الجامعة الإسلامية العالمية ماليزيا
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# THE IMPACT OF OIL PRICE ON THE MALAYSIAN ECONOMY

BY

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A dissertation submitted in partial fulfilment of
the requirements for the degree of
Doctor of Philosophy in Economics

Kulliyyah of Economics and
Management Sciences

International Islamic University
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JUNE 2010

# ABSTRACT

This paper studies the impact of oil prices; the world oil price (PW) and the domestic oil price (PD), on output and financial markets in Malaysia. The analyses are conducted at both aggregate and disaggregate levels within the VAR and the Augmented-CAPM frameworks. The results from the aggregate analysis indicate change in oil prices affect the output market significantly both in the short run and long run. Moreover, the significant relationship between the two variables is also documented in the asymmetric test. At disaggregate level, significant results of the vector error correction model (VECM) test are documented in the Agriculture, Forestry and Fishing (AGR), Mining and Quarrying (MIN), Construction (CONS), and Wholesale and Retail Trade, Hotels and Restaurant (WSALE) sectors of the PW and/or the PD analyses. These findings provide indication that the sectors are positively associated with change in oil prices in the long run. From the causality test, significant result is identified in the MIN sector only. From these findings we may conclude that the most pronounce result is documented in the MIN sector where output and the oil price variables are detected to associate significantly not only in the short run but also in the long run. For the financial market, the aggregate analysis documents insignificant results in all tests. This finding provides evidence that the stock price (SP) is relatively insensitive to change in oil prices. At disaggregate level, a unique significant result, which is obtained from the asymmetric model, is detected in the industrial (IND) sector. In particular, the returns of the IND sector are negatively exposed and are asymmetrically associated with change in the PW oil price. The overall findings of the two market analyses lead us to conclude that, the output market is more reactive to oil price change than the financial market.

# ملخص البحث

يهدف هذا البحث لدراسة مدى تأثير أسعار النفط, سعر النفط العالمي و سعر النفط المحلي, على كل من سوق الأنتاج وVARوالسوق المالي الماليزي. قد أجريت التحاليل على المستوى الإجمالي و غير الإجمالي من خلال إطار المتزايد. تشير نتائج التحليل الإجمالي بأن التغيير في أسعار النفط يؤثر بشكل واضح على سوق الإنتاج CAPM على المدى القصير والمدى البعيد سواء. زيادة عن ذلك, فقد دونت أيضا العلاقة الواضحة بين المتغيرين في الفحص نتائج واضحة في القطاع الزراعي, VECM اللا تماثلي. على المستوى الغير إجمالي, فقد دوّن فحص نموذج الغابات و الأسماك, التعدين و الإحتجار, البناء و تجارة القطاعي و الجملة و قطاع المطاعم و الفنادق في كل من تحليلات سعر **النفط** العالمي و النفط المحلي. تشير هذه النتائج بأن هناك علاقة إيجابية بين القطاعات و التغيير في أسعار النفط على المدى الطويل. كما أظهرت نتائج فحص السببية بأن هناك نتيجة واضحة في قطاع التعدين و الإحتجار. نستطيع أن نستخلص من النتائج بأن النتيجة **الأكثر** ظهورا هى في قطاع التعدين و الإحتجار حيث أنه ثبت بأن هتاك علاقة واضحة بين متغير الناتج و سعر النفط ليس فقط على المدى القصير بل أيضا على المدى البعيد. أما بالنسبة للسوق المالي, فقد دونت التحليلات الإجمالية نتائج غير واضحة في كل الفحوصات. **تدل** هذه النتيجة على أن سعر الأسهم المالية هو بالتالي أقل تأثرانسبيا بالنسبة للتغيرات في أسعار **النفط**. على المستوى الغير إجمالي, نجد هناك نتيجة واضحة فريدة من نموذج اللا تماثلي في القطاع الصناعي. بالتحديد, كل العائدات من القطاع الصناعي تظهر سلبيتها و علاقة غير تماثلية مع التغيير في أسعار النفط العالمية. إذا قارنا النتيجة الإجمالية بالنسبة لسعر النفط و مدى تأثيره على كل من السقين, فإننا نجد بأن سوق الإنتاج أكثر تفاعلا للتغيير في سعر النفط من السوق المالي.

# APPROVAL PAGE

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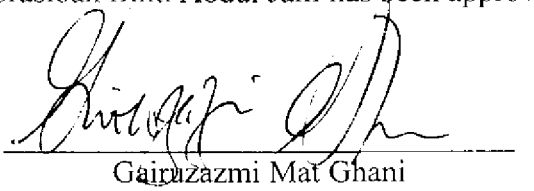

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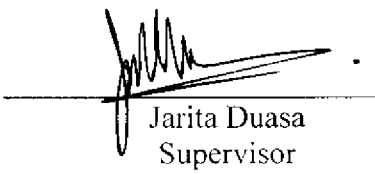

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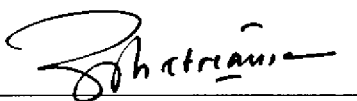

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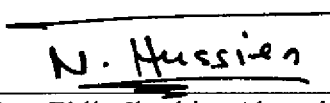

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# DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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*Dedicated to these special people whose endless love and support I can never repay*

*My beloved mother Azizah Binti Derham*

*My undisputed love, Muzakhir bin Bahari*

*My dearly loved children: Syafiq, Salsabila, Aiman, Anas Daniel and Ihsan Zikry*

*Last but not least to my decent and dedicated maid, Nurlaili Ishak*

# ACKNOWLEDGEMENTS

Praise and thanks be to Allah (swt) first and foremost whose mercy and blessings enabled me to accomplish this study. I would like to express my deepest appreciation and respect to Dr. Gairuzazmi Mat Ghani, my main supervisor for his commitment, helpful advice, relentless guidance and immense patience throughout the development and eventual completion of this study. I also wish to express my heartfelt gratefulness to Assoc. Professor Dr. Jarita Duasa for rendering her precious time in reading, correcting and giving useful suggestions and comments which helped me incalculably to improve the work in the right direction. My heartiest appreciation also goes to Prof. Dr. Mansor Hj. Ibrahim and to my ex-main supervisor, Assoc. Prof. Dr. Ruzita Mohd. Amin, for their scholarly advises at the early stage of my writing process. I am cordially grateful to all existing and ex-members of my dissertation supervisory committee for their sincere assistance and helpful guidance without which the completion of this work would not have been possible.

I am also profoundly thankful to the academic staff of the Kulliyyah of Economics and Management Sciences particularly to the Dean, Prof. Dr. Khaliq for his friendly approach which is reflected in his tremendous attention and support to the welfare of the students studying here. My gratitude also goes to my internal examiner; Assoc. Prof. Dr. M. Shabri Abdul Majid for his thorough review and constructive comments, Dr. Turkhan Ali and Dr. Mahyudi for their sincere opinion in guiding me towards the development of this paper, and also to all administrative staffs of KENMS especially to Sister Norlin Abd. Ghaffar, Sister Normah Taharin and Sister Suriawati Yaakub for their sincere support and assistance in various ways while undergoing the completion of this work.

My sincere thanks also go to all those whom I have directly and indirectly involved while in the process of preparing this work. In this regard, I like to record my deepest appreciation to my friends namely; Nursilah, Noor Zahirah, Azlina , Fauziah Hanim, Dr. Aminul Islam, and Dayana who had assist me in many ways and who were always available any time I need them. My sincere acknowledgement also goes to Sister Aisha Al-Alim Ramadan for her kind assistance in translating the abstract into Arabic.

I must also acknowledge the support that I have been getting from my sponsors; which are Universiti Pendidikan Sultan Idris and Ministry of Higher Education. Without the financial assistance, I might have not been able to start this research in the first place.

Finally and above all, I would like to record my unbounded indebtedness and sincere respect to the support, prayers and sacrifices of my family, particularly my mother, my husband and children who I hope would be proud to see her daughter @ his wife @ their mother had finally completed this highest and toughest stage of tertiary education. I also want to emphasize that without their moral support, encouragement, patience and love, I would not be able to undertake the struggle for achieving success in this academic endeavours.

For the accomplishment of this work, Thank you Allah and thank you all. May Allah grant us health, happiness, and blessings in this world and the hereafter. Amin

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| | |
|---|---|
| A-CAPM | Augmented Capital Asset Pricing Model |
| ADF | Augmented Dickey-Fuller Test |
| AGR | Agriculture, forestry and fishing |
| AIC | Akaike Information Criterion |
| APM | Automatic Pricing Mechanism |
| ASEAN | Association of South-East Asian Nations |
| BNM | Bank Negara Malaysia |
| CONS | Construction |
| CPI | Consumer Price Index |
| CSU | Consumer Products |
| DOPD | Dummy for oil price decrease |
| DOPI | Dummy for oil price increase |
| ECM | Error Correction Model |
| ECT | Error Correction Term |
| EIA | Energy Information Administration |
| EIB | Energy Information Bureau |
| ELEC | Electricity, gas and water |
| EPU | Economic Planning Unit |
| ER | Exchange rates |
| E&P | Exploration and production |
| FIN | Finance, insurance, real estate and business services |
| GARCH | Generalized Autoregressive Conditional Heteroskedastic |
| GDP | Gross Domestic Products |
| GNP | Gross National Product |
| IFS | International Financial Statistics |
| IND | Industrial Products |
| INV | Investment |
| IR | Interest rate |
| KLCI | Kuala Lumpur Composite Index |
| MANUF | Manufacturing |
| M.E | Maximal Eigenvalue |
| MIN | Mining and quarrying |
| MKTR | Market Returns |

| | |
|---|---|
| MS | Money Supply |
| NEAC | National Economic Action Council |
| NEB | National Energy Balance |
| OECD | Organization for Economic Co-Operation and Development |
| OPEC | Organization of Petroleum Exporting Countries |
| Petronas | Petroliam National Berhad |
| PD | Domestic oil price |
| PLN | Plantation |
| PP | Phillips-Perron |
| PRP | Property |
| PSCs | Production Sharing Contracts |
| PW | World oil price (in domestic currency) |
| REER | Real Effective Exchange Rates |
| RM | Malaysian Ringgit |
| SIC | Subspace Information Criterion |
| SMEs | Small-Medium Economies |
| SP | Stock prices |
| SR | Stock returns |
| TM | Tin and Mining |
| TRANS | Transport, storage and communication |
| TS | Trade and Services |
| USD | U.S dollars |
| VAR | Vector Autoregressive |
| VDC | Variance Decomposition Function |
| VECM | Vector Error Correction Model |
| VMA | vector moving average |
| WSALE | Wholesale and retail trade, hotels and restaurant |
| WTI | West Texas Intermediate |

# CHAPTER 1

# INTRODUCTION

## 1.0 INTRODUCTION

The average price of West Texas Intermediate (WTI)[1] had increased from USD19 per barrel in 1993 to USD31 in 2003. In 2004 it reached USD51 and in 2005 it went up to USD67 per barrel. The value continued to increase exceeding USD70 in April 2006 and finally recorded its highest of USD102.08 a barrel in April, 2008. Factors like depletion in oil supply, increasing oil consumption, particularly from emerging industry in developing countries like China and India and political instability in oil producing countries are being blamed for these increases. These events have triggered global alarm that causes many countries like Indonesia, India and Malaysia, to review and restructure their economic policies to offset the negative impacts.[2]

## 1.1 PROBLEM STATEMENT

Malaysia is a net oil exporting country. Despite the fact, it also imports oil from other countries. Malaysia is neither a member of Organization of Petroleum Exporting Countries (OPEC) nor a major oil producing country and therefore, it has no influence on how the oil price is determined in the international market. Due to these reasons, the repercussions from price increase in the world market could not be avoided from spilling-over to the local market.

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[1] a reference price used in the United States and globally.

[2] These three countries implement oil price control system. Consistent increase in the world oil price had pressure the government in terms of subsidy borne by the government and forces the government to slowly liberalized the domestic oil market.

Unlike world oil price, oil prices in Malaysia are set by the government. The retail price of petrol and diesel in Malaysia is determined by using the Automatic Pricing Mechanism (Section 2.2.2). The government sets the retail price for petrol and diesel at a level where fluctuations in the cost of the product will not affect the retail price. In other words, the APM ensures the difference between the retail price and the actual price will be borne by subsidies and/or sales tax exemptions. It also standardizes the price of fuel at pump stations, fixes the margins of oil companies and dealers, ensures distribution channels are secure and minimizes disruptions of petrol and diesel supply.

The episode of oil price surged in 2000s had inflicted a soaring fuel subsidy bill to the Malaysian government. Information from the Economic Planning Unit (EPU, 2005) reported that further subsidization in 2004 caused a RM16 billion (USD4.23 billion) reduction in the government's budget in year 2005, which is an increase of 35% from the amount in the previous year (APPENDIX I). The continuous increase in the world oil price in 2000s had pressured the Malaysian government to review its policy on domestic oil price setting[3] and finally decided to adjust the retail price of oil in the domestic market (APPENDIX II) in correspond to the movements in the world oil price.

The announcement of domestic oil price increase by the Malaysian government had triggered mixed responses from the public and the economic units. On the producers' side, higher oil price is associated with higher input price. Production at higher cost not only causes a reduction in the level of output produced but also forces

[3] Being a net oil exporting country, increase in oil prices at the global market implies the country's export earnings from oil go up. Therefore, the additional revenue is enough to cover up the cost of higher subsidy in the case domestic oil price is to maintain at the original level. However, the usage of the additional revenue to cover the higher cost of subsidy it is not part of economic planning. Moreover, it is considered unwise for the government to utilize the additional income earned to fully subsidize fuel prices. In other words, the additional revenue is also meant for the country's development programs.

the producers to sell the products at higher prices to cover the increasing cost. For normal goods, the consequence of higher price of the product is lesser quantity demanded which in turn will affect the producers' income negatively. Moreover, being a major energy resource to the Malaysian industries, the increase in oil price is likely to push the overall price level up and adversely affect the economy.[4] From the consumers' point of view, higher oil price means taking a bigger percent of their income for petrol expenses. Moreover, the inflation resulted from higher oil price will reduce the real value of income and adversely affect their expenditures and demand for goods and services.

However, there are certain groups who view this policy implementation as appropriate. The opinion is explained based on market interactions where movements in the domestic oil price should be derived from movements in the world oil price to ensure macroeconomic stability. Moreover, considering the status of Malaysia as an oil exporting country, the event of oil price hike in the world market should not be considered as a disadvantage to the country, but a vice versa.

Oil price increase and mixed publics' reaction to it has raised an important question on the impact of oil price on the Malaysian economy. To answer the question, such a study deserves particular attention and should be conducted at both aggregate and disaggregate levels for more detailed information. In light of this, the current study attempts to investigate the issue empirically, specifically focusing on the Malaysian output and financial markets.[5]

[4] In the real market, the economic performance is measured through movements in gross domestic products (GDP).
[5] As both GDP and stock price movements are accepted as measures to economic performance.

## 1.2 MOTIVATION OF THE STUDY

The motivation of this study focuses on three issues. The first issue is related to oil price variable used in the empirical analysis. A number of studies (Burbidge and Harrison, 1984; Rodriguez & Sanchez, 2005) use world oil price in United States Dollars (USD) to represent the oil price variable in their model specification, while in other studies (Mork et al., 1994; Abeysinghe, 2001; Cunado & de Gracia, 2003; Nandha & Hammoudeh, 2007) use world oil price converted in domestic currency. The findings from these two specifications are mixed. Taking into account that oil price in Malaysia is set by the government; an important question emerged here, how does the economy respond to changes in the domestic oil price? In the effort to provide detailed discussion on the issue of oil price impact on the Malaysian economy, this study considers two types of oil prices; the world oil price (PW) and the domestic oil price (PD)[6]. To see the impact of each oil price on Malaysian output and financial market, all analyses are alternately tested against these two oil prices.

The second issue centers on the type of economies and level of the study. Majority of the studies in the existing literatures (Hamilton, 1983; Burbidge & Harrison, 1984; Mork, 1989; Lee et al., 1995; Rodriguez & Sanchez, 2005) concentrate on aggregate type of analysis and are mainly tested on developed economies such as the United States (US) and the OECD countries. Little attention has been devoted to investigate the effects of oil price shocks at disaggregate level or on other types of economies; for example, developing economies. Concisely, with this limitation the results of those studies are appropriate as reference for those tested countries and/or for developed type of economies only. Further research on the effect of oil price shocks specifically focusing on developing economies is needed. Such a

[6] Both oil prices are in domestic currency value.

study would not only fill the gap that the oil macroeconomics literature lacks but would also serve to the needs of the policy makers.

The last issue is relating to future oil price increase and future government policy implementation. With government's intervention in the oil price settings, movements in the domestic oil price in the Malaysian market have been stable for more than 30 years. However, consistent oil price increase in the world market in year 2000s has forced the Malaysian government to review its policy on domestic oil price settings and finally decided to lift up its tax exemption and subsidy assistance on oil by increasing the domestic oil price level. In the midst of depletion in world oil supply and continuous increase in demand which is increasing at increasing rate, economists predict the oil price increase will strike again in the future. Should this occur, there is a tendency for the Malaysian government to further tightens its subsidization policy and under an extreme case, the Malaysian government may have no choice but to let the domestic oil price fluctuates freely following the market price. Foreseeing this future circumstance, it provides us a motivation to conduct this study as it not only benefits us in understanding the current economic changes but also the future - should there be any further changes in the oil price and the government policy.

The issues highlighted above provide us motivations to conduct a study in this area specifically focusing on the Malaysian economy. The reason for choosing a country specific study is because, the studies of oil price impact in Malaysia are only few in numbers (Abeysinghe & Forbes, 2001; IMF, 2000; Abeysinghe, 2001; Cunado & de Garcia, 2004) and the studies are mainly cross-countries type of analysis. Moreover, these studies are confined to aggregate type of analysis and the results are mixed. Having noted the mixed outcome of the aggregate analyses, an in depth investigation of the effects of changes in oil prices on Malaysia's economy deserves

particular attention and should be broadened into disaggregated analyses for detailed information. The reason for the choice is because, the disaggregated analysis is an in depth analyses that go further into microeconomic perspective. This approach may add additional insight to our understanding on which sector is oil dependent and which sector is not sensitive to oil price changes. The information will assist us to better understand the behavior of the economy in response to oil price changes.

## 1.3 RESEARCH QUESTIONS

This study essentially asks these questions.

i. Does change in oil price affect the Malaysian output and financial markets?

ii. Taking into account all the variables in the system, does change in oil price cause the other variable to change?

iii. Focusing on the relationship between oil price and GDP, and between oil price and stock returns, are they asymmetrically associated?

## 1.4 OBJECTIVES OF THE STUDY

The general objective of this study is to investigate the impact of oil price on the Malaysian output and financial markets. To that end the analysis is divided into the following specific objectives.

i. To detect the presence of long run relationship between the oil price variable, with the output and the stock price (SP) variables.

ii. To identify the direction of causality relationship between the oil price variable, with the output and the SP variables.

iii. To examine the impact of oil price decrease and increase on changes in output, stock price and asset returns. In particular, to detect the presence of asymmetric relationship between the oil price variable respectively with the output, stock price and stock returns variables.

## 1.5 SIGNIFICANCE OF THE STUDY

This study is expected to contribute in the following ways.

i. Provides empirical evidence on the effect of oil price changes on output and financial markets. By understanding the relationships, it provides direction to policy makers in setting their priority in protecting the right market and the right industry during oil price crisis period.

ii. Provides suggestion on the type of causality relationship that exists between the variables in the system. By knowing this characteristic, it provides more information to the policy makers on which variable that can be used as a policy tool in order to influence change in the other variable.

iii. Offers a suggestion to the question of whether change in the oil price affects the GDP (or stock prices) symmetrically or asymmetrically. By knowing the effect of oil price changes may be asymmetric, policy implementation during the period of oil price increase and oil price decrease should not be similar.

## 1.6 LIMITATIONS OF STUDY

The study of oil price impact on the Malaysian output and financial markets is limited in the following aspects.

i. The timeframe of the study covers the period between years 1991 to 2005. This time selection is made based on the maximum (quarterly and monthly) data available at the time this study is conducted. The data are obtained from the Bank Negara Malaysia periodic reports and the Bloomberg database.

ii. This study employs two models, the Vector Autoregression Modeling (VAR) and the Augmented-Capital Asset Pricing Modeling (Augmented-CAPM). In the VAR modeling, the test for long run relationship follows the standard tests of the unit-root, the cointegration, and the vector error correction (VECM) tests. The analysis shall proceed to the VECM test only if significant results are detected in the cointegration test. Otherwise, the test directly continues to the causality test.

iii. The asymmetric test is conducted at all levels of study in both market analyses, except the real output disaggregate analysis. For the output market analysis, we believe testing for the aggregate system is sufficient. This is because the Malaysian GDP is simply partitioned into or is derived from the output of sectors of the economy. Therefore, the information obtained from the aggregate analysis is sufficient to provide information on the asymmetric relationship between the output and the oil price variables. Moreover, at sectoral level, the unit-root properties of the data series for the CONS, ELEC and WSALE sectors

under the ADF test are not certain, as we find evidence for non-stationarity property. And for that reason, we accordingly perform the PP unit root test for evidences of I(1) property so that we may proceed to the other tests as already set in the standard VAR procedure. This property gives indication that the data may not be appropriate for the asymmetric test and the results from the aggregate analysis is enough to provide indication on the oil price-output asymmetric relationship.

iv. The study only considered the industry sector indices in Bursa Malaysia. It does not study individual company listed on the stock exchange or private companies. In particular, an industry's or sector's index is comprised of companies' indices from an array of principal activities and businesses. Thus, this research does not indicate which company that was badly affected by the oil price crisis.

v. Finally, there are other factors that can be attributed to the changes in the stock market. These factors include political stability. Malaysia experienced political instability since year 1996 and in years 2003 to 2005 where there was a change of Prime Minister and cabinet line-up in October 2003. The 11$^{th}$ general election was held in March 2004 and the ruling party had lost quite a number of parliamentary seats. This could also be one of the contributing factors to changes in the financial market. In this analysis, this factor and others as such are treated as ceteris paribus.