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Equity and Commodity Market Co-Movements in Thailand

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ABSTRACT

This paper studies the dynamic linkage between oil price, gold price and Thailand stock market in the long run as well as in the short run. By employing Time series analysis using monthly data from for the period of August 1999 to August 2013, the study applies co-integration technique, Granger causality test, and Impulse Response Function (IRF) and Variance Decomposition (VDC) analysis. The findings reveal that oil price changes have asymmetric effects on Thailand stock market while a positive relationship has been observed between the gold price and the stock return in the same market. Finally, few implications and applications of the study have been suggested in detail.

Keywords: Gold Price, Oil Price, Thailand Stock Market.
JEL Codes: H20, I21, J29.

1. Introduction

The last decade has witnessed a stream of research related to oil and gold price. This is partially because of the recent up rise of these two strategic commodities that play a significant role in the world economy (Hussinet. Al, 2013). For instance, the oil price shocks of 1973-74 and 1979-80 leads the academic, practitioners to explore the association between oil price shock and macroeconomic variables while the policy makers have become seriously concerned about the improvement in the oil market as this consequence the macroeconomic costs in two ways (Masih et al., 2011). Firstly, energy becomes more costly as oil is a significant input to production as well as consumer goods; and these results in a decrease in economic activities (Bohi, 1989). Secondly, increasing oil price directly

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contribute to raise inflation, particularly in energy reliant countries (Bernanke et al. 1997).Besides, the rise in oil prices in 2005 and 2006 reveal the growing demand from Asia particularly form India and China (Stevens, 2005). These two countries (China and India) have become two major principles players on the international energy scene as currently they account above 10% of the world oil consumption (Masih et al., 2011). However, The effect of these oil price shocks is significantly larger in oil-importing countries, particularly where policy makeup are weak, foreign exchange funds are low, and access to international money markets is restricted(Masih et al., 2011). Government authorities battle oil price hikes through fiscal and monetary policies. For instance, to retain high industrial production along with exports revenues, the rates of interest are kept at low levels. However, it is not easy to evaluate the influence of the oil price volatility on different macroeconomic variables, particularly the shock on the stock markets. It is may be noteworthy that the researchers did not seriously examined the impact of oil until 1990s (Driesprong et al., 2003).Gold, on the other hand, considered a pioneer in the valuable metals market, is a reliable investment asset and an industrial commodity. Usually referred to as 'safe haven' in evading high risk in monetary markets, gold is frequently a risk management device in hedging plus diversifying commodity portfolios since it is less vulnerable to exchange rate fluctuations. Therefore, it can be said that gold is unaffected to changes in the external and internal purchasing power of native currency (Hussinet. Al, 2013).Study regarding the relationship between gold prices and macroeconomic variables and is scanty with a focus primarily on gold price and financial variable relationships. A small number of formal researches have been undertaken on the stock price-gold price relationship (Hussinet. Al, 2013).The role of gold in the global financial system during the climax of recent financial crisis in most developed market proved as strong 'safe haven' (Baur and McDermott, 2010). However, the same phenomenon may not be true for small emerging market like Thailand.

The Stock market of Thailand is one of the emerging markets in Southeast Asia. It has been a consistent source of equity financing for many listed firms of different equity sectors. Since the economic liberalization in the 1990s, inflows of capital as foreign direct investment and portfolio have been a growing trend. The statistics from the bank of Thailand shows that the net capital movement of the country was about 1.1 billion US dollars in the year 1985 and climbed to 11.3 in 1991 and jumped to 21.5 in 1995. After the financial collapse in 1997 the net capital flow drooped to 9.8 billion dollar yet recovered in 2005 reaching the maximum point of 24.8 in 2011(Jiranyakul, 2014).Despite the fluctuation of net capital flow a rise of capital inflow was noticed in recent years. Consequently foreign investors play significant role by investing freely in stock, government bonds and debentures. This phenomenon of domestic capital flow may impose critical economic impact on Thailand economy for instance an appreciation in the exchange rates, a rising tendency in the price level as well as stock prices (Jiranyakul, 2014). Besides, as oil importing country Thailand has been dependent on imported equipment and machinery. Thailand's oil import reached 47.2 percent of net import in 1996, just before the year of financial crisis. Thus a decrease in oil import of 44.3 percent is observed in 1998 followed by 32.6 in 2011. This can be because of exchange rate fluctuations in the floating regime. In fact this kind of import is necessary for the production of manufacturing goods to be exported. In the Southeast Asia Thailand is the largest net oil importer after Singapore. A change in the price in world oil market can influence the stock market in Thailand(Jiranyakul, 2014).Meanwhile, the gold price had dropped significantly from its highest at $1,895 in the year 2011 to $1,061 in 2015 which was around a 44% drop.

Earlier when the Gold Traders Association was not formed, gold traders in Thailand made gold in accordance to their preferences without reviewing the percentage of gold they had used, some used around 99% while some other used 97%(Jaraskunlanat, 2016). The business hours plus the fees they charged similarly varied among different traders. This type of activities caused problems, therefore, gold traders were organized and decided to form a club named "11 Gold Traders Club" that

included 11 gold traders to set a benchmark for gold and they determined that gold in Thailand should use 96.5% from the year 1983 and onwards on concerning the nature of gold itself and the usage of gold to be best for the customers (Jaraskunlanat, 2016).

Thus, due to special features as well as roles of oil and gold in economy, it is practically important to examine how exactly these two commodities are capable to effect macro-economic variables in the economy (Hussin et. al, 2013). Yet there are many studies that explored the relationship between macro-economic variables and stock returns. Studies related to oil and gold price volatility and their impact on stock market primarily conducted for developed countries such as USA, Japan and European countries (Jiranyakul, 2014). Besides, there are few papers investigated the relationship between oil price shock and stock market of Thailand, and different factors affecting the gold price in Thailand. But there is no study that incorporated both of the commodities (oil and gold) and their volatility transmission of the stock market of Thailand. Therefore, this study intends to fill this gap, investigating the dynamic relationship between gold price, oil price and Thailand stock market. By applying vector autoregressive (VAR) model, this paper collect the dataset from for the period of August 1999 to August 2013.The findings reveal a positive relationship between the gold price and the Thailand stock market and in the case of oil price volatility, asymmetric effects have been observed.

The rest of the paper have been organised as follows. The next section provides the review of literature, followed by the description of data and econometric tools have been used, then empirical result and its implications, and finally conclusion drawing few policy implications.

2. Literature review

The vibrant relationship that prevails between stock market return and macroeconomic variables have been studied extensively using models which explain that the price of share can be written appropriately as the usual discounted cash flow (Hussin et. al, 2013). It may be inferred, then, that the determinants of share price are the expected cash flow and required ratio of return (Elton and Gruber, 1991). Therefore, economic variables like gold and oil prices that have an impact on required return and potential cash flow can be expected to do the same to share prices. The researchers based on their studies have pointed that there exist a dynamic relationship between stock prices and macroeconomic variables and the variables of strategic commodities (Hussin et. al, 2013).

Oil is a commodity that is traded on a global scale. It plays a significant role in influencing the economic conditions of the country as well as the financial markets. Since it is the principal source of world energy, oil prices can influence the global economy. First, an oil price increase results in households spending less on the consumption of other goods and services as their energy bills increases. Thus, the aggregate demand in the economy falls leading to lower economic growth. In fact, five of the last seven US recessions have been caused, to a certain extent, by increases in oil price (Sill 2007). Second, fluctuations in oil price will alter the production cost and will significantly affect the aggregate output (Mork 1994). So, the firm's profitability may be affected. Investors may become pessimistic and take decisions that have negative implications on the stock market. Therefore, it may be inferred that oil price has an inverse relationship with the stock market performance for oil importing countries. Oil price increases leads to a fall in the exchange rates leading to higher inflationary pressures in these countries. Since a higher inflationary expectation may force the Central Banks to raise the interest rate, a rise in oil prices may have an adverse impact on stock market returns (Huang et al., 1996). Numerous researchers (Jones and Kaul, 1996; Sadorsky, 1999; Hui, Rong, and Sufang, 2014) have also supported the above findings.

Besides, Sadorsky (1999) and Maghyereh's (2004) studies found that a rising adversely affect the profit of the Korean companies were affected by souring oil prices. Crude oil accounted for 41% of South Korea's total energy consumption in 2016 (Source:

https://www.eia.gov/beta/international/analysis_includes/countries_long/Korea_South/images/energy_consumption.png) and the oil consumption was around 2.9 million barrels a day in 2016 (Source: https://www.indexmundi.com/g/g.aspx?c=ks&v=93). As almost all of the crude oil was imported, so an increase in the price of world crude oil may significantly affect the South Korean firms' profits and dividends because these firms cannot pass on all the cost to the consumers. Thus, the South Korean stock price may collapse as it is determined mainly by the firms' profit and dividend. Moreover, Sadorsky's (1999) study shows that oil price volatility has major effects on the US economy. He showed that after 1986, oil price movements influenced the changes in stock returns. He further concluded that increases in oil prices reduces the real stock returns whereas falling stock returns may lead to a fall in interest rates and industrial production.

Another study was undertaken by Jones and Kaul (1996) who studied the relationship between oil price and stock markets of four developed economies. The findings showed that the future expected cash flows of the stock markets in US and Canada were affected by the oil price shocks. However, in Japan and UK, the results were inconclusive. Yet another parallel study was conducted by Sunil, Mohan, Abdullah and Muhammed (2011) to examine the effect of crude oil price changes on the stock returns of the Gulf Cooperation Council (GCC) countries. They concluded that oil price shocks significantly influences the stock returns in all the GCC countries except Kuwait. Meanwhile, Hui, Rong, and Sufang (2014) investigated the interconnection between oil price and stock markets returns across the Asia-Pacific region during the period 2000-2012. They found that a weak relationship between crude oil prices and stock returns in the Asia-Pacific stock markets. Two different trends were identified. Before the global financial crisis, there was a weak yet positive relationship between crude oil prices and stock returns in all the markets in the region except Hong Kong. However, in the aftermath of the crisis, the relationship became significantly stronger.

Gold is regarded as one of the most precious and prestigious commodities in the history of civilization. It is characterized as a more durable, authentic, and transportable and universally accepted asset in comparison to other physical assets. It is capable to be used in the making of ornaments, minted coins, and medals, electrical and medical components (Aazim, 2011). Besides, gold is considered a secured investment and plays a significant role in times with economic and political uncertainties (Aggarwal and Lucey, 2007). According to the sensible investors in the share market, gold is construed as one of the risk-avert investment avenues in the period of bearish share market (Ray, 2013).

In the past few years due to pleasant profitable conditions and outstanding safety features, gold market has witnessed a very lively scenario. Thus, the function of gold market in the big commodity market as well as in the public economy has received growing attention by the academic circles and business cycles; moreover, studies concerned can also be found promising (Zhang&Wei, 2010). However, the relationship between share market price and gold price were inconclusive (Hussin et. al, 2013). For instance, the research of Smith (2002) found a small and negative short-run correlation between the stock market index and gold prices in European markets and Japan. Moreover, Baur and Mcdermott (2010) examined the role of gold investment as a method to diversify against the investment in stocks of some emerging and developing countries by using samples from 1979 to 2009. The research reveals that investment in gold would help to hedge against risks in investment in the stock markets of Europe and USA but not of the emerging markets such as BRICS. Besides, Monjazeb and Shakerian (2014) examined the response of the stock returns of seven Banks in Iran to changes in the world oil price and gold price. They concluded that the oil price had a positive effect on the stock returns of the Banks but the gold price changes had a negative effect.

Furthermore, Mohd, Fidlizan, Azila, and Nurfakhzan (2013) undertook a research to analyze whether price changes in the strategic commodities like oil and gold has any impact on the Islamic stock market in Malaysia. Among the two commodities, it was found that only oil price changes were

co-integrated with the Islamic stock returns in Malaysia in the short run only. However, no such relationship could be established between gold price changes and the Islamic stock returns. On the contrary, the findings were the opposite for a research undertaken by Rahman and Mustafa (2018). The paper studied the relationship between changes in commodity prices like oil and gold and US Stock market returns. The research findings revealed long-run convergence between the commodity prices and the stock returns. However, in the short-run, changes in the gold prices were found to be negatively correlated with the stock returns but the result was insignificant for oil price. It can be concluded that most of the researchers referenced above have found a significant impact of oil price fluctuations and volatility on the stock market of different countries. In a few studies, the results were not significantly conclusive. On the other hand, the results were more diverse for the impact of the gold price changes on the stock returns.

However, there are few studies investigated the dynamic relationship between Thailand stock market and macroeconomic variables including oil price shock, and different factors affecting the gold price in Thailand. But there is no paper that integrated oil and gold price and their volatility transmission of the stock market of Thailand. Therefore, this research intends to fill this gap, investigating the dynamic relationship between gold price, oil price and Thailand stock market.

3. Methodology

The study empirically examined the relationship between Oil price index (OIL), Gold price index (GOLD) and Thailand stock market index (MSCITH) using the monthly data for the period of August 1999 to August 2013. The data were gathered from DataStream International. The vector aggressive model (VAR) has been adopted to examine the macroeconomic variables and Thailand stock market. The model developed and applied in the paper is as follow:

$$MSCITH_t : \alpha_0 + \alpha_1 OIL_t + \alpha_2 GOLD_t + \mu_t \qquad (1)$$

Based on the VAR regression model, the three variables of the study which are mentioned above can be expressed as:

$$\begin{bmatrix} MSCITH_t \\ OIL_t \\ GOLD_t \end{bmatrix} = \begin{bmatrix} A_1 \\ A_2 \\ A_3 \end{bmatrix} + R(L) \begin{bmatrix} MSCITH_{t-1} \\ OIL_{t-1} \\ GOLD_{t-1} \end{bmatrix} + \begin{bmatrix} et_1 \\ et_2 \\ et_3 \end{bmatrix} \qquad (2)$$

Here, R represents 3 x 3 matrix polynomial parameter estimators, (L) is the lag length operators, A stands forthe intercept, and *et* is a Gaussian error vector with mean zero and Ω is a Varian matrix.

The standard procedure of time series analysis was followed to specify the VAR model appropriately. First of all, to determine the stationary properties of the variables the Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were applied. Islam (2013) applied unit root test to find the impact of digital divide on economic growth in South Asia. Briefly, a variable is supposed to be integrated of order d, expressed as 1(d), if it needs differencing d times to attain stationarity. Therefore, the variable is regarded as non-stationary if it is integrated of order 1 or higher. Grouping of the variables into stationary and non-stationary variables is critical since standard statistical measures can handle the stationary seriesonly. Furthermore, there also exists a probable long-run co-movement labelled as cointegration among the non-stationary variables having theidentical integration order. In

this paper, the lag length is selected based on theSchwarz information criterion (SIC) as it seemed appropriate.

Consequently, a VAR-based approach of the cointegration test recommended by Johansen (1988) as well as Johansen and Juselius(1990) was employed. The Johansen (1991) test has the advantage of commencing both estimation and hypothesis testing in a unified framework. Suitably, the test provided the required information on if the variables, specifically the measures of the Thailand stock market and commodities variables were tied in the long run. If these variables are cointegrated at I (1), there should be at least unidirectional Granger causality (Morley, 2006). In this relation the study applied the VECM Granger causality method to check the direction of causal relation between Oil price, Gold price and Thailand stock market.Next, this study applied the Impulse Response Function (IRF) to determine how each variable responds over period of time to shocks in it as well as in other variables by means of the innovation technique. The IRF basically figure out the vibrant response path of a variable to an alteration in one of the variable's innovations.

Finally, to specify the extent of exogeneity between variables outside the sampling period, the Variance Decomposition (VDC) test was adopted. The VDC explains the percentage of forecast inaccuracy variance for each variable which may be characterized to its own shocks plus to variations in the further variables in the system.

4. Empirical results

4.1 Descriptive statistics

Figure 1 shows the trends of monthly return in Thailand stock market, price series of Oil and Gold. The return and oil price series exhibit an upward movement with a moderate shock in the year of 2008 and 2009 respectively. This is may be due to global economic downturn, domestic political uncertainties and the fall in oil and gas prices in Thailand.

However, it can be evident from the growth series that the market started to rise significantly in 2009 as the global economy recovered and the government's economic stimulus package began to impact the domestic market of Thailand. The gold series exhibits a consistent increasing movement without any enthusiastic crumple; however, the opposite scenario can be noticed in the case of growth series.

Figure 1: Return and growth series

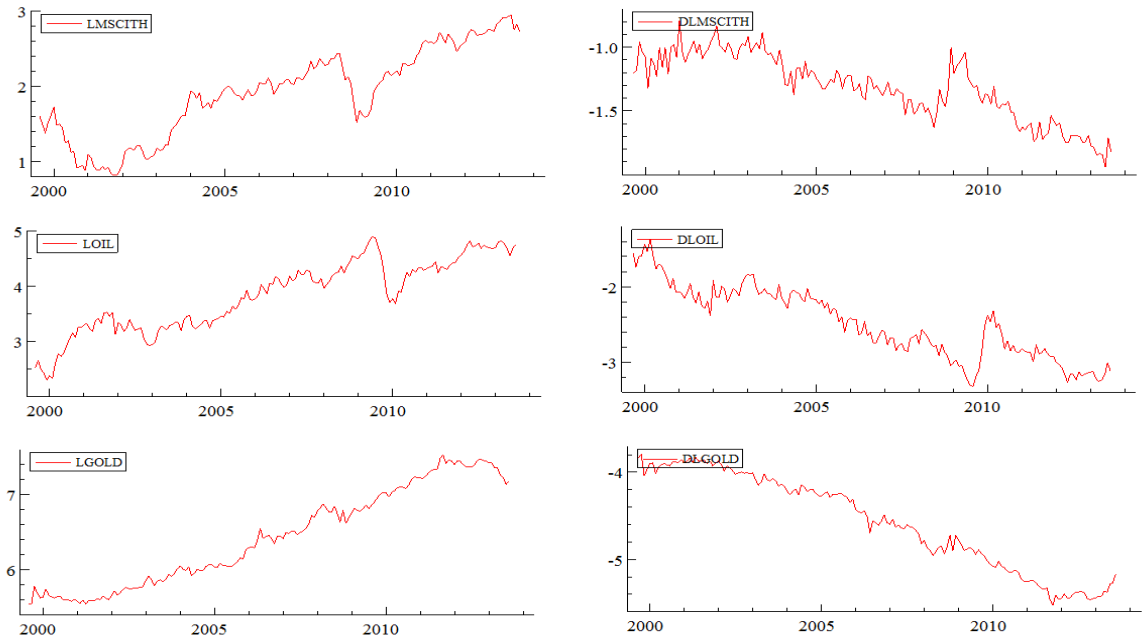


Table 1: Summary statistics

	Mean	Std.Dev	Skewness	kurtosis	J-B	Probability
LMSCITH	1.913	0.587	-0.203	2.027	7.81	0.02
LOIL	3.829	0.645	-0.253	2.144	6.961	0.030
LGOLD	6.436	0.644	0.186	1.610	14.57	0.000
N	169					

Table 1 presents the summary statistics of the variables. The skewness for return and oil series is negative and kurtosis is above 2 in comparison to oil that is below 1. The Jarque-Bera test statistics (JB) strongly reject that the hypotheses are of normally distributed.

4.2 Stationary test

As most macroeconomic variables are characterized by unit-root processes (Nelson and Plosser 1982), numerous unit root tests have been developed to test the stationary properties of the series (Shahbaz et al, 2013 and Islam, 2015). It is also obligatory to check the variables for the order of integration before we test them for cointegration (Gazi et al., 2013).In this regard, the Augmented Dickey-Fuller (Dickey and Fuller, 1979, 1981) and Phillips and Perron (1988) tests are widely accepted and used. However, Phillips and Perron (1988) proposed a modification of the Dickey-Fuller (DF) test and have developed a more comprehensive theory of unit root nonstationarity. Most significantly, for low frequency data, as is the case with ours, the PP test appears to be more powerful than the ADF

test (Choi and Chung, 1995).Table 2showsthe unit root test for the level and first difference series with constant and with constant and trend. The results reveal all the variables showing no unit root at first differenced at 1%, 5% and 10% level of significance. However, the oil series have been found to have stationary distribution even at level but with both constant and trend in case of Philliphs and Perron (1988) methodology than in case of Dickey and Fuller (1979) methodology. This is due to methodological difference between Phillips-Person and ADF tests (Al Mamun Md. et. al., 2012)

Table 2 : Unit root tests

Variables	Augmented Dickey-Fuller test		Decision	Phillips-Perrontest		Decision
	Constant	Constantand Trend		Constant	Constant and Trend	
Panel 1: Level data						
MSCITH	-0.52	-2.92	I(1)	-0.71[5]	-3.16[5]	I(1)
GOLD	-0.81	-2.48	I(1)	-0.77[6]	-2.37[7]	I(1)
OIL	-1.57	-3.02	I(1)	-1.57	-3.28[3][c]	I(1) I(0)
Panel 2: Growth data						
MSCITH	-11.96[a]	-11.94[a]	I(0)	-12.04[5][a]	-12.02[5][a]	I(0)
GOLD	-15.2[a]	-1.52[a]	I(0)	-15.3[6][a]	-15.3[6][a]	I(0)
OIL	-12.92[a]	-12.89[a]	I(0)	-12.9[a]	-12.89[a]	I(0)

4.3 Lag length criteria

Estimating the lag length of the autoregressive process for a time series is a crucial econometric exercise in most economic studies(Venus and Sen, 2004). Various lag length selection criteria such as the Aikaike's information criterion (AIC) (Akaike 1973), Schwarz information criterion (SIC) (Schwarz 1978) Hannan-Quinn criterion (HQC) (Hannan and Quinn 1979), final prediction error (FPE) (Akaike 1969), and Bayesian information criterion (BIC) (Akaike 1979) are used to select the appropriate lag length of autoregressive process. These criteria especially the AIC and SIC have been popularly adopted in economic studies which can be evident form the works of Sarantis (1999, 2001) and Baum et al. (2001), Baharumshah et al. (2002), Ng (2002) and Tang (2003) who employed the AIC, Sarno and Taylor (1998) who employed the AIC and SIC, Azali et al. (2001) and Xu (2003) who utilized the SIC in their empirical research.

Table 3 exhibits the available lag length criteria to be selected. The study followed SIC information criteria to select appropriate lag length as it offered the minimum value 1 compared to other lag length criterion.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	18.05834	NA	0.000166	-0.18823	-0.13057	-0.16482

1	536.8968	1011.735	2.84E-07	-6.56121	-6.330572*	-6.46756
2	555.2423	35.08571	2.53E-07	-6.67803	-6.27441	-6.514134*
3	565.8344	19.86019*	2.48e-07*	-6.697930*	-6.12134	-6.46379
4	571.2412	9.935103	2.59E-07	-6.65302	-5.90344	-6.34864
5	576.2719	9.055272	2.73E-07	-6.6034	-5.68085	-6.22878
6	584.5031	14.50745	2.76E-07	-6.59379	-5.49826	-6.14893
7	593.2532	15.09386	2.77E-07	-6.59067	-5.32216	-6.07557
8	602.3719	15.38793	2.77E-07	-6.59215	-5.15066	-6.00681

* 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

4.4 Johansen cointegration tests:

In order to determine the number of co-integrating vectors, Johansen cointegration tests(1995)with MSCITH, GOLD and OIL is applied. The λtrace and λmax statistics are calculated as perJohansen (1995)and presented in Table 4. The corresponding λ-statistics and their critical values are shown in the first and second columns.

As long as each λ-statistic is above its critical value, the study fails to accept the corresponding null hypothesis of no cointegration. It can be noticed that the trace and maximum eigenvalue cointegration test results presented in Table 4 reject the null hypothesis of no cointegration.

The fourth column against each null hypothesis in the table gives the number of cointegrating equations. The results of the cointegration tests in Table 4 are suggesting one cointegration of the variables under the λtrace and λmax tests.

Table 4: Johansen cointegration tests

			λ Statistics	Critical Values	P- values	Cointegrating Equations
Rank Tests: λ_{trace}Tests						
	Ho: r =0	HA: r >0	30.21752	27.06695	0.0447	Present
	Ho: r ≤1	HA: r >1	9.738357	13.42878	0.3014	Not Present
	Ho: r ≤2	HA: r >2	1.094688	2.705545	0.2954	Not Present
λ_{max}Tests						

Ho: r =0	HA: r =1	20.47916	18.89282	0.0615	Present
Ho: r =1	HA: r =2	8.643669	12.29652	0.317	Not Present
Ho: r =2	HA: r =3	1.094688	2.705545	0.2954	Not Present

Note:
1. The $\lambda_{trace\ and}\ \lambda_{max\ are}$ calculated as per Johansen (1995) Critical Values are calculated for the 5 percentsignificance level.
2. λ_{Trace} Indicates Trace and λ_{Max} states Maximum Eigen value unrestricted co-integration rank Test, P-values are calculated as per Mackinnon et al. (1999).
3. r Denotes the number of co-integrating vectors. The $\lambda_{trace\ and}\ \lambda_{max}$test statistics are computed by allowing for linear deterministic trends in the data.

4.5 The long run impacts

The long run marginal impact of oil and gold on Thailand stock market is reported in Table 5. The result indicates that 1 percent increase in oil price negatively affects the Thailand stock market by 0.147 percent. This evidence supports the observation of Ferderer (1996) that for oil-importing countries an increase in the oil prices influences their economy negatively Particularly, an increase in oil price puts a downward pressure on foreign exchange rates and upward pressure on domestic inflation rates in these countries. Since a higher expected inflation rate raises the discount rate, a rise in oil price has a negative impact on stock market returns (Huang et al., 1996). This negative effect of rising oil prices on stock markets in net oil importing countries has been supported by a number of researches (Cheung and Ng, 1998; Sadorsky, 1999; Park and Ratti, 2008).

Over the last years the Asian demand for crude oil has been on a strong rise due to the growth of the global economy and the demand for oil in transportation, household residency, commercial activities, and industrial operation. As a huge net importer of oil, Asians oil balance is highly negative. In order to keeps the economy flowing, while knowing that there is a lack of supply for consumption, a country such as Thailand is depended upon foreign crude oil due to imported into the country. The demand has strongly increased while the domestic production of oil has been inactive within this decade. In this situation, Thailand has to meet the demand by painstakingly importing oil from the international market. Therefore, it seems logical to assume an opposite relationship between oil price and stock market performance in Thailand. On the other hand, a positive association is observed as 1 percent increase in the gold price affects the Thailand stock market by 0.960 percent. Universally, gold price and stock market moves in the opposite direction. Basically, when gold price goes down, people withdraw their investment from gold and invest the same in the stock market which in turn increases the value of the stock market due to heavy investment. When the economy is in a downturn and stock markets are going down, investors tend to park their funds in gold and wait out the storm. Thedemand for gold increases in a downturn economy, and consequently the value of gold also increases.

However, the relationship between gold prices and stock prices were inconclusive and conclusion can be drawn from the existing research findings that the relationship between these two varies and depends on a country's economic situations (Hussin et al., 2013). The positive relationship between the gold price and Thailand stock market resulted in this study can be explained by the Gold ETF (exchange traded fund). The Gold ETF (exchange traded fund) is a type of gold investment in Thailand which is listed on the Stock Exchange of Thailand (SET) underlying assets consists of gold bullion. Gold ETFs represent an easy way to gain exposure to the gold price, without the inconvenience of storing physical gold bars, which are traded like shares on the stock exchanges. Every trading transaction is guaranteed by the clearing house, a subsidiary of the SET. Investors can also track real time prices from the brokers, as well as on online media. ETF products are open-ended funds in nature, meaning that there exists the flexibility to create new shares when needed and investors can trade the Gold ETF like a stock trading on existing accounts, or a new account of brokers and sub-brokers. On the first trading day on the SET, the first Gold ETF (GLD) rose by 6.58 per cent from the IPO price.

Just three weeks after it was launched, the price of GLD has increased continuously, up to 15.53 per cent (Manchsree, 2011). Consequently, the spot gold trading volume in Thailand is now in the top third of the world rankings after India and China and thus, investor's desire to receive something tangible that can be kept in personal possession instead ofholding gold bars might results in the positive association between these two variables noticed in this paper.

The lower part of the Table 5 provides the details of the short run results. It can be noted that the oil price negatively affect the stock market of Thailand while a positive association exists between the gold price and Thailand stock market. The coefficient of ECM_{t-1} has a negative sign and significant at 1 per cent level of significance. The significance of lagged error term corroborates the established long run association between the variables. Furthermore, the negative and significant value of ECM_{t-1}implies that any short run deviations in Thailand stock market are corrected by 38 per cent every month towards the long run equilibrium.

Table 5:

Panel A: long run equation

Dependable variable LMSCITH			
Long run results			
Variable	Coefficient	Std. Error	t-Statistic
C	-3.70032	0.218607	-16.9268[a]
LOIL	-0.14796	0.061458	-2.40755[a]
LGOLD	0.960114	0.061571	15.59359[a]

Panel B: short run equation			
Dependable variable DLMSCITH			
Short run results			
C	0.699065	0.056783	12.31126[a]
DLOIL	-0.07272	0.026366	-2.7582[a]
DLGOLD	0.479703	0.022911	20.93724[a]
ECM_{t-1}	-0.38126	0.024937	-15.2893[a]
R^2	0.913796		
Adj-r^2	0.912219		

4.6 VECM granger causality analysis

As cointegration exists between variables, it is imperative to spot the direction of causality as it would enable the policy makers to frame guiding principle to improve the performance of the stock market in the country. Therefore, this study has applied VECM multivariate framework Granger causality to analyze the casual relationship between oil price, gold price and Thailand stock market. The benefit of the VECM Granger causality approach is that it provides an indication about short run as well as long run. The results of the VECM Granger causality analysis are reported in Table-8. It can be noted from the table that ECM_{t-1} coefficient carries positive sign and statistically significant in all VECMs, therefore; can be concluded that in the long run a change in oil and gold price Granger cause the stock market of Thailand as well as in the short run. In general, empirical evidence reveals bidirectional causal relationships among oil price, gold price and Thailand stock market in long and short runs. This shows the significance of oil and gold price in the stock market of Thailand.

Table 6: VECM causality analysis

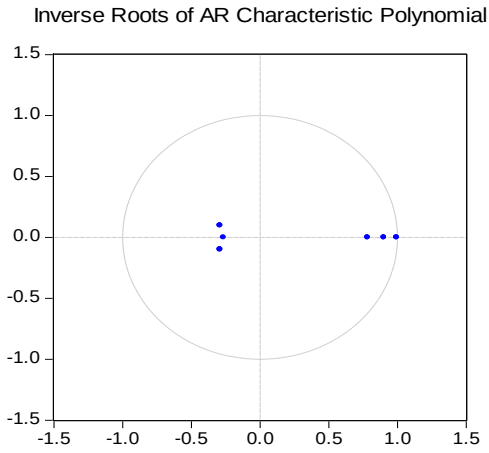
Dependent variables			Short run	Long run
	C_1	C_2	C_3	C_4
	ΔlnstockReturn	Δlnoil	Δlngold	ECM_{t-1}
ΔlnstockReturn C_1		112.14[a]	30.15[a]	300.62[a]
		(0.072)	(.039)	(.062)
Δlnoil C_2	85.18[a]		94.80[a]	43.75[a]
	(.134)		(.101)	(.076)
Δlngold C_3	1777.38[a]	29.73[a]		312.45[a]
	(.056)	(.092)		(.066)

Note: shows 5% level of significance

4.7 Dynamic analysis

To determine the relative importance of changes in oil and gold price in explaining the volatility of Thailand stock market, the impulse response functions and variance decomposition analysis will be performed. Therefore, it is needed examine and make certain about stability of VAR model (Kalyanaraman&Tuwajri, 2014). The figure 2 confirms that the VAR model is in stable condition as all inverse roots of AR characteristic polynomial are within the unit circle.

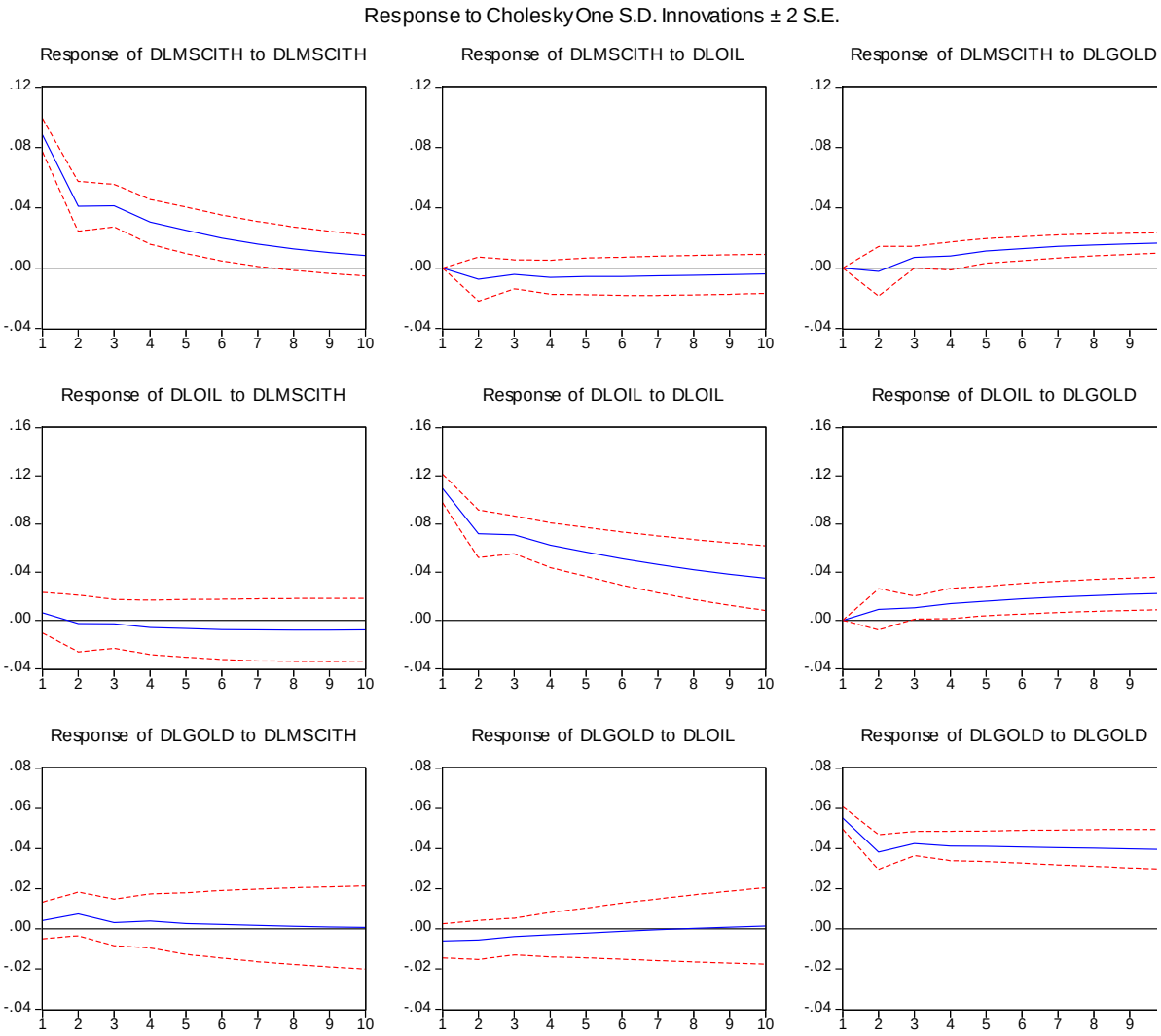
Figure 2: VAR stability analysis



4.8 Impulse response functions

Impulse response functions (IRF) explain the impact of a unit innovation to the error of each equation of the VAR (Le & Chang, 2011). The study applied the first differences of the logged variables in the unrestricted VARs to estimate the IRFs. The results suggest that one standard deviation change in the oil price affect the Thailand stock market negatively. The curve fall down from the very beginning and remain steady throughout the year. On the other hand, the stock market of Thailand responds negatively and immediately to innovation in the gold price index for the first two months. But more importantly, it responds positively after two months lasting for till 10 years. The results confirmed the co-movements between the variables and are consistent with co-integration and VECM granger causality test.

Figure 3: Impulse response functions



4.9 Variance decomposition analysis

Variance Decomposition analysis (VDC) is an dynamic and alternative way to IRF to measure the degree of change in the endogenous variables emanated from the endogenous variables along with the transferral of all other variables in the structure (Brooks, 2008). In this study the VDC analysis is done to assess the relative magnitude of change in gold price and oil price in characterizing the volatility in real stock price of Thailand. Table 7 presents the Variance Decomposition analysis for ten years. It can be noticed from the table that 21 percent variations in the Thailand stock return were contributed by other variables. Among all the variations, gold price variables were the most significant characterizing about 19.9 percent of the Thailand stock return forecast error variance. On the other hand, oil price contributed only .99 percent. However, lnstock itself remains the most important shock for lnstock explaining 98.9 percent variation in the 2nd year time horizon that gradually faded away over time hitting 79.1 percent in the final year time horizon. These results are consistent with those of

VECM and Impulse response functions analysis. It can be inferred from these analyses that Thailand stock market can be predicted from the historical prices.

Table 7: Variance decomposition method (VDC)

Time	VDC of Δlnstock return			VDC of Δlnoil			VDC of Δgold	
	Δlnstock return	Δlnoil	Δlngold	Δlnstock return	Δlnoil	Δlngold	Δlnstock return	Δlnoil	Δlngold
1	100	0.00	0.00	0.47	99.53	0.00	0.72	1.18	98.10
2	98.91	0.18	0.91	0.28	99.33	0.38	1.14	0.74	98.12
3	96.82	0.44	2.74	0.34	98.52	1.14	1.48	0.51	98.00
4	94.17	0.69	5.13	0.45	97.39	2.17	1.74	0.42	97.84
5	91.35	0.88	7.78	0.54	96.07	3.39	1.92	0.42	97.66
6	88.56	0.98	10.45	0.61	94.63	4.76	2.04	0.49	97.47
7	85.93	1.03	13.04	0.64	93.13	6.22	2.12	0.60	97.28
8	83.48	1.03	15.48	0.65	91.59	7.76	2.17	0.73	97.10
9	81.22	1.02	17.76	0.64	90.02	9.34	2.20	0.88	96.92
10	79.13	0.99	19.88	0.63	88.44	10.93	2.22	1.04	96.74

5. Conclusion and policy implications

This paper empirically investigates the relationship between oil price, gold price and stock market return in case of Thailand using monthly data over the period of 2000-2013. The Augmented Dickey-Fuller, Phillips and Perron unit root test has been applied and long run relationship has been studied by undertaking Johansen approach to cointegration. Besides, causal relationship between oil price, gold price and stock market return of Thailand is examined by applying the VECM Granger causality test and the robustness of the causality result is checked by innovative accounting and variance decomposition approach.

The study reveals that there is a positive correlation between gold price shock and the stock return in Thailand. Since there are some alternatives for gold investment, it is considered as an investment asset depending on one's financial circumstance, risk profile and objectives of investment.

As mentioned earlier, the Gold ETF (exchange traded fund) has been gaining remarkable growth in Thailand. Therefore, collaboration between national capital management firms and national gold traders would be crucial in sustaining and improving the Gold ETF sector (Manchsree, 2011). On the other hand, negative connection exists between oil price shock and the stock return in Thailand. Oil as an input contributes significantly for production in many industries. Therefore, an up rise in oil price usually creates noteworthy cost-push inflation and higher unemployment resulting in economic crisis. As a result, the hike in oil price creates uncertainty and risk that eventually affect the stock price as well as reduces assets (Dhaoui and Khraief, 2014). However, the negative relation between oil price and the stock return in Thailand may not be branded as significant. This can be explained by the fact that dependency on oil in Thailand has decreased sharply compared to the prior oil crisis since locally discovered natural gas has been used as an alternative. In 2003, the proportion of oil consumption to entire energy consumption rose 45.8 percent in comparison to that of 80.5 percent in 1983. Still the value of oil proportion to GDP has reached 6.5 percent in 2004 in comparison to 5.5 percent in 2002 with economic resurgence and rising oil prices (Bank of Thailand, 2004). Since oil price shocks can have considerable adverse effect on Thailand economy, Government should intervene and formulate policy measures to reduce volatility. In this regard the Government should consider and focus few areas. First of all, as one of the oil importing countries Thailand needs to increase their strategic oil reserve so that they can avoid disruptions in oil supply chain management (Masih, Peters, & De Mello, 2011). Secondly, oil saving measures with a focus on behavioural aspect such as promoting energy conservation behaviour using marketing technique should be taken to improve energy efficiency. Beside these, bilateral dialogue and co-operation should be increased with exporting countries to reduce the innovations (Masih, Peters, & De Mello, 2011) that might have an adverse effect on Thailand's economy.

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