*IBEJ Vol.2 Issue No.1 (2009)01-18*
*ISSN 1985 - 7918*

# STOCK PRICE MOVEMENTS: DOES CHANGE IN ENERGY PRICE MATTER?

**[1]Norasibah binti Abdul Jalil, [2]Gairuzazmi bin Mat Ghani, [2]Jarita bte Daud, [3]Mansor bin Ibrahim.**

[1]Fakulti Perniagaan dan Ekonomi, Universiti Pendidikan Sultan Idris, Tanjong Malim, Perak.
[2]Kulliah Ekonomi dan Sains Pengurusan, Universiti Islam Antarabangsa Malaysia, Gombak, Kuala Lumpur.
[3]Fakulti Pengurusan dan Ekonomi, Universiti Putera Malaysia, Serdang, Selangor.

## Abstract

This paper investigates the impact of oil price shocks on the Malaysian stock market. The co-integration test results documented zero co-integration equation. This finding implies no long-run relationship between the variables in the system. The causality test which looks at short run dynamic interactions between the variables also documented the same finding where shocks in all types of oil prices do not impose any effect on movements in stock price. This finding leads us to conclude that, a change in oil price(s) has no significant effect on stock market both in the short-run and long-run. These findings also lead us to conclude thaPt, change in oil price, particularly domestic oil price[1] cannot be used as a policy tool in adjusting the stock market in any case shocks in oil price strike again in future.

**Keywords:** Stock prices, oil prices, vector auto-regressive methods.

## Introduction

The oil price increase strikes again in the 2000s. Factors like depletion in oil supply, an increase in oil consumption, particularly from emerging industry in third world nations like China and India, and political instability in oil producing countries are being blamed as the main causes for the increase. Increases in demand without offsetting increases in supply lead to higher oil prices.

Majority of the studies on oil price impact in the existing literatures, have documented significant negative association between changes in oil prices and economic performance. The findings appear to be consistent with the economic theory which suggests that oil shocks have a stagflationary effect on the macroeconomy. Being an important energy resource to the economic industries, an increase in oil prices implies an increase in cost of production, which in turn slows down the growth rate (and may reduce the level of output, due to recession) and they may also lead to an increase in the price level and potentially an increase in the inflation rate. These tendencies are higher for an oil importing country than the exporting countries.[2] An oil price hike acts like a tax on consumption and for a net oil importing country, the benefits of the tax go to oil producing countries than the domestic government. The finding of negative association between oil price increase and economic growth is also empirically proven in studies conducted by Tatom (1993), Greene and Tishchisyna (2000), and Jones, Leiby and Paik (2004).

## Issues and Objectives

Taking an overview of the existing literatures, majority of the existing studies are very much concentrated on real effects of oil price increase. It has been widely accepted that, two ways to measure economic performance are through observing the movements in GDP and the stock prices. It is because both economic indices are interrelated. Conceptually, having a documented significant relationship between oil price movements and economic output, it is intuitive to draw similar conclusions about the linkage between the oil price and financial markets. Specifically, it can be argued that if oil affects real economic activity, it will also affect earnings of companies through which oil is a direct or indirect cost of operation. Thus an increase in oil price causes expected earnings to decline, and this would bring about a decrease in stock prices/returns.

Majority of oil price impact analysis also mainly concentrate on oil-importing established economies like USA and OECD countries. Little attention has been devoted to investigate the case on other types of economies, i.e. small open oil exporting economies like Malaysia. Moreover, despite the fact that Malaysia is an oil exporting country, it also imports oil from other countries. The marginal surplus of exporting value over the importing value makes Malaysia a net oil exporting country. This means, the country is doing both oil exporting and oil importing activities. The question that emerges here is: what is the net effect of an increase in oil price to the economy.

In the light of the above mentioned issues, the current analysis attempt to investigate oil price impact on the Malaysian stock market. This study in general aims to provide empirical evidence on the impact of oil price changes on stock price movements. In particular, it aims to specifically determine the type of association between oil price and stock price variables and to detect the presence of causality relationship from oil price to stock price variable.

## Methodology

This study uses quarterly data for a time span of 1991.1 to 2005.4. The analysis of oil price impact uses three types of oil prices; world oil price (PW), world oil price converted into domestic currency value (PWD)[3], and domestic oil prices ((PD). The world oil price variable is derived from West Texas Intermediate (WTI)[4] crude oil prices, while PWD is the world oil price (WTI) in RM value.[5] The last oil price variable is the diesel oil price (in RM per liter)[6], representing domestic oil prices. The world oil price is deflated using world CPI, while the domestic oil prices use domestic producer's price index. We employ VAR modeling to capture the oil price impact on stock prices. All data used in the analyses are expressed in real terms[7], i.e. deflated by CPI-deflator and are transformed into natural log.[8] The data are obtained from the Bloomberg, International Financial Statistic CD-Rom, various issues of Bank Negara Annual Report, the KLSE website and the EIA website.

The model specification for the current study is denoted as;

$$SP_t = ( P_{OIL}, , ER, IR),$$

where SP is the stock price dependent variable, $P_{OIL}$, *ER* and *IR* represent oil price, exchange rate and interest rate variables.

The analysis is conducted within the standard VAR framework. The first step in our empirical implementation is to determine the unit root and cointegration properties of the variables under consideration. We apply the commonly used augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests[9] to determine the variables' stationarity properties or integration order. To test for cointegration, we employ a VAR-based approach of Johansen (1988) and Johansen and Juselius (JJ, 1990).[10]

### *Causality Test*

A bivariate autoregressive standard Granger causality model is presented below:

$$\Delta Y_t = \alpha + \sum_{i=1}^{p} \alpha y_i \Delta Y_{t-i} + \sum_{i=1}^{p} \alpha x_i \Delta X_{t-i} + \varepsilon_t \qquad [1]$$

Where Δ is the first-difference operator and ΔX and ΔY are stationary time series. The null hypothesis that X does not Granger-cause Y is rejected if the coefficients, αxi, in equation [1] are jointly significant. Equation (1) is expanded to include other variables of the model to conduct multivariate Granger causality test.

**Table 1** Unit Root Test Results

| Variable | Level | | First Difference | |
|---|---|---|---|---|
| | ADF | PP | ADF | PP |
| **PWD** | -0.843[6] | -1.805[1] | -8.986[5]*** | -14.571[0]**** |
| **PD** | 3.573[6] | 2.692[2] | -0.790[11] | -25.127[1]**** |
| **PW** | -1.617[2] | -1.976[1] | -12.492[1]*** | -14.216[0]**** |
| **SP** | -3.019[3] | -3.271[2] | -10.818[2]*** | -16.591[0]**** |
| **IR** | -2.269[11] | -2.556[1] | -5.668[10]*** | -13.530[0]*** |
| **ER** | -2.951[3] | -2.518[1] | -8.512[2]*** | -15.152[0]*** |

Notes: 1) with trend and intercept. 2) ****, ** and * denote significant at 1%, 5% and 10% significance level. 3) Values in square brackets are the optimum lag length for the ADF and the PP tests. The optimum lag length for both tests, the (ADF) and the (PP), is automatically determined based on the AIC and SIC methods.

## Estimated Results

### *The Unit Root Tests*

Table 1 presents the results for the unit-root tests. The ADF and the PP tests agree in classifying all variables, except for PD, as I(1) variables, i.e. are non-stationary in level but become stationary after first differencing. For PD set to 2 for analysis PWD, 3 for analysis PD, and 2 for analysis PW - which we find sufficient to render the error terms serially uncorrelated.

The results in Trace and Maximal Eigenvalue (M.E) statistics have both documented zero co-integrating equation for all analyses. This finding provides indication that, in the long run, the variables are not tied together and have no causality relationship amongst them.

**Table 2** Co-integration Test Results

| | Null Hypothesis | Statistics | | Critical Values (5%) | |
|---|---|---|---|---|---|
| | | TRACE | ME | TRACE | ME |
| **PWD** | $r = 0$ | 39.331 | 19.258 | 47.21 | 27.07 |
| | $r \leq 1$ | 20.073 | 14.731 | 29.68 | 20.97 |
| | $r \leq 2$ | 5.342 | 3.290 | 15.41 | 14.07 |
| | $r \leq 3$ | 2.052 | 2.052 | 3.76 | 3.76 |

| | | | | | |
|---|---|---|---|---|---|
| **PD** | r = 0 | 43.033 | 15.735 | 47.21 | 27.07 |
| | r ≤ 1 | 27.298 | 14.166 | 29.68 | 20.97 |
| | r ≤ 2 | 13.135 | 9.641 | 15.41 | 14.07 |
| | r ≤ 3 | 3.492 | 3.492 | 3.76 | 3.76 |
| **PW** | r = 0 | 38.314 | 16.792 | 47.21 | 27.07 |
| | r ≤ 1 | 21.522 | 13.180 | 29.68 | 20.97 |
| | r ≤ 2 | 8.342 | 5.501 | 15.41 | 14.07 |
| | r ≤ 3 | 2.841 | 2.841 | 3.76 | 3.76 |

Notes: 1) The lag (p) order specified for analysis PWD, PD, and PW are 2, 3, and 2 respectively, which we find sufficient to render the error term serially uncorrelated. 2) The 5% critical values are based on Osterwald-Lenum(1992). 3) Both statistics indicate 0 cointegrating equation at both 5% and 1% levels for all analyses. 4) Effective number of observations is 56.

### *Causality Test Results*

The documentation of no co-integration among the variables suggests no long-run association between the variables. From VAR, the standard Granger-causality test is conducted to access the short-run interaction between the variables. The overall results are displayed in Table 3.

**Table 3** Granger Causality Test Results – Dep. Var: Δ SP

| | $\chi^2$-Statistics of lagged first differenced term | | |
|---|---|---|---|
| Indep. Var. / Analysis. | $\Delta P_{OIL}$ | ΔIR | ΔER |
| PWD | 6.278 [0.179] | 9.249** [0.055] | 0.292 [0.990] |
| PD | 0.530 [0.912] | 7.531** [0.057] | 0.763 [0.858] |
| PW | 4.899 [0.179] | 8.395** [0.039] | 0.836 [0.841] |

Notes: 1. numbers in square brackets are P-values. 2. ** significant at 5% level

Based on the findings, SP is observed to react to changes in IR only. This finding is true in all analyses. Apart from the findings, changes in oil prices and exchange rates (ER) appear to give no impact to SP. This finding leads us to conclude that, in the short-run, there is no causal relationship exists between oil price and stock price variables.

Based on these findings, we conclude that change in oil prices has no effect on stock prices (SP) both in short-run and in long run. Failure to detect any long-run relationship between oil price and stock market variables at aggregate analysis appear to be consistent with studies by Chen, Roll and Ross (1986), Hamao (1989), and Hammoudeh and Eleisa (2004).

## Discussion and Conclusion

The main objective of this study is to investigate the impact of oil price changes on stock price movements in Malaysia. The results obtained documents zero co-integration equation which indicates no long-run relationship between the dependent and the independent variables in the system. The causality test results indicate not causality relationship between stock price and other variables in the system, except the IR variable. In line with the main theme of this study, the overall finding leads us to conclude that, a change in oil price has no significant effect on Malaysia stock market both in short-run and in long-run.

There are a number of possible reasons for this finding. First, it may have to do with stabilization policy. In the event of an oil price increase, under the situation of no complete substitution effects between factors of production; increase production costs. Higher production costs dampen cash flows and reduce stock prices. Moreover, rising oil prices also are often indicative of inflationary pressures which Central Bank can control by raising interest rates. Higher interest rates make bonds look more attractive than stocks leading to a fall in stock prices. Tendencies for the negative impact are higher for oil consuming countries. Since Malaysia is both an oil consuming and oil producing country, the impact of rising oil prices on stock markets is expected to be zero as the positive and negative effects, resulting from oil exporting and importing activities, offsets each other.

An other possible reason may have to do with model specification. In this study, which follows the framework of Papapetrou (2001), the model uses a linear framework. Failure to detect any significant relationship between SP and oil price variables in all tests offers us another option in analyzing the case; i.e. through non-linear specification. We leave future research to explore the issue further.

The last possible reason that explains the finding of this study may be connected to the level of study. Many aggregate analysis of oil price impact in earlier studies, also fail to detect any type of relationship between oil price and stock price variables. However, studies by Huang, Masulis, and Stoll (1996), Faff and Brailsford (1999), and Manning (1991), who conducted disaggregated analysis, found evidence of a relationship between the oil price and industrial or individual company stock returns. These findings provide an indication that, more pronounced results may be obtain from disaggregate level analysis than the aggregate analysis. Again, these findings provide another space for future further research.

## Endnotes

1 All oil prices are determined by the world oil market except the PD oil price, which is set by the Malaysia government.

2 The literature tends to focus on consuming nations, although more recent evidence (IEA, 2004) applies globally.

3 Most of the empirical literature which analyze the effect of oil price shocks in different economies use either the USD world price as a common indicator of the world market disturbances that affect all countries (i.e. Burbidge and Harrison, 1984) or the world oil price

is converted into each respective country's currency by means of the market exchange rate (i.e. Mork et al., 1994) for OECD countries or Abeysinghe (2001) for Asian countries. A study by Nandha and Hammoudeh (2007) highlights the significance of using oil price expressed in domestic currency to capture the sensitivity of a country's stock market to changes in oil prices. The main difference between PW and PWD is that, the second oil variable takes into account the fluctuations in the exchange rates, which will assist us to differentiate whether each oil price shock reflects the world oil price evolution or could be due to other factors such as er fluctuations or national price index variations. In addition, study by Cunado and Garcia (2004) has observed more significant results are obtained when oil price shocks are defined in local currency.

4 is the average crude oil spot prices - international price (USD) per barrel and is a reference price used in the US and global market, including Malaysia

5 Converted by using market exchange rates. Calculations; PWD = (PW X ER) / deflator

6 Is the average real oil price of diesel

7 base year 2000

8 IR variable is not transformed into natural log value as it is already in percent value.

9 for ADF and PP tests, see Enders (1995), and Eun et. al. (1999)

10 refer to Johansen and Juselius (1990) for specific details of the JJ procedure. See also Hall (1989) and Dickey et al., (1991)

## References

Abeysinghe, T. (2001). Estimated of Direct and Indirect Impact of Oil Price on Growth. *Economics Letters*, Vol. 73, 147-153.

Burbidge, John & Alan Harrison. (1984). Testing for the Effects of Oil-Price Rises using Vector Autoregressions. *International Economics Review, 25*, 459-84.

Chen, N. F., Roll, R., & Ross, S. A.,(1986). Economic Forces and the Stock Market. *Journal of Business*, July 1986, 383-403.

Cunado, J. & Perez de Gracia, F. (2004). Do Oil Price Shocks Matter? Evidence for some European Countries. *Documento de Economia y Finanzas Internacionales,* January:1-19.

Faff, R. W., & Brailsford, T. J. (1999). Oil price risk and the Australian stock market. *Journal of Energy Finance and Development, 4*, 69-87.

Greene, D. L., & Tishchisyna, N. I. (2000). *Costs of Oil Dependence: A 2000 Update*. Oak Ridge: Oak Ridge National Laboratory

Hamao, Y. (1989). An empirical examination of the arbitrage pricing theory: Using Japanese data. *Japan and the World Economy,* 1, 45-61.

Hammoudeh, S. & Eleisa, E. (2004). Dynamic Relationships Among GCC Stock Markets and NYMEX Oil Futures. *Contemporary Economic Policy*, 22(2), 250-269.

Haung, R. D., Masulis, R. W., & Stoll, H. R. (1996). Energy Shocks and Financial Markets. *Journal of Futures Markets,* 16 (1), 1-27.

International Energy Agency. (2004). Analysis of the Impact of High Oil Prices on the Global Economy,. http://library.iea.org/dbtw-wpd/textbase/papers/2004/high_oil_prices.pdf

Jones, D. W., Leiby, P. N., & Paik. I. K. (2004). Oil Price Shocks and the Macroeconomy: What Has Been Learned Since 1996. *The Energy Journal*, 25 (2), 1-32.

Manning, N. (1991). The UK oil industry: some inferences from the efficient market hypothesys. *Scottish Journal of Political Economy*, 38, 324-334.

Mork, K. A., O. Olsen, & Mysen, H. (1994). Macroeconomic Responses to Oil Price Increases and Decreases in Seven OECD Countries. *Energy Journal,* Vol. 15: 19-35.

Nandha M. & S. Hammoudeh (2007). Systematic Risk, and Oil Price and Exchange Rate Sensitivities in Asia-Pacific Stock Markets. *Research in International Business and Finance*, Vol 21, Issue 2, June 2007, 326-341.

Papapetrou, E. (2001). Oil Price Shocks, Stock Market, Economic Activity and Employment in Greece. *Energy Economics,* 23*:* 511-532

Tatom, J. A. (1993). Are There Useful Lessons form the 1990-91 Oil Price Shock? *Energy Journal*, 14(40, 129-141.