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THE LONG-RUN EQUILIBRIUM RELATIONSHIP BETWEEN OIL PRICE VARIABILITY AND STOCK INDICES: A CASE OF 4 ASIAN DRAGONS

The paper strives to establish the long-term equilibrium relationship between crude oil prices and stock indices for 4 Asian dragons including Taiwan, Singapore, Hong Kong, South Korea. The long-term relationship is determined through implementing cointegration by means of the Johansen cointegration test. Johansen test has been applied on the monthly data for the period of 14 years, whereas weekly data have been collected over the period of 9 years. The domino effect of the test indicates a long-term cointegration relationship between 4 cointegrating vectors including crude oil prices and stock indices for Taiwan, South Korea and Singapore.

Keywords: *long-term equilibrium relationship, cointegration, crude oil prices; Asian dragons.*

JEL: *G02, G17, G15, G14, C32, G02.*

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ДОВГОСТРОКОВИЙ РІВНОВАЖНИЙ ВЗАЄМОЗВ'ЯЗОК МІЖ ЗМІНАМИ ЦІН НА НАФТУ І ФОНДОВИМИ ІНДЕКСАМИ НА ПРИКЛАДІ ЧОТИРЬОХ "АЗІАТСЬКИХ ДРАКОНІВ"

У статті проаналізовано довгостроковий рівноважний взаємозв'язок між цінами на сиру нафту і фондовими індексами 4 "азіатських драконів" — Тайваню, Сінгапуру, Гонконгу, Південної Кореї. Довгостроковий взаємозв'язок визначається шляхом коінтеграції за допомогою тесту коінтеграції Йохансена. Тест Йохансена був застосований до щомісячних даних за період у 14 років, а щотижневі дані бралися за 9 років. Ефект доміно у тесті показує відношення довгострокової коінтеграції між 4 векторами коінтеграції, у т. ч. цін на нафту і фондових індексів Тайваню, Південної Кореї і Сінгапуру.

Ключові слова: *довгостроковий рівноважний взаємозв'язок, коінтеграція, ціни на сиру нафту; "Азіатські дракони".*

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ДОЛГОСРОЧНАЯ РАВНОВЕСНАЯ ВЗАИМОСВЯЗЬ МЕЖДУ ИЗМЕНЕНИЯМИ ЦЕН НА НЕФТЬ И ФОНДОВЫМИ ИНДЕКСАМИ НА ПРИМЕРЕ ЧЕТЫРЕХ "АЗИАТСКИХ ДРАКОНОВ"

В статье проанализирована долгосрочная равновесная взаимосвязь между ценами на сырую нефть и фондовыми индексами 4 "азиатских драконов", т. е. Тайвань, Сингапур, Гонконг, Южную Корею. Долгосрочная взаимосвязь определяется посредством коинтеграции с помощью теста коинтеграции Йохансена. Тест Йохансена был применен к ежемесячным данным за период в 14 лет, а еженедельные данные брались за 9 лет. Эффект домино теста показывает отношения долгосрочной коинтеграции между 4 векторами коинтеграции, в т. ч. цен на нефть и фондовых индексов Тайваня, Южной Кореи и Сингапура.

Ключевые слова: *долгосрочная равновесная взаимосвязь, коинтеграция, цены на сырую нефть; "азиатские драконы".*

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1. Introduction. At the international markets oil is termed as a crucial determinant of economic development with its price creating a direct impact on country's economic growth and stock markets. As the countries modernize and urbanize their demand for oil increases manyfolds. It can be inferred that future demand for oil is although thorny to envisage, yet it is vastly connected with the level of economic development and industrialization. Therefore, the increase in oil demand is mainly attributable to the countries experiencing significant increase in their gross domestic product (GDP). In this regard Asia is known as the hub of fastest growing economies. In particular, Hong Kong, South Korea, Singapore and Taiwan are known as Asian Dragons due to their growing GDP. During the year 2010 Singapore reported a GDP growth rate of 14.5% and 28% of this GDP has been contributed by industrial sector of the country. For Hong Kong, Taiwan and South Korea the reported GDP was 6.8%, 10.8% and 6.1% respectively in the year 2010 (CIA World Fact Book, 2010).

The significant brunt of oil prices variability on a country's financial growth is basically attributable to the imbalance existing between the demand and supply conditions of oil all over the world. The global oil production has increased by 2.2% during 2010. On the contrary, the global oil consumption has increased by 3.1% (BP p.l.c, 2011). Further analyzing the consumption pattern of the considered countries, a continuous increasing trend has been identified. Increase in oil demand without any respective increase in oil supply is the basic reason behind high oil prices. Increase in oil prices creates pressure on consumers and manufacturers. Since petroleum is a basic commodity, increase in its prices reduces the amount of disposable income available for consumers to be spent on other goods and services and creates an effect of inflation. On the other hand, it increases the cost of production for manufacturers. Since these costs cannot be passed on to consumers completely, therefore, company's profits and dividends are reduced which sequentially create adverse consequence on the share prices. Apart from the demand and supply situation, fluctuation in oil prices is also evident due to significant alterations in the institutional measures of OPEC. Moreover, geopolitical situations prevailing in the area also augment the aftereffects of oil price variability (Sadorsky, 2004). Unanticipated changes occurring in the factors identified above serve to increase oil price volatility and the linked uncertainty, thus reducing wealth and investments of shareholders.

On a country's trail to economic development economic factors, financial markets and energy sector are all connected together and support and augment each other. Escalating oil prices are expected to endanger the pace of global economic growth. The increase in industrialization has been significantly supported by stock markets through raising funds for investors. The collection of funds achieved through stock markets helps boosting business in a country. In this situation if the oil prices increase, it tends to create a double pronged effect on stock returns. Reduced profitability tends to affect shareholder's claims and as a result share prices are affected.

The study focuses on newly industrialized economies of East Asia. The economies considered are also termed as the "4 Asian Tigers" or the "4 Asian Dragons", that is Hong Kong, South Korea, Singapore and Taiwan. These highly

industrialized economies are the major oil importers in the region and have converted Asia into the second largest oil market. During the year 2010 the oil consumption of Hong Kong was 16 mln tons with an increase of 15.2% since 2009. Similarly, oil consumption of Taiwan is estimated to be 46.2 mln tons showing an increase of 4.7% over the previous year. 62.2 mln of oil consumption is reported for Singapore increasing at the rate of 10.2%. South Korea can be regarded as the major oil consumer among the considered countries with the oil consumption of 105.6 mln tons annually (BP p.l.c., 2011). These high levels of oil consumption and rapid industrialization form the basic rationale for considering these 4 economies of East Asia in this research study.

1. Literature Review. Since oil is one of the main energy components for both corporate and household sectors, a significant amount of literature is available to support the concept of oil prices variability and its impact on stock returns.

Chen et al. (1986) initiated the process of studying the effect of various macroeconomic variables on stock returns. Although their systematic research identified several factors including interest rates, bond yield spread, inflation and productions costs for creating impact on the stock returns, yet the results did not identify any risk for stock returns emerging from oil price variability. The idea was further extended by Hamao (1989) for scrutinizing the consequence of oil price volatility for stock proceeds through using the data of Japanese equity market. Again, the findings of the study did not confirm any association amid oil price volatility and stock returns. Further studies by Kaneko and Lee (1995) formed the basis for the existence of a bond linking oil price volatility and stock returns. The study used a more recent data for learning the influence of oil price volatility on stock returns. In this study Kaneko and Lee again employed Japanese equity data to confirm the relationship.

The relationship was again confirmed by Jones and Kaul (1996) through studying the impact at the equity markets of the UK, Canada, the US and Japan. Jones and Kaul (1996) in their research utilized the quarterly data to analyze the manipulation and alterations occurring at local stock markets of the sampled countries as a consequence of international oil shocks. The conclusion of the study suggests that oil tremor at international market can be attributable for changes in present and future real incomes and returns of the countries under study. The relationship has been studied through using the data of producer price index as a proxy of oil prices. The study although confirms the correlation between the stock returns and the price index, yet this relationship is not of equal strength at all the markets considered. The fluctuation at the US and Canadian stock markets is actually the outcome of the oil price alterations at the international market, however, at the UK and Japanese market this relationship is not equally strong.

On the contrary, Haung et al. (1996) came up with a different set of findings as compared to earlier researchers. The main focus of the study was on exploring the connection between futures and the spot markets. In the study daily future returns and daily spot prices were considered. Haung et al. (1996) in his study used the vector autoregression (VAR) approach using the oil future returns and stock returns. As a result the study claims that oil futures do follow some companies' individual returns but that does not create any major impact on the broad indices like S&P 500 index.

Considering a more recent study by Sadorsky (1999), a confirmation can be provided for the reality of connections between fuel prices and stock profits. Sadorsky focused his study at the US market using the data extending over the period of 29 years. The study employed the VAR model incorporating industrial production and short-term interest rates. Through this study the researcher found that both oil price changes and oil price volatility tend to create an upward effect on stock returns. After the era of 1986 the parameters of the oil market have significantly changed along with changes occurring in the perceptions pertaining to the impact of fuel prices at stock markets. Initially a strong belief persisted that energy market changes create more noteworthy impact on stock markets than interest rates. Moreover, oil price movements also strive to elucidate a major segment of the forecast error variance in the actual stock returns. The study also strives to explain the direction of the association of oil prices with stock returns.

Analyzing the research findings we can be infer that positive changes tend to create more strong effects on stock returns and economic development as compared to the downside oil shocks. The VAR model has also been employed by earlier researchers like Schwert (1989). Schwert in his research used this model with the intention of studying the relationship of stock return volatility with producer price index, monetary base and other macroeconomic indicators. The findings of the study strive to confirm the relationship between the identified variables. King et al. (1994) used the multivariate model for analyzing the records from various emerging and developed markets. The research study employed various factors like interest rates, trade production, crude oil prices and other observable parameters. Findings of the research however did not confirm any sort of major affect of crude oil prices on the stock returns rather the volatility of stock returns has been attributable to unobservable factors.

In this regard a significant argument has been presented by Hamilton (1983) in the form of considering oil price volatility responsible for economic downfall in the United States after the World War II. The Hamilton's argument is further strengthened by Faff and Brailsford (1999). Their study focuses on analyzing the sensitivity of Australian equity markets and industrial sectors towards the crude oil price fluctuations. The research employs monthly data from 1983 to 1996. The study demonstrates a major positive impact of oil price fluctuations on the oil and gas industries whereas the paper and packaging and transport industries are found to be affected negatively by the fluctuations in oil prices.

Similarly, Sadorsky (2003) further extended the findings to confirm further the relationship using the data for 13 years. The study focuses on the US technology sector for analyzing the conditional volatility in its stock prices. The study encompassed numerous factors counting the default premium, federal funds rate, consumer price index, foreign exchange rates and oil prices. The results proved a significant positive influence on the conditional volatility of the share prices.

The relationship amid oil prices, actual stock returns, interest rates, and real economic activity in Greece is found to be significant (Papapetrou, 2001). Papapetrou (2001) has used the multivariate vector autoregression model. The findings of the study show that variability in oil prices create major impact on real activity and employment rates. Moreover, this relationship is further confirmed by

Hammoudeh and Aleisa (2004) in their research study. The study focused on association linking oil prices and stock returns for Bahrain, Kuwait, Oman, Saudi Arabia and the UAE. These countries have been considered as these are the member states of Gulf Cooperation Council (GCC). Bashar (2006) also scrutinized the influence of oil prices fluctuations on the GCC equity market. The inferences of the research study strive to disclose the predictive power of Saudi and Muscat markets for explaining the crude oil price variability.

The literature reviewed confirms the connection involving the fuel price changes and the stock market returns. However this association has not been studied in the countries determining the Asia Pacific region, particularly, the 4 Asian dragons. The literature has provided a rationale for investigating the influence of oil price volatility on stock market returns. The stock prices are equal to discounted expected future cash flows. The variability and fluctuations in stock prices however create a major influence on future cash flows associated with the share prices. Therefore, oil price fluctuations are found to be one of the key factors that can restrict the future cash flows for companies. Nevertheless, the diffusion of oil prices tremors to the equity market is found to be vivid in the literature which allows us study the influence of oil price changes at stock markets.

2. Data Collection and Methodology. In this study monthly and weekly data of the stock market indices and oil prices have been used. Both monthly and weekly data have been collected in order to provide an indepth view on the problem. The Brent crude oil prices data have been collected from the US Energy Information Administration (EIA), whereas the data for 4 indices has been retrieved from Yahoo Finance. Brent crude oil prices have been used in this study due to the fact that Brent is generally accepted to be the world benchmark and is used to price 2/3 of the world's crude oil supplies. The monthly data have been collected for the period from August 1997 to August 2011 and the sample size comprises 169 observations. On the other hand, the weekly data have been collected over the period from July, 1997 to May, 2011, comprising 726 observations.

As discussed above the study aims at analyzing the impact of oil price variability on 4 different indices. 4 indices considered in the study pertain to the 4 renowned Asian Dragons including Singapore, Hong Kong, South Korea and Taiwan. For Singapore, Straits Times Index (STI) has been used as a representative index. KOSPI has been employed as a representation index of South Korea. Hang Seng Index is used for Hong Kong and TSEC index is used as a proxy for Taiwan. Therefore, the study incorporates 5 variables including crude oil prices (abbreviated as OLP), STI, KOSPI, TSEC index and Hang Seng Index. Since the study utilizes both monthly and weekly data, the symbols have been changed accordingly for easy reference. The monthly data have notations as OLPM, STIM, KOSPIM, TSECM and HENGSENGM, whereas the weekly data have been labeled as OLPW, STIW, KOSPIW, TSECW and HENGSENGW.

2.2. The Augmented Dickey-Fuller (ADF) Test. In order to determine the existence or non existence of any long-term equilibrium relationship between oil prices and stock indices, it is imperative to find out whether the variables under study are integrated of the same order. Therefore, for establishing the stationarity or non-stationarity of all the time series included in the analysis, the augmented Dickey-Fuller

unit root test has been employed. Equation (1) describes the model employed by the ADF test:

$$\Delta Y_t = \beta_o + \beta_1 Y_{t-1} + \beta_2 \Delta Y_{t-1} + \varepsilon_t. \quad (1)$$

In the model given above β1 is analyzed for determining the stationarity of the data. The equation (2) explains this coefficient:

$$\beta_1 = \rho - 1. \quad (2)$$

Moreover, the number of autoregressive components included in the model is determined by the modified Akaike information criteria (MAIC). The ADF test results for both weekly and monthly data are displayed in Table 1.

Table 1. **Augmented Dickey-Fuller test Statistics**

Weekly					
	OLP	**STI**	**KOSPI**	**TSEC**	**HENGSENG**
t-Statistics	-0.900328	-1.235212	-0.624986	-2.352505	-1.278
Prob.*	0.7882	0.6608	0.8623	0.1559	0.6415
Monthly					
t-Stats	-0.951994	-1.683962	-0.962848	-2.833121	-1.638808
Prob.*	0.7694	0.4376	0.7658	0.0558	0.4605
Test Critical Values					
1% level	-3.439155				
5% level	-2.865316				
10%level	-2.568837				

*Mackinnon (1996) one sided p-values.
The results have been generated by the statistical package Eviews 5.

Analyzing the results of ADF test it can be inferred that the null hypothesis of unit root is accepted for all the time series included in the data. The ADF test statistic for all the time series is greater than the critical value at 5%. This indicates that all the variables are integrated of I (1). Therefore the time series of oil prices and stock indices for all the 4 countries are found to be non-stationary which makes the cointegration analysis viable.

3.4. Cointegration Analysis. Fabozzi et al. (2006) categorize cointegration as an important concept of financial econometric as it strives to implement the notion that there are servo-control factors and feedbacks that tend to keep the variables mutually aligned. 2 or more variables are said to be cointegrated if they remain close to each other even if they drift away as individual processes. The literature pertaining to financial econometrics and applied economics reports significant evidences for the application of cointegration concept (Haung et al., 2005; Ravichandran & Alkhathlan, 2010; Horng & Chyan, 2010). In accordance with the financial econometric literature and the non-stationarity found in the time series under study, this paper strives to explore the long-term equilibrium relationship between crude oil prices and the stock indices of 4 Asian Dragons. For this the concept of cointegration has been implemented.

The Johansen multivariate cointegration technique has been proposed by Johansen and Juselius (1990). The superiority of Johansen cointegration test is attributable to its ability to encompass the underlying properties of the times series data being analyzed. The Johansen technique results are dependent upon the maximum Eigenvalue and trace statistics using maximum likelihood estimation procedure in order to determine the number of cointegrating vectors. The Johansen test proceeds

sequentially by first analyzing H0: r <= 0, here r is the number of cointegrating vectors. If H0 is rejected, then the next hypothesis H0: r = 1, is analyzed and so on until the null hypothesis could not be rejected.

3. Empirical Findings.

3.1. Descriptive Statistics. The log prices have been used for the calculation of descriptive statistics of the data. Analyzing the descriptive statistics of the monthly data it can be inferred that South Korean index (KOSPI) has the lowest mean whereas the highest mean is attributable to Heng Seng index. Analyzing statistics, skewness indicates that except Hang Seng index all the data series are negatively skewed having long left tails. Since the kurtosis for all the time series is less than 3, the distribution of all monthly time series under study can be categorized as platykurtic.

For the monthly data at the significance level of 5% the Jarque-Bera hypothesis of normal distribution is rejected for all the time series, except for Hang Seng index. Table 1 below contains the summary of the descriptive statistics discussed above.

Table 2. **Descriptive Statistics (Monthly)**

	OLPM	STIM	KOSPIM	TSECM	HENGSENGM
Mean	3.685536	7.643166	6.873539	8.805453	9.605915
Median	3.678829	7.626185	6.814872	8.829658	9.574037
Maximum	4.888242	8.244255	7.692734	9.195729	10.35305
Minimum	2.284421	6.752773	5.696691	8.198898	8.892205
Std. Dev.	0.658463	0.311842	0.494721	0.227129	0.318577
Skewness	-0.124867	-0.164331	-0.19431	-0.413287	0.073566
Kurtosis	2.028699	2.417709	2.141708	2.383847	2.139321
Jarque-Bera*	7.082464	3.148197	6.250826	7.484367	5.368678
Probability**	0.028978	0.207194	0.043919	0.023702	0.068266
Sum	622.8556	1291.695	1161.628	1488.122	1623.4
Sum Sq. Dev.	72.8403	16.33725	41.11788	8.66668	17.05058
Observations	169	169	169	169	169

*Jarque-Bera is a Normal Distribution Test. **Probability is the p-value, p-value< α indicates significance (α = 1%, α = 5%, α = 10%).

Scanning the descriptive statistics of the weekly data provided in Table 2 below, the results similar to monthly data can be viewed. Hang Seng Index has the highest mean whereas the lowest is depicted by South Korean Index (KOSPI). Similarly, for the weekly data as well all the time series under study are negatively skewed indicating long left tails. Kurtosis again for weekly data is less than 3, therefore, weekly data distribution is also found to be platykurtic. The Jarque-Bera null hypothesis of normal distribution is rejected for weekly observations of all the times series including the Hang Seng Index for which it has been accepted in case of monthly observations. This indicates that the natural log prices of all indices and crude oil prices are not normally distributed which is also affirmed by the analysis of kurtosis.

3.2. Cointegration Test. In this study the Johansen technique has been employed at the critical level of 5% with the linear deterministic trend assumption. Since the data is non-stationary and follows a trend, therefore, linear deterministic trend assumption has been considered in Johansen test for cointegration. In this study the cointegration analysis has been employed for both monthly and weekly data. The idea behind incorporating both monthly and weekly data in the study enabled researchers to conduct an indepth analysis of long-term equilibrium relationship between the 5

variables under study. Table 4 below contains the Johansen cointegration test results for the monthly data.

Table 3. **Descriptive Statistics (Weekly)**

	OLPW	STIW	KOSPIW	TSECW	HENGSENGW
Mean	3.66033603	7.637667224	6.86764973	8.81123631	9.599390822
Median	3.5964894	7.626567705	6.81449892	8.83147948	9.575867573
Maximum	4.94925622	8.257709773	7.69522124	9.22312826	10.32444339
Minimum	2.24495598	6.690891966	5.69890393	8.18464206	8.856291976
Std. Dev.	0.64931247	0.307440208	0.48161411	0.22522045	0.313367566
Skewness	-0.1077882	-0.14459297	-0.1911092	-0.42887762	0.084860198
Kurtosis	2.0401159	2.480521428	2.20516026	2.40127904	2.170162131
Jarque-Bera*	29.277483	10.69296638	23.5302991	33.0998784	21.70243604
Probability**	4.39E-07	0.004764879	7.77E-06	6.49E-08	1.94E-05
Sum	2657.40395	5544.946404	4985.91371	6396.95756	6969.157737
Sum Sq. Dev.	305.664844	68.5266241	168.165312	36.775082	71.19444296
Observations	726	726	726	726	726

*Jarque-Bera is a normal distribution test. **Probability is the p-value, p-value< α indicates significance (α = 1%, α = 5%, α = 10%).

Table 4. **Johansen Cointegration Test Results for Monthly data**

Sample (adjusted): 3 169				
Included observations: 166 after adjustments				
Trend assumption: Linear deterministic trend				
Series: OLPM STIM KOSPIM TSECM HENGSENGM				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None	0.155523	60.92652	69.81889	0.208
At most 1	0.089719	33.20423	47.85613	0.5456
At most 2	0.050759	17.78783	29.79707	0.5818
At most 3	0.03693	9.244721	15.49471	0.3432
At most 4	0.018567	3.073528	3.841466	0.0796

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Interpreting the Johansen unrestricted cointegration rank test results for the monthly data it can be inferred that there is no cointegration relationships between any of the 5 variables under study. The results of the study are based on the trace test statistics. The hypothesis 1, stating that there are no cointegrating vectors is accepted for the monthly data at the significance level of 5%.

Table 5 below contains the cointegration test results for the weekly data.

The trace test statistics for Johansen unrestricted rank cointegration for the weekly data, indicates 3 cointegration equations at the significance level of 5%. The trace test statistic for the first 3 hypothesis is greater than the critical value at 5% which is indicative of rejection of the null hypothesis. The cointegration rank found among the crude oil prices and the 4 indices is 3 which reveals a long-term equilibrium relationship among the 4 cointegrating vectors. The trace test statistic for the fourth hypothesis is found to be less than the critical value at 5% which leads to the

acceptance of the hypothesis identifying the existence of 4 cointegrating vectors. Moreover, a detailed analysis of the Johansen's cointegration test for weekly data reveals cointegrating relationship between crude oil prices, STI, KOSPI and TSEC.

Table 5. **Johansen Cointegration Test Result for Weekly Data**

Date: 11/10/11 Time: 15:28				
Sample (adjusted): 3 726				
Included observations: 724 after adjustments				
Trend assumption: Linear deterministic trend				
Series: OLPW STIW KOSPIW TSECW HENGSENGW				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.043105	88.54327	69.81889	0.0008
At most 1 *	0.033077	56.77488	47.85613	0.0058
At most 2 *	0.025601	32.52311	29.79707	0.0237
At most 3	0.018172	13.82468	15.49471	0.0879
At most 4	0.000835	0.6025	3.841466	0.4376

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

4. Discussion. A significant amount of literature can be found studying the impact of oil prices on economic activities and financial markets. The literature suggests that financial markets are sensitive to various factors including interest rates, inflation, economic growth and oil prices. In this study Johansen test of cointegration allowed the researchers assess the underlying properties of financial markets of the 4 Asian dragons. The crude oil prices are found to be cointegrated with financial markets of Taiwan, Singapore and South Korea. The cointegration between the crude oil prices and Singapore stock index is attributable to the fact that Singapore is one of the largest oil markets in Asia. Similarly, South Korean and Taiwanese financial market is found to be cointegrated with the crude oil prices as the country does not have any domestic oil production and is majorly dependent upon oil imports. Nevertheless, we can take comfort on the lack of cointegration between oil prices and Hong Kong financial market as composite CPI of Hong Kong include not more than 1% of oil related products, therefore, oil price changes do not create a major impact on the cost structure of manufacturing companies in Hong Kong, thus making them less responsive to the oil price fluctuations.

5. Conclusion. The basic aim of this paper was to determine the long term equilibrium relationship between the crude oil price and the stock indices of 4 Asian tigers. The study found out the long-term equilibrium relationship between the indices of Taiwan, Singapore and South Korea and the oil prices. For future research it is recommended more countries to be incorporated in the analysis. A comparison can also be carried out between developed and underdeveloped countries. The usual limitations apply for the study including the time constraints.

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