "y", and independent variables are denoted by x_1, x_2, and x_3. At-least single coefficient should be significant of that lag in-dependent variable' if any regressor causes the depen-dent variable', and this also shows that the F statistic's into the normal Causality test's should prove significant for all duo of variables. In the current research, the series of variable's that will penetrate a Vector Auto Regression is (r^{RERE}, r^{PO}, h^{RERE}, h^{PO}), (r^{PO}, r^{RERE}, h^{RERE}, h^{PO}), (h^{RERE}, r^{RERE}, r^{PO}, h^{PO}) and (h^{PO}, r^{RERE}, r^{PO}, h^{RERE}). The SIC is determined optimal-lag length's. It must be indicated that the complete list of regressors' in the tests should be stationary. An un-restricted VAR method is employed to identify the signs of lag variables.

3. Findings and Discussion

The lattice investigates for the model of parsimonious $ARDL\ (p,q)$ determines that the $ARDL(1,1)$ is without of serialized correlation, because of applying LM (Lagrange multiplier) test of serialized correlation. The chi-square statistics $(x^2_{(2)})$ of the $L.M$-test = 2.175 with Prob. =0.572 brings to the outcome that, in the residuals, the null-hypo-thesis of nope serialized cor-relation is accepted. The determined F statistic's resultant as of testing Equation.2 opposed Equation.1 is 2.081, by addition of the lag level of a couple of variable's ($LRERE$, LPO) to the $ARDL(1,1)$ model. In Table CI(iii) case III, this determined F statistic's is less then the critical value in lower-bound at the level of five % of *4.94* presented via (Pesaran et al., 2001). Thus, the null-hypo-thesis of co-integration not exists is accepted; as a result, here is never long-term association among the real-effective-rates-of-exchange and real-prices of stock (Hussain et al., 2020).

The Non-Causality test of Equations (3) and (4) in a VAR model employing a level of the 2 series is conducted with the two most favorable lags, decided by SIC plus the expected one integration's order. The lag's $(k + d_{maxi})$ is 3, and the findings are presented in table' (2).

Table' (2) findings indicate that there are bi-directional direct causation's among the real-prices-of-oil and real-effective-rates-of-exchange, but the significance level is just at ten%. Furthermore, tests are executed to study the misspecification of the model of Augmented VAR(3) employed in the investigation. The $L.M$ test' statistics show the null-hypo-thesis that there is no serialized correlation in the errors up to the 3rd lags-order is accepted. Moreover, the $W.H$ test's indicates that the null-hypo-thesis rejection of the occurrence of $ARCH$ impact at the one per cent significance level. Though, the $J.B$ statistics indicate that the errors are never normal multi-variate. Thus, the model of Augmented VAR(3) is never appropriate for Non-Causality test. This means that the findings of Table.2 are not consistent. At this point, there is un-reliable Non-Causality test in the level series, and here is no 'long term association among real-effective- rates-of-exchange and real-prices-of-oil (Haseeb et al., 2020).

Thus, it can be finalized that co-integration and Non-Causality test's cannot identify the influence of real-prices-of-oil on the real-effective-rates-of-exchange. However, the 2-steps method can identify a few facets of the linkage among real prices of oil and real-effective-rates-of-exchange. The findings of the bi-variate $GARCH(1'1)$ method in the "system equations", Equation's five to nine, are presented in Table. (3).

Presumptuous the conditional correlation ρ_{12} is stable; the performance of the model is good[4]. The expected Conditional correlation is −0.215 which is statistical significance at the level of five per cent. This correlation shows that the 2 variables' are interdependent with the inverse association. Thus, the Standard-Granger Causality test's is conducted on 4 'series' of stationary. The findings are presented in Table.4.

Table (4) findings indicate that variation in the real-prices of oil tend to causes the real-effective-rates-of-exchange to appreciate (decreases), but tend to causes its instability to rise. Additionally, real-prices-of-oil instability has a tendency to causes the real-effective-rates-of-exchange to appreciate(decreases). However, such 3 findings are insignificant statistically. Lastly, real-prices-of-oil instability positively causes real-effective-rates-of-exchange instability. This finding is statistical significance at a level of five per cent. Thus, it can be finalized that throughout the floating rate of exchange regime there is instability trans-mission from real-prices-of-oil to real-effective-rates-of-exchange. This means that an expansion in the real-prices-of-oil risk can cause a rise in the real-rates-of-exchange risk's and *vice-versa*.

The "impulses response" in figure' (2) indicate that real-rates of exchange instability react depressingly to real-prices of oil instability in five months' and react positively to real-prices of oil instability after that and not ever disperse. In the situation of increasing real-rates-of-exchange instability cause by real-prices of oil instability, the trade-balances of a country's can be influenced. In the situation of increasing real-rates-of-exchange instability cause by real-prices-of-oil instability, the trade balances of a country can be influenced. If the real-rates-of-exchange instability negatively influences the imports and exports, the trade balances will be better when the extent of the effect of instability on "exports" is comparatively lesser then the extent of the effect of instability on "imports". In another way, the "trade balances" will-be debilitated.

Although, the central ‘bank can execute measures of “sound monetary policy” to stabilize various main currency’s, for example, the Japanese yen, US’ dollar, and euro currency’s, instabilities of nominal prices of oil can-not be restricted. Consequently, it appears to be essential that policy-makers must motivate firm’s to base more on latest energy (wind-power and hydro-electric) so that price of crude oil will not be the major reason of the real-rate-of-exchange instability. Additionally, a few measures’ that will increase the competitiveness of exporting-firms’ might consider required. Promoting efficiencies of energy as a substitute of energy-intensity can decrease the cost of production. Di-versification of export should also be applied (Table 2).

Table 2. Outcomes of Non-Causality tests are between L^{RERE} and L^{PO}

Null hypo-thesis	Modi-fied’Wald statistics	Prob.
L^{PO} does not cause’s L^{RERE}		
L^{RERE} does not cause’s L^{PO}	5.273 (+)	0.083
Mis-specification test’s for the VAR-model	5.732 (+)	0.073
	Test-statistics	Prob.
$L.M$	2.175	0.572
$J.B$	11.571	0.004
$W.H$	164.005	0.000

L^{REER} is a logarithm of real-effective rates of exchange, and L^{OP} is a logarithm of real-prices-of-oil. $(+)$ Shows the coefficients positive total of lag variable’s, which is a positive causal relation. The Lag-range multiplier test’s for serialized cor-relation up to the 3rd order in the residual’s shows by L.M, J.B indicates the Jarque’Bera statistics for the null hypo-thesis test that the residual’s are normal multi-variate, and W.H shows the white hetero-skedasti-city test of the residual’s (Table 3).

Table 3. Findings from the bi-variate $GARCH$ (1,1) evaluation

Mean-equations:

$$r_t^{RERE} = 0.211 + 0.331^{***} r_{t-1}^{RERE} - 0.335^{***} r_{t-2}^{RERE} - 0.021 r_{t-1}^{PO}$$
$$(1.348) \quad (5.652) \qquad (-3.618) \qquad (-1.146)$$

$$r_t^{PO} = 0.580 + 0.233^{*} r_{t-1}^{PO}$$
$$(0.376)(1.813)$$

(T-statistic in paren-thesis)
Co-variance and Variance equations’:

$$h_t^{RERE} = 0.485^{***} + 0.516^{***} \varepsilon_{t-1}^{2,RERE} + 0.148^{***} h_{t-1}^{RERE}$$
$$(3.323) \quad (2.302) \qquad (2.723)$$

$$h_t^{PO} = 2.213 + 0.226^{**} \varepsilon_{t-1}^{2,PO} + 0.742 h_{t-1}^{RERE}$$
$$(0.741) \quad (2.104) \qquad (13.371)$$

$$h_t^{RERE,PO} = -0.215^{**} \left(h_t^{RERE}\right)^{1/2} \left(h_t^{PO}\right)^{1/2}$$
$$(-1.783)$$

(T Statistics in paren-thesis)
System-Diagnostic test:

$$Q\,(6) = 29.343\ (P = 0.261)$$

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r^{REER} and r^{OP} are the changing rate's in real effective rates-of-exchange and real-prices-of-oil correspondingly. The "conditional variances", h^{RERE} for real effective rates-of-exchange and h^{PO} for real-prices-of-oil. The "conditional covariance" is, h^{RERE}, h^{PO}. ***, ** and * shows the level of significance at one %, five % and ten%, correspondingly. The residual getting from system residual Port-manteau tests for auto cor-relations is Box Pierce statistics test denotes by $Q\ (k)$ (Table 4).

Table 4. Granger-Causality test's outcomes

Hypo-thesis	F' statistics	prob.
r^{PO} does not-cause r^{REER}	*1.737 (−)*	*0.153*
r^{PO} does not cause h^{RERE}	*2.156 (+)*	*0.127*
h^{PO} does not cause r^{REER}	*1.176 (−1)*	*0.209*
h^{PO} does not cause h^{RERE}	*3.211**(+)*	*0.035*

r^{REER} and r^{OP} are the changing rates in real-effective rate of exchange and price of oil, correspondingly. The Conditional-Variance, h^{RERE} for real-effective-rates-of-exchange and h^{PO} for real-prices-of-oil. **indicates the level of significance at the five per cent (see Figure 1).

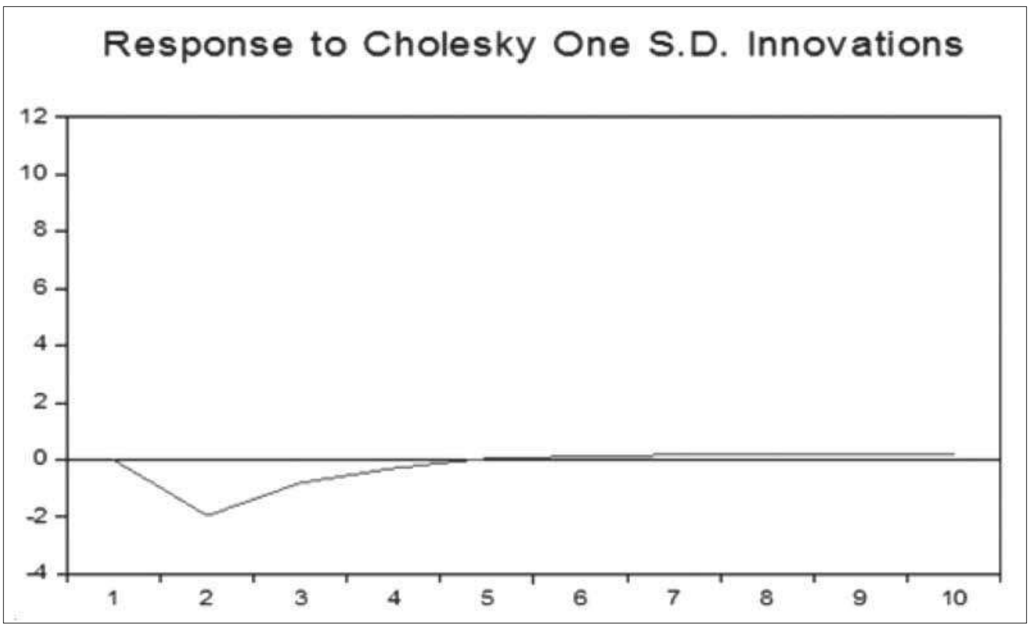

Figure 1. Response of real effective-rates-of-exchange instability to prices-of-oil instability

4. Conclusion

This research applied three methods of 'time-series' investigation to study the association among real-prices of oil and real-effective-rates-of-exchange in Thailand, and Thailand economy is a rising market-economy. The findings from co-integration tests in a framework of bi-variate indicate that the association among the real-prices-of-oil and the real-effective-rates-of-exchange does not exist in the long term. The Non Causality test that depends on an augment-ted VAR methodology is another method to investigate the causative association among real-prices-of-oil and real-effective-rates-of-exchange (Kusel et al., 2020; Lawrence, 2020; Ghozali et al., 2020; Helmi et al., 2020; Hotar, 2020; Matthews & Mokoena, 2020; Antoni et al., 2020; Berejena et al., 2020). This method approves for determining causal relationships among the level of variables. However, the findings obtained from non-causality test fail to passes "diagnostic tests", then, the findings should not be consistent.

The findings getting from the 2-steps method indicate that Causality does not exist from changes in real-prices-of-oil to changes in real-effective-rates-of-exchange. In addition, real' prices of oil instability do not causes real' effective rates of exchange to appreciates as establish in earlier experiential researches. The essential result is that a raise in real-prices of oil instability cause is a raise in real-rate of exchange instability which can damage the country's balance of trade. The Government officials must be conscious of the un-certainty (insatiability) in the foreign markets of exchange causes by instability in the prices of oil (Janseen, 2020; Sabela, 2020; Msimanga & Sekhampu, 2020; Kobayashi & Farrington, 2020; Ozcan & Vural, 2020). It's may-be essential to apply various measure's that promote firm's to depend more on latest energy (wind-power and hydro-electric) so that prices of crude oil will not-be the major causes of real-rates-of-exchange uncertainty. Additionally, various-measures that will increase the competitive-ness of exporting is firms might consider required. Promoting energy-efficiency as a substitute of energy-intensity can decrease the production-cost. In the future, diversification of export must also be applied to avoid the balances of trade to depreciate.

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