The Relationship Between Energy and Equity Mutual Funds of Thailand
ความสัมพันธ์ระหว่างกลุ่มพลังงาน และ กองทุนตราสารทุน ของประเทศไทย

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Abstract

This study investigates short-run and long-run linkages between the energy index price and mutual fund prices type equity of Thailand. The evidence is based on Johansen' Cointegration test and Granger-Causality test for the period 2005 to 2010 using a multivariate vector-autoregression approach. The evidence shows that the energy index price is not cointegrated with equity mutual fund prices, indicating long-run benefits existing for investors to diversify their risk. The direction of causality seems to differ across seven major asset management companies, offering short-run benefits for investors to earn abnormal returns.

Keywords: energy prices, equity mutual funds, Thailand

JEL codes: C12, G11, G23

1 Introduction

There is a consensus among academics and practitioners that oil prices have a significant impact on the economy (Hamilton 1983; Gisser and Goodwin 1986; Nandha and Faff 2008; Degiannakis et al. 2014). In particular, the existing literature investigates the effects of oil prices on stock markets in developed countries (Sadorsky 1999; Park and Ratti 2008; Abhyankar et al. 2013).

The international crude oil price rose rapidly during the last decade. This resulted in great fluctuations in the Asia market, which in turn pushed the energy price up (Cong et al. 2008). Therefore, increased access to financial markets provides expanded opportunities for investors to diversify their investments. If a linkage exists between the oil price and stock price, one would expect changes in the oil price to be correlated with changes in equity mutual fund prices. Since previous study confirms the capacity to equity mutual funds to replicate the stock market index, for the findings suggest that investing in equity mutual funds is equivalent to investing directly in the stock market (Pojanavatee 2013). It is reasonable to expect that there is some degree of price responsiveness between the energy index and equity mutual

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funds. The extent to which mutual fund price companies are related to the energy index is important not only for investors and fund managers with regard to their investment strategies, but also to academics and policy makers examining the implications of investing in domestic equity markets and the energy sector.

Consideration of whether, and to what extent, there is asymmetry effects related to the energy index and equity mutual funds is limited in this area of the literature. This study is an attempt to add to the sparse literature on developing countries, especially in the context of Thailand. The primary aim of this study is to examine the lead-lag relationships between mutual fund prices type equity and the energy index. The cointegration test is utilised to uncover the long-run equilibrium among the specified variables while the Granger-causality test reveals how equity mutual fund prices may affect the energy index price and vice versa. The remainder of this study is organised as follows: section 2 discusses a specific model for investigating price interaction, and also describes the data; section 3 discusses the findings of the primary analysis; and section 4 concludes the paper.

2 Data and Methodology

The efficient market hypothesis (EMH) posits that current stock prices reflect all available information (Fama 1970). The hypothesis is that all information is quickly and efficiently incorporated into asset prices at any point in time and profit (abnormal returns) cannot be made from trading information. Therefore, analysis, such as fundamental analysis[†] and technical analysis[‡] cannot be used (Bishop et al. 2004). Thus, the term "market efficiency" means security prices are rational and an investor cannot systematically beat the market (Statman 1999).

The study uses daily closing prices in seven different companies of open-ended Thailand equity mutual funds: MFC Asset Management Co., Ltd. (MFC), SCB Asset Management Co., Ltd. (SCB), BBL Asset Management Co., Ltd. (BBL), One Asset Management Co., Ltd. (ONE), Kasikorn Asset Management Co., Ltd. (Kasibhatla et al.), UOB Asset Management (Thai) Co., Ltd. (UOB), Thanachart Fund Management Co., Ltd (THAN). Together, these companies represent 51 mutual funds type equity. The oil and gas Index is used as an energy Index (EN). Historical daily data on mutual fund prices type equity and the energy Index are obtained from Morningstar Direct and DataStream over the period 2005 to 2010.

[†] Fundamental analysis is used to evaluate investments in securities from characteristics of a security by attempting to measure the intrinsic value.

[‡] Technical analysis is the evaluation of securities from the chart using historical price behaviour to predict future movement.

All variables are transformed into natural logarithms because, over time, prices are skewed, so a lognormal distribution better reflects the reality of the prices (Harrington 1987).

The seminal paper by Granger and Newbold (1974) shows that the problem of spurious regressions exists in those regressions containing non-stationary variables. Therefore, the vector autoregression (VAR) (De Gooijer and Sivarajasingham 2008) model is designed for use with non-stationary series that are known to be cointegrated (Ben-Zion et al. 1996; Chu 2011). As a result, it is necessary to test the variables for stationarity before proceeding with the analysis of the vector-autoregression (VAR) model. The study performs the Augmented Dickey-Fuller (ADF) (Dickey and Fuller 1979; 1981) and the Phillips-Perron (PP) (Phillips and Perron 1988) tests to examine the presence of unit roots of the variables. The VAR and its stability is tested and optimal lag orders are selected using the model selection criteria to find the most parsimonious model. To explore the relationship between mutual funds type equity and the energy index, the model specified below is used:

$$EN_t = \mu_t + \beta_{1t} BBL_t + \beta_{2t} KASI_t + \beta_{3t} MFC_t + \beta_{4t} ONE_t + \beta_{5t} SCB_t + \beta_{6t} THAN_t + \beta_{7t} UOB_t + \varepsilon_t \quad (1)$$

where, μ_t is intercept and $\beta_1, \ldots, \beta_7$ are coefficients. If the variables are integrated of the same order then the Johansen test for cointegration with a constant and linear deterministic trend is used to test the long-run equilibrium relationship between the variables. The short-run price dynamic is analysed by using the Granger-Causality test (Granger 1969).

3 Results and Discussion

The study performs the ADF (Dickey and Fuller 1979, 1981) and the PP (Phillips and Perron 1988) tests for the presence of unit roots in both price levels and the first difference of the variables. The null hypothesis is that all series variables are non-stationary against the alternative hypothesis that all series variables are stationary. The results of the unit root tests are presented in Table 1.

The results indicate that the logarithmic closing prices are non-stationary as the *t*-statistic critical values are greater than the ADF and the PP critical values. In addition, the study applies the same test to their first differences. The results show a rejection of the null hypothesis but an acceptance of the alternative hypothesis in that all level series variables are stationary at the 1% level of significance. It can be seen that the *t*-statistics critical value has smaller values than the ADF and the PP critical values. Thus, each price series is found to be stationary at the first differences ($I(1)$).

Table 1 Unit root tests

Variables	ADF test		PP test	
	Level	1st Difference	Level	1st Difference
EN	-1.957806	-39.60278*	-1.915663	-39.61853*
BBL	-1.846116	-38.54405*	-1.847957	-38.55032*
KASI	-1.330308	-39.66543*	-1.302322	-39.65967*
MFC	-0.491742	-40.03883*	-0.517999	-40.00518*
ONE	-0.961979	-40.46341*	-0.893920	-40.44810*
SCB	-0.563001	-37.82449*	-0.682683	-37.86757*
THAN	-1.151698	-40.09853*	-1.138746	-40.07662*
UOB	-1.462721	-40.55190*	-1.396734	-40.53949*

Note: the critical values for the ADF and the PP test statistic with intercept at the 0.01 level is -3.4345. * indicates significance at the 1% level.

Since the time series of equity mutual fund prices and the energy index price are $I(1)$, there exists the possibility of a long-run equilibrium relationship between them. The study employs a specific VAR estimated to apply a specific lagged endogenous multivariate model. Four different information criteria are used for model selection in order to determine the appropriate lag length of the VAR models along with the Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn criterion (HQ). Results of lag order selection suggest that the lag-length of VAR is $p = 3$ according to FPE and AIC. The SC finds two lags as the appropriate lag length, while the HQ tests indicate that one lag is significant for the system. By selecting lag length criteria, the statistical results show that lags of order three are sufficient based on that suggested by the AIC and FPE statistics which previous papers have usually adopted (Cong et al. 2008; Lin et al. 2014). Hence, the study selects the optimal lag with the lag interval one to three for cointegration and causality tests based on the VAR. This decision is justified based on the interaction of these variables in a relatively efficient Thai stock market (Khanthavit et al. 2012).

Next, the stability of the VAR model is tested. The results show that none of the roots are outside the unit circle, which indicates that the VAR model satisfies the stability condition check. Since the variables, the equity mutual fund prices, and energy index prices in log level, each contain a unit root, the study performs traditional tests of cointegration trend (Johansen and Juselius 1990). The null hypothesis is that there is no long-term equilibrium

relationship between the equity managed fund prices and the energy index price. The cointegration tests are presented in Table 2, which indicates that the mutual fund prices type equity and energy index prices did not exhibit any cointegration during 2005 and 2010.

Table 2 Johansen-Juselius cointegration test

Null	Alternative	Trace Statistic	99% Critical value
$r = 0$	$r \geq 1$	141.5349	171.0905
$r \leq 1$	$r \geq 2$	98.85044	135.9732
$r \leq 2$	$r \geq 3$	69.27008	104.9615
Null	**Alternative**	**Max-Eigen Statistic**	**99% Critical value**
$r = 0$	$r = 1$	42.68441	58.66895
$r \leq 1$	$r = 2$	29.58036	52.30821
$r \leq 2$	$r = 3$	25.00691	45.86900

Note: *r* indicates the number of cointegrating relationships. The critical values used for the test are defined by Mackinnon (1999).

Therefore, the evidence shows that the energy index is not cointegrated with any of the seven companies of open-ended Thailand mutual funds type equity based on tests for pairwise Johansen' Cointegration[§]. It can be seen that investors are likely to achieve considerable benefits by diversifying between these financial instruments in the long-run, as their prices have been shown to have been independent of each other. The result suggests that mutual fund type equity companies have not tried to design their portfolios related to energy index in the long run.

[§] The pairwise Johansen cointegration tests are not reported in the paper but are available from the author upon request.

Table 3 Multivariate causality

Dependent variable	Chi-square statistics							
	EN	BBL	KASI	MFC	ONE	SCB	THAN	UOB
EN		5.987	7.327	1.506	4.375	23.228**	10.845*	4.927
BBL	5.039		3.938	2.620	1.720	33.432**	5.642	5.363
KASI	4.108	3.114		3.706	1.915	23.553**	4.872	5.393
MFC	2.521	3.657	2.961		1.641	26.077**	5.167	7.569
ONE	5.100	3.776	4.821	3.121		25.337**	5.208	4.355
SCB	4.815	4.861	3.047	5.389	1.216		4.149	4.766
THAN	7.464	3.608	4.661	4.196	0.969	28.426**		6.624
UOB	5.990	4.190	6.596	3.470	5.956	28.025**	4.477	

Note: * and ** represent a rejection of the hypotheses of non-causality at the 5% and 1% significance levels, respectively.

The next stage in the analysis consists of the short-run relationship between the Thai energy index and equity mutual funds. The study performs Block Exogeneity Wald tests with a chi-square statistic to indicate the existence of Granger-causality when all variables interact in one system. Under the null hypothesis, there is no short-term Granger-causal relationship between equity managed fund prices and the energy index price. The results of the Granger-Causality tests are presented in Table 3 and suggest that the energy index prices are determined by the mutual fund prices type equity at the 1% level of significance.

For instance, the results from Granger-Causality test show that there are one-way causality runs from SCB equity mutual fund prices to energy index prices at the 1% level of significance. Furthermore, Granger-causality between the energy index and the THAN equity mutual fund prices is one-way (equity mutual funds to energy index) at the 5% level of significance. Therefore, the evidence shows that the energy index prices do not have an influence on any of the seven companies of open-ended Thailand mutual fund type equity. One possible explanation is that the energy prices might have an impact on other industries where oil and gas are used as a key input (i.e. mining, and oil and gas) rather than the financial sector (i.e. banks, insurance and investment companies) (Hamilton 1983; Gisser and Goodwin 1986). The results of Granger-Causality tests indicate that the SCB equity mutual fund prices have a relatively higher strength of exogeneity in relation to other equity mutual fund companies. It can be seen that Thai energy index prices are significantly influenced by equity mutual fund prices, particularly from the SCB equity mutual fund company. As a result, if the

current SCB equity mutual fund price rises, investors will expect that both Thai energy index prices and equity mutual fund price companies will increase. Hence, observing movements in particular equity mutual fund prices can be used to forecast the price of other equity mutual fund companies and the energy index.

The findings support previous studies in this field for example, Nandha and Faff (2008) show that the oil factor is not found to have a significant impact across industries, such as on electric equipment, information technology hardware, software and computer services, telecom services, and investment companies. In addition, Degiannakis et al. (2014) suggest that the financials sector's volatility is not mainly influenced by oil price shocks. Using VAR based analysis, this finding is consistent with previous studies that have demonstrated that oil prices are endogenous (Barsky and Kilian 2004). Additional research should be directed to investigating how the energy index prices affect oil and gas companies' stock prices for Thailand.

4 Conclusion

The results of the cointegration tests reveal that there is no long-run equilibrium relationship between equity managed funds and the energy index. This study indicates that, in the long-run, the price of equity mutual funds can diverge from that of the energy index since equity mutual funds have not designed their portfolios related to the energy sector in the long run. In the short-run dynamics, the results suggest that the SCB equity mutual fund prices do contribute greatly to changes in the energy index prices and other equity mutual fund price companies. The results of the study clearly encourage policy makers and investors to pay attention to equity mutual funds in Thailand. The evidence of causality implies the possibility of profiting from arbitrage, because investors may gain insights into the future prices of the energy index and equity mutual funds by observing the price movements in one of the equity mutual fund companies.

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