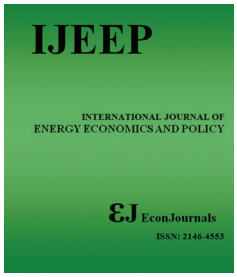

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Linkages between Oil Sectors Returns of Asian Emerging Stock Markets: Unearthing the Hidden Opportunity for Portfolio Diversification

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ABSTRACT

The increase in the extent of integration between global markets declined the opportunity for international portfolio diversification. This in turn created the hurdles amongst the investors and therefore recently they either prefer less correlated emerging markets or asset allocation at sectoral level. In view of this, considering Asian emerging markets at the forefront of portfolio diversification venue globally, this research aims at examining the linkages and portfolio diversification prospects across the oil sectors of eight Asian emerging stock markets. The study used VAR based Causality/Block Exogeneity Wald test and Forecast Error Variance Decomposition to investigate the data period of January 01, 2004, to August 31, 2019. The results exhibited a weak form of linkages between Asian emerging markets oil sector indices and therefore, it would be a great platform for the portfolio managers and investors to reap diversification benefits in this region.

Keywords: Oil sectors of Asian emerging stock markets, VAR, linkages, portfolio diversification
JEL Classifications: G11, G15

1. INTRODUCTION

The inter-linkages between cross-border financial markets is one of the growing research theme in the financial literature. Gaining insight on linkages between various financial assets provides mechanisms for risk assessment associated with financial assets, designing strategies for asset allocation, cost of capital calculation, and scope for portfolio diversification, (Wang and Liu, 2016). However, due to globalization, advancement in Information and Communication Technology, liberalization measures and reforms in stock markets, and upliftment of various barriers for the operation of foreign activities given rise for integration between national equity markets. And these became the hurdles for portfolio investors to diversify their investment across Asian emerging markets. Even some previous studies (Singh and Singh, 2010; Sharma, 2011) claimed that integration between Asian emerging markets has increased over time and it has reduced the portfolio diversification scope. Therefore, in recent years investors are considering diversification in Asian emerging markets at a sectoral level than at the country level to reap better risk-reward opportunity. During different economic conditions, sectors of a country perform at a different pace; therefore portfolios should diversify across various sectors (Gupta and Basu, 2011). Assuming this phenomenon, in order to unlock the opportunity of portfolio diversification, we have investigated the linkages between the oil sector equity indices of eight growing Asian emerging markets.

As per the World Oil Review report 2019, Asia-Pacific is one of the prolific area, alone accounted for half of the global demand growth. Further, three markets such as China, India, and South Korea standing in the world's top ten consumer category. In the year 2000, average annual oil consumption growth of China,

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India, South Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand was 4651, 2336, 2,135, 445, 374, 350, 868 and 748 (thousand barrels/day) which has been further increased to 13,025, 4,782, 2,522, 793, 484, 500, 1,012 and 1,438 (thousand barrels/day) in the year 2018 respectively. The total aggregate share of eight Asian emerging markets was 11,907 (15%) in the world oil consumption growth of 77,144 (thousand barrels/day) in the year 2000. This has grown up to 24,556 in the total world oil consumption growth of 99,340 (thousand barrels/day) almost around 25% in the year 2018. Figure 1 presents the picture of World Oil Consumption 2018 (99,340 thousand barrels/day).

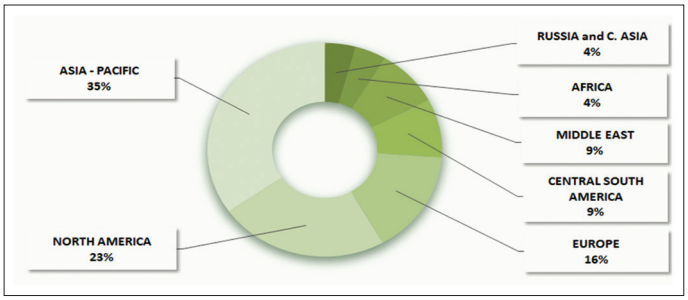
2. LITERATURE REVIEW

The voluminous research available on integration between stock markets in financial literature (Guntur and Velip, 2019)[1], but so far meagre attention received on sector-wise integration. Vardhan et al. (2015), assessed the Indian sectoral indices behavior during the post-global financial crisis time. The study supported the minimum portfolio diversification opportunity in the short-run. Garg and Chauhan (2012) found that the Indian sectors such as auto, metal, banking, health care, technology, and real estate are highly related to the US and other developed markets. Ali et al. (2019) reported reduced diversification in the Indian disaggregated stock market during the oil price movement. From the perspective of China (Cao et al., 2013) noticed a strong correlation between sectoral indices during market ups and down conditions, otherwise, it was lower. In the Indonesian region, (Soekarno and Setiawati, 2020) identified a considerable positive and negative impact of oil on various sectors. Vardar et al. (2012); Ahmed (2016) on sector linkages in other regions such as Turkey and Egypt mentioned the short-run diversification possibility across sectoral indices. Concerning cross-border sector indices linkages, (Meric et al., 2005) suggested a diminished scope of portfolio diversification in national equity indices but the same can be attained at sectoral level. Meric et al. (2008) in terms of US, UK, Germany, French, and Japan sectoral indices linkages, observed diversification opportunity during bull market conditions. Balli and Balli (2011) pointed out prospects of diversification in Euro region sectors such as basic resources, food and beverages, health care, retail services, oil and gas, and utility. Even after facing the contagion effect, some of the sectors of Europe, Asian, and Latin America provide diversification channels to investors (Phylaktis and Xia, 2009). The research of (Shahani et al., 2017) claimed a positive association between India, the US, and European sectors. Gupta and Basu (2011) documented that the portfolio constructed using different sectors offer a risk-reward opportunity to the investors.

Based on the above available literature, it is clear that not much research is concentrated so far on sectoral indices linkages. Asian emerging stock markets being a growing region and recognized it as an investment destination town, the issue of sector-wise linkages need to address to examine possible diversification opportunity. Therefore, we have considered the oil industry (oil sectoral indices) of Asian emerging markets for investigation of its linkages and to identify incentives to channelize investment across oil sectors.

1 For instance see (Guntur and Velip, 2019) Stock Markets Integration: A Review of Literature from a Global Perspective.

Figure 1: World oil consumption (2018) - 99,340 thousand barrels/day



Source: World oil review 2019

3. DATA DESCRIPTION AND METHODOLOGY

Eight Asian emerging stock markets oil sector indices data starting from January 01, 2004, to August 31, 2019, retrieved from datastream database[2]. These data are denominated in US Dollar (widely used currency across the globe for data interpretation). Further, the analysis has been carried out using oil sector return series data, which has calculated based on the following equation;

$$OSR = Ln\ (OSP_t/OSP_{t-1}) *100 \quad (1)$$

Where, OSR is oil sector returns in logarithm form, OSP_t, is oil sector index prices on today and OSP_{t-1} is previous day oil sector index prices.

Most of the financial time series data exhibit non-stationary behavior. On the other side, to obtain an accurate estimate of the econometrics methods, the pre-condition is stability (stationarity) in data series. Therefore, at the preliminary stage Augmented Dickey-Fuller Test (ADF), one of the unit root test introduced by (Dickey and Fuller, 1979) used to infer stationarity of the data. In Table 1, the result of ADF test statistics is significant at 1%. Therefore, (H_0: return series are non-stationary) is rejected and accepted the alternative hypothesis of the return series are stationary at level i.e. I (0) order of integration is zero. Having this result, the Causality/Block Wild Exogeneity and Forecast Error Variance Decomposition (FEVD) in the VAR framework implemented to examine the linkages between Asian oil sector indices. The Causality/Block Wild Exogeneity test in a VAR model based on the following equations;

$$\Delta Y_t = \propto_0 + \sum_{k=1}^{n} \propto_k X_{t-k} + \sum_{k=1}^{n} \beta_k Y_{t-k} + \varepsilon_{y,t} \quad (2)$$

$$\Delta X_t = \varphi_0 + \sum_{k=1}^{n} \propto_k X_{t-k} + \sum_{k=1}^{n} \varphi_k Y_{t-k} + \varepsilon_{y,t} \quad (3)$$

$\propto_0, \phi_0$ are intercepts in a model, $\propto_k, \phi_k$, and β_k are coefficient of the variables ε is an error term. The Appropriate lag length is selected based on AIC (Akaike Information Criterion) to run the VAR

2 Eight Asian emerging markets include China, India, South Korea, Malaysia, Pakistan, Philippines, Taiwan and Thailand selected based on MSCI classification 2019.

model. The null hypothesis of the test is: Independent variable does not granger causes to the dependent variable (Asian emerging oil sector indices).

3.1. Innovation Accounting Analysis

To quantify the direction of causality provided by the causality test, variance decomposition analysis has obtained from a VAR model. This analysis ascertains the shocks in one market are explained by its own past variance and forecast error variance of other markets in terms of percentage.

4. EMPIRICAL ANALYSIS

Table 1 unveils the summary statistics of oil sector indices returns. The mean daily returns of South Korea and Malaysia are higher of 0.0284% and 0.0267%. On the other hand, Pakistan and the Philippines market provides lowers and negative returns of −0.0105% and −0.0041%. The variability in returns measured by standard deviation is higher in the case of South Korea (2.4847%) and lower for Malaysia (1.2175%). It implies that there is a risk-reward trade-off opportunity exists in the oil sector of South Korea whereas the Malaysian oil sector investment gives higher returns for a lower risk. The result of Skewness and Kurtosis shows asymmetric and leptokurtic behavior, which is the sign of returns series are not normally distributed. This is also confirmed by Jarque-Bera test statistics.

To measure the relationship between the oil sector indices of Asian emerging markets Correlation test has implemented. The outcome in Table 2 suggests a positive but not strong correlation between oil sector indices returns. Only for 3 pairs, we noticed the correlation coefficient value higher than 0.40 (oil sector of China and India is 0.4116; China and Thailand is 0.4384; China and South Korea is 0.4430). However, the sector returns of Taiwan and Pakistan; India and Pakistan; South Korea and Pakistan sharing considerably less correlation of 0.0772, 0.0799, and 0.0986. Overall, Pakistan and Philippines market returns are weakly associated with other market's oil sectors.

To notice the short-run linkages between oil sector indices and to infer the causality influence, Table 3 presents the notable findings of VAR based Causality/Block Exogeneity Wald test. In the causality chain, out of 56 Chi-square statistics coefficient, about 23 (41.07%) parameters found significant. China market oil sector as a dependent variable, the oil sector of India, South Korea, and Thailand granger causes to it. The oil sector of India as a dependent variable, the oil sector of South Korea, Pakistan, and Philippines granger causes to it. The oil sector of China, India, and Thailand exerts influence over the South Korean oil sector. There is also unidirectional short-run causality flows from India, South Korea, and Malaysia to the Philippines oil sector index. One way causality influence also found from China, India, Malaysia, Pakistan, and Thailand market to Taiwan oil sector. Similarly, India, South Korea, and the Philippines also significantly granger causes to the Thailand oil sector. However, in the case of Malaysia only India and Thailand market have a short-run impact on it and for Pakistan only South Korean market influences.

The bi-directional short-run relationship between four pairs namely South Korea and China; South Korea and India; Philippines and India; Thailand and South Korea also evident from the causality test. Overall, the result signifies that although we found short-run causality linkages between Asian emerging regions oil sector indices but the results are considerably limited.

To measure the shocks of oil sector returns in the percentage of forecast error variance which are traverse from own past innovation and innovation of other markets, FEVD results over 1-day, 3-days and 10-days forecasted horizon illustrated in Table 4. Out of eight Asian emerging markets, oil sectors of

Table 1: Descriptive statistics of oil sector indices returns of Asian emerging markets

Oil sector indices	CHOG	INOG	SKOG	MLOG	PKOG	PHOG	TWOG	THOG
Mean	0.0038	0.0123	0.0284	0.0267	-0.0105	−0.0041	0.0206	0.0252
SD	2.0058	1.8484	2.4847	1.2175	1.6102	2.2467	1.6614	1.8672
Skewness	0.0333	−0.5178	−0.1486	−0.1226	−0.1443	0.3093	−0.0640	−0.2875
Kurtosis	10.9546	13.4407	10.3979	9.8345	6.0944	9.6254	6.8137	10.1315
Jarque-Bera	10770***	18736***	9330***	7960***	1643***	7537***	2478***	8713***
ADF	−62.9896***	−58.3628***	−64.9050***	−61.7965***	−57.0578***	−67.9390***	−66.7496***	−43.2328***

*** denotes the null hypothesis rejected at 1%. SD abbreviation used for Standard deviation. MacKinnon (1996) critical value at 1% significant level is −3.4318. The CHOG, INOG, SKOG, MLOG, PKOG, PHOG, TWOG, and THOG represent oil sector indices of China, India, South Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand

Table 2: Correlation between oil sector indices returns of Asian emerging markets

Oil sector indices	CHOG	INOG	SKOG	MLOG	PKOG	PHOG	TWOG	THOG
CHOG	1							
INOG	0.4116	1						
SKOG	0.4430	0.2560	1					
MLOG	0.3511	0.2622	0.3039	1				
PKOG	0.1193	0.0799	0.0986	0.1153	1			
PHOG	0.2028	0.1370	0.1457	0.1641	0.0957	1		
TWOG	0.3328	0.2245	0.3368	0.2757	0.0772	0.1131	1	
THOG	0.4384	0.3361	0.3115	0.3102	0.1220	0.1564	0.2702	1

The CHOG, INOG, SKOG, MLOG, PKOG, PHOG, TWOG, and THOG represent oil sector indices of China, India, South Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand

Table 3: Causality/block exogeneity wald test based on VAR model

Independent markets (Lag 1)	Dependent markets							
	CHOG	INOG	SKOG	MLOG	PKOG	PHOG	TWOG	THOG
	Chi-square statistics							
CHOG		2.57	3.29*	0.71	0.001	0.42	3.50*	0.03
INOG	60.56***		30.87***	14.51***	1.16	11.78***	28.27***	11.07***
SKOG	7.55***	3.63*		0.06	4.43**	4.31**	0.17	6.28**
MLOG	0.03	0.81	0.04		0.28	8.13***	3.51*	0.002
PKOG	0.51	3.80*	0.004	0.16		1.73	2.96*	1.13
PHOG	0.42	3.92**	0.003	1.07	0.17		0.17	2.88*
TWOG	1.73	0.79	0.94	3.56E-06	2.09	0.002		0.25
THOG	2.85*	0.50	14.64***	4.69**	0.20	0.43	7.85***	

***, ** and * indicates null hypothesis rejected at 1%, 5% and 10% significant level. The CHOG, INOG, SKOG, MLOG, PKOG, PHOG, TWOG, and THOG represent oil sector indices of China, India, South Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand. Optimal lag length is selected using AIC (Akaike Information Criterion)

Table 4: Forecast error variance of Asian emerging markets oil sector indices

Markets explained	Days	Forecast error variance (in percentage) by innovation in							
		CHOG	INOG	SKOG	MLOG	PKOG	PHOG	TWOG	THOG
CHOG	1	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	3	97.9650	1.7143	0.1887	0.0015	0.0150	0.0125	0.0344	0.0686
	10	97.9647	1.7145	0.1888	0.0016	0.0150	0.0125	0.0344	0.0687
INOG	1	16.2206	83.7795	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	3	16.1034	83.5460	0.1196	0.0239	0.0863	0.0921	0.0163	0.0124
	10	16.1034	83.5459	0.1196	0.0239	0.0863	0.0921	0.0163	0.0124
SKOG	1	19.4168	0.6870	79.8962	0.0000	0.0000	0.0000	0.0000	0.0000
	3	19.4756	1.5389	78.6072	0.0094	0.0008	0.0020	0.0111	0.3561
	10	19.4756	1.5390	78.6068	0.0094	0.0009	0.0021	0.0111	0.3562
MLOG	1	11.9752	1.6824	2.2026	84.1399	0.0000	0.0000	0.0000	0.0000
	3	12.2180	2.1317	2.1838	83.3195	0.0014	0.0311	0.0010	0.1136
	10	12.2180	2.1318	2.1838	83.3193	0.0014	0.0311	0.0010	0.1137
PKOG	1	1.3060	0.1213	0.2317	0.4300	97.9110	0.0000	0.0000	0.0000
	3	1.5660	0.2175	0.4411	0.4629	97.2484	0.0052	0.0527	0.0063
	10	1.5662	0.2180	0.4412	0.4629	97.2475	0.0052	0.0527	0.0063
PHOG	1	3.7983	0.3598	0.3010	0.6892	0.3217	94.5299	0.0000	0.0000
	3	4.0894	0.7381	0.4389	0.8415	0.3409	93.5402	8.58E-05	0.0108
	10	4.0894	0.7382	0.4390	0.8416	0.3409	93.5399	8.63E-05	0.0108
TWOG	1	10.3137	0.9104	3.9603	1.6055	0.0163	0.0190	83.1748	0.0000
	3	10.7099	1.6925	3.8635	1.6285	0.0941	0.0244	81.7981	0.1889
	10	10.7101	1.6927	3.8635	1.6285	0.0941	0.0244	81.7977	0.1890
THOG	1	19.1757	2.9076	1.4226	1.6266	0.2222	0.1579	0.6161	73.8712
	10	19.1406	3.1575	1.5578	1.6144	0.2452	0.2165	0.6125	73.4556
	20	19.1405	3.1576	1.5578	1.6144	0.2452	0.2166	0.6125	73.4555

The CHOG, INOG, SKOG, MLOG, PKOG, PHOG, TWOG, and THOG represent oil sector indices of China, India, South Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand. An optimal lag length of 1 is selected using AIC (Akaike Information Criterion) to run FEVD in VAR Model. The shaded cell represents domestic innovation and un-shaded cells pictures out foreign innovative shocks. Systematic corresponding order (CHOG, INOG, SKOG, MLOG, PKOG, PHOG, TWOG, and THOG) followed for FEVD analysis

China, Pakistan, and the Philippines are most exogenous markets with almost more than 90% of its variation accounted from its own shocks. For instance on a 3-days horizon, about 97.9650%, 97.2484%, and 93.5402% variations in these markets explained by its domestic innovations and meagrely 2.035%, 2.7516%, and 6.4598% are transmitted from foreign shocks. Therefore, it offers portfolio diversification opportunities. At the next level, India, Malaysia and Taiwan oil sectors are also self-dependent on its own innovative shocks of about more than 80% for a 1-day, 3-days, and 10-days horizon. However, it is also evident that around 20% of its market movement driven by foreign market shocks with a sizeable contribution of 22% (South Korea) and 27% (Thailand). China and India perform an influential role over other regional markets.

5. CONCLUSION

The oil sector indices linkages of eight Asian emerging markets, viz. China, India, South Korea, Malaysia, Pakistan, Philippines, Taiwan, and Thailand examined to identify the reward of portfolio diversification in this region. The sample data period from January 01, 2004, to August 31, 2019 analyzed using Correlation test and VAR based Causality/Block Exogeneity Wald test and FEVD analysis. The result of the Correlation test showed a positive but not strong association between oil sector indices returns. From the causality chain, out of 56 Chi-square statistics coefficient, only 23 (41.07%) parameters are significant. The result suggested that short-run causality linkages between Asian emerging region oil sectors are considerably limited. With an exception of Thailand and

South Korea, FEVD analysis exhibited all other markets oil sector are mostly driven by domestic innovative shocks. The findings of this study provide significant implications to the investors and portfolio managers while designing asset allocation and portfolio diversification strategies. Asian emerging markets oil sectors would be a great platform for the investors to reap diversification benefits since the oil sector indices of this region exhibited a weak form of linkages.

REFERENCES

Ahmed, W.M. (2016), The dynamic linkages among sector indices: The case of the Egyptian stock market. International Journal of Economics and Finance, 8(4), 23-38.

Ali, M., Azmi, W., Khan, A.P. (2019), Portfolio diversification and oil price shocks: A sector-wide analysis. International Journal of Energy Economics and Policy, 9(3), 251-260.

Balli, F., Balli, H.O. (2011), Sectoral equity returns in the Euro region: Is there any room for reducing portfolio risk? Journal of Economics and Business, 63, 89-106.

Cao, D., Long, W., Yang, W. (2013), Sector indices correlation analysis in China's stock market. Procedia Computer Science, 17, 1241-1249.

Dickey, D.A., Fuller, W.A. (1979), Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74(366), 427-431.

Garg, A., Chauhan, A. (2012), The Impact of the developed world on the Indian industrial portfolios return: Empirical evidence. The IUP Journal of Applied Finance, 18(1), 36-59.

Guntur, A.R., Velip, S.P. (2019), Stock market integration: A review of literature from a global perspective. The IUP Journal of Applied Finance, 25(3), 67-135.

Gupta, R., Basu, P.K. (2011), Does sector diversification benefit all markets? Analysis of Australian and Indian markets. Asia Pacific Journal of Economics and Business, 15(1), 15-25.

Meric, I., Ratner, M., Meric, G. (2005), Co-movement of the world's sector index returns. International Journal of Finance, 17, 3376-3391.

Meric, I., Ratner, M., Meric, G. (2008), Co-movements of sector index returns in the world's major stock markets in bull and bear markets: Portfolio diversification implications. International Review of Financial Analysis, 17, 156-177.

Phylaktis, K., Xia, L. (2009), Equity market comovement and contagion: A sectoral perspective. Financial Managemen, 38(2), 381-409.

Shahani, R., Talwar, A., Gupta, S. (2017), Dynamics of the co-movement of the returns of the sectorial stock indices of India, US and European economies. The IUP Journal of Financial Risk Management, 14(3), 8-21.

Sharma, P. (2011), Asian emerging economies and United States of America: Do they offer a diversification benefit? Australian Journal of Business and Management Research, 1(4), 85-92.

Singh, G., Singh, P. (2010), Chinese and Indian stock market linkages with developed stock markets. Asian Journal of Finance and Accounting, 2(2), 21-39.

Soekarno, S., Setiawati, M. (2020), Do various sectors respond to oil price shocks? New evidence for Indonesia as emerging market. International Journal of Energy Economics and Policy, 10(4), 371-376.

Vardar, G., Tunc, G., Aydogan, B. (2012), Long-run and short-run dynamics among the sectoral stock indices: Evidence from Turkey. Asian Economic and Financial Review, 2(2), 347-357.

Vardhan, H., Sinha, P., Vij, M. (2015), Behavior of Indian sectoral stock price indices in the post subprime crisis period. Journal of Advances in Management Research, 12(1), 15-29.

Wang, Y., Liu, L. (2016), Spillover effect in Asian financial markets: A VAR-structural GARCH analysis. China Finance Review International, 6(2), 150-176.